An Account
OF THE
ROTULA ARITHMETICA

Invented by

Mr. *George Brown*,
Minister of *Kilmaures*.

Together with Instructions how to use it.

EDINBURGH,
Printed for the Author, M. DCC.

At *Edinburgh, December* 1.
M. DC. XC. VIII.

THE Lords of His Majeſtie's Privy Council do hereby Grant to Mr. George Brown *Miniſter, and His Heirs and Aſſigneys, the ſole Privilege of Framing, Making, and Selling His Inſtrument, called* Rotula Arithmetica, *for the ſpace of* 14. *Years yet to come, after the Day and Date hereof. And Diſcharges any other Perſons to make or ſell the ſaid Inſtrument, dureing the ſpace foreſaid, without expreſs Liberty and Licence from the ſaid* Mr. Geo. Brown *and his foreſaids, under the Paine of* 500. Merks, *beſides Confiſcation of the* Rotula's *made or ſold.*

Extracted by Me,
Sic ſubſcribitur,
Gilb. Eliot, *Cls. Sti. Conſ.*

TO THE READER.

Courteous Reader!

WHen firſt I applied my Mind to publiſh ſomewhat concerning my *Rotula Arithmetica*; I deſigned only (without Preface or Apology) to ſet down, in the plaineſt and moſt homely Dreſs, ſuch Rules as might render thoſe, who ſhould happen to have both a Book and a *Rotula*, capable by the Help of the one, to make Uſe of the other; not doubting, but that ſuch an uſefull, *Machine* as it is, would be very acceptable to all ſorts of perſons; men that want Arthemetick being by this means, in the ſpace of four Hours

made capable to Add, Subſtract, Multiply and Divide without any other previous Knowledge, than that of Reading Figures, tho' otherwiſe ſuch Perſons were not able readily to Condeſcend whether 7 and 4 were 11 or 12: and the ableſt Maſters, being by the help of this *Machine* rendered more able to performe the moſt tedious, and moſt numerous Operations of Addition, Multiplication and Diviſion, with the greateſt Certainty, and without all that Rack of Intention, to which they are, by all the other methods hitherto known, obliged. But before I was readie to appear in Publick, I underſtood by ſeverall Documents, that it is as unfit for new Productions, to go abroad, without the Helmet or cover of a preface, as it's unſafe for a *Highland-man*, to travel amongſt thoſe Nighbours, with whom he is at Variance, without the Protection of his Broad *Sword* and *Target*.

Indeed ſome Perſons have been ſo un-

unjuſt as to ſpread a report that the *Rotula* is no new thing, but an old Invention of one *Delamain*, an *Engliſh* man, who obtained from King *Charles* I. a Priviledge for his Mathematicall Ring *Anno* 1630. Now this Report, as falſe as it is, was at firſt no ſmall prejudice againſt the *Rotula*, in the Opinion of thoſe, who knew no better, and who had a great deference for the ſentiments of thoſe, who were the Raiſers and Spreaders of this report: and all I my ſelf could ſay at firſt, (having never ſeen *Delamain's* Book nor Inſtrument) was, that if the *Rotula* had ever been known in the World before, it had never been out of faſhion, but had very ſoon after publication become very near as common as a Balance or an elln-wand, every one, who hath any thing conſiderable to meaſure or weigh, having likewiſe ſome Accompt to caſt.

But tho' this ſeemed to me a ſufficient Demonſtration concerning the Novelty

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ty of my Invention, yet I was obliged for the Satisfaction of others to procure some Copies, of *De la main's* Book and Projection, that such as were under a mistake might be convinced of the falshood of the foresaid Report, by Comparing both Projections together.

I should be loath to Charge the usage, I mett with in this affair, upon the Score of malice; that base Vice being as far below men of their Generous and Liberal Education, as it lyes out of the Road of my Actions to give them any other Provocation, than that of being an Inventor: Nor can it be Imputed to Ignorance; for they are unquestionably men of Profound Learning, and Knowledge; It must then be chargeable meerly upon the Score of Rashness, for had they but been at the Pains to Compare both Instruments together, they might have easily perceived the Difference to be as great as that betwixt a Line of *Logarithme* Numbers, and a Scale of equal parts: and

and for this cause I think I may Justly Charge them with Injustice, according to that known Maxime.

Qui statuerit aliquid, parte inaudita altera, licet æquum statuerit, haud tamen æquus fuit.

How reasonably then may the man be charged with Injustice, who passeth not only a harsh, but an unjust Verdict and Censure on a thing he hath not been at the pains duely to examin and consider.

But to proceed; Our worthy Country-man the Lord *Naper* Baron of *Merchistoun*, Invented the *Logarithm*-Tables; and Mr. *Gunter*, an *English* man, Converted these Tables into a straight Lined Scale; after him Mr. *Delamain*, who was *Gunter*'s Scholar converted *Gunter's* Scale into a double Circle, merely to ease men of Compasses: But then his Ring like *Gunter's* Scale, at that time, did only consist of one Line of Numbers, *Sines* and *Tangents*: and as he never dreamed

of

of performing Addition, or Subſtraction by the help of his *Machine*, ſo he Ingenouſly acknowledges that it was not capable to performe even Diviſion and Multiplication to an Arithmeticall exactneſs; But many times a man might come ſhort of very near an Unite; Nay He might have added that in Numbers of many Places a man may be ſome times to ſeek for Units, and Tens, if not for Hundreds. Nay to render it more certain the author requires That, which he propoſes as a portable Inſtrument, to be made of ſeverall Foots or Ells's Diameter, which would render it unweeldy, aud conſequently leſs uſefull, either by Sea or Land: and it is not Improbable, that for theſe defects, that Inſtrument hath been antiquated, and hath given place to the Double Scale of Proportion, now ſo much in uſe.

Now the *Rotula* performes all the four Arithmeticall Operations Arithmetically, and to an Arithmeticall ex-

Exactneſs, not only of the Integers, but even of the Decimalls, whither *finite* or *Infinite*. So that a man, who can but work by the *Rotula*, may within a little Time and Practice, learn to work by the Pen; if he ſhould chance to want his *Machine*; Nay I believe, when the *Rotula's* are once become common, the mother may teach her Children at home, as much Arithemetick, as may ſerve them all their lives.

I ſhould now cloſe this tedious buſineſs of a Preface, but that I am obliged to give ſome account of Mr. *Glover*, and his Invention called his *Rone Ariehmetique*.

This Mr. *Glover* is a *Scotiſh* Gentleman, whoſe Elder Brother *Thomas*, who was this *John's* Maſter, was my Scholar about the Year 74. at which time he learned from me that Skill in Numbers and other things which he afterwards taught this Gentleman, and by which both of them have ſince become famous abroad.

Now tho' this *Invention* of *John Glover's* be Posterior to my *Rotula*, as appears by the Date of his Privilege, Granted by his Majestie of *France*, which is of the 13. of *March* 1699. whereas my Privilege is granted in *Scotland* on the first of *December* 1698. Yet his comes so far short of mine, that *I* Verily believe, had he seen or gotten a perfect Account of mine before he proposed his own, he would have spared the pains of Publication.

I must Confess that for any thing I yet know, his Tables or Circles for Multiplication and Division (which indeed are very Ingenious, and haue cost him much Thought) are his own; as also his Tables for the Reduction of Pence to shillings, & shillings to Pounds. But in that Part which is common with his *Rone* and my *Rotula*, he seems to haue got some hint of mine; and this I am the more apt to belive because about the time that *I* was busie in contriving the *Rotula*, there was a very smart Gentleman

tleman, a near friend of his, Scholar with me at *Stirline*.

But that which gives me greater evidence in this particular, is some expressions in his own Book which makes me fancy that he hath, at least, got some imperfect Description of mine, before he contrived that part of his which serves for Addition and Substraction.

For, whereas there is on my sixt Plate 3. Circles, he speaks of three, and yet Immediatly he takes away two of his, & turns them into Tables for Reduceing of Pence into shillings, and shillings into pounds, & these not exceeding the limits of 120. and instead of the third on the *sixt* he gives us nothing but a little segment, about a fifth part divided into parts begining at 0. and ending at 24. which he calls his sixt *Index*: as also whereas my Circle is divided into 100. parts; he Chuses, (to make his differ from mine) 120. as being a common Product of 10. 12. and 20. These Numbers (as he alleadges in the be-

gining of his 1ſt. Chapter) being pre-
ferable to all other Numbers whatſo-
ever; and yet near the cloſe of the
ſame Chapter he acknowledges that it
would be better to divide the Circle
for Addition and Subſtraction into
100 parts or ſome Power of 10. and
ſo the Inſtrument would become uni-
verſall: All which give me ſuſpicion
that in this part, he hath goten, at leaſt
ſome lame account of mine.

Moreover his Inſtrument is Defective
and comes far ſhort of mine, even in
Additions; For in his, the Practitioner
is obliged to mind or mark down
how many Revolutions his moveable
Plate makes, and every one being 120,
he hath 120 to Multiply by the Num-
ber of Revolutions, which is not only
troubleſom, but likeways dangerous
eſpecially in reall Buſſineſs, where a
man whoſe mind is buſſied both about
the figures of his Columne, and the
points of his moveable plate, is obliged
at the ſame time to mind the ſeverall
Revo-

Revolutions of his moveable Plate, of
which for every one he forgets, or
overlooks, he loſes 120 for his Pains;
whereas in mine a man is not tied to
any ſuch intention above once for
1000. (which is more than any Co-
lumne does ordinarly contain) the
moveable Plate, at every Revolution
both marking and giving notice of the
number of Revolutions.

But, beſides this, in my *Rotula* the
ſame Circles that ſerve for Addition
and Subſtraction ſerve likeways for
Multiplication and Diviſion, but in his
Roue he hath one for Addition and
Subſtraction and ten or eleven for Mul-
tiplication and Diviſion and yet tho' the
Circles were twice as large, and tho'
they contained near twice as many fi-
gures as they do, they would be no
more than what is neceſſary to do,
what I am able to perform by mine.

Laſtly whereas his Tables are con-
fined only to ſhillings and pence, and
theſe of limited Number not exceeding,
120

120. There are on the waſte, on the middle of my moveable Plate, Tables for the Reduction of ſhillings, Pence, Farthings, Weights and Meaſures, be the Numbers never ſo large: Beſides the Decimall Tables for Money, weights Meaſures and the moſt ordinary common Fractions: By the help of which ſix laſt ſort of Tables, the Multiplication and Diviſion of Complex Numbers does become juſt as eaſie as that of Integers; without all that tediouſneſs which Mr *Glover* propoſes in his Book.

To conclude, what I have ſaid here is no more than was neceſſary for the Vindication of my own Invention, and to ſatisfie thoſe, who already are, or hereafter may be miſinformed either by the Story of *Delamain*, or Mr. *Glover's Rone Arithmetique*, who for what is Peculliarly his, deſerves a good degree of commendation and Encouragement.

CHAP.

CHAP. I.
Concerning the Rotula, *and the Rectification thereof.*

ALbeit in Books of this Nature, it be uſuall to prefix a Scheme of the Machine of which they treat; Yet I have thought fit in this, to omit that; becauſe ſuch as have a *Rotula*, need not a Scheme, and ſuch as want one, have no uſe for a Book; I ſhall therefore (as briefly as I can) deſcribe the *Rotula*, and then ſhew You how to uſe it.

The *Rotula* Conſiſts of two Principall Parts, to wit, a *Circular* Plain moving upon a *Center-pin*, this we call the *Moveable Plate*; and a *Ring*, whoſe Circles are deſcribed from the ſame Center, this we call the *Fixed Plate*; Becauſe it is fixed to the Box, to ſecure it from moving about the Center, as the other does.

The

The *Fixed Plate* is divided into three parts by two *Circles*; the Innermoſt of which is doubled, with a little Interſtice for *Peg-Holes*.

Near the Circumference of the Moveable, there is another *Double Circle*, with a ſmall Interſtice alſo betwixt them, for *Peg Holes*.

The ſpace without the double Circle, on the *Moveable*, and within that on the *Fixt*, are both of them equally divided into two Parts: and both are Numbered, beginning at 0. 1. 2. 3. and ſo proceeding in a Naturall Order to 99. all the Diviſions being drawen ſtreight from the Center.

On the *Fixt* many of theſe Diviſions are protracted, ſome only to the middle part; and others run over both: for confining the ſeverall ſingle Coefficents of the Reſpective Tabular Numbers, to which they are Prefixed, with this Caution when the Coefficients are the ſame, they are ſet down in the uttermoſt part; and when any Number

ber admits of two pair of *Coefficients*, the one Pair is ſet in the *Midmoſt* and the other in the *Out-moſt* Part. Thus againſt 18. on the *Fixt*, You will find in the *midmoſt* Part, 2 × 9 (that is two times Nine or Nine times two; This × croſs ſignifieing the word *times*) and 3 × 6 in the outmoſt. Alſo on the *Moveable* there is a Segment of a *Circle*, within the *Peg-hole Circle*, beginning at 9. of the Naturall Numbers and ending at 72. This Segment is likewiſe Divided by the ſame lines that Divide the outmoſt *Circle* of Naturall Numbers into equall parts.

On the *Fixt Plate* at the Diviſion betwixt 99 and 0 there is a little bit of Metal Screwed or Rivited, reaching likeways a little further than the *Peg-hole Circle*, on the *Moveable*, this piece of Metall we call the *Stop*: and muſt always be placed next Your left hand, with the Number 25, or 30. toward your Breaſt. There is alſo on the *Fixt*, over againſt the Numbers

89. or 90. a little *Circle* Divided into 10 equal Parts; with a little *Palme*, which shifts one part at every revolution of the *Moveable*; So that the figure, at which this *Palme* Points, Signifies the Number of Revolutions or Hundreds You have in your Accompt, or the Columne last added

When the Figures of the *Moveable Plate* move towards that side of the *Stop*, which is next the Cypher on the *Fixt*, we call the motion forward; but when they retire from it, the motion is backward.

In Rectification, be sure not to touch the little *Palme*, till the Unites or Numbers beginning with a Cypher on the *Moveable*, be some of them against the Nynties on the *Fixt*; and then turne the little *Palme* to the Cypher of it's Proper *Circle*; after which turn back the *Moveable*, till it will Move no further, and so when the Cyphers of the *Moveable* are just at the *Stop*, as well as the *Palme* of the little *Circle*

cle at it's Cypher; The *Rotula* is *Rectified* and ready for Operation.

I have filled up the Vacant Space in the middle of the *Moveable* with *Decimal Tables*, and Tables *of Common Divisors*. very usefull for those, that have much Bussines, or are in hast.

Onely observe carefuly that the Figures, on the right side of the *Moveable*, are *Top-se turvie*; So that You must alwayes take that which appears to be a *9th.* for a *6th.* and on the Contrary the *6th.* for a *9th.* and mind well, that the Unites are alwaysnext the Center, and the Tens next the Circumference: thus 61. will appear 19. and 91. will look like 16.

CHAP. II.

Concerning Addition.

AFter You have Rectified the *Rotula*, You may easily Perceive that all the Numbers on the *Moveable*,

	lib.	ſs.	d.
are the ſame, with	345	17	10
thoſe derectly againſt	976	13	8
them, on the *Fixt*;	158	18	9
but if You turne any	746	16	11
other figure of the	843	19	6
Moveable to the *Stop*,	977	15	7
then will all the Num-	865	14	10
bers on the *Moveable*	743	18	11
be juſt ſo many more	896	15	8
than theſe directly a-	739	16	7
gainſt them on the *fixt*;	478	13	4
for inſtance, if you	287	14	8
were to Add any Num-	958	19	11
ber whatſoever to 7.	549	15	5
firſt, bring that point	378	17	9
of the *Moveable* (which	486	14	8
is not only directly a-	297	18	10
gainſt 7 on the *Fixt*,	684	14	8
but indeed the ſame	1956	18	9
with it) to the *Stop*,	2768	11	6
and then you'll find	9875	19	10

all the Numbers on the *Moveable*, 7 more than the reſpective Numbers on the *Fixt*, ſo that a

againſt 1. on the *Fixt* you have 8. on the *Moveable* which is the Sum of 1. and 7. and againſt 9. on the *Fixt* you have 16. on the *Moveable*, which is juſt the Summ of 9. and 7. and on this *Theory* depends the Certainty of all your operations: wherefore you muſt take care in bringing up any number of Figures to the *Stop* one after another, to look for all the Items on the *Fixt Plate*, but not on the *Moveable*; Otherwiſe you will miſcarry in your Operation: Example, were you to add the Accompt on the preceeding Page, you muſt begin on the Top of the Columne of Pence, covering the fifth Number with a bodle Peg, or any other little thing, & then with your *Peg* bring up the Firſt Four Numbers, To wit: 10 8. 9. 11. thus, bring firſt up the point againſt 10. on the *Fixt*, which is ten on the *Moveable*) to the *Stop*, and then that Point on the *Moveable* which is againſt 8 on the *Fixt*, and then that Point of the *Moveable*, which

which is againſt 9. on the *Fixt*, and Laſtly that point of the *Moveable*, which is againſt 11, on the *Fixt*, and you will find the Summ of theſe four Numbers on the *Moveable*, at the *Stop*, to be 38. but you need not regaird the Summ, till you have done with the whole Column, wherefore ſhifting your Cover and Proceeding with the next four Figures as you did with the Firſt four Numbers, and ſo forward till you come to the foot of the Columne you will Find the Summ of your Pence to be juſt 175. of which 1 is found at the *Palme*, and 75. at the *Stop* on the *Moveable*; theſe Reduced to ſhillings (as you are taught in the Chapter concerning Diviſion) do veild 14 ſhillings and *7d.* ſet down your 7 under the Columne of Pennies; and having rectified the little *Palme*, (which muſt never be Forgot, before you begin a new Columne) ſet 14. of the *Moveable* at the *Stop*, for the 14. ſhillings you have to carry. Then

Then proceed, beginning at the Top of the Column for ſhillings, bringing up 17, 13, 18, 16, and ſo forward by four and four, as You did with the Pennies, and Your ſhillings will amount to *347 ſhill.*

Theſe reduced to Pounds, conform to the Directions contain'd in the Chapter of *Diviſion*, do yeeld *17 lib. 7 ſh.* Set down your *7 ſh.* under the column of ſhillings, and having rectified the *Palm*, put 17 of the *Moveable* to the *Stop*, for the *17 lib.* you have to carry.

Thence proceed to the Unites of the Pounds, and bring the Figures of that Column up, as you did thoſe of ſhillings and Pence, and you'll find the Summ of it juſt 151. the laſt Figure of which being 1 muſt be ſet down under the Integer Unites, and the other two Figures, to wit, 1 5 muſt be, after Rectifying the *Palm*, carried as before.

After the ſame manner You will find the ſecond Column, or *Column of Tens of Pounds* amount to 142; where ſet-

ting

ting down the last, to wit, the Figure 2, and carrying the other two, to wit, 14. You proceed as before to the Column of Hundreds, the last three Numbers of which having *Thousands* annexed to them, You may bring up all together, to wit, 19, 27, 98, and save Your self the Labour of a new Rectification or carrying. This last Sum amounting to 26c, must be all set down together in Order, to wit, the c under the Hundreds, the 6 under the Thousands, and the 2d. Figure before all.

After the same manner, You may Add all other Species whatsoever; providing allways You Divide the lesser Species by their proper Denominators, in Reduceing them to the next greater Species.

In Your first Practice of *Addition*, satisfy Your self with Examples of Integers, where there are no Reductions, till after You have learned *Division*; and then You will find no Difficulty.

If at any Time you Add two Columns

lumns in Integers, you must set down the two Figures at the *Stop*, under the two Columns; and carry that only, at which the *Palm* points. Observe, that how many soever of any one Species are requisite to make one of the next greater: That Number, I call the *Denominator* of the lesser Species.

Thus, in Integers, 10 is allways the Denominator; Because 10 in the Column of Unites, makes but one in the Column of Tens; and 10 in the Column of Tens, makes but one in the Column of Hundereds, *&c.* Nay, the Denominator of Tens is 100. *&c.*

Also, 4 is the Denominator of Farthings, Lippies, Firlots: and Pecks in relation to Firlots; but 16 is the Denominator of Bolls and of Pecks in relation to Bolls; and 12 the Denominator of Pence, and 20 of shillings, *&c.* This is well to be minded, because we may have frequent use to speak of the Denominators of Species.

CHAP. III.
Concerning Subſtraction.

Subſtraction finds the Difference betwixt two unequal Numbers.

The greater of theſe two Numbers is called the *Charge*; and the leſſer, the *Diſcharge*.

In *Subſtraction*, you muſt allways bring the ſeveral Figures of the *Charge*, one after another, together with the reſpective Figures of the *Diſcharge*; the one on the *Moveable*, and the other on the *Fixt*, directly againſt one another; and if the Figure of the *Charge* be equal to, or greater than the reſpective Figure of the *Diſcharge*, you have the Remainder at the *Stop*, on the *Moveable*.

But if the Figure of the *Diſcharge* be greater than that of the *Charge*, then againſt the Denominator of the Species, on

on the *Moveable*, you have the Remainder on the *Fixt*.

Thus, were I to take 8 from 8, or 7 from 7, having ſet the one againſt the other, you have 0 at the *Stop*.

So likeways, if I were to take 5 from 8; having brought 8 on the *Moveable*, againſt 5 on the *Fixt*: I have at the *Stop*, on the *Moveable*, 3 for a Remainder. But, if I had been to take 8*lib.* from 5*lib.* the Remainder is on the *Fixt*, againſt 10 (the Denominator of Integers) on the *Moveable*. And 8*d.* from 5 *pennies*, the remainder is on the *Fixt*, againſt 12 (the Denominator of Pennies) on the *Moveable*. And 8*ſh.* from 5*ſh.* the Remainder is ſtill on ehe *Fixt*, againſt 20 (the Denominator of ſhillings) on the *Moveable*. And 8 *Ounces* from 5 *Ounces*, the Remainder is on the *Fixt*, againſt 16 (the Denominator of Ounces) on the *Moveable*.

And the Reaſon of all this is plain; becauſe the *Diſcharge*, in this caſe, can-

not be taken off the *Charge*, but off the *Denominator*, which is equivalent to a borrowed one of the next greater Species, and the Overplus, by the very Poſition of the Inſtrument, is added to the *Charge*.

Only mind carefully, that as often as the Remainder is found on the *Fixt*, (which allways happens when any figure of the *Diſcharge* is greater than the reſpective Figure of the *Charge*,) you muſt, in that caſe, eſteem the next preceeding Figure of the *Diſcharge* an Unite more than really it is; Taking 1 for 0, and 2 for 1, and 3 for 2, and ſo of others.

lib.	*ſs.*	*d.*	
25123478	11	4	*Charge*,
23254906	14	8	*Diſcharge*.
01868571	16	8	

Thus, in this Example, I bring 8 on the *Moveable* to 4 on the *Fixt*; and becauſe the *pennies* of the *Diſcharge*, are greater

greater than the *Pennies* of the *Charge*; I look for 12, the Denominator of Pennies on the *Moveable*, and againſt it, I find ℔ on the *Fixt*, for my remainder. ℔ Theſe I ſet down under the Pennies.

Again, becauſe I found my laſt Remainder on the *Fixt*, I eſteem 14 *ſh.* in the *Diſcharge* to be 15. for which cauſe I bring 15 on the *Moveable* to 11 on the *Fixt*: and againſt 20 the Denominator of ſhillings, I have 16 on the *Fixt*. Theſe I ſet down under ſhillings,

Thereafter, for the ſame Reaſon, eſteeming the 6 *lib.* of my *Diſcharge* to be 7, I bring 8 (the reſpective Figure of the *Charge* on the *Moveable*) to it; and (becauſe the Figure of the *Charge*, is greater than that of the *Diſcharge*) I have 1 on the *Moveable* at the *Stop*, for the Remainder. Thence, becauſe the laſt Remainder was found on the *Moveable*, I muſt not change my 0 but bring 7 on the *Moveable* to 0 on the *Fixt*, and the Remainder at the *Stop*, is 7.

And

And proceeding, conform to theſe Directions, with the reſt, I perfect the Operation, finding allways the Remainder, on the *Moveable*, at the *Stop*, when the *Charge* Figure is greater than that of the *Diſcharge*, or equal to it, but on the *Fixt* againſt 10. the Denominator of Integers on the *Moveable*, when the *Diſcharge* Figure is greater than that of the *Charge*.

After the ſame Manner, and by the ſame Directions, You may Subſtract any other Species whatſoever, if You do but carefully mind the Denominators of the ſeverall Species.

CHAP. IV.
Concerning Multiplication.

MUltiplication ſuppoſes two Numbers, called *Coefficients*, to find a third, called the *Product*, which Product contains any one of the Coefficients

ents, as oft as the other contains an Unite.

Any one of the Coefficients, eſpeciallie the greater, may be called the *Multiplicand*, the other the *Multiplier*; thus, 3 times 4 is 12. of which 3 and 4 are the Coefficients, and 12 the Product, which Product contains 3, as oft as 4 contains 1.

When one of the Coefficients is 10, 100, 1000. You need no Inſtrument for Multiplication in *I*ntegers, for this is done merely by adding the Cyphers to the right hand of the other Coefficient.

Thus, 10 × 64 is 640, and 100 × 64 is 6400, *&c.*

But when the Coefficients are all, or many of them, ſignifying Figures, ſet the leſſer Number under the greater,

thus

thus,

7986542 *Multiplicand,*
9578 *Multiplier.*

63892336
55905794
39932710
71878878

76495098276 *Product.*

Having Rectified the *Rotula* (with the Pen in your Right Hand ready to Write, and your Left Hand at the *Rotula*, to turn the *Moveable* as shall be necessary) becauſe 8 is the laſt Figure of the Multiplier, you muſt look for 8 × every Figure of the Multiplicand, one after another, beginning at the laſt, but you muſt not regard the Products on the *Fixt*, but only upon the *Moveable* (nameing allways the Tens of the Product, firſt, as a ſingle Figure; putting that Figure on the *Moveable* immediatly to the *Stop*, and then the Unites, ſetting them down on the Paper First, thus,

Firſt, I look for 8 × 2. and againſt that, on the *Moveable*, I find 1 and 6. for which cauſe I ſet 01 on the *Moveable* to the *Stop*, and 6 I write on the Paper below the Coefficient 8.

Then I look for 8 × 4. and againſt that, on the *Moveable*, I find 3 and 3. for which cauſe I turn 03 to the *Stop*, and write down 3 on my Paper.

Then I look for 8 × 5. againſt which I find 4 and 3. here I put 4 to the *ſtop*, and 3 again to the Paper.

Thence at 8 × 6. I find 05 for the *Stop*, and 2 for the Paper.

And 8 × 9. I find 07 for the *Stop*, & 7 for the Paper.

And laſtly, at 8 × 7. I find 63, all for the Paper, becauſe it is the laſt Product.

After which, I Rectify again.

Now, as I have gone over all the Figures of the Multiplicand with 8, the laſt Figure of the Multiplier, ſo may you do by 7 for the ſecond Product, and 5 for the third, and 9 for the

fourth; carefully obſerving only to ſet the firſt Figure, or that next the right hand of every particular Product, under that Figure of the Multiplier, by which it is produced: theſe particular Products ſummed up do yeeld the total Product.

I ſhall ſubjoyn another Example, and ſo end with *Multiplication*.

```
   94587
     307900
  ---------
   85128300
     662109
     283761
  ---------
29123337300
```

In this laſt Example the two *Cyphers* of the *Multiplier* are ſet to the right of the Unites of the *Multiplicand*, and then multiplying by 9. I ſet the two Cyphers behind the Product; and ſo, what was but 9 times before, does now become 900 times the Multiplicand.

You

You ſee alſo the Unites of the Product made by 7, ſet under 7 of the Multiplier, and the Unites of that made by 3, under 3 of the Multiplier, all the reſt duely obſerving Rank and File.

To conclude this Chapter, and make You prompt in finding your Coefficients: Obſerve, that all the Products of any Coefficients are contain'd within Ten Times the leaſt of the two, ſo that all the Products of 2 are within 20, and all of 3 within 30, *&c.*

CHAP. V.
Concerning Diviſion.

SECTION 1.

Diviſion ſerves to find a Number ſhewing how oft the greate of the two given Numbers contains the leſſer.

The greater of the given Numbers, we call the *Dividend*: The leſſer the *Diviſor*; and the Number demanded, or found the *Quotient*.

When as many Figures taken from the left of the *Dividend*; as there are Figures in the *Diviſor*, are *æquivalent* to the *Diviſor*, or better than it; then we ſet a *Point* over the laſt of theſe, to Determine the firſt particular Dividend, which for *Brevity*, *I* ſhall call the firſt *Dividual*.

But if as many taken, from the left of the *Dividend*, be leſs than the *Diviſor*, the *Point* muſt ſtand over the next *Subſequent* Figure of the *Dividend*, for Determining the firſt *Dividual*.

Having Determined your *Dividual*, you muſt refer the firſt of the *Diviſor*, (when they are equall in Number of places) to the firſt of your *Dividual*; but if they are unequall to the firſt two of the *Dividual*, and ſo forward, the ſecond, third and fourth Figures of the *Diviſor* to the Subſequent Figures of your

your *Dividual* as they ly in Order; So that in ſubduction, where you begin at the laſt of the *Diviſor*, you muſt refer, or *Subtract* the Product of it, from the laſt of the *Dividual*.

The *Remainder* of the firſt *Dividual* with the next following Figure of the Dividend Yeilds you a 2*d*. *Dividual*.

So Soon as you have Determined your firſt *Dividual*, you preſently underſtand, how many Figures you are to have in the *Quotient*; to, wit, one for the *Point*, or firſt *Dividual*; and one for every ſubſequent Figure of the Dividend.

Wherefore, if the 2*d*, 3*d*, or any other *Dividual* ſhould happen to be leſs than the *Diviſor*; you muſt put a *Cypher* in the *Quotient* for that *Dividual*; And ſo (as if it were but a new Remainder) bring down another Figure from the Dividend; to wit, the next following for a new *Dividual*.

I ſhall firſt ſhew you how to Divide by one Figure, and then by two, and after that by as many as you pleaſe.

In *Diviſion* by any one Figure, you have nothing to do, but to bring the *Dividual* on the *Moveable* to the firſt *Cell* that occurres, in which the *Diviſor* is a Coefficient; the other Coefficient in the ſame *Cell*, is the *Quotient*, and that (having firſt drawn a Line below the Dividend.) You muſt ſet down under the laſt Figure of your *Dividual*; and the Figure, at the *Stop* on the *Moveable*, you muſt ſet over the ſame laſt Figure of the *Dividual*, for a Remainder. And ſo proceed Rectifying every time before you apply to the next *Dividual*.

Example.

74c470

Diviſor, 9) 88654321 *Dividend*.

9850480 $\frac{1}{9}$ *Quotient*

Here you ſee, that 8 (the foremoſt Figure

Figure of the *Dividend*,) being leſs than 9, the *Diviſor*; the *Point*, for Determining the firſt *Dividual* ſtands over the ſecond figure of the *Devidend*: So that my firſt *Dividual* is 88: Which being thus Determined, *I underſtand that I am to have in my* Quotient 7 *Figures*; to wit *one for the firſt* Dividual, *and one for every* Subſequent *Figure of the* Dividend.

Theſe things conſidered, and the *Rotula* Rectified, I bring the firſt *Dividual*, 88. on the *Moveable*, to the firſt *Cell*, that occurres on the *Fixt*, in which 9 is a Coefficient; and becauſe the other Coefficient in the ſame *Cell* is 9; *I* ſet that down under 8, the laſt Figure of my *Dividual*; and, having 7 on the *Moveable* at the *Stop*, I ſet 7 over the ſame laſt Figure of my *Dividual* for a Remainder; then I Rectifiie.

Now the firſt Remainder and next *Subſequent* Figure being 761 bring 76 to the firſt 9 Coefficient, & there I find 8 for my *Quotient*, and 4 at the *Stop* for my

my Remainder; these I set down as before, the one under the other, over the last Figure of the 2d. *Dividual*, and then Rectifie.

The 3d. *Dividual* being 45, and having without any *Motion* a *Cell* of 9, directlie against it, I find 5 for my *Quotient*, and 0 for my Remainder.

So that the 4th *Dividual* becomes 04. which being less than 9; I set 0 in my *Quotient* and then

The 4 still Remaining with the next *Subsequent* Figure of my Dividend, making 43; I bring 43 on the *Moveable* to the first 9 Coefficient, and there finding 4 for my *Quotient*, and 7 at the *Stop* for my Remainder.

Having set down these and Rectified, I find my next *Dividual* 72, against a *Cell.* of 9, in which I have 8 for my *Quotient*, and 0 for my Remainder,

So that my last *Dividual* being onlie 01, which is less than my *Divisor* I set nought in my *Quotient*; and 1 the last Remainder, I set over 9 the *Divisor*

Divisor at the end of the *Quotient*, with a litle Line betwixt them for a *Fraction*. Thus $\frac{1}{9}$

If any *Divisor* consist only of one signifying Figure & *Cyphers*, you must Divide only by the signifyng Figure, & from the *Quotient* cut off as many Figures towards the right-Hand, as there are *Cyphers* in the *Divisor*, observing, that if the signifying Figure be only an Unite, You have no use for the *Rotula*, or any other Instrument; but meerly to write down the Dividend below the Line in the *Quotient*; & then cut off from it conform to the Number of your *Cyphers*. Example first;

Divisor 1000.) 976583 Dividend.

976583 *Quotient.*

In this Example, you see the Figures in the *Quotient* are the same with those in the *Dividend*, because the signifying Figure of the *Divisor* is but an Unite. But because there are three *Cyphers* to the Right of the *Divisor*, I

have cut off three *Figures* from the Right of the *Quotient*, where you see that (as your Dividual *Point* Intimates) You have only three *Integers* in your *Quotient*, namely those to the left-Hand, and the Remainder is a *Decimal Fraction*; or if you will, the *Numerator* of a common Fraction, whose *Denominator* is the *Divisor*; thus:

$$976\frac{583}{1000}$$

Example 2d. 800) 478552 (7617
598 19

In this Example, I first Divide as if my *Divisor* were only 8, so that I have 5 *Figures* in the *Quotient*, just as if the Dividual *Point* had stood over 7, the Second of the Dividend: But because of the two *Cyphers* in the *Divisor*, I cut off two from the Right of the *Quotient*, and so I understand, that if 800 Men had to receive, or pay out equalie amongst them 478552 *lib.* each Mans

Mans share would come to 598 *lib.* 3 *sh* 9 *d.* and about an half Penny.

Section 2d. Shewing how to Divide by two Signifying Figures

FIRST METHOD.

In this and all *Operations*, where the *Divisor* consists of more signifying *Figures* than one, You must set the *Quotient* to the Right of the Dividend, and the Remainder under the severall Respective *Figures* of every *Dividual.*

Observe in all Subductions, that if the Remainder be either equall to, or greater than the *Dividual* you have taken the *Quotient* too little, or not set down your *Figures* right.

When you are to Divide by any two signifying *Figures*, having first determined your first *Dividual*, & Rectified, look for your *Divisor* on the *Fixt*, & at that, put in a little Peg to mark it.

Then with your other Peg or stile, bring up that *Point* of the *Moveable*

which is againſt the ſtanding Peg in the *Fixt*, once, twice, thrice, *&c.* till the Number againſt the Peg, with regard to the *Palme*, exceed the *Dividual*, minding only how many times you have brought up that *Point*, and theſe times are the *Quotient*; & wherever you find the *Dividual* on the *Moveable*, (which is either at the *Stop*, or betwixt the *Stop* and the *Point*, againſt the Peg in the *Fixt*) there you have the Remainder on the *Fixt*.

As alſo you muſt remember, that whenever the Number on the *Moveable* againſt the Peg in the *Fixt*, is leſs than that on the *Fixt*, that then you are to eſteem your hundreds, one more than that *Figure* is, at which the *Palme* Points; becauſe if you ſhould bring up that Number to the *Stop*, the *Palme* would certainly caſt another hundred: Nay, 00 on the *Moveable*, is always to be reputed 100, when it is not preciſely at the *Stop*; and ſo you may Judge of every other Number on the *Moveable*

able, when it ſtands againſt a greater on the *Fixt*.

Example.

Diviſor, Dividend, *Quotient.*

15) 75986 (5065 $\frac{11}{15}$
098
86
11 *Remainder.*

Having ſet my *Dividual* point, I underſtand that I am to have 4 Figures in my *Quotient*.

I put in a Peg at 15 on the *Fixt* for my *Diviſor* and (the *Moveable* and *Palme* being firſt rectifyed) I bring up conſtantly that *Point of* the *Moveable* which is Directly againſt this *Diviſor*; ſaying once, twice, thrice, and ſo forward till, at 5 times, I find the Number againſt my *Diviſor* exceed my *Dividual*, and then I put in 5 in my *Quotient*: After which, beginning at the *Stop*, I ſearch betwixt it, & my *Diviſor*-Peg, for my *Dividual* 75, and I find it juſt at the *Stop*; and againſt it on the *Fixt*, finding a *Cypher* for my

my Remainder; I understand that 5 times 15 is just 75. and therefore *I* set down 0 under 5, the last Figure of my *Dividual*, and to it I bring down 9 the next subsequent *Figure* of my *Dividend*, for the second *Dividual*.

Now because this 2*d*. *Dividual* is less than the *Divisor*, *I* put 0 in my *Quotient*; and to the 2*d*. *Dividual* as a mere Remainder, *I* bring down the next *Figure* of the *Dividend*, to wit 8, and so I have 98 for a third *Dividual*.

Now you may either Rectify, and begin *de Novo* for 98, as you did for 75: Or, because this *Dividual* is greater than the last, to wit 75, you may proceed: Bringing up the *Divisor* once more, and saying 6 times; so have you 6 for your *Quotient*. And against 98 on the *Moveable*, you have 8 on the *Fixt* for your Remainder.

When you have set down 8 on the Paper under 8, the last *Figure* of the third *Dividual*; you bring down to it,

it 6, the last *Figure* of the *Dividend*, so have you 86, for a new *Dividual*, and having Rectified; you find the *Quotient* 5, and the Remainder 11, after the same manner as you did the first.

If after this manner, you *Divide* the Summ of your *Pennies* in *Addition* by 12, and that of your *shillings*, by 20, you will reduce the first to *shillings*, and the second to *Pounds*, in the *Quotients*; and the remainders are *pennies*, or *shillings*, according to the Nature of the Summs Divided: The same may be said of every other Species, if it be Divided by its Proper *Denominator*.

SECOND METHOD.

I shall here likeways shew you how to do the same by the Tables of common *Divisors* on the middle of the *Rotula*; which Method will likeways be sometimes very usefull in long *Divisions*, either by two, or more Figures.

Suppose then that the Summ of your *pennies* were 798. You must in reducing

cing them to *ſhillings*, *Divide* them by 12, becauſe 12 is the *Denominator* of *pennies*, wherefore having ſet them down as in the Margine, & Marked your firſt *Dividual*, You muſt look for your *Dividual* 79 in that Table, whoſe firſt Number is 12, & if you can not find 79, you muſt take that which is next to it, but leſs; and that you will find to be 72, againſt which you have 6 for your *Quotient*; as you find in the Columne on the Left of the Tables, under the Letter *N*. That 6 you put in your *Quotient*; and then *Subſtracting* 72, the Tabular Number, from 79, the *Dividual*, you ſet down the 7 that remains under the 9 of the *Dividual*. And then bringing down 8, the next of the Dividend, to 7 the Remainder, you have 78 for the *2d. Dividual*; the next to which in the Table is 72, which gives another *6th*. Figure for your *Quotient*, and 6 for your Remainder; So that in 798

```
12) 798 (66
    78
    ---
     6
```


798 pennies; you have juſt *66 ſhilling*, and 6 *d*. The laſt to ſet down under pennies, and the firſt to carrie to your *ſhillings*.

After the ſame manner you reduce ſhillings to pounds, by the Table, which begins with 20: and Weights & Meaſures by the Tables of 16, 4, and 28, according to their ſeveral Denominators

You may likeways in long *Diviſions*, to prevent many turnings of the *Rotula*, at one Fetch ſet down the Nine Multiplies of any two Figures, and ſo Divide as by the Table,

Thus.

```
19) 796857 (41939
    38
    --
    57
    36
    ---
    178
    171
    ---
     75
     18
     --
      7
      6
      --
       17
       17
       --
        0
```

In This leſſon I put 19 to the

Stop, and then againſt 19 on the *Fixt*; I have 38 on the *Moveable*, and againſt 38 on the *Fixt*, I have 57 on the *Moveable*. Theſe I ſet down, and proceed, ſeeking 57 on the *Fixt* I find 76 on the *Moveable*, and at 76 on the *Fixt*, I find 95 on the *Moveable*; then I ſett down 76, and 95, alſo *I* find at 95 on the *Fixt*, 14 on the *Moveable*, and at 14 on the *Fixt*, *I* find 33 on the *Moveable*, and at 33 on the *Fixt* I find 52, theſe likeways *I* ſet down & then in the Laſt place at 52. on the *Fixt I* find 71 on the *Moveable*, which having ſet down, *I* diſtinguiſh my nine Numbers into threes by two Lines.

Now becauſe my *6th*. Number is leſs than my fifth; *I* underſtand by that, That here I muſt add one hundred, which hundred continues invariable till the Unites and Tens, of a following Number grow leſs than thoſe of a preceeding, & then I muſt add one more to the hundreds,

Having thus made my Table I ſearch

ſearch in it, for the neareſt Number to 79; my firſt *dividual*, and finding 76, The fourth Number I ſet 4 in my *Quotient*; and ſubſtracting the Tabular Number 76, from 79 I ſet down the Remainder 3 under the 9, of my *dividual*.

To this bringing down 6, I have 36 for my ſecond *dividual*; for which looking in the Table I find 19, the neareſt, which being the firſt number, I ſet 1, in my *Quotient*; and taking 19 from 36, I ſet down 17 the Remainder under 36, then bringing down 8 of the dividend to 17; I have 178 for my next *dividual*; the next to which in the Table is 171, which becauſe it is the *9th* Number, I put 9 in my *Quotient*, and the Remainder 7, *I* ſet under 8, and ſo proceeding after the ſame manner with the two ſubſequent Figures of the dividend; *I* find my *Quotient* to be 41939, & my Remainder to be 16.

After

After the Method here, proposed for making your little Table, You may Examin the exactnes of the Tables of common *Divisors*, and so understand, whether upon Occasion you may trust them or not.

Section 3*d.* Shewing how to Divide by any Number of *Figures* whatsoever.

In this part, having first Determined the first *Dividual* observe whether *the divisor* and *dividual* be equall in Number of places. For if they are equall, you must Refer, or Compare, the first two of the *Divisor* to the first two of the *Dividual*: But if the *Dividual* have one *Figure* more than the *Divisor*; you must refer the first two of the *Divisor* to the first three of the *Dividual*.

Then you must (either by the first or 2*d.* Method, of Dividing by two *Figures*) *Find* out how oft the foremost two *Figures* of the *Divisor* is contained in the Respective Figures of the *Dividual*

dual, (whether the foremost two or three;) And having found your *Quotient*, you must set it under the *Divisor* (at convenient distance before the following Product) with the signe of Multiplication (to wit, ×,) after it, and after that the Letter *d*, and after that the signe of equalitie to wit (=) for instance, suppose the *Figure* found for the *Quotient* were 7, you must under the *Divisor*, as you see in the following Example, Set it down Thus, ($7 \times d =$) which signifies that 7 times the *Divisor* is just equal to the Number that follo*w*es the signe of equalitie: This done, Multiplie the *Divisor* by the *Figure* found, and set the Unites of the Product under the last *Figure* of the *Dividual*, and the rest in Order.

If this Product do not exceed the *dividual*, then you are sure that the *Figure* found is the true *Quotient Figure*, for which cause you must write it in the *Quotient*, and then having Substracted the Product from the *dividual*; you

you must bring down the next *Subsequent* Figure of the Dividend to the Right of the *Remainder*, so have you a Second *Dividual*.

But if the *Product* should happen to be greater than the *Dividual* (which will sometimes fall out) do not Expunge it; (for it may be afterwards usefull) but abate an Unite from the Coefficient allreadie found; so have you the true *Quotient*, by which when you have found it, Multiply the *Divisor*, & Substract this last *Product* from the *Dividual*, & Proceed conform to the Directions allreadie given. This is the far shortest Method of any I know for finding the true Figure for the *Quotient*; & does abundantly compense the little Trouble a Man is at in making sometimes two *Products*, by freeing a Man from all that tedious Chain of thought, by which he is Obliged to compare everie severall Figure of his *Divisor*, with the Respective Figures of his *Dividual*, especiallie, when they consist of many Figures. Onlie when you see the first Remainder, or the

the Difference betwixt your Tabular Number, and the Respective Figures of the *Dividual*) palpablie too little to make the next Subsequent Figure of the *Dividual* equall, or answer as many times the third of the *Divisor*, you may abate an Unite from the *Quotient* Figure; allreadie found before you make your first *Product*.

EXAMPLE.

		×	
1598)		7620475	(4768
30	4 × *d.* =	6392	
45	2*d. Divid.*	12284	
60	7 × *d* =	11186	
75	3*d Divid:*	10987	
190	6 × *d* =	9588	
105	4*th Divid':*	13995	
120	9 × *d* =	14382	
135	8 × *d* =	12784	
Last *Remainder*		1211	

In this Example, because the *Divisor* and first *Dividual*, have an equall Num

Number of Places, I refer 15 the first two of the *Divisor*, to 76 the first two of the *Dividual*: And then by the *Rotula*, or little Table made by the help of the *Rotula*, I find 5 × 15, or 75 in 76: But then the Remainder, which is but 1, makes the third Figure of the *dividual* but 12, which being less than 5×9 (the third Figure of the *Divisor*,) I abate an Unite from the first *Quotient*, & so take it only 4 times; then I Multiplie the *Divisor* by 4 and disposing the *Product* duly under the *Dividual*; I Substract the *Product* from the *Dividual*, & to the Right of the Remainder, I bring down the next Subsequent Figure of the Dividend; so have I a second *Dividual*. Now the *Divisor* having but 4 Figures, and the second *Dividual* 5, I refer the first two of the *Divisor* to the first 3 of the *Dividual*, to wit, to 122. Wherefore searching the little Table for 122; I find 120, the neareſt to it, which would yield me 8 for my *Quotient*, but the Remainder 2, makes the fourth

fourth Figure of the *Dividual*, only 28 which is much less than 8 × 9 the third Figure of the *Divisor*, wherefore I content my self with 7 for the true *Quotient* and proceed as before.

In the third *Dividual*, I find by the foremost 3 figures 109 that I may have 7 times 15 (the foremost two of the *Divisor*) in that part of the *Dividual*, but looking back on 7 × *d* under the 2*d Dividual* I find, That that Product exceeds the 3*d Dividual*, for which cause I take 6 instead of 7 for my true *Quotient*.

In the 4*th Dividual*, I have shewed you how to do, in case you should chance to take your *Quotient* an Unite bigger than it ought to be: For finding 9×*d* greater than the *Dividual*, I Substitute 8×*d* under it, & Subtracting that from the *Dividual*; I have 1211 for my last Remainder.

I have now gone through the 4 common Rules, and if what I have said be well understood, a Man may propose as many Examples as he pleaseth, and

perform them with the like eaſe: And I am confident, that a Man of a very ordinarie Capacity may learn what concernes *Addition* and *Subſtraction* of all ſorts or Species: *Multiplication* in Integers; And *Diviſion* by one or two Figures in the ſpace of one Hour, or at moſt of one Hour and a half, ſo that he hath remaining two houres and a half, for accompliſhing this laſt leſſon of *Diviſion* by more Figures, which I doubt not but he will be able to do in ſhorter ſpace, ſo that conform to what I undertake, the Scholar learnes the 4 Com-Rules in the ſpace of 4 Houres.

But before I leave this,& to ſhewyou how Copiouſly uſeful the Inſtrument is, I will ſet you aMethod of Dividing by many Figures, in which you may (without Table or ſetting down a Product) come both at your *Quotient* and Remainder, after the ſame manner as you ought to do, if you were *Dividing* by the Pen.

To this purpoſe you may provide your ſelf

ſelf at firſt with a Label of Cart or Paper, writting on the right edge of it, the Figures beginning at 0, 1, 2, and ending at 9, This we call the Labell of prefixes as you have it in the Margine.

PREFIXES	
	0
	1
	2
	3
	4
	5
	6
	7
	8
	9

Now ſuppoſe the following Example were propoſed, having firſt rectified the *Rotula*,& with a Point determined the firſt *Dividual* proceed after this manner.

1986 (15036948) 7571
11349
14194
02928
0942*

Firſt *I* bring 15, the foremoſt two of the firſt *Dividual* on the *Moveable*,(with

a little Peg to ſtay there till I have found my *Quotient*,) to the firſt Cell, in which 1 (The foremoſt Figure of my *Diviſor*) is a Coefficient, and there I have in the ſame Cell, 9 for a *Quotient*, and at the *Stop*, 6 for a Prefix; wherefore I lay 6 on the Label of Prefixes over 15, and ſo (0) the third of my *Dividual*, becomes 60: Now becauſe 9 is my *Quotient*, and 9 is alſo the 2*d*. Figure of my *Diviſor*, I look for 9×9 on the Fixt, and finding it exceeds 60 the 2*d*: Number of my *Dividual*. I therefore ſhift the Point with the Peg in it forward, to the next Cell of (1) and there having 8 for my *Quotient*, and 7 for a Prefix, I alter my prefix to 7, and then conſider, whether this *Quotient* 8 × 9 the 2*d*. Figure of the *Diviſor*, exceeds 70, the reſpective number of the *Dividual*, & becauſe 8×9 is greater than 70, I ſhift my ſtanding Peg once more to the next Cell of (1) & there having 7 for a *Quotient*, and 8 at the *Stop* for a Prefix; I am confident, (that the Remainde

der being greater than the *Quotient*) 7 will ſerve for all the following Figures o the *Diviſor*, and ſo I put 7 in my *Quotient*, then laying aſide your Label till you come to ſeek a new Figure for the *Quotient*. You muſt in the Subductiон obſerve to take 7 times every Figure of the *Diviſor*; beginning at the laſt from the reſpective Figures of the *Dividual*, that is to ſay the laſt from the laſt, and the laſt ſave one, from the laſt ſave one, and ſo forward till you take 7×, the foremoſt of the *Diviſor*, from the foremoſt one or two Figures of the *Dividual*, according as they fall out to be one or two Thus, I firſt rectify, and take out the Peg, & becauſe I muſt take 7×6 of the *Diviſor* from 6 of the *Dividual*, I with my Peg bring up 7×6 on the *Moveable* to the *Stop*, and ſearching for a Number on the *Moveable*, having 6 Unites; I find the firſt that occurres to be 46 by which I underſtand, that I am to carry 4 to wit, the tens of 46, & becauſe I have 4 on the *Fixt*, againſt 46 on the

Mo

Moveable, I understand, that I must set down 4 as a Remainder under 6 the last Figure of my *Dividual*, and so turning back the *Rotula* till 4 on the *Moveable* appear against (o) at the *Stop*; I thereafter write down 4 below the 6 of my First *Dividual*.

Then I bring up to the *Stop*, that *Point* of the *Moveable*, which is Directly against 7×8 of my *Divisor*, and looking as before for 3 Unites I finde 6 tens to carry, and 3 on the *Fixt* to set down, these carried, and set down as becomes I next bring up 7×9 of my *Divisor*, & at (o) Unites on the *Moveable*, I have to carrie 7 tens, and on the *Fixt* (1) to set down under (o) of my *Dividual*, of these the 7 carried, and the (1) set down.

In the last place I bring up 7×1 of my *Divisor*, to the *Stop*, and on the *Fixt* I have 1 (against 15 the foremost two of the *Dividual*) for my Remainder, which 1, I set under 5, the Unites of the [illegible] and so having finished the first Sub

Subduction, I rectify and bring down 9 of the Dividend, to the right of the first Remainder, for a second *Dividual*.

If you comprehend what I have said on the first, you may easily, and after the same manner go through with the other there *Dividuals*, and so perform the whole business your self.

If the *Practitioner* curiously observe the severall Operationes by the *Rotula*, he will discover them to be so Natural, that with a carrefull *Practice*, he may come to such a Habit as will render him capable to do his business with the Pen when he wants his *Rotula*. Tho' I must confess; That the ablest Masters are not capable without it, to do any considerable business with that dispach, Certainty and Exactnes, and with so little Trouble to the Head; as by the help of the *Rotula*, they may perform with the greatest ease.

If any difficulty Occur, in what hath been hitherto delivered, such as have the Opportunity, shall not want what

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If any difficulty Occur, in what hath been hitherto delivered, such as have the Opportunity, shall not want what

what help I can afford them. But because in what followeth, a Previous knowledge in *Decimal* Fractions, is supposed; If such as want that find any difficulty, they must be at the paines, or use a Master, as they find most convenient, for the attainment of that knowledge before they make any further or Considerable Progress.

CHAP. VI.

Concerning COMPLEX *NUMBERS.*

I Call those *Numbers Complex*, that consist of Intigers and Fractions, or small Denominations, such as *lib.* sh. *d.* or *Stones lib.* of Weight and *Ounces. Chalders, Bolls* and *Pecks*, &c. *Elnes, Half quarters*, or *Eight parts*, &c.

If instead of these Fractions, or Denominations, you annex the *Decimal* to the right of the proper *Integer* distinguishin

guishing betwixt them with this mark (˽) called a *Decimal Line*, you may Multiplie or Divide, as if the whole Number represented by all them Figures were an Integer. In adding *Decimals*, You must take care that those Figures next the *Decimal Line* make one Columne, & the rest in order. Thus were I to Joyn the *Decimal* of 7*sh.* which is ˽35 to the *Decimal* of 9 *d.* which is ˽375 *I* must state them Thus

˽35
˽375
And so the *Decimal* of 7*sh.*9*d.* is ˽3875

Observe that the *Decimals* for *Pence* and *Farthings*, where the last Figure is 3 or 6 as also those for third parts or sixth parts (whose last Figures are likeways 3 or 6) are all Infinites; Thus the *Decimal* of one *d.* is ˽0416 the last Figure of which may be reiterated in *Infinitum*, or as oft as the Rules of Operation do require; for which *I* refer you to my Compendious, but compleat

ſyſtem of *Decimal Arithmetick*: But leaſt that ſhould not come to your hands *I* ſhall here ſubjoyn a few *Rules*.

Firſt you muſt not limit Infinites ſhort of *Decimal* thirds.

2*ly* You muſt not limit infinites unleſs they contain one of the Reiterated *Figures*; Thus becauſe the *Decimal* of 4 *d.* is ⌊01666 *&c.* I may upon occaſion ſatisfy my ſelf with ⌊016 and 8 *d.* being, ⌊03333 I cann't ſatisfy my ſelf with ⌊03 but ⌊036 as alſo the *Decimal* for one *penny* being ⌊041666 *&c.* I can ſatisfy my ſelf with no leſs than ⌊0416

3*ly* Infinites in *Addition* and *Subſtraction*, muſt exceed the longeſt finite at leaſt by one Step towards the right Hand, thus, were I to Joyn one *penny*

viz.	⌊041666
To three farthings viz.	⌊03125
The Summ would be	⌊07291⁶

In which you may obſerve, that I have Reiterated the laſt *Figure* of the *Decimal* for one *d.* twice.

4*ly*

4*ly*. Infinites muſt in *Addition* & *Subſtraction*, be equall in Number of places; Thus were *I* to ſet down a *Decimal* for $4\frac{1}{2}$ *d.* tho' ⌊016 might ſerve for 4*d.* yet becauſe the *decimal* of $\frac{1}{2}$ *d.* is ⌊00208 The *decimal* of 4 *d.* is ⌊01666 So that the *decimal* of $4\frac{1}{2}$ *d.* is ⌊01875 throwing away the *Cypher* after the *Decimal*, as a thing of no value.

Laſtly, The Summ, difference and *Product* of infinites is infinite, unleſs they end in a *Cypher*.

Wherefore the Summ, Difference and *Product* of the laſt Columne or Figure of an *Infinite*, muſt be reckoned on the *Segment* within the *Peg holes* of the *Moveable*, and not on the whole *Circle* without; Thus in the laſt Example you ſee that 6 & 3, which make 9 on the whole *Circle*, make 10 on the *Segment*: & therefore I ſet, 0, and carrie one: Put in all the reſt of the *Figures*, I regard the whole *Circle*, but not the *Segment*; the Reaſon, of which is manifeſt from the 15*th*. Chapter of my *Decimal* Syſteme.

In Cutting of your *Decimals* after Operation, you must observe.

First that the *Decimal* of the Summ, or difference, must in Number of places, be equall to the longest *Decimal* of the Items.

Secondly, That *In Multiplication* the *Decimal* of the *Product*, must be equall, in Number of places, to those of both *Coefficients*.

Thirdly, That in *Division*, the *Decimal* of the Dividend alone, must equall those of the *Divisor* & *Quotient* both together.

Fourthly, All Numbers, either Actually have a *Decimal* annexed to them, or must be supposed to have as many *Decimal Cyphers* as may be necessary, nay Finit *Decimals* themselves, must sometimes be supposed to have *Cyphers* following them; and on the other Hand Integers, must be supposed to have *Cyphers* to the left: For these *Additional Cyphers* do neither increase, nor diminish the true value of any Number.

Multiplication by such pure Numbers as

10, 100, 1000, &c. Is done meerly by shifting the *Decimal* Line of the *Multiplicand*, so many *Steps* nearer the Right, as there are *Cyphers* in the *Multiplier*; only if the *Multiplicand* be Infinite you must Reiterate the last Figure. Thus were it Demanded; How much would pay 100000 Men, to give them 3 Farthings a Piece? Now the *Decimal* of 3 Farthings is ,00312 5, and because there are five *Cyphers* in the *Multiplier* the Answer is 00312 5 So that 312 *lib.* 10 *sh.* will just pay 100000 Men at 3 Far things *per* Piece; here you have no Reiteration, because the *Decimal* is finite.

But at 4 *d. per* Piece, the *Decimal* of which is an *Infinite*, to wit, ,01*6* You must Reiterate the last Figure, and then you'll find the Answer for ten Men to be ,016*6* That is 3 *sh.* 4 *d.* But for 100 01,666 That is 1 *lib.* 13 *sh.* 4 *d.* and for 1000, 01666*6*. *id est* 16 *lib.* 13 *sh.* 4 *d.* for 10000, 0166666 *id est* 166 *lib.* 13 *sh.* 4 *d.* after the same manner you may by the *decimal* Tables for *pence* and *shillings*, at one look turne any pure Number into

their

their Proper Integers; Thus were 7000*d.* to be turned into *Pounds*, take the *Decimal* for 7 *d.* to wit, 02916 & by shifting the *Decimal* Line one *Step*, you have the Value of 70 *d.* to wit, 02916 which is 5 *ſh.* and 10 *d.* But if you ſhift it two *Steps* to the right Hand, you have the Value of 700 *d.* namely 029|16 which is 2 *lib* 18 *ſh*, 4 *d.* and if you ſhift it 3 *Steps*, you Reduce 7000 *d.* to their proper *Pounds* and *ſhill*, namely 029|166 that is 29 *lib.* 3 *ſkill.* 4 *d.*

I have contrived a little Pocket-Book whereby you may with the ſame eaſe convert any pure Number of the Species Current in this Kingdom, into *pound Scots* or *Sterling*, at one look.

You may uſe the Table of *Ounces* to the ſame purpoſe, in turning *Drops* to *Ounces*, *Ounces* to *Pounds*, and *Bolls* to *Chalders*; All which requires an exact knowledge of *Decimals*. Example; The *Decimal* for 6, *Ounces* or *Pecks*, is |375 and conſequently 60 *Pecks* makes 3|75 that

that is 3 *Bolls*, 12 *Pecks*, but 600 *Pecks* make 37|5 that is 37 ½ *Bolls* & 6000 *pecks* are juſt 375 *Bolls*.

In *Diviſion* by 10, 100, 1000, *&c.* Juſt contrary to *Multiplication*, you muſt remove the *Decimal Line* ſo many *Steps* nearer the left, as there are *Cyphers* in your *Diviſor*: Thus were 2916 *lib.* 13 *ſh.* and 4 *d.* to be Divided amongſt 10, 100, 1000, or, 10000 Men. You muſt firſt ſet down the Dividend 291|666 and then the ſeverall ſhares of 10, 100, 1000, 10000, or, 100000, will appear as followeth.

Diviſor 10	291|66	is	291 *lib.*	13 *ſh.*	4 *d*
100	29166	is	29	3	4
1000	2916	is	2	18	4
10000	|2916	is	0	05	10
100000	02916	is	0	00	7

I muſt refer ſuch as deſire further Satisfaction in this particular to my *Compendious*, but compleat *Syſtem* of *Decimals*

Chap

CHAP. VII.

Concerning the Rule of 3.

IN the Questions of this Rule, there are allways three Numbers, either expressly given or supposed, to find a Fourth.

Of the given Numbers, there are allways two of the same sort, Species or Notion, & these we shall call *Relative Numbers*, & the other or third Number, which falls under a different Notion, we shall call the singular Number: and the fourth Number demanded (which is allways of the same Species, or Notion with the singular Number) we call the Answer; because, when it is found, it Answers the Question.

Now to save you the trouble of two Rules, one Direct, and another Reverse: I shall lay down such easie *Directions*, as may render a Man capable to Answer Questions of either, without any such Distinction.

In

In discerning the *Divisor*, (which is all the difficulty, and which must allways be one or other of the Relative Numbers) you must carefully consider, whether the Answer ought to be greater, or lesser than the singular Number For,

1*ly*. When the Answer ought to be greater than the singular Number, then the least of the Relative Numbers must be the *Divisor*.

2*ly*. But if the Answer ought to be less than the singular Number, then the greatest of the Relative Numbers must be the *Divisor*.

Having discovered the *Divisor*, set it down next your Left-Hand, and the other two, (which we now call *Coefficients*) at a convenient Distance; the one, (it matters not which) before, the other after [::] which we call the signe of Proportion.

The Numbers thus disposed, Multiply the *Coefficients* and Divide the *Product*, by the *Divisor* and the *Quotient*, yields you the Answer; Only observe, that when

when the *Diviſor* is an Unite, there will be no uſe for *Diviſion*; and on the other hand, when one of the *Coefficients* is an Unite there, will be no *Multiplication*.

As alſo, if one of the *Coefficients* have an Infinite annexed to it, be ſure to make that the *Multiplicand*.

The following Examples, ſhall Illuſtrate what hath been ſaid.

EXAMPLE, 1ſt.
Concerning the Prices of GOODS.

IF 3 Ells coſt 10 *L.* what will 17 $\frac{3}{4}$ Ells coſt? In this Example 3 and 7 $\frac{3}{4}$ are the Relative Numbers, becauſe hey are both of the ſame ſort, to wit, Ells, and 10 is the ſingular Number; ow becauſe the Price 17 $\frac{3}{4}$ Ells, muſt e greater than the price of three Ells to it, than 10 *L.* that is the Anſwer; uſt be be greater than the ſingular Number; I thereby underſtand, that 3 ne leaſt of my Relatives muſt be the *Di-*

viſor

viſor, for which cauſe I ſet the Numbers as followeth. Taking inſtead of $\frac{3}{4}$ it's *Decimal* 175.

3 *Ells* : 1775 *Ells* :: 10 *L.*

10

3) 17750

59166

So that the Anſwer is 59 *L.* 3*ſh.* 4*d.*

You ſee I firſt *Multiply* the *Coefficients*, & then Divide the *Product* by 3 the *Diviſor*, ſo have I the Anſwer: You may convert the Queſtion, and ſo prove your Work, Thus,

2*d.* *EXAMPLE.*

If 17 $\frac{3}{4}$ Ells coſt 59 *L.* 3*ſh.* 4*d.* what will 3 Ells coſt?

1775 *Ells*, 3 *Ells* :: 59166 *L.*

3

1775) 177500(10 *L.* anſ.

00000

You ſee in the *Diviſion*, that I ought to have 3 Figures in my *Quotient*, as the *Point* intimates, of which one ought to be a *Decimal*, but that being a *Cypher* I did not think it neceſſary to ſet it down.

3d. EXAMPLE.

At 3 *ſh.* 4 $\frac{1}{2}$ *d. per lib.* what will 345 $\frac{1}{2}$ *lib.* of any thing come to?

The *Decimal* for 3 *ſh.* 4 *pence* is 166666
and that for $\frac{1}{2}$ *d.* 002083
So that 3 *ſh.* 4 $\frac{1}{2}$ *d.* is 168750

Then conform to the Rule, the leſſon will ſtand as followeth.

1 *Lib.* ; 16875 *L.* :: 3455 *Lib.*

3455
84375
84375
(50) 67500
50625
58303125 anſ. 58 *li.* 6 *ſh.* 0 $\frac{3}{4}$ *d.*

You ſee in the leſſon, there is no *Diviſion*, becauſe the *Diviſor* is an Unite.

4th. EXAMPLE.

If 345 $\frac{1}{2}$ Ells coſt 58 L. 6 *ſh.* 0 $\frac{3}{4}$ *d.* what will $\frac{1}{2}$ one Ell coſt?

345 Ells ; 1 Ell :: 58303125 *L.*

3455)

3455) 58303125 (16875 *L.*
23753
30231 Anſwer 3 *ſh.* 4 *d.*
25912
17275
0000
(7)

In this *Example*, you ſee that one of the *Coefficients*, being an Unite: There is no *Multiplication*.

5th. EXAMPLE.

If $\frac{3}{4}$ Ells coſt $\frac{4}{5}$ *lib.* what will $\frac{5}{6}$ Ells coſt?

75 Ells ; 8 *L.* :: 833 Ells

8
75) 6668 (9142
116
316
166
166

Anſw. 18 *ſh.* 3 $\frac{1}{4}$. *d.* & ſome little more.

Becauſe the laſt *Dividual* is the ſame the *Quotient* is Infinite.

In this laſt Example, the *Decimal* of $\frac{5}{6}$ being Infinite; The *Product* of the daſh'd Figure

Figure, is reckoned on the *Segment*, but the *Product* of all the rest, is reckoned on the Integer-Circle,

Item, because the Dividend is Infinite, in *Prolongation* of the *Work* I have Reiterated the last Figure.

6th. EXAMPLE.

At $5\frac{1}{2}$ *per Cent*, what will 347 *lib.* 13 *ſh.* 4 *d.* pay *per Annum*?

In this leſſon, obſerve, that tho' all the Numbers be of one Denomination or kind of things, yet (the $5\frac{1}{2}$ *L.* falling under a different Notion, to wit, that of Intereſt; whereas the other two, to wit, the *Cent*, or 100, and 347 L. 13 *ſh.* 4 *d.* are Principal Summs) the $5\frac{1}{2}$ is the Singular Number, and ſo 100 is the *Diviſor*.

Principal	*Intereſt*		*Principal*
100	55	::	347666
			55
			1738333
			1738333

Anſwer 19 *lib.* 2 *ſh.* 5 *d.* 19121666 *l. In.* and a little more than $\frac{1}{2}$ a *Farth.*

In

In this you have 6 *Decimals* in the Anſwer to wit, four for thoſe of the *Coefficients*, and two for the *Cyphers* of the *Diviſor*.

7th. EXAMPLE.

At 4 *ſh.* $10\frac{1}{4}$ *per Crown*, how many *Pounds Sterl.*^{2} muſt one have for $758\frac{1}{2}$ *Crowns*.

1 *Cr.*	5	7585	::	24375 *lib. St.*
				7585
				121875
				195000
				121875
				170625
				184884375

Anſwer. 184 *lib.* 17 *ſh.* $8\frac{1}{4}$ *d.*

8th. EXAMPLE.

If 40 Men are able to finiſh a piece of Work in 8 Dayes, how many may do the ſame in 5 Dayes? here, becauſe the Anſwer ought to be greater than the ſingular Number 5, the laſt of the Rela-

tives is the *Diviſor*, and ſo you are free from the cumberſome Reflections, on a Reverſe *Rule*.

5 *Dayes* ; 40 Men :: 8 *Days*

40

5) 320

Anſwer 64 Men

9. EXAMPLE.

If the *penny* Loaff, ought to VVeigh 18 *Ounces*, when the VVheat ſells at 10 *ſh. Sterling. per Boll*, what ought the ſame to VVeigh, when the VVheat ſells at 15 *ſh. per Boll*;

15 *ſh.* 10. *ſh.* :: 18 *Ounces.*

10 Anſwer

15)180 (12 *Ounces*

30

In Queſtions of 5 Numbers, you have, for the moſt part, two paires of Relatives, and but one ſingnlar Number, wherefore you may take any one of the paires of Relatives with the ſingular Number, to

find the firſt Anſwer, and that Anſwer will ſerve for a ſingular Number, for the other pair of Relatives in finding the laſt Anſwer.

9th. EXAMPLE.

At 5 *per Cent per Annum*, what will 197 *L.* 15 *ſh.* 8 *d.* come to in 7 Years? In this the Relatives are 100 *L.* and 197 *L.* 15 *ſh.* 8 *d.* for the firſt pair and, 1, Year and 7 Years for the 2*d.* pair, and 5 is the Singular.

L. Int.	*L.*	*Ye.*	*Ys. Intereſts.*
100 ; 5 ::	197,78	1 ; 7	75 :: 9,8891
	5		7,75
The 1*ſt.* Anſ. is 9,8891		*L. Inter.*	494458
			6922416
			69224166
			76641041

So that the Anſwer is 76 *L.* 12 *ſh.* 9 $\frac{1}{2}$ *d.* and very little more.

10th. EXAMPLE.

At 2 *Dollars per* L. *Flemiſh*, Ex-

L. change

change at 35 5/6 *ſh*, *Flemiſh per L. St.* how many *L. Ster.* will 666 2/3 *Dollars* come to ?

Doll.	*L. Fl.*	::	*Doll.*
25	1		666666
	×		*L. Flem.*

25) 666666 (266666
166
166

In this *Diviſion*, finding my 3*d. Dividual*, the ſame with the 2*d.* and, (becauſe of the Reiterated Figures of the Dividend) underſtanding that it will allways be the ſame in *Infinitum*, I therefore Reiterate the 2*d.* of my Figures in the *Quotient*; to wit, 6, till I have five Figures in all, as the *Dividual-Point* Intimates: And ſeeing I have 3 *Decimal* in my Dividend, and but one in my *Diviſor*, I underſtand that the laſt two, of my five Figures in the *Quotient*, muſt be *Decimals*, and the daſhed Figure is added, becauſe, (as hath been allready ſaid) Infinites cannot be limit

limited under *Decimal* thirds; ſo that my 666 1/3 *Dollars*, makes juſt 266 L. 13 *ſh.* 4 *d. Flem.* for my firſt Anſwer, and this muſt be one of the *Coefficients* for the 2*d.* operation, becauſe in this we have now two Parcells of *Flemiſh Money*, and but one L. *Sterl.*

L. *Fl.* L. *Sterl.* L. *Elem.* 1 *ſh.* 05
1777 1 :: 266666 1/3 *ſh.* 0055
5 *ſh.* 0277

1777) 266666 (150*l.St.* 1 L. 15 *ſh.* 1775
1 L. 15 9 *lb.* 1777
1777
8888
8888
00000

In this laſt Operation the third *Dividual. viz.*. 0000 being leſs than the *Diviſor*, I put 0 in my *Quotient*, and ſo the Anſwer is 150 Lib. *Ster.*

11*th. EXAMPLE.*

At 5 L. 10 *ſh. per Cent per An.* what will the *Intereſt* of 756 L. 13 *ſh.* 4 *d.* amount to in 7 *Yeares*, and 7 *Months*?

Year L. *Years Months* 6=5
1 55 :: 7,58 3 *Months* 1 = ,08 3
55 *Months* 7 = 58 3
37916
L. *Prine.* 379166 *Int.* L. 100 for 1 *Y.*
100 41,708 3 :: 756,666 L. *Pr.*
756,668
139027
139027
2502500 *Vide.* my *Com-*
20854168 *pend.* ſyſtem a-
29395823 nent *Multiplicati-*
317,593058 *L. In.* =*on*, with an Infinite in both *Coefficients.*

The Anſwer is 317 L. 11 *ſh.* 10 $\frac{1}{2}$ *d.* very near

12*th.* E X A M P L E.

Intereſt at 5 $\frac{1}{2}$ *per Cent.* What will 456 L. 13 *ſh.* 4 *d.* (payable 3 *Years* hence) be worth in preſent *Money?*

Years

Years L. *Years.*
1 5 55 :: 375
55
1875
1875
20625 L. *per Ce.* (for 3 $\frac{3}{4}$ *Y.*

Add this *Intereſt* to its principal, and the 2 *d.* Operation will ſtand thus.

L *Pr.* & *In* L. *Prin.* *Prin.* & *Int.*
120625 : 100 :: 456,666
100
45666,66
×
120625) (45666,668 (378,583
947916
1035416
704166
Anſ. 378 L. 11 *ſ.* 1009416
8 *d.* & leſs than 444166
$\frac{1}{4}$ *d.* more. 82291

I ſhall conclude with an Example of unequall *Diviſion*, which may be very uſeful in fellowſhip.

13*th*

13*th*. *EXAMPLE*

There is to be Divided amohgſt 14 Men 458 L. 5 *ſh*. 11 *d*. with *Proviſo*, that 9 of the Number (whoſe ſtocks or hazards were equall) have equall ſhares, but the other 5 are to have, one of them $\frac{1}{2}$ ſhare another $\frac{1}{3}$ another $\frac{1}{4}$ another $\frac{1}{5}$ another $\frac{5}{6}$ of an equall ſhare: The equall ſhare, and conſequently the ſeverall Fractions of the equall ſhare, is demanded?

In this you muſt add the *Decimals* of the ſeverall Fractions in the Queſtion to 9, and ſo you will find your *Diviſor* to be $11\overline{08}_3$ and not 14 thus

9000

$\frac{1}{2} = 5$

$\frac{1}{3} = 3\overline{3}$

$\frac{1}{4} = 25$

$\frac{1}{5} = 20$

$\frac{5}{6} = \overline{83}$

The Sum of of all which is $11\overline{08}_3$

Hence the Queſtion muſt be thus ſtated.

Men	L.	Man
$11\overline{08}_3$	$458\overline{29}_3$ ::	1 $11\overline{08}_3$

* L.

$11\overline{08}_3$) $458\overline{29}_3$ (4135 to each of 9

$4 \times d = 44333\overline{33}$ 20675 $\frac{1}{2}$ 20L. 13*ſh*. 6

1496250 13783$\overline{33}$ $\frac{1}{3}$ 13. 15. 8

$1 \times d = 11083\overline{3}$ 19337$\overline{5}$ $\frac{1}{4}$ 10. 6. 9

387916 68916$\overline{6}$ $\frac{1}{6}$ 6. 17 10

$3 \times d = 332500$ 344583$\overline{3}$ $\frac{5}{6}$ 4. 9. 2

55416. 37$\overline{15}$ 9 *Quotic.*

$5 \times d =$ 55416:458$\overline{29}$83

00000

If any Difficulty occur in theſe leſſons, it may be eaſily overcome, and at a very Reaſonable Rate, by a little converſe with the AUTHOR.

FINIS.

ERRATA. Page 29, Line 4. read 8 for 6. P. 32. L. 8. R. 9276. for 8276. In the end of the Product. alſo the Example Page. 38. is only diſorderly ſet for the 9 of the Quotient ought to ſtand under the 2d. of the Dividend. and the reſt in Order.

At *Edinburgh*, the Twentie eight *Day* of *November*, *one Thousand*, *fix Hundred Nintie Nine Years.*

THe Lords of His Majeſties *Privie Councel* Having by their Act of the fift of *December*, *one Thouſand*, *fix Hundred*, *Nintie Eight Years*, Granted to Mr. *George Brown* Miniſter, and his Heirs and Aſſignois, the ſole Priviledge of framing, making and ſelling his Inſtrument called *ROTULA ARITHMETICA*; For the Space of fourten *Years*: From the *Day* and *Date* of the ſaid Act. And Diſcharged any other Perſons to make and ſell the ſaid Inſtrument, during the Space foreſaid without expreſs Liberty and Licence, from the ſaid Mr: *George* and his foreſaids: under the Paine of five Hundred Merks; Beſides the Confiſcation of the *ROTULA's*, Made or Sold. The ſaid Lords of his Majeſties *Privie Councel* Do hereby Diſcharge the Importing of the ſaid Inſtrument, or *ROTULA*; During the Space foreſaid, alſe well as the making or Selling thereof: Under the ſaid Paine of Five Hundred Merks: Beſides the Confiſcation of the Inſtruments or *ROTULA'S* Imported. Alſe well as theſe made or Sold. And declares, this preſent Act, to the Commence from the *Date* of the former Act: Which is the firſt *Day* of *December*: *One Thouſand*, *ſix Hundred*, *Nintie Eight Years.*

Extracted by Me,
Sic ſubſcribitur,
Gilb. Eliot Cls. Sti. Conſ.

THE Principles of Geometrie,

Aſtronomie, and Geographie.

Wherein is breefely, euidently, and methodically deliuered, what-*ſoeuer appertaineth vnto the know*-ledge of the ſaid Sciences.

Gathered out of the Tables of the *Aſtronomicall inſtitutions of Georgius Henſchius.*

By *Francis Cooke.*

Appointed publiquelye to be read in *the Staplers Chappell at Leaden hall, by* the Wor. *Tho. Hood*, Mathematicall Lecturer of the Cittie of London.

AT LONDON
Printed by *Iohn Windet*, and are to be ſolde in Mark lane, ouer againſt the ſigne of the red Harrow, at the houſe of *Francis Cooke.*