

YOUNG MAN'S

BEST **COMPANION**;

OR.

SELF INSTRUCTOR:

CONTAINING

READING, WRITING, AND ARITHMETIC,

IN AN EASIER WAY THAN ANY YET PUBLISHED ; With Instructions to qualify any person for Business without the help of a Master,

Merchants' Accompts, Book-keeping,

Method of Measuring Carpenters, Joiners, Bricklayers, Plasterers, Plumbers, Masons, Glaziers, Painters' Work, &c.

AND THE MODE OF UNDERTAKING EACH WORK. AND AT WHAT PRICE :

auging, Dialling, Dying, Colouring, and making Colours, * Likewise a Description of

ENGLAND AND WALES,

eneral Observations on Gardening for every Month in the Year; To which is added,

A TREATISE ON SHORT-HAND. (A)

Sciences of Geography and Astronomy,

Containing

A BRIEF DESCRIPTION OF THE DIFFERENT PARTS OF THE EARTH. A SURVEY OF THE CELESTIAL BODIES, &c.

And an introductory

ESSAY ON THE IMPORTANCE OF KNOWLEDGE.

BY DR. PARK INS.

Of Little Grimsby, Lincolnshire,

AUTHOR OF THE CABINET OF KNOWLEDGE, Ed.

LONDON: PRINTED FOR THOMAS TEGO No. 111, CHEAPSIDE, And sold by Messrs. Duncans, Glasgow, and Mr. Sutherland, Edinburgh. 1811.



Published by Thomas Tegg. m. Cheapside, March 1-1811



INTRODUCTION.

ON 1HB

IMPORTANCE OF KNOWLEDGE.

"I have often, of late, reflected what an unhappy man I must have been, if I had not acquired in my youth some fund and taste of learning. What could I have done with myself at this age without them? Let me therefore most earnestly recommend to you, to hoard up, while you can, a great stock of knowledge; for though, during the dissipation of your youth, you may not have occasion to spend much of it, yet you may depend on it, that a time will come when you will want it to maintain you."

Ŷ,

LORD CHESTERFIELD.

IN presenting this work to the public, the experience of nearly a century supercedes the necessity of our eulogiums on its contents, and has stamped its importance and usefulness with the sanction of its approbation. We shall therefore only, in these introductory pages, endeavour to impress the youthful reader with a due sense of the importance of acquiring knowledge in general, and particularly such as may be attained by the study of

INTRODUCTION.

this volume, by exhibiting a brief sketch of those subjects which occupy its pages.

It must not be expected that in them should be found a complete circle of the Sciences; or that any authors, now deservedly esteemed, should be rejected to make way for what is here offered. It was intended, by the means of these precepts, not to deck the mind with ornaments, but to protect it from nakedness, not to enrich it with affluence, but to supply it with necessaries. The inquiry therefore was, not what degrees of knowledge are desirable, but what are in most stations of life indispensably required; and the choice was determined, not by the splendour of any part of literature, but by the extent of its use, and the inconvenience which its neglect was likely to produce.

I. Reading and Spelling.

e,

The prevalence of this consideration is shewn in the first part of our work, which is appropriated to the humble purpose of teaching to READ and SPELL;—a task of little magnificence, but of great importance, inasmuch as it is the root from whence all our acquirements in literature spring, and is equally useful to the highest and lowest as a preliminary step to the acquisition of general knowledge.

II. Language.

The principles and distinguishing features of language render it a subject of pleasing and useful in-

quiry; it is the general vehicle of our ideas, and represents by words all the conceptions of the mind. Books and conversation are the offspring of this prolific parent. The former introduce us to the treasures of learning and science, and make us acquainted with the opinions, discoveries, and transactions of past ages; by the latter, the general intercourse of society is carried on, and our ideas are conveyed to each other with nearly the same rapidity with which they rise in the mind. Language, in conjunction with reason, to which it gives its proper activity, use, and ornament, raises man above the lower orders of animals; and, in proportion as it is polished and refined, contributes greatly with other causes to exalt one nation above another in the scale of civilization and intellectual dignity.

Thus duly impressed with the importance of a knowledge of language, we have endeavoured to present the student with a concise view of English Grammar, and exhibited such rules as, by attention, we flatter ourselves he may be enabled to write and speak the English language with purity, perspicuity, and elegance; and also gain an introduct on to those general principles of grammar that may lay a foundation for his future progress in classical literature.

III. Letter-Writing.

The importance of writing Letters with propriety justly claims to be considered with care, since, next to the power of pleasing with his presence, every man would wish to be able to give delight at a distance. This is also a talent which unavoidably is called for almost every day of one's life, as well on business as on pleasure. We have therefore selected such models for imitation as we trust will enable the student to form a correct idea of the epistolatory style, and which may be useful to him in transacting the general business of life.

IV. Arithmetic.

This art, from its obvious utility, commenced in the earliest state of society, and received gradual improvements as commerce was advanced and the sciences were cultivated. It is cultivated with sufficient diligence by those whose occupations render it their interest to be expert in the application of its rules. To the merchant and the banker it is indispensably necessary, and to all ranks in society, from the peasant to the peer, it is highly useful. From the first entrance of a young man into society, he will find the advantage of keeping some account of what he receives and pays, as he may reap the double advantage of securing himself from the impositions of the fraudulent, and from the folly of spending more than he can afford. This practice may give a check to his expenditure, suggest to him the propriety of not exceeding his income, and put it in his power to be generous as well as just. Thus economy, produced by regularity of accounts, may be the parent of beneficence. Such a habit of regularity is far from being inconsistent with the liberal notions of a gentleman, although not reconcileable to the heedless extravagance of the spendthrift. The observation of every day proves its utility in every situation of life; and without the constant comparison of receipts with payments, communities as well as individuals must eventually be involved in embarrassment. It can never be ne-

1

ð

ģ

b

ŧ

gleated except by those who are determined to proceed blindly and inconsiderately to certain distress and ruin.

Arithmetic is the measure of almost every thing valuable. It is not only the indispensable guardian of private accounts, but the guide to political knowledge, as to the population, revenues, balance of trade, coinage, and military power of nations. Dr. Johnson well observed, "that nothing amuses more harmlessly than computation, and nothing is more often applicable to real business or speculative inquiries. A thousand stories, which the ignorant hear and believe, die away when the computist takes them within his grasp. Numerical inquiries give entertainment in solitude by the practice, and reputation in public by the effect."

V. Geography.

Without a knowledge of this branch of science, no reader can have a clear idea of the scene where any occurrence takes place, but is liable to the grossest mistakes by confounding one part of the world with another. It is equally applicable to modern as to ancient history, and introduces the pleasing combination of the ancient and modern nameof places, and the characters and manners of the different inhabitants. It assists the memory by the associations of ideas which it suggests, and the prospect of a country represented by a map or a globe, recals to mind the memorable deeds which have been performed in it, as well as its illustrious men.

Persons in various situations of life are interested in the study of geography, and may reap advantage from its cultivation. While it constitutes a branch of knowledge essentially necessary for the traveller, the merchant, and the sailor, it furnishes abundant stores of investigation to the naturalist and the philosopher. It is not only requisite for every reader of history, but for every one who peruses the daily accounts of the events which are taking place in various parts of the world, whether they are the seats of war or of commerce. It has long been considered as a material branch of a polite education ; at present indeed it is more particularly requisite that it should be so, as the British commerce and colonies extend our connexions to so many different countries, and as many voyages of discovery have of late years been made.

VI. Astronomy.

This science is, of all others, both the most sublime, the most beautiful, and the most interesting; for there are no persons, of whatever age, to whom the heavenly bodies are not objects of curiosity. The certain principles upon which it rests are proved by the calculations of eclipses; as the astronomer can determine not only that the luminaries of day and night will be darkened, but he can pronounce with certainty at what particular point of time, and to what particular extent, such obscurations will happen, and exactly how long they will continue. Some parts of astronomy are so useful to mankind, as to make the cultivation of it highly necessary; accordingly we find traces of it among all nations. By its assistance, geographers are enabled to ascertain the true figure and size of the earth, and the situations and extent of countries; chronologists can compute the measure of the year, and naviga-

a

viii

tors can determine the longitude of places, and direct their courses through the trackless and stormy ocean with correctness and safety.

VII. Geometry and Mensuration.

On the usefulness of these branches of science it is unnecessary to expatiate in an age when mathematical studies have so much engaged the attention of all classes of men; we have therefore only to observe, that in this part of our work, simplicity and a desire to render easy of comprehension the sublime principles of these branches of knowledge, have been what we have chiefly aimed to accomplish.

VIII. Stenography or Short Hund.

A brief sketch of this art, which has of late oceupied the attention of the most ingenious of our countrymen, also forms a part of this volume. Our study has been, in the outline we here give of this useful art as well as polite accomplishment, to render it simple and easy of practice, so that the writer, by attention to the principles laid down, may at his pleasure, with facility, follow the words of the public orator, take down his speech, preserve the debates of the tribune, or follow the professor of science through his elaborate discourses.

Besides these interesting subjects, the clucidation of which forms a portion of these pages, there are added, Instructions for the conducting of Business in general; also the best method of Book-keeping, Merchants' Accounts, &c. &c.

i¥.

Having thus exhibited to the young student the useful materials of which our Book is composed, it remains now only for us to impress on his mind the necessity of diligent application, without which he can never acquire knowledge, nor attain any object of his pursuit, however trifling it may be, much less when he aspires to the information that may be gleaned from this work. Consider, then, that idleness is the parent of every vice; but welldirected activity is the source of every laudable pursuit and honourable attainment. It is peculiarly adapted to the frame and constitution of youth, promotes good humour, and is conducive to health. Indolence and inactivity are no less subversive of every purpose of mental improvement, than of the general happiness of life. An idle boy will gradually lose the energy of his mind, will grow indifferent to the common objects of pursuit, except such as stimulate his passions; and when he advances in life, he will with difficulty be prevailed upon to make any important exertion, even for the promotion of his own interest, and much less for that of his friends. The character of a sluggardof him who loses the pleasant, the healthy, and the precious hours of the morning in sleep, and the remaining part of the day in indolence, is justly reputed contemptible. While his powers of mind remain torpid, the diligent applies his activity to the most useful ends. His steps may not be uniformly rapid, or his actions always conspicuous; he may not attract the gaze of mankind, or move in the circle of fashionable levity and dissipation; but you may observe, that by habitual dexterity of conduct, and the practice of business, he is quali- ; fied to meet the difficulties and fulfil the duties of any situation in which he may be placed; and you will frequently see him, by his unremitting perseverance, acquire objects of fortune, distinction, and

t

ľ,

honour, which men of unimproved talents very rarely, if ever obtain. 3115249

1.11.12 1.2

INTRODUCTION. C. CONTRO PORTA

-m. 45. 15

If you take an extensive survey of the world, you may remark, that nothing great or laudable, nothing splendid or permanent, can be effected without the exertion of diligence. Are not the treasures of fortune, the fruits of industry, the acquirements. of learning, and the monuments of glory, to be referred to its animating influence? Behold the student engaged in poring over the volumes of knowledge by his midnight lamp, and stealing his hours of study even from the season of repose ; behold the peasant roused by the dawn of the morning to pursue his daily toils along the furrowed field; repair to the manufactory of the artificer, and, amid the various divisions of labour, observe with what alacrity all the sons and daughters of industry are plying their incessant tasks; or visit the crouded haven, where the favourable gales call the attention of the vigilant mariners; and you will remark, that the whole scene is life, motion, and exertion. In these various situations, in every nation of the globe, from the ardent and enterprising sons of Britain, to the myriads who people the empire of China, you may observe, that the principle of diligence, like the great law of creation, which causes the planets to perform their invariable revolutions, pervades each busy scene, and throughout the universe actuates the race of men for some useful purpose.

Finally, reflect that time pursues his flight on rapid wings; and that the hours of youth, like the waters of an impetuous stream, roll on never to return. You must be sensible that the portion of life appropriated to your education, is not, if duly considered, a season for pleasure and pastime alone; that the days will come, when the engagements of the world will allow you little leisure to increase your stock of knowledge by study, and to improve, by regular application, those talents which Providence has committed to your care, for the use of which you are accountable to conscience, to society, and to Heaven; from the abuse and neglect of which will spring deep regret and unavailing sorrow; but from their cultivation will arise the delight of a self-applauding mind, and the respect and honoar of the virtuous and the wise.

E

1 .

and the set of the

Charle and a

and the state of the

• • •

•>. :..

. 1

Digitized by Google

. · · · · · ·

1.44

. . .

TABLE OF CONTENTS.

97

•••••••••

	· · · · ·	
••• • • • • • • • • • • • • • • • • • •		
		•
Marge for on a second	Po Po	ige
ENGLISH GRAMMAR		1
Use of Letters, Vowels, Consonants, Diphth	iongs; their Num-	••
bers, how pronounced and written		ib.
Of Letters Great and Small, and when to be	used	.2
Observations concerning the Sound of Let	ters, and which are	
omitted in Pronunciation	••••••	3
Of Syllables and the Art of Spelling		8
Some particular Notes	•••••	ib.
Of Stops, and other Marks, used in Reading :	and Writing	19
Directions to Read wi h Elegance and Propri	ety •••••	22
Of Words	• • • • • • • • • • • • • • • • • • • •	ib.
Names	••••••••	ib.
Qualities	••••••	23
Of Affirmations or Ve, bs	•••••	24
Of Persons	••••••	ib∙
Of Moods	•••••	25
Of Tenses	••••••	ib.
Of Regular Verbs		ib.
Of Participles	••••••••••••	27
Of Adverbs	• • • • • • • • • • • • • • • • • • • •	ib.
Of Conjunctions—Prepositions	•••••	28
Of Sentences	•••••••••••••••••	29
Of Abbreviations		30
Directions to Beginners in Writing		32
Familiar Letters on v arious Subjects		38
Snperscriptions		43
Of Secret Writing	***************	4 I
ARTFULLETTO		12
Of Notations and Numeration	4 1 0	42
Namerical Latters - a a survey and the state of the		73
Addition		44
		70 47
Avoirdunoise Weight		40
Troy Weight		17

CONTENTS.

·	Page
Tables of various Measures	5¥
Substraction	53
of Money	55
Multiplication	56
Compound	60
of Money	68
Division	74
Reduction	81
Ascending	- 25
Rule of Three	J 99
Double Rule of Three Direct	IOL
Reverse	103
Practice	112
are and Trett	115
Practions Vulgar and Declinar and the second and th	** 3".
BOOK-KEEPING	Į26
Waste Book-lournal-Ledger described	127
Entry	128
Receipts	J37
Promissory Notes	139 ·
Bills of Parcels	ु14∎
Bills of Exchange ••••	347
Indorsing and Protesting of	J49
Bills of Lading, Form of	350
Wharfage and Lighterage	455
Constant of the second s	956
MENSURATION	Ϋ́ıb.
Of Planes and Solids	46r
Directions for Joiners, Fainters, Glazers, essi-	964
Painters Prices	165
. Joiner's diffo	167
SE Sawyers: WORK.	169
Bricklayers ditto	171
1 Slaters and Plasterers Work and Processing and 17 1990	172
Masons anto Altra Market Mar	1.178
Plumbers ditto	074
Land Measure	476
To reduce Statute to Customary income	A77.
Solid Measure	
64	• \
the second second second second second second	

ţ

Ì

vi.

.

CONTENTS.

	Page
Solid Measure of Timber	179
of a Globe, &c. with Examples	183
Regular Figures	180
Of Circles	187
To measure a Cube, or a Cone	192
a Pyranud	10.
GAUGING, Rules and Examples in	193
EXTRACTION OF ROOTS	198
Examples of the Square Root	ib.
Cube Root	202
Application of the Square and Cube Roots	iķ.
GEOMETRICAL PROBLEMS	210
Line of Chords, how to make	213
INSTRUMENTAL ARITHMETIC	214
Carpenters' plain rule	· ih.
- Gunters' Line	210
Coggeshall's Sliding Rule	218
CEOGRAPHY.	2.20
'Mariners' Compass	225
Table of Climates	
FLIDOPE	
Spain and Portugal	
France	2.20
Germany	· 23A
Austrian Dominions	· 235
Switzerland	۰jb.
Denmark and Norway	• ib.
Sweden	• 236
United Kingdom of Great Britain, &c.	· 237
ASIA	• 249
AFRICA	• 249
AMERICA	, ib

Digitized by Google

vii.

CONTENTS.

i

	Page
ASTRONOMY	
Copernican System	••••••••••••••••••••••••••••••••••••••
Solar System, Laws of	
Fixed Stars	
Constellations	••••••
DIALLING	
Quadrant, Description of	
Dial, Horizontal	
Erect South	
Erect North	-/-
	/+
COLOURS and DYING	275
OF MONEY	278
Table of Stamps	
Gold and Silver. value of	
Table for buying and selling	ib-
Tables of Interest	
Mercantile Memoranda	
Bonds, Bills, Indentures, &c	
Letter of Attorney	
Will form of the	
Codicil to be accounted as the	280
OF GARDENING	
- · · · · · · · · · · · · · · · · · · ·	

Digitized by Google

.

vii.

INSTRUCTIONS FOR YOUTH,

TO SPELL, READ, AND WRITE

TRUE ENGLISH.

THE USE OF LETTERS; WHICH ARE VOWELS AND WHICH CONSONANTS; WHAT DIPHTHONGS ARE, THEIR NUM-

BER, AND HOW PRONOUNCED AND WRITTEN.

THE design of this book being to instruct mankind, especially those who are young, in the methods of conversing and transacting business in the world; therefore those accomplishments of spelling and writing good and proper English claim the first notice; for let a person write ever so good a hand, yet if he be defective in spelling he will be ridiculed, and held in contempt, because his writing fair will render his orthographical faults more conspicuous.— Therefore,

First, Syllables are made of letters, words of syllables, and sentences of words, &c.

There are twenty-six letters; viz. a, b, c. d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, and z. In these tetters we are to observe their names, their form, and their force: their names, by which to know them; their form, whether great or small; their force, in pronunciation or niterance.

Letters are distinguished, according to their sound, into vowels and consonants: a vowel is a letter that soundeth by itself, and these are six in number, viz. a, c, i, o, u; y is also an English vowel, when it cometh after a consonant, and hath the sound of i; as in by, sly, reply, syllable, &c. but the y is never used in words not derived from a foreign language, otherwise than at their end. A consonant is a letter that bath no sound except it be joined with a vowel, for without one of the vowels no syllable can be made; as b, c, d, &c. without the aid of a vowel, cannot be sounded. B Though

Though we have twenty-six letters, and six of them rowels, yet we have twenty-one commonants; for n, when set before any rowel in the same syllable, becomes a consonant; as in youth, youder, beyond, &c Note, that j hath the sound of g, as in join, jingle, &c. W is a vowel at the end of a word, as law, now.

When two vowels come together in a syllable, and are not parted in the pronunciation, but united in one sound they are called *Diphthongs*; of these there are thirteen, viz. ai, ci, oi, au, cu, ou, ce, oo, ea, co, ou, and ie j as in maid, faith, either, join, aul, cunuch, stout, feed, seed, food, broad, stealth, wealth, people, steeple, boat, oat, heat, beat, feat, friend, field, &c. Note, In the first seven words both cowels are sounded i but in the other fifteen, one of them is scarcely heard.

There are also those that are called *Tripthongs*, where three vowels meet in one sound, as in *beauty*, *beau*, *lieu*, and *quaint*: Likewise ay, oy, uy, aw, cw, and ow, become Diphthongs at the end of words, but are called *improper* Diphthongs; as in say, key, joy, saw, bow, &c. Note, aw, ew and ow, are commonly sounded as au, eu, and ou.

OF LETTERS GREAT AND SMALL, AND WHEN TO BE USED.

Great Letters are not to be used in the middle or latter end of a word, except the whole word be so written, as in JEHOVAH, LORD, or titles of books, &c. For it would be very absurd to write thus: To Mr. geoRge RoGeRs, in thaMES street; instead of, To Mr. George Rogers, in-Thames-street.

Great Letters are to be written at the beginning of sentences: as, Know when to speak, and when to be silent.

At the beginning of all proper names of places: ships, rivers, &c. as, London, the Luon, Thames, Severn: Also the Christian names and surnames, of women and men must begin with great letters; as, Samuel Sharp.

At the beginning of the more eminent words in a sentence as, Faith is the Foundation of the Christian Religion; or, if a word that we have a particular regard or determed for, as, God, Christ, King, Queen, &c. At the beginning of every line in poetry; and at the beginning of the names of arts, sciences, and trades; as, Writing, Arithmetic, Geometry, Music, Carpenter, Smith, &c.

Digitized by Google

2

German Text Aabcdeffahijklim nopgresstuvwxyzz TO DEFE C MAR MOLE E ST SH Parietn is the eauty of the World Digitized by Google



The ALPHABET in the SQUARE HANDS. SquareText. Secretary. SquareText. Secretary. Haa Aaa In 21m 366 2366 000 0000 Cccc Cttt ppp Pipp D88 238 Qqq 299 Eeee Eeee Rir REAF fff fffff Ggg Ggy \$65 \$ Stoos TEH TH 566 Lohb Vu Duo Jin Juni 21/10/21/10 RFR Lakf Xxx Xxx SPPP LIPP Ppp yyy Mim Wim 333. 33C.

à 5 ţ ¢ Digitized by Google

Yo learn round Hand without a MASTER. Hrite each Article on this and the following hage forty times over in a Copy Book rule with double Lines. shocadqjeglbh rfknm's fstud VI NOX X Y Y Z Z & // am om om din om fm gm hm'un km lm nm om fin gin m fm sm lm um WIN XIII YIII ZIII &C 1231507890.



THE Alphabet, **ROMAN** and ITALIC dracters Nº Roman Italic. No Roman. Italic. Nn Aa N A T a XIV n b B b B O_{0} XV 0 0 I Cc C C Р XVI Ш p p Dd D d Qq 0 IV XVII 9 R F E e R e r XVIII r V ſs S F f F S (s VI XIX G G XX t t VII ø Hb XXI 1 u U VIII i XXII V 7) IX 7 Ww 20 XXIII X k XI XXIVX X Xx 180 LI XXV Y Y y XII V Mm MmxxviZ z XIII Z Google



Note, The personal pronoun I, and the interjection O, must always be written in cupitals; for it is ridiculous to write thus: On Monday last i came to your house, but you were not at home; o how much it grieved me!

The small letter s is commonly written f at the beginning and in the middle of a word, and s at the end; but if two of them come together in the middle of a word, they may be written thus, ss or fs.

OBSERVATIONS CONCERNING THE SOUND OF LETTERS, AND WHICH ARE OMNITTED IN PRONUNCIATION.

A is not sounded in *Pharaoh*, nor in *Sabaoth*, but as if written *Pharo*, or *saboth*; neither in *marriage*, but as *mar-rige*; also, *parliament* as *parliment*, and *chaplain* as *chaplin*. &c. In some proper names it is dropped in the pronunciation; as in *Aaron*, *Isaac*, *Canaan*, *Balaan*; which are pronounced as if written. *Aron*, *Isac*, *Canan*, *Balam*; but we must except *Ba al* and *Ga-al*. *A* is sounded broad, like *aw*, in words before *ld* and *ll*; as in *bald*, *scald*, *hall*, *wall*, *fall*.

B is not sounded in thumb, dumb, plumb, lamb, doubt, debt, subtle, &c. but sounded as if written, thum, dum, plum, lam, dout, det, suttle, &c.

C is sounded hard like K, before a, o and u, and before land r; as in these words, cane, came, comb, cub, clay, crane, crab; and soft in cement, city, and tendency. C loses its sound in scene, science, and victuals; likewise in indict, indictment; also before k, as stack, rack, stick, thick, brick. In words of Greek and Hebrew derivation C is sounded like K, as in sceptic, Cis, Aceldema, &c.

Ch are sounded like K in many foreign words, some of which occur in the holy scripture; as in chorus, Chyinis', Chrysostom, Christ. In the word schism, the sound of ch is. lest, it being sounded as if it were sism; and in the words Rachel, Cherubim, and Archbishop, it is sounded in the English manner. Ch in French words sound like sh, as in chevalier, pronounced shevalier; mareschal, marshal; machine, masheen; capuchin, capusheen; chaise, shaize.

D is not sounded in *cibband*, nor in *Wednesday*, which are pronounced *ribbon* and *Wensday*; the termination *ed* is often shortened into *t*; as *burned*, *burnt*; *choked*, *chok!*; *ripped*, *ript*; *passed*, *past*; *choped*, *chopt*; & c.

B 2

E is

E is not sounded in hearth, &c. E final is that placed at the end of a word; and is seldom heard but in Monosyllables, as in me, he, she, ye, the, &c. where it hath the sound of ee: and in words derived from foreign languages in which e has its perfect sound; as Jesse, jubilee, Mamre, Ninere, Candace, Clue, Unice, Penelope, Salmone, Phebe, epitome, catastrophe, Gethsemane, simile, præmunire, &c. In all other cases e final serves only to lengthen the sound, and to distinguish it from other words of a different meaning, which are written without e, and are sounded short; as in these examples following, viz. cane, can; hate, hat; bite, bit; fare, fur; hope, hop; made, mad; scrape, scrap; stare, star; tune, tun; write, writ, &c. In words of more than one syllable it strengthens the sound of the last syllable, hut does not increase the number of syllables; as admire, demise, blaspheme, &c. E lengthens the syllable also in some foreign words, such as Eve, Tyrc, Crete, ode, scheme. E is seldom written after two consonants; as in pass, turn, black. Yet after rs it is used as horse, nurse, purse. Also the words ending in cre, gre, and tre, sound the e before the r, as in these words, acre, lucre, centre, sepulchre, mitre, Instre ; which are sounded as if written aker, luker, center, seputcher, mitcr, and luster, E final also serves to soften c and g, as in ace, place, lace, spice, truce, oblige, huge, age, &c. If nouns in e final take s after them, with an apostrophe before it, it stands for his, as the Pope's eye, or the eye of the Pope, the table's foot, or the foot of the table. If without an apostrophe, it makes the plural number, as Pones, tables, Words derived from those written with e final seldom retain it, as in writing, loving, doing, &c. not writeing, loveing, or docing ; except in the termination ge and ce, before able, as in changeable, peaceable, &c.

E should not be written after a diphthong in these words; vain, main, gain, fear, know, &c. not vaine, maine, gaine, &c. E final is annexed, but not sounded, in those words which would otherwise end with i, o, or u; as in die, foe, sloe, true, virtue, &c. but there are some exceptions, as do, so, to, &c.

Lastly, there are some words in which the final e does not lengthen the sound, as give, live, some, one, done, & c.

F in plurals is changed into v; as wife, wires; staff, stares; knife, knires.

G is not sounded in sign, reign, gnaw, gnat, assign, design, seignior, seraglio, phlegm, &c. G is sound d soit

in

in gender, ginger, and gipsey; but hard in Gibeon, Giberah, Gibboa, Geth-se-mane; and hard also in these proper names, Gibson, Gilman, and Gilbert; and likewise in these words, gelt, geld, girt, gimp, geese, gander, gamble, gather, gild, &c. Observe, that if g be hard with a long vowel, ue is joined and pronounced in the same syllable; as in plague, Prague, Hague, rogue, league, dialogue, catalogue, &c.

Gh in the end of some words, where au or ou goes before, hath the sound of ff, as in tough, rough, cough, laugh, sounded as tuff, ruff, coff, laff; but buff, cuff, snuff, and huff, must be so written—Gh is not sounded in mighty, though, through, daughter, and Vaughan,

H has place, but no sound, in chronicle, Christ, ghost, John, Rhine, schedule, and schism, &c. H is not sounded at the end of words if it be along, but with to before it, it is sounded as snutch, watch, &c.

I is not sounded in adieu, juice, renison, fruit, bruise. Salisbury; it is sounded like ee in oblige, mugazine, and machine, &c. I is sounded long in proper names ending in iah, as Jeremiah, Hezekiah; but short in A-ri-el, and Miri-am.--I is sounded like u in first, dirt, bird, &c.

K is nearly allied in sound to c, but to know when to use one, and when the other, Note, that c has the force of k only before a, o, oo, and u, and these two consonants l and r; and therefore we must not write kare for care, kow for cow, hrown for crown: and the use of k is only before e, i, and u; wherefore we must write keep, key, knight, kill, not ceep, cey, cnight, nor cill. But the words calendar and Catharine, are written sometimes kalendar or Katharine, K is written after c only in pure English words, such as back, deck, sick, &c. for the best authors have omitted it in words derived from the Greek and Latin, such as public, music, physic, &c.

L is not sounded in calf, half, chalk, stalk, walk; those words being pronounced as it written caff, haff, chauk, stauk, wauk. Neither is l sounded in Holborn, Lincola, salmon, or chaldron; these are sounded as if written Hoborn, Lincon, sammon, chadron; nor in colonel, where the first l has the sound of r, as cornel.

In the word accompt, mp is sounded like un.

N is scarcely heard in autumn, lime-kiln, solemn, limn, hymn, column, and condemn.

B 3

0 is

O is not sounded in people, feoffe, righteous, jeopardy. O sometimes sounds like uo, as in doing, moving, proving, &c. O is sometimes sounded like i, as in xomen, pronounced wimmin. And sometimes O is sounded as u, as in money, conduit, conjure, attorney, Monmouth, as if written muniky, cunduit, cunjure, atturney, Munmuth, &c. and it is sounded like uo, in do, to, prove, move, &c.

P is written, but not sounded, in *empty*, presumptions, plasm, and symptom, &c.

Ph have the sound of f, when together in one syllable; as in philosophy, physician, Asaph, and Elephant; but we must not write filosophy, fisician, Asaf, or Elefant.

After Q always follows u in all words; and in some French and Latin words they have the sound of k; as in risque, liquor, catholique, conquer, masquerade, chequer; promounced as risk, likker, catholie, &c. to which add oblique, relique, antique, &c. which are sounded as if written oblike, relik, anteke, &c.

S is not sounded in *island*, viscount, isle, and *Insle*; which are pronounced as if written *iland*, viccunt, ile, and *Lile*.

Ti before a vowel or a diphthong have the sound of si or shi, as in patience, dictionary, oblation, nation, translation; except when s goes just before it, as in these words, question, fustion, bastion, combustion, celestial, &c. But in some words of Hebrew and Greek, it retains its natural sound, as in Shealtiel, Phaltiel, and the like; and in the English derivatives mightier, emptier, pitiable, &c.

U is sounded like e in bury, berry; like i in busy, bizzy. U is sometimes written after g without being sounded, as in guide, guard, &c. It is also silent in the words buy, built, conduit, circuit, labour, favour, honour, &c. but it is sounded in others; as anguish, langwish, Montague, &c.

II is not sounded in answer, sword, &c. neither is it heard before r in wrap, wrath, wrong, wretch, wrangle, wriggle, &c. IVh belongs to words purely English; as what, when, where, and wheel.

X is sounded as z in Xenophon, Xerxes, Xenocrates, and Xantippe.

Y is either a vowel or consonant, as hinted before: a vowel in my, by, fly, thy. In derivative English words, having the termination ing, y is used in the middle of the word, as in buying, dying, burying, marrying, &cc.

The diphthongs ai and ay have the sound of a in air, fair, pair, may, stay, play; but a is lost in Calais (a town in France)

6

and pronounced separately in Sinia (a mountain in Arabia.)

Ei and ey are sounded like a in eight, streight, neighbour; heir, veil, and convey; like e in key: and like i in sleight.

Oi and by have a sound peculiar to themselves; as in oil, and byster.

Au and aw commonly keep a proper sound as in augur, daw, saw, &c. but u is lost in aunt and gauger, being sounded as ant and gager; they make no diphthong in Em-ma-us, and Ca-per-na-um.

Eu and ew have a united sound in most words, as in eunuch, brew, new, grew, but eu is no diphthong in Zac-cheus, and Bar-ti-me-us.

Ou are expressed in foul, proud, loud; and ow in how, cow; and now; but ou sounds like oo in soup.

Ee is no diphthong in *Be-er-she-ba*, and in words beginning with *re*, or *pre*; as *re-en-ter*, *pre-e-mi-nence*; in *Beel-ze-bub* one of the *c*'s is not sounded.

Oo is properly sounded in cool, fool, pool, root, and tool, but have the sound of u in foot and sout; they make no diphthong in Co os, co-ope-rate, &c.

Ea sound like e in sea, pca, rcam, seam, bread, head, lead, dcad, leather, feather, heaven, leaven, and creature; it is no diphthong in Ce-sa-re-a, i-de a, re-al, be-a-ti-tude, cre-a-tor; nor in words beginning with pre, as pre-am-ble, &c.

Eo is no diphthong in dun-ge-on, hi-de-ous, me-te-or, pi ge-on, the-o-ry, &c.

Oa are sounded as o in goat, boat, coat; and sounded broad, as au, in broad and groat, but are no diphthong in Go-a, (a city in India) or in the Hebrew word Zo-ar, and Gil-bo-a.

Ie before a single consonant sound like ee, as in brief, chief. and thief; but if before two consonants, sound like c, as in friend, field; but at the end of English words the e is, not heard, as die, or lie; are no diphthong in A-bi-e-zer, E-li-e-zer; nor in the English words car-ri-er, clo-thi-er; nor in words derived from the Latin, as cli-ent, o-ri-ent, qui-ct, and sci-ence.

Ui are sounded as u, in juice, fruit, and suit; but u is lost in con-duit, built, and guise, and are no diphthong in je-su-it, ge-nu-ine, and fru-i-tion.

E and *E* are not English diphthongs; they are used in *Esop*, *Casar*, *Edipus*, and sound like *c*; but in common words they are neglected, as in *equity*, *female*, and *tragedy*, though derived of *aquitus*, *famina*, and *tragadia*.

Of

OF SYLLABLES AND THEIR D. VISIONS, BEING THE ART OF SPELLING.

A Syllable is a sound pronounced by a single impulse of the voice, as vir-tue, so that virtue being thus divided, or taken asunder, makes two syllables, viz. vir and tue; which put together, form the word virtue. And many times a vowel, or a diphthong of itself makes a syllable, as in a-bate, e-ve-ry, i-dle, and in aug-ur, aid-er, oy-ster, ouk-en.

No syllable can be made, be there many or few consonants, without the aid of a vowel or diphthong.

The longest monosyllables we have in English are length, strength, and strength; which could not be sounded without the vowel e or i.

The Art of Spelling may be reduced to the four following general rules or heads:

1st. When a consonant comes between two vowels, in dividing the words into syllables, the consonant is joined to the latterswowel; as in sta-ture, na-ture, de-li-ver, a-mi-ty, &c. except compound words, which terminate in ed, en, est, eth, er, ing, ish, and ous; as coast-ed, gold-en, know-est, know-eth, bear-er, bar-bar-ous, fuol-ish, ra-ven-ous, and sub-urbs.

2dly. When two consonants come together in the middle of a word they are to be parted, if not proper to begin a word; as num-ber, stran-ger, for-tune, &c. not numb-cr, strang-er, fort-une. When the same consonaut is doubled in a word, the first belongs to the foregoing, and the latter to the following syllable, as in the rule above, and in these words, Ab-ba, ac-cord, ad-der, &c.

Sdly. Consenants that begin words must not be parted in the middle; as, a-gree, be-stow, re-frain, not ag-ree, bes-tow, ref-rain.—These consonants may begin words, viz. bl, br, cr, dr, dw, ch, fl, fr, gh, gl, gr, kn, &c. as blunt, break, chaw, cry, draw, dwelt, flesh, ghost, &c.

4thly. When two vowels come together, not making a diphthong, they must be divided, as in vi-al, va-li-ant, Li-on-el, du-el, eru-el, me-tc-or, and La-o-di-ce-u.

1

SOME PARTICULAR NOTES.

L is doubled in words of one syllable, as well, tell, swell, hull, wall, fall, will, hill, mill, &c. But in words of more than one syllable the word always terminates with single *l*, as

as angel, Babel, hurtful, beautiful, and dutiful. Neither must *l* be doubled in atways, also, although; not allways, allso, allthough, &c. but words accented on the last syllable must be excepted from the above rule, viz. install, recall, inroll, rebell, and repell.

Y must be used before the termination ing, as buying, lying, carrying, paying, slaying, burying, &c.

If you cannot write out the whole word at the end of the line, you break it off at the end of a syllable, thus, con---

C must not be put between two consonants; as think, not thinck; thank, not thanck; but if a vowel goes before e, you must write c before k, as brick, thick, stick, &cc.

Of S and C, some people may easily drop into error by mistaking S for C, as in the beginning of the following words, where C has the perfect sound of S, though C must be undoubtedly written; viz. in

City	Citron	Cellar	Çieling	Censure	÷
Cell	Censor	Censer	Certain	Cypress.	
Cive t	Ceruse	Cinque	Cymbal	Circuit	
Circle	Centre	Cistern	Cymon	Celestial	
Cease	Cipher	Cement	Celerity	Celebrate	
- 1	Centurion	Cinnamon	Cerem	ony.	
Thes	e words mus	t be written	n with Sa	nd C, viz.	
Science	Sceptre	Scal	city	Sciatica	
Schedule	Scheme	Schi	sm	Seythian.	
1	The following	g words sho	ould be wr	itten.	
- 101	ith ti	านข้	th si		
Cont	ention	• Con	fusion		
Acti	on ···	· Occ	asion 🐰	· · · · ·	
Cont	tradiction 👘	Con	tusion .	· · · ·	
Atte	ntion	Opp	ression		
Bene	diction	All	nsion	and the second second	
Арр	arition 👘 👘	Asc	ension	All States	
Cong	ço ction	' Ave	rsion .	a da	
Dec	laration	· Asp	ersion	1	
Amt	ition	Con	nmission		
Cont	rition	· Con	nprehe nsio	B	
Oral	lion	Cire	umcision	•	
Obla	ation	· · Con	clusion.		
[*] The	e following v	vords shoul	d be spelle	ed thus:	
Passion	n, not Pashor	n Sali	sbury, not	Salsbury	•
Fashio	n, not Fation	, Leie	cester, not	Lester	
	•	B 5	•	Cushion,	

- demín.

Cushion, not Cution	
Gloucester, not Gloster	r
Worcester, not Worster	•

Shrewsbury, not Shrusbury Carlisle, not Carlile Westminster, not Westmister.

Another qualification in Spelling is rightly to distinguish ' words of the same sound, or nearly the same sound, though ' widely different in their sense and signification; such as the following:

Assistance, Help Assistants, Helpers. **ABEL**, Cain's Brother Augur, a Soothsayer Able, to do a Thing Accidents, Chances Augre, to bore with Accidence, in Grammar Axe. to cut with Acre, of Land Acts, of Parliament Achor, a Valley of that Name \mathbf{B} Advice, Counsel Bacon, Hogs Flesh Advise, to counsel Baken, in the Oven Account, Esteem Beckon, to make a Sign Accompt, or Reckoning Beacon, a fire on a Ilill Ale, a Drink Bail, a Surety Ail, Trouble Bale, of Goods Bald, without hair All, every one Aul, for Shoemakers Bauld, cried out Allay, to give Ease Ball, to play with Alloy, base Metal Bawl, to cry aloud Altar, for Sacrifice Barbara, a Woman's name Alter, to change Barbary, in Africa Alchoof, an Herb Barberry, a Fruit Aloof, at a Distance Barc, naked Allowed, approved Bear, a Beast, or to bear Aloud, to speak so Bays, of Bay, trees Baize, slight woollen Cloth Ant, a Pismire Base, vile Aunt, a Father's Sister Anchor, of a Ship . Bass, in Music Anker, a Runlet Be, they are Bec, that makes Honey Are, they be ٤. Air, we breathe ... Beer, to drink Heir, to an Estate Bier, to carry the dead on : Bell, to ring Arrant, notorious 4 . Bel, an Idol Errand, a Message Berry, a small Fruit, Arras, Hangings Harass, to fatigue , Bury, to inter Blue, a Colour Ascent, a going up Blew, Assent, Agreement

Blew, as the wind Board, a Plank Bored, a Hole Boar, a male swine Bore, to make hollow Boor, a Country Fellow Bold, confident Bowled, at the Jack Bolt, to fasten Boult, to sift Meal Beau, a Fop Bow, to bend; or the bow Bough, of a Tree Boy, a Lad Buoy, of an Anchor Bread, to cat Bred, brought up Breeches, to wear Breaches, broken Places Bruit, a Noise Brute, Beast Burrow, for Rabbits Borough, a Corporation By, near Buy, with Money Brews, he breweth Bruise, a Hurt . 1 Buss, a fishing Vessel Buz, the Noise of a Fly su terra u 🕻 terag Cain, that killed his Brother Counsel, take advice Cane, to walk with -Caen, in Normandy Caluis, in France : Chalice, a Cup 😗 Call, by Name Cawl, Suet Cannon, a great Gun Canon, a Rule Canon, of a Cathedral Capital, great or chief Capitol, a Tower in Rome Career, full Speed F 6 1. . . **. 1**.

Carrier, of Goods Cellar, for Liquors Seller, that selleth Censer, for Incense Censor, a Reformer Censure, to judge Centuury, an Herb Century, an Hundred Years Sentry, a Soldier on Guard Chair, to sit on Chare, a Job of Work Champaine, Wine of France ... Campaign, a wide Field or military Expedition Choler, Rage, or Anger Collar, of the Neck Coller, of Beef or Brawn Cieling, of a Room Sealing, with a Seal Cittern, Musical Instrument Citron, a Fruit Clause, Part of a Sentence Claws, of a Beast or Bird Coat, a Garment Cote, for Sheep Commit, to do Comet, a blazing Star Condemn, to Death Contemn, to despise a Council, of the King Coarse, not fine Course, to be run Cou'd, or could Cud, to chew as Beasts Current, a running Stream Courant, a Messenger or News-paper Currants, Fruit Crick, in the Neck <u>ع</u> Creek, of the Sea or River Cousin, a Relation Couzen, to cheat Cymbal,

Digitized by Google

11
Cymbal, a Musical Instrument Symbol, a Mark or Sign Cypress, a Tree Cyprus, an Island Cruse, for Oil Cruise, a voyage Cygnet, a young Swan Signet, a Seal Dame, a Mistress Dann, to stop Water Damn, to condemn Deign, to vouchsafe Dane, an Inhabitant of Denmark Dear, in Price Deer, in a Park Deceased, dead Diseased, sick Decent, becoming Descent, going down Dissent, to disagree Deep, low in Earth Dieppe, a Town in France Defer, to put off Differ, to disagree Derbe, a City of Asia Derby, a Town in England Desert, Merit Desart, Wilderness Dew, falling Mist Do, to make Doe, a Female Deer Dough, Paste Don, a Spanish Lord Done, performed Dun, a Colour Devices, Inventions Duer, that doeth Dragon, a Serpent:

3**£**

Dragoon, a Soldier Dolor, Grief or Pain. Dollar, a Piece of Money Demure, sober Demur, a Pause or Doubt Ear, of the head E'er, ever Year, twelve Months Yearly, every Year Early, betimes Earth, the Ground - Hearth, of a Chimney Easter, the Festival Esther, a Woman's Name Enter, to go in Inter, to bury Elder, not the Younger Elder, a Tree 🗉 Eaten, or swallowed Eaton, a Town's Name Eminent, famous Imminent, over Head Enow, in Number Enough, in Quantity Earn, to deserve-Yarn, Woollen Thread Yearn, to pity East, the Wind Yeast, used in making Bread Envy, or Hatred ż Envoy, a Messonger Brercise, Labour or Practice Exorcise, to conjure Err, to mistake: \rightarrow ' Er, Brother to Onen and the v Extant, in being the Mark Extent, Distance: 12 (1998) 11 First entresses Devizes, a Town in Wiltshire Fain, desirotes . In the second Feign, to dissemble As a Door, of a House Fair, beam int, or a Market Fare, Victuals - 11 - - - -1. 1 Faint,

Digitized by GOOGLE

Faint, weary Feint, a Pretence Fourth, in Number Gentle, mild Forth, to go out Feed, to eat Feed, rewarded Fir, Wood Fur, or Hair Felon, a Criminal Felon, a Whitlow File, of Steel Foil, put to the worst . Fly, as a Bird / Fly. an Insect Fillip, with the Fingers Philip, a Man's Name Flower, of the Field Flour, Meal Floor, of a Room Follow, to come after Fallow, Ground not ан н. Сталана и сталана и стала и ста Стала и ploughed Find, to find any Thing Gallies, Ships with Oars Fined, amerced Fiend, Devil A Charles Sec. A Flea, to take off the Skin, Hare, in the field also an insect Hair, of the head Flee, to escape Heir, to an Estate Flue, of a chimabey Harsh, severe at Flew, did fly Fowl, a Bird Foul, dirty Haven, a Harbour, Heaven, a place of Happi-Francis, a Man's Name ness Frances, a Woman's Name Heart, of the Body Frays, Quarrels and Mart, in the Woods, or an Fraize, Pancake with Bacon over-grown Buck Frieze, a Sort of Cloth March Herd, of Catle Heard, did hear) Gall, of a Beast Here, in this Place Gaul, France Garden, of Herbs March High, lofty Guardian, an Overseer Hie, away, make haste 1. T. S. S. A. . 1

Genteel, graceful. Gentile, a Heathen Gesture, Carriage Jester, a merry Fellow Groan, with Grief Grown, greater Guilt, of Sin Gilt, with Gold Greater, bigger Grater, for Nutmegs Grave, for the Dead Greare, Armour for the Leg Gluttonous, greedy Glutinous, sticking as Pitch Great, large Grate, for Coals, &c. Greet, to salute Graze, to eat Grass Grays, a Town Groat, Four-pence Grot, a Cave Gallows, for Criminals Η Good House A. Hors

Him, that Man Ingenuous, candid Hymn, a spiritual Song Hitch, a Distemper Hitch, to catch hold Hail, congealed Rain Hail, to call or hail Κ Hall, in the House Haul, pull Ketck, a small Ship Catch, to lay hold of /

 Ilaul, pull
 Catch, to tay note of fight of the Foot

 Heel, of the Foot
 Kill, to slay

 Heal, to cure?
 Kiln, for Lime

 Heil, he will
 Kind, good-natured

 Higher, taller
 Coined, made into Money

 Hire, wages
 Knare, of a Wheel

 History
 Strick or to bailed Kuickt by bonur

 Hiss, as a Snake, or to deride Knight, by honour 1 as 1 Hoar, a Frost Night, dankness 1 17 1980 Whore, a lewd Woman Hole, or Hollow Whole, entire Kennel, for dogs Channel, for Water L L L Whole, entire L (1997) Hallow, to make holy Laid, placed (1997) Hollow, having a davity Lade, to throw out Water Whole, entire

 Holy, noving a Carry
 I hate, is throw out where

 Holy, nous,
 Lane, a narrow Street

 Wholly, entirely
 Lain, did lie

 Holy, a Tree
 Latin, a Language

 Home, one's House
 Latten, Tin

 Whom? What Man?
 Ladder, to ascend

 Whom? What Man? Holme, Holly Hoop, for a Tub Whoop, or hall lol. Lather, to ascend of the second Hugh, a Man's Name Varia Lease, of a House, 1, 17 Hue, of Colours while a main Leash, Three Marker and the second Hew, with an tAxe a money Lees, of Wine 19 9 Antis strong of the date of a sec 1 Leese, an old word for lose , I, I myself Leapers one who jumps, and Eye, to see with the Aught Loper, oncaleprous Idle, lazy of the at North Lessen, to make diss , which Idol, an Image awarg-towe hosself is wread our fi same PH, 1 will, Sois Die Jech Least, analysty ve B and Aisle, of a Churchib Sunsta Lest, for fentaty data grant Islog an Island when Anna Lethargy, Slepiness Oil, of Olives determined Liturgy, Church Service In, a prepariou into the Liar, that tells Lies (1) Inn, for Travellers of Mary Liar, that tells Lies (1) Incite, to stin approximation Limb, 3. Member, Insight, Knowledge Limn, to paint Insight, Knowledge

ENGLISH GRAMMAR.

Line, Length Mite, in Cheese Loin, of Veal ··· · Mout, a Ditch Liquorish, fond of Dainties · Mote, a small particle Liquorice, a plant, or its Root Moan, to lament Low, humble Moun, cut down Lo! behold More, in Quantity Lose, to suffer Loss Moor, a Black Loose, to let go Mower, that moweth Moor, barren Ground Lower, to let down Mortar, made of Lime. Lour, a Frown Loathe, to abhor Mortar, to pound in Loth, unwilling Mole, a little animal Mould, to cast in M Made, finished Muscle, a shell fish Maid, a young Woman Muzzle, to cover the Mouth Main, chief N Nay, denial Mane, of a Horse Male, the He of any species Neigh, as a Horse Mail, Armour Neither, none of the two Nether, lower Manner, Custom Manor, a Lordship New, not old Market, to buy or sell in Knew, did know Marked, noted Naught, bad Marsh, low Ground Nought, nothing Mash, for a Horse Nice, curious; also a Town Martin, a Man's Name Niece, a Brother's Daughter Marten, a Bird . Not, denying , Knot, to tie Mead, a Meadow Note, mark Mede, one of Media Mean, of low Value Note, of one's hand Nose, of the Face Mien, Carriage or Aspect Meat, to cat any other Knows, understands Meet, fit No, denial Mete, to measure. Know, to understand Message, Business. Neal, to harden Glass Kneel, on the Knees Messuage, & House Meus, for Hawks or Horses None, not one Known, understood Muse, to meditate News, Tidings Noose, a Snare Mighty, powerful Moiety, half Mile, Measure 111 Mail, to labour Oar, of a Boat Might, Strength, Dre, crude Metal d' d'er,

O'er, over Off, cast off Of, belonging to Our, belonging to us Hour, of the Day Oh! Alas! Owe, in Debt One, in Number Won, at play Oun, to acknowledge Order, Rule Ordure, Dung Pair, a Couple Pare, cut off Pear, a Fruit Pain, Anguish Pane, of Glass Patten, for a Woman Patent, a Grant Peer, a Lord Pier, of Dover Peter a Man's Name Petre, Salt. Pail, for Water Pale, of Countenance Pale, a Fence Pall, for a Funeral Paul, a Man's Name Plait, the Hair Plate, Metal Place, Room , i., Plaice, a Fish . Parson, of the Parish Person, any Man or Woman Pole, for Hons **Poll**, of the head Pool, of water Pore, with the eyes, 'or of the Skin Poor, necessitous. Palate, of the Mouth Pallet, Bed

Palliate, to cover or hide Point, a Stop Pint, Half a Quart Posy, a Nosegay Poesy, Poetry Power, might Pour, as Water Prey, a Booty Pray, to beseech Profit, Gain Prophet, a Foreteller Prophecy, a Foretelling Prophesy, to foretell Practice, Exercise Practise, to exercise Presence, being here Presents, Gifts Prince, the King's Son Prints, Drawings Please, to content Pleas, Excuses or Defences Precedent, an Example President, Chief Principal, Chief Principle, the first Rule Ø Quire, of Paper" Choir, of Singers Queen, the King's Wife Quean, a bad womah િન ન 🖪 માટલા તે છે તેનું Rack, to torment and a set of Wreck, of a Ship Tit Arrack, a strong Liquor Ram, Water Reign, of the King and the Rein, of a Bridle Rays, of the Sun Raise, lift up Raisin, a Fruit 👘 Reason, Argument Race, to run Rase, to demolish Rice,

Rice, Grain Rise, to get up Read, the Book Reed, growing in the Water Relic, a Remainder Relict. a Widow Roe, of a Fish, or Decr Row, the Boat Right, not wrong Rite, a Ceremony Write, with a Pen Wright, a Wheelwright Reddish, Colour Radish, a Root Rest, Quiet Wrest, to prevent, Roof, the Top of a House Ruff, for the Neck Rough, not smooth Rye, Corn Rye, a Town in Sussex Wry, crooked Ring, the Bells Wring, the Hands Rime, a Fog or Mist Rhyme, Verse · · · · · · Rode, did ride Road, the Highway Rowed, did row Room, Part of a House Rome, the Name of a City Roam, to wander Rheum, a Humour Rote, got by Heart Wrote, did write Wrought, did work S S Salary, wages $n \mapsto -1$ Celery, an Herb Savour, Taste or Smoll Sariour, that saves Society, Company Sore, painful

Sheep, a useful Animal Ship, for the Sca Sight, View Cite, to summon Site, Situation Sail, of a Ship Sale, of Goods Sea, the Ocean See, with the Eyes Seam, in a Coat Seem, appear Seen, beheld Scene, in a Play Seas, great Waters Seize, to lay hold of + Cease, to leave off Sent, did send Scent, a Smell Show, to make appear Shoe, for the Foot, Sink, sink down Cinque, five Slight, to despise Sleight, of Hand Shoar, a Prop Shore, the Sca Coast Sewer, a common Drain Shown, viewed Shone, did shine Slow, not quick Sluc, a sour Fruit Sew, with a Needle Sue, at law Sow, Seed So, thus Some, a Part - Sum, of Money Soul, or Spirit ... Sole, a Fish Soal, of a Shoe or Foot Son, of a Father Sour, THE YOUNG MAN'S BEST COMPANION.

Soar, aloft Suore, did swear Sword, a weapon Soared, did soar Stare, to look carnestly at Stair, a Step Stile, to get over Style, of Writing Sound, whole, firm; also Noise Swoon, to faint away Soon, quickly Statue, an Image Statute, a Law Stature, Height Stead, in Place Steed, a Horse Straight, not crooked' Strait, narrow Succour, Help Sucker, a young Sprig Spcar, a Weapon Sphere, a Globe, Then, at that Time Than, in comparison Tame, gent'e, not wild Thame, a Town in Oxon, Tear, to rend Tear, of the Fye Tare, an Allowance in weight Use, to be wont ' Ture, Vétch Tail, of a Beast Tale, a Story Tiles, for the House. Toil, to labour Toil, a net There, in that Place Their, of them Thorough, complete Throw, a Stone Throne, of the King Thrown, as a stone' Tide, a flowing water

Ticd, made fast Time, of the Day Thyme, an Herb Team, of Horses Teem, with Child To, the Prepo-ition Tue, of the Foot Tow, to be spun, to draw Too, likewise Two, a Couple Told, as a story Tolled; as a Bell Tour, a Journey Tower, of a Church V Vacation, Leisure Vocation, a Calling -Veil, a Covering Vale, between two Hills Vain, foolish 17 Vein, of the Body of a Vanc, a Weathercock Value, Worth Valley, a Vale Vial, a Bottle 🗠 🕸 4 Viol, a Fiddle U. Your, of you Ewer, a Basin Use, Practice W 1.1 Wages, pay for service Wagers, Bets Wade, in Water 24 Ł "Weighed, in the Scales Whale, a great' Fish ' Wail, to lament Waist, the Mittdle Waste, to spend Wait, to stay for Weight, Heaviness Wear, the act of Wearing Ware, Mcrchandise Were,

Were, was Where, what Place Weighed, to poise Wey, five Quarters Whey, of Milk Wield, a Sword Weald, of Sussex or Kent Wen, in the Neck When, at what Time Which, that conjures Which, who or what Whist, Silence

ļ

Whist, a Game Wist, knew Wood, of Trees Wou'd, or would X

Yea, yes Ye, yourselves Yea, a Tree You, yourselves Yann, made of Wool Yearn, to pity

OF STOPS, AND OTHER MARKS, USED IN REALING AND WRITING.

THESE are of absolute necessity; and great regard ought to be had to them for the better understanding of what we read and write ourselves; they are likewise of use to others who shall hear us read, or see our writing.

Stops; or Pauses, considered as intervals in reading, are no more than four; though there are other marks to be taken notice of. The names of the four Stops are, a Comma, Semicolon, Colon, and Period, or Full Stop: and these bear to each other a kind of progressional proportion of time; for the Comma signifies a stop of leisurely telling one, the Semicolon two, the Colon three, and the Period four—And are made or marked thus:

Comma (,) at the foot of a word.

Semicolon (;) a point over the Comma. Colon (:) two points.

Period (.) a single point at the foot of a word.

, Example of the Comma (.): There is not any thing in the world, perhaps, that is more talked of, and less understood, than the business of a happy life.

; Example of a Semicolon (;): The orator makes the truth plain to his hearers; he awakens them; he excites them to action; he shows them their impending danger.

: Example of the Colon (:): A sound mind is not to be shaken with popular applause: but anger is startled at every accident.

. Example of the Period (.); It is a shame, says Fabius, for a commander to excuse himself, by saying, "I was not not aware of it." A cruelty that was only fit for Marius to suffer, Sylla to command, and Cataline to act.

By the foregoing Examples we may easily note, that a Comma is a note of a short pause between words in the sentence; and therefore the tenor of the voice must still be kept up.—The Semicolon is a little longer, and the tone of the voice very little abated.—The Colon signifies perfect sense, though not the end of the sentence; and the voice somewhat abated.—The period denotes perfect sense, and the end of the sentence.

? When the Question is asked, there is a crooked mark made over the Period, thus? and is called a Note of Interrogation. Example, What could be happier than the state of mankind, when people lived without either avarice or envy? The true time of pause for this stop is the same as with the Semicolon.

! If a sudden crying-out, or wondering be expressed, then this mark is made over the Full Stop, thus! and called a Note of Admiration, or Exclamation, Example, Oh the astonishing wonders that are in the Starry Heavens!

() If one sentence be within another, of which it is no part, then it is placed between two Semicircles or a Parenthesis, made thus (). Example, Pompey, on the other side (who hardly over spoke in public, without a blush) had a wonderful sweetness of nature. Again: Of authors be sure to make choice of the best, and (as I said before) stick close to them. In reading a Parenthesis, the tone must be somewhat lower, as a thing or matter that comes in by the bye. The time is equal to a Comma, and ought to be read pretty quick, lest it detain the ear too long from the sense of the more important matter.

'Apostrophe, is a Comma at the head of letters, signifying some letter or letters left out in poetry, as would'st for wouldest, ne'er for never, 'tis for it is, o'er for over. Or to denote a Genitive Case; as my Father's House, my Uncle's, Wife, &c.

'Accent is placed over a vowel, to denote that the stress or sound in pronunciation is on that syllable.

• Breve, or crooked mark over a vowel, signifies it must be sounded short or quick.

Caret signifies something wanted, and which is placed underneath the line, just where any thing omitted should be brought in.

Digitized by Google

Circumflez,

90

• Circumflex, is of the same shape with a Caret, but is placed over some vowel to show that the syllable is long, as—Eû-phra-tes.

"Dizersis, two points placed over vowels, to signify they are parted, being no diphthong, as a-v-ri-al.

- Hyphen or Note of Connection, is a straight line, which shows that the syllables of a word are parted, and the remainder of it is at the beginning of the next line. Sometimes the Hyphen is used in compound words, as heart-breaking, book-keeper. When you have not room to write the whole word at the end of a line, but are obliged to finish it at the beginning of the next, such words must be truly divided, according to the rules of spelling.

į

(> Index is a note like a hand, pointing to something very remarkable.

• Asterism or Star, directs to some remark in the margin, or at the foot of the page. Several of them together denote something defective in that passage of the author.

† Obclisk is a mark like a dagger, and refers to the margin, as the *Asterism*: and in dictionaries it signifies the word to be obsolete or old, and out of use.

¶ Paragraph denotes a division, comprehending several sentences under one head.

§ Section signifies the beginning of a new head of discourse, and it is used in sub-dividing a chapter, or book, into lesser parts or proportions.

[] Brackets or Croichets, generally include a word or sentence, explanatory of what went before; or words of the same sense, which may be used in their stead.

"Quotation, or double Comma inverted, is used at the beginning of the line, and shows what is quoted from an author to be his own words, as an excellent Poet says,

" The proper Study of Mankind is Man."

When we distinguish any particular Syllable in a word with a strong voice, it is called *accent*; but where any particular word in a sentence is thus distinguished, it is called *emphasis*: and the word on which the stress is laid, is called the *emphatical* word. Some sentences contain more senses than one: and the sense which is intended can only be known by observing on what word the emphasis is laid. For example. Shall you ride to London to day? This question is capable of four different senses according to the word on which the *emphasis* is laid. If it be laid on the

99

the word you, the answer may be—" No, but I intend to send my Servant in my stead." If it be on the word ride, the proper answer may be—" No, but I intend to walk," If the emphasis be placed on the word London, it is a different question; and the answer may be—" No, for I design to ride into the Country." If it be laid on the word to-day, the answer may be—" No, but I shall to-morrow." How important then is a right emphasis in determining the proper sense of what we read or speak.

DIRECTIONS HOW TO READ WITH ELEGANCE AND PROPRIETY.

Be careful to attain a perfect knowledge of the nature and sound of vowels, consonants, diphthongs, &c. and give every Syllable, and every single word its just and full sound. Avoid all hem's, O's, and ha's, between words.

Attend to the subject, and deliver it in just the same manner as you would do if you were talking of it. This is the great, general, and most important Rule of all, which, if carefully observed, will correct almost all the faults of a bad pronunciation. Let the tone and sound of the voice in reading be just the same as in talking, and do not affect to change that natural and easy sound with which you then speak, for a strange new aukward tone.

Take particular notice of the Stops and Pauses, but make no Stops where the sense admits of none.

Place the Accent upon its proper Syllable, and the Emphasis upon the proper word in a sentence.

OF Words.

The use of words are to convey our sense of things to another person, and for that purpose are divided into four classes, viz.

1. Names. 2. Qualities. 3. Affirmations. And 4, Articles.

NAMES.

Names declare things themselves, and need not the help of any other word to make them understood, as, a boy, a ship, a cow, &c. But these names in general admit of a, an, or the before them, as a house, an onion, the world.

Sometimes they need not either of those articles, but stand by themselves as misery, joy, sorrow, & c.

Digitized by Google

These

These names have two different numbers, viz. the Singular and Plural. The Singular speaketh but of one, as *a stone*; the Plural of more then one, as *stones*.

The manner of making singulars plurals, is by adding s, as cap, caps, mug, mugs, cat, cats, &c.

But when the singular ends in ce, ch, se, sh, x, ze or ge, when sounded soft we either must add s, or es, and make another syllable, as, grace, graces; church, churches; purse, purses; fish, Ashes; fox, foxes; mace, maces; stage, stages.

There are many exceptions to this rule, as man in the plural number makes men; woman, women; child, children; knife, knives; staff, staves, &c.

There are several words which have no singular number; and, on the contrary, there are some which have no plural, Proper names have no plural, because they agree but to one.

As to personal names when mentioned in conversation, they must be either spoken of ourselves to another, or of a third; and there are three persons in the singular, and three in the plural, viz.

Singular.

Plural.

Ye or you the 2d person,

I is the 1st person Thou, or you the 2d.

He, she or it, the 3d person. [They, the 3d person.

These following have a leading state, as I has me; thou thee; he, him; she, her; we, us; ye, or you, them; they, them.

Note, I, he, she, we, yc, and they, begin a sentence but seldom end it; me, him, her, us and them, seldom or never begin a sentence, but often end one.

QUALITIES.

Some qualities proceed from personal names, as my, mine; thy, thine; our, ours; your, yours; her, hers; their, theirs, &c.

These qualities serve to express the nature, or manner of things, as good, bad, great, small, green, black, &c. and by putting to it a name, or thing, will make good sense, as a good boy, a bad girl, a great dog, a small room, a green leaf, a black hat, &c.

Note, The articles a, an, or the are qualities, but have a different use and signification, viz. a or an expresses the same; only a is used before a consonant, and an before a vowel, as a sarord, a knife; an egg, an ear. The article the,

THE YOUNG MAN'S BEST COMPANION.

. the, shows the reality of a thing itself, as the clock struck six; signifies that very clock we are speaking of.

Qualities, likowise; have their degrees of comparison, as first, tall, second, taller, third, tallest; or suppose 1 am speaking of three persons, John, is tall, James is taller, Summel is tallest; again, Sarah is pretty, Mary is prettier, Susan is prettiest.

OF AFFIRMATIONS OR VERBS.

A Verb is a part of speech, that betokens doing, suffering, or being, as I love, I am loved, I live.

Verbs are known by the word to going before them, as to laugh, to cry, to weep, to dance, to be cold, to be lame, &c. There are three sorts of verbs, viz. active, passive and neuter. A verb active denotes an action, or deing of any thing; and in such a manner, that a person or thing it acts upon follows the verb, as I love her, &c. and a verb that signifies suffering, has the title of a verb passive, as I am lored. The English tongue has no passive verbs, for we have not a verb that denotes suffering, but is supplied by the use of two or three words, which are called auxiliary or helping verbs.

A verb neuter signifies the state or being, and sometimes the action of a person or thing but has no noun after it to denote the subject of action.

A verb neuter is sometimes active, as *I run*; and sometimes passive, as *I um sick*.

There is another verb called impersonal, being without any distinction to either sex; and is governed by the word it, as it thunders, it snows, it is hot, &c.

There are also belonging to verbs four things, numbers, persons, moods and tenses; and first of numbers, riz. two, the singular and plural.

Or PERSONS.

Verbs have six persons, viz. three singular, and three plural, as

I. thou, or you, he, or she, or it, are singular:

We, ye, or you, and they, are plural.

Singular.

I play, or do play, Thou playest or dost play, He playeth or doth play, Plural.

We play or do play, Ye or you play or do play,

They play or do play.

Of

Or Moods.

Moods signify the various ways of expressing a verb or action of a verb; and strictly speaking, the English have no mood; because they have no alteration of the verb itself, urless in the second and third persons singular of the present tense, and the second person singular of the preterimperfect: therefore, the mood in English is expressed or known by certain words called helping verbs; of which there are two sorts, perfect and defective: the former are the verbs am, be, or have; the latter be, may, can, might, will, would, shell, should, could, must, or ought; as thus, the possibility of any thing to do, or to be done, is expressed by can or would, the liberty or design of the speaker oc doer, by may or might; the inclination by will or would; and the necessity of doing a thing by must or ought, shall or should.

OF TENSES.

Tense, in grammar, signifies the different times of an action, viz. first, it shews the action or thing that is doing, but not finished. Second the action or thing finished or done, without regard to any thing else. Third, the action not yet done, but will soon be done or finished, which are comprehended in the time present, time past, and time to come.

There is another division of time, viz. The time past is subdivided, 1st. into the time not perfectly past. 2d. The time long past; and the time to come is subdivided into the time some great while to come.

OF REGULAR VERBS.

Regular verbs are those that observe a stated rule in the formation of their times.

A regular verb keeps the same in every person, tense, or time, save sometimes it has a syllable more in some of the persons, and a syllable more in some of the tenses, of which I shall give you a hint by way of example.

Present Time.

Singular. I love or do lave, thou lovest or dost love, or you love or do love, he loveth, loves, or doth or does love.

Plural. We love or do love, ye or you love, or do love, they love or do love

2

Digitized by Google

Singular.

Preterperfect Time, or Time past.

- Singular. I have loved, thou hast or you have loved, he has or hath loved.
- Plural. We have loved, ye or you have loved, they have loved.

Preterimperfect Time, or Time not perfectly past.

- Singular. I loved or did love, thou lovedst or didst love, or you loved or did love, he loved or did love.
- Plural. We loved or did love, ye or you loved or did love, they loved or did love.

Preterpluperfect Time, or Time long past.

- Singular. I had loved, thou hadst or you had loved, be had loved.
- Plural. We had loved, ye or you had loved, they had loved.

First future Time, or Time to come.

- Singular. I shall or will love, thou shalt or wilt love, or you shall or will love, he shall or will love.
- *Phural.* We shall or will love, ye or you shall or will love, they shall or will love.

Second future Time, or Time of long space to come.

- Singular. I shall or will love hereafter, thou shalt or wilt, or you shall or will love hereafter, he shall or will love hereafter.
- Plural. We shall or will love hereafter, ye or you shall or will love hereafter, they shall or will love hereafter.

The perfect verb am or he, is used to supply the want of verbs passive in the English language, and make the sentence complete, by being joined to them, or going before them, as I am grieved.

As for Example:

Present Time.

- Singular. I am wounded, thou art or you are wounded, he is wounded.
- Plural. We are wounded, ye or you are wounded, they are wounded.

Preterperfect Time, or Time past.

Singular. I have been wounded, thou hast or you have been wounded, he hath or has been wounded.

Plural. We have been wounded, ye or you have been wounded, they have been wounded.

Preterimperfect Time, or Time not perfectly past.

Digitized by Google

Singular. I was wounded, thou wast or you was wounded, he was wounded.

Plural.

26

Plural. We were wounded, ye or you were wounded, they were wounded.

Preterpluperfect Time, or Time long past.

- Singular. I had been wounded, thou hadst or you had been wounded, he had been wounded.
- Plural. We had been wounded, ye or you had been wounded, they had been wounded.

First future Time, or Time to come.

Singular. I shall or will be wounded, thou shalt or will or you shall or will be wounded, he shall or will be wounded.

Plural. We shall or will be wounded, ye or you shall or will be wounded, they shall or will be wounded. Second future Time, or Time of long Space to come.

Singular. I shall or will be wounded hereafter, thou shalt or wilt or you shall or will be wounded hereafter, he shall or will be wounded hereafter.

Plural. We shall or will be wounded hereafter, ye or you shall or will be wounded hereafter, they shall or will be wounded hereafter.

OF PARTICIPLES.

A participle is a part of speech derived of a verb, and signifies either being, doing, or suffering, as a verb does: Of which there are two, viz. active, having ing added to the verb, as loving; passive having d, t, or n, added, as loved, tuught, slam.

OF Adverbs.

An adverb is a part of speech joined to a verb, to an adjective, to a participle, or to another adverb, to declare their signification, as

First, to a verb thus:

Sarah sincerely loves John.

Secondly, to an adjective thus:

Chloe is a very comely lass.

Thirdly, to a participle thus:

He is a man justly deserving preferment.

Fourthly, to another adverb thus:

He speaks very prudently.

Adverbs ending in ly, are derived from adjectives, as from just, true, brave, &c. come jystly, truly, bravely, &c.

Some adverbs are likewise compared, as soon, sooner, and soonest, &c.

27

C 2

OF CONJUNCTIONS.

A Conjunction is a part of speech that joins words and sentences together, and shews the reason of a thing or the manner of their dependence.

The following are some of the principal, viz: and, as, although, also, but, because, either, except, for, howsoever, if, likewise, moreover, no, not, namely, nevertheless, or, otherwise, save, since, that, therefore, &c.

There are various kinds of conjunctions, but the chief are copulatives, disjunctives, casuals, and conditionals, as for Example:

1. À conjunction copulative, joins, words or sentences together, as I sing, and James dances.

2d. A conjunction disjunctive, joins words but makes a division in the sense of the thing, as I or James shall be beat.

3d. A conjunction casual, shews the cause or reason of a thing, as I do work that I may eat.

4th. A conjunction conditional, renders the speech doubtful, as, If the seas dry up, we shall find great riches.

OF PREPOSITIONS.

A Preposition is a part of speech most commonly set before other parts of speech, and are either 1st. In apposition or separated, 2d. Joined or in composition.

Prepositions of upposition are these, viz. above, about, after, against, at, among, amongst, before, beside, betwist, between, below, behind, beyond, by, bencath, far, from, in, into, off. on, or, upon, out, of, towards, to, until, on this side, on that side, over, through, under, up, to, with, within, without. As for example:

John and Peter travelled into Egypt.

Here into is the preposition, separated from the noun; but if the noun be left out, it is expressed thus, John went before, and Peter followed after, viz. John went before Peter and Peter followed after John.

Prepositions of composition are these, viz. ad, en, un, up, out, mis, dis, &c. adverb, enjoy, undone, upside, &c.

OF INTERJECTIONS.

An interjection is a part of speech, that betokens a sudden passion of the mind, either by being surprised overmuch,

03

or by jesting, doubting, &c. and generally have a note of admiration after them, as oh ! alas ! O ! wondrows ! ho brave boys !

OF SENTENCES.

A sentence is the joining two or more words together, so as to make perfect sense, as Julius Casar was a worthy man, for under his conduct the Romans first entered into Britam.

There are two kinds of sentences, simple and compound. A simple sentence is that wherein there is but one verb, and one nominative word of the subject either expressed or understood, as, the bell rings.

A compound sentence is two simple sentences joined together by a conjunction, or a relative, as, I run and you fight, I laugh and you mourn, I pipe and you dance, &c.

Moreover, for the due joining of words, there are three concords. The first is between the nominative word and the verb, viz. The nominative word is the thing or person that either is, does, or suffers; and is, in general, set before the verb, as, James laughs, John mourns, Judas betrays, &cc. Except when a question is ask'd, and then the nominative is set after a verb, as lovest thou? doth the king come?

Likewise if it be an imperative sentence, as, work thou, ring the bell, &c.

And sometimes when the words it or there comes beforethe verb, as, it is my book, there came one to me.

In a conditional sentence, Had I been coverous to please my Master, I would have used diligence; for, if I had been coverous, &c. To find the nominative word or case to the verb, ask this question, who or what? and the word that answers to the question shall be the nominative case to the verb, as, I read the book through: Who read the book through? I, &c.

A verb personal agrees with his nominative case, in number and person, as, the master readeth and ye regard not.

Many nominative cases singular, with a conjunction copulative coming between them, will have a verb plural, as, Thomas and Charles were both at school, &c.

Note also, That sometimes the infinitive Mood of a verb is the nominative case to the verb, as, to steal is scandalous.

Sometimes a whole clause aforegoing, may be the nominative case to the verb, as, to rise betimes in the morning, is the most wholesome thing in the world.

When

When a verb follows a noun of multitude, it may be put in the plural, when the case is absolutely determined to be more than one, as the multitude wondered when they saw the dumb to speak, the lame to walk, &c. and it is most commonly of the singular number, as the multitude is very noisy. The eroud is gone, &c.

The second concord is between the substantive and the adjective. When you have an adjective, ask this question, who or what? the word that answers to the question, shall be the substantive to it. There is no distinction of case, gender or number in the application of adjectives to substantives in the English, as in Latin, as, a comely lass, a dirty boy, &c.

The pronouns this and that, make these and those, in the plural, as, this man is my servant; these men are my servants; that book is my son's; those books are my daughter's.

The adjective, for the most part is set before the substantive, as, a good boy. Yet sometimes when there are more adjectives than one joined together, or one adjective with other words depending on it, the adjective may be set after the substantive, as, a commander, both stout and brave. And sometimes when the article the comes between, as king George the third, &c.

When two substantives are put together in composition the first takes to itself the nature of an adjective; and is commonly joined to the following substantive by a hyphen, as, a water-cask, a sea-horse, &c.

Adjectives are frequently used as substantives, as some, for some men; few for few men.

- The third concord is between the antecedent and the relative. When you have a relative, ask this question, who or what? and the word that answers to the question shall be the antecedent to it.

A relative sentence is that which has in it the relative adjective, who or which. And the antecedent is the word going before the relative, and is rehearsed again of it, as, this is the bird which you brought home, i. e. which bird you brought home. The relative agrees with the antecedent in number and person, as, that man is wise, who speaketh few things.

When there comes no nominative case between the relative and the verb, the relative shall be the nominative case to the werb, as wretched is he who is in love with money.

Of

OF ABBREVIATIONS.

TO be ready in these shows a Dexterity in Writing, and is very necessary for Dispatch; for by these we expeditiously express, or set down a word, shortening it by making some initial Letter or Letters, belonging to the Word, to express it, as in the Table following. A, B. Bachelor of Arts Do. Ditto, or the same A. Bp. Archbishop Deut. Deuteronomy A. D. Anno Domini, Year of Dec. Deceased D. D. Doctor of Divinity the Lord. A. M. Anno Mundi. Year of E. Earl the World Earld. Earldom Ex. gr. or e. g. Exempli gratia, Admrs. Administrators A. M. Artium Magister, for Example -Master of Arts Eph. Ephesians Ana. of each a like Quantity Eccl. Ecclesiastes Ex. Exodus or Example Adml. Admiral Aug. August Esq. Esquire . A. R. Anno Regni, in the Eron. Exeter Year of the Reign Feb. February Ast. P. G. Astronomy Profes- F. R. S. Fellow of the Royal sor at Gresham College Society B. A. Bachelor of Arts Gal. Galatians **B.** D. Bachelor of Divinity Gen. Genesis B. V. Blessed Virgin Genmo. Generalissimo G. R. Georgius Rex, George Bart. Baronet the King **Bp.** Bishop Cant. Canticles, or Canterbury Gen. General Chap. Chapter Gent. Gentleman Cent. Centum Heb Hebrews Chron. Chronicles i. e. id. est, that is Capt. Captain I.H.S. Jesu Hominum Salva-Col. Colossians tor, Jesus Saviour of/Men Cl. Clericus Ib. ibidem, in the same Place Id. Idem, the same Col. Colonel Cor. Corinthians or Corollary Jan. January Cr. Creditor Jer: Jeremiah C.C.C. Corpus Christi College Judg. Judges C. S. Custos Sigilli, Keeper of J. D. Jurium Doctor, Doctor the Seal of Laws C. P. S. Custos Priviti Sigili, Jos. Joshua 1999 - A. M. A. Keeper of the Privy Seal Knt. Knight 1. Liber, a Book. Dr. Doctor or Debtur C 4.

Q. Query

q. d. quasi dicat, as if he

L. Libræ, Pounds 'Lieut. Lieutenant L. L. D. Legum Doctor, Doctor of Laws Lam. Lamentations Lev. Leviticus L.C. J. Lord Chief Justice M. one Thousand Mat. Matthew m. Manipulus. a Handful M. A. Master of Arts Mons. Monsieur Mr. Master Mrs. Mistress M. D. Medicinæ Doctor **Doctor of Physic** M. S. Memoriæ Sacrum, Sa- Serj. Serjeant cred to the Memory MS. Manuscript **MSS.** Manuscripts Mith. Michael, or Michaelmas N. B. Nota-Bene, Note, or mark well N. S. New Style No. Number Nov. November O. S. Old Style Oct. October Oxon. Oxford Pugil. a Handful Pd. Paid Parl. Parliament Philo. Math. Philo Mathemati- ye, the cus, a Lover of the Mathe- yn. then matics P. M. G. Professor of Music yt. that at Gresham College Ps. Psalm P. S. Postcript Penult, last save one

should say q. l. quantum libet, as much as you please q. s. quantum sufficit, a sufficient Quantity gr. Quarter or a Farthing Rev. Reverend, or Revelation Reg. Prof. Regius Professor Rom. Romans Rt. Honble. Right Honourable Rt. Worpl. Right Worshipful St. Saint, Street Sect. Section Sept. September Salop. Shropshire ss. Semissis, half a Pound S. T. P. a Professor or Doctor of Divinity Thess. Thessalonians V. Virgin, or Verse Ult. Ultimus, the last Vid. see Viz. Videlicet, to wit, or that is to say V. gr. Verbi Gratia, for Example Xn. Christian Xt. Christ **Xtopher.** Christopher ym. them yr. your 5. et, and or et cetera, and the rest, or, and so forth.

Many of these are rarely used, but as they sometimes occur in old books, it is thought right to continue them in ' this edition.

DIRECTIONS

DIRECTIONS TO BEGINNERS IN WRITING.

FIRST, it is necessary to be provided with the following Implements, viz. good Pens, Ink, and Paper; likewise a flat Ruler for exactness; and a round one for Dispatch; . with a Plummet or Pencil to rule lines.

How to hold the Pen.

THE Pen must be held somewhat sloping, with the -Thumb and the two Fingers next to it; the Ball of the Middle-finger must be placed straight, just against the upper part of the Cut or Cradle, to keep the Pen steady; the fore finger lying straight on the Middle-finger; and the Thumb must be fixed a little higher than the end of a the fore finger bending in the joint; and the Pen so placed. as to be held easily without griping it. The Elbow must be drawn towards the Body, but not too close. You must support your Hand by leaning on the Table-edge, resting it half way between your Wrist and Elbow, not suffering. the Ball or fleshy Part of your Hand to touch the Paper; but resting your Hand on the end of your little finger, . that and your fore finger bending inwards, and supported on the Table. So fixed, and sitting pretty upright, not leaning your Breast against the Table, proceed to the making the small a, c, e, i, m, r, s, w, and $x \neq 1$ which must be all made of equal size and height; the distance or width between the two strokes of the n must , be the same with the distance or width in the three strokes . of the m: the same proportion or width must be observed in the u, w, and o. The Letters with Stems, or Heads, must be of equal height; as the b, d, f, h, l, and f_1 . and those with tails must be of equal depth, as the f, g, gp, q, and f. The Capitals must bear the same proportion to one another with respect to size and height, as A, . B; C, D, E, F, G, H, and I, &c. All upright strokes, and those leaning to the left hand, must be fine or hair: strokes, and all downright strokes must be fuller or blacker. Due care must be taken, "that there be an equal distance between Latter and Letter, and also between Word and Word. The Distance between Word and Word may be the space the small m takes up; but between Letter and letter not quite so much. Sit not long at writing, especially at the first, lest it weary you, and you grow tired of C 5 learning.

ŀ

learning. Imitate the best Examples; have a constant eye to your Copy; and be not ambitious of writing fast, before you write well: Expedition will follow naturally when you have gained a habit of writing fair and free; for it is much more commendable to be an hour in writing six Lines well, than to be able to write sixty Lines in the same time, which perhaps will be unintelligible. And beside by a slow and fair procedure you will learn in half the time, and therefore it is vain in a Learner to desire to be quick before he has acquired Experience, and a Freedom of Writing by frequent practice. Never overcharge your Pen with Ink;, but shake what is too much into the Inkstand again.

How to make a Pen.

THIS is gained sooner by Experience, and Observation from others who can make a Pen well, than by verbal Directions. But before you begin to cut the Quill, scrape of the superfluous Scurf with the Back of your Penknife. scrape most on the Back of the Quill, that the Slit may be the finer. After you have scraped the Quill, cut it at the End, half through, on the back Part, and then turning up the Belly, cut the other Part, or Half, quite through, viz. about a guarter or almost half an Inch, at the end of the Quill, which will then appear forked. Enter the Penknife a little in the back Notch, and then putting the peg of the Penknife-haft into the back notch (holding your Thumb pretty hard on the Back of the Quill, as high as you intend, the slit to be) with a sudden or quick twitch force up the slit; it must be sudden and smart, that the slit may be clearer. Then by several cuts on each side bring the Quill into equal shape or form on both sides; and baving brought it to a fine point, place the inside of the Nib on the Nall of your Thumb, and enter the Knife at the Extremity of the Nib, and cut it through a little sloping, then with an almost downright cut of the Knife cut of the Nib. The breadth of the Nib must be proportioned to the breadth of the Body, or downright back-strokes of the Letters, in whatever hand you write, whether small or Text. Note. In sitting to write, place yourself directly against a fore-right Light, or else have it on your left Hand, but by no means have the Light on the right Hand, because the shadow of your Writing-hand will costruct your Sight.

34

Λ

35 Or WRITING. ය Note. It is necessary for all those who would qualify themselves for business, often to imitate this Print hand, to make clean marks on bales of goods, or plain directions on parcels. N N C 6 opics. Digitized by Google

Copies in Alphabetical Order.

Art is gained by great Labour and Industry. A, A covetous Man is always, as he fancies, in Want. B. Beauty is commendable in some, but it ruins others. By Diligence and some Care, we attain to write fair: С.--Contentment is preferable to Riches and Honour. Can they be deemed wise who Counsel despise? Deride not Infirmities, nor triumph over Injuries. D. Delight in Virtue's Ways, and then you'll merit Praise. E. Every Plant and Flower displays to us God's Power. Example oft doth rule the wise Man and the Fool. ٤ F. Fair Words are often used to hide bad Deeds. Few do Good with what they have gotten ill. G. Godliness with Content is great Gaip. Great Minds and small Means ruin many Men. Η. Hasty Resolutions are seldom fortunate. Haste makes Waste of Paper, Ink, and Time. I. Instruction and a good Education are a durable Portion, Ignorance is the greatest Enemy to Learning. К. Keep a close Mouth, if you'd have a wise Head. Kings as well as mean Men must die. L. Learn to live as you would wish to die. Learn to unlearn what you have learned amiss. M. Modesty has more Charms than Beauty. Make use of Time now whilst you're in your Prime. N. Necessity is commonly the Mother of Invention. Next to a good Conscience prefer a good Name. Opportunity neglected brings a severe Repentance. О. Of all Prodigality, that of Time is the worst. Р. Poor Men want many Things, but Covetous Men all. Patience and Time run through the roughest Day. Q. Quick Promisers are commonly slow Performers. Qualify exorbitant Passions with Quietness & Patience ષ. Remember your Duty to God, your Neighbour, and yourself. Repentance comes too late when all is consumed. S. Sin and Sorrow are inseparable Companions. Self Love is the greatest Flatterer in the World. Т. The End of Mirth is often the Beginning of Sorrow. Time is so swift of Foot that none can overtake it. v. Vain and transitory is all worldly glory. Virtue and Fortune work Wonders in the World, W. Wisdom is more valuable than Riches. What pleases God must be, none alters his Decree. *X. Xenophon

Digitized by Google

36

OF WRITING.

- X. Xenophon was a great Captain as well as a Philosopher Xerxes whipped the Sea for not obeying his Command-
- Y. . Young Men lament your mis-spent Time.
- Zeal mixed with Love is harmless as a Dove. Z. Zealously strive with Emulation to write.

Short Lines for Text Hand.

Abandon whatsoever is ill-Be wise betimes. Care destroys the Body-Do the Things that are just. Expect to receive as you give-Frequent good Company. Give what you give cheerfully-Hold good. Men in Esteem Imitate that which is good-Keep God's Commandments Learn to be wise-Make a right use of Time. Nothing get, nothing have-Observe Modesty. Pleasures are very short-Pains are very long. Quit all revenge-Quiet your Passions. Recompense a good Turn-Repent of your Sids. Silence gives Consent-Sin not at all. Time is more precious than Gold-Turn from your Sins-Use moderate Pleasure- Use no bad Company. Vain are some Pleasures-Vice is detestable. Wisdom is the principal Thing--Wise Mcn are scarce. Xenophon, Xenocrates.

Yesterday cannot be recalled-Zeno and Zenobia.

As good Ink is essential to good Writing, I here give a Receipt or two for making some of the best Black Ink in the World, viz.

A Receipt for making Black Ink.

To six Quarts of Rain or River Water, put one Pound and a Half of fresh blue Galls of Aleppo, bruised pretty small; six Ounces of Copperas; also eight Ounces of clean, bright, and clear Gum Arabic. Let these stand together in a large Stone Bottle near a Fire, with a narrow Mouth, to keep it free from Dust; shake, or stir it well, once every Day, and you will have excellent Ink in about a Month's Time, and the older it grows the better it will be for Use.

Ingredients for a Quart.

One Quart of soft Water, four Ounces of Galls, one Ounce of Copperas, and two Ounces of Gum, mixed and stirred as above. The Galls must be bruised.

Digitized by Google

How

How to make Red Ink.

Take three Pints of stale Beer (rather than Vinegar) and four Ounces of ground Brazil Wood; simmer them together for an Hour, dissolve Half an Ounce of Gum Arabic in it; then strain it through a Flannel, and bottle it up (well stopped) for Usc.

To keep Ink from Freezing or turning Mouldy.

In very severe Weather, ink will be apt to freeze, which takes away all its Blackness and Beauty. To prevent which, put a Wine Glass of Brandy or other Spirit into a Quart, and it will not freeze. And to hinder its turning mouldy, put a little Salt in it

FAMILIAR LETTERS,

ON SEVERAL OCCASIONS AND ON DIVERS SUBJECTS.

LETTERS are variously worded, and ought properly to express the desires, thoughts, &c. of the writer to the reader, by which the receiver of the letter may fully understand the wants or intentions of the sender. Of these I here give sundry examples

A Letter from a Son to his Father.

Hon. Father,

As I have not had a letter from you since your favour of the 8th of October last, which I answered by the next post, I take this opportunity of inquiring after your health, and that of my sister. Pray give my love to my sister, and be pleased to accept of my duty to yourself, who am,

Sir,

London, Dec. 6, 1810.

your dutiful Son, Anthony Addlehill.

The Answer.

Dear Son,

Pensey, 28th Dec. 1810.

I received your letter of the 6th instant, and thank yon for inquiring after my health, which, I thank God, I perfectly enjoy at present, as I wish and hope you do. Your sister sends her love to you, and with it a turkey and a chine of bacon, to which I wish you and your friends (if you invite any) a good appetite. Prayers to God for your welfare, temporal and eternal, are constantly offered up by

Your loving Futher,

Digitized by Google

Andrew Addlehill.

38

From a Niece to her Aunt.

Dear Aunt,

The trouble I have already given you puts me to the blush, when I think of intruding again on your goodness; but necessity, which frequently obliges us to such actions as are contrary to our inclination, is the motive that induces me to be again troublesome. I pray you to excuse me, if I once more beg your assistance, which I do not doubt but you very well know I stand greatly in need of at this time, and I shall ever have a grateful remembrance of your goodness to me; and I hope I shall be, one time or other, in a capacity of making some return for the many obligations your goodness has conferred upon me.

London, Jun. 9, Your most affectionate Niece, 1811. and very humble Servant.

Penelope Pinch.

From a Brother to his Sister.

Dear Sister,

My great distance, and long absence from you, make me very solicitous concerning your welfare. Natural affection inclines me strongly to have you in remembrance, tendering your health and welfare in every respect, as dear as my own; and there is nothing at my command, but, if you request, it shall be freely yours. Notwithstanding the distance, I purpose to make you a visit very shortly, and I had done it before now, but an urgent occasion interposed, the particulars of which being too long for a letter, I shall acquaint you with when I see you. Pray give my due respects to all friends. I am,

Dear Sister,

London, Jan. 6, Your affectionate Brother, 1811. Henry Hearty.

A Letter from a Youth at School to his Parents. Honoured Father and Mother,

I am very much obliged to you for all your favours; all I have to hope is, that the progress I make in my learning will be no disagreeable return for the same... Gratitude, duty, and a view to future-advantages, all conspore to make me fully sensible how much I ought to labour for my improvement and your satisfaction, in order to show myself upon all occasions to be

Acton School, Feb. 8, Your dutiful son, 1811. Daniel Diligent.

A Letter of Recommendation.

SIR,

The bearer, Francis Bashful, I send to you as one whose honesty you may rely on, and my experience of his conduct and fidelity gives me a certain kind of confidence in recommending him to you; for you know, Sir, that I would not recommend any one to you of whose probity I had the least. shadow of doubt or suspicion. I am, with due respect,

Sir, your real Friend,

and humble Servant,

Feb. 6, 1811.

George Generous.

A Letter of Thanks.

SIR,

I received your favour, with the kind present which accompanied it. I have no other way of expressing my gratitude at present than by my hearty thanks. Every thing you do has a peculiar excellence, and the manner of doing it is as agreeable as the action itself; but I must stop, lest a I should offend that delicacy which I would commend, and a which is constantly admired by,

Feb. 10, 1811. Sir, your most obliged and

George Grateful.

A Letter in Manner of Petition to a Friend.

Honoured Sir,

I am uncertain whether my late misfortunes have come to your knowledge; however, I will presume on your goodnature, being assured, from many examples of your compassion, that you will think of and take pity on the distressed; therefore, as an object truly deserving compassion, I most humbly implore and petition you to consider the many losses and disappointments that I have lately met with, which have reduced me to such necessitous circumstances, that I cannot possibly proceed in my affairs. You were pleased once to style me your friend, and so I was indeed. I doubt not, Sir, but your generosity and goodness are great, and I hope, with all humility, you will be pleased to interpose your good offices between ruin and, Sir,

Your unfortunate humble Servant,

Digitized by Google

It is as proper to know how to subscribe, and how to dircct, as it is to write a letter.

humble servant,

SUPERSCRIPTIONS.

To the King's Most Excellent Majesty. To the Queen's Most Excellent Majesty, &c. To the Prince, To his Royal Highness, &c. To the Psincess, To her Royal Highness, &c. To Archbishops.

To his Grace the Lord Archbishop of Canterbury, or To the Most Reverend Father in God, &c. To Bishops.

To the Right Reverend Father in God, &c. To Descons, Archdeacons, &c. To the Reverend A. B. D. D. Dean of W.

To the Inferior Clergy.

To the Rev. Mr. A. &c. or To the Reverend Doctor, &c. To the great Officers of State.

To the Right Honourable A. Lord L. Lord High Chancellor of Great Britain. Lord President of the Council-Lord Pring Seal-One of his Majesty's principal Sccretaries of State, Sec.

To Temporal Lords.

His Grave the Duke of, &c. The most Hon. the Marquis of, &c. The Right Hon. the Earl of, &c. The Right Hon. the Lord Viscount, &c. The Right Han. the Lord, &c.

The eldest sons of Dukes, Marquisses, and Earls, enjoy by the courtesy of *England*, the second title belonging to their father; thus the eldest son of a Duke of Bedjard is called Marquis of *Tavistock*; the Duke of Grefton, Earl of *Euston*; of the Earl of Macclesfield, Lord Viscount Panker, &c. and their daughters are called ladies, with the addition of their Christian and surnames thus: Ludy Carolina Russell, Augusta Fitzroy, Lady Betty Parker, &c.

The youngest sons of Dukes are also called Lords; and those of Marquisses and Earls, together with all the children of Viscounts and Barons, are styled Honourable.

To a Baronet, Honourable; a Knight, Right IVarshipful, and to an Esquire, Worshipful. Every Privy Councellor, though not a Nobleman, hath the title of Right Honourable. All Ambassadors have the style of Excellency, as hath also the Lord Lieutenant of Ireland, and the Captain General of his Majesty's forces. The Lord Mayor of London, during his Mayoralty, hath the title of Right Honourable, and the Sheriffs, during that office, have the title of Right Worshipful. All Mayors of Corporations have the title of Esquires during their office.

Digitized by Google

For

For the Beginning of Letters.

To the King; Sirc, or may it please your Majesty.

To the Queen; Madam, or may it please your Majesty,

To the Prince; Sir, or may it please your Royal Highness.

To the Princess; Madam, or may it please your Royal Highness.

- To a Duke; My Lord, or may it please your Grace.
- To a Duchess; Madam, or may it please your Grace.
- To an Archbishop; May it please your Grace.
- To a Marquis; My Lord, or may it please your Lordship.
- To a Marchioness; Madam, or may it please your Ladyship. To an Earl, Viscount, or Baron: My Lord, or may it please your Lordship.
- To their Consorts; Madam, or may it please your Ladyship. To a Bishop; My Lord, or may it please your Lordship.
- To a Knight; Sir, or may it please your Worship.
- To his Lady; Madam, or may it please your Ladyship.
- To a Mayor, Justice of Peace, Esquire, &c. Sir, or may it please your Worship.
- To the Člergy; Reverend Sir, Mr. Dean, Mr. Archdeacon Sir, as circumstances may require.

At subscribing your name, conclude with the same title you began with, as, My Lord, your Lordship's, &c.

To either House of Parliament, and to Commissioners, Bodies corporate ;

To the Right Hon. the Lords Spiritual and Temporal, in Parliament assembled.

To the Honourable the Knights, Citizens, and Burgesses, in Parliament, assembled.

To the Right Honourable the Lords Commissioners of the Treasury, or Admiralty.

To the Honourable the Commissioners of his Majesty's Customs, Revenue of the Excise, &c.

To the Worshipful the Governors of Christ's Hospital.

To the Master, Wardens, and Court of Assistants of the Worshipful Company of Stationers.

OF SECRET WRITING.

First, If you dip your pen in the juice of a lemon, or of an onion, or in your own urine, and write on clean paper whatever you intend, it will not be discerned till you hold it to the fire, and then it will appear legible.

Another way: When you write a letter, the contents of which you intend shall not be discovered but by those you think

think fit, first write your thoughts on one side of your letter with black ink, as usual, and then, on the contrary side, go over the said matter that you would have secret, with a clean pen dipped in milk, and that writing cannot be read without holding it to the fire, when it will appear legible in a bluish colour.

A third method is, to have two pieces of paper equal in size, and the uppermost cut in chequered holes or squares big enough to contain any word of six or seven syllables, and in those squares write your mind in regular sense, and then take off the said chequered paper, and fill up the vacancies with words of any kind, which will render it perfect nonsense, and not capable of being read to any purpose, and transmit and send the said uppermost, or chequered paper, or another exactly of the same form, to your correspondent; whereby he shall, by laying it nicely on your said letter, read your intended sense, without being perplexed with the words of amusement, intermixed, which make it altogether unintelligible.

Or again, you may write to your friend in proper sense with common ink, and let the lines be at so commodious a distance, that what you intend to be secret may be written between them with water, in which galls have been steeped a little time, but not long enough to tincture the water, and when dry, nothing of the writing between the said lines can be seen; but when it is to be read, you must, with a fine hair pencil, dipped in copperas-water, go between the said lines, and so you make it legible.

Note. This way will excite no suspicion, because the letter scems to carry proper sense in those lines that are set at a proper distance.

Of ARITHMETIC.

After writing, the next necessary step towards qualifying a person for business is the understanding the noble science of *Arithmetic*, a knowledge so necessary in all the parts of life and business, that scarcely any thing is done without it.

In my directions for its attainment, I shall proceed with such plainness of method, and familiarity of style, as shall render it easy to be understood, and conspicuous to the meanest capacity. And first of Notation and Numeration.

Of

Of NOTATION and NUMERATION.

In Notation we must note, or observe, that all numbers are expressed by, or composed of, these tea figures, or characters following, viz.

One, two, three, four, five, six, seven, eight, nine, sipher...

Nine of these are called significant figures, to distinguish. them from the cipker, which of itself signifies nothing ; but as it is placed in whole numbers, serves to increase the value of the next figure or figures that stand before it ; as 3, isbut three; but before the cipher, shus, 30, the 3 becomes thirty, &c. But in decimal Fractions, Q decreases the var lue of figures behind it, for there, 3 is three-tenths of any thing; but by placing 0 before it, thus, 03, it is decreased from 8 tenth parts to 3 hundred parts of any thing, drc.---We are to observe, that every one, or any of the above-mentioned nine figures, or digits, have two values, one certain, and another uncertain; the certain value is when it stands by itself; the uncertain is, when joined or placed with other figures or ciphers; for when any one of these figures stand alone, they signify no more than their own simple value; as 5 is but five, 4 but four, 6 but six, and 3 no more than three, &c. And this is the certain value of a figure. But when another figure or cipher is annexed, they then are increased in their value ten times ; as 5, or 5 units or ones, to 5 tens, or fifty; 4 to 4 tens, or forty; 6 to 6 tens, or sixty; and 3 to 3 tens, or thirty; as thus, 51, fifty-one ; 42, forty-two; 63, sixty-three; 34, thirty-four, &c. Again, if any of the said figures stand in their place towards the left hand, they signify so many hundreds, as they expressed units or ones; as 500 is five hundreds, 600 six hundreds, and 300, three hundreds, &c. If any of them possess the 4th place towards the left hand, they are so many thousands. as they contain units; and so any or every figure increases by a ten-fold proportion, from the right hand to the left, according to the place it is found or stands in; so that 5 may be either five or fifty; five hundred, or five thousand; in the first place, 5; in the second, 50; in the third, 500; in the fourth place, 5000, &c.

The true value of figures in conjunction may be fully learned and understood by the following table:

. Or ARTHMETIC.

The Numeration Table.

12 C Thous, of M. 11 X Thous, of M. 10 Thous, of M. 9 C of Millions.	7 I cues of Mullions. 7 Millions. 6 C of Thousands. 5 Tens of Thousands. 3 Hundreds. 2 Tens.	l Units Thous. of Millions Millions.	Thousands.
12345	678901	2 123 456	789 012
1234	507890	12 345	678 901
123	4567890	0 1 234	567 890
12	345678	123	456 789
- 1	234567	3 12	345 678
• .	123456	7 1	234 567
	123450	5	123 456
	1234	5	12 345
	• 123/	L j	1 234
	. 123	3	123
	1 \$	2	12
	•	l J	1

For the easier reading of any number, first get the words at the head of the table by heart, as units, tens, hundreds, thousands, &c. and apply them thus: 75, five units, five; and 7 tens, seventy; that is, seventy-five. Again 678; 8 units, eight; 7 tens, seventy; and 6 hundreds, six hundred; that is, six hundred seventy-eight. Once more, 3456 ; units, six; 5 tens, fifty; 4 hundreds, four hundreds; 3 thousands, three thousands; together, three thousand four hundred fifty six. The 4th line of the table, viz. 123456789. may be read thus : one hundred twenty-three millions, four hundred fifty-six thousand seven hundred eighty-nine. But the manner of reading any number may be rendered more intelligible by stops, thus : make a comma after every third fgure or cipher, beginning at the right hand, and so on towards the left, thereby distinguishing every third place into hundreds, as hundreds of units, hundreds of thousands, hundreds of millions, and hundred thousands of millions, &c. And for trial, read the first line of the table, where the last place in valuation is hundred thousand of millions, and being pointed into periods, will stand thus, 123.

45

123,456,789,012, and is to be read thus, one hundred, twenty-three thousand, four hundred fifty-six millions, seven hundred eighty-nine thousand, (no hundreds) and twelve. Again, the following number, viz. 276,245,678, 921,400, is to be read thus; 276 million of millions 245 thousand of millions, 678 millions, 921 thousands, 460 units or ones; that is, two hundred and seventy-six million of millions, two hundred forty-five thousand six hundred seventy-eight millions, nine hundred twenty-one thousand four hundred and sixty. The foregoing *Table of Numera*tion is on the right hand distinguished into such periods for the easier reading thereof, and the like is frequently done in the public offices, and by men of business.

Numbers to be read or written, viz.

96 Ninety-six.
242, Two hundred forty-two.
7924, Seven thousand 9 hundred 24.
54006, Fifty-four thousand and six.
524707, Fire hundred 24 thousand 707.
4706240, Four millions 706 thousand 240.
62700472, Sixty-two millions 700 thousand 472.
474960204, Four hundred 74 millions 960 thousand 204.
4214007042, Four thousand 214 millions 7 thousand 42.
44214800240, Forty-four thousand 240.

Q/ Numerical Letters.

Numbers were anciently expressed by letters; and it is necessary to understand them for reading the dates to years, in title pages of books, on funeral monuments, and in Roman history, &c.

Digitized by Google

1 signifies one.
V five
X ten.
L fifty
C hundred.
CC two hundred.
D or 10 five hundred.
M or C10 a thousand.
100 five thousand.
C100 firty thousand.
CCCC10000 a hundred thousand.

10000 five hundred thousand.

CCCCCI DODD ten hundred thousand, or a million.

M.DCCCX1 expresses the present dute of 1811.

M being one thousand D five hundred, CCC three hundred and XI. eleven, together, one thousand eight hundred and eleven.

When

When a letter of inferior value stands after one of superior, its value is to be added thereto; thus VI. VII. and VIII. signify six, seven, and eight; but when a letter of inforior value is placed before one of superior, then its value is to be taken therefrom; thus IV, IX, XL, and XC, signify four, nine, forty, and ninety.

ADDITION

Is the putting together two or more numbers or sums, so as their total value may be discovered or known.

Herein we must always observe to set the numbers to be added, orderly one under the other; that is, units under units, tens under tens, hundreds under hundreds, &c. as in the subsequent examples.

Ya	rds.		Gallons				Pounds.						
`T.	U.		H.	Т.	U.		X of	Th.	Th.	H.	T.	U.	
2	4		7	5	-6			5	7	9	6	2	
4	2		4	3	2			. 3	9	7	4	4	
6	8		5	7	8		•	6	7	2	2	2	
8	6		- 6	9	6			7	9	6	7	4	
2	4		- 4	2	2			5	2	4	9	2	
4	2	•	6	7	8	•		7	2	3	9	0	
2' 8	5	-	3 5	6	2		3	6	9	4	. 8	.4	
2 8	•		35	0	2		3	0	9	4	. 8		

Addition of Numbers of one Denomination.

In addition of simple numbers, whether it be yards, gallons, pounds, or any thing else, remember to carry 1 for every 10 that you find in the right hand row, or rank of figures, being units to the next row of tens, and the like from the rank of tens to the row of hundreds, &cc. and whatever it makes in the last row, you must set down, amount to what it will.

The numbers above arc set down in order, as before directed; that is, units under units, tens under tens, &c. as may be plainly understood, by being indicated at the head of each row, or rank, by U. T. H. &c. signifying units, tens, hundreds, &c. Then in casting up each example, to know its total, I begin at the right hand, or unit's rank of the first example, and say 2 and 4 is 6, and 6 is 12, and 8 is 20, and 2 is 22, and 4 is 26; in which row there are two tens, and 6 over; wherefore I set down 6 just under its own rank, and carry 2 to the next row, and say 2 that I carry and 4 makes 6, and 2 is 8, and 8 is 16, and 6 is 22, and 4 is
is 26, and 2-is 28; and this being the last row, I set down the amount, viz. 28; so that the total number of yards is found to be 286, and the amount of the next or second example is found by the same method to be 3562 gallons. And in the third and last example, the total number of pounds is found by the same way to be 369484; and so the total of any other example of the same kind, viz. simple numbers of one denomination may be found. Note, That when any of the ranks amount to just 10, 20, 30, 40, 50, &c. then you must set down the 0 under its proper rank, and carry either 1, 2, 3, 4, or 5, according to the number of tens that you find to the next row.

We come now to Addition of Money.

48

In England or Great Britain accounts are kept in pounds, shillings, pence, and parts of a penny; so you are to observe, that

4 Farthings make 1 penny.

12 Pence 1 shilling, and

20 Shillings 1 pound.

In adding of these together, you are, with the same punctuality, to mind that pounds be set directly under pounds, shillings under shillings, pence under pence, and farthings under farthings; as in the following example.

But before you proceed, it will be necessary to have the following tables by memory, for the readier remembrance of how many shillings there are in a given number of pence, and how many pounds are contained in a given number of shillings, &c.

Note, That l stands for pounds, s for shillings, d for pence, and qr for farthings, those being the initial letters of Libra, Solidus, Denarius, and Quadrants, Latin words of the same signification.

Tables.

Pence.	5.	d.	·		l. s.	
-20 is	1	8	20	is is	1 0	
SO -	2	6	36	; -	1 16	
40 -	Э	4	46	j	26	
50 -	4	2	56	; _	2 16	
60 -	5	0	66	; _	36	
70 -	5	10	. 76	; _	3 16	
80 -	6	ŝ	86	. -	46	
90 -	7	6	96		4 16	
100 -	8	4	106	i	56	
110 -	9	2	116	; -	5 16	
120	10	0	126		66	

Digitized by Google

The

The use of these tables is this: whenever you are casting up any sum of money, you begin at the right hand (as before in sums of one denomination), suppose at the place of pence, then if the rank or denomination of pence amounts, from the bottom to the top, 56; your table of pence tells you, that 50d. is 4s. 2d. to which adding 6d. the sum is 4s. 8d; If to 92d, the table tells you, that 90d. is 7s. 6d. which with 2d. over, is 7s. 8d. And if to 81d. the table shows that 80d. is 6s. 8d. and 1d. more makes 6s. 9d. &c.

The shilling table serves to lead you to a quick recollection of how many pounds are in so many shilling; as, admit the rank of shillings arises to 57s. the table says that 50s. is 2l. 10s. and 7s. over make 2l. 17s. If to 84s. the table shows that 80s. are just 4l. and 4s. over, make 4l. 4s. If to 112s. the table shows that 100s; are 5l. and 12s. more make 5l. 12s. &c.

Addition of Moncy.

Money owing.	ĺ.	5.	<i>d</i> .	Money received.	. 1.	<i>s</i> .	d.
To Mr Umpleby	4	12	6	For Paper	46	10	9
Mr. Olding	7	6	9	Peas	79	16	0
Mr. Worth	4	12	0	Indigo	42	18	3
Mr. Sandle	6	17	7	Bread Cloth	66	12	4
Mr. Dalton	5	6	6	' Canary	90	16	0
Mr. Howit	4	12	3	Wine	84	7	- 6
Mr. Craig	6	0	·0	Quills	24	12	0
Mr.Flewel 🗠	5	15	4	Logwood	60	10	Û
-	-i.			2 · · · · · ·			
	1 5	2	11		496	đ	10
	÷		-		-		

I begin with the right hand rank, that is, the pence in the example of money owing, and say 4 and 3 are 7, and 6 is 13, and 7 is 20, and 9 is 29, and 6 makes 35 pence; now 30 pence, according to the table, is 2s. 6d. and 5d. more makes 2s. 11d. I set down 11 exactly under the rank of pence, and say, 2 shillings that I carry (which I do to the rank of shillings), and 5 is 7, and 2 is 9 (for I take first only the units rank of shillings) and 6 is 15, and 7 makes 22, and 2 is 24, and 6 is 30, and 2 makes 32; and now being come to the top of the sum, and it making 32. I come down with the tens of shillings, saying 32 and 10 is 42, and 10 is 52, and 10 is 62 and 10 is 72, and 10 makes 82 shillings; and the table showing me that 80 shillings is 4 pounds, 1 then know 82 shillings is 44. 2s. then I set down the odd 2s. just under the

D

TOW

row of shillings, and carry 4 pounds to the pounds: saying 4 that I carry and 5 is 9, and 6 is 15, and 4 is 19, and 5 is 24, and 6 is 30, and 4 is 84, and 7 is 41, and 4 makes 45 pounds; so that the total of those several sums of money due to the several persons amounts to 45l, 2s, 14d

In the example of money received, I begin at the right hand rank as before, and say 6 and 4 are 10, and 3 is 18; and 9 makes 22, and 22 pence being is 10d. I set down 10 and carry 1s. to the shillings, saying, 1 that I carry and 2 is 3, and 7 is 10, and 6 is 16, and 2 is 18, and 8 is 26, and 6 makes 32; then I come down with the tons, saying, 32 and 10 makes 42, &c, and find at the bottom it comes to 102 shillings, which makes 51, 2s. I set down 2s; and: carry 51. to the pounds, saying 5: that I carry and 14 is 9. &c. I find, that at the top, it amounts to 364, whereof 1 set down 6 exactly under its own rank, viz. the pank of units of. pounds, and carry 3 for the 3 tens that are in 36, for at all times in the addition of the left hand denomination, whether it be money; weight, of measure ; that is in the denomination of pounds, tons, or yards, you must for every ten carry one to the next row, &c. saying, 3 that I earry and 6 is 9, and 2 is 11, and 8 is 19, &c. and I find that at the top it comes to 49; wherefore I set down 49 to the left, hand of the 6, and the total amount of the money received for those particular goods or wares sold is 4961. 2s. 10d.

ł.

Í

	M_{o}	re E	ampl	s for Pre	actic	e. !;	6. 1	•	•
	<i>l</i> .	8.	d	1.	s.	d.	l.	8.	d.
Mr. Money	17	12	$6\frac{1}{2}$	146	12	3]	4	10	6
Mr. Gaunt	26	10	21	287	10.	9	Q	7 ·	× 9
Mr. Herne	50	Q	Q	.46	16	6 -	1	.0	- 0
Mr. James	41	12	1	100	0	ΰ0	1	1.	0
Mr. King	60	14	07	72	12	1	0	4	6
Mr. Long	29	16	6	69	16	67	्ष	11	ite
Mr. Monk	16	10	0	460	12	9	4	18	3
Mr. Napper	20	0	41	4 1)	10	0	0	7 .,	6
Total	265	15	9	1233	10"	11‡	12	15	7,
	-	and the second sec			_	_		_	_

Addition of Avoirdupoise Weight.

By this weight are weighed all kinds of grocery goods or wares, or goods subject to waste; as tobacco, sugars, fruit, and drugs; as also fiesh, butter, cheese, alum, tallow, iron, brass, copper, lead, tin, pewter, pitch, tar, rosin, hemp, flax, soap, &c.

OF ARITHMETIC.

A Table of this Weight is as follows: 4 Quarters make 1 dram, marked - dr. 16 Drams 1 ounce - oz. 16 Ounces 1 pound - lb. 8 Pound 1 pound - lb.

2	8 Po	unds	1 quar	ter c	of a shu	indred	l we	ight	-	qrs.	
÷ 4	4 Qi	artei	s 1 hui	ndre	d wei	ght		-	-	cwt.	•
20) Hi	indre	d 1 ton		•	-	•	•	: 🛥	t.	
10	4	28.	10	4	28	ŧ0	4	28	1σ	10	16
C.	grs.	lb.	: C	rs.	' lb.	C• 🗤	qrs.	lb.	<i>lb</i> .	0Z.	dr.
5	1	16	24	2 -	12	-9	1	16	24	11	12
4	2	24	4 2.	2	· 0	4	3	26	42	14	15
6	3	· 6	16	U.	12	7	1	• 0	64	10	13.
7	1	12	25	3	24	·· 5	3	12	29	.9	10
9	0	.20	· 19	0	20	. 4	3	÷ 2 ·	16	12	13
6	2	0	26	1	22	2	2	2	27	13	14
39	• 3	22	154	3	6	34	3	17	206	· 9	11
		-									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

In these examples, the manner of proceeding is the same . as in the former, observing, that the number of units of each lesser denomination, which make an unit of the next greater, found by the preceding table, is placed above each rank of numbers; that is to say, in the first example, 28 the number of pounds contained in a quarter of a hundred weight, is placed over the column of pounds; now that column, when added up, makes 78, which contains two 28's, and 22 over, wherefore I set down 22 under the column of pounds, and carry 2 to the column of quarters, and so on.

Note. That in weighing at the water-side, or elsewhere, they do not weigh by the ton, though some goods are sold by it, as iron, logwood, cheese, &c. but by the hundred, quarters, and pounds, which are afterwards reduced to and computed by tons.

Addition of Troy Weight.

By this weight are weighed jewels, gold, silver, pearls, and medicines; and the usual denominations are pounds, ounces, penny-weights, and grains, as in the following table, viz.

24 Grains make 1 penny-weight.

20 Penny-weights 1 ounce, and

12 Ounces 1 pound troy weight, D 2

Digitized by Google

Examples

Examples of Troy Weight.

Ingots of	Silv. w	t. viz		10	12	20	24	- 12	20	24	
No.	lb. oz.	pw.	gr.	lb.	02. 1	ow.	gr.	cz.	DW.	gr.	
1 wt.	4.5	12	10	24	6	10	11	204	10	14	•
2	5 4	16	17	14	10	11	12	- 96	7	17	
3	3 11	- 19	20	21	6	4	17	100	11	12	
4	4 6	7	12	22	10	12	14	56	16	20	
5	51	-11	12	16	11	12	13	212	10	23	
6	4 11	12	13	22	7	6	17	96	19	12	
	28 6	0	12	123	4	18	12	767	17	2	
				÷							-

How to prove Addition.

In all examples of addition, whether of simple numbers, that is, numbers of one denomination; or in examples compound, that is of divers denominations, as pounds; shillings. pence, farthings, &c. the readiest method of proof is to cast the same downwards, beginning at the top as you did the same upwards, beginning at the bottom, and if that is the same the work is right. I might here give examples of other kinds of addition, as apothecaries weight, cloth, liquid, dry and long measure, time, &c. but this method serves for any of them, having respect to the tables that belong to those several denominations, as follow, viz.

A Table of the Parts of Apothecaries Weight.

20 Grains 1 scruple Ja scruple

3. Scruples 1 dram 3

3 a dram

8 Drams 1 ounce 12 Ounces 1 pound 3 an ounce 16 a pound

By these weights apothecaries compound their medicines, but they buy and sell by avoirduping weight.

Note. Physicians make use of the following characters. R - Recipe, take guit. a drop.

f of cach ingredient an

ana. | equal quantity.

the - a pound.

an ounce

- a dram.

- **9** a scruple.
- gr. a grain.

Cochl.

a spoonful, or half Ss. - half. an ounce of sy- Q. s. a su rups, or three Q. l. as mu drams of distilled waters.

Such a quantity as may be taken between the thumb and the two fore fingers.

M - a handful.

Cong. a gallon.

Q.s. a sufficient quantity

Q. l. as much as you please, S. a. S. a. According to the rules of art.

OF ARITHMETIC.

Cloth Measure.

4	Nails, or 9 inches,	1 qr. of a yard.
4	grs. or 36 inches,	1 yard.
5	grs. or 45 inches,	1 ell wide.
5	grs. or 27 inches,	1 ell Flemish.
Ó	ars. or 54 inches.	1 ell French.
-	A Table of	Wool Weight.

Note. 71b. make 1 clove; 2 cloves, or 141b. 1 stone; 2 stones, or 281b. 1 todd; 6 todds and 1 wey or 1821b. 2 weys, or 364lb. 1 sack; and 12 sacks 1 last, or 4368lb. 240lb. 1 pack of wool.

Note. That 11b. 20z. 12pw. troy, is equal to a pound evoirdupois, and a pound troy is about 13oz. 2 drams and a half avoirdupoise. l. s. d.

 $\begin{cases} \text{of silver is worth } \begin{cases} 3 & 2\\ 4 & 15 \end{cases}$ A pound weight troy 2 A pound wt. avoirdupois 1 112 2

1007. $\begin{cases} \text{in gold} \\ \text{in silver} \end{cases}$ weighs $\begin{cases} 1 & 11\frac{3}{4} \\ 26 & 04 \end{cases}$ Avoi. wt.

A pound avoirdupois is heavier than a pound troy; but an ounce troy is heavier than an ounce avoirdupois; i. c. 144lb. avoirdupois are equal to 175 pounds troy; but 175 ounces troy are equal to 192 ounces avoirdupois.

A Table of Liquid Measure.

Liquid Measure is of two sorts, viz. one for wine, brandy, &c. and the other for beer and ale.

- 26		os Canons i puncheon.
4	Quarts 1 gallon,	2 Hogsheads 1 pipe or butt.
42	Gallons 1 tierce,	2 Pipes or butts 1 tun, or
63	Gallens 1 hogshead,	252 gallons.
. 5	Salad oil has 236 galle	ons to the tun; but oil from
Gr	eenland has 252 gallons	to the tun.
5	The wine gallon contains	234 cubic or solid inches. by
wh	ich all liquids are measu	red, except beer and ale.
,	· · · · · · · · · · · · · · · · · · ·	Measure.
2	Pints 1 quart.	2 Kilderkins 1 barrel, or 36
4	Quarts 1 gallon.	gallons
9	Gallons 1 firkin,	1 Barrel and half, or 54 gal-
15	Gallons 1 kilderkin,	lons, 1 hogshead
	Ale	Mcasure.
2	Pints 1 quart,	2 Kilderkins 1 barrel. or 32
4	Quarts 1 gallon,	gallons.
8	Gallons 1 firkin of ale,	1 Barrel and half, or 48 gal-
2	Firkins 1 kilderkin,	lons 1 hogshead.
	*	D 3 The

Wine, &c. allon's t

The beer and ale gallon are the same, viz. 282 solid inches, but with this difference, i. e. the barrel of beer contains 4 gallons more than the barrel of ale.

	Dry	Me	asure.
2	Pints 1 quart,	5	Quarters 1 wey.
2	Quarts 1 pottle,	2	Weys 1 last.
2	Pottles 1 gallon,	36	Bushels of sea coal 1 chal-
2	Gallons 1 peck	•	dron; and 21 chaldron is
4	Pecks 1 bushel land-		accounted a score in the
	measure		River Thames.

8 Bushels 1 quarter.

The chaldron of coals at London' contains 36 heaped Winchester bushels, and weighs about 28 and a half cwt. according to the quality of the coals.

A Newcastle chaldron weighs 53 cwt. and 8 chaldron, or 21 tons 4 cwt. make a keel. A ship load contains 80 keels, or 160 chaldrons. t et ger

Tong Measure.

3 Barley corns 1 inch, 5 Yards and a half 1, pole	
4 Inches 1 hand. Used in perch, or rod.	Ś
measuring horses. 6 Feet 1 Tathom, or 2 yds,	•
12 Inches 1 foot. 40 Poles, or 220 vds. 1 fur.	
3 Feet 1 yard. 8 Furlongs 1 mile: or 1760	5
3 Feet 9 inches 1 ell Eng. varids.	
5 Feet, a geometrical pace 3 miles 1 league.	,
Land Measure.	1
141 Square inches make 1 Square foot.	

- 9	Square feel	્લ	Square yard.	•
30‡	Yards	- 1	Square pole or perch.	
.40	Perches	- 1	rood or quarter of an acre.	
160	Poles in length, and	1	in breadth is 1 acre.	•
80	Poles in fength, and	2	in breadth, 1 acre.	,
4 0	Poles in length, and	4	in breadth, 1 acre.	<i>.</i>
- 4	Poles in length make	- 1	Chain, or 22 yards.	,
16	Perches	1	Square chain, and	
	M M M M M	-	the second se	•

10 Chains in length, and 1 in breadth, make 1 acre. Time. 4 Weeks 1 month 60 Seconds 1 minute 60 Minutes 1 hour

34 hours 1 natural day

13 Months 1 day and 6 hours 1 solar year.

Seven days 1 week.

The common day begins with us at 12 o'clock at night : the astronomical day begins at 12 o'clock at noon.

The solar year is divided into 12 calendar mouths, which contains 365 days, as in the following verse :

Thirty days have September, April, June, and November, February kath 28 alone, and all the rest have thirty-one. Note. Leap Year, which happens every fourth year, consists of 300 days; on this semantic the second secon

SUBTRACTION.

The next rule in arithmetic is Subtraction, which teaches to take, a lesser number out of a greater, and shows the remainder or difference.

Place the less number accurately under the greater, draw a line under them, and beginning at the right hand, take each figure in the lower line from the figure under which If the figure in the lower line is greater than that it stands. in the upper, then, in numbers of one denomination, ten must be borrowed and added to the figure in the upper line; take the figure in the lower line from the sum, and write down the remainder, but for every ten thus borrowed, me must be paid or added to the next left-hand figure in the lower line. Example. Suppose Mr. Andrews oyes to Mr. Baker 3231. of which Mr. A. hath paid to Mr. B. the shin of 1468 in part, what remains due to Mr. Baker? Ans. 1771.

Here the lesser number 146 stands under the greater 323 I and to find the remainder, or sum remaining due, I say 6 from 3'I cannot, but 6 from 13 (for I borrow 10 and add it to the figure that stands directly over the figure 60, and there remains 7; then I that I borrowed and 4 is-5, for as I borrowed 10 in the inferior place, which is equal to one in the superior, so I must now pay the same; therefore I say 5 from 2 I cannot, but 5 from 12 (horrowing 10, and adding it to the figure 2, as above directed); and there remain 7; then 1 that I borrowed and 1. are 2, from 3, the figure above it, and there, remains 1 and so the example is done ; and by it shown that" Mr. A. still owes Mr. B. 177 pgunds; form proof of itse truth; add 177, the remainder, to 146, the lasser of the two given numbers, and it will' make 323 mbeing the same with the greater number or sum of money, first due, and therefore it is a sure proof of the truth and certainty of the rule. .u. 17. -

All examples in Subtraction of numbers of one denomination are performed as above ; .but, for the better explanation, admit a great sheep master has in all 6904 sheep, and takes out of them 2490 to dispose of at market, how many does he leave behind? To know this, set them down thus :

From-6904 the greater number,

Digitized by Google

Take-2490 the less number.

Answer 4414

Here I say 0 from 4 and there remains 4; then 9 from nothing (or 0) I cannot; but 9 from 10, adding 16 to the 9, and there remains 1; and 1 that I borrowed and 4 make 5, and 5 from 9, and there remain 4: and lastly, 2 from 6, and there remain also 4; so that 4414 are left behind, which put to the number he takes to market, makes the number he had, viz. 6904, and shows the deduction to be true, and the answer right.

	M	ore Examples f	or Practice.	
From Take	Yards. 37009 19765	Gallons. 47200 31976	ા. 479652 ૨૬૧૨૬૨	Pounds. 1479672 97694
Rem.	17244	15224	186703	. 1381978
Proof	37009	47200	479652	1479672

The distance of time since any remarkable event may be found by subtracting the date thereof from the date of the present year.

Examples.

41.-1810

1660 the fire of London. 1588 the Spanish Invasion.

Since 144 years.

L-1810

Since 222 years.

1605 Gunpowder Treason.

Since 205 years.

Subtraction of different Denominations.

Here if the figure or figures, placed in the lower line, exceed those in the upper, then as many units must be borrowed as make a unit, or one, of the next superior denomination, and one must be carried to the next left hand place in the lower line, as before.

Of Moncy.

l. s. d. Duc- 9 2 6 2 Paid- 6 16 4 p Balance 2 6 2

Suppose Mr. Cape owes Mr. Day 9l. 2s. 6d. and Mr. C. hath paid Mr. D, in part, 6l. 16s. 4d. what remains due to Mr. Day ? Answer, there is due to Mr. 2l. 6s. 2d.

. Again,

56

OF ARITHMETIC.

Sold for Paid in part	l. 242 174	s. d. 16 3 3 12 6 1 /2	Again, Mr. Coy sells to Mr. Joy Spanish wool to the value of 242l. 16s. 32d, and pays pre-
Answer	68	3 91	12s. 6gd. What money remains
Proof	242	16 3 3	684. 3s. 94. 4.

In the first of these examples, say 4d. from 6d. and there remains 2d. then 16s. from 2s. I cannot, but borrowing one integer of the next denomination, or 1 pound, which is 20s, I say 16 from 20 and there remains 4, and adding thereto the number 2, it makes 6; wherefore I put down 6 in the place of shillings, and say, 1 that I borrowed and 6 is 7: now 7l. from 9l. and there remains 2l. so the money due to Mr. Day is 2l. 6s. 2d. as in the example.

In the second example, I say 2 farthings, or $\frac{1}{2}$ from 3 farthings, and there remains 1 or $\frac{1}{2}$, which I set down in its place, viz. under the farthings; then 6 from 3 I cannot, but 6 from 15 (I borrow 1s. or 12d. to make it 15d.) and there remains 9d. which I place under the line of pence; then 1s, that I borrowed and 12 is 13; 13s. from 16s. there remains 3, which I set down under its own rank; then 4 from 2 I cannot, but 4 from 12 (borrowing 10) and there is 8; then 1 that I borrowed and 7 make 8; 8 from 4 I cannot, but 8 from 14, there remains 64 so that the sum due is 68l. 3s. 92d. For its proof, add the remainder 68l. 3s. 92d. to the lesser sum, 174l. 12s. 62d. it makes 242l. 16s. 32d the sum first due, and is a proof of the work being right.

More Examples for Practice.

Due - Paid -	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	l. s. d. 74 10 4 29 12 9	l. s. d. 2171 7 0 1976 16 6 1
•Remain -	77 4 1	44 17 7	494 10 5
Proof -	174 16 61	74 10 4	2471 7 0
1st due Paid	<i>l. s. d.</i> - 74 0 0 - 46 12 10	<i>l. s. d.</i> 274 16 6 197 19 4	l. s. d. 796 0 0 279 11 7
Balance	- 27 7 2	76 17 2	516 8 5
Proof	- 74 0 0	274 16 6 D 5	796 0 0

57

~~ ·	~ ~ ^ 1
1 1	1511
11.110	

Daid at dif	41
	84
Jerent times.	70

Paid in all

Remains due

60

1.76

-22

331 deduc

Sometimes a sum owing may be paid at several times, then the several payments must be added together, then add their total, and deduct it from the sum first due, as in the following examples.

the follo	wing	exam	ples.		₽ı	oof		353		
· • •		<i>l</i> .	. S.	d. ·	1	·		ι.	s.	d.
More du	e -	249	12	0		Rec	eived	10	0 10	0
	, .	1 24	12	6		•		1	5 15	a
• •		18	14	6				1	6 O	0
Receiu	ed at	J20	2	0	Pard	to a	severa	i) !	5 12	6
several to	imes.	\ 16	16	6	p	erso	ns.	$\mathbf{\hat{\lambda}}$) 10	, O
- · · ·		13	0	0	· .			_ [(58	4
÷ .	1	L 23	12	6				(2:	3 13	2
Received	in all	106	12	0	Pa	id i	n all	- 60	5 19	0
Remains	due	143	0	o	Ca	sh in	r hand	1 33	3. 11	0
Proof	đ	249	12	Ö.				£100) 10	0
	Avoir	dupois	se IV	eight	. (S	ee T	able,	p. 40.))	
	10	2Ô	4	28	10	4	28	10	16	16
I	ons;	, C. • 9	rs.	lb.	<i>.C</i> .	qrs	. 16.	· lb.	oz.	dr.
From	44	12	1	10	246	2	12	146	2	10
Take	39 ·	14	2	6	164	3	22	97	10	12
Remain	4	17.	3	4	81	2	8	48	7	14
Pronf	44	12	1	10	246	2	12	146	2	10
	T	roy H	eigh	t. (See T	able,	p.4	1.)		

10 12 22 24 10 2024 Ъ. gr. 02. pwt. oz. pwl. gr. From 462 4 10 11 1247 10 13 Take . 196 6 16 9 976 16 17 19 Remain 265 3 270 .13 20 462 4 10.-11 124710 13 Proof

This method of Subtraction will serve for any denomination, whatever, having respect to the several tables of quantity in addition.

MULTIPLICATION.

Multiplication is a compendious Method of performing Addition, and teaches to find what a given number will amount to when repeated a certain number of times.

It serves likewise to bring great denominations into small, as pounds into shillings; pence, or farthings; and having the length and breadth of a plain surface, we find its contents in superficial or square measure.

By Multiplication, having the value of one thing, or the wages of one putson, we find the value of many such things?

In Multiplication we are particularly to the motice of these three terms, viz. the multiplicand, the multiplier, and the product.

1. The Multiplicand (generally the greater of the two numbers) is the number to be multiplied

2. The Multiplier is the number by which the former is

-3. The product is the result or answer. The multiplier and multiplicand are collectively called fuctors.

Bat before we enter upon this Rule it is necessary to have the following Table perfectly by hearto

			1.1		1.1	7 7 1-	1					-	•
	Ť	2	-3	-4	• 5	6	7	- 8	· 9	-1 10 01		21,	
11	2	4	6	8	10	12	14	16	18	26	22	24	
	- 3	-6	- 9	12	15	18	21	24	27	30		36	
		+	 12	16	$\frac{-2}{20}$	24	28	-' 32		40		<u> </u>	
:			نب : 1.5	÷÷	-	20				+	<u> </u>		· ·,
्व	-	<u>ي</u> ۲	-	-	25	50	3 5 —		; <u>;</u> 4,3		-7 55 	00	•
	6 -	12] 8 	24	30	3 0	42	48 —	54 	60	.66	72	
	_7	14	21	28	35	42	4 9	56	63	. 20	77	84	•
	8	16	24	32	40	48	56	64	72	% ð	8\$, 9 6	
1.	 9	18	27	36	45	54	63	72	81	90	- 99	108	, , , , ,
	10	20	20	 40	50	44 0 ()	+- 70	80	 90	100	110 	420	
	₩ 11	29	39	44 44	4 55	,;., 66	77	-∔ 88		10	10a	120	
	14	++	-++ 06	÷		+	-					132	
n (1) 194	12	p24 17.11	130 1 V	14.9	<u>6.7</u>	172	184	190 D	0	120	132	144	ľ, 14

The Multiplication Table.

60 THE YOUNG MAN'S BEST COMPANION.

This table is so plain and easy, that there is scarcely need of direction; for the product of any two figures will be found in that square, which is on a line with the one, and under the other: thus 54 the product of 6 times 9 will be found on a line with 6, and under 9; or in a line with 9, and under 6; so 7 times 8 is 56, and 8 times 7 is 56, acc. And thus the table ought to be got by heart for the more dexterous readiness in multiplying.

Now for the Application.

Example 1. How many is 3 times 472? Which 472 being set down in the margin; I say, 3 times — 3 is 6, which place under 3 the multiplier; then 3 times — 7 is 21, set down 1 under 7, and carry 2 for the two 1416 tens, as in Addition of one Denomination, then 3 times — 4 is 12, and 2 carried is 14; which set down, and the product is 1316: that is 3 times 472 make so much: which may be proved by Addition, by setting down 472 three times in additional order, and casting it up, which shows that this rule performs compendiously the office of addition.

Example 2. Again, how many are produced by multiplying 742 by 4?

742 MultiplicandHere I say 4 times 2 is 8, and 44 Multiplier.times 4 is 16; 6 and carry 1; and2968set down; so the whole product is2968, as appears by the work.

More examples of one figure in the Multiplier are these:

Multiplic.	7420	4444	7460	90704	\$6789
Multiplier	5	- · · Q	7	8	. 9
	passan and				
Product	37100	26664	52220	725632	511101
		- the second	-		

Compound Multiplication .

Is when the *multiplier* consists of two, three, or morefigures or ciphers.

And here you must begin with that figure which is in the place of units of the multiplier, and go through the whole multiplicand, by multiplying each figure of it first by the said unit figure, then by the next, namely by the figure in the place of tens of the multiplier; then with the third, &c. to the last; always remembering to place the first figure of every product or line exactly and perpendicularly

dicularly under the figure you multiply by; and then add the several lines or products together, which so collected give the total product required, as in the examples following, viz.

Example 1.

How many are 23 times 7426? First, I begin 7426 with the unit figure 3 in the multiplier, saying, 23 3 times 6 is 18; 8 (which I set directly under 3, by which I multiply) and carry 1; then 3 times 22278 2 is 6, and 1 is 7; then 3 times 4 is 12; 2 and 14852 carry 1; then 3 time 7 is 21, and 1 is 22; and so I have done with the first figure of the Mulit- 170798 plier, viz. 3. Then I go to the next, that is 2, and twice 6 is 12; 2 and I carry 1 (which 2 is placed in a di-rect line under 2 the multiplying figure) then twice 2 is 4, and 1 is 5; then twice 4 is 8; and lastly, twice 7 is 14. which I set down; then I add the two products together, saying 8 is \$, 2 and 7 are 9, &c. and the total is the true product or result of the multiplication, viz. 170798. Again,

Example 2. What is the product of ______527527 Multiply by 285

It will be prolix and unnecessary to give 2637635 more verbal directions; and therefore the 4220216 learner is referred to the observations of 1055054 the example, as also to those two that follow, viz.

527535 15728	275827 19725
4220280	1379135
1055070	551654
3692745	1930789
2637675	2482443
5275:5	275827
8297070480	5440687575
	527535 15728 4220280 1055070 3692745 2637675 527555 8297070480

When ciphers are intermixed with figures in the multiplier, then multiply the figures as above; and when you come

61

come to a cipher in the multiplier, then set down another cipher exactly and perpendicularly under it, then begin the multiplicand again with the next figure to the cipher in the multiplier, and go through it in the same line, placing the first figure of that product next the cipher towards the left hand, but then care must be taken that the next figure or cipher of the next line must be satedown; one degree further towards the left hand, and not immediately under the last figure set down to the cipher; as in the folt fowing examples may be fully understood.

24393 402 784371 23604 1	327986 - 6030
48786 3137484 975720 47062260	1 09827380 19655160
9805986 1568742	1975343580
18514293084	

When you have a cipher or ciphers in the *multiplier*, at the beginning towards the right hand, then set it, or them, backward from the place of units towards the right hand; and when you have multiplied by the figure or figures, annex the cipher, or ciphers, $m_{i,j}$

4762 70	As in these Examples. 47962 400	4632 2600
339940	19184800	27792 9264
	العمرية بين المحمدية المتحديث والمراجع المراجع المراجع المراجع المراجع المحمدية المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع	12043200

If you have ciphers both in the *multiplicand* and *multiplier*, then neglect the ciphers in both, and multiply by the figures, and annex the ciphers at last;

42600 200	Aş in these Exam 42300 12000	376400 376400 376400
852 852	846 423	15056 7528
9372000	507600000	903360000

Digitized by Google

When you are to multiply by 10,100,1000, or 10,003, it is only adding or annexing so many ciphers to the multiplicand, that is, either 1, 2, 3, or 4 ciphers, and the work is done. Example. Suppose I am to multiply 375 by the numbers above; if I multiply it by 10, then I join 0 to 375, and it makes, or the product is, 3750; if by 100, then I annex 00, and it makes 37500; if by 1000, I put to it 000, and it produces 375000; and lastly, if by 10,000 I then add 0000, and it makes 375000, &c. And thus may any number be multiplied when the multiplier consists of a unit with any number of ciphers, and doue by inspection only, without any formal setting down the multiplicand with a line drawn under it, &c.

Our next business will be to show the uses of *Multiplication* in real life, and how to apply it on proper occasions, viz.

8. Suppose you want to know how many half crowns there are in 2+6*l*. you know that 8 half crowns make 1*l*? whereof set them down thus:

246/.

Multiply by 8

Answer 1968

Again, in 1968 half crowns, how many pence? 30

59040

And this serves to show, that great denominations are brought into smaller by this rule, according to the definition, p. 57.

2. Admit that you want to know the square contents of a large table, 34 feet long and 4 fect wide, multiply 34 the length by 4 the breadth, and the answer will be 136 square feet for the true contents of such a table. And this agrees with another definition of this rule.

3. If I know the value of a yard of broad cloth to be 12 shillings, what is the value of 220 yards of the said cloth in shillings?

64

	220 12
-	440 220

2640 shillings, or 132 pounds.

If the wages of 1 seaman be 23 shillings a month, what is the wages of 250 seamen for the same time?

Multiply by 23

- Multiply by

750
150
500
000

Answer 5750 shillings, or 2871. 10s.

And these two examples accord with the other definition, or use of this rule.

I shall in the next place say something concerning Multiplication of money, and a little of its use, and so conclude this rule.

Multiplication of Money.

Multiplication of money has a great affinity to addition of money; the same method being taken in carrying from one denomination to the next, viz. from farthings to pence, from pence to shillings, and from shillings to pounds. And as in Addition, and other Multiplications, you begin at the right hand and proceed towards the left, so here you begin at the least denomination, which is also at the right hand.

This method of accompting is the most apt and expeditious of all others, for small quantities, and therefore extremely necessary in making bills of parcels, &c. and is, beyond all contradiction, as sure and certain as any way whatsoever.

The general Rule

· Is always to multiply the price by the quantity.

The first step is, for quantities from 2 to 12; and this is. done by one multiplier, as in the examples following:

•			Exa	mple	1.			l .	8e :	dì,
(or	Multiply	choth	` . at 7/.	121	67	niet	 niece)	. 7	12	። 6· ይ
(· piceco or					P 0.	Pice	•		

45 15 0

Digitized by GOOGLE

OF ARITHMETIC.

Here I say 6 time 6 is 36 pence, which is just 3s. I set down 0 in the place of pence, and carry 3s. to the place of shillings, (exactly the same as in Addition of Money) then 6 times 12 is 72, and 3 is 75s. or 3l. 15s. wherefore 1 set down 15 in the place of shillings, and carry three to the pounds; then 6 times 7 is 42, and 3 is 451. So the whole amount of the pieces of cloth, at 71. 12s. 6d. per piece, is 451. 15s.

Example 2.

Again, How much is 9 times 13s. 4d. or what is the amount of 9 marks ? . 9 In this example I say, 9 ---

times 4 is 36d, or 3s. I set 6 0 0 down 0, and carry 3; then 9

times 13 is 117, and 3 makes 120; but 120 shillings make just 67. and so much is the value of 9 marks.

Example 3.

Once more: What is the value of 12 galions of wine at 5s. 4d. per gallon? đ. . 5

Here I say 12 times 4 is 48; 0 and 12 carry 4; then 12 times 5 is 60, and 4 is 64s. or 31. 4s. &c. 3 4 0

The next degree of reckoning is of quantities exceeding 12, even to 12 times 12, or 144; all which, as far as 144, are found in the Table of Multiplication; which is a ready help to all purposes of reckoning; and that you may proceed with dexterity, you must be very ready in the said table, that you may immediately see what component parts suit the quantity proposed, or is pretty near it, and then work accordingly.

If the quantity be 15 yards, I readily know that 3 times 5 is 15, and therefore 3 and 5, or 5 and 3, are to be my multiplier. If the quantity were 21, then 3 and 7, or 7 and 3, would be multipliers; if 30, then 5 and 6, or 6 and 5; also 3 and 10, or 10 and 3; if 45, 48, 56, 66, 72, 96, &c. were the quantities, then 5 and 9, 6 and 8, 7 and 8, 6 and 11, 6 and 12, and 8 and 12, &c. are to be my multipliers, and exactly bit the several quantities of which they are component parts; and examples of this kind have two multiplications for their solution.

I shall

- 4

THE YOUNG MAN'S BEST COMPANION.

I shall now show some examples of regular brantitics. that exceed 12, and are precisely answered at two multiplications, such as mentioned before, virman and it is the 4... then to since it is greated and What come 15 yards of muslis to, at 1 months & & per yard ? a serie o and seet of 3.61 51 Here 3 times 5 is 15d or 1s and 3. 3 3 and carry 1s. then 3 times 3 is 94 and 1 is 10s so the first product is 10s. and 10 3. 3d. which multiply by 5 saying 5 times 5 3 is 15d. or 1s. and 3d. 3 and carry 1; . A. then 5 times 10 is 50, and 1 is 51s. or 20 11 1.3 11 5 21. 11s. So the amount of 15 yards at 1999 21 1. A. 3s. 5d. per yard, is 2l. 11s. 3d. And demonstrable thus viz. If 10s. 3d. be the value of 3 times 34; 3d. then 5 times the value of 10s, 3d. must of necessity be 15 times the value of 3s. 5d. because 5 times 3 is 15 : Anti-its truth may be proved by Addition and Multiplication, thus: set down 3s. 5d. three times, in Additional order, and put the three lines together, and the total of them multiplied by 5, as before, and the answer will be the same. Or set down 17s. 1d. (the product of 5s. 5d. multiplied by 5) three times elso, and add them together, and the total will be exactly the same with the result of the multiplication; as in the fullowing specimens of work. fullowing specimens of work.

	•••.			1 3 4	
*	. d.	. 7	1. 33 G	8.2275,033	
. Store Sta	et Kilose and		51 - S - E 2 - S	日間に使ってた	:
23. 8. 40	เม่อ เหล่าน.		1 No.1 N	u Hi setuor 🗤	ŝ.
	- <u>)</u>	5		17. 1	1
. o. s. i. b. e. 3	3			17 1	1
1.1 1 i i	the states of th	17 1	<u>.</u>	2402 10172 10.	•
110 110	19 1 D			11 0 0	•
Loss of the	() Kerster - 3		e e 5	+₩ j ₩ casa	;
- ,	-U +	• • •	·		
					Ċ
· · · · 2 · · 11	3			Strate 1	
· ·	<u></u>	1 C. 1944	i ya ya jara	t die de te	2
V 44. J 4. P	يعتمونكم بالارتها	1 E. C.	agan bila	 Write and the 	:
Here the	tirst of these	into proofs	i is worke	by Addition	8
and Multip	lication, and	the secon	diby Mw	indication and	à.
Addition.	Also.			-procusion une	7
. By this is	ve soo that i		al sa sa sa s	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	د
	in social carry i	a la la comu	pus, under	ins, head wi	5
are to Bilch	jon, two nun	ivers, (tor	multiplers)	in the table	1
which mult	iplied togethe	r make the	guantity n	roposed . and	í.
then we are	e to multiply	theonic	iv ane of	this sushing	
			- HJY MING TOR	natubela	.
· · · · · ·				(J)	Ľ

(it matters not by which first) and then that product is to be multiplied by the other number, and the second, or last, product will be the answer.

Example 2.

Again, what is the value of 21 gallons of brandy?

t

at

.

s. u.	in this example I say, 9
7 9 per Gallon.	times 7 is 63d. or 5s. 3d. I
7 and 3	set down 3 and carry 5, then
	7 times 7 is 49, and 5 is 54s.
2 14 3	or 2l. 14s. So the first pro-
3	duct is 21. 14s. 3d. which I
- 1	multiply by 3, and that pro-
8.29	duces the last product or
	answer, viz. 81. 2s. 9d.

Now follow a few more examples of this sort, without any verbal directions, because I think those already given to be sufficient.

	Exa	mpl	e `3.				Example	4.	
. What	is tl	ie vi	alue	of 30	ells	56 b	ushels o	of w	heat,
Holland at	· .	.3	d. 6 1 10 a	per el ind 3	.		s. at 4	d. 9 7	and 8
	1	15	10 3			• , •	1 13	3 8	i 1
Answer	5	7	6	••	* .	Answer	18, 6	0	
45 p at	oune 153.	ds o 6d. 5!a	f raw per nd 9	silk lb.	79	2 broad p	ieces <i>s.</i> at 13	d 6 12	each and 6
, 3	17	51a 6	nd 9	-	-	,	14 · 2	12 0	and G
		9	• • •	• •	•	*		<u>б</u>	
A n. 34	17	6	· .	. •			84 12	0	- · `
		•••• • •					•		Example
				• Digiti:	zed by C	Google			

67

e

68	T	IR	You	J'N G	MAI	n's E	SEST C	OMP.	IKA	ON	•	
	E	x um	ple	7.				Exan	nple	8	•	
108 - at	ilbs. 0 78.	f in 8d 0	digo ! and), La	hore	1	8	1 <i>lbs</i> .	of 8. 7	tea d. 0	.	
						-				9	and	9
	•	_		12				3	9	9 9		
. · · ·	Ans.	41	8	0			Ans.	31	7	9	•	
					Ex	ample	8.				•	
96 C	wt. o	f cu	1749. XI	ito _j a	t .	• •	•••	£	2 13	3	6 pe 8 ai	er cut. nd 12
								21	. 8	3	0	•
							Answer	250	5 16	5	0	

The next step is of quantities, or numbers that are not to be answered precisely at two multiplications: In this case you will have an addition of one line more, occasioned by bringing down the price of one to be added to the last product; or else a line more made by multiplying the price by what is defective or wanting in the number by two multiplications, to make up the proposed quantity complete; as it may be of 2, 3, 4, 5, &c. as by the subsequent examples may be seen and understood.

Example 1. What is the product of 2l. 13s. 6d. multiplied by 39?

<i>ī</i> . 2.1 16	s. 13	d. 6 6 e 0	and G
		6	
96 8	6 0	0 6	
104	6	6	

Here I find that 6 multiplied by 6, makes 36; which is within 3 of the quantity proposed; wherefore I multiply by 6, and that product again by the other 6; the last product is 961. 6s. which is the value of 36; but we want to know the value of 39; wherefore I multiply the price of one, viz. 21. 13s. 6d. by 3 to make up +

۲

36 to 39, saying 3 times 6 is 18d. &c. And finding that 3 times 21. 13s. 6d. is 81. Os. 6d. which added to 961. 6s. 0d. the total gives the complete value of 39; for 36 and 3 makes 39.

Exan	nple
cwt.	l.
	1

18	0 7 and 11
9 16	0 ·
107 16 2 16	0
110 12	0 Ans.

d.

8.

2. What comes 79 cwt. of cheese to at 28s. per In this example 1 say, 7 times O is O; then 7 times 8 is 56; which is 21. 16s. set down 16, and carry 2; then 7 times 1 is 7, and 2 carried makes 9. So the first product is 91. 16s. Od. which multiplied by 11, produces 1071. 16s. Od. or the value of 77 cwt. then for the 2 wanting, I multiply the price by it, and that gives 21. 16s. Od. which

added to 1071. 16s. Od. makes the whole value of 79, viz. 1101. 12s. Od. as in the work.

Example 3 112 pounds of sugar at 51 per lb. set down thus :

> d. 51 per pound 10 and 10

7 10

2 5 10

6 the product of 51d. by 12 defective. 5

2 11 4 the Answer.

Here, after I have multiplied by 10 and 10, the parts of 100, there want 12; wherefore I multiply $5\frac{1}{2}d$. by 12, and it gives 5s. 6d. for 12/b. at 53d. which added to 21. 5s. 10d. the value of 100, makes 2l. 11s. 4d. the true value of 11216 at 5 d. per pound.

70. THE YOUNG MAN'S BEST COMPANION.

Example 4. 64 stone of beef at 22d. or 1s. 10d. per stone.

1s. 10d. 10, and 18 4 9	9 Here what is wanting after the two multiplications is 4; wherefore I multiply 1s. 10d. (the price) by 4, which pro-
<u> </u>	duces 7s. 4d. to be added, &c.
8 12 4 Answ	er.
Example 5. $97\frac{1}{2}$ cw l. s. d.	t. of raisins,
at 1.5 6 per cu 9 and 1	vt. After I have multiplied by 0 9 and 10, I multiply the price 25% for by the guern
· 11 9 6 10	tity wanting, and it produces 81. 18s. 6d. then for the half
114 15 0	cwt. I take half of the price,
8 18 6	which is 128. $9a$. and then
12 9 for th	$e^{\frac{1}{2}}C$. total of which is 1041 for $2d$
124 6 3	for the answer.

From the last example it may be observed, that there is no need of much solicitude about coming so very near by two multiplications, for there 7 is wanting to make up the true quantity; nay, if the two multiplications be short by 10 or 11, it is near enough; for it is as easy to multiply the price by 10 or 11, as by 2 or 3, and the addition is the same.

Example 6. Once more: What comes 110 cwt. $\frac{2}{3}$ of hops to, at 41. 10s. 6d. per cwt.?

l. 4	s . 10	d. 6 10	and 10
45	5	0 10	
452	·iď	· 0	and the California of A
45	5	0	
2	5	3	
1	2	7	12
501	2	1	0 ¹ / ₂ Answer.

After having multiplied by 10 and 10, which makes 100, I multiply the price 4l. 10s. 6d. by 10, that is wanting, which gives the same with the first product, viz. 45l. 5s. 0d. which stands under the product by 100; and for the $\frac{1}{2}$ of a cwt. I take $\frac{3}{2}$ of the price, viz. first the half, and then the half of that half, that is 2l. 5s. 3d. and 1l. 2s. $7\frac{1}{2}d$. which four lines added together make 501l. 2s. $10\frac{1}{2}d$. for the answer.

To prove. Multiplication.

Whether of simple numbers, or of money, it is most surely done by Bittsion; but before that is known, take this method; viz: As you multiply the multiplicand by the mattiplier, so contrarywise, multiply the multiplier by the mattiplicand; and if the products are alike, the work is right; or otherwise one of them is wrong, and must be gone over again till they both agree.

Exá	mile 1.
365 day	s in a year. Siy 27 ft
24 hou	rs in a day Attack
1460	and the second
330	and the second second second
» اور میچمندی ، او دارد او جوارد افر	
8760 hou	rs in a year. The second second
- Maria - Araba	
litere (reversely) I say, 5	times 4 is 20; :: 0 and carry 2;
o times 4 is 24, and 2 is 20	; 0 and carry 2; and 3 times
4 is 42 , and 2 is 19 and 1 is 13	3 and carry T: and S times 9
is 6 and 1 is 7 which produ	to sadded together make 8760
the hours in a year. with	out taking in the odd 6 hours'
which the year consists of m	ore than 365 days.
E ra	mnle 🕈
The collons of minits	$\mathbf{I}_{\mathbf{r},\mathbf{r},\mathbf{r}} = \mathbf{I}_{\mathbf{r},\mathbf{r}} + \mathbf{I}_{$
ou gaitons of spirits	and carry 16 and 3 times 7
at 3 2 per callon.	is 21. and 1 is 22s. or $14:2s$.
7 and 8	Again twice 8 is 16, 4 and
	carry 1s., and twice, 8 is 16,
1 2 2	and 1 is 17, 17 and carry 0;
	and once 8 is 81. Thus both
8	these examples are the same
8 17 4 Answer.	In consequence as it, you pro-
minitian mathod of Multipli	cetted in the common and
the operation	aupus and shows the clum of
and officiations of the state and	
DIV	ISION.

This Rule, though accounted the hardest lesson in Arithmetic, may be made easy and intelligible to the meanest capacity.

The use of this, rule is to know how many times one number or sum is contained in another, as if it were asked, how often is 9 contained in 54? the answer is 6 times; or how many times 12 is there in 144? Answer 12 times.

As by Multiplication great denominations are brought into small, so contrarily by Division small denominations are brought into greater; as farthings (from one gradation to another) into pounds, pounds weight into tons, and gallons liquid into hogsheads, &c.

In this rule we are to take particular notice of the three following terms, viz.

S Dividend, or number to be divided.

The . Divisor, or number by which we divide.

Quotient, or answer to the work; which shows how often the divisor is contained in the dividend.

4. The Remainder ; which is an uncertain branch of this rule, because their is sometimes a remainder, and sometimes not. ' The remainder is always of the same name with the dividend, and is less than the divisor, for if it be greater than or equal to, the divisor, the work is wrong.

To divide any number of one denomination by a number not exceeding 12.

Rule.-Write the divisor on the left hand side of the dividend, making a curve line, thus) between them, and find how many times it is contained in a certain number of figures of the dividend, and place the result below.

Multiply the divisor by the quotient figure, subtract the product from that part of the dividend, and carry the remainder, if any, as so many tens to the next figure of the dividend.

Then find how many times the divisor is contained in that number; place the result in the quotient, multiply the divisor, subtract the product, and carry the remainder, as so many tens, to the subsequent figure of the dividend. Divide again this number, as before, and so on, to the end of the dividend.

If the divisor consist of a number not greater than 12, and the dividend of a number not higher than 144, the answer is gained at once by the multiplication table; thus if 63 is to be divided by 9; the answer will be 7 times. Here 63 is the dividend, 9 the divisor, and 7 the quotient; and the operation will stand thus : 9)63

Digitized by Google

.

57.47 mar 24

If 78 is to be divided by 9, the operation will be 9)78 Here the answer is 8, and 6 is the remainder, because in 78 there are eight nimes and 6 over. 86

The general method of proving the truth of division is this "multiply the answer by the divisor, and take in the remainder, if any, and the result will be equal to the dividend, when the operation is right." The following examples will itlustrate the foregoing rules.

	4) 78906	5) 34567	2)29702
Quotient	19726-2	6913-2 5	49502 6
Proof	78906	34567	29702

In the first of these examples I say, the 4's in 7 once, and there remain 3, which considered as tens, and placed before 8, the next figure in the dividend, make 38; then the 4's in 38, 9 times; 9 times 4 is 36; 36 from 38 there remains 2; or two tens, which carried to the 9, the next figure in the dividend, make 29; then the 4's in 29, 7 times; 7 times 4 is 28; 28 from 29 there remains 1; which makes the O, the next of the dividend, 10, and the 4's in 10 twice: twice 4 is 8: 8 from 10 there remains 2: which make 6, the last figure of the dividend, 26; lastly, the 4's in 26, 6 times, and 6 times 4 is 24; 24 from 26, leaves 2 the remainder: and so for the other two examples, And for proof of the week multiply the quotient by the divisor, and take in the remainder in the place of units; and if the product be the same with the dividend. the division is right; for I say, 4 times 6 is 24, and 2 the remainder, make 26; 6 and carry 2, &c.

	More Examples.			
· .	3) 54321	7) 279060	9) 234567	
Quotient	18107 3	3985 7•	2606063 9	
Proof	54321	279060	234567	
. •		E		

73

74 8	Гне ¥оийс) 5987654	MAN'S BEST Co 11) 9578651	MPANION. 12)8955674
Quotient	7484566	8707865 11	746306- 2 12
Proof	5987654	9578651	8955674
n	11)726469	206	12)76677240
Quotien	t 66042	200- 6 11	6389770 12
Proof	72646	206	76077240
*	11)47627	000	12)42007400
Quotier	at 4329)727—3 11	3500616 —8 12
Proof	4762	7000	42007400

By being ready and dexterous in the above examples you may expeditiously divide by these numbers, viz. 110, 120, 1100, 1200, &c. for it is but cutting off, or separating the ciphers from 11 and 12, and cutting off and separating the like number of figures or ciphers from the right hand of the dividend, and then divide the other figures or ciphers towards the left hand, by 11 or 12, as it shall happen; as in the following examples, viz.

Divide 34567 by 110, and 890123 by 120, and 98765 by 1100, and 678901 by 1200.

•	11,0)3456,7	12,0)89012,3
Quotient	<u>314–27</u> 11,00)987,65	7417-83 12,00)6789,01
Quotient	89-865	565-901

When you divide by 10,100, or 1000, 10000, &c. you have nothing more to do than to cut off, or separate so

many figures or ciphers of the dividend towards the right hand, as you have ciphers in the divisor, and those figures towards the left make your quotient; and those cut of toward the fight hand the remainder.

Examples.

Divide 123456789 by 10, 100, 1000, 10000.

By 10 the Quotient is 12345678. and the Remainder is 9. By 100 the Quotient is 1234567, and Remainder is 89.

By 1000 the Quotient is 123456, and Remainder is 789.

By 10000 the Quotient is 12345, and Remainder is 6789.

When the divisor consists of several figures, then there arises a little more difficulty in the work; but if the following directions are attended to it is easily overcome; as will be evident from the following example, &c.

Suppose I am to divide 78901 pounds among 32 parishes; or suppose an assessment of so much money was laid on so many parishes; what must each parish pay by equal proportion towards raising such a supply?

Divisor 32)78901(... Quotient.

The example thus set out, I begin at the left hand, seeking how often I can take 32 out of 78; or more easily, how many times 3 are in 7, and the answer is 2 times; which I place in the quotient thus 32)78901(2, and then according to the General Rule, I multiply the divisor 32, by the 2 placed in the quotient, saying twice 2 is 4, and twice 3 is 6; so there is 64 to be taken out of 78, which should stand thus:

32)78901(2 64 ·

14

Then I make a point under 9, the third figure of the dividend, and bring it down to the remainder 14, and then the work appears thus:

> 32)78901(24 64

149

Then I seek again, asking how many times 32 in 149, which is not readily answered; but how many times 3, the first figure of the divisor, is there in 14, the two first figures of the dividual 149, and the answer is 4 times; wherefore after placing 4 in the quotient, I multiply (as directed in E 2 the

the General Rule) the divisor 32 by the said 4, saying 4 times 2 is 8, placing it under 9 in the dividual; then 4 times 3 is 12, which set down under 14; so there is 128 to be taken out of 149, and then the work appears thus:

serve, That whenever you have a place more in the dividend than in the divisor, then always try how often you can take the first figure of the divisor out of the two first of the dividend, and the answer is 7 times; but it will not bear 7 times, for 7 times 32 is 224, and you cannot take 224 out of 210; or rather you cannot take 22 out of 21; wherefore try in your mind before you set down the answer, or figure of the quotient, whether it will go to the number of times as is most easily suggested ; as here the question or demand is readily answered 7 times; and so many times 3 may be taken in 21; but when you come to multiply the whole divisor by the times you place in the quotient, you begin at the right hand, and go towards the left, carrying the tens that arise to the next place, which so increases the product, that sometime subtraction cannot be made, because the under line is greater than the upper; wherefore first try in your mind, as has been said; and since it will not bear 7 times, try if it will not go 6 times; saying, 6 times 2 is 12, 2 and carry 1; and 6 times 3 is 18, and 4 is 19, and 19 may be taken out of 21; therefore set down 6 in the quotient. next to the 4, and multiply the divisor 32 by it, and the work willstand thus:

Digitized by Google

Here the divisor 32, multiplied by 6, gives 192 to be taken out of 210, and the remainder is 18; to which after a point made under it, 1 bring down the 1, the last figure of the dividend, and then there is 181 for a new dividend; then according to the rule. I seek again how many times 32, the divisor, may be taken out of 181, or how many times 3 in 18, and the ready answer is 6 times; bat on the trial 1 find it will not go 6 times;

¢

OF ARITHMETIC.

wherefore 1 try a quotient figure less by 1, 32 viz. 5 times, and find it will bear it; and setting 5 in the quotient next to the 6, I multiply the divisor 32 by it, and it produces 160; which subtracted from 181, the last remainder is 21, and the quotient or answer is 2465; which shews that 32 is contained in 78901, 2465 times, and 21 over.

2)78901(2 64····	465
149 128	•
210 192	
181 160	
- 21	

Again, If a nobleman hath 30,000*l. per annum*, what is his daily income?

If you divide 30,000 by 365 (the days in the year) the quotient will be the answer. Set it down for working thus: 365)30,000(

First seek how mady times 365 can be taken in 300? (an equal number of places with the divisor) answer O times; wherefore I go to a place farther to the right hand in the dividend (for 0 must never begin the quotient, as wat said before) and make a point under it, viz. under the last O but one, as may be seen in the example; and there being a place more in this dividual than in the divisor, L try how often the first figure of the divisor, viz. 3, is contained in the two first figures or places of the dividend, viz. 30, and the answer is 10 times; but you are never to take above 9, times at once, in any of these examples of division; wherefore try in your mind whether it will bear 9 times, before you set it down in the quotient (as noticed before), saving to yourself, 9 times 5 is 45, 5 and go 4; 9 times 6 is 54, and 4 is 58; 8 and go 5; and 9 times 3 is 27, and 5 is 32; now 32 cannot be taken out of 30, wherefore take a figure less by an unit or one, viz. 8 times; and finding it will go 8 times, set down 8 in the quotient; and then say 8 times 5 is 40; 0 and carry 4; and 8 times 6 is 48, and 4 is 52, 2 and carry 5, and 8 times 3 is 24, and 5 is 29; and then there is 2920 to be taken from 3000; and after subtraction the work will appear thus: 365)30000(8

Digitized by GOOGLC

2920.

80

THE YOUNG MAN'S BEST COMPANION.

Then to the remainder 80 I bring down 0, the last figure of the dividend, and then there is 800 for a new dividual; then you must try how oft you can take 365 out of the said dividual 800, and the number of places being equal in both divisor and dividual, to wit, 3, try how oft 3 in 8; answer 2; so put in the quotient, and say twice 5 is 10, 0 and earry 1; and twice 6 is 12, and 1 is 13; 3 and carry 1; and twice 3 is 6, and 1 is 7; so there is 730 to be deducted from 800, and the remainder is 70, viz.

Thus it appears that the nobleman hath eight two pounds per diem, and 70l. over; which, if multiplied by 20, the shillings in a pound, would produce 1400 shillings; and this divided by the divisor, 365, there would come out 3s. a day more, and there will be a remainder of 305, which multiplied by 12, the pence in a shilling, pro9

đ

Ín

ij

ġ

lt

duces 3660; which divided still by 365, gives 10d. a day more: so 30,000l. a year is 82l. 3s. 10d. a day.

Once more: divide 46242 gallons by 252, the gallons in a tun, thus set down:

252)46242(18**3** 2252 •

2104

2016

882

756

(120)

In this example, after inquiry, I find that it will not go twice, therefore I set down I in the quotient, and place 252 under 462 of the dividend, and after subtraction the remainder is 210; to which bring down 4 from the dividend, which makes 2104; and then I find it will bear 8 times which put in the quotient, and the divisor 252, multiplied by it, the product is 2016 to be subtracted from 2104; which being done, the remainder is 88:

to which 2, the last figure of the dividend, being brought down, there is 882, and then trying again 1 find it will go 3 times; and the product of the divisor multiplied by 3, is 756; which subtracted from 882; there remains 126 for the true remainder: so that by this division 1 find there are 183 tuns in 46242 gallons, and 126 gallons remaining, or over and above, which being half of 252 the divisor, the remainder is half a tun more.

When you have a cipher or ciphers on the right hand of the divisor, in the first, second, or third place, &c. separate such

Digitized by Google

such cipher or ciphers, with a dash of the pen, from the rest of the divisor; and also cut off as many figures or ciphers from the right of the dividend as you cut off ciphers from the divisor, and divide the remaining figures towards the left hand, by the remaining significant figures of the divisor.

Example.

Divide 42952 square poles of land by 160, the square poles in an acre of land.

(7)

Here the cipher is cut off from the divisor, and the 2 from the dividend; then 1 ask how oft 16 in 42; answer twice; then the 16's in 109, answer 6 times; then the 16's in 105; answer 8 times. So there are 268 heres and almost half an acre in 42952 square poles.

Divide 27,00)62746,20(2323

81

64

54

106

25

In this example two ciphers are separated from the divisor, and also two places from the dividend and then 62746 is divided only by 27.

When the divisor is 3, 4, 5, 6, or more figures there is a sure and easy way of performing the work truly by making a table of the divisor; which may be done by addition, or by multiplying the divisor by 2,3,4, &c.

Suppose you are to divide 987654321 by 123456.

Digitized by Google

(81)

123456)987654321(8000 times,	1 :	· 123456	
907040 (6201)	2	246921	
(0323)	. 3	370368	
number of figures in the di-	. 4	493824	
a point under the sixth figure,	5	617280 .	
by 987054 becomes the first	. 6	740736	
	7	864192	
•	8	9 8764 8	
	9	1111104	

The foregoing table is made by doubling the first line, which makes 246912; this added to the first or uppermost hue, gives the third line 370368; which also added to the said first line, makes 493824 for the 4th line, or product, and so of the rest; still remembering to add the subsequent line, or product to the first, or uppermost line, till you come to the last line of 9 times, which is 1111104; the truth of which may be proved by multiplying the first or uppermost line by 2, 3, 4, 5, &c. and if you commit an error by Addition it may be found or corrected by Multiplication.

The Use of the said Table.

When you have pointed out your number of places in the dividend, cast your eye on the table, and at the first view you may know how many times you can take, as in this example 7 times are too little, and 9 times too much; wherefore I set down 8 in the quotient, and place 987648, the tabular number, which stands against 8 under the dividend; then I subtract that number from it, and the remainder is 6, to which I bring down 1, and place 0 in the quotient; then to the 631 bring down 2, and place 0 in the quotient; then to 632 I bring down 1, the last figure of the dividend; but still it will not bear any times or time, wherefore I put another 0 in the quotient, and so the work is done, and the quotient is 8000, and the remainder 6321, as the work.

Digitized by Google

Thus

ì

е 7

T

Thus having plainly, fully, and pertinently shown, by verbal directions, the method of working division, I think it unnecessary to give any more examples in that manner, but shall leave some few examples for practice sake, whose quotients and remainders are expressed, but the operation omitted, to save room, and for trial of the ingenuity of practitioners.

7400690042 divided by 987, the quotient is 7498166, and the remainder 200.

479679002742 dividend by 4689 the quotient is 102298784, and the remainder 4566.

7969767002 divided by 976294, the quotient is \$163, and the remainder 279080.

456789012345 divided by 9876543, the quotient is 46249, and the remainder 8775138.

76469749 by 4500, quotient 16993, and the remainder 1249. And 8092320000 by 345000, quotient 23456, and remains (0).

The Proof of Multiplication and Division.

These two rules reciprocally prove each other; for in proving *multiplication*, if you divide the product by the multiplier, the quotient will be like the multiplicand; or if by the multiplicand, the quotient will be the same with the multiplier.

ś.

Example 1. 345 24	Exámple	2. 345)8280(2 690.	or thus, 4
1380 690		1380	· · · · · ,
24)8280(345 7211	с 	(0)	•
108 96	• •		•
120 120		4	
(0)	E 5	n and a second	То

To prove Division.

Division may be proved by Division thus:

If you divide the dividend by the quotient, the quotient will be your former divisor.

Example. Divide 8280 by 345.

345)8280(24

Here the working again is needless, it being just done, and shows the truth of the assertion, that Division may be proved by Division.

⁹ But the most usual way of proving Division is by Mulsiplication, in this manner, viz. multiplying the quotient by

divisor, and the product will be equal to the dividend.

Secthe preceding examples, No. 1.

345 Quotient.

24 Divisor.

1380

620

Note. That when there is any remainder, such remainder must be taken in or added to the product.

8280 Proof.

As I have given some examples of the utility of Muttiplication in Money, I shall here give a few examples in *Division of Money*; whereas may be seen how expeditiously things may be done without having recourse to Reduction, the Rule of Three, &c.

Example 1. Divide 26*l*. 12*s*. 6*d*. equally among five men. For disposition of working set it down as follows:

<i>l. s. d.</i> 5)26 12 6	ir fi
5 6 6	р 1 З
Proof 26 12 6	1 T

In the working of this I say, the 5's in 26, 5 times; 5 times 5 is 25; 25 from 26, there remains 1, that is 1 pound, or 20 shillings; which, with the 12s, in the place of shillings, makes 32s, then the 5's in the 32, 6 times; 6 times 5 is 30; 30 from 32, there remain 2s, or 24d, which with 6d, in the place of pence, makes 30; then the 5's

in 30, 6 times, and so the work is done, and the answer is, that each man must have 5*l*. 6s. 6d. for his equal share in the said division of 16*l*. 12s. 6d. among five persons; and the truth of it is proved by Multiplication of Money, sufticiently shown in the rule of Multiplication; as here, 5 times 6 is 30, 6 and carry 2; and 5 times 6 is 30, and 2 is 22; 12 and carry 1; and 5 times 5 is 25, and 1 is 26, &c. **Example 2.** Divide the charges of a country feast, amounting to 246l. 13s. 4d. equally among 12 stewards, to know what each steward must pay.

l. s. d. Here 1 say the 12's in 24 twice, 12)245 13 4 and 12's in 6, 0 times, and there remains 6*l.* or 120s. and 13s. make 133, *Ans.* 20 11 1-4 and then the 12's in 133 are 11, and there remains 1s. or 12*d.* and then

12 and 4 is 16; and the 12's in 16 once, and 4 remain; so that each steward must pay 201. 11s. 1d. and something more than a farthing; and this may be proved as above.

When any quantity is such a number that any two digits of the Multiplication Table multiplied together make the said quantity or number, then the quotient may be very expeditiously found at two divisions, and sooner than at one. Example. Divide 7872 by 32. In this example the component parts, which multiplied together, make the divisor 32, are 4 and 8, or 8 and 4: for it matters not which of them you divide by first; for either way will give a true and the same quotient, as may be seen by the different methods of the following work.

4)7872		Or	thus:	8)7872	· · '
,	·	14.18	• •	·	• •
8)1968			•••	4) 984	
246 Quotient.		•		246	Quotient.

Here though the operations are different, yet the quotients are the same. Again, divide 44184 by 56.

Ē	xample 3	.
	7)44184	• .
	8)6312	
	789	Quotient.

Here the Divisors are 7 and 8, or 8 and 7; for either will give the same quotient.

And thus may a great number of examples be wrought by numbers out of the Multiplication Table, with great dispatch and expedition, as by 15, 18, 25, 35, 64, 72, 96, and by many other numbers.

When
When it appears that there is any remainder in the first division, or the last, or both, to know the true remainder as if divided by the common way, take this method, viz. multiply the first divisor by the last remainder, and take in, or add the first remainder, if there be any, and the product will be the true or same remainder, as if you divided by the long way. Example: divide 4567, by 15.

Ŗ

6

F

3)4567 Here I multiply 3, the first divisor, by 2, the last remainder, and take in 1, the first remainder, and it makes 7 for the true remainder, as may be proved at leisure by 304 2 the other way.

(7) the true remainder.

The same method may be taken with respect to component parts in division of money, as in division of simple numbers: thus l. s. d.

Divide 3)463 18 6 into 18 equal parts

6)154 12 10

Answer 25 15 5

By this method of Division of Money you may, by having the price of several things, know the price or value of one thing, at the said rate, as well as by the Rule of *Three:* so disth Multiplication of Money answer questions in the Rule of Three, when the first number is a unit, or 1. Thus, If 8-41b. of coffee cost 311. 10s. 0d. what costs 11b. Here 7 multiplied by 12. gives 84; therefore proceed as follows:

7).31		10	0
12) 4) .	10	0
nswer	D	7	6

As in the Multiplication of Money, to have an answer, you multiply the price by the quantity, so in Division of Money you divide the price by the quantity, to have your answer.

The various uses of Multiplication and Division will be better understood by their application in the following Rule of Arithmetic called

Digitized by Google .

84

REDUCTION;

Which shows how to reduce numbers of one denomination to another, thereby discovering the same value, though in different terms.

1. As first, all great numbers are brought into smaller by Multiplication, as pounds into shillings, pence, or farthings, by multiplying by 20, 12, or 4. Or hundreds weight into pounds weight, by multiplying by 4 and by 28, or by 112; or lower, into ounces or drams, by multiplying the pounds by 16 and 16.

II. And on the contrary, all small names are brought into greater by Division; as farthings into pounds, by dividing by 4, 12, and 20; and pounds weight into hundreds weight, by dividing by 28 and 4; the drams into pounds by dividing 16 and 16.

But note, That pounds are brought into pence by multiplying by 240; or into farthings by multiplying by 960; and just the contrary by Division.

Ex. 1. In 2401. Sterling how many pence?

20 shillings 1 pound.

890	shillings	in 240/.	
12	pence 1	shilling.	

240*l*. 240*d*. in 1*l*.

Ans. 57600 pence in 2401.

	5	C	2)	ļ
	0	0			
b	ð	Ų)		

Or thus:

Answer. 57600

Es. 2. In 226 tons of copper, how many pounds wt. 20 Cwt. 1 ton

		Or thus:	1
4550	Cwt. in 226 tons.	226 to	ns, (
	grs. I Cwt.	20	
18080	grs. of 1 Cwt. in 226 tons	4520	
, 28	lb. 1 gr. of a Cwt.	112	· · · •
144640	the off of the association the constant of the second second	54240	1.1.5. 1. 1. 1.
	n de la grande de la servicie de la grande de la servicie de la servicie de la servicie de la servicie de la s La servicie de la serv		
506240	pounds wt. in 226 tons	506240	pds.
' <u>2.5</u> ''	of the second second	· • • • • • • • • • • • • • • • • • • •	Thes

THE YOUNG MAN'S BEST COMPANION.

86

These foregoing examples are great names to be brought into small (as may easily be observed and understood) therefore as the rule directs, it is done by Multiplication, by multiplying the greater name by the number of the next lesser name that makes one of the said greater; as in the first example the ksser name to pounds is shillings; wherefore I multiply by 20, because 20 of that lesser name makes one of the said greater name, *i. e.* 20 shillings make a pound. And the same regard is had, and method observed, in the example of weight, as is very plain to be seen in the work, and is called *Reduction Descending*, because it brings higher or greater denominations into lower or lesser.

	12)123600 pence	96,0)49440,0(515%
	2,0)1030,0 shilling	480 3
	515 pounds	96 I divide by
4		480 things in a 480 pound, &c.
	en an	(0)

In the first way I divide the farthings by 4, because 4 make a penny, and the quotient is pence; then the pence I divide by 12, because 12 make a shilling, and that quotient is shillings; these I divide by 20 to bring them into pounds, thus; I cut off the cipher in the dividend towards the right, for the cipher that is in the divisor 20, which is also separated from 2 with a dash of the pen; then I halve the figures one by one, as they are united with the remainder in the dividend; which half is pounds, and is a short way of dividing by 20; in the example I say the half of 10 (because I must not set down 0 at the beginning) is 5, and the half of 3 is 1, but there remains 1, which makes the next, which is 0, 10; and the half of 10 is 5; so that 10300 shillings make 515 pounds, or there are so many pounds in 494400 farthings.

Note, In dividing by 20, as above, if any thing remain it must be joined or annexed to the figure of cipher cut off:

٠

off; as suppose there had in the halving the last figure (excepting what you cut off) remained 1, then that 1 must have been added to the cipher separated or cut off, and there would have been 10 shillings.

Ex. 4. Reduce 27552 pounds weight into Cwts.

4)

28)27552(9)	84	Or thus:	
	16 cwt. Answer	10. 112) 2 755	CWI. 52(246 Ane.
235 —		224	
224	·	• . •	. .
		515	j (* 1977)
112	•	448	3
112			· ·
	•	67	72
(0)	•	6	ĩ 2 .
		())

In the first of the two foregoing examples I divide the pounds by 28, to bring them into quarters; then I divide those quarters by 4, to bring them into hundreds weight, as above.

In the second way, I divide the pounds weight by 112, the pounds in 1 Cwt. and it brings the pounds weight into hundreds weight at once.

The said examples are of small denominations to be brought into greater; and therefore it is done by Division, by dividing the lesser name by as many of them as make the greater name: that is by 28, because 28 of them make one of the next greater name, riz, a quarter of an hundred, and this reduction is called *Reduction Ascending*, because it brings low or small names to higher or greater denominations; by which may be observed, that all questions in Reduction, whether ascending or descending, are answered either by Multiplication or Division, or by both; as will plainly appear in the examples.

When it is required to reduce numbers of several denominations by *Reduction Ascending*; or by *Multiplication*, you are to work as before; but you must always remember to take in such numbers as stand in the place of the next inferior denomination, as when you multiply the pounds by 20, if there be any shillings to the denomina-

88 THE YOUNG MAN'S BEST COMPANION.

tion, or place of shillings, you must take them in; so likewise when you multiply the shillings by 12, if there be any pence in the place of pence, you must also take them in; and so when you multiply the pence by 4, to bring them into farthings, you must take in the farthings, if there be any, in the place of farthings, as in the following work.

l. s. d. Ex. 5. In 346 16 9½ how many farthings.? 20 shillings 1 pound.

> 6936 shillings in 346/. 16s. 0d. 12 pence 1 shilling.

83241 pence in 346*l*. 16*s*. 9*d*. 4 farthings 1 penny.

332966 farthings in 3461. 16s. 92d.

The above example is so plain that it hardly needs any explication; but I begin to say 0 is 0, but 6 in the units of shillings is 6; then twice 6 is 12, and one in the tens of shillings is 13, 3 and carry 1; and twice 4 is 8, and 1 is 9, and twice 3 is 6: then by 12, saying 12 times 6 is 72, and 9d. (in the place of pence) is 81, 1 and carry 8; and 12 times 3 is 36, and 8 is 44, 4 and carry 4; and 12 times 9 is 108, and 4 is 112, 2 and cairy 11; and 12 times 6 is 72, and 2 (in the place of farthings) is 6; 4 times 1 is 4, and 2 (in the place of farthings) is 6; 4 times 4 is 16, and so on.

C. grs. lb. Ex. 6. In 56 2 16 of tobacco how many pounds wt? 4 grs.

> 226 qrs. in 56 C. 2 qrs. 28 lb. 1 qr. of a C.

1814 453

Ans. 6344 pounds wt. in 55 C. 2 grs. 16 lb.

Digitized by Google

In

In the foregoing example I multiply the 56 C. by 4, and take in 2 quarters; then I multiply the 226 qrs. by 28, saying 8 times 6 is 48, and 6 (the unit figure in the odd pounds) is 54, 4 and carry 5, &c. Then I multiply by 2, saying twice 6 is 12, and 1 (that stands in the place of tens in the odd pounds) is 13, 3 and carry 1, &c. Then adding the two products together, they make 6344 pounds contained in 56 C. 2 grs. 16 (b. as above stated.

Reduction Ascending

Is the bringing numbers from a smaller denomination to a greater, and is the reverse of *Reduction Descending*; and each may serve as a proof to the other, one being performed by *Multiplication*, and the other by *Division*.

If at any time in *Reduction Descending* you take in, or add to, the odd money, weight, or measure, as you nultiply the several denominations, such quantities will be the remainders in *Reduction Ascending*.

4) Examples, (See Ex. 5 and 6.) In 332966 farthings, how many pounds it Divide by 4, by

19)83241-11d. remains.

2,0)693,6-9d. remains.

346-16s. remains.

So that in 332966 farthings there are 3461. 16s. 91d.

Again, in 6344 pounds weight, how many hundred weight? Here divide by 28, and then by 4.

28)6344(226 qrs.			
 74	56 C. 2 grs.		
56	. 2		
184 168	-		
·			

(16) lbs. remains.

/ So that in 63.44 pounds wt. there are 56 C. 2 grs. 16 lb. and these instances prove the preceding examples of descending to be right.

Digitized by Google

The

[12, and by 20.

The following are promiscuous examples of both kinds of Reduction, one proving the other.

In 2761. 12s. how 1 20	many pence?
	6384d: how many pounds?
12 2,0)	553,2
Ans. 66384d. Ans. l.	276, 12 and Proof.
In 47964 grains, how m	any pounds Troy?
20)	
4)47964 (199,8	
24	
12)99 17 pwts.	
$\frac{210}{10} 10 \otimes 10.3 \text{ oz.}$	18 pr. 12 gr. 110w many grains r
230	· 2 · ·
210 99	
904	
102 1008	
Gr. (12)	
7994	
3997	
<u><u> </u></u>	
Answer 47964 and Pi	roofi
In 34 C. 3 qrs. of woo	l, how many pounds?
34 3 qrs.	Crent
4	110\3709(34 3 Are
130	336
20	532
1112	418
278	
	84 lbs. or 3 qrs.
3892	atoms a
	•

Į1

Digitized by Google

90

In 456 cut. 3 qrs. 27 lb. of copper, how many pounds? and what is the amount at 21 pence per pound ?

Cwt. 456	qrs. 3	<i>lb.</i> 27
4	,	
1287	· · •	
28		
14623	·	
3656		
51.83	lb.	
21		
51183		
102366		

1074743 pence; which divide by 12 and by 20, give 44781. 10s. 3d. the value of 456 C. 3 qrs. 27 lb. of Copper at 21 pence per lb.

Bing 4796 ells Famish into ells English; multiply by 3 and divide by 5, because 3 quarters 3. make an ell Flemish, and 5 an ell English. 5)14388

ĩ

Reduce 46, ells English into yards; multiply by 5, and divide by 4, thus

456 English ells

5 qrs. 1 Eng. ell In 570 yds. how many Eng. c. 4 qrs. 1 yd. 4): 280 qrs.

5)2280

Yds. 570 Answer.

An.

English ells 456, Answer and proof. Bring 130 tuns of wine into gallons.

4 hogsheads 1 tun.

	· ·	Or thus :
520	· •	252 gallons 1 tun.
63 gallons 1	hog shea d	130 tuns.
1500		7500
S120		252
and the second s		
. 32760 gallons.		32760
		Last s.

Lasta Reduce 42 10	s, Quarters. 3 ars. 1 last.	Bushels. 5	Pecks. 2 into pecks.		
10 qrs. 1 last,Here multiply by 10423and take in 3 qrs. an8 bushels 1 qr.then by 8, and take in3389bushels: and take in 2 pecks4 pecks 1 bushels.bushels.					
13558	- pecks in 42 l - 2 p	asts, 3 q rs. occks.	5 bushels, and		
4) In 13558 pe	cks how many l	asts, &c.			
8)3389	2 pecks takon	in.			
1,0)42,3	5 bushela take	n in.			
Lasts 42	3 quarters take	n in.	-		

Answer. 42 lasts, 3 quarters, 5 bushels, and 2 pecks.

By Reduction also.

Foreign coins or exchanges may be reduced to Stenling money, and on the contrary Sterling money to foreign.

Example.

Reduce 246 Venetian Ducats de Banco into Sterling money, the exchange at 52d. Sterling per ducat, thus:

246 52	
497 1230	
12)12792	
2,0)106,6	

Digitized by Google

£, 53, 6s. to be paid in London, for the 246 ducats drawn in Venice.

Reduce

Or ARITHMÉTIC.

Reduce 531. 6s. sterl. into ducats at 52d. sterl. per du. 20

> 1066 · 12

52)12792(246 ducats to be paid in Venice for 531. 6s. 104 drawn in London.

23**, &c**.

To reduce Flemish money into Sterling money divide the pence Flemish by the course of exchange, suppose 33s, 4d and the quotient will be the Sterling money; and what remains, multiply by 20, Sc.

Example.

In 542l. 13s. 4d. Flemish, how many 20 pounds Sterling, &c.

		F
33s. Ad. Flemish.	'48 53	
12	12	N
400	4,00)582,40	
	145 rema	ins 240
		20

4,00)48,00

12

Answer 1451. 128.

By the above it appears that 1451. 12s. Sterling is equivalent to 2421. 13s, 4d. Flemish, at 33s. 3d. Flemish per pound Sterling.

Thus Flemish money may be reduced to Sterling money, though the course of exchange may be at any other rate of shillings and pence Flemish; but when the rate above, viz. 33s. 4d. then the answer is sooner found by multiplying by 3, and dividing by 5; for 400d. Flemish is the same to 240d. Sterling, (each being a pound) as 5 is to 3, for if you divide 400 by 5, it quotes 80; so 240, divided by 3, quotes the same.

Digitized by Google

The

The above Example done by the last proposed way. 1.242 13 4 Flemish.

		3
5)728	0	0
<i>l</i> .145 1	2	0

In 426 French crowns, each $54\frac{1}{4}d$. Sterling, how many pounds Sterling?

54 1	In this Example the num-
1704	ber of crowns is multiplied by 54d. and for the $\frac{1}{2}d$. I take the 4th part of 426, which is 106
106-1	$\frac{2}{r}$ of a penny, or a halfpenny, which added to the other pence
$12)23110\frac{1}{2}$	gives for total 23100d. which divide by 12, quotes 1925.
2,0)192,5 10d.	and 10d. remains: so the an- swer is 961, 5s, 10d, 1 Ster-
Ans.l. 96: 5: 10d.1	ling.

Note, To multiply a number by $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{3}$. &c. is the same as to divide the number by 4, 2, 3, 8, &c.

Again, bring 1600 pieces of eight, at 54d. 1 Sterling, into pounds Sterling.

1000 54‡	
6400 8000 400	Here the 1600 pieces of eight are multiplied by 54,
12)86800 pence	to bring them into pence, and for the $\frac{1}{4}$ take the $\frac{1}{4}$ of 1600, &c. as in the work: and the
2,0)723,3-4	answer is l. 361 ; 13 : 4.
<i>l</i> . 361 : 13 : 4	and a second second Second second

This method is of use in reducing the exchanges of Cediz, Leghorn, and Genoa. Or when the exchange is

at so many pence and eights of a penny, (as often the exchanges run) then multiply the given number to reducc it into pence, by the pence contained in a piece of eight; and also multiply the said given number apart, by the numerator or upper figure of the fraction, and divide by the denominator or under figure of the fraction, and the quotient will be pence; which add to the other pence produced by multiplying the given number by the pence contained in one of the pieces for exchange, then divide the total pence by 12, &c.

Example.						
Bring 296 terling.	dollars at	52d.	5	Sterling	into	pounds
0	296					
	52					
-	592			296 do	ollars.	
	1480	•		5		;
	15302		:	8)1480	-	
•	185	ı			•	
	12)15577		,			
. •.	2.0)129.8-	-1		,		

Answer *l*. 64 : 18 : 1

S

Sterling money for 296 dollars, at 52d. $\frac{5}{8}$ Sterling per dollar.

But ducats, dollars, crowns, &c. are more expeditiously cast up by the rules of Practice, hereafter to be shown.

The next rule in Arithmetic is

The GOLDEN RULE, or RULE OF THREE.

It is called the Golden Rule, from its excellent use in Arithmetic, and in other parts of Mathematical learning.

And also denominated the Rule of Three, because by three numbers given, proposed, or known, we find out a fourth number required, or unknown, which bears the same proportion to the third which the second does to the first number: whence also the Rule of Proportion.

Digitized by Google

Of this Proportion there are two sorts; one named Direct, and the other Indirect, or Reverse.

Direct Proportion is when the second and third numbers are to be multiplied together, and their product divided by the first.

Indirect or Reverse Proportion, is when the first and second numbers are to be multiplied together, and their product divided by the third.

'In Direct Proportion, the fourth number, or answer to the question, contains the third number as often (or as many times) as the second contains the first.

But in Indirect Proportion the greater the third number is, the less is the fourth; and the smaller the third number is, the greater is the fourth.

The Stating the Question.

The chief difficulty that occurs in the Rule of Three is the right placing the numbers, or stating the question; for when that is done, you have nothing more to do, but to multiply and divide, and the work is done.

And to this end, we are to remember, that of the three given numbers, two of them are always of one denomination, and the other number is of the same name with the fourth number or answer required; and must always be the second or middle number. And the number that asks the question must possess the third or last place, and the other number of the same name with the third must be the first number ; for the first and third numbers must always be of one name, viz. both money, both weight, both time, or both measure. And though they be of one kind, yet if one of them is altered by Reduction from a higher to a lower name, then the other must be reduced to the same name. That is, if either the first or third number consist of several denominations, that is, of pounds and shillings; or pounds, shillings, and pence; or of pounds, shillings, pence, and farthings; or of tons, hundreds, quarters, and pounds, &c. then must they be reduced to the lowest name mentioned. And if any one happens to be of divers denominations, and the other but of one name, then the number of one name must be reduced as low, or into the same name with the other. As suppose the first number is brought into farthings, the third number also, though but pounds, must be brought into farthings. Then you are to multiply the second and third numbers stogether, (when the Proportion is Direct) and divide the product

product by the first number, and the quotient thence arising will be the answer to the question, and in the same name with the middle number: and if in the small denomination, it must be brought by Division to the highest name for the better understanding the answer. If the middle number be of several denominations, it must be brought into the lowest mentioned.

Example 1.

If 15 gallous of brandy cost 4l. 10s. what will 134 gallons cust at that rate?

Gall.	<i>l. s.</i>	Gal!.
15	4 10	134
,	20	90
	90	15)12060
		2,0)80,4
		+.40:4

Ŧf

Here the first and third numbers are of like names, viz. both gallons; and 134 being the number that asks the question, it hath the third place, as it always must, as before asserted; and 4l. 10s. the second number, being of two denominations, viz. pounds and shillings, it is r duced into the lowest mentioned, viz. shillings, as before directed, and then the three numbers are these, viz. 15-90-134; and 134 the third number being multiplied by 90, the second number, produces 12060; which divided by 15, the first number, quotes 804, which are shillings, because 90, the middle number, were shillings; and 804 shillings, divided by 20 give 40l. 4s. for the answer : for the proof of its truth, state it backward thus.

	Gall.	1.	5.	Gall.	
ſ	134 cost 4	0	4	what cost 15	
		20			
	. 8	04			
		15			
	40	20			
	80	4			
	134)120	600	90	s. Answer, or 41. 10s.	the
	120	:6		cost of 15 gallons,	and
			•	this is a proof of	the
	• • •	C)	first work; and	the
				back stating and we	ork-'
nf.	16 96 much	• ~		tion in the Duly of Thur.	

ing the proof is as much a question in the Rule of There as the first. F В¢

By the foregoing rule and directions, and these examples, the nature of the rule, and method of working may be un 'erstood; I shall therefore only give some few examples with a little of the work, and answers to the questions, leaving part of the operations t + be performed by the ingenious practitioner.

Ex. 3. If 56lb, of indigo cost 11*l*. 4s. what will 1088*lb*. cost at that rate?

lb. s. lb.

If 56 224 1008? Answer 4032s. or 2011. 12s.

Ex. 4. If half an Cwt. of copper cost 4l. 18s. what quantity will 14s. buy at that rate?

s. 1b. s.

If 98 buy 56, what 14? Answer 8lb. of copper.

Ex. 5. If 4 C. 3 qrs. sugar cost 5l. 15s. 7d. what will 4 hogsheads come to, weighing 4 C. 1 qr. 14lb?

16. d. 14.

If 532 13875 746? Ans. 12373 pence, or 51l. 11s 1d. And the remainder, 266, multiplied by 4, gives a halfpenny more; so the whole is $51l. 11s. 1d. \frac{1}{2}$.

Either of these examples, or any other, may be proved by back-stating, according as the first example was proved; and each proof becomes another question in the Rule of Three, as stated before.

E. 6. If I have 50*l*. a year salary, how much is due to me for 144 days service at that rate?

Days. l. Days. l. s. d. If 305 50 1411 Answer 19 14 6_{363}^{99} parts of **a** penny.

In this example, the product of the third by the second number is 7200; which divided by the first 365 (according to the rule) quotes 19 pounds, the name of the middle number, and there is a remainder of 265; which multiplied by 20, according to Reduction, the product still aivided by 265, there comes out 14 shillings; and yet there is a remainder of 190, which multiplied by 12, and the product divided by 365, gives 6d, and there is a remainder of 90: which if multiplied by 4 (the last inferior name) and divided by 365, yet would not come to a forthing more; so that the answer is as above, l. 19 14 $6\frac{9^{\circ}}{36^{\circ}}$.

When the first of the three given numbers is an unit or one, the work is performed, or answer found, by Multiplication only.

Digitized by Google

E.c.

98

OF ARITHMETIC.

Ex. 7. If I am to give 17s. for 11b. of Organzine silk, what must I give for 264lb. at that rate ?

$$10.$$
 s. $16.$
If $1 - - 17 - 264$

Ex. 8. If I buy 49 bags of hops at 12'. 12s. 6 !. per bag, what come they to at that rate?

Bag. 1 Multiply by	<i>l. s.</i> —12 12	d. Bags. 649 7 and by 7
	88 7	6 7
	618 12	6

The foregoing work is performed by the component parts as taught in Multiplication, because 7 times 7 is 49.

When the third, or last of the three given numbers is an unit, or one, the work is performed by Division.

Ex. 9. If 12 ells of Holland cost 31. 6s. what is the price of 1 ell at that rate?

12) s. £lis. EII. If 12---5 6 of 1s. or 6d.

Ex. 10. If 56 yards of broad cloth cost 40%. 123. what is the price of a yard at that rate?

Yds. 7) i. s. Yd. If 56-8) 5 16 0 14 Gd. Answer.

This example is wrought by Division of Money, and by 7 and 8, the component parts, as shown in the rule of division. Ex. 11. If A. owes B. 2961. 17s. and compounds at 7s. 6d. in the pound, what must B. take for his debt?

5. d. s.

If 20-90-5937. Answer. 1. 111 Gs. 4 d.

Ex. 12. If a gentleman's income be 500/. a year, what may be expend daily, and yet lay up 121. 13s. per month? First multiply 12/. 15s. by 12 the months in a year, and it makes 153% which deducted from 500% the remainder is 3477. Then say, E.2

Digitized by Google

166093

1.

Daus. If 365 ----- 347, what 1 day? Answer 19s. 5

After you have reduced the pounds into shilling, which make 6940, you divide them by 365, and the quotient is 19s. per day, and 5 remains over, which being placed over the divisor 365, gives 19s. 353.

The Rule of Three, Inverse or Indirect Proportion.

In Indirect Proportion, the product of the third and fourth numbers is equal to the product of the first and second.

But the method of stating any question in this rule is the same with that of the direct rule.

For the first and third numbers must be of one name, and so reduced as in that rule, and the number that asks the question must possess the third place; and the middle number will be of the same name with the answer as it is there.

To know when the question belongs to the Direct, and when to the Inverse rule.

When the question is stated as aforesaid, consider whe- : ther the answer to the question ought to be more or less than the second number; if more, then the lesser of the first and third numbers must be your divisor ;

But if less, then the greater of the two extreme numbers ' must be your divisor.

And if the first number of the three is your divisor, then the proportion is direct ; but if the last of the three is your ! divisor, the Proportion is Indirect or Inverse.

Or without regard to Direct or Reverse.

If more is required, the lesser } is the divisor. If less, the greater

Examples for Explanation.

Ex. 1. If 4 men plane 250 deal boards in 6 days, how many men will plane them in 2 days?

If 6 days require 4 men, what 2 days? Ans. 12 men.

Ans.

Er. 2. If a board be 9 inches broad, how much in length will make a square foot?

Digitized by Google

In

OF ARITHMETIC.

In B.	. In L.	1 J. 1	
lf 12		9 inches broad?	
	12		
		•	

:,---

Answer 16 inches in length.

In these examples, the first and second numbers are multiplied together, and the product is divided by the third; for, in the first example, it is most certain that 2 days will require more hands to perform the work than 6 days; there fore the lesser of the extreme numbers is the *divisor*, and declares the question in the *Indirect Proportion*.

Likewise, in the second example, 9 inches in breadth must needs require more in length to make a foot than 12 inches in breadth, wherefore it is in the same *proportion* with the first example, because the *divisor* in the third number.

E.r. 3. How many yards of sarcenet, of 3 qrs. wide, will line 9 yards of cloth of 8 qrs. wide?

8 Here the nurrower the silk, the more in length is required, of course 3)72 8 must be the multiplier, and 3 the divisor.

Yards 24 Answer.

Ex. 4. If a loaf weigh $.4\frac{1}{2}b$, when wheat is 5s. 6d. the bushel, what must it weigh when wheat is 4s, the bushel?

d. Half lb. d. lb. 1f 06 - 9 - 48 Answer $6\frac{3}{8}$

Ex. 5. If in 12 months 100l, principal gains 5 pounds interest, what principal will gain the same interest in 5 months?

Months.	Principal.	Months.
12	100	5
-	12	
•	5)1200	

Answer 2401. principal.

The Double Rule of Three Direct. In this Rule there are five numbers given to find out a F3 sixth,

sixth, which is to be in proportion to the product of the fourth and fifth numbers, as the third number is to the product of the first and second numbers.

Questions in this kind of *proportion* are wrought either by two operations in the *Single Rule of Three Direct*, or by the rule composed of the five given numbers, and the one may be a proof to the other, as may be seen in the following example.

Ex.1. If 100 pounds principal in 12 months gain 5 pounds interest, what will 246 pounds principal gain in 7 months?

If 100 gain 5, what will 240	57 - 14 - 14 - 14 - 14 - 14 - 14 - 14 - 1
1 00)12 30 20	
1 00)6 00 M. l, s. Then say again, if 12 gain 12 6 w 20	Answer 121. 6s. M. hat 7
246 7	
12)1792	•
2(01 14 3 6d.	•
£7 3 61.	· •

In the first stating, the answer is, that if 100*l.* gain 5⁺ pounds, then 246*l.* will gain 12 pounds 6 shillings.

Then I say in the next stating, if 12 months gain 121 Gs. what will 7 months? and the answer is 71. 3s. 0d. And so much will 246 pounds gain in 7 months, if 100 pounds gain 5 pounds in 12 months.

You must particularly note, that in all operations where the answer to the question is found by two statings of the Rule of Three, the answer of the first stating is the middle number of the second stating, as in the preceding example.

This mark \times when it stands between two numbers, denotes that the numbers are to be multiplied into another; thus 9×5 signifies that 9 is to be multiplied into 5, and the product is 45. The

The foregoing question may be answered by a stating composed of the five given numbers thus.

(1) (2 L. M M 100 + 12 12.) (3) . L. 5	(4) -246 + 7	(5) M. 7
1200	•	1722	

1.1

In this work, in stating the question, the first and fourth numbers are made of one name, as are the second and fifth; then the two first numbers are multiplied together for a divisor, and the last three numbers are multiplied together for a dividend,' and the quotient, or answer, is of the same name with the middle numbers, ziz, pounds, inte-

e 1 80
12,00)+2,00
s. 3—60 0 12
12,00)79.00
d 6

-210

rest. In the work I find the first quotient 7 pounds interest; and so I proceed from one denomination to another, till I find the same answer as in the work at two statings, viz. 71. 3s. 6d.

This method of operation serves to answer all questions' in the Double Rule of Three Direct.

The Double Rule of Three Reverse.

In this Rule you must place your numbers in such order, that your second and fourth number may be of one name or denomination, and your third and fifth.

Ex. If 100/. principal, in 12 months, gain 6/. interest, what principal will gain 20/. interest in 8 months?

Stated thus : (2) (1) (3) (4) (5) Principal. Mo. Interest. Mo. Interest. ---6 lf 100 + 12--20 + 6 121200 48 the divisor. 20 48)24000(5001. principal, Answer. 2+0 (0) F 4

Digitized by Google

103

104

In this work, the third and fourth numbers are multiplied together for a divisor; and then the first is multiplied by the second, and that product by the fifth number, and the product, 24000, is divided by 48, and the quotient is 500*l*. principal, which is the answer to the question, as before shown.

RULES OF PRACTICE.

These Rules are so called from their frequent use and brevity, in finding the value of most sorts of goods or merchandize; for any question in the Rule of Three, when the first number in the stating is 1, is more briefly done by these rules, called Practice.

But previously to these rules, it is necessary to have the following tables by heart.

Parts of a S	Shilling.	Of a Pound.	Parts of a Pound.
Parts of a 5 d. 6 is -1 3 4 3 4 2 5 1 5 *	Shilling.	of a Pound.	Parts of a Pound. s. d. 10 0 is $\frac{1}{2}$ $\dot{0}$ 8 5 0 4 0 3 4
$1\frac{1}{12}$	- -	240	$\frac{2}{2} \frac{6}{3} \frac{1}{3}$
• •		×	$\begin{array}{cccc} 1 & 8 & \frac{1}{12} \\ 1 & 0 & \frac{1}{20} \end{array}$
	••••••••		

Parts of a Shilling.

6d. is $\frac{1}{2}$ Ex. I. 426 pounds of sugar, at 6d. per lb.

210)2113

£10 13 Answer.

Here 6d, being the price of each *lb*, and the half of a shil-Jing, therefore the half of 426 is taken, and gives 213s. or 10/, 13s for the value of the sugar.

 $\begin{array}{c|c} 4.d. \ 15 \ \frac{5}{3} \\ cf \ 1s. \end{array} \begin{array}{c} Ex. \ 1I. \\ \hline 210)17 \ 1v \ 8d. \end{array}$

£8 10 8 Answer.

Here 4d. is $\frac{1}{3}$ of a shilling; therefore the third part of 512 is 170s, and $\frac{2}{3}$ of a shilling, or 8d. remains.

The remainder is always of the same name with the dividends

OF ARITHMETIC.

dend, which here is groats, for the pounds of cheese are at a. groat each.

3d. is 1 Ex. III. 246 yards of ribband, at 3d. per yard. of 1s. 210) 6 | 1 6d.-

1.3 1 6 Answer.

Here the yards are divided by 4, because 3d. is the 4th of a shilling, and it quotes 61 shillings, and 2 remains, or two 3 pences; so the answer is 3l. 1s. 0d.

And thus may any proposed question be answered, belonging to the first table, or parts of a shilling; that is, by dividing the given number by the denominator of the fraction, and the quotient will be always shillings, which (the remainders being known as above) brings into pounds, by dividing by 20, &c.

When the price of the integer is at a farthing, a halfpenny, or three farthings more than the value of the pence mentioned, then for those farthings take a proper part of the foregoing quotient found for the pence, and add them together. Ex. 240 ells of canvas at 4d. $\frac{1}{2}$ per ell.

Ad is Ll	<i>Ex.</i> 240 cl	ls of canvas at	4 a
$\frac{1}{2}d.$ is $\frac{1}{8}$ of 4d.	83 10 <u>3</u>	or 4d. 1.	
·.	210) 913	41	
	1.4 13	4 ¹ / ₂ Answer.	

In this example, divide by 3 for the groats, as being the third of one shilling, and it quotes 83s. then consider that a halfpenny is the eighth of 4d. therefore take the eighth part of the great line, or 83s. and that produces 10s. and $\frac{3}{4}$ of a shilling, or $4\frac{1}{2}d$; then the two lines being added together, make 93s. $4\frac{1}{2}d$, or 4l. 13s. $4\frac{1}{2}d$ as in the work. Parts of a Pound.

10s. is $\frac{1}{2}$ | 254 yards of cloth, at 10s. per yard. l.127 Answer.

Here the half of 254 is taken, because 10s. is the half of a pound.

Digitized by Google

s. d. 6 8 is $\frac{1}{3}$ | 972 gallons, at 6s. 8d. per gallon.

-1.394 Answer.

F 5

Here

Here the third part is taken, because 6s. 8d. is the third of a pound, and the answer is 324l.

And thus may any question proposed be answered, belonging to the second table, or parts of a pound : that is, by dividing the given number by the denominator of the fraction, and the quotient will always be pounds; and if any thing remains, it is always so many halves, thirds, fourths, or fitths, &c: of a pound, according to the denominator that you divide by.

If the price be shillings and pence, or shillings, pence, and farthings, and no even part of a pound, then multiply the given number of the shillings in the price, and take even parts for the pence, or pence and farthings, and add the several lines together, and they will be shillings, which shillings bring into pounds, as before.

Examples.

	•	. هر		
•	16. s. d. 426 at 4 9 4	<i>Ell</i> 216 2	s. s. d. at 2 3½ per elł.	
61d. 31d. 01 6d.	1704 213 106½ or 6d.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · · · ·	
	210)202i3 6	210)49 55.	. <u></u>	
	l. 101 3 6 Ans.	. 1. 24 15	Aus.	
		396 gal. of bi 7	andy, at 7s. 9	L per
61d. of 35d. of	1 s. (5d. (2772 19 8 99	· ·	
N T	210)3	30619	,	
	/. 1	15319	·	• •

When the price is 10% only, annex 0 to the right of the given number, which is multiplying by 10, and they are pence, which divide by 12 and 20.

Digitized by Google

Exam-

OF ARITHMETIC.

Example: 4261b. of hops, at 10d. per lb. 12)4260

e

210) 3515 1. 17 15 Answer.

When the price is 11*d*. set down the quantity twice in the form of Multiplication, and add the two lines together, then divide by 12 and 20.

Example.

426lb. of copper at 11d. per lb.

526

12)4686 pence.

210) 39 0 6

1. 19 10 6 Answer.

If the price be $11\frac{1}{2}d$. proceed as before, and take half the uppermost line, &c.

Example. 942lb. of tobacco at 111d. per lb. 942

471

12110833

2)0(90 | 2 9

1.45 2 9 Answ.

When the price is 1s. only, divide by 20, and you have the answer at once.

> *Example.* 210)96 | 41b. of tobacco, at 12d. per lb.

1.48 4 Answer.

When the price is 2s. it is done at sight, by doubling the last figure towards your right hand, and setting it apart for shillings, and the figures towards the left are pounds.

Example.

596 gallons of spirits at 12s. per gallon.

1.59 12 Answer. Here the double of 6 is 12, and the 59 are pounds. From

THE YOUNG MAN'S BEST COMPANION. *

From this method of working by 2s. a multitude of examples may be most expeditiously wrought, viz.

	Els. 441 Cambric, at 5s. 9d.	Yards. 426 at 3s. 8d. per yard.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	44 8 at 2s. 44 8 at 2s. 1s. ½ 2s. 22 4 at 1s. 6d. ½ 1s. 11 2 at 6d. 5 11 at 3d.	42 12 at 2s. 21 6 at 1s. 10 13 at 6d. 74 11 at 3s. 6d.

Answer 1. 127 13 at 5s. 9d.

1(8

The operation of these two examples is so plainly shown that there is no need of further explanation.

Again, 548 yards broad cloth, at 12s. 6d. per yard.

l. 54 16 at 2s. 6 times 2 is 12s.

6 1. is	328 16 at 12s.	Note. That 131, 14s. is the
4 01 20.		two shilling line.

1.342 10 Answer.

Or multiply by 12s. take half of the given number for the 6d. thus, and divide by 20, the answer is in pounds.

		548 12	yards.
<u>ل</u>	6	576 27 4	
210)	63	50	
7 2	10	10	Aneres

Where the price is an even number of shillings, multiply the numbers of integers by half the price, and double the first figure of the product for shillings, and carry, as is usual in multiplication, and the other figures towards the left will be pounds.

Digitized by Google

Esam-

Example.

296 yards of cloth, at 14s. per yard. 7 the half of 14s.

1. 207 4s. Answer.

Here 7 times 6 is 42; the double of 2s. is 4s. &c.

When the price is an odd number of shillings, work for the even number as above, and for the odd shillings take the $\frac{1}{20}$ of the given number, and add them together.

Example.

496 gallons of citron water, at 17s. per gallon. 8 half of 16s.

1.396 16s. 24 16

1. 421 12 Answer.

In this example I say, 8 times 6 is 48, then twice 8 is 16s. and carry 4; then 8 times 9 is 72, and 4 is 76, 6 and carry 7; and 8 times 4 is 32, and 7 is 39; then the half of 4 is 2, & c.

I have not here room to speak of the various and almost infinite methods and rules of *Practice*, but I shall leave some general rules, which, if carefully noticed, will be of the greatest use to learners. These are:

1. When the price is parts of a farthing, or of a penny, and $\frac{3}{4}, \frac{5}{5}, \frac{7}{8}$, &c. then multiply the integers by the numerator, and divide by the denominator, and the result will be either farthings or pence, which reduce to pounds, &c.

2. When the price is pence, and no even part of a shilling; as suppose 5d.7d.8d. or 9d. then it may be done by taking their parts, as 3d. and 2d. is 5d. and 4d. and 3d. is 7d. and 4d. and 4d. is 8d. and 6d. and 3d. is 9d. but it is an easy and sure way to multiply the given number by 5, 7, 8, or 9, then the product is pence, which bring to pounds by *Ke*-duction.

3. When the price is pence and parts of a penny, as $1\frac{1}{2}d$. $2\frac{1}{2}d$, or $6\frac{2}{3}d$. then work for the penny, by taking the $\frac{1}{12}$: for 2d. the $\frac{1}{6}$; and for 6d. the $\frac{1}{5}$: then for the farthing take $a\frac{1}{2}$ of the penny line, and for $\frac{1}{2}$, $\frac{1}{4}$ of the two-penny line; and for $\frac{3}{4}$ take $\frac{1}{5}$ of the sixpenny line; then add the results together, and the total will be shillings, which reduce to pounds, by dividing by 20. Or by the sure way of bringing the mixed number into the lowest denomination; as $1\frac{1}{4}d$.

into 5 farthings; $2\frac{1}{2}d$ into 5 halfpence, and $6\frac{3}{4}d$. into 27 farthings; then multiply the integers by 5, and the product is farthings; or by 5 halfpence, and the product will be halfpence; or by 27 farthings, and the product will be farthings; which, whether farthings or pence, reduce to pounds, &c.

4. When the price is shillings and pence, or shillings, pence, and farthings, multiply the integers by the shillings of the price, and take parts of the pence, or pence and farthings, &c.

5. If the price be pounds and shillings, or pounds, shillings, pence, and farthings, multiply by the shillings in the price, that is in the pounds and shillings, and take parts of the pence and farthings.

6. When the number of integers hath a fraction annexed, or belonging to them, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, &c. then take $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, of the price of one of the integers, and add that to the other results.

TARE AND TRETT, &c.

Gross Weight is the weight of goods in hundreds, quarfers, and pound, with the weight of the hogshead, cask, chest, bag, bale, &c. that contains the goods.

Tare is allowed to the Buyer for the weight of the hogshead, cask, chest, bag, bale, &c.

Frett is an allowance made for waste, dust, &c. in sundry sorts of goods, as tobacco, cotton, pepper, spices, &c. and is always 41b. in each 1641b. Subtile, and found by dividing the Subtile Pounds by 26, because 4 times 26 make 1041b. When the gross weight is brought into pounds, and before the tare is deducted, they are called *Pounds Gross*, and after the Tare is subtracted the remaining pounds are called *Pounds Subtile*, which divided by 26 (as before stated) quotes Pounds Trett, &c.

Tare at so much per Cask, Hogshead, Bag, &c.

The allowances for Tare are variously wrought, as by the following Examples :

In 12 Casks of Indigo, containing 45 cwt. 1 qr. 14lb. Gross, Tarc 30lb. per Cask, how many Pounds net?

Digitized by Google

30lb.

30 <i>lb</i> .	Eut.	qr.	Ъ
12	45	1	14
	4		
360 Pounds Tare	. <u> </u>		-
••••••••••••••••••••••••••••••••••••••	181		
	28		
			
•	1462		
	362		
·	••••••••••••••••••••••••••••••••••••••		
t .	5082		
Subtract -	360		
		•	
Answer	4722		

In this Example the *Us.* Tare of one Cask are multiplied by the number of Casks, and the Product is 360 pounds Tare; and the Gross Weight is reduced into Pounds by the method'shown in Reduction of Weight; and then the Pounds Tare are deducted from the Pounds Gross, and the' remainder is Pounds net, viz. 4722, as above.

When the Tare is at so much per Cat. multiply the number of hundreds by the Tare, and take parts for the odd weight, adding to it the Tare found by Multiplication, and dividing by 122 to bring it into Gross Weight in order for Subtraction.

Example.

What is the net weight of 12 Casks of Argol, Gross Wt. 84 Cut. 2 or. 14 lb ?

14 Tare per Cut. 336		C. 84 10	qrs. 2 2	<i>lb.</i> 14 83	Tare.
84 7 for half Cut. 1 ² / ₄ for 14 <i>lb</i> .	Ans.	74	0	5 <u>}</u>	

112)1184³/₄(10 Cut.

112

6416. or half a Cwt. and 816.

The Tare in this Example is to be found by the foregoing directions, 10 c. 2 q.s. $8\frac{2}{3}lb$, which subtracted as in the work, leaves 74 c. 0 qrs. $5\frac{1}{3}lb$, for the net wt.

But this may be better performed by Practice, thus:

THE YOUNG MAN'S BEST COMPANION.

14%. is 1/8	of Cwt. Sub	Cwts 84 10	q̀rs. 2 9	<i>lbs.</i> 14 Gross. 8 ³ Tare.
	505.	10	_~	

74 0 $5\frac{1}{2}$ net. In this method the Gross Weight is divided by 8, because 14*lb*. is one eighth of 112*lb*. and the remainder is reduced into the next inferior Name, still divided by 8 to the end and then deducted as above, and the net weight is the same as by the other way. And so may any Tare per Cwt. be found, if the Tare be an even part of 112*lb*. as 14 is one eighth, and 7*lb*. the half of that, &cc. that is, if the Tare be at 7*lb*. per Cwt. find it for 14*lb*. as before, and then take the half of that for 7*lb*. per Cwt. Tare, the same for 8*lb*. per Cwt. Tare; taking 1 seventh for 16*l*/. and then the half of that for 8*lb*. per Cwt. Fare.

TRETT.

What *Trett* is, and how found, having been said already ; now I shall gave an Example for explanation, viz.

Bought six Hogsheads of Tobacco, containing Gross and Tare as follows, viz.

	No.	Ć. gr	s. 16.	• ·	lb.
	1 wt.	4 1	- 20	Tare	80 .
	2	5 2	19	•	100
	3	63	18		102.
	4	73	12		104
	5	82	13		106
Subtile	6	91	14		F10
26)4198(16lb. Trett	· . · ·	42 3	12		602
26	•	4		;	
159		171		÷	-
1 56		. 28			
·		·			
38		1380			
26	,	342		,	
·		<u> </u>	•	· · .	
38		4800	Pour	nds G	ross.
26	 Subtrac 	t 602	Pour	nds Ta	ire.
20)192(7 oz.		4198	Pou	nds St	ibtile
182	Deduct	~161	7 Pc	unds	Trett
10		4036	9 P	ounds	Net.

There are a few other rules, such as Barter, or exchange of Goods for Goods, for Coin &c. but these being performed either by the Rule of Three, or by Practise it is needless to enlarge upon them.

OF FRACTIONS VULGAR AND DECIMAL.

A Fraction is a term for a part or parts of an Unit.

A Vulgar Fraction is written with two figures, or numbers one above another, and a short line drawn between them. The *lower* number is called the Denominator, and this shews in how many equal parts the unit is supposed to be divided. The *higher* number is the Numerator, which shows how many of those parts are meant by the Fraction. Thusif I want to express 7d. as part of a Shilling, I write τ_x^7 . The Denominator 12 shows the number of pence in a shilling, and the Numerator 7 is the number given. If I would express 13 shillings, as a part of a pound I write $\frac{1}{2}$, because in the first case 20 shillings make 1 pound, and in the second 112*lbs*. make 1 cwt.

Fractions are thus set down and read, viz. $\frac{1}{4}$, one fourth; $\frac{1}{2}$, one half; $\frac{1}{3}$, one third; $\frac{1}{5}$, one fifth; $\frac{1}{6}$, one sixth; $\frac{2}{3}$, two thirds; $\frac{2}{4}$, two fourths; $\frac{5}{5}$, five sixths; $\frac{5}{7}$, five sevenths, &c.

Fractions are either proper or improper :...a proper Fraction hath its numerator less than the denominator, as $\frac{5}{5}$, five eighths; $\frac{2}{54}$, twenty-four fifty-sixths, &c.

An improper Fraction has its numerator greater than the denominator; $\frac{7}{3}$, seven thirds; $\frac{48}{75}$, forty-eight fifteenths, &c.

Fractions are either Simple or Compound; Simple, when a part of an unit or integer, or thing, hath but one numerator, and one denominator; as $\frac{3}{4}$ of a pound sterling $\frac{1}{2}$ of a cwt. $\frac{2}{3}$ of a tun, $\frac{2}{5}$ of a gallon, &c. Compound is a Fraction of a Fraction, as the $\frac{1}{2}$ of a $\frac{1}{4}$ of a pound sterling, which is equal to half a Crown; or when one is divided into any number of parts, and those parts again sub-divided into parts, &c.

Again, Fractions are of two kinds, Vulgar and Decimal. Vulgar Fractions are as before stated. Decimal Fractions are artificially expressed, by setting down the numerators only, the denominators being understood; and are always an unit, with as many ciphers annexed as there are places in the numerator; numerator; and therefore may be either 10, or some power of 10, as 100, 1,000, 10,000, or 100,000, &c.

Decimal Fractions appear, and are worked as whole numbers, but are distinguished from them by a point or comma prefixed thus: .5 is read five tenths; .32 thirty-two hundredths; and .256 two hundred fifty-six thousandths; but of their use we shall treat hereafter.

Reduction of Vulgar Fractions is to prepare them for Addition, Subtraction, &c.

1. To reduce a mixed Number to an improper Fraction.

Multiply the integer by the denominator, taking in the numerator.

Ex. Reduce 12 gallons $\frac{3}{4}$ to an improper Fraction, thus :

51 new numerator.

Answer 51, or 51 quarts.

2. To reduce an improper Fraction to a whole or mixed number.

Divide the numerator by the denominator.

Ex. Reduce the above to a whole or mixed number thus: 51 4) 5

4 12-3 remainder equal to $\frac{3}{4}$ Here 12 gallons is the whole number, $\frac{3}{4}$ the fraction, the same with three quarts.

3. To reduce Fractions to a common Denominator.

Multiply the numerator of each Fraction into all the denominators except its own, and the product will be a numerator to that fraction; and so on by the others. The common denominator is found by multiplying all the denominators together.

Ex. Reduce $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{5}$ of any integer to a common denominator; thus, twice 4 is 8, and 6 times 8 is 48, for a new numerator to $\frac{2}{3}$; then 3 times 3 is 9, and 6 times 9 is 54, for a new numerator to $\frac{3}{4}$; lastly, 5 times 4 is 20, and 3 times 20 is 60, the numerator to $\frac{5}{5}$: Then to find the common denominator, say 3 times 4 is 12, and 6 times 12 is 72, the common denominator; so that $\frac{4}{7}$ is equal to $\frac{2}{3}$, $\frac{5}{77}$ is equal to $\frac{3}{4}$, and $\frac{60}{72}$ is equal to $\frac{5}{5}$. Which may be thus proved :

$\frac{2}{7}$ of a pound is	13	4	48)	72)	162	(2	or 21
3 ditto	15	0	54		141	• .	
🕺 ditto	16	8	60 🌔				
•)	•	18		•

But 2l. $\frac{1}{4}$ 2l. 5s. or 0 $\frac{162}{74}$ Common denominator.

Here the several numerators are added together, and they make 162; which placed over the common denominator 72, make the improper fraction $\frac{162}{72}$; and its value is found as before shewn in the Rule for reducing an improper fraction to a whole or mixed number.

4. To reduce a Fraction into its lowest Terms.

Rule. If they are even numbers, take half of the numerator and denominator as long as you can; then divide them by any digit number (*i. e.* 3, 4, 5, 6, δc .) that will leave no remainder in either,

Ex. Reduce $\frac{56}{84}$ into its lowest terms; thus the half 56 is 28, and the half of 84 is 42, then the half of 28 is 14, and the half of 42 is 21. So the fraction $\frac{56}{84}$ is reduced to $\frac{14}{24}$, And since these cannot be halved any turther, for though you can have 14, yet you cannot 21, without remainder; try therefore to divide them by some other digit number; you will there find that 7 will divide both numerator and denominator without any remainder; then say the 7's in 14 twice, and the 7's in 21, three times: so the fraction $\frac{56}{84}$. The working is performed in the following manner.

2		2	.7.		
56	1	28	14	2	
84	ř	42	21	1 3	

And the Proof that $\frac{2}{3}$ is of equal value with $\frac{56}{84}$ appears by multiplying any integer by the numerator of each fraction, and dividing by the denominator of each fraction.

Ex. Let the intege The fraction $\frac{2}{3}$	r be 1 <i>l.</i> sterling, or 20s. The fraction $\frac{56}{84}$	
<i>s</i> .	8.	
20	20	
2	56	
3)40	84)1120(13s.	
	84	
13-4d.		13s. 4d.
	280	
	252	
•	28	- · ·
	12	,
	336(44.	
· 、	336	-
	(U)	

. 116

Here it is manifest, that by working by a fraction in its lowest terms, much time and figures are saved. In one operation, 20 the integer, is multiplied by 2, and the product 40 divided by 3, and there remains 1, or $\frac{1}{3}$ of a shilling, or a great, as in the other work.

There are other methods of reducing a fraction into its lowest terms; but none so ready as the foregoing, where it can be used.

5. To reduce a Compound Fraction into a Simple one of the same value.

Rule. Multiply the numerators together for a new numerator, and the denominators for a new denominator.

Ex. Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of a pound sterling into a Simple Fraction. Thus twice 3 is 6, and 5 times 6 is 30, the numerator; then three times 4 is 12, and 6 times 12, is 72, the denominator: so $\frac{3}{72}$ of a pound is equivalent to $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{5}$ of a *lb*. Thus proved, $\frac{1}{5}$ of a *lb*. 16s, 8d, and $\frac{3}{4}$ of 16s. 8d, is 12s. 6d, and $\frac{2}{3}$ of 12s. 6d, is 8s. 4d, the Answer. And multiplying 20s. by 30, and dividing by 72, gives the same Answer, as is seen in the following work.



6. To find the value of any Fraction, whicher of Coin, Weights, or Measures.

Multiply the integer by the numerator, and divide by the denominator; and if any thing remains, multiply it by the number of units of the next inferior denomination.

Ex. 1. What is $\frac{3}{2} \circ 2$ of a pound, or 20s.? The Operation of the foregoing Example of proof to the Compound Fraction $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$, answers this question, and need not repetition. Ex. 2. What is the amount of $\frac{5}{6}$ of a ton weight? 20 Integer. 5 Numerator.

Denominator 6)100

Cust. grs. lb. oz.	16	2	18	104
Answer 16 0 18 104	Cut	qr s .	1 6.	<i>oz.</i>

Here the integer 20 C. is multiplied by the numerator 5; and the product 100 divided by the denominator 6, and the remainder 4 is multiplied by the parts of the next inferior denomination, &c. the answer is 16 C. 2grs. 8lb. 10oz. \$, or \$ of an ounce weight as above.

Addition of Vulgar Fractions.

If the Fractions to be added have a common denominator, add the numerators together for a numerator, which place over the common denominator, and the work is done. Ex. Add 2, 3, and 4 of a pound sterling together. Thus 2 and 3 is 5, and 4 is 9, the numerator; which place over 5 the common denominator thus 3, and this improper fraction ?, is in talue 36s. for 9 times 4s. (the 5th of a pound) is 36s. for if the number 9 be divided by the de-5)9 nominator 5, I say the 5's in 9%. once, and 4 remains, which is 4 of a pound, or 16s. 1

But if the Fractions to be added have unequal denominators, they must first be reduced to a common denominator, by the Rule before shown, before addition can be made; and then proceed as above.

2. When mixed numbers are to be added, work with the fractional parts as before, and carry the fractional value to the whole numbers.

Example. Add 251. 3 to 121, thus 253 121 Answer 381.

Here 1 and 3, the numerators, make 4; and 4 is 1, and 2 is 3, and 5 makes 8; and 1 and 2 is 3, the answer is 38. 01 Or they may be reduced to improper fractions, thus :

253	124	103
4	4	49
103	49	4) 152
4	4	38 pounds.

Here the numerators are added, and their total is 152; which divided by 4, the common denominator, quotes 38 pounds, as above.

3. When compound fractions are to be added to simple ones, reduce the compound fraction to a simple one, as before directed; and then proceed as above.

Ex. 1. Add $\frac{2}{3}$ and $\frac{3}{4}$ so $\frac{1}{2}$ of $\frac{2}{3}$ of a pound; thus once 2 is 2, and twice 4 is 8, therefore $\frac{2}{3}$ is equal to the compound fraction. Then saying, 2 and 3 is 5, and 2 is 7, the new numerator, and $\frac{7}{3}$, equal to 17s. 6d. will be the answer.

Ex. 2. Add $\frac{3}{4}$ to $\frac{3}{4}$ of $\frac{1}{3}$ of a shilling. The work will be $\frac{3}{4}$ added to $\frac{3}{5\pi}$, but these must be brought to a common denominator, and the fractions will then be $\frac{36}{5\pi}$, added $\frac{24}{5\pi}$, which will be $\frac{60}{5\pi}$, or when brought to the lowest terms $\frac{5}{4}$ of a shilling; the 8th of a shilling is $1\frac{1}{4}d$, therefore $\frac{5}{4}$ is $7\frac{1}{3}d$,

That this answer is right is thus proved: I am to add $\frac{3}{4}$ of a shilling, or $4\frac{1}{2}d$. to $\frac{3}{4}$ of $\frac{1}{3}$ of a shilling, now the third of a shilling is 4d, and $\frac{3}{4}$ of 4d, must be 3d.; of course $4\frac{1}{2}d$, added to 3d, gives $7\frac{1}{2}d$, according to the answer as above.

Subtraction of Vulgar Fractions.

In this Rule the Fractions must have a common denominator, or be reduced to one, before any deduction can be made.

Ex. What is the difference between $\frac{1}{4}$ and $\frac{3}{4}$? Answer $\frac{2}{4}$; which may be proved by Addition, for $\frac{1}{4}$ and $\frac{2}{4}$. make $\frac{2}{4}$.

Note. The difference between the numerators is the difference of the fractions.

Again; from $\frac{2}{3}$ of a pound take $\frac{5}{12}$: here the fractions are to be reduced to a common denominator; 36 is the first numerator, and 20 the second numerator, their difference is 16, and 48 is the common denominator: so that $\frac{6}{18}$ or $\frac{1}{3}$, in its lowest terms, is the difference between $\frac{2}{3}$ of a pound, and $\frac{5}{12}$ of a pound.

To

To subtract a Compound Fraction-from a Simple one.

Rule. Reduce the compound Fraction to a simple one, and work as before.

E.r. From $\frac{13}{14}$ take $\frac{2}{3}$ of $\frac{8}{9}$, say twice 8 is 16, and 3 times 9 is 27, therefore $\frac{16}{27}$, is equal to a compound fraction. Then then $\frac{13}{14}$ and $\frac{16}{27}$ must be reduced to a common denominator, thus, 13 times 27 is 351, the first numerator; 16 times 14 is 224, the second numerator; and 4 times 27 is 378, the common denominator. Subtract 224 the second numerator from 351 the first numerator, and the remainder is 127, which place over 378, the common denominator, thus $\frac{127}{15}$ Answer.

When a Simple Fraction is to be deducted from a whole number.

Rule. Subtract the numerator of the fraction from the Denominator, and place the remainder over the denominator, carrying 1 to subtract from the whole number, &c.

Example.

From 121. take $\frac{3}{2}$ of a pound, thus 5 (the numerator) from 8 (the denominator) and there remains 3, which place over the denominator 8, thus $\frac{3}{6}$; then 1 from 12 and there remains 11. So the Answer is $\pounds 11\frac{3}{8}$, or $\pounds 11$ 7s. 6d.

Multiplication of Vulgar Fractions.

Rule. Multiply the numerators into one another for the numerator of the product, and then do the same by the denominators, for the denominator of the product.

Er. Multiply $\frac{3}{4}$ of a pound by $\frac{5}{8}$ of ditto: say 3 times 5 is 15, the numerator, and 4 times 6 is 24 the denominator. So the Answer is $\frac{15}{2}$, or in the lowest terms $\frac{5}{2}$.

Fou are to observe, that Multiplication in Fractions lessens the product, though in whole numbers it augments it; as above ξ , or 12s. 6d. is less than ξ , or 16s. 8d. and also less than the othe fraction $\hat{\chi}$, or 15s.

2. To multiply a whole Number by a Fraction.

Rule. Multiply the integer by the numerator of the Fraction, and place the product over the denominator.

Note. Multiplication by a Fraction implies the taking away some part or parts of the multiplicand, and therefore, may be truly expressed by a compound fraction. Thus $\frac{1}{2}$ multiplied
THE YOUNG MAN'S BEST COMPANION.

 $\frac{1}{2}$ multiplied by $\frac{2}{3}$, is the same as $\frac{1}{2}$ of $\frac{2}{3}$ or $\frac{3}{3}$: and therefore though the rule is called Multiplication, it produces contrary effects from multiplication in whole numbers.



This improper fraction $\frac{168}{4}$ reduced, according to rule makes but 42*l*, which is less than 56: and confirms what has been asserted, *viz*. that Multiplication of Fractions lessens the Product, &c,

To multiply a Simple by a Compound Fraction.

Rule. Reduce the Compound Fraction to a Simple one, according to the foregoing rules, and work as above.

Ex. Multiply $\frac{6}{5}$ of a pound, by $\frac{2}{7}$ of $\frac{3}{4}$ of a pound: say 6 times 6 is 36, and 8 times 12 is 96. So that the answer is $\frac{3}{5}$, or $\frac{3}{5}$ in its lowest terms; equal to 7s. 6d.

Division of Vulgar Fractions.

Multiply the numerator of the divisor into the denominator of the dividend, and the product is the denominator, of the quotient; then multiply the denominator of the divisor into the numerator of the dividend and the product will be the numerator of the quotient.

Ex. Divide $\frac{15}{16}$ by $\frac{2}{3}$. The work will stand thus: $\frac{2}{15}\frac{15}{15}\frac{45}{45}$ quotient.

Here 16, multiplied by 2, gives 32; and 15 by 3, gives 45: so the quotient is $\frac{45}{2}$ equal to 1 $\frac{13}{2}$, as in the work.

' Again, suppose $\frac{2}{3}\frac{1}{5}$ was divided by $\frac{2}{3}$, the quotient will be $\frac{7}{2}$, equal to 1 integer, or whole thing. And so for any other Example.

Reduction of Decimal Fractions.

What a Decimal Fraction is has been already shown. The next thing is how to reduce a Vulgar Fraction into a decimal, which is no more than to annex ciphers at discretion (that is 2, 3, or 4, &c.) to the numerator, and then dividing by the denominator.

Digitized by Google

Example

120

Example 1. Reduce $\frac{1}{4}$ of a pound sterling to a decimal.

4)300 that is, 75 hundredth, equal to 3 qrs. of any thing, whether money, weight, measure, &c. as being 3, 75 and is written 75 of 100, and so 25 hundredths is in Decimals, the quarter of any thing, as being the 1 of a 100, and is expressed ,25, and five tenths expresses the half of any thing, as being the 1 of 10, as thus ,5.

In Reduction of Decimals it sometimes happens that a cipher or ciphers must be placed on the *left* hand of the decimal, to supply the defect of the want of places in the quotient of division. In this case always remember that so many ciphers as you *annex* to the denominator of the vulgar fraction, so many places you must point off in the quotient towards the left hand; but if there be not so many places to point off, then you must supply the defect by placing a cipher or ciphers to the left of the decimal.

Example 2. Reduce 9d. or $\frac{9}{2}$ to the decimal of a shilling, thus: 12)9,00 equal to ,75, or 75 hundredths of a shilling, or to 9d.

75 Ex. 3. Reduce 9d. to the decimal of a pound sterling. In this case the denominator of the fraction will be 240, as 240 pence make a pound, and the work will stand thus,

240)9.0000(,0375

Here are but three places in the quotient, viz. 375, and therefore I cannot point off 4 for the four ciphers annexed to 9; wherefore I prefix 0 to the left of the quotient 375, thus ,0375, and then it is 375 ten thousand parts of an integer; and in vulgar fractions it would stand thus $\frac{375}{1000}$.

The more ciphers are annexed, when the Answer is not exact, the nearer will it bring the decimal to the truth : in most cases, however, four ciphers annexed are sufficient. But when you are to reduce $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ (as above) of an integer to a decimal, or any number of shillings to decimal of a pound, two ciphers are sufficient.

Ex. 4. Reduce 3 farthings to the decimal of a pound, that is the vulgar fraction $\frac{1}{260}$ farthings in a pound.

96 | 0)3,0000 | 0(,003125. The work being performed according to the rule of Division, with two ciphers prefixed,

G

quotes ,003125, or 3125 ten hundred thousandth parts of a pound, and in vulgar fractions it would stand thus: $\frac{3125}{5000000}$.

Ex. 5. How is 12 pounds weight expressed in the decimal of 1 C. Avoirdupoise, or 111/b. The vulgar fraction is $\frac{12}{112}$, and the decimal ,1071, found as before, thus:

30, &c.

Ex. 6. How is 73 days brought to the decimal a Year? vulgarly thus expressed $\frac{37}{365}$ 36,3

365)730(,2 Ans. 2 tenths or ,2. Thus proved 36,5 730 730 73

(0)

Here 365, the days of the Year, are divided by 10, twice, and the quotients added together make 73 days.

Valuation of Decimals.

To find the value of a decimal fraction whether of corn, weight, measure, &c.

Rule. Multiply the decimal given, by the units contained in the next inferior denomination, and point off as many places from the right hand as you have in your decimal; those figures towards the left of the point are integers, or whole numbers; and those on the other side, towards the right hands, are parts of 1, or unity; that is, so many tenths, hundredths, thousandths, or ten thousandths, of one of those integers, whether a pound, a shilling, or a penny, &c. of a ton, a hundred, a quarter, or a pound weight, &c. And so many of any other infeger, of what quality or kind soever.

Example 1.

-,476 parts of a pound'sterling. 20 shillings a pound.

9,520

12 pence one shilling.

6,240 Answer 98. 6d. ,240

Digitized by Google

Example

Example 2.

,476 parts of a ton wt. 20 Cut. 1 ton.

9,520

4 grs. 1 Cwt.

Answer ! 2,080

- 2,240

9 C. 2 grs. 2lb. 240 parts 28 lb. 1 gr. of a Cwt.

In the Example of Money multiply the fraction by 20, and point off 250 for the three places in the decimal, &c. and the Answer is 9s. 6d. and 240 over, or $\frac{1}{1000}$, which is nearly equal to a farthing.

In the Example of weight, proceed as in that of money, but differently with respect to the inferior denominators, and the Answer is 9 C. 2 gr. 2lb. $\frac{i}{1000}$ of a lb.

To find the value of a decimal in money by a short method, viz.

Ride. Always account the double of the first figure (to the left hand) for shillings; and if the next to it is 5, reckon one shilling more; and whatever is above 5, call every one ten; and the next figure so many ones as it contains; which tens and ones call farthings; and for every 24, abate one. As in the last Example of Money, viz. 476, the double of 4 is 8; and there being one 5 in 7; (the next figure) reckon 1s, more, which makes 9s, and there being 2 (in the 7) above 5, they are to be accounted two tens, making 26 farthings; and abating 1 for 24, they give 6d.

Addition of Decimals

Is the same in Practice as in whole numbers, only in setting down, care must be taken that the decimal parts stand respectively under like parts: that is, primes under primes, seconds under seconds, thirds under thirds, &c. and the integers stand as in whole numbers.

G_2

Digitized by Google

Examples

2 2 2 2 2 1 Inte-	.4 7 9 6	6 2 0 6 4 Primes.
2 2 2 4 2 9 8 gers.	,4 2	0 9 4 Seconds.
2 4 2 0 7 8 1 Frimes.	,0 7 6	0 9 4 6 Thirds.
2 6 6 9 8 5 5 8 conds.	,0 0 0 4	0 9 Fourths.
2 7 9 0 Thirds.	,5	0 Filths.
437,705	1,4760	2,14982

Note. There must be as many places pointed off as there are in that Number which has most Decimal Places.

The casting up of the foregoing Examples is the same with addition of one denomination in whole numbers. The total of the first (supposing them pounds sterling) is 4371. and ,705 parts. The second is 11. and ,4760 parts. And the third is 2l. and ,14982 parts.

Subtraction of Decimals.

The numbers must be placed as before in Addition, and then proceed as an in Subtraction of Numbers of one Denomination.

l. pls.	l. pts.	l. pts.
46,51	144,42	4762,0
9,24	91,7462	0,472
37,27	48,6738	4761,528

Multiplication of Decimals.

Here the placing the numbers and the operation is the very same as in the whole numbers; remember only to point off, towards the right hand, so many places for decimals as you have decimal places in both Multiplicand and Multiplier.

(1) 24,6 2,5	Examples. (2) 4602 ,075	(3) ,2796 26
1230 492	23010 32214	16776 5592
61,50	345,150	7,2696

194

OF ARITHMETIC.

	. Esumpics.	
(4)	(5)	(6)
.07214	,083	4,25
,906	,16	1,09
,00043284	493	3825
• •	083	4250
- 1	,01328	4,6325
•		

Note. That when there are not a competent number of figures, or places to point off, the defect is supplied with ciphers, to the left hand, as in the 4th and 5th examples, according to what has before been stated in reducing a vulgar fraction to a decimal.

Devision of Decimals

Is the same in operation as in whole numbers, the only difficulty is to know how many decimal places to point off, towards the left hand of the quotient, to which end remember this rule; observe how many decimal places there are, both in the divisor and in the dividence, and find the difference; and whatever it is, so many places must be pointed off to the right hand of the quotient.

Example 1. Divide 12,345670 by 6,789 and the work stands thus: 6,789)12,345670(1,818 Ans.

In this example, the Dividend hath three decimal places more than the divisor, wherefore I point off three places to the right hand of the quotient viz. 818; so the quotient is 1 integer, and ,813 parts.

55566 54312	- • . : • • . : • •
12547 6789	•
57580 54312	
3268	•

6,789 ...

Ex. 2.

126 THE YOUNG MAN'S BEST COMPANION.

Ex. 2. Divide 3,46000 by 1,23:

Here the difference between the decimal places in the divisor and dividend is three places; as in the foregoing Example, therefore 813 is pointed off for the decimal fraction; and the quotient is 3 integers, and ,813 thousandths of an integer.

	1	
123	3) 3,46000(2,813
	246 · • •	
	·	
•	1000	•
1.0	984	
-	محمت كلنفت	
ί.	160	
	123	
	370	
	369	
. ·		1
	(1)	2

The Reader who has attended thus far, is recommended to look through the whole from the beginning; he will find but little difficulty, and much satisfaction and pleasure in treading over the same ground again, and amusing himself by working other Examples which he may readily devise under every Rule.

OF BOOK-KEEPING.

• BOOX-KERPING is the set of recording mercantile transactions in a regular and systematic manner.

A Merchant's Books should exhibit the true state of his affairs. They should show at first sight, as it were, the particular state of each transaction, and exhibit also the general result of the whole? and they should be so arranged as to afford correct and ready information upon every subject for which they may be consulted.

Books may be kept either by single or double Entry.

Single Entry is chiefly used in retail business; it is the most concise and simple method of Book-keeping, but not the most perfect.

Double Entry is generally used in wholesale and mercanile affairs, whence it is usually called by way of pre-emience Merchants' Accounts. Of these we have now to give an account: and is is not without good reason that most cople of business and ingenuity are desirous to be masters of this art; for if we consider the satisfaction that naturally arises from an account well kept, the pleasure that accrues o a person by seeing what he gains, by the species of goods

Digitized by Google

he

he deals in, and his whole profit by a year's trade, and thereby also to know the true state of his affairs and circumstances, so that he may, according to discretion, ratrench or enlarge his expences, &c. as he shall think fit, the acquirement of this knowledge must surely be desireable.

The Book of principal use in the business of Double Entry are the *Waste Book*, (by some called the *Memorial*) Journal, and Ledger.

Waste Book.

In this Book must be daily written in the order of time, in which it happens, whatever occurs in the way of trade; buying, selling, receiving, delivering, bargaining, shipping, &c. without omission of any one thing either bought, sold, borrowed, &c.

The Waste Book is ruled with one marginal line, and three lines for pounds, shillings, and pence, and the day of of the Month, and the Year of our Lord, is inserted in the middle of the page. In this Book any one may write, and on occasion, any thing may be blotted out, if not well entered, or any Error be made.

JOURNAL.

INTO this Book every article is brought out of the *Waste Book*, but in other terms, in a better style, and in a fairer hand, without any alteration of ciphers or figures: and every item is promiscuously set down without intermission, to make the book, or the several entries in it, of more credit and validity in case of any law dispute, or any controversy that may happen between merchant and merchant. In this book you are to distinguish the Debtor and Creditor (or in other terms, the *Debts* and *Credits*). And to this book you must have recourse for the particulars of an account which in the Ledger are entered in one line. In this book also, the day of the month is usually placed in the middle of the page: it is ruled with double marginal lines, for reference to the Ledger, and with three lines for \pounds . s. d. as the Waste Book.

Of the Ledger.

From the Journal or Day Book all matters or things are posted into the Ledger, which by the Spaniards is called El Libro Grande, as being the largest Book, or chief of Ac-G 4 counts. counts. The left hand side of this book is called the *Debtor* and the right the *Creditor* side: and the *Numbers* or *Fohos* of each side must be alike, as 45 *Debtor*, and also 45 *Creditor*. The day of the Month (in this Book) is set in a narrow column on the left hand, and the Month on the left of that: but when I kept Books, the number in the narrow Column referred to the Journal Page, and the Month and Day were placed in the broad Column, to the right of that; and at the Head of each Folio the name of the place of Residence, and the Year of our Lord; as thus:

I.mdon, Anno 1810.

But the Example of these several Books hereafter following will make the foregoing Hints of them much more intelligible. The following is a general Rule, upon which most of the Entries in Book-keeping depend, viz.

All things Received, or the Receivers, are Debtors to the Delivered, or the Deliverer.

4.	Waste Book Entry. Jan. 2.	1.	\$.	d.
	120 Yards of white Sarsanet, at 2s. 3d. per Yard, to pay in two Months.	, 1 3	10	0
1	The Journal Entry of the same. Wrought Silk, Debtor to John Witks. 1.13 10s. for 12() Yards of White Sarce- net, at 25. 3d. per Yard to pay in two Months.	13	10	0
	In this Example the wrought Silks are received, and therefore Debtor to John Wilks the Deliverer.			3 € ;
1	Waste Book Entry. January 4, 1810. Sold James Chapman 2461b. nett of Indigo, at 6s. 6d. per lb. to pay in 3 Months.	79	19	Q.
	Journal Entry. James Chapman. Dr. to Indigo, for 246lb. nett, at 6s. 6d. per lb, to pay in 3 Months.	79	9	0

BOOK KEEPING.

Bou Che	Waste Book Entry. ght of George Goodinch, Sen, viz. sh. Cheese 430 Cwt. 4.	· <i>1</i> .	s'. [d.
a But 2 to	L 23s. 4d. per Cwt. \pounds . 502 5ter, 50 Firkins, qt. neat $35 0$ 800lb. at 3d. per lb. $35 0$ ϕ pay at 6 Months. $-$	537	5	; 0
5 Sun	Journal Entry. dry Accounts, Cr. to George Goodinch, 1.537 5.			•
$\begin{array}{c c} 1 & \mathbf{C} \\ 1 \\ 2 \\ 1 \\ 2 \\ 5 \\ 2 \end{array}$	$\begin{array}{c} \text{snire Cneese, for 430 Cwt.} \\ \text{, at 23s. 4d. per Cwt.} \\ \text{ter, for 50 Firkins, qt. nett} \\ \text{s00lb. at 3d. per lb.} \\ \end{array}$			
	Waste Book	<u>5?7</u>	5	0
Solo Wh a Ind	d to James Jenkins, riz. ite Sarcenet, 50 Yards t 3s. per Yard igo, 50 Pounds, at 7s.			ς
P 6 Im	er Pound. Journal Entry of the last.	25	0	0
7 To	white Sarcenet, for 50 yards, at s. per yard l. 7 10 C		-	
То 7	Indigo, for 50lb. at s. per lb }	, 25	0	0

From these few Expmples of Entry it may be observed, that a Person experienced in Accompts, and a good Writer, may keep a Journal without a Waste-Book or a Waste-Book without a Journal, since they both import one and the same thing, though they differ a little in words or expression.

But however, I shall give Methods of keeping each, as far as room will allow. G 5

Digitized by Google

129

The

THE YOUNG MAN'S BEST COMPANION.

(1) The Waste B	Sook.
ondon, January 1s	t 1810.
An Inventory of all the Money, ing to me A. B. of Lond	Goods, and Debts, belong- on, Merchant, viz.
In cash	3500 0 0 L s. d.
In Tobacco, 4726lb. at 9d.	177 4 6
In Broad cloth, 6 Pieces at 50s per Piece	15 0 0
Dowlas, 1000 Ells, at 2s.	116 13 4
Canary Wines, 9 Pipes, at £.30 per Pipe.	270 0 0
Due to me from Henry Bland, per Bond	60 0 0
	413817/10
(1) Journal. Inventory, &c. Sundry Accts. Dr. to Stock - viz.	£. s. d. 4138 17 10
1 Cash	3500
Tobacco, for 4726lb. at 3 9d. per lb -	177 4 6
Broad cloths, for 6 Pieces at 5s. per Piece.	15 0 0
Dowlas, for k000 Ells, at 2s. 4d. per Ell.	161 13 4
1 Canary Wines, for 9 Pipes at £.30 per Pipe.	270 0 0
3 Henry Bland, due on Bond	60 0 0
•	41381710

I shall make one Page serve for Waste Book and Journal Entries, to save room, and also to have both Methods of Entry under Eye, to make them more intelligibly useful to the Reader, without being obliged to turn over to see their difference of Entry.

Digitized by Google

Waste

.

BOOK KEEPING.

Waste Book.

London January 1st.			18	<u>.</u>			
Owing to William Webb, by - Note of Hand -	}	50	0	c	l.	s	ą.
Ditto to Roger Ruff, the ba- lance of his Account	Į	⁻ 16	12	4			
Ditto to Henry Hern due the 4th of Muy next -	<pre> { </pre>	62	0	0	•		i L
					128	12	4
Journal.				1	`		
Stock Debtor to Sundry Acco	oun	ts,					
£.128 12 4 viz.		• .					
To Henry Webb by my Note of Hand	}	50	0	0	-		
To Roger Ruff, for the Ba- lance of his Account.	}	16	12	4			•
To Henry Hern, due the 4th	ł	62	0	. 0			
or many mater -	•				128	12	4

Waste Book.

London, Feb. 2. Sold Thomas Townshend, viz.	1810.			
Sold Thomas Townshend, viz.	1		_	
24616. of Virginia Cut Tobac- co, at 14d. per lb.	14 7 0		•	
per Ell.	<u>69 o o</u>	83	7	0
Feb. 2. Journal.		· ,		
Thomas Iownshend, Dr to Sur	idries,			
10 10bacco, for 2401b. at	14 7 0			ł
3s. per Ell.	69 0 0			K
		8 3	7	0

6.6

Digitized by Google

۰.

:

Waste

٦

.	Waste Book.	l.	s.	d.
	Ditto 24th. Bought of Leonard Legg, four Pipes of Ca- nary, at £.28 per Pipe. To pay in 6 Months.	112	0	0
	Ditto 24th. Journal. Canary Wines, Debtor to Leonard Legg, for 4 Pipes, at 28 Pounds per Pipe. To pay in 6 Months.	112	0	0

The short Lines ruled against the Journal Entries, which may be termed Posting Lines, and the Figure on the Top of the Lines denote the Folio of the Ledger, where the Debtor is entered; and the Figure under the Line shows the Folio of the Ledger where the Credit is entered; and the other smaller Figures against the sundry Debtors, or sundry Creditors (whether Goods or Persons) show also in what Folios of the Ledger they are posted.

The Accounts of Persons and Things are kept in the Ledger, on opposite Pages, in which those, that in the Journal are said to be Debtors, are entered on the Lefthand Page with the word To; and those, to which they are said to be Creditors, are entered on the Right-hand Page, with the word By. For instance, the last Journal Entry should be posted on the Left-hand, or Debtor's side, of the Account of Canary Wines, thus:

1810. Feb. 24. To Leonard Legg----4 Pipes-112 0 O And the same should be posted on the Right-hand, or Creditor Side, of the Account of Leonard Legg, thus:

Feb. 24. By Canary Wines to pay in 6 Months, 112 0 0

There are several other Books used by Merchants besides the three before mentioned; as the Cash-Book, which is ruled like the Ledger, and in this all Receipts of Money are entered on the left-hand Folio, and payments on the right; specifying in every Entry the Day of the Month (the Year being set on the Top) for what and for whose Account the Money was received, or paid; and the total Debt or Credit on each side is to be posted into the Ledger to the account of Cash therein, in one line of either side, viz. to, or by sundry Accounts, as per Cash-

book,

book, Folio, &c. which is to be done once a Month, or at discretion, and the Particulars of each Side, Article by Article, are to be posted into the Ledger to the proper Accounts to which they belong: with References in the Cash Book to the several Folios in the Ledger; and carry the Balance over Leaf into the Cash Book, by which you may know at any time what Cash you have, or ought to have by you.

Another Book, is a Book of Charges of Merchandise, wherein is to be entered the Custom and petty Charges of any Goods shipped; as porterage, wharfage, warehouseroom, &c. which once a Month is transferred into the Cash-book on the Credit Side, making Reference to the Book of Charges of Merchandise; and likewise the same in the Debtor Side of the same Account in the Ledger for the Amount thereof

The next Book I shall name, is the Invoice Book, or Book of Factories. In this Book are to be copied all Invoices of Goods shipped, either for Accompts proper or portable; and also of Goods received from abroad, which must always be entered on the Left Side, leaving the Right Side blank; and on the Advice of the Disposal of Goods sent abroad, and also on the Sale of Goods received from abread, enter them on the Blank or Right side; so as at first View may be seen how the Accompt stands, &c.

The next is a Bill-book, in which are entered Bills of Exchange accepted, and when they became due; and when paid, they should be made so in the Margin.

The next is a Book of Household Expenses for monthly Charges of Housekceping; likewise Apparel, House-rent, Servants Wages, and Pocket Expenses; and this may be monthly summed up, and carried to the Credit of Cash.

Besides the abovementioned, there must be a book to copy all letters sent abroad, or beyond the seas, in which the name of the person or persons to whom the letter is sent must be written tull, for the readier finding it.

Then next, and what is very necessary, a receipt-book, wherein are given receipts for money, paid and expressed for whose account or use, or for what it is received; to which the receiving person must set his name for himself, - or some other, with the year and day of the month on the top.

Lastly,

Lastly. A note, or memorandum-book, to minute down affairs that occur, for the better help of memory, which is of great use, when there is a multiplicity of business.

Having given an account of the several books and their use, the next thing will be to give some few rules of aid, to enable the book-keeper to make proper entries, and to distinguish the several debtors and creditors, viz.

First. For money received, make cash dr. to the party that paid it, if for his own account, and the party cr.

Secondly. For money paid, make the receiver dr. if for his own account, and cash cr.

Thirdly. For goods bought for ready money, make the goods dr. to cash, and cash cr. by the goods.

Fourthly. Goods sold for ready money just the contrary, i. e. cash dr. and goods cr.

Fifthly. Goods bought for time; goods bought are dr. to the selfer of them, and the seller cr. by the goods.

Sixthly. Goods sold for time, just the contrary, *i.e.* the party that bought them is dr. to the goods, and the goods cr. by the party.

Seventhly. Goods bought, part for ready money, and the rest for time. First, make the goods dr. to the party for the whole. Secondly, make the party dr. to cash for the money paid him in part of those goods.

Eighthly. Goods sold, part for ready money, and the rest for time. First, make the goods dr. to the party for the whole; secondly, cash dr. to the party received of him in part of those goods. Or either of these two last rules may be made dr. to sundries; as goods bought, dr. to the seller for so much as is left unpaid, and to cash for so much as is left unpaid, and to cash for so much paid in ready money; and so on the contrary for goods sold.

Ninthly. When you pay money before it is due, and are to have discount allowed you, make the person dr. to cash for so much as you pay him, and to profit and loss for the discount, or make the receiver dr. to sundries, as before.

Profit and Loss is Dr.

To cash for what money you pay and have nothing for it, as discount of money you receive before due, and for abatement by composition, houshold expences, & c.

Per Contra, Cr.

By cash for all you receive, and deliver nothing for it, as discount

discount for prompt payment, any legacy left you, money received with an apprentice, and by the profit of every particular commodity you deal in, by ships in company, by voyages, &c.

To balance, or clear an Account, when full written.

First, if the dr. side be more than the credit, make the old account cr. by the new; and if the contrary, make the new account dr. to the old. But if the dr. side be less than the credit, then make the old account dr. to the new, and the new account cr. by the old, for such a rest or sum as you shall find in the account.

2. An account of company, wherein you have placed more received of another than his stock, then add as much on the debit side as you find on the credit side, to the end, that in the new account you may have so much debit as you put in, and so much credit as you have received.

3. In accounts of merchandize, you must enter the gain or loss, before you make the old account cr. by the new, and the new dr. to the old, for the remainder of the goods unsold.

4. In the foreign accompts, which you are to keep with a double column for the dollars, crowns, or other foreign coins, as well as their value in *l. s. d.* which have been received or paid, by bills of exchange tor goods sold by factors or correspondents, or bought by them for the accompts before; here you must first balance the said inward column of dollars, crowns, &c.

To remove an Accompt full written to another Folio.

Sum up or add the dr. and cr. sides, and see the difference, which place to its opposite. Admit the cr. side exceeds the dr. then you are to write the line in the old accompt to balance on the dr. side, to answer the line on the cr. side of the new accompt.

How to balance at the Year's End, and thereby to know the State of your Affiars and Circumstances.

You must make an accompt, of balance on the next void leaf or folio of your ledger to your other accompts, but after so done, do not venture to draw out the accompt of balance in the said folio till you have made it exact on a sheet of paper, ruled and tilled for that purpose, because of mistakes or errors that may occur or happen in the course of balancing

Digitized by Google

135

ing your ledger, which are to be rectified, and will cause erasements or alteration in that accompt, which ought to be very fair and exact; and after you have made it to bear in the said sheet, copy fair the said account of balance in the ledger.

The Rules for balancing, are these, viz,

1st. Even your account of cash, and bear the net rest to balance dr.

2dly. Cast up all your goods bought, and those sold, of what kind soever, in each account of goods, and see whether all goods bought be sold or not; and if any remain unsold, value them as they cost you, or according to the present market price, ready money, and bear the net rest to balance dr.

3dy. See what your goods or wares severally cost, and also how much they were sold for, and bear the net gain or loss to the accompt of profit and loss.

, 4thly. Even all the personal accompts with your drs. and your crs. in order as they lie, and bear the net rest of them severally to balance.

5thly. Even your voyages, your factors accompts, wherein is either gain or loss, and bear the net gain or loss to the accompt of profit and loss to the goods unsold to balance.

6thly. Even the accompt of profit and loss, and bear the net rest to stock or capital, as an advance to your stock or capital.

7thly. Even your stock, and bear the net rest to balance cr. 'Then cast up the dr. and cr. sides of your balance, and if they come out both alike, then are your accompts well kept; otherwise you must find out your error, by pricking over your books again to see whether you have entered every dr. and cr. in the ledger as you ought.

Note. By pricking over the book is meant, an examining every article of the journal against the ledger, and marking it thus: or thus \dagger ; and upon the second examination thus \ddagger ; and upon a third examination thus \S ; or any other mark.

Note also. In all accompts of goods, you must keep a column in the middle of the leaf, of each side, for number, weight, or measure.

Though all that hath been said in relation to book-keeping, and the several rules thereunto belonging, may seem a little abstruse to the altogether unlearned therein, yet there is no such mighty difficulty to instruct them as they may imagine. The following hints may render what hath been already said intelligible to an ordinary capacity. 1st. Stick close to the text, or general rules before-mentioned, viz. That all things received, or the receiver, are debtor to all things delivered, or the deliverer; for this rule holds good in all cases.

2d. When the dr. (whether persons or goods) is known, the cr. is easily understood without mentioning it; for if *A*. be dr. to *B*. then *B*. is cr. by *A*. for what sum soever it be. Also, if goods be dr. to *C*. then *C*. is cr. by those goods for the sum they amount to.

3dly. This art of book-keeping is called Book-keeping by Double Entry, because there must be two entries, the first being a charging of a person, money, or goods, and the second a discharging of a person, money, or goods.

Athly, strictly note, That if the first entry be on the dr. or left hand side of your ledger, the next or second entry must always be made on the right or credit side of your ledger; for when one person or thing is charged, then always another person or thing is discharged for the said sum, let it be what it will.

And so it is in balancing an accompt, and carrying it to another folio; for if the old accompt be settled by the balance on the credit side, then the new accompt must be debited or charged on the debit side for the sum that balanced the old account.

Much more might be said on this Art of Book-keeping, if I had room; but I have said what I hope may be sufficient for the instruction and improvement of any reader.

The next matter I shall go upon is to shew, or give examples of various kinds of receipts and promissory notes; also bills of parcels in different trades; likewise bills of book-del ts, bills of exchange, with remarks on them, and some other precedents of writings in trade and mercantile affairs.

And first of Receipts of different Forms.

Received, September 9th, 1809, of Mr. Anthony Archer, the sum of six pounds nine shillings; I say received for my master, Bryan Barry, per me.

1.6 9.

Caleb Catchmoney.

London, Sept. 14, 1809.

Received of Mr. Kendrick Keeptouch, ten pounds eleven shillings and sixpence, in full payment, per me,

Digitized by Google

1.10 11 6

Henry Hasty. Note: 138 THE YOUNG MAN'S BEST COMPANION.

Note. The sum received must always be expressed in words at length, and not in figures, in the body of the receipt ; but it may, and ought to be expressed in figures between two lines on the left hand of the name at the bottom of the receipt, as well as in the body of the receipt.

When a receipt is given in a book, there is no occasion to mention the man's name of whom you receive the money, because that is implied, he being the owner of the book.

Received the 24th of September, 1809, of Mr. Timothy Trunklittle, fifty pounds in part of indigo sold him the 22d inst. per me.

1.50 0 0 Laurence Lovemoney.

A Receipt given in a Receipt Book.

Received the 26th of September, 1809, the sum of fortyfive pounds, by the order, and for the account of George Greedy, Esq. per me,

Timothy Trusty.

Received the 27th of September, 1809, of Mr. Daniel Davenport and Company, one hundred pounds, on account of self and Partner, per me,

1.100 0 0

James Jenks.

Received the 28th of March, 1\$10, of Mr. Peter Punctual, fifty pounds sixteen shillings and nine pence, in part for tobacco sold him the 24th of August last.

1. 50 16 0 Fabian Funk.

Received the 29th of March, 1810, of the Hon. East India Company, three hundred and fifteen pounds ten shillings, per order, and for the account of Peter Pepper.

1315 10 0 Stephen Storax.

Received March 31st, 1810, of the Governor and Company of the Bank of England, one thousand six hundred pownds ten shillings, for Self and Company, per me,

Digitized by Google

1. 1600 10

Leonard Longpurse. Received

Received the 4th of April, 1810, of the Worshipful Company of Grocers, forty-nine pounds fifteen shillings, in full payment for my father, Peter Plumb, per me,

l. 49 15. 0 Peter Plumb, jun.

Received the 6th of April, 1810, of Richard Cox, Esq. Chamberlain of London, the sum of sixty pounds, for the use of the Worshipful Company of Juiners, per me,

1.60 0 0

----- A Rent Gatherer's Bill.

Received the 14th of November, 1809, of Mr. Aaron Arable, in money, eighteen pounds, and allowed him for landtax five pounds, and for repairs two pounds, in all twenty-five pounds, in full for half a year's rent, due at Michaelmas last; I say received for the use of Lawrence Letland, Esq. by virtue of his letter of attorney, per me,

1.25 0 0

Robert Rentroll.

Caleb Careful.

Received of Mr. Timothy Tenant, this 25th day of No-wember, 1809, six pounds for a quarter's rent, due at Michaelmas last, for my master, Lancelot Letfarm, per

Francis Faithful.

600

Received, August 24, 1809, of Mr. Brook Bishop, twenty-nine pounds six shillings, in part of a bill of sixty pounds due the 3d of October next, to Mr. Samuel Shuffle.

Francis Fidell.

1.29 6 0

A Receipt on the Back of a Bill of Exchange. October 30, 1809, Received the full contents of the within mentioned, being five hundred pieces of eight.

500 pieces of eight

Nathan Needy.

Promissory Notes.

I promise to pay Mr. Timothy Teazer, or order, sixty pounds, on the 26th of this instant October. Witness wy hand this 15th of October, 1809.

Digitized by Google

Daniel Dilatory.

THE YOUNG MAN'S BEST COMPANION.

18th October, 1809. I promise to pay to the Honourable the Directors of the South Sea Company, or bearer, on demand, four hundred and fifty pounds, for my father, James Jones.

annual production of the subscription of the s	
450 0 0	Joshua Jones.
I promise to pay to the Bank of England, or order	24th October, 1809. the Governor and Company of the r, on demand, two thousand pounds.
1.2000 0 0	Nahum Neednothing.
I promise to pay to Mil on demand, seven hundred and nine-pence, for my mas	November 24th, 1809. les Man, and Company, or bearer, and fifty-six pounds, ten shillings ter, Robert Regular.
1.756 10 9	Mark Martin.
1 promise to pay to the or bearer, upon demand, Hudson.	November 24th, 1809. Honourable East India Company, five hundred pounds, for Henry
1.500 0 0	Martin Moneybag.
I promise to pay to Mr. months after date, five por my hand this 26th day of N	November 26th, 1809. Christopher Cash, or order, three unds for value received. Witness Vovember, 1809.
1.5 0 0	Robert Ruck.
A Note	given by Two.
WE, or sither of us, prot trust, or his order, six pour received. Witness our hand 1.6 0 0	mise to pay to Mr. Matthew Mis- ids sterling, on demand, for value is this 27th of September 1809. Nathan Needy. Samuel Surety.
Witness Nicholas No.	ta.

Digitized by Google

A Bill

A Bill of Debt.

Memorandum.—That I, William Want, of London, weaver, do owe, and am indebted unto Mr. Timothy Trust, of Westminster, watch-maker, the sum of twonty-five pounds six shillings of lawful money of Great Britain; which sum I promise to pay to the said Timothy Trust, his executors, administrators, or assigns, on or before the 10th day of December next ensuing. Witness my hand this 22d day of March, 1810. William Want.

Witness, Titus Testis.

Bill of Parcels.

It is usual when goods are sold for the seller to deliver to the buyer, with the goods, a bill of parcels, which is a note of their contents and prices, with a total of their value cast up, &c. These bills ought to be handsomely written, and in a methodical order, according to the best and customary way of each particular trade.

I shall therefore give the Forms of Bills of Parcels in some trades and professions, with the shortest methods of casting up the several articles in each bill.

A Mercer's Bill.

London, September 26, 1809.

Richard Jones, Esq.

Bought of Abel Atlas, and Ben Burdett, viz.

12 Yds. 2 of rich satin, at 12s. 6d. per yd. 8 Yds. of sprigged tabby, at 6s. 3d. per yd. 5 Yds. 1 of farringdon, at 6s. 8d. per yd. 6 Yds. of mohair, at 4s. 2d. per yd.	1. 7 2 1 1	s. 19 10 15 5	d. 4½ 0 0 0
17 Yds. ½ of lutestring, at 3s. 4d. per yd.	2 1.16	18	4
		-	

If the money is paid, then the receipt is made as follows:

Received the 26th of September, 1810, sixteen pounds seven shillings and eight pence halfpenny, for Abel Atlas and Company, Francis Fairspoken.

A Woollen

A Wvollen Draper's Bill.

London, September 24th, 1810.

Bought of Benjamin Broadcloth, S	22d of Sep	t (mb)	r. 1810.
7 Yds. of fine Spanish black, at	•	10 ·	4 per yd.
5 Yds. 1 of ditto, at -	-	12	4 ditto. `
6 Yds. 3 of fine mixed cloth, at	- 1	15	4 ditto.
16 Yds. 🛃 of frieze, at -	•	3	6 ditto. 🗉
4. Yds. of drap-de-berry, at -	-	13	5 ditto.
	• *		

5 Yds. $\frac{7}{8}$ of superfine Spanish cloth 18 10 ditto. 1

The several articles of these bills are purposely omitted being cast up, for the exercise of the reader in the Rule of Practice, or in those of *Multiplication of Money*, before shown; which indeed is the best method of all for the ready casting up the articles contained in any Bill of Parcels whatsoever.

We will take the last article of the woollen draper's bill, riz. 5 yds: 7 &c. at 18s. 10d. per yard.

578	•	18 10
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		8) 121 10
Answer 1. 5 10 74	· · · ·	16 5 ³ / _‡

In this example the price is multiplied by the quantity, viz. 5 yards $\frac{7}{4}$. according to the rules delivered in *Multiplication of Moncy*; and the product by 5 is l.4 14 2. Then for the $\frac{7}{4}$ of a yard, multiply the price of the integer, viz. 18s. 10d. by the numerator of the fraction, viz. 7. and divide by the denominator 8, and the quotient is 16s. 5 $\frac{3}{4}$ d. agreeably to the rule in the doctrine of fractions. Which 16s. 5 $\frac{2}{3}$ d. added to l.4 14 2. gives l.5 10 7 $\frac{2}{3}$, as in the foregoing operation.

A Hosier's Bill.

October 5, 1809.

Mrs. James, bought of Abraham Sock.

To	5	Pair of women's mixed worsted	hose,	at	5.	7d.
	3	Pair of women's silk hose, at	•		95.	4d.
	22	Pair of men's woollen ditto, at		-	35.	24
	8	Pair of women's ditto, at	5 🛓 👘		2s.	2d.
	21	Yds. of flannel, at			18.	11d.
	8	Pair of thread hose, at -		-	3s.	4d.
		• .	Δ	Lcali	hersc	ller's

A Leatherseller's Bill.

October 17, 1809.

Mr. Last bought of Henry Hidebound.

		5.	d.	
To 15 Large oiled lamb skins, at	· ·	1	31	per skin.
13 Kipp of goat skins, at	· _ `	3	4	
107 Alumed sheep skins, at	-	- i	3	•
19 Calf skins, at	·	4	3	
85 Oiled Buck skins, at 🚽 🖃	· _	12	·9 -	
10 Russia hides, at -	/ . .	12	ğ	
60 Dicker of hides, at -		11	Ğ -	

Note-50 Goat skins make a kipp; and other skins are five score to the hundred. A dicker is 10 hides, or skins; and 20 dickers a last.

A	P	ewt	erei	18	Bill
	_	~ ~ ~ ~			AJ 6666

October 7, 1809.

Mr. Johnson, bought of Andrew Antimony.

	<u> </u>	8.	d.
To 9 Metal dishes, wt. 42lb. at 14d. per lb.	2	9	0
1 Dozen of ditto plates	Ø	17	0
1 Standish of ditte	0	4	0
2 Tankards of ditto	0	5	10
3 Best spoons	0	4	6
13 Hard metal-porringers	•0	3	Õ
1 Salt of ditto	Ó	ĩ	10
1 Set of castors	0	10	0
and the second		<u> </u>	
	<i>l</i> . 4	15	5.
	_		

A Mercer's Bill.

1809.		Mad. Deborah Doughty, Dr. to	Bry	an Brocade
	•6	Yds.	s.	d.
March	10	10 10 to flowered satin, at	14	9 per yd.
April	14	14 of Venetian silk, at	11	8
	_	99 of Mohair, at -	6	3
May	16 [.]	141 of flowered damask, at	9	7
June	7	5 f of Genoa velvet, at	21	6
	25	🖞 of lutestring, at 💡 -	4	7

If part of the bill only is paid, write thus: Received of Madam Deborah Doughty, twelve points, tenshillings, on account, for my master, Bryan Brocade.

' Digitized by Google

1.12 10 0

Henry Hunter. A Stationer's

144 T	HE YOUNG MAN'S BEST COMPANION.
	A Stationer's Bill.
1809.	Mr. Samuel Scribe, Dr. to Philip Pott, viz. 1. s. d.
July 12 31	To 57 Reams demy, at 1 2 0 per ream. 195 Do. 2d foolscap, at 1 2 0
August 24 Sept. 6	375 Do. 2d demy, at, 1 4 0 95 Do. French royal 1 15, 0 96 Rolls parchment, at 0 2 6
Note.—A 20 quires ;	1 roll of parchment is 60 skins; a ream of paper and a bundle of paper is 2 reams.
.t	Bills on Book Debts.
	A Woollen Draper's Bill.
1809.	Mr. Frank Fustian, Dr. to George Goose.
Apru 24 20 94	To 16 Yds. 1 of black cloth, at 18 3 per yd. 4 Yds. 1 of drap-de berry, at 15 6
May 4	35 Yds. of mixed grey cloth, at 10 5
17 June 12	9 Yds. of fine ditto, at 17 5 12 Yds. 1 of fine broad cloth,
	at

Received, the 19th of October, 1809, of Mr. Frank Fustian, the sum of fifty-four pounds for the above bill, for my master, George Goose.

Mark Goodmeasure.

ŝ

A Bricklayer's Bill.

1. 54

Mr. Martin Topstone, Dr. to Peter Pantile, viz.
To 25 Thousand bricks, at 35s. per M.
11 Thousand plain tiles, at 50s, per M.
28 Cwt. of lime, at 14s. per cwt.
20 Loads of sand, at 5s. 6d. per load.
140 Ridge tiles, at 18s. per hundred
90 Days of work myself, at 5s. per day.
90 Days my man, at 4s. 6d.
90 Days another bricklayer, at 4s.
90 Days for 2 labourers, at 2s. 6d. each.
-1000 plain tiles is a load : and 25 bags or bushels
of

of lime 1 cwt. A brick must be 9 inches long and four inches broad, Bricks are of three sorts, place bricks, red, and grey stock bricks.

Here it will be proper to give a general rule for casting up any thing sold by the thousand; as bricks, tiles, &c. and other things mentioned in the book of *rates*, viz. barrel hoops, goose quills, oranges, and lemons, squirrel skins, billets, &c. Which is as follows, viz.

Multiply the given number by the shiftings in the price (if the price be at so many shillings per thousand), always cutting off three figures or places on the right hand; and the figures towards the left hand are shillings, which divide by 20, to bring them into pounds ; and those figures separated toward the right hand multiply by 12, the next infcrior denomination, and still cut off or separate three places towards the right hand, and the figures towards the left are pence; and cutting the three last figures off, multiply by 4, still separating three places toward the right hand, and the figures toward the left hand are farthings .- If the price be shillings and pence, or shillings, pence, and farthings per thousand, multiply by the shillings as before, and take parts for the pence and farthings, as in the rule of Practice; add these together, and proceed as before directed.

Ex. 1.—24650 17	bricks, at 17 <i>s. per</i> thousand.
272 550 24650	
⁹ 4191050 12	Answer 419s. 01d. or 201. 19s. 01d.
01600	
2 400	

H

Digitized by Google

Ex. 2.

146 THE YOUNG MAN'S BEST COMPANION.

Er. 2. 6d.-1 261324 plain tiles, at 16s. 6d. per thousand,

	10	and a second
	1567944 261324 130662	na an an an An Arabitan (francús) a trainn an Arabitan (francús) a trainn an Arabitan (francús)
	4311 846 12	Answer 4311s. 10d. 605 or 2151. 11s. 10d.
• •	10 152 4 608	(a) (a) (b) (b) (b) (b) (b) (a) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b

5

'n

When any thing is sold by the hundred, as Dutch and English pantiles, then observe the following rule; viz.

Multiply the given quantity by the shillings in the price; and take parts for the pence and farthings (if there be any) as before; then from the right hand of the sam cut off two places, and proceed as in the last rule.

Ex. 3 .- 1726 pantiles, at 7s. per hundred.



Of Bills of Exchange.

Bills of exchange are either inland or foreign. The *inland* bills are drawn by one trader in one city or town, upon another of another city or town, in the same kingdom; as *London* upon Bristol, or Exeter upon London, &c. and these chiefly concern shop-keepers, and wholesale traders either in town or country; and the foreign more immediately concern the merchants.

Bills of Exchange, if handsomely drawn, must be written in a fair hand, on a long piece of paper, about three inches broad, and written in form after the following precedents :

Form of a Bill payable at Sight.

... London, 5th April, 1810.

At sight pay to Mr. Gregorius Grandy, or his order, the sum of fifty pounds for value received of Christopher Cutpurse, and place it to account, as per advice from To Mr. Peter Palmer, Your humble servant,

Air-street, London.

David Drawwell.

York, March 28, 1810.

Seven days after sight pay to Mr. Nat. Needy, or his order, twenty-four pounds ten shillings for value received of Mr. Timothy Transfer, and place it to account, as per advice from To Mr. S. Surety, Your friend and servant,

Cheapside, London.

Mark Moneypenny.

If Mr. Needy send his servant, Abraham Honesty, to receive the money, after he has written his own name on the back of the bill. (which is his order) the servant must write a receipt to his master's name, thus:

Received for Nat. Needy,

Abraham Honesty.

Usance is a determined time fixed for payment of bills of exchange, and reckoned either from the day of their being accepted, or from the day of their date. This is called Usance, because regulated by the usage or custom of places on which they are drawn.

A Foreign Bill of Exchange.

London, 28th December, 1809, for 460 crowns, at $56d. \frac{2}{3}$ per crown.

At usance pay this my first bill of Exchange, (my second or third not being paid) unto Mr. Harry Vane, or order, four H 2 kundred hundred and sixty crowns, at 56d. $\frac{2}{5}$ per crown, for value received of Mr. Simon Thornhill, and place it to account, as per advice from, Sir,

To Mr. Walter Watchful, Merchant, Hamburgh, Your humble servant, Edmund Saveall.

Note.—It is usual to send two and sometimes three bills of the same kind, in case the first and the second should not, through any accident, arrive at their destined place.

Another.

London, 7th October, 1809, for 480 dollars, at 55d. $\frac{1}{2}$ per dollar.

At three usance pay this my first bill of exchange unto Mr. Williami Wealthy, or order, four hundred and eighty dollars, at $554.\frac{1}{2}$ sterling per dollar, for value received from him, and place it to account, as per advice from

To Messrs. J. & J. D'Costa, Your humble servant, Merchants, Aleppo. Mark Mercator.

Usance between England and France, or Holland, is one calendar month: between England and Spain, or Portugal, two months; between England and Italy, three months, &c.

Example.

Bristol, 10th March, 1810, for 600 pieces of cight, at 53d. ³/₃ per piece.

At double usance pay this my first bill of exchange unto Mr. Lawrence de Luz, or his order, six hundred Mexico pieces of eight, at 53d. $\frac{3}{5}$ sterling, for value received of Henriques Gomes, and place it to account, as per advice from your's, &c. To Mr. Solomon Sylvester, Henry Hunt.

Merchant, Leghorn.

Remarks on Bills of Exchange.

1. The acceptor of any bill is the absolute debtor to the person to whom the bill is payable, for the contents thereof.

2. The person to whom the bill is payable, must demand the moncy the very day it becomes due, and if the acceptor dies before it becomes due, it must be demanded of the executor or administrator.

3. The drawer of any bill must always give his correspondent a letter of advice, that he has drawn such a bill on him for such a particular sum, &c.

4. There

56

ĩá

4. There is no obligation to pay a bill without such letter of advice.

5. In *England* a bill is due the third day after the expiration of the time mentioned in the bill.

Of Indorsing Bills and Notes.

It frequently happens, that between the acceptance of a bill and the time of payment, the party to whom it is first made payable has occasion to pay it away. 'In this case he writes his name on the back of the bill, which is his order, and gives it to the person to whom he is indebted; he is then empowered to receive the money : and if the second person also wants to pay it away, then he likewise writes his name under the other, and delivers it to a third person to receive the money; and it may happen the third person to receive the money; and it may happen the third does the same, and delivers it to a fourth person, §c. All that thus do are indorsers; and he that last has the bill, if the acceptor will not pay it, may sue him, or the indorsers, or drawer, or any of them, for the money.

An indorsement is sometimes in these words, viz. Pay the contents of the within-mentioned bill Henry Hasty.

George Greedy,

But generally the name only is counted sufficient.

Of Protesting.

When a bill is to be *protested*, the party who is in posses, sion of the bill must go to a *notary public*, (not a common *scrivener*) whose business it is; and he goes to the acceptor's house and demands payment, &c. He then draws up a *protest* according to law; which is to be returned to the drawer, or the person from 'whom he received it, within the time limited, &c.

It is quite unnecessary to give the form of a protest, as no person can do it for himself.

Charges of Noting and Protesting a Bill.

Noting {within the City 1 6} Prowithout the City 2 6} testing { without 5_{\pm} 0 =

A Bill of Debt.

Know all men by these presents, that I, Lawrence Luckless, of Southwark, Vintner, do one and am indebted unto H 3 Claudius

150 THE YOUNG MAN'S BEST COMPANION.

Claudius Careful, brewer, the sum of one hundred and fifty pounds of lawful money of Great Britain, which sum I promise to pay unto the said Claudius Careful, his exccutors, administrators, or assigns, on or before the 24(h of December next ensuing the date hereof. Witness my hand and seal this 6th day of March, 1810.

Scaled and delivered Lawrence Luckless, in the presence of A.B.

A Bill for Money borrowed.

Received and barrowed of Oliver Forecast, of London, merchant, fifty pounds, which I do hereby promise to pay on demand. Witness my hand this 6th day of April, 1810.

1. 50

Launcelot Lackpenny.

Form of a Bill of Lading.

Shipped by the grace of God, in good order and wellconditioned, by Edward Export, of London, merchant, in and upon the good ship called the Good Adventure of London, whereof Martin Maintop, of London, mariner, is master, under God for this present voyage, and now riding at anchor in the port of London, and by God's TB' grace bound to Cadiz, that is to say, 1 bale of stocking No. baize, and 1 trunk, containing five hundred pair of silk 1,2 stockings, contents, &c. as per invoice, being marked and numbered as per margin, and are to be delivered in the like good order at the aforesaid port of Cadiz, the danger of the seas only excepted, unto Mr. Martin Mercat, merchant there, or to his assigns, he or they paying freight for the said goods, three pieces of eight per cwt. with primage and average accustomed. In witness whereof the master or purser of the said ship hath af-firmed to three bills of lading, all of this tenor and date; one of which (three) bills being accomplished, the other (two) to stand void. And so God send the good ship to. her destined port in safety. Amen.

Dated London, the 6th March, 1810; inside and contents unknown to Martin Maintop.

Note: The several words included in the parentheses are to be put into the several vacant places that are in a blank bill of lading.

Note also, Average is the general allowance made to the master of the ship, of 1d. or 2d. in every shilling freight for primage, as a small allowance to be distributed among the sailors.

The Form of an Invoice.

Port Royal, Jamaica, July 10, 1809. Invoice of five barrels of indigo, five hhds. of sugar, and five hhds. of pimento, shipped on board the Lune, of London, George Wright, Commander, for account and risk of Messrs. John and James Jones, of London, merchants, being marked and numbered as per margin.

Co	ntents, costs, and charges, as in the follow	ing e	xan	ple:
viz.	Indigo 5 B	11.	15.	1 d.
IF	143	1	ł	
No.	143	1		
121	146	1	1 4	÷
fq	152		1	1.
125	172	1		
	7561b. net. at 2s. 6d. per 1b.	81	18	-
\$	Sygar 5 Hode Taro			
	C. pr. lb. C. qr. lb. C. qr. lb.			
2 26	11 3 27 1 2 19 Gross 68 0 0			
to ;	12 9 19 1 3 0 Tare 8 3 12			1
130				
	16 1 10 1 9 09 ot 94 of 0	170	1	1 .
	13 1 10 1 5 22 at 245. p. C.	10	19	.5
	68 0 0 8 3 12	~		•
	Pimonto //			
•	5 Hhds Tare 2026 Gross			
No.	<i>lb. lb.</i> 389 Tare			
131	432 84			
10	396 72 net 1637 at 111d. per lb.	78	8	91
131	410 81			02
	376 70 Charges.			
-	412 80 To cost of 5 barrels and			
	10 hhds 4 7 9			
	2026 389 To storage 1 0 0	5	7	9
		236	13	111
	To commission at 5 ner C.	11	16	81
	Errors excepted per A. B.			4
•	· · · · · · · · · · · · · · · · · · ·	•	•	

An Account of Sales a sale, and a sale

1. 101. 77

Port Royal, Jamaica, July 15, 1809.

Account of sale of 27.65, clis of brown Osnaburghs, 1112; wards of blue Harrford, 2 pieces of grey clath, qt. 39 yards, 50 pair of fine worsted hose, and 157 ells of bag Holland, received from on hoard the ship Good Success, Captain Samuel Sharp, Commander, for account of Lawrence Lucky, of London, merchant, is dr. To portage of ditto 10.17 6 °**'I** 11 To commission of sales 13 1 110 To storage, at 3 per C. 6 10 11 20 10 41 To the net product carried to the credit of your account, bad debts excepted. 247 :6 267 16 9 Per Contra, Cr. By 2765 brown Osnaburghs, making 3456 yds. 1 at Bid. per yd. sold Ambique Baker 🕓 122 :8 2 By 1112 yds. of blue linen, sold at 73d. per yard 18 35 12 By James Smart, for 39 yds. of cluth, at 15m C 1 per yard 29 5 0-By Lawrence Monk, for 50 pair of hose, at 75. 10d. per pair ÷., 11 19 11 ø By ditto for 175 ells of bag Holland, at 6s. 3d. per ell 13 54 <u>9</u>: 261 16 10-Errors excepted, July 11th, 1809, per Charles Careful,

Business on the wharf, concerning exporting and importing of goods, & c. Entering them at the custom-house, & c.

When there are goods to export, and ready packed, &c. there must be firstmade a bill of entry (as it is called) of the contents, after this form, viz.

In the Loyal Briton, Abraham Handy, for Barbadoes.

Edwin Export.

Three cases of haberdashery. Five tuns of hear, &c.

Q£

Of these bills there must be seven, one of which must be in words at length, and the other may be expressed in figures. These are by the clerks of the custom-house entered into several books kept for that purpose. If some of the articles pay custom, and others not, then there must two entries be made; one for those that pay custom, and another for those that do not; and you must likewise have two cockets.

A Cocket testifies the payment of all duties, and is written on a small piece of parchment as follows:---

Know ye, that Edwin Export, merchant, for three cases of haberdashery, and five tuns of beer, in the Loyal Bitton, Abraham Handy, for Barbadoes, hath paid all duties.— Dated the 9th of November, 1809.

On the back of the cocket must be set down the marks, numbers, and quantity of the articles expressed in the inside. Then on clean paper transcribe your bill of entry, upon which a thipping bill will be made out, on the back of which signify the marks, numbers, and contents, as before, on the cocket, both of which being thus indorsed, are to be delivered to the searcher at the water-side, who deposits them in the office till the going away of the ship; they are then delivered to the Captain or Master of the ship.

If you have not knowledge or experience enough to enter your goods yourself, application must be made to one of the clerks in the long room, who make it their business to enter goods; they will write out bills, and pass your entries, without any further trouble, or your running a risk of making any false entries, &c. for which you will pay him one shilling.

Entry Inwards.

On a ship's arrival, search the entry book in the long room, and you will find the name of the ship and Captain, as also the waiters that are to attend the delivery of the ship, and at what wharf the goods will be landed. The entry inwards runs thus:

In the Mercury, Jacob Keelson, from Antigua.

25 hhds. of sugar, &c,

56 bags of cotton, &c.

There must be eight of these bills (though but seven outwards) and one of these also must be in words at length, which is for the warrant of delivery, and must be signed by the H 5 person

153

person in whose name the goods were entered, and the mark also in the margin, which being done, and the fee for entry and custom paid, you will then have from the landwaiters a warrant for the landing and receiving your goods. When goods are to be exported by certificate, viz. foreign goods formerly imported, these goods being to be sent abroad, or exported to another place or country by a native of *England* within twelve, or a stranger within nine months after importation, entitles the exporter to a drawback of part of the custom paid on the importation of the said goods, upon producing a certificate from the comptroller that they, have paid the duties inwards. And the debenture of custom drawback runs thus:

Debenture.

Christopher Commerce, natural born, did on, &c. make an entry with us of two thousand ells of broad German linen, in the Amazon, Capt. Stephen Stout, for Jamaica, the subsidy, &c. was paid inwards by, &c. as appears per certificate of the collector inwards : and for further manifestation of his just dealing therein, he hath also taken oath before us of the same.

Custom-house, London, Nov. 12th, 1809.

The Oath,

Jurat C. C. That two thousand ells of broad German linen, abovementioned, was really shipped out, and hath not been relanded in any port or creek in England or Wales since last shipped. Nov. 12, 1809.

The Certificate Cocket.

London : Know ye, that C. C. for two thousand ells of broad German linen, paid per, &c. the duty, &c. last, late unladen, and now in the Amazon, Stephen Stout for Jamaica. Dated lhe 12th of November, 1809.

This Cerlificate Cacket is gained by applying to the books of the importer, to know the day, &c. when the custom inwards was paid, and by whom, which carry to the longroom in the Custom-house, and deliver it to the comptroller's clerk of the subsidy inward and outward, with an account of what you would export, &c.

As it has been mentioned that goods must be landed at some wharf or (key) quay, it may be proper to name them, viz.

Digitized by Google

Some . 1

Somer's Key, Smart's Key, Wiggin's Key, Bear Key, Dice Key, Custom-house Key, Porter's Key, Wool Key, Galley Key, Brewer's Key, Rulph's Key, Chester's Key, Lyon's Key, Cox's Key, Hammond's, Young's, and Gaunt's Key.— And the wharfs are, Fresh Wharf and Botolph Wharf.

Besides these, there are certain places called *Docks*, which are harbours cut into the land, where there is no current, but only a flow and an ebb, occasioned by the rise and fall of the tide in the river *Thames*, and these are convenient for the lying of vessels, hoys, lighters, barges, and boats, and are as follow, viz.

Billingsgate Dock, Sabb's Dock, Tower Dock, St. Catherine's Dock, Wapping Dock, Hermitage Dock, Execution Dock, and Limehouse Dock. And above bridge, Queenhithe Dock, Puddle Dock, White Friar's Dock, and Scotland Yard Dock. And in Southwark, or the Surry side are St. Saviour's Dock, Clink Dock, and Sarery's Dock, below the Bridge Yard, and several others for private uses. But more particularly eminent on that side of the water is the Bridge-Yard for landing sundry sorts of merchandizes, but chiefly from the ports of England.

Of Wharfage and Lighterage.

Wharfingers have several managers over them, and also a Committee to redress grievances, &c. and clerks of the stations, with lighter managers, and have the letting of many warehouses, cellars, &c. they have the privilege also of keeping lighters for the carriage of goods to and from ships.

India Docks.

These works, situated at Blackwall, are for the reception of all the ships that trade to the East and-West Indies.— The northern dock for unloading inwards, covers a space of 30 acres, and is capable of containing from 2 to 300 ships. The smaller dock contains an area of 24 acres, and is devoted solely to the husiness of loading outwards. The proprietors of these great works are styled the *India Dock Company*. The expences have not been short of a million of money. To reimburse themselves, they lay a tonnage of 6s. upon the burthen of every ship which enters the docks, and for wharfage, landing, weighing, cooperage, watehouseroom, &c. they are entitled to certain rates upon all goods that are discharged.

Digitized by Google

Тне
THE LONDON DOCKS AT WAPPING are upon a still harger scale, and for more general purposes.

Of Husbands of Ships.

Where several persons are concerned in a ship there is usually a husband chosen by them, to take an account of every merchant's goods, &c. and pay the wharfage, lighterage, porterage, &c. and these husbands are to collect every merchant's proportion, as also the Owner's freight.

OF THE MENSURATION OF PLAINS & SOLIDS.

THE several kinds of Measuring are three, viz.

1st. Lineal, by some called *Kunning Measure*, and is taken by a line, and represents length without breadth; the parts of which are,

12 Inches 1 foot, 3 feet 1 yard, 16 feet and a half 1 rod, pole, or perch.

All kinds of ornamental work, such as a cornice, frieze,. &c. are measured by Running Measure.

2dly, Superficial or Square Measure, is that which respects length and breadth, and the parts are,

144 Inches 1 foot, 72 inches half a foot, 36 inches one quarter of a foot, 18 inches half a quarter of a foot, 272 feet and a quarter 1 rod, 136 feet half a rod; 1296 inches, or 9 feet, one superficial, or square yard.

3dly, Solid, or Cube Measure, which respects length, breadth, and depth, or thickness, and the parts are,

1728 Inches 1 foot, 1296 inches three quarters of a foot, 864 inches half a foot, 432 inches one quarter of a foot, and. 27 feet one solid yard.

Superficial Measure.

To measure things that have length and breadth, suchas board, glass, pavement, wainscot, and land, is to take the dimensions of the length and breadth, according to the customary methods used in each particular: for instance, board and glass are measured by the foot, the dimensions are taken in feet and inches, and the contents givenin feet.

The dimension of wainscoting and paving, plastering, and painting, are taken in feet and inches, and the contents given in yards.

Of the Square and Superficial Contents or Arca. The squaring of any number is multiplying it into itse'f,

as 12 inches multiplied by 12 inches make 144 square inches. The superficial content or area of any thing is found four several ways, viz. by whole numbers, by decimals, by practice, and by cross-multiplication, in each of which methods I shall give examples of operation.

A rectangle hath its sides perpendicular, and these that are opposite equal; but the adjacent sides are unequal: boards, wainscots, ceilings, windows, doors, &c. are commonly of this figure.

When any thing is to be measured, it must be considered what form or fashion it is of, and then it must be measured according to the several-Rules for each figure.

First. If it be a square or oblong, then the length and breadth must be multiplied one by the other, which gives the contents in square measure, and that product must be divided by its proper divisor, according to the name in which the content or area is to be given.

Er. Admit a board to be 12 inches broad, and 8 feet or 96 inches long, how many square or superficial feet doth it contain?



Here the length in inches is multiplied by the breadth in inches, and the product 1152 divided by 144, the square inches in a foot, quotes 8 feet square for the content of the board.

A Rule for Dispatch.

If the length of a board, or piece of glass, be given in feet, and the breadth in inches, multiply one by the other, (without any reduction) and divide the product by 12, and the quotient will be the answer in feet, and the remainder will be parts of a foot. So the foregoing Example might have been done sooner by dividing 96 the length by 12 the breadth, and it quotes 8 feet for the content, by the former way.

Ex. Suppose a board be 14 feet long, and 15 inches broad, what is the content in square feet i_{i} .

158 THE YOUNG MAI	N'S BEST COMPANION.
14 fect long.	
15 inches broad.	
	The Answer is 17 feet
12)210	and 1. And so for any other
	Example of this kind.
Feet $17\frac{6}{12}$ or $\frac{1}{2}$	1
Or thus:	
14	Here 3 inches is the 1 of
by 1-3	a foot, wherefore 1 of 14
	is taken and added to 14,
	and it that $x \in Y$ leet, and $\frac{1}{T}$
315 # 3401 %.	Cquat (6 . ฐ.
Answer 171	1
Anothen Engenals man	And from different many
Another Example wor	keu jour uigerent wuys.
If a Board be 195 teet, or	150 inches long, and 15 inches
broad, now many square le	Decimally
Tucher 150 long	19.5
15 broad.	1.25
10 010445	-,
750 ·	625
150	250
	125
\$250	
,,	Feet 15,625
144)2250(15 feet	Feet 15,625
144	12
810	Inches 7,500
120	4
Rem 00	Quarters' 2 00D
Multiply by 19 inch. 1 fe	i quincis 2,000
interipty by the interior	
144)1080(7 inches.	the second second second second
1009	The second s
Rem. 72	Maria Andrea De Maria Antonio Maria Maria Mandria.
Multiply by 4 the quart	ers in an inch.
144)288(2 quarter	5 or 5.
288	
•••	•
· •	
	Coogle
Digitized by	GUUSIC

By Cros	is Mul	tiplication.	Ĺ	By Pra	ctice.
	Feet.	In.		Feet.	In.
	12	6	. `	12	6
	1	3		1	3 `
	12	6	,	12	6
	3	1 6.	3 Inches is $\frac{1}{2}$	3.	11
Answer	15	7 6		15.	71

The four methods here used are as follow: first by multiplying the inches together, and dividing by 144, &c. The second work is performed decimally: the third method is by cross multiplication, and the last and best is by practice.

Any of these methods may be easily understood by the use of the arithmetical part of this Book, except the method by crosss multiplication, which may be thus explained:

Rule. Under the multiplicand write the corresponding denominations of the multiplier. Multiply each term in the multiplicand, beginning at the lowest, by the *feet* in the multiplier, write each result under each respective term; carrying an unit for every 12, from each lower name to its next higher.

Note. Feet multiplied by feet give feet :- Feet multiplied by inches give inches: but inches multiplied by inches give seconds.

In the same way multiply all the terms of the multiplicand by the *inches* in the multiplier, writing the result of each term one place removed to the right hand of those in the multiplicand. Do the same with the *seconds* in the multiplier, getting the result of each term two places removed to the right hand of those in the multiplicand. Thus in the examples I say, once 6 is 6, and once 12 is 12;--then with the 3 inches I say, 3 times 6 is 18, that is 6 and carry 1, (putting the 6 to the right hand of the line of inches).3 times 12 are '36 and 1 are 37, but 37 inches are 3 feet, one inch, which I put in their proper places. I now add the two rows together, which make 15 feet, 7 inches, and 6 seconds.

If a board be wider at one end than the other, then take the breadth in the middle, or add the measure of both ends together, and take the half of the main breadth, which multiply by the length.

Ex. Suppose a board to be 120 inches long, and the narrowest end 10 inches wide, the broadest end 34 inches wide; what is its contents in superficial feet.

Add {	34 broades 10 narrowe	t end. est.		
Sul its hall	m 44 f is 22 the me 120 the len	edium betw gth	cen: the least	and greatest lengths.
			48	
14	s)2640(18 fee	et $\frac{1}{2}$. An.	12	•
	144 1200 1152 Rem. 48 Feet. 10	Or the In. O the le	144)576 } 4 570 } 4 	inches or $\frac{1}{3}$ of a foot.
	1	10 the m	ain breadth, c	r 22 inches
	10 8	0 4: 0%		
	1,8	4 An.		

Ma board or piece of glass be ever so irregular, it may be measured very near, by taking the breadth in 5 or 6 places, and adding the several breadths together, dividing the total by the number of places, and the quotient willbe the main breadth; which multiply by the length, &c.

Having the breadth in inches of any board, or piece of glass, to know how much the length of that board or piece. of glass will make a foot superficial.

Rule. Divide 144 by the inches in breadth, and the quotient will be the length of a board that will make a foot. Example Ex If one board be 9 inches broad, and another 24inches: what length of board will make each a superficial foot ?

One must be 16 inches long, and the other only 6.

Proper Directions for Joiners, Painters, Glaziers, &c. 7

Rooms being various in their forms, take this general rule in all cases, viz.

Take a line, and apply one end of it to any corner of the room; then, measure the room, going into every corner with the line, till you come to the place where you first began; then see how many feet and inches the string contains, and set it down for the compass or round; then take the height by the same method.

Glaziers are to take the depth and breadth of their work, and multiply one by the other, dividing by 144; glass being measured as board.

Having thus shown the methods of casting up dimensions, Lecome now to particulars; and first of

Glaziers' Work by the Foot.

If the windows be square, or rectangular, multiply the length by the breadth, which will produce the contents as has already been shown, viz. By Cross Multiplication. By Practice.

Feet. In. 8-9 high 7-3 broad	By Practice, <i>Fcet.</i> In. 8 — 9 7 feet 3
61-3 2-2 3 3 inc	61 - 3 hes $\frac{1}{2} - 2\frac{1}{4}$
6 3-5 3	$63 - 5\frac{1}{4}$ An.

Thus if the value of a window be required whose height is 8 feet 9 inches, and breadth 7 feet 3 inches, at 20d. per foot square, I first find the number of feet in the window, which in this case are 65 feet 5 inches, 3 seconds; and to avoid fractions, I call this 65 feet 6 inches, or 55 feet,

20

which I multiply by 20*d*. for, the walue of each foot, and divide by 12 and by 20.

12)1310,0	Here it is co	onvenient to throw-
2,0)10,9••2	work as by the	rule in decimals.

1.1.1.1

Answer £. 5-9-2.

If the windows are arched, or have a curved form, no allowance is made, by reason of the extraordinary trouble, and waste of time, expenses or waste of glass, &c. And the dimensions taken from the highest part of the arch, down to the bottom of the window, from the height or length; which multiply by the breadth, and the product will be the answer in feet. &c.

Glaziers are often so very nice as to take their dimensions, and measure to a quarter of an inch-

Ex. How much does a window measure whose height is $4-3\frac{1}{2}$, and breadth $2-7\frac{3}{2}$? Perform by Practice.

	Feet. 4	In. - 31 - 73	long. broad.
: 7	8	- 7 - 13 - 64	a a NGC DO NGC DO

14 ----- 4

The parts, beyond the fractions of an inch are hereomitted; but the work may be performed with accuracy by Cross Multiplication, or as it is usually called, by Duodecimals, thus:

Feet.	I	n.		
4	3	·6·		
2	7	9		
,	_	-		
-8	7	0.		
2	6	0		
	3	2	7	6
	_			
11	4	3	1	6

Here we see the accurate answer; for Cross Multiplication is capable of being carried to thirds and fourths; as inches multiplied into inches give seconds, so inches by seconds give thirds, and seconds by seconds give fourths.

MENSURATION.

Glass is measu	ared l	oy th fo	e foo llows	ot, an , viz.	d the	pric	e of	it is	a
Newcastle cros	vn, a	ccord	ing to	b the	size	5.,	d.	8.	d.
from	-	-		· .	-	2	10	to 3	4
Second, ditto	.	-	-	.	÷	2	5	2	11
Green glass.	-	- `	-	-		1	6	1	8
	Pain	ters' I	Vork	bu the	Yara	ŧ.			

When the wainscot of a room is painted you are to measure round the room with a line, as hinted before, and the height is to be taken by girting a string over all the mouldings from the top of the cornicc to the floor : then multiply the compass by the height, and you have the contents in feet and inches; which may be reduced into square yards, by dividing by 9.

Example 1.- A room painted,

Feet. In. Being 45 — 8 in compass. What are the contents in. 10 f. 6 high. square yards i

456 - 8 22 - 10	
9)47 <u>9</u> — 6,	

Yards 53 - 2-6 An.

Example 2. If the height of a room painted be 12 feet 4 inches; and the compass 84 feet 11 inches; how many square yards does it contain? Answer, 116 yards 3 feet $3\frac{2}{3}$ inches.

Digitized by Google

•	Feet. In. 84 - 11 compass 12 - 4 high
	$ \begin{array}{r} 1019 - 0 \\ 28 - 3-8 \end{array} $
9)	1047 — 3-8
Y/ds	. 116-3-3-8

Note. Double work is allowed in window shutters; sash frames and mantle-picces are reckoned separately unless the mantle-picces stand in the wainscot; in that case they are measured as plain work nothing being deducted for the vacancies.

Prices

Prices of Painting in Common Colours.

	\$.	d.		
Clearcole and once in oil	0	6		
twice in oil	0	8		
three times in oil	0	11		
Sash frames twice in oil, each 🚬 -	1	4:		
	1	10		
Squares, twice in oil, per dozen	1	4		
Water trunk, gutters, &c. per foot running	0	2	to	3d.
Skirting, per foot running	0	12	to	2d

Joiners' Work.

In wainscoting, the dimensions are taken as in painting, viz. by measuring the height and then the compass; multiplying one into the other, and dividing the product by 9; the quotient is the answer in square yards.

Ex. 1.—What are the contents of a piece of wainscoting. 9 feet 3 inches long, and 6 feet 6 inches broad ?

9-3. 6-6	
556	

4-7-6

6.

Ft. In.

The length and breadth being multiplied together brings it into square feet; which divided by 9, (the square feet in a yard) produces 6 yards twothirds for answer.

9)60—1 $\frac{1}{2}$ (6 yards 6 feet $1\frac{1}{2}$ inches answer = 54

Ex. 2.—What are the contents of a wainscotted room whose compass is 47 feet 3 inches, and height 7 feet 6, inches, in square yards !: An. 39 yards $\frac{1}{3}$.

47-3 compass 7-6 the height.
330-9
23-72
$9)354-4\frac{1}{2}$
39 yds. 3 or 3

Answer 39 yds. 3 feet, 41 inches.

MENSURATION.

Prices of Joiners' Work.

		_			••	· .	- I. -	s.	d.
Slit deal, v	wrought,	2 side	s per	fuot			0	0	6
🖁 deal 🍈	do.	-	•	-	-	•	0	0	7
Inch deal	do _		-		-	• •	0	0	9
11 deal	do. 📍	-	• -	. •	••••• •		0	0.	101
1호 deal	do.	-	-	-	• • •	-•	0	0	10
2 inch des	al do.	-	-	•		- 🌰 -	0	1	0
🔒 deal boa	ards for s	lating,	per a	quare		-	1	12	0
🗿 wrough	t weather	-board	ing	. . .		·	- F -	14	0
11 wainso	ot ovolo	sashes	-				0	1	4
2 inch do.		-	-	•	-	•	0	1	6
11 2 pani	iel squ <mark>a</mark> r	e dooi	r	<u> </u>		•	0	1	4
1 4-pani	nel do.			•		- ,	- 0 -	1	0
2 inch des	al 6-pann	el mou	ilded	2 side	3	• `	· 0	1	7
11 square	framed	partiti	on	. =	-	-	0	0	93
Inch deal	keyed d	ado	-	-		-	0	- Q	71
Deal mon	ildings p	ersfoot	sup	erficial			0	.1	4
		· ·							

Carpenters' Work.

Roofing, flooring, and partitioning, the principal parts of carpentery in modern buildings, are measured by the square of 10 fect each way, that is 100 square fect.

For roofing, multiply the depth and half depth by the front, or the front and half front by the depth, and you, will have the contents, if the roof is true pitch.

The dimensions are taken in feet and inches.

Ex.—How many squares are contained in a piece of work measuring 199 feet 10 inches in length, and 10 feet 7 inches in height? An. 21 squares, 14 feet, $10\frac{2}{4}$.

Operation.	Feet. In.	The division is perform-
1	199-10 long	ed by pointing off two
1 - 1 - 1 - 1	10-+ 7	places towards the right
	1 And a state of the state of t	hand, and the number
	1998 - 4	on the left are squares.
•	116-6-10	·
		1
· · · · · · · · · · · · · · · · · · ·	21,14-10-10	An. 21 squares, 14 fa10 i.
•	and an and and	

Again.—In a floor of 49 feet 7 inches 4 parts long, and 26 feet 6 inches broad, how many squares?

Digitized by Google

n ⁻

The

The Operation performed by Practice. Feet. In. Parts. 49 -7-4 26 1289-10-8 24-9-813,14-8-4 Ans. 13 squ. 14 feet, 8 inch. 4

In measuring roofing no déduction is made for sky-lights, chimney-shafts, &c.

In measuring flooring, from the contents of the whole floor in feet, take the contents of the vacancy for the stairs in feet, and the remainder is the true contents; which bring into squares as before.

In partitioning, measure the doors, door-cases, and windows by themselves, and deduct their contents out of the whole, except they are included by agreement, in that case the doors, door-cases, and windows must be mentioned in the written agreement.

There are various sorts of carpenters' work belonging to a building, viz. cornices, guttering, shelves, dressers, &c. all which are measured by superficial measure. There are also doors and door-cases, lantern-lights with their ornaments, cellar-doors, curbs, columns and pilasters, which all are valued by the piece, or superficial foot.

Carpenters measure the frames of any building, (which they call the carcass.) by the square of 10 superficial measure, or 100 square feet, as hinted before.

Sawyers' Work.

It may not be improper here to add something relative to the method used by sawyers in measuring their work, which when they perform by the Great, as they term it, they most commonly measure by the superficial foot; so that it is not difficult to take the dimensions; for they account the depth of the kerfs for the breadth, and the length for the length. The dimensions being thus taken in feet, the contents of one superficial kerf may be found by multiplying the length by the breadth, then having found the number of feet in one kerf, multiply it by the number of feet in them all.

· Digitized by Google

When

"When they have thus cast up the whole contents of their -work in teet, they are paid for t by the 100 feet.

If the kerf be but six i ches or best in depth, they have a custom to be paid for kerf and hald. (is they express it.) i.e. for ha f as much more as it comes to by measure; the reason given for if is, that the trouble is so much the more on account of the often shifting, removing, and new binding the timber, and therefore they insist on it as a customary price.

The Prices of Sawyers' Work.

• • • •	ι.	5.	а.
12 feet deals sawed, per dozen, cuts -	0	3	6
10 feet do	Ö	3	0
12 feet battens do	0	2	' 4
10 feet do. do	0	2	9
Ends or half deals	0	- 1	9
Fir timber, at per load, 50 feet cube -	·0	6	6
SAll extra cuts are charged at the rate of 3s.	6d.		•
The super 100 superficial feet		:	
Oak timber per load	v	9	0
Elm, do	:0	18	0

Öf Walling.

Walling is measured by the rod statute measure, being 272 feet and 1 superficial. The method of taking the dimensions for a wall round the orchard or the like, is by measuring the length by a line going over the buttresses; and for the height by measuring over the mouldings, (pressing the line into them.) even to the middle of the coping: likewise in taking notice of the thickness of the wall, *i. e.* how many half bricks in length the wall is in thickness; for three half bricks, that is a brick in length, and one in breadth, is standard thickness; and all walls, whether more or kess must be reduced to this standard by this rule, viz. multiply the product of the length and height, by the number of half bricks that the wall is in thickness; which product being divided by 3, the quotient will be 272 (the 1 being generally neglected,) and the quotient will be rods, one brick and a half thick, standard measure.

Ex.—Admit the face of a wall to measure 4085 feet and the thickness, two bricks and a half, or 5 half bricks-thick, how many rods does it contain ?

4085 5	
3)20425	
262;6808(25 rod. 544	
1368 rod. 1360 An. 25	.7
•••••	

When the work is wrought Decimally, divide by 2723; or 272,25, which gives the quotient somewhat less. But the measuring of brick-work may be shortened by having the rod of 16 feet & divided into 100 equal parts, with which you take the dimensions, and length of the wall in those rods; and 100 parts multiplied by the height give the contents in rods of any wall that is a brick and half thick. Deduction must be made for doors, windows, &c. To reduce brick-work to standard-measure, i. c. a brick and a half thick.

e Lonie in

- 4

Brick.

1	Subtract
2	Add
3)
41	Multiply by
6*	

Reduces to a brick & 1

Ex.-If a garden wall be 254 feet round, 12 feet 7inches high, and three bricks thick, how many rods does it contain?

Feet.	254 12	0 In. 7	In this operation, the aggre- gate or total is multiplied by 2.
In. $6\frac{1}{2}$ $1\frac{1}{2}$	3048 127 21	0 2 2	because twice S is 6, the nume ber of half bricks p which re- duces the work to standard mean sure, as here shown.
	3196	2	je v stantik (kole (kole (kole)) kole Narada (kole) (kole (kole)) stantik Narada (kole) (kole) (kole) (kole) Narada (kole) (kole) (kole) (kole)
	2)6309	2 4(23 8	contra de la contra El contra de la contr

272)6392 4(23, &c.

Of Chimnies.

This kind of brick-work is commonly agreed for by the hearth, and sometimes by the rod; and the method of tak-ing dimensions thus :- If the chimney stands not leaning against, or being in a wall, and worked upright over the mantle-tree to the next floor, it is girt about the breast for the length, and the height of the story is taken for the breadth, and the thickness of the jambs for the thickness. But if the chimney stands against, or in a wall, which is before measured with the rest of the building, then the breadth of the breast or front, together with the depth of the two jambs, is the length; the height of the story the breadth, and the thickness of the jambs the thickness. But if the chimney stands in the corner of a room, and has no jambs, then the breadth of the breast is the breadth, the height of the story the length, and the thickness the thickness; and, for the shaft, it is commonly girt in the smallest part for the length, and the thickness of both sides for the thickness, in consideration of the widths, pargetting, scaffolding, &c.

There is nothing to be deducted for the vacancy between the hearth and the mantle-tree, because of the width and the thickening for the next hearth above.

Of Gable Ends.

Take half the perpendicular for the breadth; the width of the house for the length, or half the width of the house for the breadth, and the perpendicular for the length, which brings the measure to an oblong, and the contents are found by multiplying the length by the breadth, &c.

Note.—There are several other things in bricklayer's work, as cornice, facias, straight arches, scheme arches, hips and valleys in tiling, and water-courses : all which are measured by the foot. Also piers, pilasters, rustic work, &c. which are valued by the piece.

Prices of Bricklayer's Work.

	-	4.	×.	a.
Brick-work, all grey stocks, in walling, &c. per rod, including labour, materials, &c.	}	25	0	0
Labour and mortar only -	-	4	10	0
Grey stocks, per thousand		3	5	0
I '			Pla	ain

			6.6	а.	ч,
Plain tiles, per thousand	-		2	10	Ó
Pantiles, per 100	•	-	0	12	0
Bricklayers, per day, from M	larch 2.	5, to Nov. 9,	0	5	0
Ditto from N	ov. 9, t	o March 25,	0	4	0
Labourers per day, from Mai	ch 25,	to Nov. 9,	0	3	0
Ditto from Nov	. 9, to I	March 25,	0	2	9
Mortar, per hod -		-	΄Ο	0	<u>9</u>
New plain tiling, per square, it	cluding	g all material	52	16	•

Of Paving.

Pavement for cellars, wash-houses, &c. is measured by the square yard.

Example.—If a cellar, wash-house, or court-yard be paved with bricks, or pitched with pebble, being 9 yards 2 feet long, and 6 yards 2 feet broad; how many yards square doth it contain? *Answer*, 54 yards 1 and $\frac{1}{2}$ feet, as in the following work, by Cross multiplication.

Yds.	Fi.
9	2
6	2
58	0
6	1 1 3
46	113

Slating

Is valued by the square of 100 feet, in some places by the rod of 18 feet square: or 36 square yards, or 324 feet.

(> In tiling and slating, where there are gutters and valleys, there is commonly an allowance, which is to take the length of the roof all along the ridge, making the gutter double measure; this is allowed in some places. Sometimes there is an addition for hollow ware, that is ridge tiles, gutter tiles, corner and dormar tiles; and here customs differ; for in some places one superficial foot is counted for every lineal foot or running measure; then 100 feet lineal is reckoned a square. In other places, for every 100 of such tiles is reckoned a square.

Digitized by Google

Prices

170

Prices of Slating in London, 1810.

• •	W	elch S	blating,	, viz.			l.	s .	d.
Common double 100 feet	Welch	ı slati -	ng, <i>pe</i>	r squ	are of	}	2	10	Ø
Ladies ditto	-	-	-	•	-	נ	2	6	0
Countess ditto	• '	-	′ -	-	-		2	2	Ō
Welch rags	-	-	-		-		3	10	0
Westmoreland sl	ating,	with	iron na	ils	· _		3	16	Ō
Ditto, with copy	oer nail	S			-		3	10	ō
Tavistock slating	g	•	-		-		3	10	õ
Labour and mat new laying co	erials, i mplete	rippir , <i>per</i>	ig old : square	slatin	g, and	} [.]	1	4	0

Plastcrer's Work

Is of two kinds, viz. First, Work lathed and plastered. sometimes called ceiling. Secondly, Plastering upon brickwork, or between the quarters in partitioning, by some called rendering; both which are measured by the yard square, as by the joiners and painters. In taking dimensions of a ceiling, if the room be wainscoted, consider how far the cornice bears into the room, by putting up a stick perpendicular to the ceiling, close to the edge of the uppermost part of the cornice; measuring the distance from the perpendicular stick to the wainscot, twice which distance must be deducted from the length and breadth of the room taken upon the floor, and the remainder is the true length and breadth of the ceiling. As if a floor be 24 feet long, and 18 feet broad, and the cornice shoots out 6 inches. deduct 1 foot for both ends, and the length of the ceiling is 23 feet; the same for the breadth, and it leaves 17 feet broad ; which multiplied together, gives the contents as 391 feet : or 43 yards and a half, nearly, thus :

Exampl	e.—23	feet	in	length.
-		e .		

F

17 feet broad	
---------------	--

161 23	
9)391(43 yards, 4 feet. 30	
31 27	

I 2

Digitized by Google

Iſ

If the ceiling of a room be 19 feet 10 inches one way and 17 feet 6 inches the other, how many square yards does it contain?

By Cross M	altiplic	ation, thus:
19	10	
17	· 6	-
337	2	· .
9	11	
9)347	1(38	yds. 5 feet 1 inch.

How many yards square are in a piece of plastering 47 feet 4 inches 7 parts long and 18 feet broad?

F. 47	I. 4	<i>Pts.</i> 7 3 times 6 is 18
141	1	9 6

9)852 10 6(94 yds. 6 feet, 10 inches, 6 parts.

The Prices.

						<i>L</i> .	•.	u.	
Render 1 coat and	sett,	ver ve	ırd		•	0	•0	7	
Ditto	, ·	floate	d		•	0	•	9	
Lath plaster sett		-	-		-	0	1	2	
Ditto		floate	d		-	·0	1	7	
Wash stop and whi	te	-	•	-	-	0	0	2	
Straw colouring	-	S		ę	-	0	0	4	
Lime whiteing per	yard	-		-	-	0	0	2	
Plain cornice, per f	oot s	uperfie	cial	· .	-	0	1	4	
Plasterer per day		-	-	÷	•	0	5	0	
Labourer	-		•		-	0	3	0	
Boy -		-	-		-	0	1	6	
A bundle laths and	nails		-	•	•	0	4	3	
Lime and hair, per	hod		-		-	0	1	0	
Fine stuff	ditto		-		-	. 0	.1	2	

Of Mason's Work.

Mason's work consists of stone, and is of two sorts, viz. superficial

Digitized by Google -

superficial and solid. Pavements, and the face of stonewalls, houses, &c. are measured as brick-work. If the work have ornaments, as capitals, pilagters, rails, and ballusters, &c. they are then valued by the piece.

The Prices.

Portland stone, per foot cube	-	4	9
Plain work. super	•	1	0
Sunk on moulded ditto	-	1	6
Portland chimney-pieces per foot super	•	2	2
Fire-stone, hearths, and coveing, per foot super		1	4
Vein marble chimney-pieces, set complete 6s. 6	Sd.	9	6
Purbeck paying in courses, per foot super	•	1	1
Purbeck steps, per foot running -	•	3	3
13 inch York coping, per foot running	•	2	8
York window sills, per foot running -	-	1	6
Labour and gravel, to pebble paving, per yard		0	9
Clinker paying all materials, ditto	-	9	6
New York paying, per yard -	-	2	11
Old paying re-laid, per yard (labour only)	-	1	0
		-	
Smith's Work is done by the lb. viz	•		-
		8.	d.
Chimney bars, &c	- 🖷	0	.0
All framed-work, 8d. per lb. gates, &c. 8d. to		· 1	. 0
Iron holts and nuts, &c	•	.0	8
Cast-iron rails, &c. per cwt. 20s. to	•	30	0
Price of Flumber's Work.			
	2.	s.	đ.
Sheet lead, ner crit.	2	2	0
Milled lead	2	4	O
34 Rain nipes, per foot -	0	3	2
4 Ditto per foot	0	1	4
Joints of solder	0	2	6
1 Joints	0	3	0
1 ¹ / ₂ pipe	0	2	0
Solder per lb.	0	1	0
Plumber per day	0	5	0
Man Manham allow for ald load to non a		•1	

Mem.—Plumbers allow for old lead 4s. per cut. less than the price of new cast lead; it is customary to deduct 2lb. per cut. for dirt.

Land

s. d.

Land Measure.

Land is usually measured by the acre. The dimensions are taken with a chain of four poles in length, which is divided into 100 parts, called *links*, and 10 square chains make an acte. Let them be 10 in length, and 1 in breadth, or 5 in length and 2 in breadth, &c. or 160 square poles; but to find the contents, (if not regularly square) it is generally divided into triangles: Thus a piece of land of 4 sides, (if not square) may be divided into two triangles, pieces of 5 sides into 3, and a 6-sided piece into 4 triangles, and so on.

To measure a Triangle.

Admit the longest side of the following triangle, viz. AD to be 76 poles; and the perpendicular or dotted line BC to be 30 poles; multiply 76 (the base) by 15, the half of the perpendicular BC, and it produces 1140: or multiply the whole perpendicular by half the base, (or longest side) it will produce the same; which divided by 160, (the square poles in an acre) the quotient gives the contents of that piece of land in acres; multiply what remains by 4, dividing by the same divisor, and it gives roods, &C.

The perpendicular is always drawn from the opposite angle to the base, or longest side, as in the following figure.



MENSURATION.

All pieces of land generally should be divided into triangles, and when measured, their contents added together.

, If an oblong plot of ground contains 35 poles broad, and 185 poles long, how many acres docs it contain?

Rule.—Multiply the length in poles by the breadth, dividing the product by 160, (the square poles in an acre) and the quotient will be the answer in acres, as follows:

185 the length. 35 the breadth. 925 555 160)6475(40 acres ac 640 75

The contents 40 acres, and and 75 poles; or nearly 40 acres and a half.

By the Four Pole Chain.

Example 1.—If a pole of ground contains 16 chains and 25 links in breadth, and 57 chains and 30 links in length what are the contents thereof ?

Ch. Link. 57,30 length. 16,25 breadth. 28650 11460 34380 5730

Ac. 93 | 11250 cut off 5 places.

No roods ,4500 40

Poles 11 | 00000 93 A. O R. 18 P. Ans.

Four roods, or rods, make 1 acre, 40 poles 1 rood or rod, so that one rood, or rod, is a quarter of an acre.

14

Digitized by Google

175

The

The chain, commonly called *Gunter's* chain, contains 4 statute poles in 100 links, so that any number of chains are no more than so many 100 links, as 4 chains are 400 links, and 6 chains 600 links, &c. 160 statute poles are an acre. each pole being 16 feet and an half; therefore, in a square chain are 16 square poles; and if you divide 160, the square poles in an acre, by 16, the square poles in a chain, the quotient is 10, the square chains in an acre.

A square chain contains 10,000 square links (or 100 multiplied by 100) hence it follows that 1 acre contains 100,000 square links.

To reduce Statute to Customary Measure.

According to a statute made in the 33d of Eduard I. and another in the 25th of queen Elizabeth, a statute pole is 16 feet and a half long, but in some parts of England poles of 18, others of 21, and some of 24 feet long, are used, called customary measure, being in use according to the custom of the place where they are taken. Therefore, to turn one kind of measure into another, admit statute measure to be turned into customary, as thus: multiply the number of acres, roods, and poles, statute-measure, by the square half yards, or square half feet in a square pole of statute measure, dividing the product by the square half-yards, or square half feet contained in the pole of the customary measure, and the quotient gives the answer in the latter, in acres. &c.

Example.—In 172 acres statute measure, how many acres of 18 feet to the pole or perch?

172 statute measure 121 square half yards

144(20812(144 acres 76 customary measure.

In a statute pole are 11 half yards, which squared, make 121 square half yards; and in a square pole of 18 feet, or 6 yards, there are 144 square half yards, &c. For the remainder, work as before, viz. by multiplying by 4, &c. and the next remainder by 40, &c. So that the answer is, that 172 acres, statute measure, make 144 acres, 2 roods, and 4 poles of such customary measure.

Digitized by Google

An

An Example to the Contrary.

In 543 customary acres of 18 feet to the pole, how many acres of statute measure, of 16 feet and a half to the pole?

· 543 Customary,

144 Square half yards in customary acre.

2172
2172
543

121)78192(646 statute acres.

726

ł

55, &c.

The remainder 26 multiplied by 4 produces 104, which not amounting to a rood, should be multiplied by 40, the product is 4160; this divided by 121, quotes 34 perches, 46 remaining. So that 543 customary acres, of 18 feet to the pole, make 646 acres 34 poles, and $\frac{46}{131}$ of a pole.

Note.—Customary acres, as well as statute acres, contain 160 square poles or perches; the excess of size is by the size of the pole.

Solid Measure,

Is that of timber, stone, digging, &c. and the rule in working is to multiply the length taken in inches, and the breadth together, and then the product by the depth or thickness, and the last product will be the contents in cubic inches, which, if timber or stone, divide by 1728, (the cubic inches in a solid foot) and the quotient gives the contents in solid feet.

Digitized by Google

Examp.e.

Example.—If a tree be 16 feet long, and 18 inches square, how many solid feet does it contain?

	18	16	· ·
Multiply	18	12	
			-
	324	192	length in inches.
		324	breadth and thickness.
	· ·		
		768	•
		384	
		576	a thu
	172	8)62208(36 feet
	•	51,84	
	•	••••••	
		10368	
			
		0	

Solid measure.

40 Feet of round Stimber is a ton or load

50 ---- of hewn

1728 inches is a foot of stone or timber

27 feet is a yard

282 inches is a gallon of ale or beer

231 inches is a gallon of wine

In an oblong piece of timber, whose breadth is 2,25 feet, thickness 1,64 feet, and length 36,5 feet, how many solid feet?

> 2,25 breadth 1,64 thickness

900 1350 225

36900 86,5 length

184500 221400

110700

134,68500 Ans. 134,685 solid feet, or 134, § nearly.



Of Timber Measure.

To know the contents of a piece of timber by common or decimal arithmetic, observe as follows, viz.—The tree being girted, and one fourth part taken for the side of the square, multiply the length of the side of the square in inches into itself, and that product by the length in feet; which product divide by 144: but if you multiply by the length in inches, then your divisor must be 1728, and if any thing remains, divide by 12, and the quotient will be the odd inches.

Ex.—If a piece of timber be 15 feet long, and a quarter of the girt 42 inches; what are the contents of that piece?

Thus: 42 inches in the side of the square:

84
168
100
1704
15 feet in length
F. I.
144)26460(183-9 Answer
144
1006
1200
1152
540
439
109
108
12
144)1296(9 inches.
1206

10

In this example 1764 is multiplied by 15 in one line; but it may be worked shorter by decimals, thus: Squared $\begin{cases} 3,5 \text{ the side of the square 42 inches.} \\ 3,5 \end{cases}$

175 105	· .
10.05 110	

12,25 the product are fect.

15 feet the length.

183,75 the contents, or 183 feet, 75 9 inches.

But this common way of taking $\frac{1}{4}$ of the circumference for the side of the square, which is equal to the contents of the circle in round timber is erroneous, and gives the solidity somewhat less than the true contents; for the true way is to multiply half the diameter into half the circumference, and then multiply that product by the length, which divide by 1728, and the quotient is the contents. If you cannot measure the end of the piece, you may know its diameter by this proportion, *viz.* is 22 is to 7, so is the circumference to the diameter.

Or you may find the side of a square of a round piece of timber, thus: multiply 2821 by the inches of the circumference, and cut off 4 figures on the right hand for the product.

2821		
Inch.	66 the	compass.
		•
160	106	

16926
16926

18 6186 Ans. 18 2 in.

Having the breadth 24 inches, and depth 18, of a piece of timber or stone, to know how much in length will make a solid foot, multiply one with the other, and let the product be a divisor to 1728, thus:

Digitized by Google

-	24 broad.
	18 thick.
-	·
	192
	24
-	
	432)1728(1 inches in length.
	1728

Thus

Thus you may make a table to serve all breadths and depths, by which much labour may be saved, and yet measure any piece of timber with accuracy.

In square timber you must make the inches squared adivisor to 1728, and the quotient will be the answer in sinches of length, that will make a foot solid.

Ex.-If a piece of timber be 8 inches square, what length of it will make a foot?

64)1728(27 128	Answer, 27 inches, or 2 feet 3. inches in length.
	U
448	1
448	. •
(0) He	the square of 8 is 64. &c.

Again, if a piece be 18 inches square, what length will make a foot ? Ans. 5 inches and one third.

The square of 18 is 324)1728(5 103 equal to one third, 1620

(108)

The usual way of tapering timber is by taking the dimensions in the middle, and multiplying by the length, which is not accurate; but if the dimensions are taken in several places, and properly worked, the contents thus found will be very near the truth.

Digging

Is measured by the solid yard of 27 feet; that is, 3 times 3 is 9, and 3 times 9 is 27, by which are measured vaults or cellars, clay for bricks, §c.

Other things are measured by the floor of 324 solid feet.

 E_x .—If a vault or cellar be 9 feet deep, 4 feet $\frac{1}{2}$ long, and

and 3 feet 9 inches broad, what are its contents in solid yards?

	Feet. $4\frac{1}{2}$ long. 9 deep.
	$\frac{40\frac{1}{2}}{3 F. broad}$
$\begin{array}{c} 6inches \frac{1}{2} \\ 3 is \frac{1}{2} of 6 \end{array}$	121] 20] 10]
-	27)151 ⁷ / ₈ (5 Yards, 16 feet ⁷ / ₈ , 185
	(16)

Ex. 2.—How many yards of digging will there be in avault that is 25 feet 4 long, 15 feet 8 broad, and 7 feet $\frac{1}{2}$. deep?

Ft. 95	In.	
15	8	
380	0	· · ·
16	10	8
396 7	10 6	8`
2778	2	8"
198	5	4 Vd F+ Tn
27)2976 297	8	0(110 6 8
6		•
Answe	- r 11	O Yds. 6 Ft. 8 Inches.

Digitized by Google

Er. 3.-

MENSURATION.

Ex. In a mote 648 feet long, 24 feet broad, and 9 feet deep, how many floors?

17	• 648 long.	
	24 broad.	-
· · · ·	2592	
-	1296	
	15552	
	9	
Divide by	324(139968(432 floors.	Answer.
	&c.	
	the second designed in the second designed in the second designed in the second designed and the secon	

(0)

Most solid bodies being generally painted, it is necessary to know how to obtain the superficies. To find the superficial contents of a square, or many-sided, or round pillar, multiply the sum of the sides or circumference by the height in feet, and the product divided by 9 will be square yards.

Of a Glube.

Multiply the circumference in feet by itself, and then the product by this decimal 0,0353678, and this last product will be the contents in yards.

To find the superficial contents of a pyramid or cone, (see plate fig. 7 and 8) multiply for the pyramid, half the sum of the sides, or for the cone half the circumference of the base, by the slant height in feet, and the product divided by 9 will be square yards.

If the pyramid or cone be not complete, that is, if part of the top be wanted, add together the circumferences at top and bottom, and half their sum being multiplied by the slant height will be the superficial contents.

Note. A solid square yard of clay will make about 7 or 800 bricks, 3 bags, or bushels, and half of lime, and half a load of sand will lay 1000 bricks.

Digitized by Google

500 bricks 1000 plain tiles 25 bags 1 cwt. of lime

h

It may be proper here, as well for refreshing the memory as for improving the understanding, and storing the mind with just notions and ideas of measuring, to give a short repetition, by demonstrative geometrical figures, to explain what has been before expressed.

And 1st. for *Planimetry*, or *superficial*, or *flat measure*, some parts of which are measured by the square foot, as boards, glass, marble, freestone, and pavements. The dimensions are taken in feet and inches, and the contents given in square feet.

Ex. 1. In an oblong, or long square, whether board, glass, or pavement, &c. and containing on the longest side (or length) 24 feet and a half, and the shortest side or breadth, 14 feet $\frac{1}{4}$, as in the following figure. Work as follows, viz.

F. 241		
14 F. 2	Area or contents 349 f. 125.	
	14,25 breadth. 24,5 length.	
•	7125 5700 2850	
	349,135	

Rule. Multiply the length by the breadth, and cut off as many places to the right hand as there are decimals in the length and breadth.

Lx. 2. Suppose a board or piece of glass, in the form of fig. 1, plate called a Rhomboid, that is in the shape of a common pane of glass, or diamond square; to measure which, let fall a perpendicular at B, and multiply by the length of any of the sides (for they are all equal), and cut off as many places to the right hand as there are decimal places in both multiplicand and multiplier, as before hintcd. Suppose the perpendicular height to be 8 feet 38 parts, and the length of the side to be 8 feet 52 parts, then the work will be as follows:

F. P.

F. P .
8,52
8,38
6816
2556
6816

13800

Here the multiplication is as in whole numbers, and the contents or answer is found to be 71 square feet, and $\frac{7976}{16000}$ of a foot, or something more than 4 inches $\frac{1}{4}$.

71,8976

3976 is separated by a comma, as above directed, and are so many 10,000 parts of a foot.

Ex. 3. Again, suppose a solid body be in the form of fig. 2, called a Rhomboid, its length C. D. 17 feet 25 parts, and its breadth A. B. 8 feet 58 parts.

F . P .	The forementioned figure	
17,25 length.	hath its opposite sides equal,	
8,58 breadth.	and its opposite angles	
	alike.	
13800		
8625		

148,0050 Answer, the contents are 148 feet.

Again, suppose a board, piece of glass, pavement, or piece of land, to represent, or be in the form of a triangle, or three-cornered figure, expressed as in figure 3. Every triangle is half an oblong, whose length and breadth are equal to the perpendicular and base.

The dotted line is the perpendicular, the bottom line the base, and the line from the top of the perpendicular A to the left angle of the base C, is called the hypotheneuse. If A B be 10 feet, and C D be 16 feet, the superficies of the triangle will be 80 feet.

Fig. 4. is called a trapezium, and consists of 4. sides.— This figure, before it can be measured, must be divided intotwo triangles, thus, viz. by a line drawn from one angle or corner, to the angle opposite to it, as in the figure. The line A B is called the diagonal.

Rule. Multiply the diagonal by half the sum of the two perpendiculars falling upon it from the opposite angles, and . the product will be the area.

Ex. 4. Suppose the dimensions of the trapezium before described to be, viz. the diagonal A B 16 F. 67, the one perpendi-

perpendicular D z 12 F. 50, and the other C z 9 F. 68 (as in fig. 5.) what are its contents?

The O	The Operation.		
One rerpendicula The other -	ir - 12,50 } add		
The sum is	22,18		
The half sum is	11,09 which		
produces 1	84.8703		

which is 184 feet, and $\frac{5703}{10000}$ of a foot, equal to 10 inches and a half

If two sides of a trapezium are parallel, equi-distant, add them together, and half the sum multiplied by the nearest distance, or a perpendicular between those two sides, gives the contents. Or measure in the middle between two sides or lines of equal length, and the answer will be the same.

The painting, plastering, &c. of irregular pieces, in forms of triangles or not, if divided as above, may be measured as before, and brought into yards (if the contents are to be so given) by dividing by 9, as before shown.

Of Regular Figures.

Figures having more than 4 sides are called polygons, and those that have their sides and angles equal are called regular polygons.

Regular figures have their names from the number of their sides; thus a figure having

5	Ϋ́.	, Trigon, or equilateral triangle.
-4		Tetragon, or square.
5		Pentagon.
6		Hexagon.
7	Equal sides, is	Heptagon
8	calleda	Octagon.
9		Nonagon.
10		Decagon
11	· ·	Undecagon.
ر 12)	Dodecagon.
-		0

The area of a pentagon may be found by multiplying the square of its side by the number 1,7204774. Thus if the side

MENSURATION.

side of a pentagon be 11 feet, then the square thereof will be 11 times 11, or 121 feet. Multiply 1.7204774

tiply by	1,7204774 121
]	17204774 34409548 7204774
20	8,1777654

Therefore the area of a pentagon will be upwards of 280 square feet.

In like manner, to find the area of the

Trigon, Tetragon, Horagon		0,4330127 1,0000000
Heptagon, Octagon,	Multiply the square of the	2,5980702 3,6339124 4,8284271
Nonagon, Decagon,	side by	6,1818242 7,6942088
Undecagon, Dodecagon,) (9,3656404

Note. The multipliers in this table are the areas of the polygons to which they belong, when the side is unity or one. See Bonnycastle's Mensuration, 2d edit. p. 55, where the demonstration is given at length.

Of a Circle (Figure 9.)

A circle is contained under one line, called the circumference or periphery, as A B C. Plate fig. 9. All right lines drawn from the centre E, to the circumference, are equal, and called radii, or half diameters; and the long line through the centre from A to C is the diameter.

To divide a circle into 6 equal parts extend the compasses to half the diameter, as from A to the centre E, and the extent applied to the circumference will divide it into those parts.

The diameter A C divides the circle into two equal parts, each of which is **a**lled a semicircle; and if a semicircle be divided into two equal parts, those parts are called quadrants.

Digitized by Google

187

The questions relating to the measuring of the circle and its parts may be solved as follows:

1. The diameter being given to find the circumference,

Rule. Multiply the number 3,141597 by the diameter, and the product will be the circumference. Note. The number 3,1416 will be exact enough in most cases.

Example. The diameter of a circle being 11 inches, what is its circumference?

3,14	116 11
3,14	116
3,141	6

Answer 34,5576, or something more than 341 inches.

2. To find the area of a given diameter.

Rule. Multiply the number 0,7853982 (or in common cases 0,7854) by the square of the diameter, and the product will be the area.

Ex. What is the area of that circle whose diameter is 11inches? 11 times 11 is 121, 0,7854

200-21
-
more a
7834
15708
854

101

Answer 95,0334 square inches.

3. To find the diameter of a given circumterence.

Rule. Multiply the number 0,3183099 (or in common 0,31831) by the circumference, and the product will be the diameter.

Example. What is the diameter of a circle whose circumference is 34½ inches, or 34,5 ?

34,5	
159155 27324 94593	

1

Answer, 10,981695 (or almost) 11 inches.

Digitized by Google

4. To

4. To find the area of a given circumference.

Rule. Multiply the number 0,0795775 (or in common, 0,0796) by the square of the circumference, the product will be the area.

Example. What is the area of a circle whose circumforence is 341 inches?

34,5	1190,25		
34,5	0,07.96		
1725	714150		
1380	1071225		
1035	833175		

4190,25 Answer 94,743900 or almost 95) sq. In.

5. The area of a circle being given, to find its diameter. Rule. Multiply the square root of the area by the number 1,12837, and the product will be the diameter.

Example. What is the diameter of a circle whose area is 95,0334 square inches?

5,0334)9,75 nearly.	1,12837
L	9,75
\$03	564185
309	789859
9434	1015533
9725	11,0016075
	5,0334)9,75 nearly. 1 403 309 9725

Answer. The diameter is 11 inches.

6. To find the circumference of an area of a circle. Rule. Multiply the square root of an area by the number 3,5449, the product will be the circumference.

Ex. What is the circumference of a circle whose area is 95,0334 square inches? The square root of

Digitized by Google

95,0334(9,75	3,5149
as before.	9,75
	177245
	248143
•	319041
•	34,562775

Ans.

Ans. Circumference something more than 341 in.

7. To measure the sector of a circle (See fig. 10.)

Case 1. If the length of the arc D E, and the semidiameter C E be given, multiply the length of the arc by $\frac{1}{2}$ the semidiameter, and the product will be the area.

Case 2. If the number of degrees contained in the arc and the semidiameter be given, multiply the square of the semidiameter by the number of degrees contained in the arc, and that product by the number, 0,0087267, and the result will be the area required.

Er. Let the arc consist of 90 degrees, or $\frac{1}{4}$ of the circumference, and the semidiameter be $3\frac{1}{4}$.

3,5	12,25	0,0087267
3,5	-90	11025
175	1102,50	436335
105	·	174534
		872670
12,25		87267
	· .	9,62118675
	•	1

Note.—Problems relating to the square root should be deferred till after the reader has proceeded to that subject hereafter treated of.

Of Solid Measure.

Solid or cube measure has been already defined, as well as superficial measure, some of the figures of which are numbered 6, 7, and 8.

To measure a solid in form of a cube, which is in length, breadth, and thickness equal, multiply these into themselves, and the last product will give the solidity or contents. A cube has six sides, and is in shape like a die.

Ex. What is the solidity of a cube whose side is 12 inches? 12

Digitized by Google

1728 the	solid	inches	in	a_sol	id
12					
144				,	
12					
12	· .				

foot.

MENSURATION.

To measure a solid of unequal length, breadth, and thickness, multiply the length by the breadth, and the product by the height; the last product will be the solidity.

Ex. What is the solidity of a block of marble whose length is 10 feet, breadth $5\frac{2}{3}$, and depth $3\frac{1}{2}$ feet?

By Cross Mult.		s Mult.	By Decimals.	By Practice		
5 f	t. 9 i	n.	5,7 5	5	9	
3	-6		3, 5	.3	-	
				6 is 1		
17	3	•	2875	17	3	
2	10	6	1725	2	10	6
			00.105			
20	1	0	20,125	20	1	0
		10	10			10
201	3	0	201,25 the sol.	201	3	0

The cone is measured by finding the superficial inches at the bottom or base thereof, multiplied by one third of the inches in length, and that product is the solid quantity in inches, which divided by 1728, the quotient gives the answer in solid teet.

Example of finding the solidity of the cone decimally without dividing by 1728.

Let the diameter of the base be 2 feet 6 inches, and the altitude 10 feet 6 inches. The area of a circle is the square of the base multiplied by 7854.

- Digitized by Google

2,5 the diameter.

2,5	
125 50	4,908750 area of the base.
6.25	24543750 height.
7,854	14726250
2500 3125 000	17,1806250=The solidity in feet
75	
08750	

191

The
192 THE YOUNG MAN'S BEST COMPANION.

This method will serve for tapering timber, or for any conical figures.

To measure a Pyramid.

Multiply the area of the base or bottom by one third of the perpendicular height, and the last product will be the contents in solid feet; or one third part of the area at the base, multiplied by the whole altitude, gives the contents also.

Examples of both ways.

Suppose a square pyramid (or figure resembling the spire of a steeple) the side of whose base is $4\frac{1}{2}$ feet, the perpendicular height 18 feet, what are its solid contents?

4,5 4,5	6,75 18	$\frac{1}{3}$ of 20,250, the area the whole height.	at the	b as e
-225 180	5400 675			
20,25 6 1 of	121,50 f the altitu	Answer 121,50 as befo ide.	re.	

ł

١

Ì

121,50 Answer 121 feet, and 100 or 1.

When one side of a base is longer than the other, as suppose one to be 2 F. $\frac{1}{2}$, and the other 1 F. $\frac{1}{2}$, then multiply the length of the base by the breadth, and that product by the height as before.

If the base be a polygon, find its area by the rule given in page 186, multiplying it by $\frac{1}{4}$ of its height.

To measure the frustrum or sedgment, i. e. a piece or part of a pyramid whose ends are similar regular polygons.

Rule. To the areas of the two ends of the frustrum add the square root of their product, and this sum being multiplied by $\frac{1}{3}$ of the height, will give its solidity.

To measure the Frustrum or Segment of a Cone.

Rule. Divide the difference of the cubes of the diameters of the two ends by the difference of the diameters, and this quotient being multiplied by 7854, and again by $\frac{1}{3}$ of the height, will give the solidity.

Ex. What is the solidity of the frustrum of a cone, the diameter

diameter	of the greater of	end being	four	feet,	and	that of	the
lesser end	two feet, and	the height	ni n e	feet ?			

Cirbe of 4.	64 cube of 2.
Vitturo an S	9

of the (2)56 Difference of cubes of the diameters. diameters. (2)56 Difference of cubes of the diameters.

62832 15708 21,9912 3 one third of the cone's h	7854					
15708 21,0912 3 one third of the cone's h	62832	,	•	~		
21,9912 3 one third of the cone's h	15708					
	21,9912 3.0	ne thire	l of	the c	one's	h

Of Gauging.

There is some kind of affinity between the art of measuring timber and that of gauging or measuring liquors, both being performed by cube or solid measure. For as often as there is found 1728 solid or cubic inches in a piece of timber, of whatever form, it is said to contain so many solid feet; so likewise in gauging; so many times as 284 (the solid inches in a beer or ale gallon) are found in any vessel of such liquor, that vessel is said to hold so many gallons; so of wine; only in that the divisor alters, it being 231 solid or cubic inches, instead of 282.

The gallon of dry measure contains 2722 cubical inches.

Every cubical foot in beer or ale measure contains. 6 gallons and almost a pint.

- The same in wine measure is 7 gallons, and almost 2 quarts.

A cubical foot of dry measure contains $\mathbf{6}$ gallons and somewhat above one third of a gallon.

141 inches make 2 quarts of beer or ale, 70 inches $\frac{1}{2}$, one quart, and 35 inches $\frac{1}{2}$, a pint.

K

Notes

Note. To find the contents of any vessel, as a box, that has the form of a cube, that is, a figure, whose breadth, depth, and length, are equal, and is well represented by the shape of a die.

Multiply the side into itself, and then again that product by the side; which last product, if for beer or ale, divide by 282, the inches in a beer or ale gallon, and for wine, brandy, &c. by 231, the inches contained in a wine gallon.

Ex. In a cube, whose side is 79 inches, find the solid contents in beer and wine gallons. Answ. 1748 101 beer or ale gallons, or 2134 31 wine gallons.

79	282)493039(1)	748 beer or ale gallon.
79	282	
711	2110	231)493039(2134 wine gallons
553	1974	462
6241	1363	310
79	1128	231
		angentigene andres 7
56169	2359	793
43687	2256	693
	• ~~	·
493039 c	ube in. 103	1009
		924
		. 85

To find the contents of a parallelopepid, or solid figure, contained under six sides, of which the opposite are paralel, and of the form of figure 12th.

Rule. Multiply the length by the breadth, and that product by the depth, and then divide by 282 for beer or ale. and 231 for wine.

Ex. If the length of a chest be 95 inches, the breadth 62 inches, and the depth 23 inches, what are its contents in beer and wine gallons?

95 length.

194

95 length.

62 breadth 282)134570(480 110 beer gallons.

190 570

5890

23 depth 231)135470(586 104 wine gallons.

17670

11780

135470 solid inches,

To gauge a Back or square Tun.

Example. If its length be 112 inches, its breadth 71 in. and its depth 48 inches, what are the contents in solid inches, and also the contents in beer gallons? s Ans:

112	length	282)387072(1372	등을 gall
- 72	breadth.	282	
		· ·	
224		1050	
784		. 816	
8064		2047	
48	depth.	1974	
	-		
64512		73 2	
32256		564	
		4. 0	

387072 solid inches. (168)

(4)

thus

To bring these gallons into barrels, divide them by 36, the gallons in a barrel of beer.

36)1372(38	Answer. 38 barrels and 4
108	or # of a barrel, and the re-
	mainder 168 is something more
292	thau half a gallon.
288	

Кĉ

Digitized by Google

How

How to guage a Copper, Tub, or Cask.

If it be of equal size both at top and bottom, find its contents in cube inches, and bring it into gallons as before.-But if it be wider at top than at bottom, or the contrary. then take the width or diameter somewhat above the middle. next to the broadest end, if it be taper, or find the mean diameter thus; if the bung diameter be 26 inches, and the head diameter be 23 inches, the difference between which is 3 inches, two thirds of which make two inches: this added to the smaller of the two diameters, makes 25 for the mean Having the mean diameter, proceed to diameter sought. find the contents in solid inches thus; square the mean diameter, and multiply that square by 07854, and the product will give the contents of the liquor at one inch deep, and this multiplied by the length, will give the solid inches in either copper, tub, or cask.

Ex. Suppose the mean diameter to be 72 inches, and the length 56 inches?

72 72	4071,5136 56
144 504	244290816 203575680
5184 square.	280047616
7854	
20736 25920 1472 288	•

4071,5136 Contents at one inch deep.

26

The solid inches, as above found, 228004, brought into gallons, make 808, and 148 solid inches remain, something more than $\frac{1}{2}$ a gallon; in all 22 barrels, 16 $\frac{1}{2}$ gallons of beer. Again,

If the mean diameter of a cask of wine be 14 inches, the length 72 inches, what is its contents in wine gallons?

Digitized by Google

14

1

196

,7854 196
47124 70686 7854
153,9084 72
3078768

107	756	88

231)11083	3,5648(47,9	
924		
1040		
1843	A	
1017	Answer 48 gai.	near
2205	•	• •
2079		
1866		

čс.

The contents of a spheroid may be found by multiplying the square of the shortest diameter by the longest diameter, and dividing by 538 for beer gallons, and by 441 for wine gallons.

Ex. If a spheroid, in its shortest diameter, be 74 inches, and the longest 125 inches, what are its contents in beer and wine gallons?

Digitized by Google

74 74 296 518 5476 the square of the shortest diameter. 125 the longest diameter.

27380

65712

538)684500(1272 536 gallons of beer. 441(684500(1552 536 gallons of wine.

To

y٠

198 THE YOUNG MAN'S BEST COMPANION.

To find the contents of a frustrum of a spheroid, take twice the square of the bung diameter, and once the square of the head, and multiply the same by the length. Then for beer, divide by 1077, and for wine gallons, divide by 882.

Ex. In a cask whose bung diameter is 23 inches, head diameter 21 inches, and length 27 inches, what are the contents in beer and wine gallons?

23	21 /
23	21
529 sq. bung diam.	441 sq. head diam.
2	-
1058.	
441	
•	
1499	
27 length	
882)40473(45 2 3	1077)40473(37 -614
3528	3231
5193	8163
- 4410	7539
• • • • • • • • • • • • • • • • • • •	
783	624
	

Answ. 46 wine gallons nearly, and something more than $37\frac{1}{2}$ beer gallons.

The Extractions of the Square and Cube Root, of great Use in Measuring, Gauging, &c.

Of the Square Root.

1st. A square number arises from the multiplication of a number into itself, the number so multiplied bring called the root; thus 4 multiplied by 4 produces 16, for 16 is a square number, and 4 is the root thereof; so also 4 is the square of 2, for twice 2 is 4, and 9 is the root of 81, for 9 times 9 is 81, &c.

2dly. To extract the square root of any number is to find another number, which multiplied into itself, produces the

number

ł





Digitized by Google

18

number given: and after the root is found, such a multiylication is a proof of the work.

3dly. Square numbers are either single or compound.

4thly. All the single square numbers, with their respective roots, are contained in the following tables, viz.

Roots	1	2	3	4	5	1.0	1.7	18	9
Squares	1	4	9	16	25	36	49	64	81

5thly. When the square foot of any number less than 100is required, and that number is not expressed in the foregoing table, then take the root of that square number in the table which is the least nearest to the given number. Thus, if the square root of 50 be required, then as 49 is the nearest square number in the table, its root, 7, will be the root of the given number, nearly.

6thly. A compound square number is that which is produced by a number consisting of more places than 1, nultiplied by itself, and is never less than 100; so 729 is a compound square number, produced by the multiplying 27 into itself, and 961 is the square of 31.

7thly. The root of any number under 100 may be easily known by the foregoing table of single squares; but to extract the root of a compound number of several places, observe the following directions:

Ex. To find the square root of the number 45796.

1. Set a point over the place of the units thus, 45796, and so successively over every second figure towards the left hand, as thus 45796; and thus, 45796. But in decimals you must point from the place of units towards the . right hand, omitting one place, as above : and if the places of decimals are odd, put a cipher toward the right hand of them to make them even. The number thus prepared, draw a crooked line on the right of the number, as in division; (and, indeed, the operation of the square root is not much unlike division, only there the divisor is fixed, but in the square root we are to find a new divisor for each operation.) Having made a crooked line thus, 45796 (, seek in the foregoing table for the nearest square to the first point on the left hand, which here is 4, the root of which is 2, which 1001 K 4.

200 THE TOUNG MAN'S BEST CO	OMPANION.
root place on the right hand of the croo square 4 under the said point as under.	ked line, and set its 45796 (2
	4
	(0)
Then subtract it, and 0 remains. To the down the next point 57, thus:	45796 (2
	A
Which call the resolvend, then doub first point, and place it on the left han thus:	le the root of the d of the resolvend,
	45795 (2
	4
4) Call the'4 the double of the root 2, thu hand of the crooked line, the divisor, an the divisor, can be taken in 5, the first yend 57 (for you are to omit the last right hand) which here is once, place 1 root 2, and also to the right of the divis	s placed on the left d seek how often 4, figure of the resol- figure towards the to the right of the or 4, thus:
• • •	·. ·
45796 (4	2
· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
41) 057 Then multiply the divisor (now 41) by th in the root, viz. 1, place it under the r tract it therefrom.	ne figure last placed resolvend, and sub-
45796 (4	21
41)057 41	
16	
Then bring down the next point, viz. 96 the right of the remainder 16, for a new	, and place it on resolvend, or divi- dend :

inni

EXTRACTION OF ROOTS.

dend: next double the quotient, or part of the root, riz. 21, and place it for a new divisor to the new resolvend 1696, thus:



Then try how often 42 be in 169, (still reserving or omitting the unit figure of the resolvend or dividend as aforesaid) and it will be found 4 times, which 4 place in the quotient and in the divisor; and proceeding as before, the work will appear thus:

45796 (214 root. 4

41)057 resolvend. 41

424) 1696 resolvend. 1696 product.

(6) In this last operation 4 is placed in the root, and likewise in the divisor 42, which makes the new divisor 424, to the resolvend 1696; this divisor multiplied by 4, the figure placed in the root, produces 1696; equal with the dividend or resolvend aforesaid, as in the operation. Therefore the square root of 45796, is 214; for 214 multiplied into itself, produces 45796, the number whose square root was sought.

Example 2.

9

What is the square root of 12299049 (3507 the root.

1st divisor 65) 329 resolvend. 325 product.

2d divisor 700) 490 resolvend. K 5

Digitized by Google

Heré

Here it is evident 49 cannot be divided by 70, of course put down an 0 in the divisor, and also in the root, and bring down the next point.

3d divisor 7007) 49049 resolvend. 49049 product.



When the divisor cannot be had in the resolvend, then place a cipher in the quotient, and also on the right of the divisor, bringing down the next square, &c. as in the second example.

If any remainder happen after extraction, proceed by annexing pairs of ciphers to the right of the given number, and thus come to what exactness you please.

Such numbers given for extraction that leave remainders, are by some called *Irrationals*, because their roots cannot be exactly discovered, but still there will something remain, though you work by whole numbers or fractions: As in the example above, where the remainder is 2799: for here you may proceed for ever and not come to an exact root, because no figure multiplied into itself will give 0.

The Extraction of the Cube Root.

TO extract the Cube Root of any number, is to find another Mother number, which multiplied by itself, and that product by the number found, produces the number given for extraction.

All single cube numbers, with their respective roots, are contained in the following table :

Roots.	1	1	2	1	3	Ī	4	1	5	16	17	T	8	9
Square.	1	1	4	T	9	I	16	1 9	25	1 36	49	1	64	81
Cube.	1	Ι	8	١	27	T	64	11	25	1216	343	15	12	729

1st. To prepare any number for extraction, make a point over unity, and so successively over every third figure towards the left hand in integers, missing two between each point; but in decimals point from the place of units to the right hand, &c.

Ex.-Extract the cube root of 46656, prepared as above directed :

thus 46656

Mere are but two points, therefore the root will have but two places.

2*dly*, The number being prepared, find in the foregoing fable the nearest root to the first point or period 46, which you will find to be 3, which place in the quotient thus, 46656(3); the cube whereof is 27, which place under your first period 46, as in the margin; subtract it from 46, and there remains 19; this is your first work, 46656(3)and no more to be repeated. Then to the re- 27 mainder 19, bring down the next period, viz. 656 (which is the last) and place it on the right of the 10 remainder 19.

> 46656(3 27 19656 resolvend.

Then draw a line under the resolvend; next square the 3 placed in the quotient, which makes 9; which multiplied K6 by

203

:

by 300, makes 2700 for a divisor, which place accordingly, thus :



Then try how often 2 may be found in 19, which is only 6 times, because of the increase that comes from the quotient, and place 6 in the quotient: then multiply the divisor by 6, and the product will be 16200; which place orderly under the resolvend thus:

27 27 2700) 19656

16200

Then proceed to find the increase coming from the quotient thus ϵ square your last figure 6, and it makes 96; which multiplied by three, the other figure of the quotient, gives 108; which multiplied by 30, makes 3240. This place, also, orderly under the last number set down, $\tau/2$. 10200, and the work will appear thus:

a se contras	46656(36	з т _л .	• • •	÷	e k
	27		1	: *	<u>.</u>
2700)	19656 [°] 16200 [°]	na satan Milanasa	بار د بر د	.n	:
بر د کار (زیر پی زیر در	3240	·		• .• • •	•

Then cube the figure last placed in the quotient, viz. 6, and it makes 216; which place orderly likewise under the line 3240; and the three lines together, and they make 19656; which is equal to the resolvend above, viz. 19656, and there being no more periods to bring down, the work is finished, and the cube root of 46656 will be found to be 36. A show the state of the root 36 be multiline the solution of the root 36 be multiplied

EXTRACTION OF ROOTS.

plied by 36, and that product again by 36, for then the result will be 46656 as under.

36 35	
216 108	
1296 36	•
7776 3888	•

46656 proof.

Having separated the given number into periods, and from the first period subtracted the greatest cube it contains, put the root as the quotient, and to the remainder bring down the next period for a dividend.

Find a divisor by multiplying the square of the root by 300; try how often it is contained in the dividend, the answer is the next figure in the root.

Multiply the divisor by the last figure in the root. Multiply all the figures in the root by 30, except the last, and the product by the square of the last. Cube the last figure in the root. Add these three last found numbers together, and substract their sum from the dividend : to the remainder bring down the next period, proceeding as before. To Extract the Cube root of 52313624,

3	52313623 (374 root.
4 3	27
9	25313
•1.5 300.	23653,
270 0	1660624
7	1660624
18900 6	 A state of the sta
² 5 1 23653	37 × 37 × 300=410700 divisor

205

206 THE YOUNG MAN'S BEST COMPANION.



Let the Reader try his skill by answering the following questions :

What is the Cube Root of 389017?--Ans. 73. What is the Cube Root of 5735339?--Ans. 179. What is the Cube Root of 3246759? What is the Cube Root of 84604519?

Uses of the Square and Cube Roots.

1. To find a Mean Proportional between two Numbers.

Rule.—The square root of the product of the given numbers, is the mean proportional sought: so the mean proportional between 16 and 64, will be 32, for 16 multiplied by 64 produces 1624, and the square of 32 is also 1024. This is the use in finding the side of a square equal to any parallelogram, rhomb, rhomboid, triangle, or regular polygon.

2. To find the Side of a Square equal to the area of a given. Superficies.

Rule.—The square root of the contents of any given superficies is the side of the square. So if the content of a given circle be 160, the side of the square equal will be 12,649, &c.

5. The Area of a Circle being E^tren, to find the Diameter.. See Page 189.

6. The Area of a Circle being given, to find the Circumference. — See Page 183.

Any two sides of a Right-angled Triangle being given, to find the Third Side.

This depends upon a mathematical proposition, in which it is proved that the square of the hypothemuse, or longest side of a right-angled triangle, is equal to the sum of the squares squares of the base and perpendicular, that is, of the other two sides.

1. Let the base or ground B A fig. 13, represent the breadth of a most or ditch, and the perpendicular, B C the heighth of a castle, tower, or wall; and the hypothenuse A C the length of a scaling ladder.

In this figure the base AB is supposed to contain 40 yards; and the perpendicular, or height of the tower, or wall, 30 yards; what length will the hypothenuse AC, or scaling ladder be?

Rule.—The square root of the sum of the squares of the base and perpendicular is the length of the hypothenuse, thus:

1600 the square of the base 40.

(0)

(0)

900 the square of the perpendicular 30.

The sum 2500 (50 yards the root or length of the scaling 25 ladder.

2. If the length of the base or breadth of the ditch were required, then the square root of the difference of the squares of the hypothenuse and perpendicular is the length of the base, or breadth of the ditch or most, thus:

2500 the square of the hypothenuse AC.

900 the square of the perpendicular BC.

The differ. 1600 (40 Yards, the root or breadth of the 16 ditch.

3. If the height of the tower or perpendicular BC were required, then the square root of the difference of the quares of the hypo'h nuse and base is the height of the perpendicular BC, thus:

2500 1600		900 (30 Yards. 9
-		
900		
	•	7. Any

7. Any number of men being given to be formed into a square battalion, to find the number of rank and file.

Rule.—The square root of the number of men given, will be the number of men to be placed in rank and file.

Example.—If an army of 32400 men be formed into a square battalion, the square root of 32400 will be found to be 180, and so many men must be placed in rank and file.

8. To find the Side of a Squarc, Polygon, or the Diameter of a Circle, which shall be to any other given Square, similar Polygon, or Circle, in a given proportion.

Rule.—Since similar surfaces are to each other in a duplicate proportion of their like sides, therefore,

'As the given circle, square, or polygon,

Is to the required circle, square, or polygon; .

So is the square of the diameter, or side of the first, To the square of the diameter, or side of the second.

Then the square root of the result of the above proportion will be the diameter or side required.

Ex. 1.—In a circle, whose diameter is 11, what will the diameter of that circle be whose area is four times the area, thereof t

Here 11 times 11 is 121 : and	1
As 14	
	4-
v lav i vi i goto j	
•	484 (22 the Answer. 4
	42) 84
	84

Ex. 2.—In two similar polygons, whose areas are as 9 to 25, and the side of the smaller is 12 yards, what is the side of the larger?

. . Ilere

Digitized by Google

EXTRACTION OF ROOTS.

-	Here 12 times 12 is 144; and
	As 9
	720
	288
	the second s
	9) 3600
•	
	400 (20 the answer: *
	4

000

9. The uses of the Cube Root are to find the Dimensions of similar Solids, as Globes, Cylinders, Cubes, Sc.

Rute. —Since similar solids are to each other as the cubes of the like sides or diameters; therefore,

As the content or weight of a given solid, Is to the content or weight of another like solid; So is the cube of the side, or diameter, of the one,

To the cube of the side, or diameter, of the other.

Then the cube root of the result will be the length of the side or diameter required.

T Er. 1.-If a ball weighs 72lbs. and is 8. inches in diameter, what will be the diameter of a ball that weighs 9lbs.?

-	As 72-		-9
;			9
••			432
i	1.1.1	,	وسيبينه الم
		·	288
	. ,	•	288

Here the cube of 8 is 512; and

Then the cube root of 64, riz. 4 is the diameter required. Ex. 2.—If a ship of 100 tons be 44 fect long at the kccl, of what length must the kcel of a ship be that carries 220 tons?

Say, as 100 is to 220, so is the cube of 44, viz. 85184, to 187404.8; whose cube root is 57,226, the length of the keel sought.

, Et. 3.- A cubical vessel has its side 12 inches, and it is required

THE YOUNG MAN'S BEST COMPANION. 210

required to find the side of a vessel that holds three times asmuch. Here the cube of 12 is 1728, which

multiplied by ----

the cube root of which is 17,306 the Answer required, or side sought.

An easy Rule to find the Length of the Mast of a Ship.

The mast always bears a certain proportion to the breadth of the ship; whatever be the breadth of the vessel, multiply it by 12, and divide the product by 5, which gives the length of the main mast. Thus a ship 30 feet broad, in the widest part, will have a mast 72 feet long. And a ship 40 feet broad, will have a mast 96 feet high, for 47=12× 480, and 480 divided by 5, gives 96. To find the Thickness of Masts.

The thickness of masts is estimated by allowing one inch for every three feet in length ; accordingly, a mast 72 feet long, muss be 24 inches in diameter.

SOME USEFUL GEOMETRICAL PROBLEMS.

At a given Paint near the middle of a Right Line, to Erect a Perpendicular.

Let CD (fig. 14.) be the line given ; to have a perpendicular erect it from the point B, with the compasses (opened at a convenient distance) place one foot at the foot B, and with the other make the two marks E and F, on each side of B, and at equal distances from it; then, with the same, or at any other distance in the compasses, set one point on E, and with the other describe the arch G G; which being done, without altering the compasses, set one point at F, and with the other describe the arc HH, crossing the former at the point A; through which intersection, with a ruler draw a line from A to B, which will be perpendicular to the line CD.

To raise a Perpendicular at or near the end of a Line.

This is effected several ways; but I shall instance only two, which are very easy.

1st.

1st: Suppose the line AB (fig. 15.) be given to raise a perpendicular near the end, A.

First open your compasses to a convenient distance, and set one foot on the point A; and with the other describe the arc FED; then with one foot of the compasses in D, (they being kept to the same distance) cross the arc in E, and then setting one foot in E, with the other make the arc AFG, crossing the first arc in F. Again set one foot in F, and with the other describe the small arc HH, crossing the former in the point C; so the line AC being drawn, will be the perpendicular required.

2d. Let B be the given point on which to draw the perpendicular B1. Open the compasses to any convenient distance; and setting one foot on the point B, pitch down the other foot at random, as suppose K, then the foot resting in K, turn the other about till it cross the line AB in L; then draw the line KL, and continue the same beyond K, setting off the same distance KL, (at which the compasses already stand) from K to M, so a line drawn from B, through M will be the perpendicular required.

3. How to divide a Right Line into Two equal Parts.

Suppose the line AB (fig. 16.) be given to be divided into two equal parts. Take in the compasses any distance above half the length of AB, and setting one foot on the point A, with the other draw the arc FDE; then (with the compasses unaltered) set one foot in B, and with the other cross the former arc both above and below the line, in the points F and G, then a line drawn from F to G shall intersect, or cut the given line in II, and divide the line AB into equal parts, AH and DB.

A Line being given, how to draw another Line parallel thereto, at any distance required, or through any point assigned.

• Of parallel lines there are two sorts, vin. Straight or Circular. And all circles drawn on the same centre, whether greater or less one than the other, are said to be parallel or concentric, that is, having one common centre.

In this figure the circle ABCD (fig. 17.) is concentric or parallel to the circles EFGH, because both of them are drawn from the same centre. The line AC is the diameter of

2

1

of the greater circle, and the line EG of the lesser circle. And all right lines drawn from the centre to either of the circumferences, are equal with respect to their periphery; and such lines are called half diameters, and sometimes the radius of the circle, and will divide the circle into six equal parts, each containing 60 degrees, and the whole circle 360; into which all the great circles of the sphere are supposed to be divided.

Of Parallel Right Lines.

Right-lined parallels are lines drawn on a plane of equal length and distance; and though infinitely extended will never meet, and in all parts retain an equal distance as underneath.

r de



To draw a Right Line parallel to another Right Line at a Distance given.

Take in your compasses the given distance GH (fig. 18.) then setting one foot in E, draw the arc IK; then moving to F, describe the arc LM; then laying a ruler on the top of the two arcs, just touching them, draw the line NO which will be parallel to the given line EF.

5. Through any three Points (not in a straight line) to describe a Circle.

Let the points given be AB and C, (fig. 19.) through which it is required that a circle be drawn. First, set one foot of the compasses in one of the given points, as suppose in A^m and extend the other foot to B, another of the points, and draw the arc of a circle GFD; then (the compasses not altered) set one foot in B, and with the other cross the said arc with two small arcs, in the points D and E; and draw the line DE. Thirdly, set one foot in C (the compasses being at the same distance) and with the other foot cross the first arc GFD in the points F and G, and draw the line FG, crossing the line DE in the point O, which is the centre sought for; in which, place one foot of the compasses, and describe the circle at the distance OA, and it will pass through all the given points AB and C.

Another

Digitized by Google

Another method.—Join the three points, and bisect any two sides of the triangle, and on the points of bisection erect perpendiculars crossing each other, and the point of intersection is the centre of the circle sought.

How to make the Line of Chords Geometrically to any assigned Length or Radaus.

As in the art of dialling, frequent use is made of the line of chords, it is proper here to show the making thereof.

A line of chords is 90 degrees of the arc of a circle transferred from the limb of the circle, to a straight line; now every circle, whether great or small, is divided (or supposed to be divided) into 360 equal parts, called degrees; so the semi-circle contains 180; the quadrant, or quarter, 90, and the radius, or semi-diameter, (which is that line with which the circle or semi-circle is drawn or described) is always equal to 60 degrees of that circle which it describes, and therefore 60 degrees of a line.

To make the Line of Chords.

First draw a line to any length, CBD (fig. 20.) and on the middle thereof, erect the perpendicular AB; next open your compasses to the radius or length that you would have your line of chords be, which admit AB, and with that, distance on B as the centre, describe or draw the semicircle CAD, which is divided into two equal parts or quadrants by the perpendicular line AB; thirdly, divide the arc or quadrant AD into 9 equal parts, each of which will be 10 degrees, according as the numbers are seen and set, apart to them. The quad: ant AD, being thus divided into parts of 10 degrees each, set one, foot of the compasses in D, and open the foot to 90, and describe the arc 90 A, touching the line CD, in A, so is the point A upon the right line CD, the chord of 98 degrees. Open the compasses from D to 30 degrees, and describe the aic 80 b; so shall the point b be the chord of 80 deg. Open the compasses from D to 70, describe the arc 70 c, c the chord of 70 degrees, and so of the rest, and then you will have the line DA, divided into 9 unequal parts, 'called chords, as in fig. 20, and if the quadrant be large enough, each of the parts ; may be subdivided into ten others, in the same manner, and then you have the chords for 90 degrees.

Thus

214 . THE YOUNG MAN'S BEST COMPANION.

Thus much for the line of chords frequently made use of in dialling, where there is not the conveniency of having a mathematical instrument maker near at hand.

Note.—A degree is the 360th part of the Globe, or of any circle; and each degree is supposed to be divided into 60 parts, called minutes; so that 45 minutes is three quarters of a degree, and 30 minutes kalf a degree, and 15 minutes one quarter of a degree.

INSTRUMENTAL ARITHMETIC.

As all problems or questions in measurement, &c. are solved or answered arithmetically by the pen, so are they instrumentally taken by compasses, from certain lines, &c. or rules made for that purpose, for the help of those that are deficient in arithmetic, or for a quicker dispatch of business; and such performances are called *Instrumental Arithmetic*; and of these instruments, the most in use are the three following: 1. The carpenter's plain rule: 2. Guater's line: 3, Coggeshall's sliding rule.

Description and Use of the Carpenter's Plain Rule.

This rule is made use of in measuring boards and timber, being two feet in length, and divided into twenty-four parts or inches, and every one of those parts or inches subdivided into half inches, and each of these halves into quarters, and each quarter into two parts; so that every inch is divided into eight parts, and the whole length into 192 parts.

As this rule is well known, it is not necessary to represent it; but, however, for the better understanding it, I shall give one thus :

Under board measure thus described.

1	2	3	14	13	10	1	7	
12	6	14	3	18	2-			
0	Ø	0	10	10	0			ł

This

Digitized by Google

INSTRUMERTAL ARITHMETIC. This line begins at 6, and goes on to 36, within 4 inches

of the rule on the right hand. Its use as follows : Fret. In Pts. In. dp. 12 0 1 2 3 4 5 (f) 0 6 0 0 4 0 0 in length make 3 0 0 a foot square. 2 4 5 O(in length make If a board be

By this table it will be easily understood that a board of 4 inches requires 3 feet in length to make a foot square, and a piece of 3 inches broad will require 4 feet in length to make a foot square, &c.

At the other end of the rule is a table called Under-Timber Measure; and described thus :

1	2	3	4	5	16	17	8	1
144	36	16	9	5	4	2	2	
0	0	0	0	9	0	111	3	1

This line begins at 81, going on by divisions to 36. In Souare Fret

			•	
	1	144,	Ο,	
	2	36,	Ū	
	1 .	16,	0	
In a piece of	34	9,	0	In length make a
timber of	15	5,	9	solid foot.
	6	4,	0	
	17	2,	11	· ·
	8	2,	13 '	

So that if a piece of timber be 6 inches square, 4 feet in. length of such piece will make a solid foot. . . .

It is a common method with carpenters to add the breadth and thickness of a piece of timber in inches together, and call the half thereof the side of the square of that piece; but this method gives the contents more than it is; and the greater the difference the larger the error. But the true square may be found in Gunter's Line, thus : place one point of the compasses upon the line at the thickness, and the other at the breadth; then half of that extent will reach. from either the breadth or thickness, to the side of the true square in inches.

2. Gunter's

215

THE YOUNG MAN'S BEST COMPANION.

246.

2. Gunter's Line.

This line is commonly set on the carpenter's plain rule, and consists of two lines numbered 1, 2, 3, &c. one set at the end of the other, and it is somewhat of the following form:

Gunter's Lin	ie.	ř.	ed ters for	۲
	To prove the line by th that the	e comp	asses, observ	e
191	Distance {1 to 2 is equ from 5 to 10 the di 4 to 8 from:	ial to istance -	2 to 4 4 to 8 3 to 6	• •
4	To Number on Gu	inter's L	ine.	•
	Observe, that the figures	1, 2, 3,	4, 5, 6, 7, 8	3,
	at other times, 10, 20, 30,	40, &c	Again, a	i.
8	other times 100, 200, 300,	or 1000	, &.	Ĵ
	To find a Number on the 1	ine, as.	uppose 134.	;
	I for the figure 1, account for 3, take 3 of the largest	i t 1-on division	the-line;-and is: and for a	d 1
68 t	take 4 of the smaller divis	ions, at	d that is th	e
9	point: Again, to find 750 take 7 on th o r line. for 50	0 on th take b	e line, for 7 of the grea	7 .t
S and	divisions, and that is the poi	nt.	0	-
T	To find a small Number on 12.	the Lin	e; as silppos	è
60	For 10, take 1, as before	, andifo	r 2 take 2 0	f
	In measuring boards, o	is the p r timbe	oint. r it is best t	э
67 E b	ave a line of 2 feet long,	and, com	passes I foo	t
	ong. (1 1 1	р 19. 1 . Эврания	
H H				;

Note.—Let the measurement be by the inch. foot, yard, pole, rod, &c. it is best to have it decimally divided, or so supposed, that is, into 10th parts.

Note also, That if one point of the compasses reach beyond the line in the work, remove the other point to the same figure or place on the other line.

· Multi-*

Multiplication by Gunter's Line.

To multiply 5 by 7, set one foot of the compasses on it in the left-hand line, and extend the other to 5 upwards, or toward the right hand, and with the same extent place one foot in 7, and the other foot will fall on 35 in the righthand line, which is the answer.

Division in Gunter's Line.

Example 1. Divide 63 by 3; extend from 3 to 8 down wards, or towards the left hand, and the extent will reach the same way from 63 to 21 the quotient.

N. B. In multiplying you must always extend upwards, that is, from 1, to 2, 3, 4, &cc. and on the contrary, in dioiding extend downwards.

Example 2. Divide 2881. equally among 16 men: extend from 16 to J downwards; and that extent will reach the same way, from 2881. to 181. for each man.

Again;

Example. Suppose 750l. were to be divided among 25 men, extend from 25 to 1 downwards; and that extent will reach the same way, from 750l. to 30l. each man's share.

BULE OF THREE DIRECT.

Example 1. If 5 bushels of barley cost 11 shillings, what will 10 bushels cost? Extend from 5 to 11 upwards; and that extent will reach the same way, from 40 to 88, the shillings required.

Example 2: If three ells of Holland cost 10s. 6d. what will 40 ells cost : extend from S to 101 upwards, and that extent the same way will reach from 40 to 140s. the answer.

The Use in Board Measure.

Example. If a board be 9 inches broad, and 19 feet long, what are the contents in superficial square feet ? extend from 12 (the centre of foot measure) to 9 downwards, and that extent the same way will reach from 89 to 14 and 4.

L

In Timber-Measure.

Example. In a piece of timber 24 inches square, and 8 feet long, what are the contents in solid feet? extend from 12 the centre, to 24 upwards, and that extent twice the same way will reach from 8 to 32 feet the contents.

Brick-Work.

How many rods of work are there in 4085 feet?—Extend from 272 downwards to 2, and that extent the same way from 4085 will reach 15 rods, the answer.

3. Description of Coggershall's Sliding-Rule.

This rule is framed 3 ways; sliding by one another as the glazier's rule; sliding on one side of a two-feet joint-rule; and one part sliding on the other, in a foot of length; the back part being flat, on which are sundry lines and scales.

Upon the aforesaid sliding side of the rule are four lines of numbers, three are double lines, and one a single line of numbers, marked with $A \ B \ C$ and D, the three marked AB and C are called double lines of numbers, and figured 1, 2, 3, 4, 5, 6, 7, 8, 9. Then 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, at the end. That marked D is the single line of numbers, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, and at the end 40, even with and under 10, in the double line next to it; and that is called the Girt-line, and so marked in the figure.

The figures on the three double lines of numbers may be increased or decreased at pleasure; thus 1 at the beginning may be called 10, 100, or 1000; and 2 is 20, 200, or 2000; so that when 1 at the beginning is 10, then 1 in the middle is 100, and 10 at the end is 1000; but if 1 at the beginning is accounted for 1, then 1 in the middle is 10, and 10 at the end is 100.

And as the figures are altered, so must the strokes or divisions between them be altered in their value, according to the number of the parts they are divided into; as thus, from 1 to 2, it is divided into 10 parts, and each tenth is divided into 5 parts; and from 2 to 3 it is divided into 10 parts, and each tenth into 2 parts, and so on from 3 to 5; then from 5 to 6 it is divided into 10 parts only; and so on unto 1 in the middle of the rule, or the end of the first part of the double line of numbers. The second part of the double line is divided like the first.

The

The Girt-line marked D is divided from 4 to 5 into 10 parts, and each 10th into 2 parts, and so on from 5 to 10; and then from 10 to 20 it is divided into 10 parts, and each tenth into 4 parts; and so on all the way from 20 to 40 at the end, which is right against 10 at the end of the double line of numbers.

The lines on the back-side of this rule that slide on one side, are these, viz. a line of the inch-measure from 1 to 12, each divided into halves, quarters, and half-quarters: another line of inch-measure from 1 to 12, each divided into 12 equal parts, and a line of foot-measure, being 1 foot divided into 100 equal parts, and figured 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100, even with 12 on inch-measure.

And the back-side of the sliding-piece is divided into inches, halves, quarters, and half-quarters, and figured from 12 to 24, so that it may be slid out to 2 feet to measure the length of a tree, or any thing else you have occasion to measure.

Example of the Use of the Double Scale.

Suppose there is a geometrical square, whose sides are 3 feet $\frac{1}{2}$ each: set one foot on the line *B*, to $3\frac{1}{2}$ on the line *A*; and then against $3\frac{1}{4}$ on the line *B* is 12 feet $\frac{1}{4}$ on the line *A* which are the contents of such a square.



Suppose the side of a rhomb be 8 feet 6 inches $\frac{1}{4}$, and the breadth of the line $A B \otimes F$. $4\frac{1}{4}$, what are the contents? Set one foot on the line B to 8 feet $\frac{5}{7}\frac{5}{25}$ on the line A, then again 8 feet $\frac{5}{7}\frac{5}{25}$ on the line B, is 71 feet $\frac{5}{7}\frac{5}{25}$ parts of a foot on the line A, and to know the value of the decimal, or part of the foot, look for $\frac{1}{7}\frac{5}{25}$ on the rule, and you will find against it 4 inches $\frac{1}{4}$, so that the contents of this rhomb are 71 feet, 4 inches $\frac{1}{4}$.

L 2

219

.1

Again, suppose the length of a Rhomboid to be 14 feet $\frac{S}{4}$ or $17 \frac{23}{109}$ and the breadth 8 ft. 7 or $8 \frac{15}{166}$ what are the contents? Set one foot on the line B to 17, 25 on the line A, then against 8, 58 on the line B, is 148 feet on the line A. The figure has been represented before, and worked arithmetically, therefore it is here unnecessary.

Let the base of a triangle be 4 feet 1 inch $\frac{1}{4}$ and the perpendicular 2 feet $1\frac{3}{4}$; the half of the one, in 2 feet 7 parts; and of the other 1 foot 7 parts. Set one on the line *B*, to 4, 15 on the line *A*; then against 1, 07 half the perpendicular on the line *B*, is 4 feet and almost $\frac{1}{4}$ a foot for the contents. Or, if you set 1 on the line *B* to 1, 07 on the line *A*, against 4, 15 on the line *B*, is 4, and almost $\frac{1}{4}$ foot on the line *A*.

Again, another way. If you set one on the line B to 4, \checkmark 1 on the line A, then against 2, 25 on the line B is 8 feet feet $\frac{1}{16}$ (which is about 11 inches,) on the line A, the half whereof in 4 feet 5 inches $\frac{1}{2}$, which are the contents of the triangle.

Of GEOGRAPHY.

GEOGRAPHY is the art of describing the surface of the earth, the constituent parts of which are land and sea.

Many arguments may be produced to prove that the earth and seas are of a spherical or globular figure; one of them may be sufficient in this place, viz. that ships in sailing from high capes or head-lands, lose sight of the lower parts first; and continue gradually also to lose sight of those which are situate higher and higher, till at last the top disappears, which could not be unless the surface of the sea were convex; now this convexity of the sea is found to be uniform in all parts thereof, therefore the surface of the waters is spherical, which being granted, that of the land must be nearly so, because its extremity sets limits to the waters.

The whole body of the earth and seas is therefore called the Terraqueous Globe.

Since, as has been before observed, all circles are divided into

into 360 degrees, therefore any great circle surrounding the terraqueous globe is usually so divided. Our ingenious countryman, Mr. Richard Norwood, about the year 1635, by an accurate measurement of the distance between London and Yerk, found that a degree of a great circle was about 69½ statute miles in length, and consequently that the circumference of the terraqueous globe was 25,020 miles; whence its diameter will be 7964 miles.

The sca covers the greater part of the terraqueous globe, out of which the land rises with very slow accents, the height of the loftiest mountains being Chimboraco in South America, and this is not quite four miles perpendicular above the surface of the sca.

Geographers have found it necessary to imagine certain circles to be drawn on the surface of the carth, for the better determination of the positions of places thereon.

These are either greater or lesser circles; great circles divide the globe into two equal parts, the lesser circles divide it into two unequal parts.

There are six kinds of great circles; two of them, vis. the Equator, or Equinoctial, and the Ecliptic, are fixed; but the others, viz. the Meridians, the circles of Longitude, the Horizons, and the Vertical circles, are variable, according to the part of the globe they are appropriated to.

There are two points on the surface of the terraqueous globe, called the Poles of the Earth, which are diametrically opposite to each other; the one is called the North, and the other the South Pole.

The Equator is that great circle which is equally distant from both the above-mentioned poles, and is so called from its dividing the terraqueous globe into two equal parts, named from the poles which are situated in each, the northern and southern hemispheres. It is also called the Equinoctial, because when the sun enters it, the days and nights are of equal length in all parts of the globe. Seamen commonly call this circle the Line.

Meridians or Circles of Terrestrial Longitude, are supposed to be drawn perpendicular to the equator, and to pass through the poles: they are called Meridians, or Midday Circles, because when the sun comes to the meridian of any place it is noon, or mid-day, at that place,

Hence every particular place on the surface of the terraqueous globe hath its proper meridian, and consequently

L 3

a traveller who doth not directly approach to, or recede from one of the poles, is continually changing his meridian.

With respect to the two circles above described, every place upon the earth is said to have its particular latitude and longitude.

The latitude of any place upon earth is its distance from the equator, in a direct line towards one of the poles; and since the meridians proceed in such a direct line, therefore latitude is reckoned in degrees, and parts of degrees, on the meridians of the place.

The longitude of any place upon the carth is the cast or west distance of the meridian of that place, from some fixed meridian, at which longitude is supposed to begin. Now, flice all the meridians pass through the poles, they coincide¹ with one another at those points, and their greatest distance from each other will be when they are farthest from those points of coincidence, viz. at the equator; therefore, longitude is reckoned in degrees, and parts of a degree, of the equator.

Geographeis have differed very much in the meridian from whence they have assumed the beginning of longitude; the ancients chose the meridian of the Canaries, which they called the Fortunate Islands: others have pitched upon the Azores, or the Western Islands; but the most usual way is now to reckon longitude from the capital of that country in which an author writes, and accordingly the longitude is reckoned in this work from the meridian of London.

Parallels of latitude are small circles drawn parallel to the equator at any assigned distance therefrom; therefore every particular place on the surface of the terraqueous globe bath its proper parallel of latitude.

There are four of these parallels of latitude that are particularly remarkable, viz. the two tropics, and the two polar circles; but for the better explanation of those properties it will be necessary, first, to define the ecliptic.

The Ecliptic is that great circle in which the sun scems to perform its annual motion round the earth; this circle makes an angle with the equator of 23° 29'; it intersects it in two opposite points called the Equinoctial Points; and those two points in the ecliptic, which are farther from the equinoctial points, are called the Solstitial Points.

The tropic of cancer is a parallel of latitude 25[•] 29' distant from the equator in the northern hemisphere, passing through through the northern solstitial point of the ecliptic, as before described : And,

The tropic of Capricorn is a parallel of latitude, as far distant in the southern hemisphere, passing through the southern point.

The arctic polar circle is a parallel of latitude 23° 29' distant from the north pole; and the antarctic polar circle is a parallel of latitude as far distant from the south pole.

The tropics and polar circles divide the globe into five parts, called gones; that is to say, girdles or belts; one of them is called the torrid; two temperate; and two frigid.

The torrid zone, so called from the great heat of the sun, which passes directly over the heads of the inhabitants twice in a year, is situated between the two tropics, and is therefore about 47 degrees in breadth; the inhabitants are called Amphiscians; that is, such as have their shadows cast both ways, the sun being seen at noon sometimes to the north, and at other times to the south of them.

The northern temperate zone is situated between the tropic of Cancer, and the arctic polar circle; and the southern temperate zone between the tropic of Capricorn, and the antarctic polar circle; they are each of them about 43 degrees broad; the inhabitants are called Heteroscians, that is, such as have their shadow but one way; for at noon the shadows of the inhabitants of the northern temperate zone are always cast northward; and those of the inhabitants of the southern, southward.

The frigid zones contain all that space between the polar circles and the poles themselves; the northern frigid zone being surrounded by the arctic circle, and the southern by the antarctic. The inhabitants are called Periscians, because, when the sun is on the same side of the equator as those inhabitants are, their shadows are, in the space of 24 hours, cast of all sides, or quite round them. The sun does not set in the places within these zones during several successive revolutions or days in the summer; and in the winter he doth not rise for a like space of time. To the inhabitants of the poles, if there be any, the sun is visible for one half the year, and invisible for the other half.

If any place on the globe, except the poles and equator, be particularly considered, there will be three other places on the same meridian which have more immediately a relation thereto, viz. 1. That place which has the same lati-

L4

tude

tude on the other side of the equator. The inhabitants of this place are called Antiscii. They have mid-day and mid-night at the same time with those of the place assumed; but the seasons of the year are different, the summer of the one being the winter of the other.

2. That place which is on the same parallel of latitude, but is 180 degrees different in longitude. The inhabitants of this place are called Perisici. They have summer and winter at the same times with those of the place assumed; but the times of the day are different, the mid-day of the one being the mid-night of the other.

3. That place, which has the same latitude, on the other side of the equator, and is 180 degrees different in longitude. This place is diametrically opposite to the place assumed; its inhabitants are called Antipodes, and their seasons of the year, as well as times of the day, are totally opposite.

The horizon is that great circle which divides the upper or visible hemisphere of the world, from the lower or invisible, the eye of the spectator being always in the centre of the horizon. Hence every particular place on the terraqueous globe hath a different horizon; and consequently a traveller, proceeding in any direction, is continually changing his horizon.

The circle is, by mariners, divided into four quarters, containing 90 degrees: the four points quartering this circle are called cardinal points, and are named East, West, North, and South : the cast and west are those points on which the sun rises and sets when it is in the equinoctial ; and the north and south points are those which coincide with the meridian of the place, and are directed toward the north and south poles of the world.

Each quarter of the horizon is further divided into eight points, which are very necessary to the geographer for disinguishing the limits of countries: but the use of those divisions is much more considerable when applied to the mariner's compass.

Before the invention of this excellent and most useful instrument, it was usual, in long voyages, to sail by, or keep along the coast, or at least to have it in sight; as is manifest and plainly evident by the voyages of St. Paul, Acts xx. 13, and xxviiis 2, which made their voyages long, and very dangentue, by being so neas the shore. But now,

by

by the help of a needle, touched by the magnet or tond, state, which, by a wonderful and hidden quality, inclines its point always northerly, the mariner is directed in his proper course of sailing through the vast ocean, and unfathomable depths, to his intended port; and, if the wind is favourable, can sail more than 333 leagues, or 1000 miles, in a week, through the darkest weakers; or darkest nights, when neither land moon, nor stars are to be seen, which before were the only guides, and if not seen, the mariners were at a great loss, and exposed to the most imminent danger.

The following figure is a representation of the said Compass, with the cardinal and other points :

The Mariner's Compass.



The compass, of which the figure is given above; is a set presentation of the horizon on a circular piece of paper called a card, which card being properly fixed to a piece of steel called the needle, and placed so as to sum freely round a pin that supports it, will show the position of the meric L 5
dian, and other points; and consequently towards which of them the ship sails.

Note.— The letters NBE, NNE, NEBN, &c. are to be read north by east, north north east, north cast by north, &c. A climate is a space of the terraqueous globe contained between two such parallels of latitude, that the length of the longest day in the one exceeds that in the other by half an hour.

There are sixty climates, thirty to the north, and thirty to the south of the equator; twenty-four of each thirty being situate being the equator and the polar circle, differ in the length of their longest day by 24 hours; but in the remaining six, between the polar circles and poles, the differences of the lengths of the longest day are each a month. A Table of the Climates between the Equator and the Polar

A Table of the Climates between the Equator and the Polar Circles.

Climate. Longest Begins			Ends		Breadth.		
	Da	y. Latiti	ıde.	Lat	itude.		
1	124 E	Ío. ()°	0'	80	34'	-80	34'
2	13	8	34	16	43	8	09
3	131	16	43	24	11	7	28
4	14	24	11	34	45.	6	` 34
5	' 14 <u>1</u>	-30	45	36	30	5	`45
6:	15	36	30	41	22	4.	52
7	153	41	22 .	41	31	4	09
8 .	16	45	.31	49	01	3	30
9	16]	.49	01	51	58	2	57
10	17	51	58	54	29	2	31
31	173	54	29	56	37	2	08
12	18	56	37	58	26	1	-49
13	. 181	58	26	59	· 59	1	33
14	19	59	59	61	18	1.	19
15	191	61	18	62	25	1	07
16	20 .	62	25	63	21	0	48
17	20 1	<u>> 63 – </u>	21	64	09	0	48
18	21	64	09	64	49	0	40
19	21	64	49	65	29	0	32
10 -	22	·· 65	21	65	45	0	24
91	223	65	45	66	06	0	21 -
22	28	-66	06	66	20	0,	14
\$3	231	66	20	66	28	0	08
\$4	924 9	. 66	28	66	- 31	. 0	03.

Climate. Longest Begins Day. Latitude.			Ends Latitude.		Breadth.			
25		1 Mo.	.66°	31'	67°	21'	80	50
26	-	2.	67	21	69	48	2	27
27		3	69	48	73	37	3	4 <u>9</u>
28		4	73	37	78	30	4	53
29	, i	5	78	30	84.	05	5	35
30	:	9 [·]	84	05	90 .	90	5	5 5

A Table of the Climates between the Polar Circles and the Poles.

The terraqueous globe, or globe of the earth and water, is divided by nature into continents, islands, peninsulas, isthmusses, mountains, promontories or capes, hills, and vallies, occans, seas, lakes, gulphs, or bays, streights, ports, or harbours, and rivers, rocks, shelves, banks, marshes, and bogs.

A continent, called sometimes the main-land, is a large tract of land, containing several contiguous countries, empires, kingdoms, or states.

An island is a piece of land wholly surrounded by the ocean, sea, or other water, and so divided from the continent.

A peninsula is a piece of land encompassed by water, except on one side, where it is joined to the continent or other land.

An isthmus is a neck, or narrow piece of land, that joins a peninsula to the continent.

A mountain is a part of the earth which is considerably higher, or more elevated, than other lands near it.

A promontory is a mountain running out into the sea, the extremity of which is called a cape or headland.

A hill is a smaller kind of mountain; and a valley is that land which is situate at the bottom of a mountain or hill, or between two or more hills or mountains.

The ocean is a vast body of salt water, which separates some of the continents, and washes their borders or shores.

A sea is a branch of the ocean flowing between some parts of the continents, or separating islands from them.

A lake is a body of water every where surrounded by the land.

· L6 · ·

- A gulph, or bay, is a part of the ocean or sea contained between two shores, and is encompassed by the land, except on one side, where it communicates with the other waters.

A strait is a narrow passage whereby seas, gulphs, and bays, communicate with the ocean, or with one another.

A port or harbour is a part of the ocean, or sea, so enclosed by the land that ships may ride in safety.

A river is a running water, descending m a narrow channel from the mountains, or high lands, and emptying itself into some ocean, son, lake, or other river.

Rocks are immense stany masses; shelves and banks are eminences consisting of stones, sand, or other matter, which obstructs the passages of ships at sea, and often prove fatal to those who do not keep clear of them.

Marshes are lands lying low, and liable to be overflowed by the sca or rivers; and bogs are mixtures of earth and water, over or through which it is dangerous to attempt a passage.

The known parts of the earth are commonly divided into four parts, viz. Europe, Asia, Africa, and America; the first three were known to the ancients, and are for that reason called the Old World; the fourth was discovered something more than 300 years since, and therefore called the New World.

The lands which he towards the north and south poles are very little known; that towards the north pole is called Terra Arctica, and that towards the south pole Terra Antarctica, or Terra Australis Incognita; the latter is supposed by some to be nearly as big as Europe, Asia, and Africa.

The ocean assumes different names in different parts of the earth; and the seas, gulphs, and bays are named mostly from the lands to which they adjoin; it is thought, therefore, most convenient in this short sketch to describe the land and waters together; and first.

Of Europe, with the Adjacent Waters.

Europe is bounded on the north by the northern or frosen ocean; on the west by the north Atlantic or western ocean, which separates it from America; on the south by the Mediterranean sea, separating it from Africa; and on the east by Asia, to which it joins, without any visible limit, towards wards the northern parts, but on the southern it is separated by various rivers, seas, &c.

The length of Europe₄ from Cape St. Vincent to the Uralian Mountains, is about 3,300 miles, and the breadth from Cape North in Lapland, to Cape Matapan in Greece, may be about 2,350 miles.

Europe contains the following empires, kingdoms, regions, or states, viz. Spain, Portugal, France, Italy, Turkey, Great Britain, the Netherlands, Germany, Hungary, Poland, Denmark, Sweden, and the Russian Empire.

Of Spain and Portugal.

Spain and Portugal are surrounded by the sea on three sides; on the south and south-east by the Mediterranean, which communicates with the western or Atlantic ocean, by the Straits of Gibraltar; on the west by the said ocean; and on the north by the same or a part thereof, called the Bay of Biscay; on the north-east by the Pyrenean mountains, which, reaching from the Mediterranean to the Bay of Biscay, separate it from France.

Portugal is now a kingdom separate from Spain, to which it was formerly subject. It is aitnate on the ocean, which washes it on the west and south ; it is hardly 300 miles in length from north to south, and about 100 in breadth. The capital city is Lisbon, which was, till lately, in a ruinous condition, having been almost totally destroyed by an earthquake, and a fire which succeeded it in November 1755.-The city of Oporto is also a place of great trade, particularly famous for its wine.

ć.

÷

Á

9

٩i

X

化四羟乙

;4)

Most of the provinces of Spain were all formerly separate kingdoms; such were Andalusia, in which Gibraltar is situated, as are the cities of Seville and Cadiz; Granada within the Straits, the principal city has the same name, and on the Mediterranean are situated the ports of Malaga and Almeria; Murcia, more eastward in the Mediterranean, in which, besides a city of the same name, is the city and port of Carthagena: Valencia, north-eastward of Murcia: this has a city and sea-port of the same name, and another port of great trade, called Alicant.

Spain is divided into fourteen districts, viz.

Asturia,	Leon,	Valencia,	Murcia.
Biscay,	Old Castile,	New Castile,	and
Navarre	Arragon,	Estramadura,	Granada.
Galicia,	Catalonia,	Andalusia,	· · ·

Digitized by Google

229

Its

Its chief towns are Madrid, the capital, Barcelona, Seville, Corunna, and Cadiz, sometimes called Cales.

The principal rivers are the Ebro, the Tagus, and the Douro, all of which have their rise in Spain.

On a promontory, in the south of Spain, stands Gibraltar, which has been in the possession of the English for a century, and is so defended by nature and art as to be considered impregnable. Not far from Spain are the Balearic Isles, called Majorca, Minorca, and Yvica.

Proceeding eastward along the Mediterranean sea is the kingdom of France, which is bounded on the east by Italy, Switzerland, and Germany, on the north by the English Channel, on the west by the Bay of Biscay, and on the south by the Pyrenees, which separate it from Spain, and a part of the Mediterranean sea.

France was anciently divided into provinces, but since the Revolution, it has, with the Netherlands and various other territories, acquired by the war, been divided into 120 departments, which are as follow :

Ancient	Departments.	Chief Towns.
Prov.	Basses-Alpes Bouche-du-	Digne. Aix.
Provence	⁴ Rhone, Var, Vauclus	Toulon, Avignon.
Dauphine	3 Hautes-Alpes, Drome, Ifere,	Gap, Valence, Grenoble,
Franche Comte Alsace	3 Doubs, Jura, Haute-Saone. 2 Bas Rhin, Haut Rhin.	Besancon, Lons-le Saunier, Vesoul. Colmar, Stras- bourg.
Lorraine	4 { Meuthe, Meuse, Moselle, Vosges	Nancy, Bas-sur- Ornain, Metz, Epinal.
Champagne	4 Ardennes, Aube, Marne, Haute- Marne.	Mezieres, Troyes, Chalon-sur Marne, Chaumont.
Les deux Flandre	2 Nord. Pas-de. Calais.	Douai, Arras.
Isle de Franc e	6 Seine, Oise, Seine, Seine et Oise, Somme, Seine et Marue.	Laon, Beauvais. Paris, Versailles, Amiens, Melan.

۰.

٠.

Ancient Prov.	Departments.	Chief: Towns.
Normandie	5 Calvados, Eure, Manche, Orne, Seine-Inferieure.	Caen, Évereux, Constances, Alen- con, Rouen
Bretagne	5 Finisterre, Isle, & Villaine, Loire- Inferieure, Mor- hjban.	St. Brieux, Quimper, Rennes, Nantes, Vannes.
Hant & Bas . Maine	Indre et Loire, Mayenne, Mayenne et Loire, Sarthe.	{ Tours, Leval, { Angers, Le Mans.
Poitqu	3 { Deux-Sevres, Vendee, Vienne.	S Niort, Fontenoy le Peuple, Poictiers
Orleannois	3 Loir et Cher, Loiret.	Chartres, Blois, Olreans.
Berri	2 Indre, Cher.	S Chateauroux,
Nivernois	1 Nievre.	Nevers.
Valromey	4 Yonne, Saone et Loire,	Bourg, Dijon, Auxerre, Macon.
Bourgogne	2 Loire, Rhone.	S Mantbrison,
Bourbonnois	1 Allier.	Moulins
Marche	3.) Correge, Creuse,	S Tulle, Gueret,
Angoumois	1 Charente.	Angouleme
Aunis	1 Charente-infe-	Saintes
Pingord	1 Dordogne.	Perigueux
Bordelois	4 Lot on Garonnes. Gers.	Bourdeaux, Mont- de Marsan, Agen, Auch.
Quercy	1 Lot	Cahors
Rouvergne	1 Aveyron	Rhodez
Bearn	1 Basses Pyrenes	Pau
Digorre	1 Hautes Pyrenees	Iarbe
Couserans	1 Arriege	Jarascon
nousinon 1	I ryrenees Oriental	rerpignan

232

		*
Ansient Prov.	Departments.	Chief Towns.
Languedoc	7 Ardche, Ande, 7 Gard, Haute, Garonne Heuart Lozere, Tarn.	Privas Carcassonne Nimøs, Toulouse, Montpelier, Mende, Castres.
Vel ay	Cantal, Haute- 3 Loire, Poy-le- Dome.	St. Fleur, Là Puy, Claremont
Corse	2 Gola, Liamone.	Baștia, Ajaccio
Savoy	8 Alpes Maritimes Leman	S Chambray, Nice, Geneva
Hainault, Austrian Flanders, Brabant, Liege	Dyle Escant, Fo- rets, Jemapes, Lys, Meuse Infe- rieure, Deux Ne- thes, Ourthe, Sambre et Meuse	Brussels, Gand, Luxembourg, Mons, Bruges, Mæstricht, Angers, Liegc, Namur.
Countries between the Meuse and Rhine, the Rhine and Moselle	4 Rhin et Moseile Mont-Tonnere	Aix-la-Chapelle, Treves, Coblents, Mayence.

102

Paris, the capital of France, is, next to London, the largest and most considerable city in Europe. It contains, at this time, immense collections of works of art, ancient and modern. The other principal towns of France are Lyons, Marseilles, Bourdeaux, and Lisle.

The principal mountains in France are the Alps, which anciently divided it from Italy, and the Pyrenecs, which divide it from Spain.

The principal rivers are the Rhone, the Garonne, the Loire, the Seine, and the Somme. The Rhine forms the boundary between France and Germany.

The canals in France are very numerous; the chief work of this kind is the canal of Languedoc, about one hundred and eighty miles in length.

Near

Digitized by Google

Near Toulon are the isles of Hyeres, which are the same as Homer's Isle of Calypso. On the western coast is the Isle of Oleron. The Isle of Rhe is opposite Rochelle. Bellisle has been repeatedly attacked by the English. The Isle of Ushant is the most westerly head-land in France.

Italy is divided from France on the west by part of the Alps; from Germany on the north, by the same mountains called the Alps, and is every where else surrounded by the Mediterranean Sca, and the Gulph of Venice, which is a branch thereof.

It is divided into the Italian Republic, the kingdom of Etruria, the Roman States, and the kingdom of Naples.

The Appenines form a grand chain of mountains, which runs through almost the whole extent of Italy. Mount Vesuvius, near Naples, is a celebrated volcanic mountain. But Vesuvius, compared with Etna in Sicily, is only a small hill; the circuit of Vesuvius is thirty miles, that of Etna is one hundred and eighty. The ashes of Vesuvius are sometimes thrown seven miles, but those of Etna are frequently thrown thirty.

Rome was the principal city of the Pope's dominions, and the capital of Italy. Florence is the capital of Etruria, and is now regarded as the Athens of modern Italy.— Milan is the capital of the Italian States.

Sicily, the largest of the Italian islands, is separated from the south-west part of Naples by the Strait of Messina .---This strait was famous for the Scylla and Charybdis of the ancients, the former being a rock, the latter a whirlpool. both very dangerous to the navigators of that period. The chief towns are Palermo, Messina, and Syracuse. The sovereign was sometimes styled King of Naples, and sometimes the King of the Two Sicilies. Sardinia, another large island, is situated almost in the centre of the Mediterranean: the principal town is Cagliari. Corsica is separated from the northern parts of Sardinia by the Strait of Bonifacio; its chief town is Bastia. The island of Malta lies about sixty miles south of the island of Sicily, and is celebrated for the strength of its fortifications, and is now possessed by the English.

Candia, to the south of Greece, is famous for Mount Ida; and both Malta and Candia are renowned for withstanding sieges by the Turks, who in the former lost thirty

thousand

thousand men, and in the latter one hundred and eighty thousand.

Rhodes, N. E. of Candia, is famous for its collossal statue, between the legs of which ships sailed into the harbour. In its right hand was a light-house for the direction of muriners. It was destroyed by an earthquake.

The principal rivers are the Po, the Tiber, the Var, and the Adige.

Germany was formerly divided into 9 great divisions, called ercles; 3 northern, Westphalia, Lower Saxony, and Upper Saxony: 3 in the middle, Lower Rhine, Upper Rhine, and Franconia; and 3 southern, Suabia, Bavaria, and Austria. These circles were subdivided into principalities, duchies, electorates, bishoprics, &c. Besides these, there were a number of free cities, which were Sovereign States, some of them styled Imperial Towns, and quartered the Imperial Eagle in their arms.

The Emperor was elected by ten electors for life, under the title of Emperor of Germany and King of the Romans. The present Emperor is also, in his own right, Archduke of Austria, and King of Bohemia. The ten electors were the King or Elector of Bohemia; the Elector of Bavaria; the Elector of Saxony; the Elector of Brandenburgh (King of Prussia); the Elector of Hanover; the Elector Arch-Chancellor of the Empire, whose residence was Ratisbon; the Elector of Saltzburgh; the Elector of Baden; the Elector of Wurtemburgh; and the Elector of Hesse.

The Electors of Saxony and Hanover were regarded as the principal potentates in the north of Germany; the Elector of Bavaria, and the Elector of Wurtemberg in the south. Prussia and Austria were considered as independent powers. Almost every prince in Germany, of which there were about 200, was arbitrary in the government of his own estate; but together they formed a great confederacy, governed by political laws. The head of those petty sovereigns was the Emperor.

The chief towns are Vienna, the residence of the present Emperor: Dresden, the residence of the Elector of Saxony, famous for its gallery of pictures, its various collections in the fine arts, and its porcelain manufactory; Berlin, which is the capital of the Prussian dominions: Hamburgh, situated on the Elbe, and one of the first commercial cities in Europe; Leipsic, and Frankfort, famous for their fairs; Gottingen, Jena, Leipsic, and Halle, celebrated for their universities; besides Hanover, Munich, Manheim, Wurtemberg, Heidelberg, Augsburgh, Constance, and Prague.

The principal rivers of Germany are the Danube, the Rhine, the Main, and the Elbe.

The Austrian Dominions.

The Austrian dominions comprehended Austria, Bohemia, Hungary, part of Poland, with the Venetian States.— By the partition of Poland Austria acquired one sixth part of that country, and four millions of subjects.

The capital of this Empire is Vienna, where the Emperor is regarded as the successor to Augustus; in the other provinces he is looked upon as the nominal King of Hungary and Bohemia. The other chief towns are Venice, Prague, Presburg, Buda, Cracow, and Trieste:

The principal mountains are the Tyrolese, the Alps, and the Carpathian Mountains.

There were in Germany several free cities, which were small commonwealths under the protection of the Germanic Body, such as Ratisbon, Frankfort, Hamburgh, &c. And among the Alps were several small commonwealths, commonly known by the name of the Swiss Cantons.

Switzerland, remarkable for its mountains, is divided into thirteen cantons, Zurich, Berne, Underwalden, Zug, Schweitz, Basil, Glacis, Soleure, Uri, Appenzel, Lucerne, Fribourg, and Schaffhausen. The three principal towns are Basil, Berne, and Zurich.

The sources of the Rhine and the Rhone, two of the grandest rivers in Europe, are to be found in the mountains of Switzerland. The lakes of Constance and Geneva have been long celebrated for their beauty. The Alps, which divide Switzerland from Italy; the Mountains of St. Gothard, in the Canton of Uri; and Mont Blanc, on the borders of Savoy, are the highest in Europe.

Denmark and Norway, two kingdoms under the same sovereign, are bounded on the north and west by the ocean, on the south by part of Germany, and the Baltic sea, and on the east by Sweden; the capital of Denmark is called Copenhagen, and that of Norway Christiana.

On

236

On the coast of Norway is the Maelstroom, a whirlpool of great extent, and very dangerous to ships that approach it.

Greenland and the Ferro islands are subject to Denmark, and so is Iceland, celebrated for the burning Mount Hecla, a volcano one mile in height.

Sweden has Denmark on the west, the Baltic Sea on the south, Russia on the east, and the ocean on the north. It includes the greatest part of ancient Scandinavia, and is divided into Sweden Proper, Gothland, Finland, Swedish Lapland, and the Swedish Islands.

The chief towns are Stockholm, the capital, which stands on seven rocky islands, united by bridges; Upsal, Gothenburg, Tornea, and Abo.

Russia has part of Sweden and the Baltic sea on the west, Crim Tartary on the south; Great Tartary in Asia on the cast, and the ocean on the north.

This vast empire comprehends in fact all the northern parts of Europe and Asia, but only a small part of its inhabitants are in a state of civilization. By the partition of Poland, Russia has acquired two thirds of that country, and six millions of inhabitants.

The principal towns are Petersburgh, the capital, Moscow, Archangel, Cherson, Astracan, and Tobolsk. The chief rivers the Wolga, the Don, the Nieper, and Neister.

More to the eastward is Turkey in Europe, which consists of many provinces, and includes ancient Greece, Constantinople, in the eastern part thereof, being the residence of the Grand Seignior, sovereign of the empire.

The northern provinces are Moldavia, Bessarabia, Wallachia, Servia, Bosnia, and Dalmatia; those in the middle are Bulgaria, Romania, Macedonia, Albania, and Epirus; the southern parts, called Greece, contain Thessaly, Achaia, and the Morea. The famous city of Delphos was in the district of Achaia, but it is now reduced to a mean village, called Castri.

The metropolis of Turkey, Constantinople, is finely situated between the sea of Marmora and the Black Sea.— Adrianople is the second city in the Turkish Empire.

The principal rivers are the Danube, the Saave, and the Neister. The chief mountains are Pindus and Olympus, which separate Thessaly from Epirus; Parnassus in Livadia, Athos, and Hæmus. The islands are very numerous; the chief are Rhodes and Candia, in the Mediterranean.— There are also Zante Cephalonia, Corfu, and others lying west of Turkey, forming the republic of the Seven Islands.

The United Kingdom of Great Britain and Ireland.

This being our native country, we shall be a little more particular in the description of it.

The island of Great Britain is divided into England, Wales, and Scotland. It is about six hundred miles in length, and half as broad, and is known to contain above twelve millions of inhabitants.

England contains forty counties or shires, situated in the following order, taken from north to south.

Counties.	Chief Towns.	Counties.	Chief Towns.
Northumberl.	Newcastle	Buckinghams.	Aylesbury
Durham	Durham	Northamptons.	Northampton
Cumberland	Carlisle	Bedfordshire	Bedford
Westmorland	Appleby	Huntingdonsh.	Huntingdon
Yorkshire	York	Cambridgesh.	Cambridge
Lancashire	Lancaster	Norfolk	Norwich
Cheshire	Chester	Suffolk	Bury
Derbyshire	Derby	Essex	Chelmsford
Suropshire	Shrewsbury	Hertfordshire	Hertford
Nottinghamsh.	Nottingham	Middlesex	London
Lincolnshire	Lincoln	Kent	Canterbury
Rutland	Oakham	Surrey	Guildford
Leicestershire	Leicester	Sussex	Chichester
Staffordshire	Stafford	Berkshire	Reading
Warwickshire	Warwick	Hampshire	Winchester
Worcestershire	Worcester	Wiltshire	Salisbury
Herefordshire	Hereford	Dorsetzhire	Dorset
Monmouthsh.	Monmouth	Somersetshire	Wells
Gloucestersh.	Gloucester	Devonshire	Exeter
Oxfordshire	Öxford	Cornwall	Launceston

We shall give a brief account of some of the principal cities and towns in England, without any particular regard to the order of arrangement.

LONDON, the metropolis of England, is perhaps the most populous and richest city on the face of the earth. Including Westminster and Southwark, it may perhaps be deemed three cities. London London, taken in this extent, presents almost every variety which diversifies human existence. Towards the east it is a sea port, replete with mariners, and with trades connected with that profession. In the centre it is the seat of numerous manufactures, and prodigious commerce, while the western or fashionable extremity present royal and noble splendour, amidst scenes of luxury and dissipation. This city is supplied with water by the Thames, the water of which is thrown into the houses by machinery creeted at London-Bridge, and by the New River, which flows from Ware, in Hertfordshire. The highest parts of London towards Mary-le-bone have their water, from a number of large ponds situated on Hampstead Heath.

Yonk is thenext city to the capital in dignity, though not in extent, or in opulence; it is regarded as the metropolis of the north of England. The cathedral of this city is greatly celebrated: the western front being peculiarly rich, the chief spire very lofty, and windows of the finest painted glass.

į

LIVERPOOL approaches now the nearest to London in wealth and commerce. It is only about a century since this immense town was a mere village. In 1699 it was constituted a parish, in 1710 a dock was constructed, and the chief merchants came originally from Ireland. The infamous traffic in slaves was a distinguishing feature of Liverpool, and it was there that from 100 to 150 ships were constantly employed in that trade. In a single year, during the American war, Liverpool fitted out 170 privateers.

BRISTOL is still a large and flourishing city, though much of its commerce with the West Indies and America have passed to Liverpool. Bristol is famous for its hot wells.— In the adjacent rocks are found beautiful crystals, called Bristol stones. The trade of Bristol is chiefly with Ireland, the West Indies, or North America, Hamburgh, and the Baltic. By the navigation of the two rivers Severn and the Wye, Bristol engresses most of the trade of Wales. In 1787, Bristol employed 1600 coasting vessels, and upwards of 400 ships engaged in foreign commerce.

MANCHESTER is celebrated for its cotton manufacturers, which are known and prized in every part of Europe.

BIRMINGHAM was originally a village, but is now a town of immense manufactures in iron ware. The extension of Birmingham originated in a great degree from Mr. John Taylor. Taylor, who introduced the manufacture of gilt buttons, and japanned and enamelled works. The great fabric of the arts, called Soho, belonging to Messrs Boulton and Watts, is situated about two miles from Birmingham.

SHEFFIELD is famous for its cutlery and plated goods.

LEEDS, BRADFIELD, HALIFAX, and WAKEFIELD, are the chief centres of the manufactories of woollen cloth, and stuffs. Leeds is the principal mart for broad cloths. The clothhall appropriated to the sale is a vast edifice, and the whole business is transacted within the space of an hour on the market-days.

HULL is celebrated for its large dock; and its trade with America and the south of Europe is very important. The coasting traffic is extensive in coals, corn, wool, and various manufactures.

NEWCASTLE, so named from a fortress, erected by Edward I. is a large and very populous town, in the centre of the grand coal-mines in the counties of Durham and Northumberland, which have for many centuries supplied London, and most of the east and south of England with that species of fuel.

In the west of England, *Exeter*, the capital of Devonshire, is an ancient and respectable city, the principal commerce of which is in coarse woollen goods, manufactured in Somersetshire, Devonshire, and Cornwall. They are exported to Italy and other parts of the Continent to a very great amount, and the East India Company purchase yearly a very large quantity. Some ships from Exeter are engaged in the cod and whale fishery.

SALISBURY is famous for its flannels and cutlery, particularly for the manufacture of scissars. Wilton is celebrated for its carpets.

WINCHESTER, the chief city of Hampshire, was for centuries the metropolis of England; it still retains many vestiges of ancient fame and splendor. Besides a cathedral, Winchester has a college founded by William of Wickham, which has sent forth many illustrious characters.

PORTSMOUTH, in the same county, is the grand naval arsenal of England. The harbour is noble and capacious, narrow at the entrance, but spreading into an inland bay, five miles in length, and from two to four in breadth.

CANTERBURY, the chief town in Kent, and the metropo-

240 THE YOUNG MAN'S BEST COMPANION.

Tis of the English church, is chiefly remarkable for ecclesiastical antiquities.

NORWICH, the capital of Norfolk, from its size and consequence, is justly styled a city. It is a place of great trade, particularly in camblets, crapes, stuffs, and other woollen manufactures. The wool is chiefly from the counties of Lincoln, Leicester, and Northampton, and the principal exports are to Holland; Germany, and the Mediterranean.

CAMBBIDGE is remarkable for a university containing 12 colleges and 4 halls, all well endowed, and are as follow:

	COLLEGES.	By whom Founded.
When	Founded.	,
1284	Peter House	Hugh de Bathan, Bp. of Elv.
1346	Corpus Christi, or Bennet	Henry of Moumouth, Duke of Lancaster.
1348	Gonvil and Caius	So called from its several Founders.
1441	King's	Henry VI.
1448	Queen's	Margaret his Queen.
1497	Jesus	John Alcocke, LL.D. Bishop of Ely.
1506	Christ's	Margaret, Countess of Rich- mond.
1546	St. John's	Ditto.
1542	Magdalen	Edward Strafford, Duke of Buckingham.
1546	Trinity	King Henry VIII.
1384	Emanuel	Sir Walter Mildmay.
1598	Sidney Sussex	Frances Sidney, Countess of [Sussex.
•	HALLS.	
1343	Clare	Richard Badew.
1347	Pembroke	Mary, Countess of Pembroke.
1353	Trinity	W. Bateman, Bp. of Norwich.
1540	Catherine	Rt Wood the Chancellor

OXFORD is famous for having the finest University in the world, which consists of 20 colleges endowed, and five halls not endowed, viz.

872 University

Digitized by Google

				4 · ·
872	University	-	-	- The Saxon King Alfred.
961	Baliol	-	-	- John Baliol, King of Scotland.
274	Merton -	-	-	- Walter de Merton, Bishop of Rochester,
1316	Exeter -	•	•	- Walter Stapleton, Bishop Exeter.
1905	0	-	-	- King Edward II.
1323	0/10/	-	-	Robert Englesford, B. D.
1340	Queens -	•	-	William of Wickham Bishon
1375	New	-	-	f Winchester
	4			01 WINCHESTER
1427	Lincoln -	-	-	- R. Fleming, and F. Rother- ham, Bishep of Lincoln.
1437	All Souls -	-	-	- II. Chicheley, Abp. of Cant.
1459	Magdalen -	•	-	- Wm. of Wainfleet, Bishop of of Winchester.
1511	Brazen Nose	-	-	Wm. Smith, Bp. of Lincoln, and Sir R. Sutton, Knt.
1516	Cornus Christ	i	-	- R. Fox, Bp. of Winchester.
1 = 10	Christ Church	6	-	- King Henry VIII.
1349	m till.	•	_	- Sir Thomas Pope.
1555	Trinity -	-	-	Sir T White Lord Mayor of
1537	St. John's -	-	•	London.
1571	Teone	-	÷	_ Queen Elizabeth.
10/1	Wadhum		-	Nicholas Wadham, Esq.
1009	Wannam -	-	-	T. Tesdale, Esg. and Rich.
1620	Pembroke •	-	-	

Whitwick, B. D.

- _ Sir Thomas Cooke.
- _ Dr. Newton.

HALLS St. Edmund's St. Alban's belonging to St. Mary's New Inn Magdalen

1700 Worcester

1740 Hartford

Queen's Merton Oriel College. New Magdalen

THE PRINCIPALITY OF WALES.

WALES was originally independent of England, but in the reign of King Henry the Vilth it was incorporated with it. This country is very mountainous and barren, except in the val ics and intervals, where it yields plenty of grass and corn. The situation is westward, bordering on the Trish М

242 THE YOUNG MAN'S BEST COMPANION.

It is sea; the air bleak and sharp, but wholesome; the cattle are numerous, but very small; and on the hills there are goats in abundance. This country is divided into north and south.

Wales is divided into twelve counties, as follow:

Counties.	Chief Towns.	Counties.	Chief Towns.
Flintshire	Flint	Radnorshire	Radnor
Denbighshire	Denbigh	Brecknocksh.	Brecknock
Montgomerysh.	Montgomery	Glamorgansh.	Cardiff
Anglesea	Beaumaris	Pembrokesh.	Pembroke
Caernarvonsh.	Caernarvon	Cardiganshire	Cardigan
Merionethshire	Harlech	Carmarthensh.	Carmarthen

North Wales contains Anglesey, Caernarvonshire, Denbighshire, Flintshire, Merionethshire, and Montgomeryshire.

Anglesey is an island in the north-west part of the country, about 80 miles in compass. The common passage to Ireland is from Holyhead in this island to Dublin.

South Wales contains Brecknockshire, Cardiganshire, Carmarthenshire, Glamorganshire, Pembrokeshire, and Radnorshire.

Pembrokeshire is a very pleasant and plentiful county, for the most part surrounded by the sea. It is famous for a harbour called Milford Haven, which is justly estcemed to be in all respects one of the best in the world.

SCOTLAND.

ł

SCOTLAND is the northern division of *Great Britain*, and is situated to the North of *England*; the capital city is called Edinburgh; it is divided into thirty-three counties, as follow:

Shires.	Chief Towns.	Shires.	Chief Towns.	
Edinburgh	Edinburgh Dunbar	Bute&Caith-	Rothsay	
Merse	Dunse	Renfrew	Renfrew	٠
Roxburgh	Jedburgh	Surling	Stirling Shir	es.

Shires.	Chief Towns.	Shires.	Chief Towns.
Selkirk	Selkirk	Linlithgow	Linlithgow
Peebles	Peebles	Argyle	Inverary
Lanerk	Glasgow	Perth	Perth
Dumfries	Dumfries	Kincardin	Bervie
Wigtown	Wigtown	Aberdeen	Aberdeen
Kircudbrig	htKircudbright	Inverness	Inverness
Air	Air	Nairne and	Nairne and
Dumbarton	Dumbarton	Cromartie	Cromartie
Forfar	Montrose	Fife	St. Andrews
Banff	Banff	Kinross	Kinrows
Sutherland	Strathy Darnoe	Ross	Tuine
Clacmanna	nClacmannan	Elgin	Elgin
		Orkney .	Kirkwall

Berwick-upon-Tweed lies between England and Scotland, and is distinguished from both, by having its peculiar privileges, and a small territory within its jurisdiction.

The most considerable towns in Scotland next to Edinburgh are Glasgow, and Aberdeen, all of which are famous for their universities; Glasgow is no less so for its extensive commerce.

The islands belonging to Scotland are the Shetland, the Orkney, and the Hebrides, or Western Islands.

The Hebrides, or Western Isles, are said to be above 300 in number, the most considerable of which are Arran, Sky, and Mull; and the isles of Orkney, and Shetland, to the northward of each of which, there are many in number.

The principal rivers are the Forth, the Tay, the Dee, and the Don; and the most considerable lakes, Loch Tay and Loch Lomond, which contains several islands; and Loch Ness, in Invernesshire.

TRELAND

Is a large island to the west of England and Scotland, the . chief city of which is Dublin; it is divided into four provinces, viz. Ulster, northward; Leinster, eastward; Munster, southward; and Connaught, westward. These are again subdivided into the following counties:

Digitized by Google

Countics.



The chief towns next to Dublin, the capital, are Cork, Londonderry, and Belfast. Cork is a flourishing commercial city, and remarkable for its fine harbour. The principal rivers are the Shannon, the Blackwater, the Boyne, and the Liffy.

In St. George's Channel, almost equally distant from England, Scotland, and Ireland, is situated the Isle of Man, the royalty of which, under the kings of Great Britain, was formerly in the family of the Stanleys, Earls of Derby; but the male issue of that family being extinct, it was enjoyed by the Duke of Athol, descended from the Derby family by a female branch, till the Session of Parliament 1765, when it was annexed to the Crown.

The Britannic Isles above described are separated from France, on the south by the English channel; and from Holland, Germany, Denmark, and Norway, by the German ocean on the east; the northern and western sides being washed by oceans of the same name.

HOLLAND, or as it is now called, the Batavian Republic, has Germany on the East and North, the German ocean to the west, and France to the south. It consists of the seven following provinces:

Provinces.	Chief Towns.	Provinces.	Chief Towns.
Ċroningen	Croningen	Utrecth	Utrecht
Friesland	Lewarden	Guelderland	Zutphen
Over-yssel	Deventer	Zealand	Middleburgh -
Holland	Amsterdam 🐳	•	,

The chief towns, with regard to commercial purposes, are Amsterdam, Leyden, Rotterdam, and Haarlem.

The

4

The Hague is the largest, and was the richest village in the world; it is thirty miles from Amsterdam; and was, before the Revolution, the seat of Government, and the residence of the principal people.

Amsterdam, the capital, is curiously built upon wooden piles. Leyden is famous for its university. The streets have canals running through them, the borders of which are planted with rows of trees. The principal rivers are the Rhine, the Maese, and the Scheklt. The canals are very numerous, and serve for the same purpose as roads in other countries.

ASIA.

ASIA is separated from Europe towards the north-west; towards the south-west by the castern part of the Mediterranean sea; and by the 1sthmus of Suez and the Red Sea, which divide it from Africa. It is bounded on the south by the Indian ocean; on the cast by the pacific; and on the north by the northern or frozen ocean; its dimensions may be conceived from what follows.

It seems most regular to divide this large country according to its present possessors, the Grand Seignor or Emperor of the Turks, the King of Persia, the Great Mogul, and the other potentates of India, the Emperor of China, and the potentates of Tartary.

The Turkish possessions in Asia are Anatolia, Syria, Arabia, Armenia, or Turcomania, Georgia, and Mesopo tamia, or Diarbeck: of which in their order.

Anatolia, formerly called Asia-Minor, is encompassed on the north, west, and south sides, by the Euxine, the Mormorian, the Archipelago, and the Mediterranean seas; it is separated from Syria on the south-east by the mountains called Taurus, and from Turcomania on the east by the river Euphrates.

Syria, called by the Turks Suristan, is subdivided into Syria proper, Phanicia, and Palestine or Judea; whose chief cities are Aleppo, Damascus, and Jerusalem.

Arabia (a country which preserves its ancient name, as do the inhabitants their roaming disposition) is bounded on the west by the Red Sea and the Isthmus of Suez; on the north by Palestine, Syria, and Diarbeck; on the east by M 3 the Persian Gulph, and on the south-west by the Arabian sea, and part of the Indian ocean.

It is divided into three parts, called the Desert, the Stony, and the Happy; the two first lie to the northward, the other to the south.

There are very few towns in the desert or stony parts of this country; the Arabs living in tents, and removing with their families from place to place, as profit or convenience suggest. But in Arabia the Happy, (one of the finest countries in the world) there are several of note, such as Medina, where the sepulchre of Mahomet, the founder of the Turkish religion, is; Mecca, his birth-place, to which every Turk or Mussulman is obliged by his religion to come in pilgrimage once in his life-time, or to send another in his stead; Aden, a place of traffic; and Mocha, famous for its coffee.

Armenia, or Turcomania, is bounded on the west by Anatolia, on the south by Diarbeck, on the east and north by Georgia and the Euxine sea.

Georgia, formerly called Iberia, including Mingreli and Gurgistan, is bounded on the north by part of Russia, on the west by the Euxine sea, on the south by Turcomania, and part of Persia, and on the east by part of Persia; the cities of the greatest note are Fasso and Tafflis.

Mesopotamia, or Diarbeck, is bounded on the north by Turcomania, on the west by Syria, on the south by Arabia the Desert, and on the east by Persia; its principal cities are Diarbeker and Bagdat.

Besides these large possessions on the Continent of Asia, the Turks hold several islands in the Archipelago; with Rhodes and Cyprus in the Mediterranean sea, the last of which is very considerable.

The next division of Asia, proceeding castwardly, is Persia, which has the Turkish dominions on the west, the Persian Gulph and part of the Indian ocean on the south; the empire of the Great Mogul on the east, and, on the north, part of Tartary, the Capsian sea, and part of the Russian empire. This is a very large country, but at present it is torn to pieces by different competitors for the sovereign power; the capital city is Ispahan; the most considerable of the others are Derbent on the Capsian sea, and Gombroom and Bassora on the Persian Gulph.

Proceeding still eastward, the next empire is that of the Great

Great Mogul, which has Persia on the west, the two Indian Peninsulas and the bay of Bengal on the south, China on the east, and part of Tartary on the north.

This is another large tract, with the inland parts of which the Europeans are not much acquainted.

The principal cities are Agra, Lahor, Delhi, Cabul, and Cassimir; but whether Agra or Lahor is the capital, is difficult to determine; the Mogul hath a magnificent palace at each of these cities.

The maritime parts of the continent of India are divided by the bay of Bengal, a branch of the Indian ocean, into two peninsulas, anciently called India Within, or on this side the Ganges, and India Without, or beyond the Ganges; besides which two peninsulas, there are several large islands belonging to India, of which in their order.

The peninsula on this side the Ganges contains several distinct territories or kingdoms, most of which either are or were subject, or at least tributary, to the Mogul; the western side thereof is called the Coast of Malabar, the eastern the Coast of Coromandel.

The coast of Malabar contains several European settlements, such as Bombay, an island belonging to the English East India Company, and Goa, to the Portuguese, at each of which they have the sovereignty; and the English trade at least, if they have not forts, at Guzurat, Surat, Calicut, and Cochin.

The island of Ceylon, by some called Zeloan, is situated a little to the east of Cape Comorin, the most southern point of this peninsula.

The coast of Coromandel, which is washed by the bay of Bengal, tends towards the north and north-east from Cape Comorin, and extends to the mouth of the Ganges; the Principal settlements of the English on this coast are, Madras or Fort St. George, and Fort St. David, near which the French had a settlement called Pondicherry; which neighbouring settlements were for several years at war with each other, with various success, the natives, headed by by their Princes, called Nabobs, having taken part therein, some on one side, and some on the other; but the English were at last victorious, and have lately had large provinces yielded to them by the Princes of the country.

The peninsula on the other side of the Gauges, consists of the large kingdoms of Bengal, having a capital of the $M \blacktriangle$ same

247

same name; Pegu, whose chief cities are Pegu and Arracan; Siam, having a capital of the same name; Malacca, situate to the south, is almost encompassed by the sea, and the city, so called, is situate near the southern extremity; Cochin-China, whose chief city is Cambodia, and Tonquin, whose capital is of the same name.

South-west of Malacca is the island of Sumatra.

South-cast of this lies the island of Java, separated by the straits of Sunda; the western point of which is called Java Head by English mariners, it being often the first land made by them after they have doubled the Cape of Good Hope; the principal cities are Bantam and Batavia, the latter of which till lately belonged to the Dutch East India Company, who were sovereigns over the greatest part of this large and fruitful island. It now belongs to England.

Eastward from Malacca and Sumatra is the island of Borneo, almost round, and near 600 miles in diameter.

The island of Celebes is to the east of Borneo, but muchless than it. Proceeding eastward are the Molucca, or Spice Islands; the Dutch having made themselves masters of the e, thereby engrossing the spice trade to themselves.

The Phillippine Isles are very numerous, some authors have reckoned 10,000 of them; the most considerable is Luconia, whose capital is Manilla.

To the north and north-west of these is situated the potent Empire of China, reckoned by some to be as big as all Europe; it hath the Pacific occan on the east and southeast; Cochin-China and Tonquin on the south-west; the Mogul's empire on the we t, and on the north-west and north a part of Tartary.

There are a great number of cities in this empire, of which Pekin, situated in the northern part of the country, is the capital; the European trade to this country is chiefly carried on at Canton, a great seaport in one of the southern provinces.

The most considerable Chinese Islands are those which compose the empire of Japan; which consists of several large islands, the largest of these is Niphon: and the chief towns are Jeddo, Miaco, and Nagasaki.

Thus we have taken a cursory survey of all the southern parts of Asia; the northern hath only one general name, viz. Tartary, which has Persia, India, and China, on the south the Pacific ocean on the east, the northern or frozen

Digitized by Google

İ

t

I

1

ł

í

١

1

ì

248

ocean on the north, and Russia on the west; this large tract is subject to divers Potentates, of whom little is known.

AFRICA.

AFRICA is a large peninsula, which is joined to the continent of Asia by the Isthmus of Suez, a narrow desert between the Mediterranean and Red Seas. The inland parts of this Continent are not much known to the Europeans; so that only the sea coasts will be mentioned here, beginning at the Isthmus of Suez, and coasting first along the Mediterranean sea.

Egypt is under the dominion of the Turks; its present capital is called Cairo; the piratical States of Tripoly, Tunis, and Algiers, have capitals of the same name, and the capital of the empire of Morocco is the city of Fez.

Along the coasts of the Atlantic ocean, there are no extensive dominions, the inhabitants being mostly subject to petty Princes of their own, who being almost continuaily at war with one another, sell their prisoners for slaves; the European nations have been induced, for the protection of their trade therein, and other commodities, to erect several small forts in different places, to enumerate which would be tedious; the Madeiras, the Canaries, and the Cape Verd Islands, are the most considerable on this coast; the only one possessed by the English is a very small one, called St. Helena, frequented by the East India ships.

At the southern extremity of the Continent is situated the Cape of Good Hope, where there is a tolerable town for t¹ e convenience of shipping, built by the Dutch East India Company: from hence, along the eastern coast, both on the ocean and in the Red Sca, very little remarkable offers itself to notice. At some distance, however, from the part of this coast is situated one of the largest in the world, called Madagascar, which has been at different times the asylum of European pirates.

AMERICA.

AMERICA, by some called the New World, because discovered about 318 years ago, being before that time un-M 5 known

known to the inhabitants of Europe, Asia and Africa, ia divided into two remarkable divisions, called North and South America, which are joined together by the Isthmus of Darien or Panama.

North America includes the United States, Spanish and British America, and the independent Indian nations.

The inland seas of North America are the Gulphs of Mexico, Californio, and St. Lawrence, with Hudson's Bay, and Davis's Straits. The Gulph of St. Lawrence is closed by the island of Newfoundland, and the great sand-bank, about four hundred miles in length, celebrated for the codfishery.

The lakes Superior, Michigan, Huron, Winnipeg, and Slave Lake, are the grandest in the world, and may with propriety be denominated seas. The rivers are also grand features of North America. Of these, the principal are the Missouri, or Mississippi, the Ohio, and the St. Lawtence; and the most celebrated mountains are the Apalachians, passing through the territory of the United States. Among these the Ohio has its rise.

The UNITED STATES are divided into Northern, Middle, and Southern.

. The northern States are Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island. The middle States are New York, New Jersey, Pennsylvania, Delaware, and the territory on the north wet of the Ohio. The southern States are Maryland, Virginia, Kentucky, North Carolina, Georgia, and the country south of Kentucky. The chief cities and towns are Washington, the capital, Philadelphia, New York, Boston, Baltimore, and Charlestown.

The Spanish dominions were Louisiana (which have been lately ceded to the United States for a certain sum of money) East and West Florida, New Mexico, and Old Mexico, or New Spain. Mexico is the capital of all Spanish America. The chief river in Spanish America is Rio Bravo, and the capital lake is Nicaragua.

The British dominions are amazingly extensive, and include Upper and Lower Canada, Nova Scotia, New Brunswick, the island of Cape Breton, Newfoundland, the Bermudas, or Summer Islands.

The Native Tribes and Independent Countries.—These are Greenland, Labrador, the regions around Hudson's Bay, those those nations lately discovered by Sir A. Mackenzie, and those on the western coast.

Of the West Indies .- The most important of these islands are Cuba, and Porto-Rico, Spanish; St. Domingo, and Jamaica, English. North of St. Domingo and Cuba are the Bahames, the principal of which is Providence Island. The Caribbee Islands extend from Tobago in the south to the Virgin Islands in the north. Those belonging to England are Barbadoes, Antigua, St. Christopher's, St. Vincent, Dominica, Grenada, Trinidad, Montserrat, Nevis, and the Virgin Isles, Guadaloupe, St. Lucie, and Tobago. The Danes formerly possessed St. Croix, and St. Thomas. St. Bartholomew belongs to the Swedes, and Eustatia to the Enelish.

From these islands are procured sugar, rum, cotton, indigo, spices, cocos, and coffee; in time of war the smaller and inferior islands are often changing their masters.

South America comprehends Terra Firma, Guiana, Amazonia, Peru, Brazil, Paraguay, Chilli, and Patagonie

Amazonia and Patagonia are not under the yoke of any European power; they are divided into several kingdoms. cach of which has its chief. The inhabitants have no temples or priests, but worship images of their departed heroes.

South America has no inland sea, but the river Amazons, and that of La Plata, are celebrated as the largest in the world. They both have their rise among the Andes.-The mountains in South America are the loftiest on the whole face of the globe, and are intermixed with volcanos of the most sublime and terrific description. The Andes follow the windings of the coast, and extend four thousand six hundred miles. The highest are near the Equator, and are covered with perpetual snow. The Spanish dominions in South America are Buenos Ayres, Peru, Chilli, and New Granada. Peru and Chilli are famous for their gold and silver mines. In Chili it never rains, the sky is seldom. cloudy, but the night dews supply the want of rain.

The Portuguese territory of Brazil is perhaps equal in extent to the Spanish, compensating by its breadth for its deficiency in length. Guiana belongs partly to the French and partly to the Dutch. Cayenne consists of an extensive territory on the Continent, and of an island of that name.

The southern extremity of South America is Patagonia, a desolate country, inhabited by a savage race, some of whom

M 6

252. THE YOUNG MAN'S BEST COMPANION.

whom are of a colossal nature. The islands contiguous to South America are Trinidad, the Falkland Islands, Terra del Fuego, Chiloe, and Juan Fernandez. The Gallipago Islands are near the Equator, and the Pearl Islands he in the Bay of Panama.

ASTRONOMY.

ASTRONOMY is a Science which treats of the motions and distances of the heavenly bodies, and of the appearances arising from them.

There have been a great variety of opinions, among philosophers, concerning the disposition of the great bodies of the universe, or of the positions of the bodies which appear in the Heavens: but the notion now embraced by the most judicious astronomers is, that the Universe is composed of a vast number of Systems or worlds; that in every system there are certain bodies moving in free space, and revolving at different distances around a Sun, placed in or nearthe centre of the system, and that these Suns, or the other bodies, are the Stars which are seen in the Heavens.

That system, to which our Earth belongs, is by astronomers called the *Solar System*; and the opinion, which supposes the Sun to be fixed, in or near the centre, with several bodies revolving round him, at different distances, is confirmed by all the observations hitherto made.

This opinion is called the *Copernicum System*; from Nicholas Copernicus, a Polish Philosopher, who, about the year 1473, revived this nation from the oblivion it had been buried in for many ages.

The Sun is therefore placed in the midst of an immense Space, wherein ten opaque spherical bodies revolve about him as their centre. Seven of these wandering globes are called the planets, who, at different distances, and in different periods, perform their revolutions, from west to east, in the following order.

I. & Mercury * is nearest to the Sun of all the planets, and performs its course in about three months or 87d. 23h-II. & Venus, in about seven Months and a half, or 224d-17h. III. The Earth, in a year, 364d. 6h. IV. & Mars, in about two years, or 686 d. 23h. V. 24 Jupiter, in twelve years, or 4232d. 12h. VI. J. Saturn spends almost thirty years, that is 10759d. 8h. in one Revolution round the Sun. And the H Herschell Planet, whose year is equal to almost eight-two of ours. The distances of the planets from the Sun are nearly in the following proportion, viz. supposing the distance of the Earth from the Sun to be divided into 160 equal parts; that of Mercury will be about 37 of those parts; of Venus 66; of Mars 155; of Jupiter 493; of Saturn 903; and that of the Herschell 1813.

The Orbits + of the planets are not all in the same plane, but variously inclined to one another; so that, supposing the orbit of the earth to be the standard, the others will have one half above, and the other half below it; intersecting one another in a line passing through the Sun.

Besides these seven large planets, three smaller bodies have been discovered revolving about the Sun between the Orbits of Mars and Jupiter.

The plane of the Earth's Orbit is called the Ecliptic; and this the Astronomers make the standard, to which the planes of the other orbits are judged to incline.

The right line passing through the sun, and the common intersection of the plane of the Orbit of any planet with the ecliptic, is called the Line of the Nodes of that planet, and the points themselves, wherein the orbits cut the ecliptic, are called the nodes. The orbits of the planets are not circles, but ellipses or ovals.

What an Ellipsis is may be easily understood from the following description: imagine two small pegs or pins fixed upright on any plane, as a table, and suppose them tied with

* The sharacters placed before the Names of the Planets, are, for brevity's sake commonly made use of by Astronomers instead of the words at length, as 2 for Venus, &c.

+ By the orbit of a Planet is understood the Track or Ring described by its circuit round the Sun, but by the plane of the Orbit, is meant a flat surface, extended every way through the orbit infinitely.

with the ends of a thread, somewhat longer than their distance from one another; now if a pin be placed in the double of the thread and turned quite round (always stretching the thread with the same force) the curve described by the motion will be an Ellipsis. The two points where the pegs stood, (about which the thread was turned) are called the Foci of that ellipsis; and if without changing the length of the thread, we alter the position of the pegs, we shall then have an ellipsis of a different kind from the former : and the nearer the Foci are together, the nearer will the curve described be to the circle, until at last the two Foci coincide, and then the pin in the doubling of the thread will describe a perfect circle.

The orbits of all the planets have the Sun in one of their Foci, and half the distance between the two Foci is called the eccentricity of the orbits. This eccentricity is different in all the planets, but in the most of them it is in little schemes or instruments made to represent the planetary orbit, and need not here be noticed.

The ten planets before mentioned are called primaries, or primary planets, but beside these there are 18 other lesser Planets, which are called Secondaries. Moons, or Satellites. These moons always accompany their respective primaries, and perform their revolutions round them, whilst both together are also carried round the Sun.

Of the Primary Plancts there are but four, as far as observation can assure us, that have these attendants, viz. the Earth, Jupiter, Saturn, and the Herschel.

The Earth is attended by the Moon, who performs herrevolution in about 29½ Days, at the distance of about 30diameters of the Earth from it; and once a year is carried round the Sun along with the Earth.

Jupiter has four Moons or Satellites; the first or innermost performs its Revolution in about one day and $18\frac{1}{2}$ hours, at the distance of $5\frac{1}{2}$ Semidiameters of Jupiter from his centre; the second revolves about Jupiter in 3 days and 18 hours, at the distance of 9 of his Semi-Diameters; the third in 7 days and 3 hours, at the distance of $14\frac{1}{3}$ Semidiameters; the fourth and outermost performs its course in the space of 16 days 18 hours, and its distance from Jupiter's centre is 25 of his Semi-diameters.

Saturn has no less than seven Satellites; the first or inmermost revolves about him in 1 day and 21 hours, at the distance

distance of $4\frac{3}{2}$ diameters of Saturn from his centre; the second completes his period in $2\frac{3}{4}$ days, at the distance of $5\frac{3}{4}$ diameters; the third, in about $4\frac{3}{2}$ days, at the distance of 8 diameters; the fourth performs his course in about 16 days, at the distance of 8 diameters: the fifth takes $79\frac{1}{3}$ days to finish his course, and is 54 diameters of Saturn distant from his centre. The sixth performs his revolution in 1 Day; and the seventh in little more than 22 heurs, these two are nearest to the planet, but being discovered last are called the sixth and seventh instead of the first and second. The Satellites, as well as the primaries, perform their Revolution from West to East; the Planes of the Orbits of the Satellites of the same Plane are variously inclined to one another, and consequently are inclined to the Planes of the Orbits or their primary.

Besides these attendants, Saturn is encompassed with a thin ring that does no where touch his body; the Diameter of this ring is to the Diameter of Saturn, as 6 to 4; and the void space between the ring and the body of Saturn is equal to the breadth of the ring itself; so that in some situations the Heavens may be seen between the ring and his body.

This surprising phenomenon of Saturn's ring is a moderndiscovery; neither were the Satellites of Jupiter and Saturn known to the Ancients; the former were first discovered by the famous Italian Philosopher Gallieo, by a Telescope, which he first invented; and the celebrated Cassini, the French King's Astronomer, was the first that saw the five Satellites of Saturn; which, by reason of their great distances from the Sun, and the smallness of their own bodies, cannot be seen by us, but by the help of very good glasses.

The six Satellites of *Herschel* revolve about the Planet in the following times: The first in δ d. 21 h. the second in 16 d. 17 h. the third in 11 days, the fourth in 13 d. 11 h. the fifth in 38 days; and the sixth in 107 d. 16 h.

The motion of the primary planets round the Sun, (as also of the Satellites round their respective primaries) is called their annual motion; because they have a year, or the alteration of the seasons, to complete in one of those revolutions. Besides their annual motion, four o the planets, Venus, the Earth, Mars, Jupiter and Saturn, are known to revolve about their own Axis, from west to east: and this is called their diurnal motion. For, by this rotation each point of their surface is carried successively towards

towards, and from the Sun, who always illuminates the hemisphere which is next to him, the other remaining obscure: And, while any place is in the hemisphere illuminated by the Sun, it is day; but when it is carried to the obscure hemisphere, it becomes night; and so continues until, by this rotation, the said place is again enlightened, by the Sun.

The Earth performs its revolution round its Axis in 23 hours 59 minutes; Venus in 28 hours; Mars in about 24 hours and 58 minutes; and Jupiter moves round his own Axis in 9 hours and 56 minutes.

The Sun is also found to turn round his Axis from west to east in 25 days; and the Moon which is nearest to us of all the planets, revolves about her Axis in a month, or in the space of time that she turns round the earth; so that the Lunarians have but one day throughout their year.

The planets are all opaque bodies, having no light but what they borrow from the Sun; for that side of them which is next towards the Sun has always been observed to be illuminated in whatever position they be, but the opposite side, which the solar rays do not reach, remains dark and obscure; whence it is evident that they have no light but what proceeds from the Sun, for if they had, all parts of them would be lucid, without any darkness or shadow. The planets are likewise proved to be globular, because let what part soever of them be turned towards the Sun, its boundary, or the line separating that part from the opposite, always appears to be circular; which could not happen if they were not globular.

٩

The Earth is placed betwixt the Orbs of Mars and Venus. Mercury, Venus, Mars, Jupiter, Saturn, and the Herschel, all move round the Sun; both which may be proved from observations, as fol ow:

1. Whenever Venus is in conjunction with the Sun, that is, when she is in the same direction from the Earth, or towards the same part of the heavens the Sun is in, she either appears with a bright and round face, like a full Moon, or else disappears; or, if she is visible, she appears horned like a new Moon; which Phenomenon could never happen, if Venus did not turn round the Sun, and was not betwixt her and the Earth; for since all planets borrow their light from the Sun, it is necessary that Venus's lucid face should be towards the Sun; and when she appears fully illuminated,

ted, she shows the same face to the Sun and the earth; whence, at that time, she must be beyond the Sun, for in no other position could her illuminated face be wholly seen Further, when she disappears, or, if from the Earth. visible, appears horned; that face of hers, which is towards the Sun is either wholly turned from the Earth, or only a a small part of it can be seen by the Earth; and in this case she must of necessity be betwixt us and the Sun. These observations must be made with a telescope.

Besides the foregoing there is another argument to prove that Venus moves round the Sun in an Orbit that is within the Earth's; because she is always observed to keep near the Sun, and in the same quarter of the Heavens that he is in, never receding from him more than about $\frac{1}{2}$ of a whole circle; and therefore she can never come in opposition to him, that is, the Earth never can be between the Sun and Venus, which would necessarily happen, did she perform her course round the Earth either in a longer or shorter time than a year.

And this is the reason why Venus is never to be seen near midnight, but always either in the morning or evening, and at most not above three or four hours before Sun-rising, and after sun-setting from the time of Venus's superior conjunction, or when she is beyond the Sun, she is more easterly than the Sun, and therefore sets later, and is seen after Sun-setting: and then she is commonly called the Evening Star; but from the time of her inferior conjunction, till she comes again to the superior, she then appears more westerly than the Sun, and is only to be seen in the morning before Sun rising; and is then called the Morning-Star.

After the same manner we prove that Mercury turns round the Sun, for he always keeps in the Sun's neighbourhood, and never recedes from him so far as Venus does; and therefore the Orbit of Mercury must be within that of Venus, and on account of his nearness to the Sun he can seldom be seen without a Telescope.

Mars is observed to come in opposition, that is, the Earth is sometimes between the Sun and Mars; he always proserves a round, full, and bright face, except when he is near his quarters, when he appears somewhat gibbous, like the moon, three or four days before or after the full: Therefore the Orbit of Mars must include the Earth within

it, and also the Sun; for if he were betwixt the Sun and us at the time of his inferior conjunction, he would either quite disappear, or appear horned, as *Venus* and the Moon do in that position.

Mars, when he is in opposition to the Sun, appears to us almost seven times larger in diameter than when he is in conjunction with him; and therefore must needs be almost seven times nearer to us in one position than in the other. For the apparent magnitudes of distant objects increase or decrease in proportion to their distances from us: but Mars keeps always nearly at the same distance from the Sun, therefore it is plain it is not the Earth but the Sun that is the centre of his motion.

Ì

1

It is proved, in the same way, that Jupiter, Saturn, and the Herschel, have both the Sun and Earth within their Orbits; and that the Sun, and not the Earth, is the center of their motions; although the disproportion of the distances from the Earth is not so great in Jupiter as in Mars, nor so great in Saturn as it is in Jupiter, because they are at a much greater distance from the Sun.

We have now shown that all the planets turn round the Sun, and that Mercury and Venus are included between him and the Earth, whence they are called the inferior planets, and that the earth is placed between the Orbits of Mars and Venus, and therefore included within the Orbits of Mars, Jupiter, Saturn, and the Herschel Planet, whence they are called the superior Planets. And since the Earth is in the middle of these moveable bodies, and is of the same nature with them, we may conclude, that she has the same sort of motions:—but that she turns round the Sun is proved thus:

All the planets seen from the Earth, appear to move very unequally; as sometimes to go faster, at other times slower, and sometimes to be stationary, or not to move at all; which could not happen if the Earth stood still*.

The annual periods of the plancts round the Sun are determined by carefully observing the length of time from their departure from a certain point of the heavens (or from a fixed Star) until they arrive at the same again. By these

* This subject, and whatever relates to the Science of Astronomy, is made very intelligible in the 2nd vol. of Scientific Dialogues.

these kinds of observations the ancients determined the periodical revolutions of the planets round the Sun; and were so exact in their computations as to be capable of predicting eclipses of the Sun and Moon, But since the invention of telescopes, astronomical observations are made with greater accuracy, and consequently our tables are far more perfect than those of the ancients.

And, in order to be as exact as possible, Astronomers compare observations made at a great distance of time from one another, including several periods; by which means the error that might be in the whole, is in each period subdivided into such little parts, as to be very inconsiderable. Thus the mean length of a solar year is known even to seconds.

The diurnal rotation of the planets round their axis was discovered by certain spots which appear on their surfaces.

These spots appear first on the margin of the planets' disks, or the edge of their surfaces, and seem by degrees to creep towards their middle; and so on, going still forward, till they come to the opposite side or edge of the disk, where they set or disappear; and after they have been hid for the same space of time that they were visible, they again appear to rise in or near the same place as they did at first, then to creep on progressively, taking the same course as they did before. Spots of this kind have been observed on the surface of the Sun, Venus, Mars, Jupiter, and Saturn, by which means it has been found that these bodies turn round their own axis in the times before mentioned.

It is very probable, that Mercury and the Herschel have likewise a motion round their axis. that all the parts of their surface may alternately enjoy the light and heat of the Sun, and receive such changes as are proper and convenient for their nature; but by reason of the nearness of Mercury to the Sun, and the immense distance of the Herschel from him, no observation has hitherto been made, by which their spots (if they have any) could be discovered, and therefore their diurnal motions have not been deter-The diurnal motion of the earth is concluded to mined. exist from the apparent revolutions of the heavens, and of all the Stars round it, in the space of a natural day. it is much easier to conceive that this comparatively small Globe should turn round its own axis, once in 24 hours, than that such a great number of much larger bodies, some

of

of them so immensely distant, should revolve round it in so short a space of time. The solar spots do not always remain the same, but sometimes old ones vanish, and afterwards others succeed in their room; sometimes several small ones gather together and make one large spot, and sometimes a large spot is seen to be divided into many small ones. But notwithstanding these changes, they all turn round with the Sun in the same time. 1

ļ

1

4

1

Each planet is observed always to pass through the constellations Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, and it also appears that every one has a track peculiar to itself, by which the paths of the six planets form among the Stars a kind of road, which is called the Zodiac; the middle part whereof, called the celiptic, is the orbit described by the earth, with which the orbits of the other planets arc compared.

As the ecliptic runs through twelve constellations, it is supposed to be divided into twelve equal parts, of 30 degrees each called Signs, having the same names with the twelve constellations they run through.

The plane of the ecliptic is supposed to divide the celestial sphere in two equal parts, called the northern and southern hemispheres; and a body, situated in either of these hemispheres, is said to have north or south latitude, according to the hemisphere it is in; thus the latitude of a celestial object is its distance from the ecliptic.

The planes of the other five orbits are observed to lie partly in the northern and partly in the southern hemisphere; so that every one cuts the ecliptic in two opposite points, called nodes; one, called the ascending node, is that through which the planet passes, when it moves out of the southern into the northern hemisphere; and the other called the descending node, is that through which the Planet must pass in going out of the northern into the southern hemisphere. The right line joining the two nodes of any planet is called the line of the nodes.

The names of most of the constellations were given by the ancient astronomers, who reckoned that star in Aries, now marked Υ (according to *Bayer*), to be the first point in the ecliptic, this for being next the Sun when he entered the vernal equinox; at that time each constellation was in the sign by which it was called; but observations show, that that the point marked in the heavens by the vernal equinox, has been constantly going backwards by a small quantity every year; whereby the Stars appear to have advanced as much forward, so that the constellation Aries is now almost removed into the sign Taurus; the said first star in Aries being got almost 30 degrees forward from the equinox; which difference is called the Procession of the Equinox, whereof the yearly alteration is about 50 seconds of a degree, or about 72 years.

All the Planets have one common focus, in which the Sun is placed; for as no other supposition can solve the appearances that are observed in the motion of the Planets, and as it also agrees with the strictest physical and mathematical reason; therefore it is now received as an elementary principle.

The line of the nodes of every Planet passes through the Sun; for as the motion of every Planet is in a plane passing through the sun, consequently the intersections of these planes, that is, in the lines of the nodes, must also pass through the Sun.

All the Planets in their revolutions are sometimes nearer, sometimes farther from the Sun; this is in consequence of the Sun not being placed in the center of each orbit, the orbits being ellipsis.

The Aphelion, or superior Apsis, is that point of the orbit which is farthest distant from the Sun, and the Perihelon, or inferior Apsis, is that point which is nearest the Sun; and the transverse diameter of the orbit, or the line joining the two Apsis, is called the line of the Apsis.

The Plancts move faster as they approach the Sun, or come nearer to the perihelion, and slower as they recede from the Sun, or come nearer the aphelion. This is not only a consequence from the nature of the Planet's motions about the Sun, but it is confirmed by all good observations.

If a right line be drawn from the Sun, through any Planet (which line is called by some the Vector Radius), and be supposed to revolve round the Sun with the Planet, then this line will describe, or pass through, every part of the plane of the orbit, so that the Vector Radius may be said to describe the area of the orbit.

There are two chief laws observed in the Solar System, which regulate the motions of all the Planets; namely,

I, The Planets describe equal areas in equal times; that
is, in equal portions of time the Vector Radius describes equal areas or portions of the space contained within the Planet's orbit.

11. The squares of the periodical times of the Planets are as the cubes of the mean distances from the Sun. That is, as the square of the time which the Planet Atakes to revolve in its orbit, is to the square of the time taken by any other Planet B, to run through its orbit, so is the cube of the mean distance of A from the Sun, to the cube of the mean distance of B from the Sun.

The mean distance of a Planet from the Sun is its distance from him when the Planet is at either extremity of the conjugate diameter, and is equal to half of the transverse diamet.r.

The foregoing are the two famous laws of Kepler, a great astronomer, who flourished in Germany about the beginning of the 17th century, and who deduced them from a multitude of observations. But the first who demonstrated these laws, was the incomparable Sir Isaac Newton.

By the second law, the relative distances of the Planets from the Sun are known; and if the real distance of any one be known, the absolute distances of all the others may thereby be obtained.

Besides the Planets already mentioned, there are other great bodies that sometimes visit our System, which are a sort of temporary Planets; for they come and abide with us for a while, and afterwards withdraw from us for a certain space of time, which they again return. These wandering bodies are called Comets.

The motions of the Comets in the heavens, according to the best observations hitherto made, seem to be regulated by the same immutable law with the Planets; for their orbits are elliptical, like those of the Planets; but vastly narrower or more eccentric. Their orbits have different inclinations to the Earth's orbit; some inclining northwardly, others southwardly, much more than any of the planetary orbits do.

Although both the Comets and the Planets move in elliptic orbits, yet their motions seem to be vastly different, for the eccentricities of the Planets orbits are so small that they differ but little from circles; but the eccentricities of the Comets are so very great that the motions of some of them seem to be almost in a right line, tending directly towards ì

١

ŧ

-

F

1

1

2

towards the Sun. Now, since the orbits of the Comets are so very great that the motions of some of them seem to be almost in a right line, tending directly towards the Sun. Now, since the orbits of the Comets are so extremely eccentric, their motions, when they are in their perihelia, or nearest distance from the Sun, must be much swifter than when they are in their aphelia, or farthest distance from him; which is the reason why the Comets make so short a stay in our system, and, when they disappear, are so long in returning.

The figures of the Comets are observed to be very dif. ferent: some of them send forth small beams, like hair. every way round them; others are seen with a long fiery tail, which is always opposite to the Sun. Their magnitudes are also very different, but in what proportion they exceed each other, is as yet uncertain. Nor is it probable that their numbers are yet known, for they have not been observed with due care, nor their theories discovered, but of late years. The ancients were divided in their opinions concerning them; some imagined that they were only a kind of Meteors, kindled in our atmosphere, and were there again dissipated; others took them to be some ominous prodigies; but modern discoveries prove that they are worlds. subject to the same laws of motion as the Planets are; and they must be very hard and durable bodies, else they could not bear the vast heat which some of them, when in their perihelia, receive from the Sun, without being utterly con-The great Comet which appeared in the Year sumed. 1680, was within 2 part of the Sun's diameter from his surface; and therefore its heat must be intense beyond imagination, and when it is at its greatest distance from the Sun the cold must be as rigid.

The fixed Stars are those bright and shining bodies which, in a clear night, appear to us every where dispersed through the boundless regions of space. They are termed fixed, because they are found to keep the same immutable distance from each other in all ages, without having the motions observed in the Planets. The fixed Stars are all placed at such immense distances from us, that the best of telescopes represent them no bigger than points, without having any apparent diameter.

It is evident from hence, that all the Stars are luminous bodies, and shine with their own proper and native light, clse

Digitized by Google

. 5

else they could not be seen at such a great distance. For the statellites of *Jupiter*, *Saturn*, and the *Herschel*, though they appear under considerable angles, through good telescopes, yet are altogether invisible to the naked eye.

Although the distance betwixt us and the Sun is vastly great, when compared to the diameter of the Earth, yet it is nothing when compared with the prodigious distance of the fixed Stars; for the whole diameter of the Earth's annual orbit appears, from the nearest fixed Stars, no larger than a point, and the fixed Stars are at least 100,000 times farther from us than we are from the Sun; as may be demonstrated from the observations of those who have endeavoured to find the parallax of the Earth's annual orbit, or the angle under which the Earth's orbit appears from the fixed Stars.

Hence it follows, that though we approach nearer to a fixed Star at one time of the year than we do at the opposite, and that by the whole length of the diameter of the Earth's orbit, or 190 millions of miles, yet this distance, being so small in comparison with the distance of the fixed Stars, their magnitude of positions cannot thereby be sensibly altered. Therefore we may always without error suppose ourselves to be in the same centre of the heavens, since we have always the same visible prospect of the Stars, without any alteration.

If a spectator was placed as near to any fixed Star, as we are to the Sun, he would there observe a body as large as the Sun appears to us; and our Sun would appear to him no bigger than a fixed Star, and undoubtedly he would reckon the Sun as one of them, in numbering the Stars. Wherefore, since the Sun different in nothing from a fixed Star, the fixed Stars may be reckoned as so many Suns.

It is not unreasonable to suppose that all the fixed Stars, are placed at the same distance from us; but it is more probable that they are every where interspersed through the vast indefinite space of the universe; and that there may be as great a distance betwixt any two of them as there is betwixt our Sun and the nearest fixed Star. Hence it follows, why they appear to us of different magnitudes, not because they really are so, but because they are at different t distances from us; those that are nearest excelling in brightness and lustre those that are more remote, which give a funter light, and appear smaller to the eye.

Digitized by Google

Astronomers

l

2

ż

ŗ

14 y. 5-

Astronomers distribute the Stars into several orders, or classes; those that are nearest to us, and appear brightest to the eye, are called Stars of the first magnitude : those that are nearest to them in brightness and lustre, are called Stars of the second magnitude; those of the third class are styled Stars of the third magnitude; and so on until we come to the Stars of the sixth magnitude, which are the smallest that can be discerned by the naked eye. Thereare infinite numbers of smaller Stars that can be seen through telescopes; but these are not reduced to any of the six orders, and are only called telescopic Stars. It may be here observed, that though astronomers have reduced all the Stars that are visible to the naked eye into some one or other of these classes, yet we are not thence to couclade that all the Stars answer exactly to some one or other of these orders; but there may be in reality as many orders of the Stars as there are numbers, few of thom appearing of the same size and lustres a stress of 3

The ancient astronomers, that they might distinguish the Stars in regard to their situation and position to each other, divided the whole starry firmament into several as : terisms; or systems of Stars, consisting of those that are near to one another. These asterisms are called constellations, and are digested into the forms of some snimals, as men, lions, bears, serpents, &c. or to the images of some known things, as a crown, a harp, a triangle, &c.

The starry firmament was divided by the ancients into 48 images or constellations; twelve of these they placed 5 in that part of the heavens in which the planes of the planetary orbits are; this part is called the Zodiac, because the constellations placed therein resemble some living creature. The two regions of the Heavens on oach side of the Zodiac are called the north and south parts of the heavens,

The constellations within the Zodiac are, 1. Aries of the Ram; 2. Taurus 8, the Bull; Gemini II, the Twinis; 4. Cancer 23, the Crab; 5. Leo 3, the Lion; 6. Virgo M, the Virgin; 7. Libra 2, the Balance; 6. Scorpio M, the Scorpion; 9. Sagillarius 2; the Archer; 10. Capricornus 19, the Goat; 11. Aquarius 3; the Water-bearer; and 12. Fiscer X, the Fishes.

The constellations on the north side of the Zodiac are thirty-six, vis; the Little Brar, the Great Bear, the Drad

N

Digitized by Google

gon,

gan, Cephens, a king of Ethiopia, the Greybounde, Bootes, the keapen of the Boars Mons Meyelans, Berenice's Hair, Charles's Heart, the Northam Crown, Hereules with his club watching the Dragon; Cerberus, the Harp, the Swan, the Easy the Goose, the Lizard, Cassiopeia, Persius, Andromeda, the Great Triangle, the Lizard, Cassiopeia, Persius, Andromeda, the Great Triangle, the Lizard, Sobieski's Shield, Camelopardus, Antinos, the Colt, the Lynx, the Little Lion, and Musce.

The constellations noted by the ancients on the south side of the Zodiac were the Whales, the River Eridanus, the Hare, Orion, the Great Dog, Little Dog, the Ship Argo, Hydra, the Centaur, the Cup, the Crou, the H'olf, the Altar, the Southern Crow, and the Southern Fish. To these have been lately added the following, viz. the Rhamin, the Crane, the Peacock, Noak's Dove, the Indian, the Bird of Paradise, Charles's Oak, the Southern Triangle, ther Fly, or Bec, the Swallow, the Chamelion, the Flying Fish, Toucan, or the American Gouse, the Water Serpent, and the Sword Fish.

The ancients feigned these particular constellations or figures in the heavens, either to commemorate the deeds of some great man, or some notable exploit or action; or else took them from the fables of their religion, &c. And modern astronomers still retain them, to avoid the conficsion that would arise from making new ones, when they compare the modern observations with the old ones.

Some of the principal Stars have particular names given them, as Syrus, Arcturus, &cc. There are also several. Stars that are not reduced into constellations, and these are called unformed Stars.

Besides the Stars visible to the naked eye, there is a very remarkable space in the heavens, called the Gulaxy, or Milky Way. This is a bread circle of a whitish hue, like milk, going quite round the whole heavens, and consisting of an infinite number of small State, visible through a telescope, though not discernible by the naked eye, by reason of their exceeding faintness; yet with their light they combine to illumine that part of the heavens where they are, and to cause that shining whiteness.

The places of the fixed Stars, or their relative situations one fram another, have been carefully observed by astronumers, and directed into catalogues. The first among the Greeks, who soluced the Stars into a catalogue, was Hipparchus, Hipparchus, who from his own observations, and of those who lived before him, inserted 1022 Stars in his catalogue about 120 years before the Christian Ara; this catalogue has been since enlarged and improved by several learned men, to the number of 3000, of which there are a great many telescopial, and not to be discerned by the naked eye; and these are all ranked in the catalogue as Stars of the seventh magnitude.

It may seem strange to some, that there are no more than this number of Stars visible to the naked eye; for sometimes, in a clear night, they seem to be innumerable. But this is only a deception of our sight, arising from their vehement sparkling, while we look upon them confusedly, without reducing them into any order; for there can seldom be seen above 1000 Stars in the whole Heavens with the naked eye at the same time; and if we should distinctly view them, we shall not find many but what are inserted upon a good celestial Globe.

÷

i

ì

į

I.

Ť

÷

Although the number of Stars that can be discerned by the naked eye are so lew, yet it is probable there are many more which are beyond the reach of our optics; for through telescopes they appear in vast multitudes; every where dispersed, throughout the whole Heavens; and the better our glasses are, the more of them we shall discover. The ingenious Dr. Hook, has observed 74 Stars in the *Pleinde*; of which the naked eye is never able to discern above 7; and in the Orion, which has but 80 Stars in the Britisk catalogue (and some of them telescopial) there has been numbered 2000 Stars.

Those who think that all these glorious bodies were created for no other purpose than to give us a little dimlight must entertain a very slight idea of the Divine Wisdom; for we receive more light from the Moon itselfthan from all the Stars put together.

And since the Planets are subject to the same laws of motion with our Earth, and some of them not only equal to, but vastly exe ed it in magnitude, it is not unreasonable to suppose that they are all habitable worlds. And since the fixed Stars are no way behind our Sun, either in size or lustre, is it not probable that each of them have a system of Planetary Worlds turning round them, as we revolve about the Sun? and if we escend as far as the smallest Star we can see, shall we not then discover inabment by

meie

68 THE YOUNG MAN'S BEST COMPANION.

more of these glofficus, which are now altogether invisible to us; and *ad infinitum*, through the boundless space of the Universe? What a magnificent idea must this raise in us of the Divine Being, who is every where, and at all times present, displaying his Divine Power, Wisdom, and Goodness, to all his creatures !

The next thing I shall proceed to, is to say something in relation to the art of making Dials: but first it may be proper to describe and speak of the use of a very necessary instrument called a *Quadrant*, the shape of which is here represented.



This Quadrant, or quarter of a circle, is useful for various purposes, viz. to take heights and distances, whether accessible or inaccessible: To find the hour of the day, &c.

Description of the Quadrant.

. The outward Arc is divided into 90 parts or degrees (being the fourth part of the circle of the sphere) and

figured from 10, 20, Sc. to 90; above these figures are letters signifying the 12 calendar months in the year; as J for January, F for February, &c. And again over those letters for the months are lines to know the hour of the day; and upon the line G D, are sights of thin brass to be looked through, or for the Sun to shine through, Lastly, in the middle or point of the Quadrant, viz. at A, is a line or thread of silk, fixed through a hole with a plummet of lead at the end of it, and also a small bead in the middle—Some of the many uses of this instrument are as follow:

Of Heights.

Suppose you would know the height of a steeple, tower, or tree; hold up the Quadrant, and view through the sights the top of the steeple, tower, or tree, and then step forward or backward, till you find the plummet hang at liberty just at 45 degrees, that is just in the middle of the Quadrant; then the height of the steeple, towar, or tree, is equal to the distance of your standing-place from the bottom of the steeple, adding for the height that you hold. the Quadrant from the ground.

To find the Hour of the Day.

Lay the thread just upon-the day of the month, then hold it till you slip the small bead or pin's head to rest on one of the 12 o'clock lines, then let the Sun shine from the sight at G to the other at D, the plummet hanging at liberty, the head will rest on the hour-line of the day.

To find the Latitude of a Place nearly.

Hold up the Quadrant, and through the sights observe, in a clear star-light night, the North-Pole Star; the plummet hanging at liberty, the thread will rest on the degrees of latitude of the place-you are in, or where you take your observation.

Of Dialling. DIALLING is a very ancient art, even as old as the time of King Hezefich, where mention is made of the Diat of Ahaz, in the 2d Book of Kings, Chap. xx. ver. 14.

The Gnomon, or Sub-stile of a Post or Horizontal Dial should point directly south, and its back will be then directly N 3

270 THE YOUNG MAN'S BEST COMPANION.

rectly north, the south may be truly known by a good watch or clock, just at noon; for then the sun is always at the metidian, and makes just 12 o'clock; so that knowing the south; the north is then found, it being its opposite.

To fix a Dial North and South.

Fasten your, board on the top of a post, and then with your compass make 4, or 5, or 6 circles, one within the other from the centre or middle, where place a large pin perpendicular or upright, and nicely observe when the Sun shines in the forenoon, on which circle the head of the pin shadoweth; then make there, a mark; and do the same in the afternoon, when the shade of the pin's-head comes on the same circle; and from the midway of the two marks draw a line to the centre, on which place your meridian or 12 o'clock line; so will the post dial point north and south.

He as meridian line you may also know when the moon, or a Star of magnitude, comes to the south; which when they do, they are always at the highest, whether by night or day.

The following Figure represents a Horizontal Dial.



First with a refer draw the line A B, then, cross it in the centre with another line, as the line C D, which is the meridian, or 12 o'clock line: and the first line drawn, till. A B is the six o'clock line: then open, your compasses, and place one foot at the beginning of the degrees, or the arc edge of your Quadrant; and extend the other foot to 60 degrees, and with that extent place one foot in the centre of the Dial at E, where the two first lines cross one another, and draw the semicircle A C B.

Next, having the 12 o'clock line E C, to know what distance must be set off from it, for 1 o'clock and 11 o'clock, being all one; be directed by the following small table, viz.

	5	Ja	. I.	at.
	D.	M.	Но	our.
	11 24	55 26	$\frac{1}{2}$	11 10
	38 53	13 44	3 4	<u>0</u> 8
ļ	71	. 9	5	. 7

In the first column against 1 hour and 11, you find 11 degrees and 55 minutes; which take off the edge of the Quadrant, by setting one foot of the compasses at the beginning of the division under B, and the other foot to 11 degrees 55 minutes; the compasses so opened, set one foot in the circle at the bottom of the 12 o'clock line, and with the other foot of the compasses make a mark in the circle both towards A and B, and from those two marks draw lines fowards the centre, which you may afterwards go over with ink. Then to make the hour lines from 2 and 10 o'clock, book on the table for 2 and 10 hours, where you will find 24 degrees and 20 minutes, which take off the degrees of your Auadrant, and mark as the other from the 12 o'clock line both ways in the circle.

The same is to be done for 3 and 9 o'clock, and also for 4 and 8 b'clock; and the like for 5 and 7 o'clock; and for 5 and 7, 4 and 8, above the 6 o'clock line, set off the same distances as below it.

· · · · · ·

872 THE YOUNG MAN'S BEST COMPANION.

Then for the height of the Gnomons or Stile, admit 52 degrees, take it off the edge of the Quadrant with the compasses as before, and with that extent set one foot at bottom of the 12 o'clock line as before, and extend the other foot in the circle, and make a mark, and then draw a line from thence to E the centre, for the upper edge of the stile, and so raise it directly over the meridian of the 12 o'clock line.

Of upright Planes.

Those Planes are said to be greet or upright which stand perpendicular to the Horizon of the place, whose upper part points to the Zenith, and their lower part to the Nadir; and such are the walls of houses, churches, steeples, &c. against which Divis are commonly made.

To draw the hour lines on a direct south plane, in the latitude of 31 deg. 32 min. as described by the following Figure.



First, draw the circle ZEWN, representing, an unright direct south plane; next cross it with the diameters ZQN. for the meridian, or 12 o'clock line; and IFQE function. prime vertical circle, or hour-line of six,

Secondly, out of your line of chords take 38 degrees 28 minutes (the complement" of the latitude of the place), and set that distance on the Dial Plane from Z to Q, and, from E to b, and from N to e.

Thirdly, lay a ruler from IV to Q, and it will cut the meridian ZN in the point P, the pole of the world; and a ruler also laid from IV to b will cut the meridian in A. which is the point through which the Equinoctial must pass: for the drawing of which you have three points given, viz. E Æ and W. and the centre will always be in the meridian line Z N.

Fourthly, divide the semicircle ENW into 12 equal parts as the points 000, &c.

Fifthly, lay a ruler to Q in the centre, at each of these points 000, and the ruler will cross the equinoctial circle in the points *** &c. dividing them, into 12 unequal parts.

Sixthly, lay a ruler to P (the pole of the world) and every one of the marks*** &c. and the ruler will cross the circle of the plane in the points | | &c.

Lastly, if through the centre Q and the respectivo points | | | &c. you draw right lines, they will be true Hour-lines on an erect south plane. For the Onomon or Stile, take 38 deg. 28 min. out of the line of chords, and set them from N to e, drawing the line Q e for the axis of the Stile, which must hang directly over the meridian or hour-line of 12, and point downwards to the south pole. because the plane beholds the south part of the meridian.

In making this Dial you make two Dials; for the crect direct North Dial is but the back-side of the south, for as this beholds the south part of the meridian, so the other faces the north part of the meridian; and as the meridian. line in the south Dial shows when it is 14 o'clock at noon. so the back side thereof, viz, the north side, represents the hour-line of 12 o'clock at midnight, and therefore not expressed, nor the hour-lines of 9, 10, 11 ut night, or of 1, 2, or 3, in the morning, the Sun being never seen by us above:

The Complement of any Arc is what that Are wants of 90°. Thus the Complement of 51° 32' is 38° 284 N 5.

.

1

the -

274 THE YOUNG MAN'S BEST COMPANION.

the horizon at those hours: so the north Dial is capable of only receiving the hours of 4, -5, 6, 7, and 8 in the morning, and the same at **night**; and (in this latitude) not all of them neither; for it shines not in this plane at 8 in the morning, nor at 4 in the afternoon; but it is best to put them down as in the following figure, to know how much it is past in the morning and what it wants of 5 in the afternoon.

An crect North Dial.



Having given these examples as specimens of the mechanical structure of dials, I will now point out the method of performing the like by the globe.

To construct a horizontal dial by a globe, elevate the clobe to the latitude of the place, say 53% the latitude of London; turn it till some particular meridian comes to the north point of the horizon; set the index to XII. now turn the globe till the index points to I. and the meridian will cut the horizon in the number of degrees from the north point that I. is distant from XII. and so on with respect to the the other hours, and it will be found that the first meridian of the globe cuts the horizon in the number of degrees from the north to the east, viz. $11\frac{1}{2}^{\circ}$; $24\frac{1}{4}^{\circ}$; $38\frac{1}{12}^{\circ}$; $53\frac{1}{2}^{\circ}$; $71\frac{1}{13}^{\circ}$ and 90°, which are the respective distances of the hours I. II. III. IV. V. VI. from XII. in the plane of the horizon. The same is to be done with regard to the morning hours, and, being transferred to the horizontal plane, on which is fixed a gnomon, the dial is complete.

OF BEAUTIFYING AND COLOURING DIALS.

First, the boards are to be brushed over with Linseed Oil, thinly ground with Spanish brown, done over three or four times (drying between each time), a little thicker cach time with the colour, and this is called Priming.

TO MAKE THE FAT OIL FOR DIALS.

Boil Red-lead, and Linseed Oil, and a little litharge of Gold (about a penny-worth), together, till almost us thick as syrup; and when cold, and well settled, pour the clearest into a bottle or bladder for use.

THE GOLD SIZE FOR DIALS.

Mix fine ground yellow Ochre with the aforesaid fat oil to such a consistency as when used it may settle smooth of itself.

A MIXTURE FOR HOUR LINES.

Grind Vermiliun or Lamp-black with the fat Oil.

To DRAW GOLDEN LETTERS OR FIGURES FOR THE Hours.

First draw them with a Vencil dipt in the Gold Size before mentioned; and when so dry as to stick to your fingers, then with a smooth-edged penknife shape your leaf-gold to your mind; take it up with a piece of cotion cloth fixed to the end of a stick, and lay it on the size, pressing it down with the same cotton, and when dry brush off the loose gold with a feather. and smooth the rough edges of the letters with a pencil dipped in red or black colours. N 6

276

THE YOUNG AMAN'S BEST COMPANION.

OF THE DIAL PLANE.

Let the board be of the best seasoned, firmest, clearest, oak, one, two, or more feet square, and about three inches thick. Take two boards, and get them planed on both sides, and then laid in the sun-shine, or near a moderate fire, two or three days together, then plane them again, and fix them with good joints, and fasten them in gluing with wooden pegs, as you may have seen coopers fix their pieces of heading to their casks, and when thus glued and dried, plane them again, and then fasten them, by nailing two small plates of iron or tim on the back. If you cannot get seasoned wood, but green, then boil it about an hour in water, to make it tough and keep it from warping. In the general, wood is accounted better than stone, because it keeps the colouring more staunch or firm.

Before you colour your Dial-plate or board, fix your iron stile of 38 degrees (which indifferently serves for all England), and having marked your hour lines with ink, Jasten a nail at the end of each hour-line, that the head of each nail may shadow or direct you to the centre when it is coloured. And as it may happen that golden letters or figures may decay in a few years, you may on that account make them with a white lead paint, painted with rell in a black (margin. When your Dial is finished out dry, dip a feather in your oil, and anoint it thinly; for the finer you max or grind the colouring with the oil, the more beautiful it appears, though not so lasting.

These hints of colouring Dials, and atter very necessary, remarks relating to mixtures of colours, dying of stuffs, &c. are collected from Mr. Salmon's Polygraphice.

Or Colours.

1

Whites, are Ceruse, Flake-white, and White-lead ...

Blacks, are Lampblack, burnt Cherry-stones, and old Itory burnt.

Reds, are Red lead, Vermilion, Red Ochre, and Indian Lake.

Greens, are Verdigrise, Verditure, and Sap-green, made of the Juice of Buck-thorn Berries

Yellows, are Suffron, Yellow-pink Gamboge. Brown, is Umber burnt. Gold Colour is Orpiment.

Again, Verdigrise with a little Sap-green, makes a good and bright green. Blues, are Ultramarine, Smalt, Indigo, and blue Bice.

OF MIXING COLOURS.

Colours are mixed by being ground on a stone with clear water, severally, and dried and kept in paper bags for use ; except Lampblack, Saffron, Smalt, Gamboge, and Sup-green. Blue. to compound, temper a little Indigo and Smalt, with

oiL

A light Blue, mix Smalt and White-lead together.

Lead-Colour, mix Lumpblack and White-lead together, on a marble.

A Fox Colour is Umber burnt.

Gold Colour, is Orpiment mixed with fat oil, by a knife on au earthen plate, or gally-tile rather.

To hinder colours from cracking put oil of Walnuts in them.

Yellow Colour, beat Suffron, to powder, and steep it in Vinegar. Or take the yellow Chives in White Lilies and Gume water mixt for writing.

Red, Vermilion with Gum-water mixt for writing.

Golden Letters, to write ; mix Vermilion and Gum Ammoniac with yolks of eggs.

OF DYING WOOL, STUFFS, &c.

To dye Blue, take wood one pound, and mix it with four pints of boiling water, and steep whites in it 24 hours.

To dye red of a clear colour, take 60 pints of water wherein bran has been steeped 14 hours, and when strained, distblue two pounds of alum, and one pound of tartar; in which water boil what you have to dye for two hours; then take it out, and boil it in hulf as much fresh water, with bran, viz. 30 pints; to which add madder three pounds, and so perfect the colour with moderate warmth without boiling

To dye Green. First make a yellow by the direction underneath ; then take 60 pints of water, wherein bran hath been 'soaked', aforesaid ; then strain it ; let three pounds of alum be dissolved in it, and then boil what you have to dye in it for two hours. L. To To dye Yellow, take woad, two pounds of the said water of bran, and boil till the colour is good.

And if you would turn the said Yellow to Green, put the stuff into the aforesaid Blue Dye.

To dye a Sand Colour, add Log-wood to the Black Dye before mentioned.

To dye linen or thread, &c. light red : Take pouler of Brazil and Vermilion, of each one ounce, boiled in alum waler.

To dye linen or thread yellow, dissolve gumboge in alum-wa ter, Sca

To stain skins blue, boil elder-berries, and with the liquor brush over the skins, and wring them; then boil the berries in alum-water, and wet them twice over.

OF MONEY.

ř

The current coin of this nation is either made of Copper, Silver, or Gold. Of Copper is made the Farthings, Halfpence, Pence, and Two-pences. Of Silver the Pennies, Two-pences, Three-pences, Groats, Sixpences, Shillings, Half-crowns, and Crowns. But there is very little Silver' coined below the Sixpence. Of Gold is made the Quarter-Guinea, the third of a Guinea, or Seven Shilling Piece, the Half-Guinea, the Guinea, and Five Guinea Pieces. There are also some few ancient pieces of Gold, of a pale volour, as being alloyed with Silver, and therefore may be reckoned the best, and sometimes called Angel or Crown Gold; but the Old Gold, or bread Pieces, are mostly alloyed with copper, which makes them of a reddish colour.

IMAGINARY MONEY.

We appropriate several names to money of which there are no coin, as,

The	Pound	• •		 - 0	(20s.	Oď.
The	Mark			 	13	4
The	Noble,	or	Half-Mark	 	6	8
The	Angel		سندر رخب	 	10	0

In England accounts are kept in Pounds, Shillinge, and Pence Sterling; and their marks are derived from their name in Latin, viz. *l.* for Libræ, or Pounds; s. for Solidi, or Shillings; d. for Denarii, or Pence; qr. for Quadrantes, or

or Farthings, four making a Penny; and expressed or set l. s. d. gr. down thus: 4 16 8 2

 $l.4 - 10 - 8 = \frac{1}{2}$: hat better thus. The Mark for pounds standing before the sum denominates the first number, and the others are known of course; for after pounds follow shillings, and after shillings succeed pence, &c. When the price of any thing is shillings and pence, it is - set down thus: · #. d.

or thus: 4s. 6: and when shillings and pence, and parts of a penny, expressed thus : s. d. 6#

б.

or thus, 4s. 6d1. The latter way by some is accounted the neater, and the best way to express parts of a penny? or farthings : thus.

1 a farthing, or one fourth part of what it follows.

4 a halfpenny, or one half of what it follows.

1 three furthings, or 3-4ths or qrs. of what it follows.

And being thus set fraction-wise, the under figures show how many parts of the quantity before it is divided into, and the upper figures show how many of those under parts the fraction stands for; as thus, $\frac{1}{2}$ an ell, $\frac{3}{2}$ of a foot, or 9 inches; and the same of a shilling is 9 pence; of a pound is 15s. Yds

If you are to set down 6 yards and a half, write thus, 64 C. 191

Ninetcon Hundred three Quarters thus,

Sixteen Pounds and a Quarter thus,

or else thus, 19 C. 2, 16 1b. 1, 5 feit 3, 14 days 2. Here the name is put between the whole number and the fraction, which I think is the plainer and better way: for exsimple, 61 Hhds. may, through ignorance or wilfulness, be tead 6 hulf Hhds, as well as 6 Hhds. and half.

Digitized by Google

Table

Ь,

164

280	Тне	Your	ig Mai	s Br	вт'Сом	PANIC	N.		•
1.2 1 9	i ar	ble of	the Valu	e of G	old and	Silter.		• •	
	X L	Pound	IS WOLL	n i i		- <i>z</i>	43	. u	0
Gold	2 1	C Anuce		-		.	4	U U	0
		Penny	weight.	-		- •	0	4	0
		Grain				4 '	0	0	2
	CT	Pound	is wort	h y ≤ -#i		• . •	3	0	0
Silver	y i	Ounce	<u>بند : از او</u>			• .	0	5	0
witter	1. 1	Penny	weight	· · 🛁	جہ دارے ہ		0	0	3
	E 1.	Grain	ن ۔ آ	د		•	:0	0	ł
N. H	3. The	Price o	f the Pre	tiou b M	etals vari	es conti	nual	y,	•
A Table	for bar	fing ou	selling	my Cos	modity	ry the G	reat	Hur	n-1
		dre	d, which	is 119	Pounds_	-			I
d. q	. s. d.	d.q.	l. s. d.	d.q.	l. s. d.	d q.	1	- d.	T
0.10	2.4		2 18 4		5 14 4	ļ ,	8	10 4	
20	4 8	12	3 6 8	1 . 2	5 16 8			12 8	ł
30	7.0	3	3 3 0	3	5 19 4	3	8	15 0	
1 6 0	94	70	3 3 4	13 0	6.14	19 0	8	17 4	i I
10	11.8	1. 1.	3 7 8	1	U 38	1	8	19 8	1
20	14 0	2	3 10 0	2	6 6 0	2	9	20	Ì
30	10 4	3	3 12 4	3	0 84	3.	9	44	
2.00	18 8	80	3 14 8	. 14 0	6 10 8	20 0	-94	08	
	2 4		3 10 4		6 15 4		9	90 11 A	
- 31	5 8	3	4 1 8	3	0 17 8	3	a a	13 R	
3 01	8.0	0.0	4 4 0	15 0	7 0 0	21.0	å	16 0	
11	10 4	1	4 6 4	1	7 24	1	. ğ	18.4	
- 24	12 6	្ទ	4 8 8	2	7 4 8	2	10	0 8	
81	15 0	. 3	4 11 0	3	7.70	• 3	10	30	1
. 4 0 1	17 4	10 0	4 13 4	16 0	794	.22 0	10	54	·
11	19 8	1	4 15 8	1	7 11 8	1	10	78	1
23	2.0	2	4 18 0	2	7 14 0	2	10	10 0	" f
5 0 2	44	3	5 0 4	3	/ 10 4	3	10	13 4 17 0	1
0 0 2	60.0	11 0	5 5 6	4/ 9	9 1 0		10	17 0	
qua	11 2	9	5 7 4		8 3 4		10	10 A	
. 32	13 8	3	5 9 8	3	8 5 8	3	11	1.8	1
6.02	16 Å	12 0	5 12 0	115 0	8 - 8 -0.	24 .	11	4.0	
	7.11	10 11 11	EV AN	ADIE					-

EXAMPLE.

First, at 5d. 2q. the Pound; what is the Great Hundred? Look in the Table for 5d. 3q. in the first column, and against it in the second you shall find 2l. 13s. 6d. and so much will 112 pounds cost. Again, if a hundred weight cost 4l. 8s. 8d. find 4l. 8s. 8d. and against it, in the Column towards the left hand, you will find 9d. 2q. and so much it is by the pound.

Note. For every farthing that one pound doth cost, reckon two shillings and fourpence, and that is the price of the great hundred. INTEREST

																													1
		•	61	•	. 'q	• •		•						•	•							• 🕶			,				
		•		2	····			<u>_</u>		~	~	~	~		~	~	^	<u>ہ</u>	~	<u>,</u>	<u>,</u>	ò	0	0	õ	ົດ	0	0	ວ່
		فرآ	0	č	č	U	;	0	U	۷	č	ĭ		Č	č		Č	•	Č	Č	Ĩ				-	-	_	~	
<u>S</u>	1	14	4,	4	101	*	180	Ø	2	00	9	ġ	Q ,	õ	9	5	O,	ទួ	Ð	Ë,	ġ,	0	Ö	Q	•	°,	0	0	•
Ľ.	<		0	0	0	o	0	0	0	¢,	0	0	1	Ϋ́	~	-	m	m	+	-	Ś	2	3	0	S	0	ŝ	9	4
5	-	te	m	-	m	m	m	3	m	m	Ē	3	-	T	1 1,	h	-		17	16	F.	-	-	-		r.	H	<u> </u>	2
~	N.	13	6	н		m	4	Ś	و	~	80	σ,	*	m		~	-	0	0	بر	ы.	۹n	1	2		7	é	o,	1
a	ď,		_	_	-				_	_		4	•	ينيا.	-		2	5	-	Ŕ.		نە ،	eit.	-	ĥ	6	~	Ś	3
2	ŗ	2	0	2,	.0	•	, 9 ,	.0	0	-	ř	•				Ē.			Ţ		4	Ŧ,		m			~		-
E	E	~	Ò	ò	°,	°,	۵	0	0	0	0	°,	°°	0	0	ø	ø	~	0	0	2	<u> </u>	-	2	4		- 	e1	
ät	·	15							-	H	-	-	-	63	H	4	m	-	4	स्र	ر س	**	m	ø	1	**		-	
E	ay	5	•							0	0	0	0	0	H	н	۳.	₩.		ы	ς,	ю.	1977	-	TT	4	2		4
	e l									0	Q,	ò	٥	0	٥	٥ '	' 0	ò,	0	¢٢	Ò,	Ô,	9	"	₩.	4	•	61	Ś
E J	n n	Ι.								^		<u>`</u>	·· ·	0	á	, i	ം റ	0	0	0	i 1 0.	ď	ò	6	2ł	6	•	5	0
Ę	~	1				_		_	<u>,</u>	_	-	<u>-</u>		-	~	-	-	ŗ	5	ğı	Ţ	÷	0	5	0	0	0	0	5
4	.10	d	5	(4	5	4	5	0	1.0	Å,	0.	ų	ě	š	¥	Š	ö	ř.	ŏ	ŏ.	ğ	ğ	ğ	4 4	Š,	ğ	Ř,	δ.	ĝ,
	-131	nd					-			÷	-	<u>.</u>	ينيك	<u>.</u>	خذ			÷	÷	-			-	36	-	-			-
		15	N		**	-		41		ŝ					í,	١.		,			Á	~	1	ก่'	` ~`	ĥ		0	0
6	La la	5	э.	5	-7	4	0	σ.	. 15	•7	"	0	0		0	0	9	٦,	Ŧ,	Υ.	Ŭ,	Ň	Ξ,	J,	ν,	1	ĩ	•	
-	2		0	H	61	က	-7	4	Ś	ø	-	∞.	2	+	1	p	6	9 .	۰,	1	e,	0	٩.	2	9	°r	0	0	0
nt	¥		0	n	0	0	0	0	0	0	0	0	0	-		* 2 '	4	Ν,	ŝ	<u>.</u>	-	LØ	9	£	8		þ	2	£
ບັ					-	-			•	-	-	m	m	Ŧ.	-	E	-	-	÷	-	=	5	-	-	4	i m			
5	ŝ.	2	0		-	m	•	-	ŝ	ø	5	1	ŝ	, m	F	m	*	ŕ	m		Ģ.	ê	έφ.	ę.	<u>0</u>	Ś	9	2	ч
<u> </u>	5	P	-	-	1			_	_	2	_		-	-	·		-		•~	3	ما		•	ub.			ŵ	•	6
3	E	-	0	D	0	0	Ö	0	0	0	0	0	_		**		•••			<i>ד</i> t	-,	27	1	T	Ħ,	Ф,	-	-	
.9																			-	-1	-	4	-	·					
1	E 1	~	0	٥	0	٥	٥	0	0	0	•	•	<u>.</u>	٠	Ò	0	•	9	0	ð	0.	6	0	щ	pí	i fin	N.	61	2
at F	E	1	<u> </u>	<u> </u>	•	0	0	0	0	0	0	0	0	•	٥ ۲	0	0 म	0	0	6	0. 4	5	0	.ศ เส	ні Г.				2
T at I	E.ye	1	0	0	-	0	•	<u> </u>	0	0	•	0 1 0	0 1 0	ý Na	-	0 1 4	0 4 4	. 1 3 0	0	6 5	0 11 11	3	2	ন ন পু			7 11 10	2	1 2 2 2
EST at I	Day. [1]	1. A. J. L	0	-	~	•	0	<u> </u>	•	0	l o	0 0 1 0	0 2 0 0	0 <u>0</u>	0 = 0	0 1 0	0 4 4 6	0.130	0 :	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 11 11 10	0 2 2 0	0 0 0	ন ন পু				101	z z 11 1
LREST at F	De Dey. [1]	4. 5. 1	0	<u> </u>	• 	•	•	<u>م</u>	•	0	0	0 0 0 1 0	0 0 0 1 0	0 0 <u>0 3</u> •	0 0 1 1 0	0 1 4 0 0	0 	0 0 1 3 0		0 4 5 5 6 7 6 7 6 7 6 7 6 7 7 7 7 7 7 7 7 7		0/01 2 1 0/0	0 0 0	5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				9 1 0 2	3 I 11 3 3
trrest at I	One Day. [1]	1 . 4 5. 1	0	•	- - -	•	•	• •	0	0	0	0 0 0 10	0 0 0 2 0	0000	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0	0 0 0 1 3 0		0 0 0 0		0 0 0 3 4 6	00000	1 A 9 0 0 0				0 1 0 0	01 3 I 1 1 3 3
INTEREST at F	One Day. [1]	P 1. e. d. f. l	£1 0	0 7	3, 0	4	د	0 9	2	0	6	IO O O DIO	20 0 0 2 0	30 0 0 0 3 0	40 0 0 1 0	50 0 0 ± 1 0	60 0 0 t 1 0	70 0 0 1 3 0	80 0. 0 08	90 00 1 2 1 0 06	100 0 6 4 F G	200 0.0 3 1 6	300 0 0 3 3 0	400 0 0 10 21 1	500 0 F 1 1	fool of I a B F		2 0 1 0 2	9001 3 I 11 2 2 2
LINTEREST at I	Core Day. [1]	2 2 1 4 5 1	£1 0	2	3, 0	4 0	<u>د</u> .			0	6		20 0 0 0 2 0	30 0 0 0 3	0 = 0 0 0 F	50 0 0 ± 1 0		70 0 0 1 3 0		90 00 30 30 90		1 200 0 0 0 3 E C	300 0 0 7 3 0	400 0 0 20 21 5				2 0 I 6 00g	H 9001 3 I HI 3 3
WEINTEREST at I	Core Day. T	5 2 2 1	£1	1 2 0	0 = 1 31 · 0	1 3 1 4 1 0	· · · · ·		0 1 1 1	2 0	1 3 1 3 1 0 I 0		0 1 20 0 0 2 0	0 1 30 0 0 0 3 e	0 1 0 0 0 1 0	0 1 20 0 0 4 1 0	0 0 0 0 0 0 0	0 1 70 0 0 1 3 0		90 00 00 00 00 00 00 00 00 00 00 00 00 0		0 H 200 0 0 0 3 H 6	0 1 300 0 0 0 3 3 0	0 400 0 0 0 10 1 1				2 0 1 6 00g 0	O H BOOI 3 I TI 3 3
or W.INTEREST at I	at. 12 Obe Day. T	4. J. 2 2 1. e. d. J. 1	7 21	2 1 2	9 - 3 - 0	4 3 4 0	0	7 6	2 1 7	9 2 1 0	4 31 - 0	O I I O O O I I O	0 20 0 0 2 0	0 30 0 0 0 3 •	0 1 10 0 0 1 0	0 2 30 0 4 1 0	0 00 00 00 0	0 1 70 0 0 1 3 0		0 H 2 H 20 00 H 0 1		0 0 1 200 0 0 0 2 1 6	0 1 300 0 0 0 3 3 0	2 0 1 400 0 0 10 1 1				2 0 1 6 000 0 C	0 H 0001 3 I HI 7 2
for Wilnterest at I	Yeat. 2 One Day. [1]	2. 4. J. 2. 2. 4. J. 1.	0 7 21	1 2 1 3 V	1 9 - 1 3 - 0	2 4 3 4 6	3055	47 1.6	4 2 1 7 . 0	A 9 2 1- 8	5 4 34 9 S		12 0 1 20 0 0 21 0	18 0 1 30 0 0 b 3 e	+ 0 1 +0 0 0 F 0 +	IO 0 1 30 0 0 1 0	10 0 1 00 0 0 F F 0	2 0 70 0 0 1 3 0		11 0 1 2 3 30 00 1 0 11	0.0. 100 0. 6 4 5 0	··· 0 0 1 200 0 0 0 3 1 C	. o o H 300 o o o 3 N o	- 0 0 400 0 0 10 M 1				2 0 1 6 00g 0 0	0 0 H 0001 3 I HI 3 3
nt. for WillNtEREST at F	AYeat. 2 One Day. TT	L	0 0 1 7 1 0 0	0 1 2 1 2 0	0 I 9 - 1 3 . 0	0 2 4 3 4 10	03055	0 4 7 1. 6	0 4 2 1 7 0	0 4 9 2 5 8	0.5 4 34 9 9		0 12 0 1 20 0 0 0 2 0	0 18 0 1 30 0 0 b 3 e	1 4 0 1 40 0 0 8 9	1 IO 0 500 0 410	1 16 0 1 60 0 0 0 1 1 0	2 2 0 70 0 0 1 3 0		2 11 0 1 90 00 2 2 9 0	3 0 0 1 100 0 0 0 0 0 0 0 0 0 0		9 0 0 1 300 0 0 0 3 8 0	12 0 0 1 400 0 0 10 1 1				2 0 1 6 000 0 0 7z	27 0 0 H 9001 3 I FI 3 2
Cent. for WillNEREST at F	AYeat. 12 Obe Day. 11	1 L 2. 2 5 2 2 1. 0. 2 5 1.	2007 21	0 1 2 1 2 1 0	3 0 I 9 5 3 3 0	10 2 4 3 4 10	30 30 5 5	z 0 4 7 1, 6 . to	0 4 2 1 7 0	2049258	10.5 4 34 9	3060110000010	3 0 12 0 20 0 0 0 20 0	3 0 18 0 1 30 0 0 b 3 e	1 I 4 0 I 40 0 0 E 0	2 1 10 0 5 50 0 0 1 0	5 1 10 0 1 00 0 0 T 1 0	1 2 2 0 70 0 0 0 1 3 0		1 2 1 0 1 90 0 4 2 1 0	3 0 0 10 100 0 0 0 0	1 .e. o o H 200 0. 0 2 H C	2 9 0 0 1 300 0 0 0 3 0	2 12 0 0 400 0 0 10 1 1	315 0 0 500 0 1 315			1 27 0 0 900 0 1 0 2	ziz 0 0 H 0001 3 I HI 3 2
er Cent. for WillNterest at F	wys AYear. 2 One Day. 77	d. J. L. d. J. Z. B. L. a. d. J. L	02007 21 0		13 0 195 3 (0	21024344	2303015	3 2 0 4 7 1. 6 . 0	4 0 4 2 1 7 7	42049258	2 1 0 2 4 3 1 0	530 6 0 1 10 0 0 P 1 0	13 3 0 12 0 1 20 0 0 21 0	53 0 18 0 1 30 0 0 0 3 0		5 2 1 10 0 1 50 0 0 1 0	11 5 1 10 0 H 60 0 0 0 1 N 0	5 1 2 2 0 70 0 0 1 3 0	11 I 2 8 0 H 80 0 0 H 10	5 1 2 1 0 1 90 00 2 2 1 0		10 1 - 0 · 0 + 200 0 · 0 2 1 C	9 2 9 0 0 1 300 0 0 9 3 0	8 2 12 - 0, 0 1 400 0 0 10 2 1 1	7315 0 0 1 500 0 to 3 1		3 7 0.0 1.000 1.0 1.	2 1 27 0 0 1 6 000 0 1 0 1 2	7 2 1 2 1 1 1 2 0 0 4 8001 3 1 1 1 3 2 3
per Cent. for WillNEREST at F	yDays AYear.	· d. S. L. s. d. S. 12 2 4. s. d. J. L	0 0 2 0 0 7 2 1 2 1 0		0, 13,0 19 5 3, 0	0 2 1 0 2 4 3 4 4 0	0 230 3 0 5 5	3 a a b b b b b c c c c c c c c c c	0 4 0 4 2 1 7 7	0 4 2 0 4 9 2 1 8 8 0			0 13 3 0 12 0 1 20 0 0 2 0	1 5 3 0 18 0 1 30 0 0 0 3 e		3 5 2 1 10 0 5 50 0 0 1 10	2 11 2 1 10 0 H 60 0 0 1 3 0	3 5 4 2 2 0 70 0 0 0 1 3 0	3 11 1 2 8 0 H 80 0 0 4 0	4 5 1 2 1 4 0 1 90 0 4 2 1 0	4 II 3 0 0 1 100 0 6 7 1 0	9 10 1 - 0 · 0 4 200 0 · 0 2 1 C	+ 3 2 9 . 0 0 H 300 0 0 0 3 0	9 8 2 112 . 0. 0 1 400 0 0 10 21 1	4 7 3 15 0 0 1 500 0 1 3 1			6 2 1 27 0 0 900 0 1 0 1 2	7 7 2 22 0 0 H 0001 3 I 11 3 3
ree per Cent. for WillNtEREST at I	irtyDays AYeat. 2 00c Day. [1]	a. d.f. L. a. d.f. 2 B L. a. d. f. L	0 0 2 0 0 7 2 1 0	0 1 0 1 2 1 2 0	0 I 3 0 I 9 5 3 3 0	0 2 1 0 2 4 3 4 4 0	0 2 3 0 3 0 5 5	5 3 2 0 4 7 1 6 0	0 4 0 4 2 1 7 7	D 4 2 0 4 9 2 5 8	0 2 1 0 .5 4 31 9		0 11 3 0 12 0 1 20 0 0 2 0	1 5 3 0 18 0 1 30 0 0 0 3 0	1 1 1 1 1 1 4 0 1 40 0 0 F 0	1 2 5 2 1 10 0 1 50 0 0 1 10	2 11 2 1 10 0 1 00 0 0 1 3 0	3 5 4 2 2 0 70 0 0 0 1 3 0	0 3 11 1 2 8 0 8 80 0 0 0 0 1 4 0	0 4 2 1 2 1 0 1 90 00 4 2 1 0		0 10 1 .0 · · · · · · · · · · · · · · · · · ·	0 1+ 0 3 0 0 1 300 0 0 0 3 0	0 19 8 2 12 - 0, 0 4 400 0 0 10 24 5	(4 7 3 15 0 0 1 500 0 1 3 1 1			1 14 5 1 24 0 0 1 800 0 1 0 2	5 7 7 5 1 5 1 0 0 4 8001 3 1 11 3 3
l'hree per Cent. for WillNturest at I	ThirtyDays AYear.	1. a. d. 5. L. a. d. 5. 2. 9. a. d. 5. 1	0 0 0 2 0 0 7 21 0	0 0 1 0 1 2 1 2	0 0 1 3 0 1 9 5 3 3 0	0 0 2 1 0 2 4 3 4 4 0	0 0 2 3 0 3 0 5 5	0 0 3 2 0 4 7 6 6	0 0 4 0 4 2 1 7 0	0 9 4 2 0 4 9 2 5 8			0 11 3 0 12 0 1 20 0 0 2 0	0 I 5 3 0 18 0 1 30 0 0 0 3 0	0 1 11 2 1 4 0 1 40 0 6 7 0	0 2 5 2 1 10 0 5 50 0 0 1 0	0 2 11 2 1 10 0 1 00 0 0 1 3 0	0 3 5 1 2 2 0 1 70 0 0 1 3 0	0 3 11 1 2 8 0 H 80 0 0 4 7 0	0 4 5 1 2 1 0 1 90 00 2 2 1 0		0 9 10 1 .6 0 0 H 200 0 0 1 1 00	1 0 1 + 6 3 6 . 0 0 1 300 0 6 9 3 0	1 0 19 8 2/12 0 0 1 400 0 0 10 2 1	1 1 4 7 3 15 0 0 1 500 0 to 1 7 1		X 14 3 71 6.0 1.000 1. 6 1 2	1 14 5 124 0 0 800 9 I 0 2	3 5 7 7 5 52 0 0 H 3001 3 I FI 3 2
at Three per Cent. for Wilntenest at I	(. ThirtyDays AYear. 2 One Day. T	F. L. a. d. F. L. a. J. 2 2 1. a. d. F. L	0 0 0 2 0 0 7 2 1		0 0 I 3 0 I 9 5 3 3 0	0 0 2 1 0 2 4 3 4 4 0	0 0 2 3 0 3 0 1 5 0	0 0 3 2 0 4 7 6 6	0 0 4 0 4 2 1 7 7	0 9 4 2 0 4 9 2 5 8		4 a o 3 3 o 6 o 11 10 o o b 1 o	0 1 0 0 1 3 0 1 0 1 20 0 0 0 1 0	32 0 I 53 0 18 0 1 30 0 0 0 3 0	3 0 1 11 2 1 4 0 1 40 0 0 E 7 0	3 0 2 5 2 1 10 0 5 50 0 0 1 0	1 0 2 11 2 1 10 0 1 00 0 0 0 1 1 0	[1] 0 3 5 4 2 2 0 1 70 0 0 0 1 3 0	1 2 0 3 11 1 2 8 0 1 80 0 0 5 5 1 0	13 0 4 2 1 2 1 4 0 1 90 0 4 2 1 0		3 3 0 0 10 1 .0 0 4 200 0 0 1 1 CO	53 0 14 9 2 9 0 0 1 300 0 0 7 3 0	7 3 0 19 8 2 12 0, 0 1 400 0 0 10 21 5	9 3 I. 4 7 3 15 0 0 1 500 0 1 3 1	13 1 6 7 18 0 0 1 tool 0 1 3 1 E	I 3 I I 4 3 51 6.0 1.200 0.1 9 I 7	3 3 1 14 5 1 z4 0 0 800 9 1 0 2	5312 4 4 2127 0 0 H 9001 3 I HI 21 2
r at Three per Cent. for Wilntenest at I	Day. [ThirtyDays] AYcar. 12 One Day. [7]	d. f. e. d. f. L. e. d. f. 2 2 2 1. e. d. f. L	0 0 0 2 0 0 7 2 1 0		0 0 1 3 0 1 9 5 3 3 0	0 0 2 1 0 2 4 3 4 4 0	0 0 2 3 0 3 0 5 5	0 0 3 2 0 4 7 1 6 1	0 0 4 0 4 2 1 7 . 0	0 9 4 2 0 4 9 2 5 8	0 0 2 1 0 5 4 34 9		010013012 0 2000 0 200	0201530180 30000 030	030 I II 2 I 4 0 1 40 0 0 8 0	030 2 5 2 1 10 0 5 50 5 0 4 1 0	1 0 2 11 2 1 10 0 0 00 0 0 1 1 0	IIO 3 5 4 2 2 0 7 70 0 0 1 3 0	1 2 0 3 11 1 2 8 0 H 80 0 0 4 0	I30 4 5 1 2 14 0 1 90 0 4 2 1 0		33 0 9 10 1 6 0 0 4 200 0 0 5 1 6	53 0 14 9 2 9 0 0 1 300 0 0 7 3 0	7 3 0 19 8 2 12 0 0 4 400 0 0 20 2 1	9 3 1 4 7 3 15 0 0 1 500 0 1 3 1 I		× I 3 X I 4 3 51 6.0 1.200 0.1 9 1 7	3 3 1 14 5 124 0 0 800 9 1 0 2	5312 7 7 7 12 0 0 H 0001 3 1 HI 3 2
est at Three per Cent. for Wilntenest at I	bay. [ThirtyDays AYcat. 2 00c Day. [7]	e + d f. 1. e. d.f. L. e. d.f. 2 a L. e. d. f. L	0 0 0 2 0 0 7 21 0	0 0 1 0 1 2 1 2 0	0 0 1 3 0 1 9 5 3 3 0	0 0 2 1 0 2 4 3 4 4 0	0 0 2 3 0 3 0 5 5 0	0 0 3 2 0 4 7 1 6 1	. 10 0 4 0 4 2 1 7 7 .	0 0 4 2 0 4 3 2 5 8			0 0 1 0 0 1 3 0 1 0 1 20 0 0 0 1 0	0 0 2 0 1 5 3 0 18 0 1 30 0 0 0 3 0	0 0 3 0 1 11 2 1 4 0 4 40 0 6 7 0	0 0 3 0 3 5 2 1 10 0 5 50 5 0 4 1 0	0 1 0 2 11 2 1 10 0 1 00 0 0 1 10	0 1 1 0 3 5 4 2 2 0 1 70 0 0 1 3 0	0 1 2 0 3 11 1 2 8 0 H 80 0 0 4 0	0 1 3 0 4 5 1 2 14 0 1 90 0 4 2 H 0	0 1 3 0 4 11 3 0 0 1 100 0 6 A R 0	0 3 3 0 9 10 1 6 0 0 4 200 0 0 5 1 6	• 53 0 14 9 2 9 0 0 1 300 0 0 7 3 0	0 7 3 0 19 8 2 12 - 0 0 400 0 0 10 2 1	0 9 3 1 4 7 3 15 0 0 1 500 0 1 3 1 1	0 11 2 1 6 1 18 0 0. 1 1000 1 7 3 2 1 1	E I 3 X I 4 3 71 6.0 1.000 0.1 9 1 X	I 3 3 I 14 5 1 24 0 0 800 9 I 0 2	I 5312 4 4 2/24 0 0 H 9001 3 I HI 3/2
arese at Three per Cent. for Wilnteness at I	Die Day. ThirtyDays AYcar. 2 00e Day. 11	. e. d. f. e. d. f. L. e. d. f. Z. B. L. e. d. f. L	0 0 0 2 0 0 7 2 1			0 0 2 1 0 2 4 3 4 4 0	0 0 2 3 0 3 0 5 0			0 9 4 2 0 4 9 2 5 8	0 0 2 1 0 2 4 3 9 0		0 0 0 1 0 0 1 3 0 1 0 1 20 0 0 0 2 0	0 0 0 2 0 1 5 3 0 18 0 1 30 0 0 0 3 0	0 0 0 3 0 1 11 2 1 4 0 1 40 0 0 E 0	0 0 0 3 0 2 5 2 1 10 0 1 50 0 0 4 1 0	0 0 1 0 2 11 2 1 10 0 1 00 0 0 0 1 10	0 0 1 1 0 3 5 1 2 2 0 1 70 0 0 1 3 0	0 0 1 2 0 3 11 1 2 8 0 H 80 0 0 F 1 0	0 0 1 3 0 4 2 1 2 17 0 1 90 0 4 2 1 0		0 0 3 3 0 9 10 1 .6 0 0 1 200 0 0 5 1 C	0 6 5 3 0 1 + 6 3 6 . 0 0 1 300 0 6 7 3 0	0 0 7 3 0 19 8 2 12 0 0 1 400 0 0 10 1 1	0 0 9 3 1 4 7 3 15 0 0 5 500 0 5 1 1		Q E I 3 X 14 3 51 6.0 1.000 0 1.01 X	0 I 3 3 I 14 5 1 24 0 0 800 9 I 0 2	0 I 231 2 7 7 21 2 4 21 2 0 0 H 3001 3 I HI 3 2 2
TERRST AL Three per Cent. for Wilnterest at I	One Day. ThirtyDays AYeat. 2 One Day. [1]	6 erd f 1. e. d. f. L e. d. f. 2 2 1. e. d. f. h	0 0 0 2 0 0 7 21 0			1 [0 0 2 1 0 2 4 3 4 4 0	5 0 2 3 0 3 0 5 5 0	6 . 10 0 3 2 0 4 7 1. 6 . 10		0 0 0 4 2 0 4 9 2 5 8 0	0 10 2 10 2 4 3 1 0 1 6		0 0 0 0 1 0 1 3 0 1 0 1 20 0 0 0 1 0	o o o z o z o z 3 o z 0 1 30 o o o 3 o	0 0 0 0 3 0 1 11 3 1 4 0 1 40 0 0 F 1 0	0 0 0 0 3 0 2 5 2 1 10 0 1 50 2 0 4 1 0	0 0 1 0 2 11 7 1 10 0 1 00 0 0 1 1	0 0 0 1 1 0 3 5 1 2 2 0 7 70 0 0 1 3 0	0 0 1 1 0 3 11 1 2 8 0 1 80 0 0 1 1 0	0 0 0 1 3 0 4 5 1 2 1 0 1 90 0 4 2 1 0		0 0 0 3 3 0 9 10 1 6 ~ 0 0 4 200 0 0 5 1 C	x 0 0 0 5 3 0 1 + 3 2 9 . 0 0 1 300 0 0 9 3 0	X 0 0 7 3 0 19 8 2 12 . 0, 0 1 400 0 0 10 2 1	20 0 0 9 3 1 4 7 3 15 0 0 1 500 0 1 3 1		30 9 F. I. 3 X 14 3 21 6.0 1.700 0 I 6 I X	0 I 3 3 I 14 5 1 24 0 0 800 9 I 0 2	30 0 I 2 3 5 4 4 5 57 0 0 H 900 3 I FI 3 5
INTERSST at Three per Cent. for Wilnterest at I	One Day, ThirtyDays AYeat. 2 One Day. T	A 6 - 4 5 1. a. d. 5. L. a. d. 5. 2 - 4 5. 2 - 4 5. 1			3 0 0 I 3 0 I 9 5 3 3 0	4 0 2 1 0 2 4 3 4 0	5 0 2303030 0	6 0 3 2 0 4 7 1 6 1 0		8 0 4 3 0 4 9 2 5 8 0	0 10 2 10 2 4 3 0 10 10	10 10 0 2 3 0 6 0 1 10 0 0 0 1 0	20 0 0 01 0 01 3 012 0 20 0 0 20 0	30 0 0 2 0 1 5 3 0 18 0 1 30 0 0 0 3 0	400 0 030 1 11 2 1 4 0 1 40 0 0 F 0	50 0 0 0 3 0 2 5 2 1 10 0 1 50 0 0 4 1 0	0 0 0 1 0 3 11 7 1 10 0 9 0 0 0 0 1 1 0 0	70 0 0 1 1 0 3 5 4 2 2 0 1 70 0 0 1 3 0	80 0 0 1 1 0 3 11 1 2 8 0 1 80 0 0 1 1 0	90 0 0 1 3 0 4 5 1 2 1 4 0 1 90 0 4 2 1 0		300 0 0 3 3 0 9 10 1 6 0 0 4 200 0 0 5 1 6	300 0 0 5 3 0 14 9 3 9 0 0 1 300 0 0 7 3 0	400 0 0 7 3 0 19 8 2 12 0 0 1 400 0 0 10 2 1	500 0 0 9 3 1 4 7 3 1 5 0 0 1 500 0 1 1 1 I		700 G F I 3 X 14 3 71 6.0 1.700 0 1. 9 1 X	300 0 1 3 3 1 14 5 1 24 0 0 800 9 1 0 2	900 0 1 2 31 2 7 7 2122 0 0 H 0001 3 1 11 31 2
INTERSS at Three per Cent. for Wilnterest at I	2 One Day, [ThirtyDays] A Yeat. 2 One Day. [1]	A & e & d f & e & d f & e & d f & e & d f & e & d f & d	. 21 0 0 0 2 0 0 7 2 1 0	2 0 1 0 1 2 1 2 6	· 3 0 130 195 3 3 0	4 0 2 1 0 2 4 3 4 0	5 0 2303030 0	6 . 10 0 3 2 0 4 7 1. 6 . 10		8 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	0 10 12 10 2 1 0 2 1 3 1 0 1 10	10 10 0 2 3 0 6 0 1 10 0 0 0 1 0	20 0 0 01 0 01 3 012 0 1 20 0 0 0 2 0	30 0 0 0 2 0 1 5 3 0 18 0 1 30 0 0 0 3 0	400003011111 40 1 4000 F 0	50 0 0 0 3 0 3 5 2 1 10 0 1 50 0 0 4 1 0	0 0 0 1 0 3 11 5 1 10 0 0 0 0 0 0 0 1 9 0	70 0 0 1 1 0 3 5 4 2 2 0 1 70 0 0 1 3 0	80 0 0 1 2 0 3 11 1 2 8 0 1 80 0 0 4 0	90 0 I 3 0 4 5 I 2 1 0 1 90 0 4 2 1 0	100 0 0 1 3 0 4 11 3 0 0 1 100 0 6 8 1 c	300 0 0 3 3 0 9 10 1 .6 0 0 4 200 0 0 5 1 6	300 0 6 5 3 0 1 + 6 2 8 9 . 0 0 1 300 0 6 7 3 0	400 0 0 7 3 0 19 8 2 12 0 0 1 400 0 0 10 2 1	500 0 0 9 3 1 4 7 3 15 0 0 1 500 0 1 1 1		7 700 0 E I 3 X 14 3 21 6 0 1 700 0 I 9 I 7	200 0 I 3 3 I 14 5 124 0 0 800 9 I 0 2	900 0 I 2 31 2 4 4 2/27 0 0 H 9001 3 I II 2/2

,

.

ì

,

282	THE Y	OUNG MIA	NA BEST	COMFANIC	LN .
Thing	gs oppoper	to be know Oc	n and reme cusions.	mberch on	particular
AR	am of Pap	er 23 Quir			
AO	uire of Pau	er. 24-Shet	ts a	* ****	ين : الدر ا
A Di	tto for Prin	ters. 23 St	eets.		
A Ba	de of Pape	r. 10 Rean	s. A Bun	dle Ditto,	2 Reams
A.Ro	H of Parch	ment, 5 De	zen, or 60	Skins,	4 (2) y
A Di	cher of His	des, 10 Ski	146		
Ditto	of Gloves,	, 10 Dozen	Pair,		
A La	st of Hides	, 20 Dicke	rs	. 16 L .I	•
A Lo	ad of Timb	er unbewn,	40 Feet.		•
		hewi	1, 50 Feet.		
. A Ch	aldron of C	Coals, 36 B	ushels.		
AHO	gshead of	Wine, 63 G	allons	s più anni	:
Ditto	of Beer, 5	64 Gallons.			- <u>-</u> - <u>+</u> -
A Ba	rrel of Been	r, 30 Gullo	15.	•••	
	of Ale, 32	Gallon.	1 - S. A. B.	1 8 - 100 - 100	• ,
A Gr	0 55, 144, 01	r 12 Dozen	• 	· · · · · · · ·	
A W(sign of Une	cse 2,50 P0		I Lloum 0	-66
Days	In the De	T, 303; W	orthing Of	urtranita ia Articata	7. pu .
rence Threat		040 %40, f	artings 90	r Perches	
പപ	the of Land	Jan Buch	ale a view o	a cicucai	
ΛΜ	wket: Load	5 Rushels	. 10		モイ・ハー
A I ac	t of Corp.	r Rane-see	d 9 Load	or 10 Qua	Pines.
Ditto	of Pot-Ash	es. Codfish	White-her	rings. Mca	I. Pitch:
and	Tar. 12/1	arrels.			
Ditto	of Flax a	nd Feather	s. 17 Civi	of Gunpor	vder, 24
. Bar	rels. or 24	00lb, of 43	68lb.		
A To	n of Wine	, 252 Gall	lons: Oil	of Greenla	nd, 252
🛸 Gal	lons; and	Sweet Oil o	of Genda, 2	35 Gallons	•
- A Tối	n in Weigh	t, 20 Cwt.	of Iron, &	c. but of L	ead there
is b	nt_19 Cwt.	and a Hal	f, called a	Fother	
A Tod	l of Weol,	28 Pounds	. A Pack	of Ditto, 5	64 Pds.
A Loa	ul of Brick	s, 500; and	l of plain 1	iles 1000.	
A Ster	ne of Fish	slb. and o	f Wool 14	lb. The	same for
Hor	seman's W	eight, and a	also Hay	but Repper	r, Cinna-
ກາວກ	r, and Ahur	n, have but	151b. 2 to	the Stone.	- A C A .
	ne of Glass	5 Pounds;	and a Sea		a Stone,
A In	iss of Hay	y, 50 Poul	nus, and a	10 DROLL	aito, g
L TU	sses. But	New Hay	in June	and wingus	r, ought
το, ε	le of Paul	us to the 11	(055. 600'. And	of Same	1000
Iran	and Shot	-rierrings,	Stope	or sprats	, 1000-
1101	and Shot	rain. to me	; alum:.		

:

Burrels of sund	lry Commodities.
Anchovies 301b.	Raisins, 1 Cut.
A double Barrel. 601b.	Oil 31 Gallons and a Hulf.
Nuts or Apples, 3 Bushels.	Spanish Tobarco, 2 Cwt. to
Pot-Ash or Barilla, 200lb.	3 Cwt
White or Black Plates, 300.	Gunpowder, J Cwt.
Candles, 10 doz. lh.	Soap, 240lb.
almon or Eels, 42 Gallons.	Butter: 224lb.
Figs 3 qrs. 141b. to 2 Cwt. 1.	Herrings, 82 Gallons
Things in wholesale Trade, boy	ght und sold by the Thousand.
Luttle Bones.	Bricks
Dranges and Lemons.	Clinkers or Flanders Tiles.
Chair Nails.	Billets and Leaves of Hurn.
acks and Tenter Hooks.	Barrel Heops.
omegranates and Tazels.	Squirrel Skins.
boose Quills and Thimbles.	Slate and Hilling Stones.
Pins and small Needle	s by the 1000 Dozen,
Things sold and howeht at	Sin Score to the Hundred

121 2

0071

Banks and Barlings.	I Cole, Ling and Newfound-
Barrel and Pipe Boards.	land-fish, Stock-fish of
Bompepars and Bow staves.	all Sorts.
Canspars and Caprevans.	Ells of Canvass, and most
Herrings and Deal Boards.	Foreign Linens.
Nails, Eggs and Cod-fish.	Hogsheud Staws.

Of Bunds, Bills, Indentures, Letters of Attorney, Wills, and other useful Writings.

Precedents of these are very necessary, not only for the understanding of them, but to know how to make them properly on Occasion.

A Bond from One to Another.

KNOW all Men by these Presents, that I Abraham Darnel, of the Parish of St. Sepulchre, in the City of London, Gentleman, am held and firmly bound to John Melvil, of the said City of London, Esg. in the Sum of Fifty Pounds of good and lawful Money of Great Britain, to be paid to the said John Melvil, or his certain Attorney, his Executors, Administrators or Assigns; for the true Payment whercof I bind myself, my Heirs, Executors, and Administrators, firmly by these Presents scaled in the fiftieth

Fiftieth Year of the Reign of our Sovereign Lord George the Third, by the Grace of God, of the United Kingdom of Great Britain and Ireland, King, Defender of the Faith, and so farth, and in the Year of dur. Lord One Thousand Eight Hundred and Ten.

The Condition of this Obligation is such, that if the above bounden Abraham Darnel, his Heirs, Executors or Athuinigtrators, do well and truly pay, or some to be puid to the abovenamed John Melvil, his Executors, Administrators, or Assigns, the full Sum of Twenty-five Pounds of good and lawful Money of Great Britain, on the Twentierk Day of August next ensuing the Date hereof, with the lauful Intercet thereof, then this Obligation to be void, or else to remain, continue, and be in full force and virtue.

Scaled and Delivered	್ಷ ಗ್ರೇಷ ಗ್ರೇಷಣಕ ಬಂಗ ಕಾರ್ಯಿಗ
(being first duly Stamped)	I month a straight of
in the Presence of in the	AURALIAN DARNER
GEORON' N'EEDY	She walter the second of the
THOMAS TRUSTY.	

Note, The Mark O in this and the Form following, represents the Seal, which in this and all those in which it appears, ought to be affixed: the person who executes any of them (a Will excepted, concerning which Directions will be given in its Place) is in the Presence of the Witnesses to take off the Seal, (that is the Instrument with which the impression was made) and then taking the Paper or Parchment, in his or her, Right-Hand, is, to pronounce these words, I deliver this as my Act and Deed for the Parpases within mentioned.

a set as A Bill with a Penalty.

KNOW all Men by these Presents, that I, John Jenking, of the city of Chichester, in the county of Sussex, Victualler, do acknowledge myself indebted to Martin Moneyman, of East Grinstead, in the county aforesaid, Grazier, in the Sum of Twenty Pounds of good and lawful Money of Great Britain, to be paid unto the said Martin Monsyman, his Heirs, Executors, Administrators or Assigns, in or upon the 20th Day of September next ensuing the date hereof, without Fraud or further delay: for and in consideration of which Payment well and truly to be made and done, I bind myself, my Heirs, Executors, and Administrators, in the penal Sum of Forty Pounds, of the like lawful Money, firmly by these Presents: Presents: In witness whereof I have hereunto set wy Hand and Seal, this Twenty-fifth Day of Murch, in the Fiftieth Year of the Reight of our Sovereign Lord King George the Third, and in the Year of our Lord One Thousand Eight-Hundred and Ten.:

Signed, Sealed, and Deli-	•-		
vered in the Presence of	. ;	JOHN PENKINS.	0
Titus Testindar.	1		•
ANDREW AFFIDAVIT.	• •		×
		1	

A short Bill, or Note of Hand

KNOW all Men by these Presents that I Peter Pennyless, of the Parish of St. Saviour, Southwark, in the County of Surrey, Blacksmith, do owe, and own myself to stand indebted to Robert Rich, of the Parish of St. Andrew, Holborn, in the County of Middlesex, Gent. in the just and due Sum of Five Pounds of lawful Money of Great Britain, which by these Presents I promise to pay unto him the said Robert Rich, at or upon the Sixth Day of October next ensuing the Date hereof: for the true Performance of which Puyment well and truly to be made,) and in witness bereof I y have set my Hand to these Presents, the 4th Day of July, 1810.

Among Men of Bu-iness the following form is commonly used, and is equally effectual in law:

PETER PENNYLESS.

136-1 28

£5 0 0 I.ondon, May 10, 1810. Five Months after Date I promise to pay to Mr. Robert Rich, or Order, the Sum of Five Pounds, for Value received. PETER PENNYLESS.

This Note is transferable to Another, if Robert Rick writes his name on the back of it; but then if Peter Pennyless does not pay it, Robert, Rick is liable to be called on for the Money.

A penal Bill from Two to Onc.

KNOW all Men by these Presents, that we Laurence Luckless, and Peter Pauper, both of the Parish of Saint Dunstan, Stepney, in the County of Middlesen, Weavers, do ocknowledge and own ourselves to stand theobte t to Gabriele Greedy, of the Parish of St. Olase, Southwark, in the County s County of Survey, Feltmaker, in the just and due Sum of Ten Pounds of good and lawful Momey of Great Britain, to be paid unto him the said Gubriel Greedy, his Heirs, Executors, Administrators, or Assigns, at or upon the Thirteenth Day of October, next ensuing the Date hereof, without Fraud or further delay: for and in Consideration of which Payment well and truly to be made, we do bind our Heirs, Executors, and Administrators, in the penal Sum of Twenty Pounds of the like lawful Money firmly by these Presents. In witness whereof, we have hereunto set our Hands and Seals, this Sixteenth Day of May, in the Fiftieth Year of the Reign of our Sovereiga Lord King George the Third, &c. and in the Year of our Lord One Thousand Eight Hundred and Ten.

Signed, Scaled and Delivered in the Presspece of LAUR. LUCKLESS. O. WIMBLEDON WITNESS, PETER PAUPER. O. TIMOTHY TESTIS.

A Letter of Attorney.

KNOW all Men by these Presents, that I Charles Careful, of Lewes in the County of Sussex; Apothecary (for . divers Considerations and good causes me hereanto moving) have made, ordined, constituted and appointed, and by these Presents do make, ordain, constitute, and appoint my trusty Friend William Wagstaff, of Pemsey, in the County aforesaid, Gentleman, my true and lawful Attorney, for.me, in my name, and to my use, to ask, demand, recover or receive of or from A. B. of Ryc, in the said County, the Sum of Forty Pounds; . giving, and by these Presents granting to my Attorney, sole and full Power and Authority, to take, pursue, and follow such legal courses for the recovery, receiving, and obtaining the same, as I myself might or could do, were I personally present; and upon the Receipt of the same Acquittances, and other sufficient discharges, for me, and in my name to make, sign, seal, and deliver, as also, one or more Attorney or At-. torneys under him to substitute or appoint, and again at his . pleasure to revoke ; and further to do, perform, and crecute for me, and in my name, all and singular thing, or things,

Note, All Obligations must be in English, and the words in full length; also Bonds, Nates of Hand, Bills, Letters of Attorney, Indentures, &c. must be on stamped Paper to render them valid. which are or may be necessary touching and concerning the premises, as fully; thoroughly; and entirety, as I the suid Churles Capeint in my own Person, aught, or could do in and about the same; ratifying, allowing, and confirming whatsoever my said Attorney shall lawfully do, or cause to be done in and about the Execution of the Premises, by virtue of these Presents. In witness whereof I have becentorset my Hand, and Scalthe Sixth Day of July, in the Fylieth Year of the Reign of our Sovereign Lord George the Third, by the Grace of God of the United Kingdom of Great Bertain and Ireland, King, Sc. and in the Year of our Lord One Thousand Eight Handred and Ten.

A Letter of Attorney by a Seaman.

KNOW all Men by these Presents, that I Timothy Tarpaulin, Mariner, now belonging to His Majesty's Ship the ... Rye, for divers good Causes and Considerations me thereanto moving, have and by these Presents do make my trusty Priend Henry Hearty, Cilizen and Baken of London, (ur my beloved Wife Penelope Tanpaulin) my true and luwful Attorney, for . me, and in my name, and for my Usr, to ask, demand, and receive of and from the Right Honourable the Trenmerer, or Paymaster of His Majesty's Navy, and the Commissioners of Prize-money, and whom else it may concern, as well all such Wages and Pay, Bounty-money, Prize-money, and all other Sum or Sums of Money whatsuever, as now are, and which hercafter shall and muy be due; or payable anto me; also all such Pensions, Salaries, Smart-money, or other Money and things whatsoever, which now are, or at any time hereafter shall or may be due to me, for my service, or otherwise, in any one of his Mujesty's Ship or Ships, Frightes or Vessels : Giving and hereby granting, unto the said Attorney, full and whole Power, to take, pursue, and follow such legal ways and courses, for the recovery, receiving, and obtaining and discharging the said Sum or Sums of Money, or any of them, as I myself might or could do were I personally present; and I do hereby ratify, allow, and confirm all and whatever my Atforney shall lawfully do or cause to be done in and about the Execution of the Premises, by wirtue of these Presen's. In witness whereof I have hereunto set my Hand and Seal, this Twenty-second Day of March, One Thousand Eight Hundred and Ten, Sc.

TIMOTHY TARPACTIN. O.

288 THE YOUNG MAN'S BEST COMPANION.

A short Will in legal Form

In the Name of God, Amen. I, William Weakly, of the City of London, Haberdasher, being very sick and weak in (or, in perfect health of) Body, but (or, whd) of perfect Mind and Memory of my Body, and knowing that it is appointed for all Men once to due, do make and ordnin this my last Will and Testament: That is to any principally, and first of all, I give and recommend my Sout into the Hand of Almighty God that gave it, and my Body I commend to the Earth, to be buried in decent Christian Burial, at the discretion of my Executors; nothing doubting but at the general Resurrection I shall receive the same again by the mighty power of God. And as fouching such worldby Estate wherewith it halts pleased God to bless me in this life, I light decide, and dispose of the same is the following Manner and Forman of First. I groe und bequeated to Klauwing Manner, and Forman

Wife, the Sam of Fire Hundred Bounds of lawful Movey of Great Britain, to be raisely and levied out of my Estate, Logether with all my household Gunds, Debts; and moveable Effects.

Also, I give to my well-beloved Daughter, Elizaboth Weakly, whom I likewise constitute, make, and ordainsthe sole Executris of this my last Will and Testament, all and singulat my Lakde; Messuages, and Tenements, by hes freely to be possessed and enjoyed. And I do howeby utterly disables, revoke, and disumul all and severy other former Testaments, Wills, Legacies, Bequester, and Executors by mein any wise before named, willed, and bequesthed, ratifying and confirming this, and no other, to be my last Will and restorent. In Witness where of I have hereunto sol my Hand and Seal, this 12th Day of May, mither Year of our Lord One Thousand Eight Handred and Ten.

1.5.1 N 2 1 1 Signed, sealed, published, pronounced, and declared by the said William W. WEAKLY. O. y IKeakly, as his last Will, and Testament, in the Presence of us, who, in his Presence, and in the Presence of each other, have hereunto it its transt of t subscribed our Names. . I all to all HERRY HARDY. SAMUEL SHORT, . . WILLIAM WORTLE. . J .

The

The Testator, after taking off the Seal, must, in the presence of the Witnesses, pronounce these words, I publish and declare this to be my last Will and Testament.

Note, If a Will be already made, and the Person hath no mind to alter it, but to add something more, there may be affixed the following Codocil or Schedule to it, and it will stand good in Law, as part of the Will.

A Codocil to a Will.

BE it known unto all Men by these Presents, that I, William Weakly, of the City of London, Haberdasher, have made and declared my last Will and Testament in writing, bearing date the 12th Day of May, One Thousand Eight Hundred I the said William Weakly by this present Codocil and Ten. do ratify and confirm my said last Will and Testament; and do further give and bequeath unto my loving Cousin and Godson William Weakly, junior, the Sum of Fifty Pounds of good and lawful Money of Great Britain, to be puid unto him the said William Weakly, by my Executrix, out of my Estate. And my will and meaning is, that this Codocil be adjudged to be a part and parcel of my last Will and Testament; and that all things therein mentioned and contained be faithfully and truly performed, and as fully and amply in every respect, as if the same were so declared and set down in my suid last Will and Testament. Witness my Hand-this 20th Day of May, One Thousand Eight Hundred and Ten.

Signed in the Presence of us,

W. WEIKLY. O.

A. B. C. D.

A Deed of Gift.

TO all Pcople to whom these Presents shall come: I George Generous do send greeting. Know ye, that I the said George Generous, of the Parish of Pancras, in the County of Middlesex, Brick-maker, for and in consideration of the Love, Goodwill, and Affection, which I have and do bear towards my loving Sister, Sarah Sørrowful, of the same Parish and County, Widow, have given and granted, and by these Presents do freely give and grant unto the said Sarah Sorrowful, her Heirs, Executors, or Administrators, all an. I singular my Goods and Chattels now being in my present Dwelling-house in the Parish aforesaid, known by the Name of Fishers Figgery, of which (before the signing of these Presents) I have delivered her, the said Sarah Sorrowful, an Inventory signed with my own Hand, and bearing even Date, To have and To hold all the said Goods and Chattels in the said Premises or Dwelling-house, to her the said Sarah Sorrowful, her Heirs, Executors, or Administrators, from henceforth, as her and their proper Goods and Chattels absolutely, without any Manner of condition. In witness whereof, I have hereunto set my Hand and Seal, this 10th Day of May, One Thousand Eight Hundred and Ten.

Signed, Sealed, and Deli- GEORGE GENEROUS. O. vered, in the presence of

DANIEL DRAYTON.

AARON ATKINS.

Nate, This Precedent may be extended to the giving away of Cattle, Corn, House or Land, if not entailed, &c. but the Particulars must be named, &c.

An Indenture of Apprenticeship.

THIS Indenture witnesseth, that Richard Reynolds, Sun of Robert Reynolds, late of Pomsey, in the County of Sussex, hath put himself, and by these Presents doth voluntarily put himself Apprentice to Charles Carpenter, Citizen, and Linen. draper of London, to learn his Art, Trade, or Mystery, and after the Manner of an Apprentice to serve him from the Day of the Date hereof for and during the full term of Seven Years next ensuing: During all which tune he the said Apprentice his said Master shall faithfully serve, his Secrets keep, his LAIVFUL Commands every where gladly obey. He shall do no Damage to his said Master, nor see it to be done by others, without letting or giving Notice thercof to his said Master. He shall not waste his said Master's Goods, nor lend them unlawfully to others. He shall not commit Fornication, nor contract Matrimony within the said term. At Cards, Dice, or any unlawful Game, he shall not play, whereby his said Master may be damaged. With his own, or the Goods of others, during the said term, without Licence of his Master, he shall neither buy nor sell. He shall not absent himself Day or Night from his said Master's Service without his leave. Nor haunt Alchouses, Taverns, or Playhouses: but in all things behave himself as a faithful Apprentice ought to do during the said term. And the said Muster shall use the utmost of his endeavours to teach. or cause to be taught and instructed

instructed the said Apprentice in the Trade and Mystery he now professeth, occupieth, or followeth: and procure or provide for him the said Apprentice sufficient Meat, Drink, Apperel, Washing and Lodging, fiting for an Apprentice, during the said Term: And for the true performance of all and every the Covenants and Agreements either of the said Parties bind themselves unto the other by these Presents.

In witness whereof they have interchangenbly put their Hands and Seals, this 16th Day of April, in the Forty-minth Year of the Reign of our Sovereign Lord George the Third, by the Grace of God of the United Kingdom of Great Britain and Ireland, King, &c. and in the Year of our Lord God One Thousand Eight Hundred and Nine.

Note, If an Apprentice be inrolled before a Justice of the Peace or other proper Officer, (the Chamberlain being such in London) he cannot sue out his Indenture but upon proof of unmerciful Usage, want of Victuals, or other necessaries, or his Master's being incapable of teaching him his Trade, or not choosing it so to be done at his proper charge by others. And the same holds good in relation to a Mistress. But there being no Inrolment, an Indenture may be sued out without showing cause, in Citics and Corporations, &c.

A General Release.

÷., , , ,

KNOW all Men by these Presents, that I, Peter Peacea-He, of Hastings, in the County of Sussex, Tobacconist, have demised, released, and for ever quit Claim, to William Winter. of Rye, in the County oforesaid; Fish-Chapman, his Heirs, Executors and Administrators, of all and all manner of Action o Actions, Suits, Bills, Bonds, Writings, Debls, Dues, Duties, Accompts, Sum and Sums of Money, Leases, Mortgages, Judgements by Confession, or otherwise obtained, Executions, Extents, Quarrels, Controversies, Trespasses, Damages and Demands whatsnever, which by Law or Equity, or otherwise soever, I the said Peter Peaceable against the said William Winter ever had, and which I, my Heirs, Executors, or Administrators, shall or may claim, challenge or demand. for or by reason, or means, colour of any Matter, Cause, or Thing whatsvever, to the Day of the Date of these Presents. In witness whereof I have hereunto set my Hand and Seal. this 15th Day of April, &c.

PETER PEACEABLE. O.

Digitized by Google

THE

THE GARDENER'S CALENDAR;

Or the Practice of Gardening in all its Branches, for the twelve Months in the Year.

JANUARY-Pleasure Garden.

FROST is to be expected now, and nothing is so hurtful to tender Flower-roots, and their Shoots for Spiing.

Ranunculuses, Anemonies and Tulips will be in danger; cover the Beds to guard them; lay on Pea-straw, where they are not come up; but where the Shoot appears, place Hoops with Mats and Cloth upon them. This is the common Practice; but in that excellent Work, The Complete Body of Gardening, there is a method proposed, much casier and better. This is to place behind them a Reedbedge, sloping three Feet forward. A Mat is to be let down from the Top in severe Weather, and taken up in mild. This preserves them, and yet does not draw them weak, or make them tender. Cover the Beds and Boxes of seedling Flowers; and take off the Defence when the Weather is milder. Cover Carnation Plants from Wet, and defend them from Mice and Sparrows.

Clean the Auricular Plants, pick off dead leaves, and scrape away the Surface of the Mould; put fresh Mould in the place of it, and set the Pots up to the brim in the Mould of a dry Bed, and place behind them a Reed-hedge.

For the Kitchen Garden. Throw up some new Dung in a heap to heat, that it may be ready to make Hot-beds both for the early Cucumbers and Melons in this part of the ground, and for raising seeds of Annuals in the Flowergarden. Dig up the ground that is to be sown with the Spring crops, that it may lie and mellow.

Nurse the Cauliflower Plants kept under glasses carefully; shut out the Frost, but in the middle of milder days let in a little air; pick up the dead leaves, and gather up the mould about the stalks.

Make a slight Hot-bed in the open ground, for young Salading, and place hoops over it, that it may be covered in hard weather. Plant out Endive for Seed into warm Borders; earth and blanch Celery. Sow a few Beans and Peas, and seek and destroy Snails and other Vernin.

Fruit Trees, whether in Orchards, or Espaliers, or against Walls, demand the same general management.

Cut off

Cut off dead Wood and irregular Branches; clean the Stumps and Boughs from Moss with a hollow Iron; and repair Espaliers, tastening the Stakes and Poles with Nails &c. and tie the Shoots down with the twigs of Osier.

Place Stakes by all new planted Trees; and cut Grafts to be ready; lay them in the Earth under a warm Wall.

FEBRUARY-Pleasure Garden.

Make Hot-beds for annual flowers with the Dung laid up for that purpose, and sow them upon a good bed of Mould, laid regularly over the dung.

Transplant perennial Flowers and hardy Shrubs, Canterbury Bells, Lilacs, and the like. Break up and new lay the Gravel-walks. Weed, rake, and clean, the box borders.

Sow Auricula and Polyanthus seeds in boxes; these should be made of rough boards six Inches deep, with holes at the bottom for carrying off water; they must be filled with light Mould, and the seeds scattered thinly over the surface; then some more Mould must be sifted over them a quarter of an Inch thick, and be set where they can have the morning Sun.

Plant out Carnations into pots for flowering.

Dig and level Beds for sowing Radishes and Onions, Carrots and Parsnips; and Dutch Lettuce: Leeks and Spinach should also be sown now, also Beets, Celery, Sorrel and Marygolds, with any other of the hardy kinds.

Make up the Hot-beds for early Cucumbers, and sow Caulittower seeds and some others.

Plant Beans and sow Peas; the best way is to sow a Crop every Fortnight, that if one succeeds and another fails, as will often be the case, there may still be a constant supply, at the due season, for Table. Plant Kidney beans upon a Hot-bed for an early crop. The Dwarf, White, and Battersea Beans, are the best sorts. They must have Air in the middle of mild days when they are up, and once in two days they must be gently watered. Transplant Cabbages, plant out Silesia and Cos Leituce from the beds where they grew in Winter, and plant Potatoes and Jerusalem Artichokes.

Most kinds of Trees may now be pluned, but it will be better to do it in Autumn; whatever has been omitted must be done now, the hardiest kinds being pruned first, and such as are more tender at the latter end of the month, when there will be less danger of her suffering from frost.

Transplant

Transplant Fruit-trees to the places where they are wanted; opening a large hole, settling the Earth carefully about their Roots, and nailing them at once to the Wall, or fastening them to strong stakes. Nail up the tender Trees with care. Sow the Kernels of Apples and Pears, and Stones of Plumbs, for Stocks, and keep off the Birds.

MARCH-Pleasure Garden.

Watch the beds of tender Flowers, and throw Mats over them supported by Hoops in hard weather.

Transplant all the hardy perennial fibrous-rooted Flowers, Sweet-williams, Golden-rods. Dig up the earth about those which were planted in Autumn, and clean the Ground between.

All the Pots of flowering Plants must now be dressed. Pick off dead leaves, remove the Earth at the top, and put fresh in the place, give them a gentle watering, and set them in their places for flowering. Taking care the Roots are not wounded, repeat this once in three days.

The third week in *March* is the time to sow sweet Pcas, Poppies, Catchflies, and all the bardy annual Plants.

The last week is proper for transplanting Evergreens; but for this purpose a showery day should be chosen. New Hot-beds must be made to receive the Seedlings of annual Flowers raised in the former.

Sow in the bcds of the Kitchen-garden some Carrots and also the large Peas, Rouncevals and Grey.

In better Ground sow Cabbages and Savoys, also Carrots and Parsnips for a second Crop, and towards the end of the Month put in a large parcel of Beaus and Peas.

Sow Parsley and plant Mint; also Cos and Imperial Lettuce; and transplant the finer kinds.

In the first Week sow Dutch Parsley for the roots.

In the last Week if dry Days, make Asparagus-beds.

Clear up the Artichoke-roots, slip off the weakest, and plant them out for a new Crop, leaving four from each good Root to bear; and from such as are weaker, two. Dig up a warm border, and sow *French* Beans. Let them have a dry soil; and give them no Water till they appear.

The Grafts which were cut off early and laid in the Ground to be ready for use, are now to be brought into service, those of the earlier kinds are to be used first, and the Apple last of all. Look to the Stocks inoculated last

Year

GARDENING.

Year and take off their Heads. A Hand-breadth should be left on the Place: This holds the Bud secure by tying to it, and the Sap rises more freely for its Nourishment.

The Fruit-trees planted last October must be headed; and should be cut down to almost four Eves; the Sap then rises more freely.

A P R I L-Pleasure Garden.

The up the stalks of all Flowers to sticks two feet long, thrusting eight Inches into the Ground, and let them be hid among the Leaves, rake the Ground between them.

Take of the slips of Auriculas, and plant them out carefully for an increase. Transplant perennial Flowers and Evergreens, and take up the roots of Colchicams, and other bulbous Plants.

Sow French Honysuckles, Wall-flowers, and other hardy Plants, upon the natural Ground; and the tenderer kinds on Hot-beds. Transplant those sown last Month into the second Hot-bed. Plant some Tubereses in a moderate Hot-bed, and sow Carnations and Pinks on the natural Ground and open Borders.

Plant a large crop of *French* Beans, choosing a dry warm Border. Plant cuttings of Sage and other aromatic Plants. Sow Marrowfat Peas, and plant some Beans for a late crop: also Thyme, Sweet Marjoram, and Savory.

Prepare Dung for making ridges to receive Cucumber or Melon-plants designed for Bell or Hand-glasses.

Sow young Salading once in ten Days: also Cos and Silesia Lettuces.

The seeds of all kinds being in the Ground, look to the growing crops, clear away the weeds among them, and dig up the Earth between the rows of Beans, Peas, and all other kinds that are planted at distances. This will give them a strong growth, and bring them soon to perfection.

Draw up the Mould to the stalks of the Cabbages, and Cauliflower-plants; and in cold Nights cover with glasses carly Cucumbers and Melons.

Look to the Fruit-trees against the Walls and Espaliers. "Take off all foreright Shoots, and train such as rise kindly. Thin Apricots, as there are usually more than can ripen, the sooner this is done the better the others succeed.

Water new planted trees.

Plant

-296 THE YOUNG MAN'S BEST COMPANION.

Plant cuttings of Vines, and look over the grown onts, nip off improper shoots. When two rise from the same Eye, always take off the weakest. d

2

Weed Strawberry-beds; cut off the strings; stir the Earth between them; and once in three Days water them.

M A Y-Pleasure Garden.

When the Leaves of Sow-breads are decayed take up the roots, and lay them carefully by till the time of planting.

Take up the Hyacinth-roots which have done flowering, and lay them sidewise in a Bed of dry rich Mould, leaving the stems and Leaves out to die away; this practice greatly strengtheus the roots. Clean all Borders from Weeds; take off all straggling Branches from the large flowering Plants, and train them up in a handsome shape.

Plant out *French* and *African* Marygolds, with other Autumnals, from the Hot-beds the last Week of this Month, choosing a cloudy warm Day.

The up the stalks of Carnations. Plant cuttings of the Jachinis, and Lychinideas, and sow the small Annuals, Candy-tuft, and Venus Looking glass, in the open Ground.

Pot the tender Annuals, as Balsams, Amaranths, and the like, and set them in a Hot-bed Frame till Summer is more advanced for planting them in the open Ground.

Water once in two Days those Plants that require it. Destroy Weeds in all parts of the Ground, and dig up the Earth between the rows, and about the large kinds.

Sow small Salading once in ten Days, as in the former Month: choosing a warm Border, and sow some Purslain: also Endive, and plant Beans and Peas for a large crop, and *French* Beans to succeed the others. With care these kinds may be had fresh and young throughout the Season.

On a moist day, an hour before Sun-set plant some Savoys, Cabbages, and red Cabbages, draw the Earth carcfully up to the stems, and give them a few careful waterings.

If any fresh shoots have sprouted up on the Fruit-trees, nip them off, and train the proper ones to the Wall or Poles, at due distances, and in a regular manner.

Look over Vines, and stop every shoot that bas Fruit upon it, to three Eyes beyond the Fruit. Train the Branches regularly to the Wall, and let such as are designed designed for next Year's Fruiting, grow some time longer, as their Leaves will give a proper shade to the Fruit.

Water new planted Trees, and keep the Borders clean; and pick off Snails and other Vermin.

JUNE-Pleasure Garden.

In the Evening of a mild showery Day plant out into the open Ground the tender Annuals hitherto kept in Pots in the Hot-bed Frame; they must be carefully loosened from the sides of the Pot, and shaken out with all the Mould about them: a large hole must be opened for each; they must be placed upright in it, and when settled by a gentle watering, tied to Sticks.

Let Pinks, Carnations, and Sweet-williams, be laid this Month for an increase. Let the Layers be covered lightly, and watered every Day a little at a time.

The Spring Flowers being now over, and their Leaves faded, the roots must be taken up and laid by for planting again at a proper Season. Snow-drops, Winter-acoustr, and the like, are to be thus managed.

The Hyacinth roots, laid flat in the Ground, must now be taken up, the dead Lcaves nipped off, and the Mould; and, when clean, laid upon a Mat in an airy Room to harden, and then laid by. Tulip roots must now be taken up also as the Leaves decay; the like method must be followed with Anemonics and Ranunculuses.

Cut the cups or pods of Carnations that are near blowing, in three or four places, that they may blow regularly.

Inoculate some of the fine kinds of Roses.

In the Kitchen Garden, transplant the Cauliflower Plants sown in May. Give them a rich Bed and frequent waterings.

Plant out Thyme and other savoury Plants sown before, and in the same manner shade and water them. Take the advantage of cloudy weather to sow Turnips; and if there be no Showers, water the Ground once in two Days.

Sow Brocoli upon a rich Border, and plant out Celery for blanching. This must be done in trenches a Fooi and a half deep, and the Plants must be set half a Foot asunder in the rows. Endive should also be planted out for blanching; but in this the Plants should be set fifteen inches asunder, and at the same time some Endive-seed must be sown for a second crop. Pick up Snails; and in the damp Evenings kill the naked Slugs.

Fruit
Fruit Garden, continue the taking off fore-right shoots upon Wall and Espaher trees, directed as in last month. Train proper Branches to their situation, where they are wanted; once more thin the Wall-fruit; leave Nectarines at four inches distance, and Peaches at five; but not nearer; the Fruit will be finer, and the tree stronger for next Year. Inoculate the Apricots, and choose for this operation a cloudy Evening. Water new planted trees, and pick off Snails and Vermin.

J U L Y-Pleasure Garden.

Roll the Gravel frequently, and mow Grass.

Clip Box-edgings; cut and trim Hedges; look over all the Borders; clearing them from Weeds, stirring up the Mould between the Plants.

Inoculate Roses and Jessamines of all kinds that require this propagation; and any other flowering Shrubs.

Take up the roots of Fritillarias and Maragon, and others of this sort that are past flowering time.

Gather the seeds of Flowers you design to propagate, and lay them upon a Shelf in an airy Room in the pods. When they are well hardened tie them up in paper-bags, and do not take them out of the Pods till they are to be used.

Lay Pinks and Śweet-williams, as the former, in Earth. Cut down the stalks of those Plants which have done flowering, and which you do not keep for seed; and tie up those now coming into Flower to sticks as directed for the earlier kinds.

Sow Lupines, Larkspurs, and the like, on dry, warm Borders, to stand the Winter, and flower next Year.

Sow a crop of *French*, Beans to come in late, when they will be very acceptable. Clear all the Ground from weeds.

Dig between the rows of Beans and Peas, mow the Ground about the Artichokes.

Water the crops in dry weather.

Spinach seed will be now ready for gathering, as also that of Welch Onion, and some others; take them carefully off, and dry them in the shade.

Take up large Onions, and spread them upon Mats to dry for the Winter. Clear away the stalks of Beans and Peas that have done bearing.

Watch the Mclons as they ripen, and give them but little water. Water Cucambers more freely.

Inoculate

(

- Inoculate Peaches and Nectarines. Take off all foreright shoots in the Espalier and Wall-fruit trees.

Hang Phials of Honey and Water upon the Fruit-trees, and look carefully for Snails. Keep the Borders where the Fruit-trees stand clear from weeds, and stir the Earth about them. This will greatly assist the Fruit in ripening.

Look to the Fruit-trees that have been gratied and budded the last Season. See that there are no shoots from the stocks. Whenever they rise, take them off, for they will rob the intended growth of its nourishment.

Look carefully to the new planted Trees, water them often; and whatever shoots they properly make, fasten to the Wall or Espaher.

Repeat the care of the Vines, take off improper Shoots, and nail any that are loose to the Wall. Let no weeds rise in the Ground about them, for they will exhaust the nourishment, and impoverish the Fruit.

AUGUST-Pleasure Garden.

See whether the Layers of Sweet-williams, Carnations, and the like, be rooted; transplant such as are, and give frequent gentle waterings to the others to promote it.

Dig up a mellow Boider, and draw lines at five inches distance lengthwise and across; in the centre of these Squares plant the seedling Polyanthuses, one in each.

In the same manner plant out the scedling Auriculas. Shade them till they have taken root, and water them once in twenty-four hours.

Cut down the stalks of Plants that have done flowering. Save the seeds as they ripen.

Water the tender Annuals every Evening.

Sow Anemonics, and Ranunculuses, as also Fritillary, Tulip and Narcissus seed.

Dig up a Border for early Tulip roots, and others for Hyacinths, Anemonies, and Ranunculuses. Sow Annuals to stand the Winter, and shift Auriculas into fresh Pots.

Sow Spinach upon a rich Border, and on such another sow Onions. These crops will live through the Winter, unless very severe, and be valuable in the Spring. The second week in August sow Cabbage-seed of the early kinds; and a week after sow Cauliflower-seed. Some of these may be also ventured in a very well defended situation open. The last Week of this Month sow another crop

to

to supply the place of these in case of accidents; for if the Season be severe they may be lost; and if very mild, they will run to Seed in Spring. These last crops must be defended by a Hot-bed Frame. Sow Lettuces, the Cabbage, and brown Dutch kinds, in a warm and well sheltered piece of Ground. Transplant Lettuces, sown earlier in warm and well sheltered Borders. Take up Garlic, and spread it on a Mat to harden; also Onions and Rocambole; and at the latter end of the Month, Shalots.

Watch the Fruit on your Wall-trees, and keep off Vermin swarming about them. Pick up Snails, and hang Bottles of sweet Water for Flies and Wasps, fasten loose Branches, and gather the Fruit, carefully as it ripens.

Go round the Vines, and pull of trailing Branches so very luxuriantly produced at this time. See that the Fruit is not shaded by loose Branches; keep the Borders clear of Weeds. This tends greatly to the ripening of the Fruit.

SEPTEMBER-Pleasure Gerden.

A new kind of work begins this Month, which is, preparing for the next Season. Tear up the annuals that have done flowering; and cut down such Perennials as are past beauty, bring in other Perennials from the Nursery Beds, and plant them with care at regular Distances.

Take up the Box-edgings where they have not outgrown their proper size, and part and plant them afresh.

Plant Tulip and other Flower-roots.

Slip Polyanthuses, and place them in rich shady Borders. Sow the Seeds of Flower-de-luces and Crown Imperial, as also of Auriculas and Polyanthuses.

Also part off the roots of Flower-de-luce, Piony, and others of these kinds. In the last Week transplant hardy flowering Shrubs.

Sow Lettuces of various kinds, Silesia, Cos, and Dutch, and when they come up shelter them carefully.

Make up fresh warm Beds with the Dung that has laid a Month in the Heap. Plant the Spawn in these Beds upon pasture Mould; the same they were found in; and raise the top of the Bed to a Ridge, to throw off Wet.

Look to the Turnip-beds and thin them, leave the Turnips at six inches distance.

Weed the Spinach, Onions, and other new sown Plants. Tran-plant Transplant Sage, Lavender, and sweet Plants. Earth up Celery as it grows in Height.

Sow Salading upon warm and well sheltered Borders.

. Clean Asparagus Beds in this manner;—Cut down the Stalks, and pare the Earth off the surface of the Alleys, throw this upon the Beds half an inch thick, and sprinkle over it a little Dung from an old Melon-bed.

Dig up the Ground where Summer crops have ripened; and lay it in Ridges for the Winter. These should be disposed East and West, and turned once in two Months; they have thus the advantage of a Fallow.

Plant some Beans and sow some Peas on warm and well-sheltered Borders, to stand out the Winter.

The Fruit must now be gathered with care every day, and the best time is an Hour after Sun-rise. Then it should be laid in a cool place till used.

Keep Birds from the Grapes, for as they now begin to ripen they will be in continual danger.

Transplant Gooseberries and Currants, and plant Strawberries and Rasberries; they will be rooted before Winter and flourish the succeeding season.

OCTOBEB-Pleasure Garden.

Let all the bulbous roots for Spring flowering be put into the Ground. Narcissus, Maragon, Tulips, and such Ranunculuses and Anemonies as were not planted sooner.

Transplant Columbines, Monks-hood, and all kinds of fibrous-rooted perennials. Place the Auriculas and Carnations, that are in pots, under shelter. The best way is by sloping Reed-hedge. Dig up a dry Border, and if not dry enough naturally, dig in some Sand. In this set the Pots up to the brim. Place the Reed-hedge sloping behind them, and fasten a Met to its top that may be lot down in bad Weather. Take off the dead Leaves of the Auriculas before they are thus planted.

Plant out the Cauliflower Plants where they are to be sheltered; and it will be proper to plant two for each Glass, where that method is used, for fear of one failing.

Sow another crop of Peas, and plant Beans; choose a dry spot well sheltered from the cold wind of Winter.

Transplant the Lettuces sowed last Month, where they can be defended by a Reed-hedge, or under Walls.

Transplant

Transplant Cabbage plants and Coleworts where they are to remain.

Take great care of the Cauliflower Plants sown early in Summer; they now begin to show their Heads, so break in the Leaves upon them to keep off the Sun and Rain; it will both harden and whiten them.

Prune the Peach and Nectarine Trees and the Vines. This is a very useful practice, for it strengthens the Buds for Spring. Cut Grapes for preserving, with a joint of the Vine to each Bunch.

Gather Fruits for Winter keeping as they ripen. Transplant all Garden Trees for flowering; prune Currant-bushes, and preserve Seeds for sowing.

NOVEMBER-Pleasure-Garden.

Throw together a good heap of pasture Ground, with the Turf among it, to rot for Mould on the Borders.

Transplant Honey-suckles and Spireas, with other hardy flowering Shrubs.

Rake over the Beds of seedling Flowers, and strew some Pea-straw over them to keep out the Frost.

Cut down the Stems of Perennials which have done flowering; pull up Annuals that are spent, and rake and clear the Ground. Place Hoops over the Beds of Ranunculuses and Anemonies, and lay Mats or Cloths in readiness to draw over them, in case of hard Rain or Frost.

Clean up the Borders in all parts of the Garden, and take care to destroy the Weeds, and look over the Seeds of those Flowers which were gathered in Summer. See they keep dry and sweet, and in a condition of Growth, and dig a Border or two for the hardier kinds. Weed the crops of Spinach, and such other kinds as were sown late, for the wild growth will else smother and starve the crop.

Dig up a Border under a warm Wall; and sow some Carrots for Spring; sow Radishes in such another place, and see the Ground be well and deep dug for both. Turn the Mould that was trenched and laid up for fallowing.

Prepare Hot-beds for Salading; cover them five inches with Mould, and sow upon them Lettuces, and common small Salading, Mustard, Rape, Cresses, and Radish Plant another crop of Beaus; and sow more Peas for a Succession.

Trench

1

Trench the Ground between the Artichokes, and throw a thick ridge of Earth over the Roots.

Take up Carrots and Parsnips, and lay them in Sand to be ready for use. Give Air at times to the Plants under Hand-glasses and in Hot-heds, or they will suffer as much by want of that, as they would have done by the Frost.

Stake up all Trees planted for Standards, or the Winds will rock them at the bottom, and the Frost, if it set in, will destroy them.

Throw a good quantity of Pea-straw about them, and lay on it some Brickbats or Pebbles, to keep it fast; this will mellow the Ground, and keep out Frost.

Prune Wall-fruit Trees, and at this time also the Apple and Pear kinds.

DECEMBER-Pleasure-Garden

Draw the Mats and Cloths over the Ranunculus and Anemone Beds in severe weather, whether Frost or cold Rain; but give them Air in the middle of every tolerable Day, and as soon as possible uncover them all Day: but draw on the Mats against Night.

Throw up the Earth where flowering Shrubs are to be planted in Spring; and once in a Fortnight turn it.

Dig up the Borders that are to have Flower-roots planted in them in the Spring, and give them the advantage of a Fallow, by throwing up the Ground in a ridge.

Scatter over it a very little rotten Dung from a Melon-Bed, and after this turn it twice during the Winter.

Look over the flowering Shrubs and prune them. Cut away all the dead Wood, shorten luxuriant Branches, and if any cross each other, take away one. Leave them so that the Air can have free passage between them.

Strew good fresh Mould over the roots of Perennial Flowers whose Stalks have been cut down, and rake over, the Borders. This will give the whole an air of Culture and good management.

In the Kitchen Garden,

Plant Cabbages and Savoys for Seed. This is to be done with great care; dig up a dry Border, and break the Mould well; then take up some of the stoutest Cabbage and Savory Plants; hang them up by the Stalks five Days, and then plant them half way of the Stalks into the Groun !, draw up a good Quantity of the Mould about the part of the Stalk that is out of the Ground, and make it into a kind of hill round each; then leave them to Nature.

Sow another crop of Peas, and plant another parcel of Beans to take their chance for succeeding the others.

Make another Hot bed for Asparagus, to yield a supply when the former is exhausted. Continue to earth up Celery, and cover some Endive with a good quantity of Pea-straw as it is growing, that you may take up when wanted, which otherwise the Frost will prevent.

Prepare for planting Trees where they will be wanted in Spring, by digging the Ground deep, and turning it well in the places where they are to stand.

Scatter over the Borders, where the Fruit-trees are planted, some fresh Mould, and some old Dung, and in a mild Day dig it with a strong three-pronged Fork.

Look over the Orchard-trees, and cut away superfluous and dead Wood. Let the Branches stand clear of one another that the air may get between, and the Fruit will be better flavoured.



The ALPHABET with the DOUBLE & TRIPE Lett, Char, Arb, Abbrev, D.C. & Char a.an.alvere a ch hifi. h be, by because 1 s Ve c lh lhr de did đ) e str ever, every, mid C 1 hom wh ٩., God give, aive. 9J o he had his h 1 VO nq. . J. cue, below ı a k king know Ь 10 1 ford will all d • ,• tion £ me my most . م. m and, in, nature 9 12 titions ~ h O, ch, ourc, alore 0 k neople, heave • 🗤 p ρ lr quest "quantity .,. 9 e.H.S Ó ,× m 101 or, ale r ·.' is un soon s n rmlels the lo, it t 1 **י**ף' p dichment have save 1' 9 **ی**ه' 6 you view middle s !-' 11 " yl stract n'c, n'ith t W except,example v 101 .r ď w '_' ye your, ye let V orward 2 .r Abbreviating Ma A Substantive Divi An Adjective Divis A Verb Divi A Participle Divi Digitized by Google

ins's Reply to Pyrrhus. 'RIP , 6-1, 2 crage consective (hu 11/200 1: U.dr y. In Le 1.0 UNIMO -, 0, - y - w , n L. a. - 1 - 1 - 1 - L. د ١٠/ ١٦ ا ٢٠٠ به ا ٢٠ 2,2'2 www.see ~ ~p~p",o merloor "" in how 65-6 210 10 Ty + Ld. 2.2 4 ~~ uppor van/a.e... 0 or r. Ayt. ~ (1 eron), 10, 203) 1- Lyour (11- :100 F2/ 70.60 به ما او ب 12 41m-12-2. zhu.o 13.5.641 rave x ~ 1/~.~/./ 1:pyline fog ELINGe- E tey wor /er 911200 5012-2-2.0-18-20, all to e · (ر برم بر کر ک .04 . Pain)ppm. yoh/h 1 ~~/ pullog I. 01-1, 07- 2961-30 er' voyo ~ (1412 coas ~ ~ 0. ~ < ~ 5 2 $vh_{"}I^{o}o'$ 111-9º سن ۲۵ مرا united and - ~ . s ر **مرد ۱۰٬۰ در ۲**۰۰ مرد ۲ itraries as 2 1 ., only ; nothing 0 where fore n gitized by Google



STENOGRAPHY.

- STENOGRAPHY, or SHORT-HAND.

ţ

ì

The art of stenography, or short-writing, was known and practised by most of the ancient civilized nations. The Egyptians, who were distinguished for learning at an early period, at first expressed their words by a delineation of figures called hisroglyphics. A more coucise mode of writing seems to have been afterwards introduced, in which only a part of the symbol or picture was drawn. This answered the purpose of short-hand in some degree. After them the Hebrews, the Greeks, and the Romans, adopted different methods of abbreviating their words and sentences, suited to their respective languages. The initials, the finals, or radicals, often served for whole words; and various combinations of these sometimes formed a sentence. Arbitrary marks were likewise employed to determine the meaning, and to assist legibility; and it seems probable that every writer, and every author of antiquity, had some peculiar method of abbreviation, calculated to facilitate the expression of his own sentiments, and intelligible only to himself.

It is also probable, that some might by these means take down the heads of a discourse or oration; but few, very few, it is presumed, could have followed a speaker through all the meanders of rhetoric, and noted with precision every syllable, as it dropt from his mouth, in a manner legible even to themselves. To arrive at such consummate perfection in the art was reserved for more modern times, and is still an acquisition by no means general.

In every language of Europe, till about the close of the 16th century, the Roman plan of abbreviating (viz. substi tuting the initials or radicals, with the help of arbitraries, for words) appears to have been employed. Till then no regular alphabet had been invented expressly for stenography, when an English gentleman of the name of *Willis* invented and published one. His plan was soon altered and improved, or at least pretended to be so. One alteration succeeded another : and at intervals, for a scries of years past, some men of ingenuity and application have composed and published systems of stenography, and doubtless have themselves reaped all the advantages that attend it. But among the various methods that have been

proposed, and the different plans that have been adopted by individuals, none has yet appeared fortunate enough to gain general approbation; or proved sufficiently simple, clear, and concise, to be universaily studied and practised.

The English writers on stenography, are Mr. Addy, Aldridge, Angell, Annet, Blandemore, Blosset, Botley, Bridges, Byrom, Coles, Cross, Dix, Everardt, Even, Facey, Farthing, Gibbs, Græme, Gurney, Heath, Holdsworth, Hopkins, Jeake, Labourer, Lane, Lyne, Macauley, Mason, Mavor, Metcalfe, Nicholas, Palmer, Rich, Ridpath, Shelton, Steele, Tanner, Taylor, Thicknesse, Tiffen, Welster, Weston, Williamson, Willis, B. D. and Willis, &c. Of all these, Dr. Mavor has given the most complete work in his Universal Stenography, which is now used as a class book in many schools.

Some systems are replete with unmeaning symbols, perplexing arbitraries, and ill-judged contractions; which render them so difficult to be attained by a common capacity, or ordinary application, that it is not to be wondered at if they have sunk into neglect, and are now no longer known. Other systems, by being too prolix, by containing a multiplicity of characters, and those characters not simple or easily remembered, become ineffectual to the purpose of expedition, and are only superior in obscurity to a common hand. Some, again, not only reject all arbitraries and contractions, but even prepositions and terminations; which last, if not too lavishly employed and badly devised, highly contribute to promote both expedition and legibility; and though they reduce their characters to fewer than can possibly express the various modifications of sound, yet they make nearly one half of them complex. In the disposition of the vowels, there is the greatest perplexity in most systems. A dot is sometimes substituted for all the vowels indiscriminately, and the judgment is left to determine which letter out of six any dot is intended to express; or a minute space is allotted them: so that unless they be arranged with mathematical precision, they cannot be distinguished from one another; but such a minute attention is inconsistent with the nature of short-hand, which should teach us to write down in a short time, as well as in small bounds, what we wish to preserve of what we hear. Nor is the plan of lifting the pen and putting the next consonant in the vowel's place, in the middle of words, less liable to obje**e-**

objections; or that of representing all the vowels by distinct characters, being obviously ill-calculated for facility and dispatch, and consequently inadmissible into any useful system.

The person who first proposed the omission of vowels in the middle of words, which it is obvious are not wanted, and invented letters, which could be connected as in a running hand without lifting the pen in the middle of the word, made a real improvement on the works of his predecessors. But most systems, either in their plan or execution, labour under some capital defect, attended with circumstances higbly discouraging to the learner, and which in a great measure defeat the end of their invention, by being too complicated to be learnerd with ease and remembered with accuracy, or to be practised with the expedition which is requisite; and so difficult to be deciphered, that a man can scarcely read what he has just written.

To obviate these defects; to provide against prolixity and conciseness, which might occasion obscurity; to exhibit a system founded on the simplest principles, which might be easily learned and read, and yet be capable of the utmost expedition—were the motives that gave rise to the present attempt.

This method will be found different from any yet published, and superior to all in the disposition of the vowels and the facility of arranging them; the confusion in place ing which seems to detract from the merit of the best pertormances on the subject; and it may be affirmed, without ostentation, that characters simpler in their form, and more perfect in their union, have not been applied to the art of stenography.

As well as it could be determined, the simplest characters are appropriated to the letters most usually employed: indeed, as far as possible, those which are complex have been rejected; but as it was an object always kept in view that the writing should be on a line, a few are admitted. into the alphabet for that reason.

The characters for the double and triple consonants are the easiest that could be invented, consistent with perspicuity; for care has been taken to provide against all obscurity which might arise by adopting letters too similar in their formation; and with respect to the prepositions and terminations, those which occur most frequently are expressed by the simplest characters, which will be found perfectly easy in their application.

The arbitraries are few in number, and the arbitrary abbreviations, as they are entirely from the letters of the alphabet, and chosen from some thousand of words in common use, will well repay the learner for an hour's trouble in committing them to memory.

In the last section is laid down a scheme of abbreviation. comprised in a few rules, perfectly casy to be understood and practised by proficients in this art, which we hope will be found free from the perplexity complained of in many systems where abbreviation is admitted. The principal rules are new, and are so easy, so extensive in their use, and so consistent with expedition and legibility, if applied with judgment, that they alone might suffice. The learner is however advised by no means to adopt any of them, till experience has convinced him that they may be used without error or injury to legibility. All abbreviating rules ar suited to those only who have made some progress in the stenographic art; for although they certainly promote expedition in a wonderful manner, and afford the greatest case to a proficient, yet a learner, as expedition is not his first, though his ultimate view, should admit of nothing that in the least renders the reading difficult.

Of the Principles of Stenography.

The English alphabet consists of 26 letters ; six of which are vowels, as every school-boy knows.

This alphabet, as is observed by the best grammarians who have written on the language, is both defective and redundant in expressing the various modifications of sound. But all modern alphabets are equally, and some more anomalous in these respects.

But as it is not our intention to propose a mode of spelling different from that in common use, when applied to printing or long-hand writing, we shall only observe, that in stenography, where the most expeditious and concise method is the best, if consistent with perspicuity, the following simple rules are studiously to be practised.

RULE I. All quiescent consonants in words are to be dropped; and the orthography to be directed only by the pronunciation; which being known to all, will render this art attainable by those who cannot spell with precision in long-hand. RULE II. When the absence of consonants, not entirely dormant, can be easily known, they may often be omitted without the least obscurity.

RULE III. Two or sometimes more consonants may, to promote greater expedition, be exchanged for a single one of nearly similar sound; and no ambiguity as to the meaning ensue.

RULE IV. When two consonants of the same kind or same sound come together, without any vowel between them, only one is to be expressed; but if a vowel or vowels intervene, both are to be written; but if they are perpendicular, horizontal, or oblique lines, they must only be drawn a size longer than usual; and characters with loops must have the size of their heads doubled.

Might is to be written mit, fight fit, machine mashin, enough ennf, laugh laf, prophet profet, physics fisiks, through thro, toreign foren, write rite, wright rit, island iland, knavery navery, temptation temtation, knife nife, stick stik, thigh thi, honour onour, indictment inditement, acquaint aquaint, chaos kaos, &c.

Strength strenth, length lenth, friendship frenship, connect conek, commandment comanment, conjunct conjunt, humble humle, lumbor lumer, slumber slumer, number numer, exemplary exemlary, &c.

Rocks rox, acts aks or ax, facts faks or fax, districts distriks or distrix, affects afeks or afex, afflicts affiks or offix, conquer konkr, &c.

Letter leter, little litle, command comand, error eror, terror teror, &c. But in remember, moment, sister, and such like words, where two consonants of the same name have an intervening vowel, both of them must be written.

These four rules, with their examples, being carefully considered by the learner, will leave him in no doubt concerning the disposition and management of the consonants in this scheme of short-writing : we shall therefore proceed to lay down rules for the application of the vowels with ease and expedition.

RULE I. Vowels, being only simple articulate sounds, though they are the connectives of consonants, and employed in every word and every syllable, are not necessary to be inserted in the middle of words; because the consonants, if fully pronounced, with the assistance of coanection, will always discover the meaning of a word, and make the writing perfectly legible.

RULE II. If a vowel is not strongly accented in the

ancipient syllable of a word, or if it is mute in the final, it is likewise to be omitted; because the sound of the incipient vowel is often implied in that of the first consonant, which will consequently supply its place.

RULE III. But if the vowel constitutes the first or last syllable of a vowel, or is strongly accented at its beginning or end, that vowel is continually to be written.

RULE IV. If a word begins or ends with two or more vowels though separated, or when there is a coalition of vowels, as in diphthongs and triphthongs; only one of them is to be expressed, which must be that which agrees best with the pronunciation.

RULE V. In monosyllables, if they begin or end with a vowel, it is always to be inscribed, unless the vowel e be mute at the end of a word.

Such are the general principles of this art; in vindication and support of which it will be needless to offer any arguments, when it is considered that brevity and expedition are the chief objects, if consistent with legibility; and the subsequent specimens in the orthography recommended will, we hope, be sufficient to show that there is no real deficiency in the last mentioned particular.

1

٠ï

He who md us mst be etral, grt, nd maptat. It is ur dty, as real bags, to srv, lv, and oby hm. A matht wd avd blm, shd be sekmspk in al hs axes, nd ndvr wth al hs met to pls evry bdy. I wd nt frm any knxns wth a mn who hd no rgrd fr hmslf; nthr wd I bly a mn who hd ous tid me a li. Hnr is of al thngs the mst df klt to prsry ntrashd; nd whn ons mpchd, lk the chstty of a wmn, nvr shns wth its world lstr. With gd mors, kmplsns nd an esy plt adrs, mny mk a fgr in the wrl, why mntl ablts wd skrsly hv red thm aby the rnk of a fimn. Idlns is the prnt of a thand mafrtns, wch ar nvr fit by the ndstrs: it is a pn and a pnshmut of itslf, nd brngs wat and bgry in its tra. Vrtu is the frst thing tht shd be rgrdd; it is a rwrd of itslf; mks a ma rspktbl hr, nd wl mk hm etrnly hpy hrftr. Prd is a mst prinss psn, wch yt ws plntd by hvn in ur ntr, to rs ur emlsn to imit grt nd wrthy krktrs and axns, to xt in us a sl fr wht is rt nd grst, nd a ldbl ndgnsn gnst oprsrs nd wrkrs of any knd of nkty : in shrt to mk us st a prpr vlu upon ursivs, nd dsps a wrthls flo, h evr xltd. The fr prd is a vrtu, nd my gstly be kld a grins of sl. Bt prd, like othr psns, garly fxs upn rng obgks, or is apld in rng prprsns. Hu kmn is it to se a rich whm evry vs hs rndrd msrbl, nd evry fly katmtbl, ving hmslf on hs hi brth, nd bstng ths ilstrs assttrs,

Digitized by GOOGLC

of whm he nhrts nthng bt the nm or ttl! nsstrs who if thy nu hm, wd dsn thr dpndnt wth kntmt. But al prd of ths srt is fly, nd evr to be avdd.

Of the Stenographic Alphabet.

As the whole of this art depends upon a regular method and a simple alphabet, we have not only endeavoured to establish the former on satisfactory principles, but have been careful to appropriate, according to the comparative frequency of their occurrence, such characters for the letters as, after repeated trials and alterations, were conceived to be the best adapted for dispatch.

The stenographic alphabet consists of 18 distinct characters (viz. two for the vowels and the rest for the consonants), taken from lines and semicircular curves; the formation and application of which we shall now explain, beginning with the vowels.

For the three first vowels, a, e, and i, a comma is appropriated in different positions; and for the other three, o, u, and y, a point. The comma and point, when applied to a and o, is to be placed, as in Alphabet Plate, at the top of the next character; when for e and u, opposite to the middle; and when for i and y, at the bottom.

This arrangement of the vowels is the most simple and distinct that can easily be imagined. Places at the top, the middle, and the bottom of characters, which make three different positions, are as easily distinguished from one another as any three separate characters could be; and a comma is made with the same facility as a point.

Simple lines may be drawn four different ways; perpendicular, horizontal, and with an angle of about 45 degrees to the right and left. An ascending oblique line to the right, which will be perfectly distinct from the rest when joined to any other character, may likewise be admitted. These characters being the simplest in nature, are assigned to those five consonants which most frequently occur, viz. l, r, t, c hard or k, and c soft or s.

Every circle may be divided with a perpendicular and horizontal line, so as to form likewise four distinct characters. These being the next to lines in the simplicity of their formation, we have appropriated them for b, d, n, and m.

The characters expressing nine of the consonants are all

320

perfectly distinct from one another; eight only remain which are needful; viz. f, g, or j, h, p, q, v, w, and x. To find characters for which we must have recourse to mixed curves and lines. The characters which we have adopted are the simplest in nature after those already applied, admit of the easiest joining, and tend to preserve lineality and beauty in the writing.

It must be observed that we have no character for c when it has a hard sound, as in *castle*; or soft, as in *city*; for it always has the sound of k or s, which in all cases will be sufficient to supply its place: or c being easier written, might be used in all cases for the hard sound.

 \hat{R} likewise is represented by the same character as l; only with this difference, r is written with an ascending stroke and l with a descending; which is always to be known from the manner of its union with the following character; but in a few monosyllables where r is the only consonant in the word, and consequently stands alone, it is to be made as is shown in the alphabet for distinction's sake. The character for h, when lineality requires it, may be made from the bottom and inverted: And often k may be omitted entirely.

Z, as it is a letter seldom employed in the English language, and only a coarser and harder expression of s, may be supplied by s whenever it occurs; as for Zedekiah write Sedekiah, &c. or z itself may be used.

Of the Prepositions and Terminations.

The prepositions and terminations in this scheme are so simple, that the greatest benefit may be reaped from them, and very little trouble required to attain them; as the incipient letter or the incipient consonant of all the prepositions and of several of the terminations is used to express the whole. But although in the Plate sufficient specimens are given of the manner of their application, that the learner of less ingenuity or more slow perception may have every assistance, we have subjoined the following directions.

RULE I. The preposition is always to be written without joining, yet so near as plainly to show what word it belongs to; and the best way is to observe the same order as if the whole was to be connected.

RULE II. A preposition, though the same letters that constitute it may be met with in the middle or end of a word, is never to be used, because it would expose to obscurity.

RULE III. Observe that the preposition omni is expressed by the vowel o on its proper position; and for anti, anta, ante, by the vowel a, which the radical part of the word will easily distinguish from being only simple vowels.

The first rule for the prepositions is (allowing such exceptions as may be seen in the plate) to be observed for the terminations; and also the second mutatis mutandis; except that whenever sis, sus, sys, cious, tious, and ces occur, they are to be expressed as directed in the fourth rule for the consonants, whether in the beginning, middle, or end of words. But in a few words where three horizontal characters meet, it will be better to express the *fis*, &c. by the semielliptical character in the Plate opposite *tious*.

RULE IV. The terminative character for tion, ston, cion, cian, is to be expressed by a small circle joined to the nearest letter, and turned to the right; and the plurals tions, sions, cians, cians, rians, tience, by a dot on the same side.

RULE V. The terminative character for ing, is to be expressed likewise by a small circle, but drawn to the left hand; and its plural ings by a dot. In horizontal characters, by the left hand is meant the top, and by the right the space below the letter. In all other characters the right and left positions cannot be mistaken.

RULE VI. The plural sign ε is to be added to the terminative characters when necessary.

RULE VII. The separated terminations are never to be used but in polysyllables or words of more syllables than one.

These rules duly observed will point out a method as concise and elegant as can be desired, for expressing the most frequent and longest prepositions and terminations in the English language. If it should be thought necessary to increase their number by the addition of others, it will be an easy matter for any one of the least discernment to do so, by proceeding on the principles before laid down.

Rules for Abbreviations.

Though a more concise method of writing, or more numerous abbreviations, may not be indispensably necessary, if the foregoing directions be practised for a considerable time, yet contractions will be found extremely useful and convenient to those who have attained a proper knowledge of the subject, and lead to a greater degree of expedition, at the same time that they diminish the labor of writing. It has been observed in the introduction, that abbreviations are only to be employed by proficients in this art; because expedition is not the first, though the ultimate, object in view: and that an easy legibility is of the utmost consequence to the learner; which, however, cannot be preserved, if he adopts too soon those very rules which in time will afford him the greatest ease when applied with judgment.

The following short and practical rules will be found fully adequate to every purpose for which they were intended, and are far superior in the facility of their application to any which we have seen.

RULE I. The usual abbreviations in long-hand are always to be followed; as Mr. for Master, M. D. for Doctor of Physic, and Abp. for Archbishop.

RULE II. Substantives, adjectives, verbs, and participles, when the sense will direct to the meaning, are to be expressed by their initial consonant with the distinguishing marks exhibited in the Alphabet Plate, viz. a substantive must have the dot exactly over its initial consonant; an adjective must have a dot under it; a verb is to be expressed by a comma over its initial consonant; and a participle by a comma under. The dot or comma being placed thus will never occasion them to be nistaken for vowels, because they should always be on one side or other; whereas the mark for parts of speech must constantly be placed exactly over or under. These being the four principal parts of speech will be sufficient; and an adept will never be at a loss to know when he can with safety apply this rule to them.

RULE III. To render the writing more legible, the last letter of the word may be joined to the first, and the proper mark applied.

RULE IV. The constituent or radical part of words, especially if they are long, will often serve for the whole, or for sometimes the first syllable; as, we ought to moderate our ex. by our circum.; a man's man. commonly shape his for.

RULE V. All long words without exception may have their prepositions or terminations expressed by the incipient consonant efsuch preposition or termination.

RULE VI. When there is a great dependence between the parts of a sentence, the initial letter will often suffice; as L is the capital of Great B.; the eldest S. of the king of G. B. is styled P. of W. Every one, it is presumed, will allow this to be perfectly legible either in long or shortband. RULE VII. The terminations ness and less may be omitted; as faithfulness is only to be written faithful; forwardness, forward; heedless, heed; stubbornness, stubborn, &c.

h

.

RULE VIII. The second and third persons of verbs, ending in eth and est, may be expressed by s; as, he loves, thou teaches; instead of he loveth, thou teachest: or even without's; as, he love, &c.

RULE IX. Words naturally supplied by the sense may often be entirely omitted, and yet no ambiguity ensue; as, In beginning God created heaven and earth, for in the beginning God created the heaven and the earth.

RULE X. When there is an immediate repetition of a sentence or word, a line is to be drawn under the sentence or word to be repeated; as, Amen, Amen, is to be written *Amen*; but if any words intervene before a word or sentence is to be repeated, the line must be drawn as before, and A or mark of omission placed where the repetition should begin; as, Is it just the innocents should be condemned A reviled?

THE CONTENTS OF THE STENOGRAPHIC PLATES.

Fabricius's Reply to Pyrrhus.

As to my poverty, you have indeed, Sir, been rightly informed. My whole estate consists in a house of but mean appearance, and a little spot of ground, from which by my own labour I draw my support. But if by any means you have been persuaded to think, that this poverty makes me less considered in my country, or in any degree unhappy, you are extremely deceived. I have no reason to complain of fortune, she supplies me with all that nature requires; and if I am without superfluities, I am also free from the desirc of them. With these I confess 1 should be more able to succour the necessitous, the only advantage for which the wealthy are to be envied; but as small as my possessions are, I can still contribute something to the support of the state and the assistance of my friends. With regard to honors, my country places me, poor as I am, upon a level with the richest; for Rome knows no qualifications for great employments but virtue and ability. She appoints me to officiate in the most august ceremonies of religion ; she entrusts me with the

command of her armies; she confides to my care the most important negotiations. My poverty does not lessen the weight and influence of my counsels in the senate; the Roman people honor me for that very poverty which you consider as a disgrace; they know the many opportunitics I have had in war to enrich myself without incurring censure; they are convinced of my disinterested zeal for their prosperity; and if I have any thing to complain of in the return they make, it is only the excess of their applause. What value then can I set upon your gold and silver i What king can add any thing to my fortune i Always attentive to discharge the duties incumbent on me, I have a mind free from self reproach, and I have an honest fame. Dodsley's Preceptor.

Letter to a Friend against Waste of Time.

Converse. often with yourself, and neither lavish your time, nor suffer others to rob you of it. Many of our hours are stolen from us, and others pass insensibly away; but of both these losses the most shameful is that which happens through our own neglect. If we take the trouble to observe, we shall find that one considerable part of our life is spent in doing evil, and the other in doing nothing, or in doing what we should not do. We don't seem to know the value of time, nor how precious a day is; nor do we consider that every moment brings us nearer our end. Reflect upon this, I entreat you, and keep a strict account of time. Procrastination is the most dangerous thing in life Nothing is properly ours but the instant we breathe in, and all the rest is nothing; it is the only good we possess; but then it is fleeting, and the first moment robs us of it. Men are so weak, that they think they oblige by giving of trifles, and yet reckon that time as nothing for which the most grateful person in the world can never make amends. Let us therefore consider time as the most valuable of all things; and every moment spent, without some improvement in virtue or some advancement in goodness, as the greatest sublunary loss. St. Paul's Speech before Agrippa and Festus. See Acts. xxvi. 1-29.

FINIS.

Plummer and Brewis, Printers, Love-Lane, Little Eastcheap.

教之的



4.17