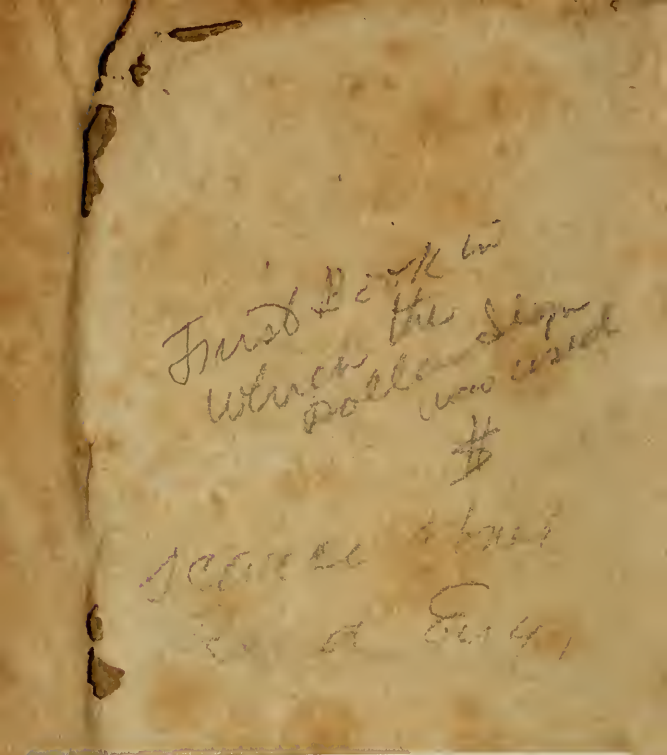

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AMERICAN EAGLET
Sp. Pistole.
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Johannes Port.
Fr. Guinea.
Br. Guinea.
Engd by A. Reid.

THE

American Accomptant;

BEING

A PLAIN, PRACTICAL AND SYSTEMATIC

COMPENDIUM

OF

FEDERAL ARITHMETIC;

IN THREE PARTS:

DESIGNED FOR THE USE OF SCHOOLS,

AND SPECIALLY CALCULATED FOR THE

COMMERCIAL MERIDIAN

OF

THE UNITED STATES OF AMERICA.

BY *CHAUNCEY LEE*, A. M.

LANSINGBURGH:

PRINTED BY WILLIAM W. WANDS.

M,DCC,XCVII.

[*Published according to Act of Congress.*]

RECOMMENDATIONS.

Rutland, (Vermont) February 7, 1797.

WE have perused and examined the following work, entitled "The American Accomptant, &c." by Chauncey Lee, A. M. and are of opinion it is calculated very greatly to facilitate the learning of Arithmetic, in its various branches;—that, in many of the branches, it proposes a more simple, as well as more compendious method, than has yet been adopted;—that it will be extensively useful to men of business, and is particularly calculated for usefulness in the United States.

NATHANIEL CHIPMAN,
ENOCH WOODBRIDGE,
LOT HALL,
} *Judges of the Superior Court.*

Williams College, (Mass.) March 9, 1797.

HAVING examined, with some attention, the following work, entitled "The American Accomptant," by the Rev. Chauncey Lee, A. M. I am pleased both with the plan and the execution of it; and think it calculated to promote the knowledge of Arithmetic among the Youth in our common schools, in a more easy and expeditious manner than any work of the kind now in use. In some branches it proposes new rules, which are highly recommended by their simplicity and conciseness; and, on many accounts, appears calculated for extensive usefulness among men of business in the United States.

EBENEZER FITCH, *President of Williams College.*

HAVING perused, in manuscript, the American Accomptant, by the Rev. Chauncey Lee, I find many things therein attended to of much consequence, and a number of judicious remarks on long established customs, with alterations proposed; which, should they obtain in common practice, according to the even-

tual probability, would very much ſimplify many of our computations, by making all leſs denominations of integral parts more generally deſcend upon a decimal ſcale, agreeably to the author's plan.

Conceiving it to be a work of merit, I am therefore of opinion, the general plan will meet with the approbation of the public—it being ſo happily adapted to the capacities of young ſtudents, and firſt beginners in *Arithmetic*, that it cannot fail in communicating to them juſt ideas, and a due comprehenſion of the foundation principles of that firſt branch of the *Mathematics*.

SAMUEL MOORE, *County Surveyor.*

Saliſbury, (Connecticut) March 3, 1797.

Copy of a letter from the Reverend JOB SWIFT, *to the Author.*

Bennington, March 21, 1797.

Dear Sir,

THE manuſcript copy of your "Compendium of Federal Arithmetic," with which you favored me, I have examined with attention; and, as you requeſted my obſervations upon it, I cheerfully expreſs my warmeſt approbation of the work, both with reſpect to its general plan, and alſo the ſeveral novel rules and arrangements introduced as improvements in its various branches.—In a word, I conceive it to be judiciouſly calculated to anſwer the valuable purpoſes mentioned in your propoſals, "the more eaſy inſtruction of Schools, and the benefit of young gentlemen in all occupations."

Accept, Sir, my beſt wiſhes for the ſucceſs of your undertaking; and, ſhould my name be thought of anv conſideration in the premiſes, it is freely at your ſervice.

Yours, &c.

JOB SWIFT.

Rev. Mr. Lee.

INTRODUCTION.

THE work contained in the following sheets, was originally begun with no further design than as a short catechism upon the first rules of Arithmetic, for the instruction of a particular school; but finding it open an extensive field of practical Arithmetic, and a door for many *apparent* improvements, so necessary to meet the exigencies of school education in general, which arise from the present peculiar commercial circumstances of our Country; I was induced to extend my plan, and continue the work to that serious length which is now presented to the public eye in the size of a volume.

I shall not affect to entertain my readers, with all the customary apologies for a new publication. The work will speak for itself. That it has its full share of imperfections I have not a doubt. If it possess any merit, the candid Instructor, and the intelligent MAN of BUSINESS, will readily discern it—if it be undeserving of attention, the consequences are as obvious; and in either case apologies would be impertinent. In this view of it, I have only to say, that I have spared no application nor pains in my power to insure the highest object of publication, *the benefit of my country*. How far I have succeeded, is humbly submitted, with the assurance that I shall not only receive the criti-

cifms of candor without a wound, but feel indebted to the friendly hand that ſhall point me to its defects.

Leſt any one ſhould entertain a miſtaken idea of the *deſign* of this compendium, and hence be lead to expect many things in it which he will not find; I would here appriſe him, that I have attempted in it to treat of and ſimplify the ſyſtem of *commercial* arithmetic only—to render many of its rules more eaſy and conciſe, and better adapted to the inſtruction of young minds in the method and progreſs of common ſchool education. With this view, I have omitted ſeveral rules contained in former Arithmetical treatiſes, that are perhaps more calculated either to amuſe or puzzle, than to profit the common ſchool ſtudent, or at leaſt are inapplicable or unneceſſary to trade and buſineſs, and the common affairs of human life; and added others in their ſtead deſigned to facilitate and promote theſe important, practical objects. In a word, without aſpiring to the higher branches, and more intricate rules and reſearches of the art, which indeed are rendered unneceſſary, by the labors and publications of abler hands, this compendium is deſigned as an eaſy guide to the young ſtudent—an uſeful Aſſiſtant to the common ſchool Inſtructor, and to the man of buſineſs in all the variety of commercial tranſactions.

Senſible, however, that all innovations upon old rules and long eſtabliſhed modes of

inſtruction or practice have to combat the united force of prejudice and habit; are viewed with a ſuſpicious eye, and received with a cautious hand, I conceive it a duty, I owe both to the public and myſelf, to exhibit the reaſons and grounds upon which I have ventured to project ſuch a variety of alterations as appear in the following work. Whilſt thus aſſuming the burden of proof, I have only to requeſt the reader's patient attention, and that he would not uncandidly paſs ſentence before trial, but firſt examine and then judge.

There is, I conceive, this imperfection in the mode of moſt Arithmetical authors who have publiſhed, that is, not to have treated with ſufficient explicitneſs and perſpicuity upon the firſt principles and fundamental rules, ſo as to render them palpable to the underſtanding of the new beginner—but taking many things for granted, as already well known and underſtood, tho' needing at the ſame time as particular explanation as the more abſtruſe and complicated parts, the ſtudent, as he proceeds, is ſubjected to the arduous taſk of erecting a ſuperſtructure without a foundation.

Hence too originates a ſimilar error, I mean, a ſuperficial mode of inſtruction in many of the common ſchools. The boy, advanced perhaps ſome way in his *teens*, is ſent to a winter ſchool for two or three months to complete his education; for he cannot attend

in any other ſeaſon, nor then indeed but quite unſteadily. But as he is almoſt a man he muſt go to ſchool to *cypher*; and as he has but a ſhort time for the buſineſs he muſt *cypher* faſt. He goes to ſchool, vulgarly ſpeaking *raw*, perhaps ſcarcely able to form an arithmetical figure. His maſter *ſets him a ſum* in addition, and it may be tells him he muſt *carry one for every ten*; but why, is a myſtery which neither maſter nor ſcholar gives himſelf any trouble about; however, with a deal of pains, he at length *gets his ſum done*, without ever being aſked, or knowing how to read the ſum total, or any number expreſſed in the ſtatement. * But it is *cyphering*, and that is ſufficient. If he is taught to commit any of the rules to memory, he learns them like a parrot, without any knowledge of their reaſon, or application. After this manner he gropes along from rule to rule, till he ends his blind career with the *Rule of Three*; and in the end, the only and the trueſt account he can give of the whole is, that he has been *over it*. But he has completed his ſchool education, and is well qualified to teach a ſchool himſelf, the next winter after.

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* *As a ſtriking example of this method of inſtruction, I have actually known a lad of eighteen, who, after having, in this way,* gone over *all the firſt rules of Arithmetic, at a common ſchool, was utterly unable to read or enumerate any number conſiſting of four places of figures.*

This repreſentation however is not meant to be generally applied. On the contrary I have the pleaſing ſatisfaction to believe that the mode of common ſchool education in this country has of late years been much improved and is ſtill improving; and it is the deſign and wiſh of the author to contribute his mite for the furtherance of ſo deſirable an object.

To remedy the aforementioned defects, it appears highly neceſſary that the elementary parts of Arithmetic ſhould be accurately explained and clearly diſtinguiſhed—their various combinations pointed out—the reaſon of every rule explained to the underſtanding of the ſtudent, and the whole ſyſtem analyſed with exactneſs and preciſion. Our knowledge of any art or ſcience is not born with us, but acquired—the acquiſition is progreſſive and not immediate—we proceed ſtep by ſtep—from ſmall to greater, from ſimple to complex. The foundation muſt be laid, before the ſuperſtructure can be raiſed. The child muſt firſt learn the alphabet before he can read or ſpell; and that mode of ſtudy and inſtruction is confeſſedly the moſt judicious, which places each ſtep in its natural and juſt order, and caſts the ſtrongeſt light upon the intimate connexion and mutual ſubſerviency of the ſeveral parts.

Theſe were my reaſons for adopting ſundry alterations of method to ſimplify the firſt rules, and claſſing each part in ſhort and eaſy leſſons, which, expreſſed in queſ-

tions and anſwers, may be thoroughly ſtudied, regularly recited and eaſily retained.

NOTATION is the firſt ſtep. This is as it were the A, B, C of Arithmetic, and bears the ſame important relation to all the following rules, which the Alphabet does to the art of reading. Let the learner therefore, after writing figures enough to be able to form them handſomly and place them orderly, acquaint himſelf well with this rule, by attending to the Numeration Table—the names and order of the ſeveral denominations of whole numbers—their mode or ratio of increaſe in value as he names the figures either from right hand to left, or from left hand to right—the uſe and effect of cyphers interjected between ſignificant figures, or digits, &c. and alſo by the exerciſe of expreſſing written numbers in figures and the reverſe; paying the like attention as he proceeds, to the notation of mixed quantities.

ADDITION is the next in order. In this the learner begins to calculate the operation and power of numbers expreſſed by figures in Notation. Let him begin with the eaſieſt and plaineſt examples; with numbers whoſe aggregate ſhall not exceed *ten*—then let him proceed to larger ſums of two or more figures, and nextly to the addition of the mixed quantities of money, weight, meaſure, &c. learning each table well by heart as he proceeds, together with their reſpective uſes.—In the addition of whole numbers, let him

clearly see the reason and propriety of adding *one* to the left hand column, for every *ten* contained in its right hand one, setting down only the overplus of the tens. And also in the mixed quantities *one* for the *terminus* of each denomination to the next higher denomination, according to its table.

SUBTRACTION. Let the learner, in this also, begin with the simplest and easiest examples, where every lower figure expresses a smaller number than the one directly above it. When the lower figure is the larger, for instance, as in subtracting *nine* from *fifty-six*, placed $\begin{matrix}56\\9,\end{matrix}$ instead of going the circuitous route of saying 9 from 6 I cannot, but 9 from 10 leaves 1, and 6 is 7; and then 1 that I carry to 0 is 1, which from 5 leaves 4; let him, by a mere mental operation, subtract 1 from the left hand figure 5, and annexing the right hand one to it for 16, say at once, 9 from 16 leaves 7, and then the left hand figure is the remainder is 4, without any subtracting, borrowing or paying, standing 47. This I conceive to be a more simple, natural and easy mode, especially in whole numbers, than the former which is usually taught and practised. *This* is purely Subtraction, whilst *that* is Subtraction and Addition blended together.

These two last rules, both in integral and fractional quantities, are purely simple. In this I speak only of their mode of operation; and by this alone I distinguish between *simple*

and *compound* rules. The addition of *money*, *weight*, *meaſure*, &c. is performed by the operation of Addition *merely*, and is therefore as *ſimple* Addition as that of whole numbers. It is ſimple Addition of compound or mixed quantities. And on the other hand, there is compound Addition of ſimple as well as mixed quantities. The ſame alſo applies to ſubtraction. Theſe diſtinctions, appearing to me juſt and forming a more accurate analyſis of the firſt principles of the Art, I have ventured to make in the following work.

MULTIPLICATION, all excepting the Multiplication Table, ſo called, and in caſes where the multiplier conſiſts of a ſingle figure whoſe ſquare or product with each figure in the multiplicand does not exceed *nine*, is a compound of Multiplication and Addition. The new propoſed method of *Croſs Multiplication* is conſidered as an improvement in the art; and after the learner is firſt well verſed in the common method, may, by a little practice, become equally familiar and eaſy. It is a general rule wherever the multiplier conſiſts of a plurality of ſignificant figures, and in every ſuch caſe will be found of ſpecial utility in practice. There are ſeveral other curious methods of contracting Multiplication in certain caſes, which, as they apply but to a few particular multipliers only, whoſe operation can but very ſeldom occur in practice, I have deſignedly omitted—judging thoſe rules to be the moſt uſeful, and the beſt

adapted for the inſtruction of the learner, which are the moſt general in their application.

DIVISION, whether ſhort or long, of ſimple or mixed quantities, in its mode of operation, is never ſimple, but is a compoſition of Diviſion, Multiplication, Subtraction and Addition—unleſs we except merely the reverſe of the Multiplication Table, where neither the diviſor nor quotient exceed 12. And yet this becomes compounded as before whenever there is any remainder. The diviſor is alſo a multiplicand, the quotient a multiplier, their product a ſubtrahend, and the dividend a ſubſtratum. In the proof by Multiplication, the quotient becomes the multiplicand, the diviſor the multiplier, the laſt remainder, a ſum to be added to their product; and the dividend the ſum total.—The method of contracting long diviſion by ſetting down only the remainders, may be eaſily attained and familiarized by practice, after the ſtudent has become well verſed in the common method; accordingly I have uſed only theſe contracted modes of Multiplication and Diviſion, in all the examples of the Second and Third Parts, where the operations are ſet down. The propoſed method of proving Diviſion as well as Multiplication by the *Ecks*, is calculated greatly to leſſen the labor both of the Scholar and Inſtructor. Rules of proof in all caſes, ſhould be as conciſe as poſſible, conſiſtently with

rectitude, and general application. Otherwise, if the operation of the proof be as lengthy and laborious as the work which it is designed to prove, it will not only form a heavy tax upon the students' time and patience, but oftentimes the testimony of the witness may be called in question and the proof itself equally want proof.

Our tables of weight and measure, (as all the parts, both of the ultimate and *mesne* integers, are in the ratio of vulgar fractions) are as illy contrived for ease of calculation and practical convenience as can well be imagined. Indeed, in my humble opinion, vulgar fractions are a very unimportant, if not useless part of Arithmetic, and decimals only of any considerable practical consequence.—All mixed quantities become obscure and intricate in calculation in the same proportion as they deviate from a decimal standard.—Their processes are indirect and in a greater or less degree difficult and uncertain. In this consists the wisdom and excellency of our Federal money currency, which, I am bold to say, is the highest pitch of improvement, to which money calculations can or will ever be brought. But, at the same time, it increases the above-mentioned inconveniency of mixed quantities, whilst continuing upon their present standard, through the want of an uniformity; and I am persuaded that experience will soon evince the expediency, if not the absolute necessity of federal-

izing all the tables of weights and meaſures, and other mixed quantities, which have an immediate relation to commerce, upon a decimal ſcale. There is no man, who has any knowledge of figures, but who will, by a minute's attention, perceive the inconveniency and difficulty of multiplying a vulgar and decimal fraction together, or of dividing the one by the other, without firſt expreſſing them both in vulgars, or both in decimals. This difficulty will be ſtill increaſed, where the vulgar fraction is a compound fraction, or a fraction of a fraction, which is always the caſe where there is a plurality of denominations below the integer expreſſed in the given quantity. For inſtance, £1 : 13 : $7\frac{3}{4}$ is £1 and $\frac{13}{20}$ and $\frac{7}{240}$ and $\frac{3}{960}$ of a pound—theſe fractional parts of a pound, are alſo fractional parts of each other, each denomination of all its higher denominations. After the ſame manner alſo 1 *ton*, 9 *hundreds*, 3 *quarters* and 17 *pounds*, is 1 Ton, and $\frac{9}{20}$ and $\frac{3}{80}$ and $\frac{17}{2240}$ of a Ton. Now let the farmer, or any other man undertake to reckon the worth of the laſt mentioned quantity of hay, or any other article of produce valued by weight, at the price of 4 Dollars, 44 Cents and 4 Mills *per* Ton, without decimalizing thoſe vulgar fractions, and he would find it a troubleſome buſineſs. He muſt do it in one or the other of theſe two ſeveral ways, *viz.*

1. Add all the vulgar fractions of the given quantity together, by multiplying each

numerator and all the denominators but its own together, and taking the sum of those several products for a new numerator; under which for a new denominator, write the product of all the denominators multiplied together, by which the several fractions are added into one simple fraction—Then,

Multiply the given price and the Numerator together; divide their product by the Denominator, and that quotient add to the given price of a Ton.—Or,

2d. Multiply the given price three times successively, once by each of the several Numerators, and divide their products by their respective Denominators, and then add together all those quotients and the given price of a Ton.

For the satisfaction of the curious and the conviction of all, let the business be exemplified, and the operation of each of the foregoing rules drawn out in figures at length in answering the question,

What is the worth of 1*T.* 9*Cwt.* 3*Qrs*, 17*lb. of hay, at* 4*Doll.* 44*Cents and* 4*Mills per Ton?* from which every one may the better judge, for himself, of the conveniency of our present weights and measures—of the practical utility of Vulgar Fractions, and how much they are deserving of attention.

By the 1st Rule:

1 Ton & $\frac{9}{20}$ and $\frac{3}{80}$ and $\frac{17}{2240}$

Mult. by 3 Mult. by 17 Mult. by 80

60 500 179200

2240. 80 by 9

Mult. by 60 1360 Several products add. tog. 1612800

124400 Mul. by 20 27200 27200

27200 124400

New Numerator 1774400

Denominators Multiplied

2240

By 80

179200

By 20

New Den. 3584000

The whole Fraction

$\frac{1774400}{3584000}$

Then Mult. the Numerator 1774400

By Doll. 4.444 price of a Ton.

70976

70976

70976

70976

doll. c. m.

Divide by 3584000)7885433.600(2. 20. 0

7168 Add 4. 44. 4

7174 *Answ.* 6. 64. 4

7168

Fraction thrown away 633600

By the 2d Rule:

1 Ton $\frac{9}{20}$, $\frac{3}{80}$, $\frac{17}{2240}$ at 4*d.* 44*c.* 4*m.*

	4.444		4.444
1ſt Numr. Multr.	9	2d Numr. Multr.	3
1ſt Deno. Divſ. 2|0	2|9.996	2d D. Di. 8|0	1|3.332(.16.6
Price of 9 Cwt. *D.*	1.99.9 $\frac{16}{20}$	Prc. of 3*qrs. D.*	0. 16. 6

	4.444	Prc. of a Ton.	4*d.* 44*c.* 4*m.*
3d Numr. Multr.	17	of 9 *cwt.*	1. 99. 9
	31108	of 3*qrs.*	0. 16. 6
	4444	of 17*lb.*	0. 03. 3
3d Den. divr. 22|0	7|5.548(.03.3	*Anſw.*	6. 64. 2
	672		
	834		
	672		
	(1628)		

Price of 17*lb. Doll.* 0. 03. $3\frac{16}{22}\frac{2}{40}$

Now let us compare the foregoing operations with the ſame example wrought by Decimals.

Rule. Multiply the commodity by the price; from the product point off as many right hand figures as there were Decimals in the Multiplier and Multiplicand together, and the reſt are Dollars.

9*cwt.*	= .45	*Anſwers.*	
3*qrs.*	= .0375	*By 1ſt Rule,*	*D.* 6. 64. 4
17*lb.*	= .0075	*By 2d* ——	6. 64. 2
The whole quantity	*Ton* 1.495	*By Decimals*	6. 64. 4 *very nearly.*
Multiply by *Doll.*	4 4 4		
	5980		
	5980		
	5980		
	5980		
	6.64.3.780	*Anſwer.*	

This laſt method of operation by decimals may ſtill be ſhortened more than one half, by the aforementioned mode of Croſs-multiplication, explained at large in the following work.

But ſtill this mode of operation does not reach the higheſt pitch of improvement to which it might be carried by decimals. An inconvenience will ariſe from the difficulty of readily changing theſe compound vulgar fractions into decimals. The man of buſineſs may not always have his decimal table by him, or may be difficulted to remember the decimal ratio among ſo many various rules of decimal reduction; and ſo be obliged to divide all the numerators by their denominators, in order to find the decimals: and this inconvenience, though ſmaller than the former, will ever continue to operate in a greater or leſs degree, until this *vulgar* evil is plucked up by the very roots—all theſe ſurd, untoward fractional numbers baniſhed from practice and the ſeveral denominations in all commercial tables of mixed quantities conformed to our Federal money, and eſtabliſhed upon a decimal ſcale. To accompliſh all this is a taſk too great for any individual in a republican government. It requires the arm of Congreſs to effect it; and it is equally to be hoped as expected, that their wiſdom and patriotiſm will not be inattentive to ſo important an object of legiſlation.

These considerations, however, have induced me to suggest some hints for this kind of arithmetical improvement, in a work denominated Federal Arithmetic, and to come forward as a *projector* simply, in exhibiting to public view a plan of federalizing weights and measures, as well as money, upon a decimal scale; and illustrating their utility by a variety of practical examples under each. As none of them excepting Federal Troy-weight alters the quantity of the ultimate integer, they might, if approved, be reduced to practice by merchants and others, even without legislative aid. This would enable them to keep their books, both as to commodities and prices, in decimals; and the practice, I am persuaded, would abundantly realize the benefits of the mode.

The following scheme is therefore humbly submitted to the judgment of every candid American.

AVOIRDUPOIS-WEIGHT.—Of this we have two kinds in use, tho' both weighed by the same steelyards and weights. These are commonly distinguished by the terms *gross* weight and *neat* weight. The former, which makes an hundred pounds weight to consist of 112, I must confess, appears perfectly needless, childish and nonsensical, and to be continued in practice merely thro' the force of blind habit and arbitrary custom, without a single good reason for it existing. Liability to waste is the most plausible, and perhaps the

only reaſon which can be aſſigned: but many articles, ſuch as metals, which are the leaſt liable to waſte, are weighed by this ſtandard. If this were a juſt reaſon, why would not the ſame end be better anſwered by deducting $\frac{12}{112}$ from the *price* of a hundred weight, and thereby avoid this inconvenient mode of reckoning, and the abſurdity of calling 112 only 100. Thus, for inſtance, whatever article ſells for 1 dollar *per cwt.* groſs; take 11 from an hundred, which is about the proportion, and call the price 89 cents; then let the ſame pound upon the ſteelyards be divided into *ten* inſtead of ſixteen notches; and omitting the uſeleſs denomination of quarters, we might form, as follows, the Table of

FEDERAL AVOIRDUPOIS.

10 drams make 1 ounce
10 ounces - 1 pound
100 pounds - 1 hundred weight
10 hundreds - 1 thouſand.

TROY WEIGHT, *federalized.*

Let the weight of a Dollar in American, Britiſh, and Portugueſe Gold, which according to the Act of Congreſs, paſſed February 9, 1793, is 27 grains, be the penny-weight, divide this into ten equal parts for grains—divide the grains decimally alſo, and call the parts Cents—Cents might be divided into Mills, but it is probable there would not be occaſion for that minuteneſs in practice: Therefore, I ſhall not deſcend to it, but pro-

portion the several denominations according to the following Table :—*viz.*

10 Cents - - - 1 Grain,
10 Grains - - - 1 Pennyweight,
10 Pennyweights - 1 Ounce,
10 Ounces - - - 1 Pound.

Then the value of Federal, British, and Portuguese gold by weight, would stand thus in Federal Money, *viz.*

1 Cent is - - 1 Cent,
1 Grain - - - 1 Dime or 10 Cents,
1 Pennyweight 1 Dollar,
1 Ounce - - 1 Eagle, or 10 Dolls.
1 Pound - 10 Eagles, or 100 Dolls.

Then, after the weight of any quantity of standard Gold is ascertained and written down in figures, its value in Federal money is already found, no other reduction being needed, but only to point off all the figures below Pennyweights for the decimal parts of a dollar, and all the rest are dollars, and to be read as one whole number.—Take the following for an example.—

What is the value in Federal money, of the following weight of Federal, British, or Portuguese gold, *viz.*

lb. Oz. dwt. gr.
1 . 2 . 3 . 4 . 5 *cents?*
Answer Dolls. 123. 45 *cents.*

By such a table as this, it is plain that a child might weigh and determine the value of gold, with the utmost ease and accuracy.

FRENCH and SPANISH GOLD.

This standard being less in value by $\frac{4}{177}$

in the Federal pennyweight, the proportions will be as follow, *viz.*

		Dolls.	*C.*	*M.*
1 Cent	equals	0	00	9.854
1 Grain	- - -	0	09	8.54
1 Pennywt.	- -	0	98	5.4
1 Pound	- - .	98	54	

The exchange of this gold into Federal money, may be eaſily performed in either of the ſeveral following methods.

1. Take the actual weight in cents multiplied by 270, and divide by 274, the quotient will be Federal money.—Or,

2. From the actual weight ſubtract its product, when multiplied by 146, obſerving to ſet the left hand figure of the product under the third from the left hand in the ſubſtratum or given weight.—Or,

3. From the given weight taken in grains, ſubtract the quotient made in dividing it by 685.

Let us take the former example to trace the operation of each of theſe rules.

Required the value in Federal money of

lb. oz. dw. gr. cents.

1 . 2 . 3 . . 4 . 5 of French or Spaniſh Gold.

1ſt Rule.

lb. oz. dw. gr. cts.

1. 2. 3 . 4 . 5. = 12345 *Cents.*

Multiply by 270

86415

24690

——— *Cents.*

Divide by 274)3333150(12164.7

or *Dollars* 121.64.7

2d Rule.

lb. oz. dw. gr. cts.

1 . 2 . 3 . 4 . . 5 . 12345 . . . .

Multiply by 146 1802370

74070 12164763o

49380 *Dol.* 121.64.8 nearly.

12345

1802370

3d Rule.

lb. oz. dw. gr. cts.

1. 2. 3. 4. 5. = 123.4.5 *grains.*

Divide by 685)123.45(1.8

685 *D.*121.65

5495

5480

15

But a more concife and convenient rule than either of the foregoing, the reader will find in the *Second Part* of the following work, where the fame fubject is more particularly treated and explained.

LIQUID MEASURE.—*The Gallon unaltered.*

10 Pints make 1 Gallon

10 Gallons - 1 Federal Barrel

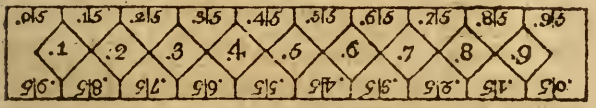
10 Barrels - 1 Hogfhead.

FEDERAL CLOTH MEASURE.

For the purpofe of mercantile convenience, let the Yard be the only denomination ufed, and the parts of the yard expreffed in

decimals. The yard divided into ten equal parts, and these again sub-divided into twentieths of a yard, as parts of a hundred, are as minute divisions as will ever be needed in Cloth measure. It would be convenient to make use of a measure upon the plan of the following

Federal Yard-Stick.



FEDERAL DRY MEASURE.

Let the Bushel according to its present standard be the unit or integer; and the only denomination used; and the parts of a Bushel, as it is now divided by pecks and gallons, be expressed in decimals of a bushel and marked upon the measures according to the following Table.—*viz.*

An half peck or 1 gallon	.125	of a Bushel.
1 Peck or 2 gallons	.25	
$1\frac{1}{2}$ Peck or 3 gallons	.375	
$\frac{1}{2}$ Bushel or 4 gallons	.5	
$2\frac{1}{2}$ Pecks or 5 gallons	.625	
3 Pecks or 6 gallons	.75	
$3\frac{1}{2}$ Pecks or 7 gallons	.875	

FEDERAL APOTHECARY-WEIGHT.

The common Grain unaltered.

10 Grains equal 1 Scruple,
10 Scruples - 1 Dram,
10 Drams - - 1 Ounce,
10 Ounces - 1 Pound,

This decimal table bears the following proportions to the vulgar table in general use, by which the reduction might be easily performed, *viz.*

Decimal Table.	*Gr.*	*Vulgar Table.*
1 Grain	= = = = = = =	1 Grain,
1 Scruple	= = = = = = =	10 Grains,
1 Dram	= 100 =	1 Dram and 2 Scruples,
1 Ounce	= 1000 =	2 Ounces and 2 Scruples,
1 Pound	= 10000 =	1 pound, 8 ounces, 5 drams.

Note. This table, perhaps, might be found rather inconvenient to the Apothecarist, in compounding his simples, until the Dispensatory could be conformed to this standard.

FEDERAL BOARD MEASURE.

The common Foot unaltered.

10 Pepper-Corns make 1 Inch,
10 Inches - - - - 1 Foot,
10 Square Feet - - 1 Pannel,
10 Pannels - - 1 Gang,
10 Gangs - - - 1 Thousand feet.

FEDERAL TABLE of things accounted by the *Tale*.

10 Particulars make 1 *Desm*,
10 Desms - - 1 Gross,
10 Gross - - - 1 Great Gross.

It may yet be an object of further inquiry whether the foregoing proposed reform in the doctrine of weights, might not be carried to a still higher pitch of simplicity and improvement; whether it might not answer a more beneficial purpose, not only to conform

the ſeveral different tables of weights to our federal money, but alſo to each other, and reduce them all to one ſingle ſtandard, *viz.* the propoſed Federal Troy weight. It is plain that an unneceſſary multiplication of the tables of compound quanties will not facilitate the ſtudy or practice of Arithmetic, but have a contrary effect: And, let me aſk, what *real* neceſſity can there be of having ſuch a diverſity of weights? What even *imaginary* neceſſity, abſtract from the current of arbitrary cuſtom and habit? What benefit ariſes from it to ſociety in general, or to the tuition of ſchools in particular? What good purpoſes are anſwered by it in the tranſaction of any kind of buſineſs, or in the operation of any arithmetical calculation whatever, which would not be as well, and on the whole much better anſwered, by reducing them all, in practice, to a ſingle ſtandard; and aſcertaining the gravity of gold, iron, medicines, and all kinds of ſubſtances, now claſſed under three different ſorts of weights, by one common table of weight, diſtinguiſhed and dignified by the name of *American weight?* This might be made to aſcend to as large, and deſcend to as ſmall denominations, upon the decimal ſcale, as could ever be needed or wiſhed. But, on the contrary, the inconveniences of the preſent eſtabliſhed mode are obvious. It renders the practice complicated, and ſets the knowlege of Arithmetic, inſtead of nearer, at a farther diſtance from

the common reach.—The boy is, perhaps, diſguſted and diſcouraged, at his very outſet, in travelling thro' ſuch a thorny wild, ſuch a dreary conſtellation of mixed quantities, in which he ſees no particular reaſon nor propriety—in learning the names and uſes of ſo many different tables—the ſeveral denominations of each, with their reſpective proportions; and then, as he proceeds, finding them repeated upon him in each of the firſt rules ſucceſſively, by the operation of a variety of practical examples under each; and thus, as it were, meeting them at every corner. His memory is fatigued—his patience tried; and in ſhort, his time and pains, and his parents' money, offered a thankleſs ſacrifice at the ſhrine of arbitrary cuſtom. At the beſt, he is retarded in the purſuit of real knowlege and improvement, by attending to what is intrinſically needleſs.

The ſame arguments, I think, may be applied in ſupport of ſuch a reform in the doctrine of weights, as in that of federal money; and ſimilar good ends be anſwered by it, as in that of eſtabliſhing an uniform money ſtandard, and aboliſhing thoſe abſurd and idle diverſities exiſting in pounds, ſhillings and pence. And, in this age of improvement, ſhall we ſtop ſhort at the threſhold, and content ourſelves with but a partial reform?

The diſſimilarity between us and ſome foreign nations, effected by ſuch a reform, I

do not conceive would operate essentially as a clog to our commerce, any more than our actual money establishment. Our own internal convenience and happiness is to be viewed as the first object of our national policy; and a servile compliance with the manners, usages and customs of foreign nations, the last. Our chief interest lies at home; and foreign intercourse has been found to be an inlet of *evils* as well as *goods*. Whatever dissimilarity, therefore, may operate, in its remotest conceivable tendency or smallest degree, as a guard against the bane of foreign influence, is to be regarded as a national blessing.

I need not be reminded, that it becomes not a private individual, in a great Republic, to dictate rules and reforms of this kind: I am not so weak as to aspire to it; but only to exercise the republican private privilege of *proposing* what the more enlightened public may judge of, and candor will not reject without reason.

In the Second Part of the following work, I have particularly attended to the rules of Reduction (commonly so called) between the several tables of mixed quantities; and especially between each and all the various money

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NOTE. *The rules of Reduction, applying to the* proposed American *weight, are made out, and illustrated by examples, as the substance of a distinct Lesson, in the* Second Part.

currencies which run in pounds, ſhillings and pence, and Federal money—together with the exchange between the various foreign and federal gold coins by weight, and their value in each of the various currencies reſpectively; endeavoring to fix upon the cheifeſt mode of operation in all caſes; with a variety of examples wrought at large under each: and explanations added, where neceſſary, for the more eaſy inſtruction of Schools, and the benefit of young gentlemen, who may have unfortunately miſſed of a competent early ſchool education.

Decimal Practice, in which I include all operations by decimal fractions, is the title of the Third Part, and therein made the ſubject of a pretty extenſive treatment. A variety of original rules are introduced—their reaſons explained, and their uſe and benefit illuſtrated by numerous examples. I have attempted, by a ſeries of decimal rules, to conform the whole ſyſtem of commercial arithmetic to a Decimal Practice, with a view to evince the ſpecial utility of decimal fractions, in facilitating arithmetical calculations of every kind. How far I have ſucceded, every one will judge for himſelf.

The principles of the art of Book-Keeping form another diviſion of the Third Part. This is a deviation from the uſual method of moſt, if not all the authors who have gone before me in writing general treatiſes of Arithmetic. They have uniformly omitted,

altogether, that important branch of knowlege, or but ſlightly touched only upon ſome of its out-works, and minuteſt parts; leaving the young ſtudent, either by mercantile apprenticeſhip, or the dint of neceſſity in tranſacting buſineſs for himſelf upon the ſtage of life, to acquire (in the habit of any mode, however unapt, which he may happen firſt to embrace) the practice of the art, without ever having the knowlege of its firſt principles. This appears to me an error, deſerving of correction; for, tho' the old adage, that *practice makes perfect*, is emphatically true in this article, yet if practice be denied the advantage of theory, the road to perfection muſt ſurely be found more difficult and uncertain. There are many branches of practical knowlege whoſe firſt principles muſt be learnt at ſchool, and which, if the foundation be not well laid, by proper inſtruction in early life, will excite the regret, whilſt they mock the wiſhes of riper years. The art of accomptantſhip appears to belong to this claſs; and, were it introduced as a ſubject of inſtruction, among the higher branches of Arithmetic uſually taught in common ſchools, I am perſuaded that the practice would evince its utility, by laying a foundation in the mind of the young ſtudent, for a more eaſy and advantageous entrance upon buſineſs, in every ſtation in life.

BOOK-KEEPING is an art of daily uſe in life, and of the higheſt importance in all com-

mercial dealings. To be well acquainted with it, therefore, is a neceſſary qualification to every man of buſineſs. It enables him readily, and at any time, to aſcertain the exact ſtate of his affairs, and alſo eaſily to make an equitable, preciſe and honeſt adjuſtment of all his accompts with his cuſtomers. Succeſs in buſineſs materially depends upon a thorough underſtanding of the art, and a ſtrict attention to its rules. Ignorance and inattention in this article, are rocks upon which thouſands have ſplit, and made ſhipwreck not only of fortune, but of honeſty and good conſcience. Indeed, without the knowlege and practice of this art, a man's intereſt is ever in a blind, uncertain and hazardous ſituation, and that too in proportion to the variety and extent of his buſineſs.

In addition to a compendium of the Italian mode of Book-keeping agreeably to Gordon's ſyſtem of accomptanſhip, I have propoſed a new method, and called it *The Farmer's Book-keeping*—which I think may be an uſeful improvement to people in the common walks of life—to farmers, mechanics, and many merchants in the country, and all whoſe buſineſs and connections are not very extenſive. It is intended to ſuperſede the neceſſity of a Blotter, Day-book, or Alphabet diſtinct from the Ledger, and the laborious drudgery of poſting books, and looking up particular names and entries in the Day-book or Journal by references in the Ledger, commonly practiſed in the ſettlement of accompts.

CLERKSHIP is so interwoven, in practice, with Book-keeping, that I have not disconnected them in theory. Clerkship, in its most extensive sense, includes Book-keeping. The latter is limited by its literal signification: the former extends to all the various written forms, and every exercise of penmanship in the draughting of *notes of hand*, *discharges*, *orders*, *receipts*, *bills*, *bonds*, *deeds*, *mortgages*, &c. which enter into the transaction of commercial business. I trust, therefore, it will not be expected, in a compendium of Arithmetic, that I should minutely trace a single branch, in a measure foreign from the rest, and in itself sufficiently copious for the substance of a volume; but only to sketch out the general outlines, with some particular directions, and a few of the most usual and necessary written forms of doing business in the common dealings of mankind.

Upon the subject of Book-keeping, in this place, I have only to add a single word of advice to every man in every station. *Be as careful and as faithfully exact in making entry upon your Book of every article of* CREDIT, *as you are in that of* DEBT.

This method will enable you, at any time, the more easily to reckon, not only with others but with *yourself*. It will also greatly tend to prevent some of the bittereſt evils in life; such as vexatious lawsuits, confused and quarrelsome arbitrations, loss of property—loss of friendship and good neighborhood.

The rules of operation in computing intereſt is another principal object of the Third Part. There is hardly any part of Arithmetic more practical, or of more daily uſe; yet the ſubject is neither ſo generally nor ſo thoroughly underſtood as could be expected, or wiſhed. It is true, that in ordinary caſes, intereſt for a round term of time, may be aſcertained with tolerable preciſion, by the help of printed Intereſt Tables; and this is a method practiſed by many. But it will ever be found both more convenient and more reſpectable for the man of buſineſs to carry his knowlege in his *head* than in his *pocket-book*. And what parent would not chuſe to give his ſon that independence in point of education, as might place him above the neceſſity of applying to his School-maſter or Stationer for aſſiſtance, whenever he has an accompt or note of hand to be adjuſted?

Without attempting to dictate any particular mode of reckoning intereſt upon endorſed notes and bonds, as there is a diverſity of practice in this buſineſs, I have ſelected two particular methods, which I believe are the moſt generally uſed, and contented myſelf with adapting to each the beſt rules of operation I could deviſe.

1. The rule eſtabliſhed by the Superior Court of the State of Connecticut and adopted in practice in various other parts of the Union, *viz.* To ſubtract each payment from the amount of principal and intereſt up to the

time of payment; and so taking the remainder for a new principal, make as many several casts as there are payments.

2. A mode considerably practised, and strenuously contended for by many, *viz.* to cast interest upon the whole principal for the whole time, then separately upon each endorsment for its respective time, and subtract the whole amount of the one from that of the other.

But objections are raised to each of these methods; and it is much to be wished that a greater uniformity in this point, were established. This difference, as far as it essentially operates, is disadvantageous to commerce, by placing it on uncertain ground, and hence, has been a source of litigation and lawsuits. There was, a few years since, in the state of Connecticut, an important action at law, by reviews and appeals, carried and tried through all the judicatories, from the commencing Inferior to the Supreme Court of Errors; in which action, the whole dispute arose from this difference in the mode of casting interest. The action was brought on a bond of a considerable number of years standing, having a variety of payments, of different dates, endorsed upon it. The plaintiff reckoned his interest by the former mode, and claimed £.1500 or upwards, upon the bond: the defendant reckoned the interest by the latter mode, and plead *full payment*. Judgment finally went

in favor of the defendant, upon proof made that that mode by which he reckoned, was the mode of computing intereſt commonly practiſed among merchants and men of buſineſs in the State where the plaintiff lived, and where the contract was made.

Tho' the latter mode of computing intereſt appears to be on the ground of ſimple intereſt ſtrictly, and its variation from the other mode, in common caſes, will not be very material; yet, the following objection, upon a little attention, will be found moſt clearly to lie againſt it, *viz.* that the intereſt will, in a courſe of years, completely expunge, or, as I may ſay, eat up the debt, while no part of the principal is paid.

This may need ſome explanation. The following example, I think, will be concluſive illuſtration: A. lends B. £.100, at 6 *per cent.* intereſt, and takes his note of hand. B. does no more than come and pay A. at every year's end £.6, and has it endorſed upon his note. At the end of ten years B. takes up his note: and what is the ſum he has to pay? It is reckoned thus: The principal £.100, on intereſt 10 years, amounts to £.160: There are *nine* endorſements, of £.6 each, upon which the debtor claims intereſt; one for 9 years, the ſecond for 8, the third for 7, and ſo along down: the whole aggregate amount of the ſeveral endorſements, and their intereſts (as any one may ſee, who will take the pains to reckon it) is £.70: 0: 2½: This ſub-

tracted from £.160, the amount of the debt, principal and interest, leaves, in favor of A. the creditor, the balance of £.89 : 19 : 2½—£.10 : 0 : 9½ less than the original principal; of which he has not received the smallest fractional part, but its annual interest solely. This sum he completely loses by this mode of reckoning interest.

If the same note should lie 20 years in the same way, B. would owe but £.38 : 12, without paying a farthing of the £.100 borrowed. Extend it but to 23 years, and A. would fall in debt to B. £.2 : 1 : 7—The interest, like Pharaoh's lean kine, has completely eaten up the principal: Whereas, by the former mode, A. would receive, at the payment of the note, the exact sum which he was intitled to receive, *viz.* £.106, being the principal and its interest for the last year.

The objections against the Connecticut mode are these:

1. It is a complicated operation, and tedious in its length, where there are a great many endorsements.

Answer. Motives of interest are paramount to those of laziness or ignorance. A man might afford to cover a sheet with figures, and even to hire a clerk, if necessary, to assist him, in order to save ten pounds in a hundred.

2. *Objection.* It is in some cases, in a degree *compound* interest; that is, whenever the

principal is not diminiſhed as much as the whole ſum paid.

Anſwer. This depends intirely upon circumſtances. If it be the intent of the law, or the agreement of the parties, either, or both, that the intereſt ſhould be annually payable; it is not *compound* intereſt, but ſtrictly ſimple; becauſe the ſame rule alſo further provides, that the intereſt is not to be added to the principal for a ſubſtratum or minuend, where the payment is leſs than the intereſt then due.* But,

If, by the agreement of parties, the intereſt be not payable under a plurality of years, then, before, it ought not to be reckoned by a plurality of periods; and whatever the debtor pays in the *interim*, would be a juſt deduction from the ſimple intereſt only. In this inſtance the Connecticut mode, (tho' it is over-ruled by the agreement of parties, and cannot apply) would be in a ſmall degree compound intereſt, and in the ſame degree work injuſtice to the debtor; merely, however, by being a departure from the original contract.

As to the formidable objection, founded upon the moral diſtinction of *lawful* and *unlawful* intereſt, I would aſk, what moral evil there is in a man's underſtandingly, and, by agreement, either giving or receiving compound intereſt? The crime of uſury, when

* *See the rule ſtated more at large, under the head of* Intereſt, *in the* Third Part.

conſiſting not in extortion or exorbitant intereſt, but in exceeding a certain eſtabliſhed rate *per cent.* is perhaps a mere creature of the law, and ſome of the remaining dregs of ancient ſuperſtition. It was once thought, by our pious forefathers, a great ſin for a man to receive intereſt for the loan of money; it was, in the ſmalleſt degree of it, reprobated as *uſury*. By degrees they relaxed from the ſeverity of this ſentiment. As it was found convenient and neceſſary, intereſt for money began to be allowed, and in the ſame degree the conviction prevailed of its being morally right and juſt. After the lapſe of ſome few centuries, and ſeveral fluctuations in the *ratio* of intereſt, it has progreſſed to the ſtate in which we find it at the preſent day; being, in moſt of the United States, eſtabliſhed at the rate of ſix *per cent. per annum*. But intereſt upon intereſt is ſtill viewed as uſurious and wrong—and why? Perhaps for the ſame reaſon that intereſt upon *principal* was formerly.

If, by the moſt moderate calculation, by uſing my money myſelf, I might increaſe it at the rate of 6 *per cent. per annum*, and the amount be my capital, or principal, for the ſecond year, and ſo on in the geometrical progreſſion of compound intereſt, at the rate of doubling in 12 years—why ſhould I not receive an annually-increaſing benefit from the uſe of my money, when in the hands of another perſon, who is more immediately benefited by it? And if the intereſt for ſervice

done, goods sold, or money lent, becomes, at the year's end, a part of the debt, and as honestly due as the principal; why should not the forbearance of that, and especially if by the *lache* of the debtor, equally intitle the creditor to *its* interest, as the further forbearance of the original principal, or as a second sum lent upon a new contract? And, upon what principles of casuistry, would it be less consistent with equity and good conscience?

And upon what reasonable ground, the use of *pecuniary* property should be restricted by *legislative* authority, whilst that of all others is left open to be regulated by contracting parties, and the existing state of commerce; I am also equally difficulted to conceive. Can there be any good reason for the one, which does not equally well apply to the other? Does not experience prove, that both the circulating quantity and current value of money, are as fluctuating as those of any other kind of property, and equally subject to the rise and fall of *market price?* A man may be as extortionous in lending other property, as in the loan of money; but is that a reason for the legislature to affix a price upon the use of my horse, and by law enact that I shall forfeit all demand, and even the horse too, if I require any more, let the circumstances of the contract be as they may? It is not uncommon for the farmer to let his sheep, and other live stock, to be returned at an hundred *per cent.* interest in four years; and such contracts are

affirmed by legal adjudications: but ſhould he diſpoſe of his cattle for *money*, and loan it at the ſame rate of intereſt, however benefited might be the borrower, or how great ſoever the riſque and inconvenience of the lender, alas! it would be quite a different caſe—the contract would be illegal, yea uſurious; and the borrower intitled to the privilege of returning the kindeſs of his benefactor, by defrauding him of the moſt equitable demand, *in due courſe of law*.

If the deſigned operation of this be to prevent one man from making another's neceſſity his opportunity of extortion, will it not rather operate to add inſult to wretchedneſs, and take from neceſſity the opportunity of *relief?* For the monied man, if acting from no other motive than intereſt, would ſooner put two locks upon his cheſt, than unlock one, to loan his money at 6 *per cent.* upon the beſt ſecurity given.

But it is time for me to cloſe this ſubject with an apology for proceeding thus far. It is not my intention or wiſh, to act the part of a cenſor or dictator, but that of an humble individual, exerciſing the freedom of enquiry. In this light I wiſh to be viewed in the preceding obſervations. I undertake not to preſcribe at what rate *per cent.* any one ſhall loan his money; but merely to aſſiſt him, by the moſt convenient rules, to calculate the uſe of it, at whatever rate he pleaſes—whether by the *firſt* or *ſecond* mode juſt conſidered—and

whether at *ſimple* intereſt, or *compound*. If the purchaſer ſhould receive this benefit from the book, my wiſhes will be gratified—my pains compenſated—and he will loan his money more advantageouſly than at *compound intereſt*.

BURLINGTON, *(Vermont)*
January 31, 1797.

The American Accomptant, *&c.*

PART I.

LESSON I.

ARITHMETIC,

IN GENERAL.

Q. WHAT *is* Arithmetic ?

A. It is the art of computing by numbers, either whole or in fractions.

Q. *What is* Number ?

A. It is one or more quantities answering to the queſtion "how many."

Q. *What is* Arithmetic *in* whole *numbers ?*

A. That which treats of intire quantities, or integral numbers, not divided into parts.

Q. *What is* Arithmetic *in* fractions ?

A. That which ſuppoſes its numbers to be the parts of ſome intire quantity or number, leſs than a whole.

Q. *What is the nature of all Arithmetical operations ?*

A. By ſome numbers or quantities that are given, to find out others before unknown.

Q. *What are the Fundamental Rules in Arithmetic ?*

A. Theſe five, viz. Notation, Addition, Subtraction, Multiplication and Diviſion.

LESSON II.

NOTATION.

Q. WHAT *is* Notation ?

A. It is the art of expreſſing numbers, by certain characters or figures.

Q. *What is the* uſe *of Notation ?*

A. Notation teaches to write and read numbers by their true value.

Q. *By how many kinds of characters are numbers expreſſed ?*

A. By two, viz. the *Arabian* figures, and the *Roman Letters*, called *Numerical Letters.*

Q. *How many different characters of the Arabian figures are uſed in Arithmetic ?*

A. Ten.

Q. *How are they formed ?*

Thus	1	One.
	2	Two.
	3	Three.
	4	Four.
	5	Five.
	6	Six.
	7	Seven.
	8	Eight.
	9	Nine.
	0	Nought, or Cypher.

Q. *How far may the uſe of theſe figures be extended ?*

A. To expreſs all manner of numbers, from the leaſt, to the greateſt that can be named, or conceived.

LESSON III.

Of the Numerical Letters.

Q. WHICH *are the* Roman Letters *uſed to expreſs numbers ?*

A. Theſe following, with their numbers expreſſed both by figures and words in the oppoſite columns.

Figures.	*Letters.*	*Names.*
1	I	One
2	II	Two
3	III	Three
4	IV	Four
5	V	Five
6	VI	Six
7	VII	Seven
8	VIII	Eight
9	IX	Nine
10	X	Ten
11	XI	Eleven
12	XII	Twelve
13	XIII	Thirteen
14	XIV	Fourteen
15	XV	Fifteen
16	XVI	Sixteen
17	XVII	Seventeen
18	XVIII	Eighteen
19	XIX	Nineteen
20	XX	Twenty

Figures.	*Letters.*	*Names.*
30	XXX	Thirty
40	XL	Forty
50	L	Fifty
60	LX	Sixty
70	LXX	Seventy
80	LXXX	Eighty
90	XC	Ninety
100	C	One hundred
200	CC	Two hundred
300	CCC	Three hundred
400	CCCC	Four hundred
500	D	Five hundred
600	DC	Six hundred
700	DCC	Seven hundred
800	DCCC	Eight hundred
900	DCCCC	Nine hundred
1000	M	One thouſand
1796	MDCCXCVI	One thouſand, ſeven hundred and ninety ſix.

Q. *How many different letters of the Alphabet are uſed in expreſſing every number from* one *to the higheſt ſet down in the above Table?*

A. Seven only, *viz.* I, V, X, L, C, D, M. Theſe Letters may be divided into the following claſſes, *viz.* The ſingle units, I, II, III; the Unit-Cardinal V, and its forerunner IV; 2. The Decimal-Cardinal X, with its forerunner IX; 3. The Half-Century Cardinal L, and its forerunner XL; 4 The Century Cardinal C, and its forerunner XC; 5. The Semi-millenary Cardinal D; and 6. the Millenary Cardinal M. The two laſt have no diſtinguiſhing forerunners.

Q. *What are the Rules of Notation?*

A. The *forreunners* are diſtinguiſhed by prefixing the laſt letter of the foregoing number to its Cardinal, which imports that the value of the left hand letter is ſubtracted from that of the Right hand one—thus

IV is V less by I, or 4. IX is X less by I, or 9, XL is L. less by X, or 40. XC is C less by X, or 90.

2. All the intermediate numbers between each ten and the next ten, are a repetition of the same letters in the same order—they are all annexed to the Decimal-Cardinal, and are to be read by adding their value, or number to that of the preceding number of tens—thus XVIII is X, more V, more III, or 10 and 5 and 3, which equals 18.

3. All the tens under forty, are expressed by as many X's; all the tens over 50 and below 90, by annexing to L as many X's as tens over 50.

Lastly, All the numbers between each hundred, are expressed by the same letters, as the numbers under the first Hundred.

Q. *To what special uses are these Numerical Letters applied?*

A. They are of but very little *real* use, or practical benefit—are totally unfit, or certainly the most inconvenient, for any Arithmetical calculation—The use they are applied to, is principally in typography, (besides the mill-marking of boards) to divide Verses or Chapters in Books; and seldom are used to express any higher number, than that of the year of Salvation at the bottom of the Title page.

LESSON IV.

Of the Numeration Table.

Fourth Period.			Third Period.			Second Period.			First Period.		
Hun. of Tens of Tho. of Mil.	Tens of Tho. of Mil.	Tho. of Mil.	Hun. of Tens of Mil.	Tens of Mil.	Mil.	Hun. of Thouf.	Tens of Thouf.	Thouf	Hund.	Tens.	Units.
											9
										8	9
									7	8	9
								6	7	8	9
							5	6	7	8	9
						4	5	6	7	8	9
					3	4	5	6	7	8	9
				2	3	4	5	6	7	8	9
			1	2	3	4	5	6	7	8	9
		9	1	2	3	4	5	6	7	8	9
	8	9	1	2	3	4	5	6	7	8	9
9	8	9	1	2	3	4	5	6	7	8	9

Q. *What is the use of the foregoing Numeration Table?*

A. It teaches how to read any sum or number expressed in figures.

Q. *Explain it?*

A. Beginning at the uppermost figure of the right hand column, which is so many single units or *ones*, as that figure expresses, I read it, *Nine.*

2d. Row. *Two places of figures.* Beginning, as before, with the right hand figure, and enumerating towards the left, according to the denominations written at the top, I say, 'units, tens:' the left hand figure is therefore so many tens, as when standing alone, it would express single units; that is eight tens or eighty.—Accordingly I read towards the right hand and say, *Eighty nine.*

3d Row. *Three places of figures.* Say, 'units, tens, hundreds;' the left hand figure being so many hundred single units, read the whole, *Seven hundred and eighty nine.*

4th Row. *Four places of figures.* Say, 'units, tens, hundreds, thousands'—the last figure is so many thousand single units—read the whole, *Six thousand, seven hundred and eighty nine.*

5th Row. *Five places of figures.* Say, 'units, tens, hundreds, thousands, tens of thousands'—which figure is so many times ten thousand, as it expresses single units when standing alone—or fifty thousand—Read the whole number, *Fifty six thousand, seven hundred and eighty nine.*

6th Row. *Six places of figures.* Enumerate, 'units, tens, hundreds, thousands, tens of thousands, hundreds of thousands;' read, *Four hundred and fifty six thousand, seven hundred and eighty nine.*

NOTE. *Let the learner commit to memory the names and numerical order of the several denominations in the Numeration Table, so that he may readily apply them to any number without the help of the Index.*

7th Row. *Seven places of figures.* You now begin to count millions—the left hand figure being next to hundreds of thouſands, is ſo many millions, or thouſands of thouſands, as when ſtanding alone it would expreſs ſingle units—Therefore read, *Three millions, four hundred and fifty ſix thouſand. ſeven hundred and eighty nine.*

8th Row. *Eight places of figures.* The laſt place, or left hand figure being tens of millions, read *Twenty three million, four hundred and fifty ſix thouſand, ſeven hundred and eighty nine.*

9th Row. *Nine places of figures,* which brings you, in enumerating, to hundreds of millions—read it, *One hundred and twenty three millions, four hundred and fifty ſix thouſand, ſeven hundred and eighty nine.*

10th Row. *Ten places of figures,* which brings you to thouſands of millions—read it, *Nine thouſand, one hundred and twenty three millions, four hundred and fifty ſix thouſand, ſeven hundred and eighty nine.*

11th Row. *Eleven places of figures,* amounting to tens of thouſands of millions; Read, *Eighty nine thouſand, one hundred and twenty three millions, four hundred and fifty ſix thouſand, ſeven hundred, and eighty nine.*

12th Row. *Twelve places of figures.* The laſt left hand figure, ſtanding in the place of *Hundreds of thouſands of millions,* read it, *Seven hundred and eighty nine thouſand, one hundred and twenty three millions, four hundred and fifty ſix thouſand, ſeven hundred and eighty nine.*

LESSON V.

The ſame ſubject continued.

Q. IN *what proportion do numbers increaſe from the units place towards the left hand?*

A. In a tenfold proportion.

Q. *Why is the Numeration Table made to conſiſt of* twelve *places of figures, rather than ten or eleven only?*

A. Becauſe they make four even periods.

Q. *What do you mean by a* Period *?*

A. A number expreſſed by three figures, of which the right hand one ſignifies ſo many units ; the ſecond, ſo many tens : and the third, ſo many hundreds.

Q. *Why are three figures called a period ?*

A. Becauſe, if the number be increaſed above three places, there is ſtill the ſame periodical return of the value of thoſe places, and every third figure to the left hand will always be *hundreds*, if it be ever ſo far extended.

Q. *What are the figures in the Numeration Table called, in diſtinction from the cypher ?*

A. They are called *ſignificant* figures or *digits.*

Q. *What is the uſe of the* cypher *in Notation ?*

A. 1. When ſtanding in units' place in connection with ſignificant figures, it always expreſſes an even decimal number ; or ſuch a number as may be divided by ten, without leaving any remainder.

2. It increaſes the value of its left hand ſignificant figure tenfold—as 7 ſeven, 70 ſeventy, which is ten times 7.

Q. *Does the Cypher have any effect upon its right hand figure ?*

A. None at all in whole numbers—but otherwiſe in decimal fractions, as will be ſeen in its proper place.

Q. *What is the effect where there are* two, *or more cyphers together ?*

A. They increaſe the value of the firſt left hand ſignificant figure, by a tenfold proportion, as many times as there are cyphers, thus 4, written 400, 4000 becomes four hundred—four thouſand. Cyphers are alſo uſed for the ſame purpoſe, when occupying vacant denominations, between ſignificant figures. As 4009, is four thouſand, no hundreds, no tens, and nine units—or four thouſand and nine.

LESSON VI.

Numeration farther extended.

Q. *Is the expreſſion of numbers, by figures, limited to twelve places of figures only?*

A. No. It may be continued and increaſed without end towards the left hand, in the ſame decimal ratio, by ſubſtituting a new collective name at every ſixth place of figures from millions, inſtead of millions of millions, &c. Tho' there is very rarely, if ever, occaſion for more than 12 places of figures in ordinary practice.

Q. *By what other names, beſides thoſe already mentioned in the Table, would you extend numeration beyond 12 places of figures?*

A. Names are but arbitrary ſigns of ideas, and it is pretty immaterial indeed, what names are uſed to expreſs a number beyond all human conception; and where, in fact, the name conveys no adequate idea to the mind: but the names which are uſually applied to every 6th place of figures from units, and their order of arrangement, are as follow, viz. Millions, Billions, Trillions, Quatrillions, Quintillions, Septillions, Octillions, Nonillions, Decillions, Undecillions, Duodecillions, &c. Each of theſe are millions ſo many times involved, as their indices, or number of remove from the place of units, counting by periods of ſix figures, point out. So that between either two of theſe, taken in the order that they ſtand, there is the ſame proportion, which there is between a million and a ſingle unit—a million, is a ſingle unit repeated a thouſand thouſand times—a billion is a thouſand thouſand millions, or a million of millions, and ſo on, according to the following

SCALE.

Quintil.		*Quatril.*		*Trillions*		*Billions*		*Millions*		*Units.*	
th.	un.	th.	un.	th.	un.	th.	un.	th.	un.	th.	un.
	5		4		3		2		1		
143000		750	026	653	912	973	908	604	012	763	921

LESSON VII.

Examples for exercise.

IT *is required of you to write down, in proper figures, the following numbers?*

Nineteen.

Six hundred and forty two.

Three thousand and forty three.

Seventy six thousand, five hundred and seventy three.

Eight hundred and twenty one thousand and four.

Two millions, twenty seven thousand and nine hundred.

Ninety millions, ninety thousand and nine.

Five hundred millions, sixty seven thousand and three.

Four thousand and seventy one millions, three hundred and forty three thousand, four hundred and fifty two.

Thirty seven thousand million, eighty four thousand and eight.

One hundred and twenty thousand, four hundred and six millions, one hundred and twenty nine thousand, seven hundred and sixty three.

Now write down in words at length the following numbers:

5	734	409070	4916743	7467934857
14	1030	600978	70049048	68198136194
137	60567	5087194	195847096	7000048900005

LESSON VIII.

Notation of mixed quantities.

Q. WHAT *is meant by a* mixed *quantity ?*

A. It is a quantity compoſed of ſeveral denominations of the ſame ſpecies or ſort of things, of which all the lower denominations are, according to their numbers, fractional parts of the higheſt denomination, as Pounds, Shillings, Pence; Dollars, Cents and Mills—Tons, Hundreds, Quarters, &c. &c.

Q. *How are the Tables of mixed quantities divided ?*

A. Into thoſe of Money, Weight, Meaſure, Motion, Time, and Tale.

Q. *How are the ſeveral denominations in each Table further diſtinguiſhed ?*

A. The higheſt denomination may be called the ultimate or grand integer—the loweſt denomination the ultimate fraction—the intervening denominations, the *meſne* integers and the *meſne* fractions, according as they reſpect the higher, or the lower denominations.

2. The number expreſſed in the higheſt denomination is unlimited—that of all the others is bounded—each one by the particular number of its *Terminus*.

Q. *What do you mean by* Terminus ?

A. That number which in each of the lower denominations makes an unit, or one in the next higher denomination, and is therefore a bound which the number in that denomination muſt not equal—for inſtance, as twenty Shillings make one Pound—*Twenty* is therefore the *Terminus* of Shillings, and the number, in that denomination, can orderly ariſe no higher than 19.

Q. *In what order and form are the ſeveral denominations to be placed, in expreſſing a mixed quantity by figures ?*

A. Begin by writing the higheſt given denomination at the left hand, placing its characteriſtic, either

over it, or at its left hand; then, proceeding towards the right hand, set the numbers in each denomination, in the order of the rank or value of its denomination, at a small distance apart, and separated, if it be a vulgar table, by two commas thus (,,) but if a Decimal Table, by the Decimal point or dot, thus (.) between the highest and the lower denominations.

Q. *What do you mean by a* Characteristic?

A. A certain appropriate character, or one or more letters, which represent and point out the particular denomination of any number to which it is applied.

Q. *Are these to be applied to every denomination in a given mixed quantity?*

A. It is not necessary to express any other characteristic, than that of the highest denomination in the given quantity; unless for the greater ease of the young beginner, and until he is become well versed in the order of the denominations.

Q. *What if there be a vacant denomination in the given quantity, as seven pounds, and seven pence?*

A. Fill up the vacant denomination with as many Cyphers, as it will admit of significant figures; as £7,,00.,7.

Q. *What do you mean by a Vulgar Table, and a Decimal Table?*

A. A Decimal Table of mixed quantities, has the terminus of each denomination a decimal number, such as ten, hundred, &c. A Vulgar Table is that which has any other number as Terminus.

LESSON IX.

The Tables of Money—different currencies—standard value of Gold—names and value of foreign and Federal coins.

The Vulgar Table of Money.

		Characteriſtics.
4 Farthings (*q*) make	1 Penny.	*d*
12 Pence	1 Shilling.	*ſ*
20 Shillings	1 Pound.	*£*

Q. *Are there not ſeveral currencies in this Table, which differ in their value?*

A. Yes, there is,

1. Sterling money, which is the money of account in England.

2. Iriſh money—uſed in Ireland.

3. Halifax money—the currency of Nova Scotia and the two provinces of Canada.

4. South Carolina and Georgia currency.

5. The currency of New-Hampſhire, Maſſachuſetts, Connecticut, Rhode-Iſland, Virginia, Vermont and Kentucky, commonly called the Lawful Money of New-England.

6. New-Jerſey, Pennſylvania, Delaware and Maryland currency.

7. New-York and North-Carolina currency.

Q. *What are the proportionate values of theſe different currencies?*

A. They may be ſeen by the following tables, valuing 1 Pound of each currency in Federal money, and 1 Dollar of Federal money in thoſe ſeveral currencies.

One Pound,	*Dollars.*
1. Sterl. money	= 4.44 4
2. Iriſh do.	= 4.81 4
3. Halifax do.	= 4.00 0
4. S.C. &c. do.	= 4.98 7
5. N.H. &c. do.	= 3.33 3
6. N. J. &c. do.	= 2.66 6
7. N.Y. &c. do.	= 2.50 0

One Dollar Federal money, is

- 4/5 *Sterl.*
- 4/10½ *Iriſh.*
- 5/0 *Halifax.*
- 4/8 *S.C. &c.*
- 6/0 *N.H. &c.*
- 7/6 *N. J. &c.*
- 8/0 *N.Y. &c.*

But all the above different currencies that are uſed in the United States, are giving way to one uniform currency of the *Federal Money.*

Of Federal Money.

	Characteriſtics.
10 Mills (/) make 1 Cent.	/
10 Cents - - - 1 Dime.	⅍
10 Dimes - - 1 Dollar,	$
10 Dollars - - 1 Eagle.*	E.

Q. *What are the names of the ſeveral foreign and federal gold, ſilver and copper coins, circulating in the United States, and their value in Federal Money?*

A. *Gold Coins.*

		$
Foreign.	A Double Johannes is	16.00 0
	A Single ditto, - -	8.00 0
	An Engliſh Guinea, -	4.66 7
	A Half ditto, - -	2.33 3
	A French Guinea, -	4.59 8
	A half ditto, - - -	2.29 9
	4 Piſtoles, - - -	14.45 2
	2 Piſtoles, - - -	7.22 6
	1 Piſtole, - - -	3.61 3
	A Moidore, - -	6.05 8
Federal.	An Eagle, - - -	10.00 0
	A Half ditto, - - -	5.00 0
	A Quarter ditto, - -	2.50 0

Silver Coins.

A French Crown is	1.10
A Half ditto, - -	0.55
A Piſtareen, - - -	0.20
A Half ditto, - -	0.10
Spaniſh & Federal Dol.	1.00

Its parts are in proportion.

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* *The* Eagle *is the largeſt* Gold Coin *of the* United States. Dimes *are annexed to* Cents, *and only the*

Copper Coins.

The Cent, one hundredth part of a Dollar.
Half Cent, or five Mills.

Q. *At what rate, according to their preſent ſtandard, are the Gold coins of Great Britain, Portugal, France and Spain, made a lawful tender in the United States, by act of Congreſs?*

A. Thoſe of Great Britain and Portugal, at the rate of 100 Cents, or 1 Dollar for every 27 grains actual weight: Thoſe of France and Spain at 27 grains and two fifths of a grain actual weight.

Q. *What is the ſtandard of all gold coins of the United States?*

A. Eleven parts fine, or pure gold, to one part of alloy; ſo that, eleven parts in twelve of the entire weight of the ſaid coins muſt conſiſt of pure gold, and the remaining one twelfth part of alloy.

Q. *Of what is the alloy compoſed?*

A. Of ſilver and copper—not exceeding one half ſilver.

Q. *What is the proportionate value of gold to ſilver in all coins current in the United States?*

A. It is as *fifteen to one*, according to quantity in weight of pure gold, or pure ſilver; that is to ſay, every fifteen pound weight of pure ſilver is, by act of Congreſs, to be of equal value, in all payments, with one pound weight in pure gold; and ſo in proportion.

Q. *What is the ſtandard for all ſilver coins of the United States?*

A. One thouſand, four hundred and eighty parts fine, to one hundred and ſeventy-nine parts alloy; and the alloy muſt be wholly of copper.

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denominations of Dollars, Cents and Mills *expreſſed, in reckoning Federal money:* the Dollar being the money unit. *For the names and values of foreign coins, ſee the* Rules of Exchange, *in the* Second Part.

LESSON X.

The mixed quantities of Weight, Measure, &c.

Vulgar Troy-Weight.

		Characteristics.
24 Grains *(gr.)* make	1 Pennyweight.	*dwt.*
20 Pennyweights -	1 Ounce.	*oz.*
12 Ounces - - -	1 Pound.	℔.

Q. WHAT *things are weighed by this weight?*
A. Gold, silver, jewels, electuaries, and all liquors.

Federal Troy-Weight.*

10 Cents *(ct.)* make 1 Grain.
10 Grains - - 1 Pennyweight.
10 Pennyweights - 1 Ounce.
10 Ounces - - 1 Pound.

See this Table more particularly explained in the Introductoin, page 10.

Vulgar Avoirdupois-Weight.†

		Characteristics.
16 Drams *(dr.)* make	1 Ounce.	*oz.*
16 Ounces - -	1 Pound.	*lb.*
28 Pounds - -	1 Quarter Hund.	*qr.*
4 Quarters - -	1 Hundred wt.	*cwt.*
20 Hundred wt. -	1 Ton.	*T.*

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* *The new-proposed Federal Tables, tho' already recited in the Introduction, are re-inserted in this Lesson, for the sake of orderly arrangement.*

† *By Avoirdupois are weighed all coarse and dry goods, grocery and chandlery wares, bread, and all metals excepting gold and silver.*

FEDERAL AVOIRDUPOIS-WEIGHT.

10 Drams *(dr.)*	make	1 Ounce.	*oz.*
10 Ounces - - -		1 Pound.	*lb.*
100 Pounds - - -		1 Hundred wt.	*cwt.*
10 Hundreds - -		1 Thousand do.	*mat.*

See the Introduction, page 10.

APOTHECARY-WEIGHT.* *(Vulgar Table.)*

20 Grains *(gr.)*	make	1 Scruple.	℈
3 Scruples - -		1 Dram.	ʒ
8 Drams - - -		1 Ounce.	℥
12 Ounces - -		1 Pound.	*lb.*

FEDERAL APOTHECARY-WEIGHT.

10 Grains equal 1 Scruple.
10 Scruples - - 1 Dram.
10 Drams - - 1 Ounce.
10 Ounces - - 1 Pound.

Characteriſtics the ſame as in the Vulgar Table.

LONG MEASURE.†

3 Barley-Corns *(b. c.)*	make	1 Inch.	*in.*
4 Inches - - - - -		1 Hand.	*hd.*
12 Inches - - - -		1 Foot.	*ft.*
3 Feet - - - - -		1 Yard.	*yd.*
6 Feet - - - - -		1 Fathom.	*fa.*
5 Yards and a half -		1 Rod, Pole or Perch.	*po.*
40 Rods, or 220 Yards, -		1 Furlong.	*fu.*
8 Furlongs, or 1760 Yards,		1 Mile.	*m.*
3 Miles - - - -		1 League.	*l.*
60 Miles - - -		1 Degree.	*deg.*

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* *All the weights now uſed by Apothecaries, above grains, are Avoirdupois.*

† *The uſe of Long Meaſure is to meaſure the diſtance of places, or any other thing, where length is conſidered, without regard to breadth.*

Federal Board Measure.

10 Pepper-Corns *(pc.)* make	1 Federal Inch.	*in.*
10 Federal Inches - - -	1 Common Foot.	*ft.*
10 Square Feet - - -	1 Pannel.	*p.*
10 Pannels - - -	1 Gang.	*g.*
10 Gangs - - - -	1 Thousand Feet.	*td.*

Cloth Measure. *(Vulgar Table.)*

2 Inches and a Quarter make	1 Nail. Marked	*na.*
4 Nails - - - -	1 Qr. of a Yd.	*qr.*
4 Quarters, or 36 Inches -	1 Yard. - -	*yd.*
3 Quarters of a Yard -	1 Flemish Ell.	*Fle.*
5 Quarters of a Yard - -	1 English Ell.	*Eng.*

See the above Table *federalized*, in the *Introduction*, page 2[illegible].

Land Measure.

9 Square Feet make	1 Yard. Marked	*y.*
30 Yards & a Quarter	1 Pole. - -	*po.*
40 Square Poles -	1 Rood. - -	*r.*
4 Roods, or 160 Poles	1 Acre. - -	*a.*

Liquid Measure. *(Vulgar Table.)**

4 Jills *(j.)* make	1 Pint. Marked	*pt.*
2 Pints - - -	1 Quart. - -	*qt.*
4 Quarts - -	1 Gallon. - -	*gal.*
31½ Gallons - -	1 Barrel. - -	*bar.*
42 Gallons - -	1 Tierce. - -	*t.*
63 Gallons - -	1 Hogshead. - -	*hhd.*
84 Gallons - -	1 Puncheon. -	*pu.*
2 Hogsheads - -	1 Pipe, or Butt. -	*p.*
2 Pipes, or 4 Hogsheads,	1 Tun. -	*tu.*

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* *All Brandies, Spirits, Perry, Cyder, Mead, Vinegar and Oil, are measured by this measure, which is usually called* Wine-measure.

Liquid Measure. *(Federal Table.)*

10 Federal Pints *(pt.)* make 1 Common Gallon. *gal.*
10 Common Gallons - - 1 Federal Barrel. *f. b.*
10 Barrels - - - 1 do. Hogshead. *hhd.*

Dry Measure.

2 Pints *(pt.)* make 1 Quart. Marked *qt.*
4 Quarts - - 1 Gallon. - - *gal.*
2 Gallons or 8 Qts. 1 Peck. - - *p.*
4 Pecks - - 1 Bushel of the U. S. *u. b.*
5 Pecks or 40 Qts. 1 Canada Bushel. - *c. b.*

See this Table *federalized*, page 25, *Introduction.*

Time.

60 Seconds *(sec.)* make 1 Minute. Marked *min.*
60 Minutes - - 1 Hour. - - *hr.*
24 Hours - - - 1 Day. - - - *da.*
7 Days - - 1 Week - - *wk.*
4 Weeks - - - 1 Month - - *mo.*
13 Months, 1 Day and 6 Hours } 1 { Common or Julian Year. - *yr.*

Q. *What is a* Solar *Year?*

A. 365 days, 5 hours, 48 minutes and 55 seconds.

Q. *How is the year divided by the* Calendar?

A. Into 12 months, each containing the number of days which follow, *viz.*

September, April, June, November	30	October, December, January, March, May, July and August	31

February hath but 28 days, excepting the addition of 1 day in every fourth year; which year is called *Bissextile*, or *Leap Year.**

* *The* Anno Domini *which may be divided by four, without any remainder, is* Bissextile, *or* Leap Year.

MOTION, *(in the Heavenly Bodies.)*

60 Seconds *(//)* make 1 Minute. Marked *′*.
60 Minutes - - 1 Degree. - - °.
30 Degrees - - 1 Sign.
12 Signs, or 360 Degrees, make the whole great Circle of the Zodiac.

Of things accounted by the Tale.

12 Particulars *(p.)* make 1 Dozen. Marked *doz.*
12 Dozen - - 1 Groſs. - - *gr.*
12 Groſs, or 144 Dozen 1 Great Groſs. *g. gr.*

Federalized.

10 Particulars *(p.)* make 1 Deſm. Marked *dm.*
10 Deſms - - 1 Groſs. - - *gr.*
10 Groſs, or 100 Deſms - 1 Great Groſs. - *g. gr.*

LESSON XI.

Explanation of ſundry Marks and ſigns uſed in this Compendium.

= TWO horizontal parallel lines are the ſign of equality; as $\$1 = \$10 = \$100 = \$1000$; *i. e.* 1 dollar equals 10 dimes, which equals 100 cents, which equals 1000 mills.

+ A rectangular croſs is the ſign of Addition; as $10 + 7 + 5 = 22$; *i. e.* 10 and 7 and 5, added together, equal 22.

{ The perpendicular brace, placed at the left or right hand of two or more ſimple or mixed quantities, combines them together, and ſignifies that their aggregate, or ſum total, is to be taken—thus: $\left\{\begin{array}{l}153\\426\\738\end{array}\right.$

This is more especially used in the compound rules, hereafter explained.

⌒ The horizontal brace. This connects all the numbers over which it is placed, and signifies that that number is to be taken, which is produced from one or more operations of those numbers, agreeably to the signs with which they are connected—thus: $\overbrace{15+12}$ is the same as 27; and, by the brace, are requestered from any preceding or following numbers. This sign is more escecially used in Proportion.

—— A strait line, or dash, is the sign of Subtraction. It may be placed between any two or more single or aggregate numbers which are set down either horizontally or perpendicularly; as 25—12, or $\frac{25}{12}$, signify, in the first case, that the right hand number is to be taken from the left; and in the second, that the lower number is to be subtracted from the upper.

× The *oblique* cross, or *ecks*, is the sign of Multiplication. This may be placed between numbers set down either horizontally or perpendicularly; as 25×5 =125, or $\begin{array}{r} 25 \\ \times 5 \\ \hline 125 \end{array}$

÷ &) (} Are signs of Division. The former is used in compendious statements; the latter, or inverted parentheses, in formal operations, where the example is to be wrought at large. Thus 125 ÷ 5 expresses the Quotient of 125, divided by 5; but 5)125(directs to the formal operation of Division.

·· & : : Are the signs of proportion: the first (··) separates the first and second terms, and the third and fourth; the second (: :) separates the second and third terms: The first may be read by the words *is to;* the second by the words *so is:* thus, 3 ·· 5::6 ·· 10; that is, as 3 *is to* 5, *so is* 6 to 10.

——— A single line between two lines, is used to divide the statement from the work, and also the seve-

ral ſteps of the operation into its proper diviſions or parts.

( ) Is a ſign, when uſed in explanations, to ſignify that the figure or figures, incloſed by it, are actually ſet down in the work. When it incloſes a figure or figures, in ending the operation of diviſion, thus, 224)448(2, it ſhews what remainder there is.

$$\frac{448}{(0)}$$

X The capital *ecks*, uſed in proving operations in Multiplication and Diviſion, as will be explained in its proper place.

═══ The double line, drawn under a row of figures, ſhews that the operation is finiſhed, and the anſwer ſtands over it.

Note. *The Decimal Signs will be explained, under that branch of Arithmetic.*

LESSON XII.

ADDITION, IN GENERAL.

Q. WHAT *is the uſe of* Addition?

A. It teaches to bring ſeveral particular numbers, either of one or more denominations, into one total ſum.

Q. *What is the* aggregate *quantity called?*

A. The ſum total.

Q. *How is* Addition *divided?*

A. Into Simple and Combined; and each of theſe ſubdivided into that of whole numbers and mixed quantities.

Q. *What is the* general rule *of ſetting down ſeveral numbers or quantities, ſo as to prepare them for the work of Addition?*

A. It is indifferent which number you ſet down firſt; but obſerve to place all the figures of the ſame value or denomination in a perpendicular line; that is to ſay, place units under units, tens under tens, &c. pounds under pounds, ſhillings under ſhillings, &c. dollars under dollars, cents under cents, &c.

LESSON XIII.

ADDITION OF WHOLE NUMBERS.

Q. WHAT *is the rule of operation?*

A. After the numbers are ſet down, as directed in the former Leſſon, begin at the unit figure of the lowermoſt number, and add it to all the figures ſtanding directly above it.

Q. *What is the next ſtep?*

A. 1. Set down the amount of thoſe unit figures directly under them, having firſt drawn a line of ſeparation under the ſtatement.

2. If the amount of the figures added exceed *ten*, then ſet down only its number of complete tens, and add *one*, for every of thoſe tens, to the next left hand column; but if the ſum of a right hand column be any number of exact *tens*, in that caſe ſet down a cypher in the ſum total, and carry for the tens to the next column as before.

3. Continue this operation thro' all the columns, obſerving to ſet down the whole amount of the left hand column, which will complete the operation.

Q. *What is the reaſon of this rule of carying* one *for every* ten, *to the next place of figures?*

A. It ſprings from the principle of the Numeration Table, and the decimal ratio of increaſe in the riſing ſcale, which is from right hand to left, in all the denominations or places of figures expreſſing whole numbers; *ten* in the units' place make *one* in the

tens' place; and ten *tens* make *one* in the place of *hundreds*; and so on.

Q. *How is the work of Addition proved?*

A. By adding the figures downwards, and finding the same sum total.

ADDITION TABLE.

1								
2	2							
3	4	3						
4	5	6	4					
5	6	7	8	5				
6	7	8	9	10	6			
7	8	9	10	11	12	7		
8	9	10	11	12	13	14	8	
9	10	11	12	13	14	15	16	9
10	11	12	13	14	15	16	17	18

Q. *How is this Table to be read?*

A. By the figures standing upon the steps; each of which added to itself is the number standing the next under it; and if you would add any two different numbers upon the steps, note the number standing the next under that check where their perpendicular and horizontal rows meet, and that is their sum; for instance, in adding 8 and 4, the number standing the next under their common angle of meeting is 12.

EXAMPLES.*

3	34	456	5607	82596
4	45	523	6391	97403
7	79	979	11998	179999

* *Let the learner be accustomed in each Example to read correctly each number expressed in the statement before he performs the addition; and afterwards the sum total.*

Dollars.	*Yards.*	*Pounds.*
4734736	46431734	34731284
34743123	72261374	26812631 2
4161321	12612714	71812619 0
7369138	31371262	73161819 2
3143618	74147312	31213471 6
473 2216	473 12641	171216198
276 15341		

Explanation of the laſt ſum wrought.

Beginning with the unit figure of the lowermoſt number, I ſay 6 and 8 is 14 and 8 is 22 and 1 is 23 and 2 is 25 and 6 is 31 : I therefore ſet down 1 directly under the column, and for the thirty carry 3 to the next column : the *ſecond* column by adding I find to amount to 14—I ſet down 4 and carry 1—the *third* column amounts to 23—I ſet down 3 and carry 2; the fourth column amounts to 25, here I ſet down 5 and carry 2; the *fifth* column amounts to 31, ſet down 1 and carry 3 ; the *ſixth* column amounts to 26, ſet down 6 and carry 2 ; the *laſt* column amounts to 27, I ſet down the whole, and find the ſum total to be *twenty ſeven millions, ſix hundred and fifteen thouſand, three hundred and forty one dollars.*

Received of ſeveral perſons the following ſums of Money ; what is the total ſum received, viz.

Of	A.	£3575
	B.	1846
	C.	297
	D.	2954
	E.	1328

Note. *The Inſtructor may, both in this and the following Rules, add as many practical examples, as he judges neceſſary for the exerciſe of his ſtudent.*

LESSON XIV.

Addition of Federal Money, and of the other Federal Tables.

Q. WHAT *is the Rule of Operation?*

A. Juſt the ſame as that in addition of whole numbers; obſerving only to place the ſeperating point between the ſeveral denominations.

EXAMPLES.

FEDERAL MONEY.

1	2	3
$17.35 5	$175.75 0	$571.57 4
15.21 3	241.39 4	142.98 0
19.19 6	142.93 5	78.00 6
12.12 2	87.00 9	241.39 1
9.65 8	325.55 2	523.65 9
24.33 3	532.44.4	235.66 6
97.87 7		

Explanation of the firſt example, which will virtually explain the operation of the others, and of all the examples in each of the Federal tables following.

Say 3 and 8 is 11, and 2 is 13, and 6 is 19, and 3 is 22, and 5 is 27; ſet down 7 and carry 2. Next, 2 I carry to 3 is 5, and 5 is 10, and 2 is 12 and 9 is 21, and 1 is 22, and 5 is 27, (7) and carry 2; next 2 I carry to 3 is 5, and 6 is 11, and 1 is 12, and 1 is 13, and 2 is 15, and 3 is 18; ſet down 8, and carry 1; next 1 I carry to 4 is 5, and 9 is 14 and 2 is 16 and 9 is 25 and 5 is 30, and 7 is 37, ſet down 7, and carry 3. Laſtly, 3 I carry to 2 is 5, and 1 is 6, 1 is 7, 1 is 8, 1 is 9; which, ſet down, completes the operation, and makes the ſum total *ninety ſeven dollars, eighty ſeven cents, and ſeven mills.*

A Merchant's Bill.

Bought of Anthony Brotherton, Dec. 18, 1796.

9 yards of Silk at	2.33	- -	20.97
14 ditto Broad cloth at	4.50	- -	63.00
9 ditto Holland at	75	- -	6.75
10 ditto Shalloon at	55	- -	5.50

Federal Troy Weight.

1	2	3
lb.oz.dw.gr.	*lb.oz.dw.gr.*	*lb.oz.dw.gr.*
19.7 5 6	44.8 3 2	325.9 8 7
21.6 5 7	32.6 9 4	436.8 7 6
34.8 3 9	57.7 6 5	547.7 6 5
45.3 9 8	84.5 4 1	658.6 5 4

Federal Avoirdupois Weight.

1	2	3
mwt.c.lb.oz.		*mwt.c.lb.oz.dr.*
33.5 64 3		754.6 78 9 0
48.7 57 7		643.5 67 8 9
27.6 28 8		532.4 56 7 8
54.9 61 2		421.3 45 6 7

Apothecary Weight.

1	2
lb.℥.3.℈.*gr.*	lb.℥.3.℈.*gr.*
4.6 7 7 3	17.7 7 7 7
5.8 6 5 4	16.6 6 6 6
6.4 5 6 8	15.5 5 5 5
7.3 4 8 2	14.4 4 4 4

LESSON XV.

SUBTRACTION

Of Whole Numbers.

Q. WHAT *is the nature and use of Subtraction?*

A. It takes a less number from a greater, and shews the difference between them.

Q. *What are the parts of Subtraction?*

A. 1. The larger number from which the subtraction is to be made, called the Substratum.

2. The Subtrahend, or smaller number, to be taken out of the Substratum.

3. The Remainder, or the difference found after the work is performed.

Q. *How are the numbers to be set down, to prepare them for the work of Subtraction?*

A. In the same manner as in Addition, observing only to place the *Substratum*, or larger number, the uppermost.

Q. *What is the rule of operation?*

A. Draw a line under the Subtrahend, and then, beginning at the right hand, subtract the value of each figure in the lower number, from that of the one standing directly above it, setting down the difference in a third row, directly under it, for the Remainder.

Q. *What if the upper figure be a larger number than the lower one?*

A. 1. In that case you will subtract the lower number from the upper, made larger by ten. If, for example, you have to take 7 from 6, say 7 from 16, and set down the difference between those two numbers.

2. Read the next left hand figure 1 less in the operation than what it stands for in the numeration; and if it be a cypher, read it 9; and if there be two or more cyphers standing together, read them all nines, and the first left hand significant figure 1 less than what it stands for.

Q. *What is the reaſon of this Rule?*

A. It is becauſe your annexing a left hand unit figure, or adding 10 to the ſmaller Subſtratum figure, is borrowing or taking away 1 from its next left hand figure, which leaves it one the leſs; and in caſe of one or more cyphers, as they make their left hand ſignificant figure a decimal number, taking away 1, reduces the firſt ſignificant figure 1 leſs than its nominal value, and places the cyphers, be there ever ſo many intervening, at 1 leſs than a decimal number, which is 9; thus, take 1 from 500, will leave 499.

Q. *Is there not another method of performing Subtraction?*

A. Yes: the common method is, in the caſe above, to borrow ten from which to ſubtract, and to the difference add the upper number, carrying 1 to the next Subtrahend figure; but this is only a circuitous way of adding *ten* to the upper figure in the firſt inſtance.

Q. *How do you prove the operation of this Rule?*

A. By adding the Remainder to the *Subtrahend*, and finding it equal the *Subſtratum*.

EXAMPLES.

	1	2	3
From	8645	75679	978675
Take	6543	54362	976330
	2102		

	4	5	6
From	654006	8492653	73165841
Take	584567	4738062	6241792
	69439		

Explanation of the Example laſt wrought.

Beginning at the right hand, I ſay 7 from 16 leaves 9: this aſſumption changes the three next left hand

figures, 400, into 399; therefore I go on with the next figures in the Subtrahend, and say 6 from 9 leaves 3; 5 from 9, 4; 4 from 13, 9; 8 from 14, 6; 5 from 5, 0; and the subtraction is completed—leaving for a remainder, sixty-nine thousand, four hundred and thirty-nine.

LESSON XVI.

Subtraction of Federal Money, and the other Federal Tables.

1. MONEY.

Q. HOW *do you subtract* Federal Money?

A. The rule of operation and of proof, in this and all the other Federal Tables following, is precisely the same as that of whole numbers, observing only to keep the denomiationns distinct by the seperating Points.

	1	2	3
	℔ // /	℔ // /	℔ // /
From	17.35 5	175.75 0	571.57 4
Take	15.21 3	142.95 5	523.65 9
Rem.	2.14 2		

	4	5	6
	℔ // /	℔ //	℔ // /
Borr.	43.6 4 3	59.7 4	48.3 3 3
Paid	37.9 3 7	43.8 3	22.6 6 6
Due			

Note. *The other Federal Tables are upon the same principle.*

7

	℔ // /
Received	728.56 3
Paid out	628.56 4
	℔

8

	℔ // /
	8765.89 3
	957.75 8
	℔

9

I lent my friend ℔525.50 0
Received in part pay 270.16 6
What is the balance due me ? ℔

TROY-WEIGHT.

1	2	3
lb. oz.dw.gr.	*lb. oz.dw.gr.*	*lb. oz.dw.gr.*
45.3 9 8	84.5 4 1	658.6 5 4
34.8 3 9	32.6 9 4	325.6 9 7

AVOIRDUPOIS WEIGHT.

1	2	3
mwt.c.lb.oz.	*mwt.c.lb.oz.*	*mwt.c.lb.oz.dr.*
54.9 61 2	48.7 57 7	754.3 45 6 7
33.5 64 3	27.6 28 8	421.6 73 9 0

APOTHECARY WEIGHT.

1	2
℔ ℥ ʒ ℈ *gr.*	℔ ℥ ʒ ℈ *gr.*
7.3 4 8 2	17.4 4 4 4
4.6 7 7 3	14.7 7 7 7

BOARD MEASURE.

1				2					
td.	*g.*	*pan.*	*ft.*	*td.*	*g.*	*pan.*	*ft.*	*in.*	*pc.*
5.	8	9	2	86.	1	4	7	3	2
2.	5	6	4	48.	9	6	8	5	4

CLOTH MEASURE.

1	2	3
yds.	*dec.* *pts.*	*yds.*	*dec.* *pts.*	*yds.*	*dec.* *pts.*
42.	25	72.	85	340.	25
19.	7	17.	25	172.	35

LIQUID MEASURE.

hhds.	*b.*	*gal.*	*pts.*	*hhds.*	*b.*	*gal.*	*pts.*
7.	3	7	5	64.	4	3	1
5.	6	4	3	35.	4	6	9

DRY MEASURE.

Bu.	*dec.* *pts.*	*b.*	*dec.* *pts.*
8.	115	65.	625
5.	875	48.	845

LESSON XVII.

ADDITION and SUBTRACTION *combined.*

Q. WHAT *is the nature and effect of this Rule?*

A. It is finding the difference between two quantities, whereof either one or both are aggregate num-

bers, by the operation of Addition and Subtraction compounded in one process, instead of several distinct processes by those Rules.

Q. *What do you mean, in this place, by an* Aggregate number?

A. It is the whole amount of several numbers expressed in the statement, whose sum total is not to be set down in the operation.

Q. *How do you prepare the numbers for the work?*

1. Set them down as in Addition and Subtraction, units under units, &c. &c. the Substratum the uppermost.

2. Place the sign of Subtraction between the numbers, and distinguish the aggregate by extending the perpendicular brace to each of the particular numbers of which it is composed.

CASE 1.

Q. *Where the Substratum is a single number, and the Subtrahend an aggregate, what is the rule of operation?*

A. 1. Add the right hand column of the aggregate, and subtract the unit figure of its sum from the figure above it in the Substratum.

2. If you have to borrow ten in the subtraction, add that to the number of tens you have to carry in addition.

Q. *How is the work proved?*

A. By adding up the several numbers of the aggregate, setting down their sum total, and subtracting it from the upper number.

EXAMPLES.

1.

From	98762
Take	7654
	3842
	763
Remains	81503

Explanation.

Say 3 and 2 is 5, and 4 is 9 ; 9 from 12 (viz. 2 with the addition of 10 borrowed) leaves 3 :—

Next, 1 that I borrowed, to 6, makes 7, and 4 is 11, and 5 is 16 ; 6 from 6 leaves 0.

Next, 1 that I carry (for the 10 in addition) to 7 is 8, and 8 is 16, and 6 is 22 ; 2 from 7 leaves 5, which alſo ſet down.

Next, 2 that I carry to 5 is 7, and 3 is 10 and 7 is 17 ; 7 from 8 leaves 1.

Laſtly, 1 from 9 leaves 8.

2.

Borrowed	£2546.66 6	Lent	£2668.40 3
Paid at ſeveral times.	43.51 3	Received at ſeveral times	41.86 3
	57.32 9		65.41 3
	53.59 0		58.36 3
	70.34 6		48.51 2
	65.30 0		65.36 0
	88.93 3		48.61 6
	39.92 0		57.69 6
	45.60 3		12. 21 0
Unpaid.		Remains due.	

The general rule of operation is the ſame in the two laſt examples as in the two former.

Theſe examples are judged ſufficient to be inſerted in this place. The Inſtructor or Practitioner can at his pleaſure extend them to all the other tables of mixed quantities, the ſame general rule of operation applying to them all.

CASE 2.

Where the Subſtratum is an aggregate and the Subtrahend a ſingle number.

Rule. Make the ſubtraction from the ſum of each column in the aggregate, ſetting down the unit figure of the remainder, and adding the figure in the tens' place, to the next column of the aggregate, and if

there ever be occasion to borrow 10 in the subtraction, take 1 from the number of tens to be carried in the next addition or from the sum of the next column.

The work may be proved by comparing the sum total of the aggregate set down, with that of the Subtrahend and Remainder.

EXAMPLES.

1.

96857	
73869	*Explanation.*
43541	1+9+7=17−3=14(4); 1+4+6+
—	5=16 −4=12 (2); 1+5+8+8=
87543	22−5=17(7); 1+3+5+6=15−7=
———	8 ( ); 4+7+9=20 −8=12 (12)
Rem. 128724	
═══	

2.

Lent to B. at several times	35·45 0	
	53·54 5	
	28.75 6	
	47.63 8	
Received	99.90 0	
Remains due		

3.

Borrowed of W. at several times.	152.91 6	
	133.26 6	
	288.76 3	
	184.99 0	
Paid	491·96 6	
Remains due		

CASE 3.

Where the Subſtratum and Subtrahend are both aggregates.

Rule. 1. Take the unit figure of the sum of the right hand column in the Subtrahend, from that of the column directly above it in the Subſtratum, and set down the difference below it.

2. If the *unit* figure of the Subtrahend be the larger, borrow 10 as in Simple Subtraction, and add 1 to the number of tens in the sum of the Subtrahend.

3. After this, balance the *tens* of each part; if they are equal in number there is none to carry to the next

column in either of the aggregates—if they are unequal, carry the balance to that aggregate which has the most—Continue this operation thro' all the columns from the right hand to the left.

Q. *How is the work proved?*

A. By doing it at large; that is, finding the sum total of each aggregate and subtracting the one from the other.

EXAMPLES.

1.

Explanation.

97823	7+2+5=14: 8+1+3=12: 12—4=
45841	8 (2) balance of tens 1 in favor of the Sub-
37298	trahend, therefore fav 1+8+4+6=19:
—	9+4+2=15: 15—9=6 (6) balance of
74365	tens again 1 to the Subtrahend, therefore
36742	1+3+7+3=14: 2+6+8=16: 6—
45387	4=2 (2) balance of tens even. 5+8+4
—	=17: 7+5+7=19: 9—7=2 (2) bal-
22268	ance even. 4+3+7=14: 3+4+9=
==	16—14=2 (2).

Practical Examples in the last Case.

2.

George Maxwell to *Robert Cochran* *Dr.*

1796,			£	s	
Jan. 3.	To 5 yds. black Kerſimer,	at	2.55	12.78	5
10.	To 25 do. Holland,	at	.75	18.75	
Feb. 19.	To 14 lb. Loaf Sugar,	at	.29	4.06	
	To 7 do. Hyſon Tea,	at	1.75	12.25	
	To 4 gall. Brandy,	at	2.83	11.32	

1796,	*Credit.*				
March 1.	By 10 buſh. Wheat,	at	.75	7.50	
15.	By 3 cwt. Iron,		5.—	15.00	
April 4.	By 100 lb. Cheeſe,	at	.08	12.00	
11.	By 63 do. Flax,	at	.13 3	8.37	9

Balance due,

3.

Archibald Spigget borrowed of *Anthony Hotspur*, at several times, the following sums of money, *viz.*

1793, February 14,	£419.19 7	
May 30,	651.60 0	
September 8,	881.11 5	}
1794, March 23,	634.42 5	
August 1,	1074.88 2	

Paid at several times, *viz.*

1793, December 5.	919.54 0	}
1794, February 12.	1490.58 2	
October 11.	349.99 0	

What remains due, exclusive of interest ?

LESSON XVIII.

MULTIPLICATION.

Q. WHAT *is Multiplication ?*

A. It is a concise method of Addition.

Q. *What are the parts of Multiplication ?*

A. 1. The *Multiplicand* or the sum to be multiplied.

2. The *Multiplier* or the sum multiplied by.

3. The *Product*, or answer to the question ; which is the sum total of the Multiplicand added to itself as often as there are units in the Multiplier.

Q. *What are these several parts of Multiplication called, taken collectively ?*

A. The Multiplicand and Multiplier are called Factors, and the Product, the Rectangle or Square.

Q. *How is Multiplication generally divided ?*

A. Into two kinds, viz. Simple, or Single, and Compound, or Combined.

Q. *What is the definition of Simple Multiplication, as treated in this Compendium ?*

A. It is where neither of the Factors exceed the number 12, and the Product is found by a single process of Multiplication simply, and without the combined operation of Addition; as 4 times 6 is 24.

Q. *How are the parts to be arranged in Single Multiplication?*

A. In a horizontal line, with the sign of *Multiplication* placed between the Factors, and the sign of *Equality* between the Factors and the Product; thus $4 \times 4 = 16$.

Note. *Single Multiplication is a necessary preparation to combined Multiplication, and the whole of it is to be learnt perfectly by heart by the student, before he proceeds to the latter.*

SINGLE MULTIPLICATION, *commonly called the* MULTIPLICATION TABLE.

$2 \times 2 = 4$	$4 \times 7 = 28$	$11 \times 2 = 22$
$2 \times 3 = 6$	$4 \times 8 = 32$	$11 \quad 3 = 33$
$2 \times 4 = 8$	$4 \times 9 = 36$	$11 \quad 4 = 44$
$2 \times 5 = 10$	$5 \times 5 = 25$	$11 \quad 5 = 55$
$2 \times 6 = 12$	$5 \times 6 = 30$	$11 \quad 6 = 66$
$2 \times 7 = 14$	$5 \times 7 = 35$	$11 \quad 7 = 77$
$2 \times 8 = 16$	$5 \times 8 = 40$	$11 \quad 8 = 88$
$2 \times 9 = 18$	$5 \times 9 = 45$	$11 \quad 9 = 99$
$3 \times 3 = 9$	$6 \times 6 = 36$	$12 \times 2 = 24$
$3 \times 4 = 12$	$6 \times 7 = 42$	$12 \quad 3 = 36$
$3 \times 5 = 15$	$6 \times 8 = 48$	$12 \quad 4 = 48$
$3 \times 6 = 18$	$6 \times 9 = 54$	$12 \quad 5 = 60$
$3 \times 7 = 21$	$7 \times 7 = 49$	$12 \quad 6 = 72$
$3 \times 8 = 24$	$7 \times 8 = 56$	$12 \quad 7 = 84$
$3 \times 9 = 27$	$7 \times 9 = 63$	$12 \quad 8 = 96$
$4 \times 4 = 16$	$8 \times 8 = 64$	$12 \quad 9 = 108$
$4 \times 5 = 20$	$8 \times 9 = 72$	
$4 \times 6 = 24$	$9 \times 9 = 81$	

The number 10, I have not noticed in the above Table, because it does not change the figures of its multiplicand in the product; and whenever you would multiply any number by 10, you have only to annex the cypher to it, and the product is found.

LESSON XIX.

MULTIPLICATION *combined with* ADDITION.

Q. HOW *are the factors in this Multiplication, to be placed to prepare them for the work?*

A. Place the Multiplier under the Multiplicand ſo that units ſhall ſtand under units, tens under tens, &c. as in Addition; and put the ſign of Multiplication at the left hand of the Multiplier.

Q. *What is the general rule of operation?*

A. Begin to multiply with the unit figure of the Multiplier, and with that multiply each figure in the Multiplicand from the right hand to the left; in each ſingle product, in the multiplication of whole numbers, ſet down only the overplus of complete tens, and add the number of tens laſt found to the product of the next multiplicand figure.

Q. *In what order are the particular products to be ſet down, where there are two or more figures in the Multiplier?*

A. The firſt figure in each product is to be placed directly under it Multiplier.

Q. *What is the reaſon of this rule?*

A. It is becauſe the firſt figure in each product is ever of the ſame numerical denomination as its Multiplier; units produce units, tens tens, hundreds produce hundreds; therefore the product of the figure ſtanding in hundreds' place in the Multiplier, muſt be thrown back into the place of hundreds in the product; and ſo of the other denominations.

Q. *What is the next ſtep?*

A. After the proceſs of Multiplication is completed then add all the particular products together, and their ſum total will be the total product, or anſwer to the queſtion.

Q. *How do you prove Multiplication?*

A. In ſeveral ways, as

1. By inverting the factors, and multiplying them together ſo as to make the ſame total product as before.

2. By dividing the product by either of the factors, and finding the quotient juſt equal to the other factor. (The learner, however, is not yet ſuppoſed capable of this mode of proof.) Or

3. By a croſs, which is the moſt eaſy and compendious method: viz. firſt add together all the figures in the multiplicand, caſting out all the nines as you proceed—then add the figures of the multiplier in the ſame manner, and ſet the overplus of each on two ſides of the Ecks, thus 7X6—then multiply thoſe two figures together, and caſting the nines out of the product, ſet the overplus at the top of the Ecks for a ſtandard figure, thus 6 *Laſtly*, add together all the figures in the total product, in the ſame manner; place the overplus at the bottom of the Ecks, and if it be the ſame with the ſtandard, or topmoſt figure, the work is proved.

7X6

Q. *What is the reaſon of this mode of proof?*

A. It ariſes, I conceive, from theſe peculiar properties in the number 9, viz. that whatever number it is multiplied by, the figures of its product added together will invariably make one, or more complete nines—and *ſecondly*, the product, in ſuch caſe, will always lack juſt the number of the multiplier of being ten times its number.

CASE 1.

EXAMPLES.

1.	2.	3.
4761327	4761374	7126312
X2	X3	X4
9522654		

4.	5.	6.
7126312	73126184	7713126 74
×5	×6	×7
=====	=====	=====
7.	8.	9.
31261267	47612312	31261731
×8	×9	×11
=====	=====	=====
10.	11.	12.
76138126	82365243	65423789
×12	×11	×12
=====	=====	=====

CASE 2.

The Multiplier larger than 12.

EXAMPLES.

1.
691861
×9738

5534888
4843027
6226749

6766400 58

Explanation. 8×1=8(8)8×6=48(8)8×8=64+4=68(8)8×1=8+6=14(4)8×9=72+1=73(3) 8×6=48+7=55(55)
7×1=7(7)7×6=42(2)7×8=56+4=60(0)7×1=7+6=13(3) 7×9=63+1=64(4)7×6=42+6=48(48)
9×1=9(9) 9×6=54(4)9×8=72+5=77(7)9×1=9+7=16(6)9×9=81+1=82(2)9×6=54+8=62(62)

Laſtly, add all theſe particular products, and the total product is found, viz. 'ſix hundred and ſeventy ſix millions, ſix hundred and forty thouſand, and fifty eight.'

PROOF. $\begin{matrix} 6 \\ 6 \times 4 \\ 6 \end{matrix}$

Explanation. 6 and 1 (the 9 being thrown away) is 7 and 8 is 15, caſt out 9 leaves 6, and 6 is 12, 9 out leaves 3 and 1 makes 4, which ſet upon the right ſide of the *Ecks.*

Multiplier. 9 is nothing: 7 and 8 make 15, 9 out leaves 6. Set it upon the left ſide of the Ecks—multiply thoſe two numbers together, and the product is 24; caſt out the nines, and the remainder is 6, which ſet at the top.

Total Product. Add the figures together the ſame way as in the factors, caſting out all the nines, and the remainder will be 6, which ſet at the bottom of the Ecks and it being the ſame with the figure atop, the operation is proved.

2.	3.	4.	5.
129186	281216	181281	543764
×98	26	763	239
1266594228	7311616	138317403	129959596

6.	7.	8.	9.
269181	261986	812617	281691
4629	7633	43859	76286
1246038849	2001049068	35640569003	21489079626

Q. *Are there no exceptions to the foregoing caſe?*

A. Yes. 1. When theſe figures, 1 and 1, or 1 and 2, happen together in any part of the multiplier, you may multiply by both at once, as in Caſe 1.

EXAMPLES.

1.	2.	3.	4.
761312	671612	963458	843126
×112	×114	×912	×119
9135744			
3045248			
31366044			

2d *Exception.* When any other number between 12 and 20 happens, as 13, 14, 15, &c. then multiply by the figure in the units' place, and, as you multiply, add to the product of each single figure, that of the multiplicand which ſtands next on the right hand.

EXAMPLES.

1.	2.	3.	4.
5497623	8413574	9364326	8128621
×16	×17	×18	×19

3d *Exception.* When there is any number between 20 and 30, the multiplier, you may multiply in the ſame way, only add double the right hand figure.

EXAMPLES.

1.	2.	3.
527392	643897	798346
×25	×26	×27

CASE 3.

Q. *What is the particular rule in the third caſe of Multiplication ?*

A. 1. Such Factors as have cyphers at the ends muſt be ſet down as if there were no cyphers.

2. Pay no attention to the cyphers until the multi-

plication is performed, and then annex the same number of cyphers to the total product, as there are in both the factors.

EXAMPLES.

1.	2.	3.
476 00	180120	461210
× 170	× 48100	× 81900
80920000	8663772000	37773099000

4.	5.	6.
760000	461200	618010
× 4800	× 72000	× 74210
3648000000	33206400000	45862522100

CASE 4.

Q. What is the particular rule in the fourth case of Multiplication?

A. When cyphers are placed between the significant figures in the Multiplier, omit them in the operation, observing to place the first figure of every particular product as before.

EXAMPLES.

1.	2.	3.
128121	128128	246145
× 72001	× 70043	× 66012
128121	8974469504	14771653740
256242		
896847		
9224840121		

CASE 5.*

Q. *How do you multiply any whole number by a ſum in Federal Money, in order to find the price or value of the whole?*

A. 1. Set down the factors as before; for the ſake of convenience, placing that for the Multiplier which has the fewer figures.

2. Multiply the factors together as if they were both whole numbers, according to the general rule in Leſſon XIX.

3. Point off, in the total product, as many right hand figures, as there were figures in the factor or price below dollars, for cents and mills—the reſt are Dollars.

EXAMPLES.

Q. *What is the amount of* 3257 *yds. of Velvet, at* $3.55\frac{7}{10}$ *per yard?*

22799
16285
16285
9771

Anſwer, 11585.149

By this ſingle example, and ſtill more by that in the next Caſe, the inſtructor, the merchant, and eve-

* *This and the following Caſe properly belong to Decimal Arithmetic, in the* Third Part: *But as the multiplication of Federal Money muſt be of ſuch daily practical uſe; as its operation is plain and eaſy to the young beginner, and performed in exactly the ſame method as the multiplication of whole numbers, it was conſidered beſt to inſert a ſhort ſketch of the ſubject in the Firſt Part of the work. This may alſo ſerve as a ſpecimen, both in rule and example, of all the other (propoſed) Federal Tables, without their being particularly noticed in Multiplication.*

ry man poſſeſſed of the knowledge of practical Arithmetic, will readily diſcern the ſimplicity and ſuperior excellency of our Federal currency, in all the various branches of money calculation.

CASE 6.

Q. *How do you multiply a mixed quantity of any of the (propoſed) Federal Tables, by any ſum in Federal money, in order to determine its value or price?*

A. 1. Place the Factors, and multiply them as before.

2. From the total product, point off as many right hand figures as there were figures in both the Factors, below their ultimate Integers, or the higheſt denomination in their reſpective Tables; then the figures ſtanding upon the left hand of the point, are *dollars;* the two figures next upon the right hand of the point are *cents;* the third *mills;* and if there be any more they are caſt away, being leſs than the ultimtae fraction, one mill.

EXAMPLE.

mwt. c. lb.

A farmer ſold 34.70 65 of Hay,
at ℳ × 4.33 3 per thouſand weight:
What did he receive in the whole?

104295
104295
104295
139060

Anſwer, 150.63 6(745

This example, I conceive, evinces the practical utility that would reſult from having all our Commercial Tables of mixed quantities conformed to our Federal money, and eſtabliſhed upon a decimal *ſcale.*

Queſtions for exerciſe, in the two laſt Caſes.

1. Q. *What is the price of 37543 acres of Land, at* ℳ4.75 ℔ *acre?* Anſwer, 178329.25.

2. Q. *What would be the impoſt duty on* 1538 *buſhels of Salt, at* //15 ℔ *buſhel?* Anſwer, ℳ230.70.

3. Q. *A merchant bought* 756 *gal. of Rum, at* ℳ1.34 ℔ *gallon; what ſum did he have to pay?* Anſ. 275.04.

4. Q. *How much is* 23*mwt.* 1*c.* 25*lb. of bloomery Iron, worth, at* ℳ40.26 ℔ *mwt.?* Anſwer, 935.61 6.

5. Q. *A ſilver-ſmith purchaſed* 34*lb* 5 *oz.* 6*dw.* 7*grs. Federal Troy weight, of old Silver, for* 58 *cents* ℔ *oz. how much did he give for the whole?* Anſ. ℳ200.49.

6. Q. *A gentleman built him an houſe, which required* 47*td.* 5*g. and* 75 *feet of boards, to complete it, for which he paid at the rate of* ℳ5.45 ℔ *thouſand feet; how much did that article enhance the expence of the building?*

Anſwer, ℳ271.28.

7. Q. *A pedlar bought of a printer,* 3 *gr.* 6 *deſm and* 5 *Almanacks, for* ℳ6.50 ℔ *groſs; how much did the whole coſt him?* Anſwer, 23.72.

8. Q. *He retailed them, by the ſingle, at* //12; *what did he receive for them, and what were his neat gains?*

Anſwer, ℳ 43.80 received in the whole.
20.07 his neat gain.

LESSON XX.

CROSS MULTIPLICATION, or DIAGONAL INVOLUTION.

Q. *Is there not a ſhorter method of performing Multiplication, both of whole numbers and the mixed quantities of the Federal Tables?*

A. Yes. A method which ſaves all the figures in the operation, after the factors are ſtated, but thoſe of the total product, let the multiplier be ever ſo large.

Q. *What is it called?*

A. Croſs Multiplication, or Diagonal Involution.

Q. *What is the benefit of this rule?*

A. After the learner is well verſed in the common method of multiplication, he may eaſily attain the

knowledge of this ; which by a little uſe will become equally familiar and eaſy ; and as it greatly ſhortens the operation, it will be found proportionably advantageous in practice.

Q. *What is the principle of the operation?*

A. It is the ſame as that in the 2d and 3d exceptions in the 2d caſe of Leſſon XIX, and is in reality but extending the ſame rule to a multiplier of the ſame, or any larger number of figures.

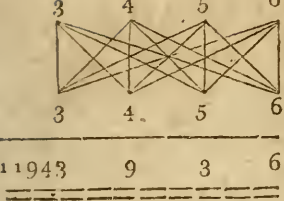
Q. *How is the operation performed?*

A. 1 Set down the factors as before.

2. Multiply the two unit figures of the factors together, and ſet down the unit figure of the product according to the common rule.

3. As you proceed with the unit figure of the multiplier, carry the work in your mind, and add the product of the firſt figure of the multiplier and ſecond of the multiplicand, with that of the ſecond figure of the multiplier and firſt of the multiplicand ; ſetting down and carrying as before.—At the next ſtep, add the product of the ſecond and third figures of the multiplier, with the firſt and ſecond of the mulplicand, to that of the firſt figure of the multiplier, and third of the multiplicand—multiplying both ways from corner to corner. Proceed in the ſame manner with all the remaining figures, taking in another left hand figure in both factors, at every new ſtep of the proceſs ; ſo that if there be an equal number of figures in the factors, you will multiply the right hand figure of the multiplier, with the left of the multiplicand, and the left of the multiplier with the right of the multiplicand and add their products with thoſe of all the intermediate figures multiplied in this way, at the ſame ſtep.

The following example with diagonal lines drawn between the figures, together with the explanation ſubjoined, will clearly illuſtrate the operation of the rule ; whilſt the ſame example wrought at large, will prove its truth, and brevity.



The same wrought at large.

3456
×3456
20736
17280
13824
10368
11943936

Explanation.

$6\times6=36$ (6); $6\times5=30+3=33$; $5\times6=30+33=63$ (3); $6\times4=24+6=30$; $4\times6=24+30=54$; $5\times5=25+54=79$ (9); $6\times3=18+7=25$; $3\times6=18+25=43$; $4\times5=20+43=63$; $5\times4=20+63=83$ (3): *The* unit *figures of the factors are now difmiſſed.* $5\times3=15+8$ to carry $=23$; $3\times5=15+23=38$; $4\times4=16+38=54$ (4): *The* tens *are now difmiſſed.* $4\times3=12+5$ to carry $=17$; $3\times4=12+17=29$ (9): *The* hundreds *are now difmiſſed.* $3\times3=9+2$ to carry $=11$ (11.)

The operation is now cloſed; producing *eleven millions, nine hundred and forty-three thouſand, nine hundred and thirty ſix.* Compare this example with the work done at large in the common method, and it is found to ſave 20 figures in this ſmall ſum.

CASE 2.

Q. *How do you perform Croſs Multiplication, where the factors conſiſt of unequal numbers of figures?*

A. 1. Set the factors as before, the ſmalleſt for the multiplier.

2. Multiply in the ſame manner as before, and after you have multiplied the unit, or right hand figure of the multiplier, into the one ſtanding immediately over its left hand figure, continue the proceſs with each remaining figure of the multiplicand, juſt as if all the figures of the multiplier were, at every ſtep, removed one figure farther towards the left hand; and,

for convenience sake, you may set a point over each figure of the multiplicand, standing on the left hand of the multiplier, when you multiply it by the right hand figure of the multiplier, and under each right hand figure, as soon as it is dismissed.

EXAMPLES.

1.	2.
59271 acres of Land,	7854362
at × 5.75 ₱ acre?	× 5268
340808.25 *Answer.*	41376779016

Explanation of Example 1.

5×1=5 (5); 5×7=35; 7×1=7+35=42 (2); 5×2=10+4=14; 5×1=5+14=19; 7×7=49+19=68 (8): *Now dismiss the* unit *figure of the* multiplicand, *and set the multiplier under the figures* 927. 5×9=45+6 to carry = 51; 5×7=35+51=86; 7×2=14+86=100 (0): *Now dismiss the* tens *in the multiplicand, and set the multiplier under* 592. 5×5=25+10 to carry =35; 5×2=10+35=45; 7×9=63+45=108 (8): *Now dismiss the* hundreds *in the multiplicand, and the* units *in the* multiplier. 7×5=35+10 to carry=45; 5×9=45+45=90(0): *Dismiss the* thousands *in the* multiplicand, *and* tens *in the* multiplier. 5×5=25+9 to carry=34 (34). This finishes the multiplication.

Lastly, point off the two right hand figures for cents, because there were cents in the multiplier, and the whole work is finished, producing *three hundred and forty thousand, eight hundred and eight dollars, and twenty-five cents.*

CASE 3.

Q. *How do you improve this Rule in Book keeping?*

A. Place the factors, which are the commodity and price, at each entry, in a horizontal line; then multiply them together as before; carefully observing not to take

a wrong figure in the multiplicand, and carry out the product in a right hand column.

2. Cast away in the operation, without setting them down, all the right hand figures in the product, next to the three below dollars.

EXAMPLES.

Thomas Baxter to *Joseph Manly* Dr.

		℔	//	/
To 325 yds. Coating,	at ℔2.33 3	758	22	5
To 75 do. Satin,	at 3.25	185	25	

Explanation of the first Entry.

5×3=15 (5 mills and 1 cent to carry); 5×3=15+1 =16; 2×3=6+16=22 (2 in the units' place of cents); 5×3=15+2=17; 3×3=9+17=26; 2×3=6+26 =32 (2 in the dimes' place) 5×2=10+3=13; 3×3= 9+13=22; 2×3=6+22=28 (8 in the units' place of dollars); 2×2 4+2=6; 3×3=9+6=15 (5 in the tens' place of dollars); 3×2=6+1=7 (7 in the hundreds' place of dollars,—making *seven hundred and fifty-eight dollars, twenty-two cents and five mills.*

LESSON XXI.

DIVISION, IN GENERAL.

Q. WHAT *is* Division?

A. It is a concise method of performing many Subtractions. It shews how many times one number is contained in another, and how many remains.

Q. *How many parts are there in* Division?

A. Four; *viz.*

1. The *Dividend*, or number to be divided.

2. The *Divisor*, or number by which the division is made.

3. The *Quotient*, or the number of times that the divisor is contained in the dividend, which is the answer to the question.

4. The *Remainder*, or the number left after the work is performed, which is always less than the divisor, and of the same kind with the Dividend.

Q. *Which of these are certain, and which not?*

A. The three first are certain and necessary—the *remainder* is uncertain, as in the operation of some numbers there is none left.

Q. *How many sorts of division are there?*

A. Division may be generally divided into Simple or Single Division, and Combined Division.

LESSON XXII.

SINGLE DIVISION, *or the* DIVISION TABLE.

Q. WHAT *is Single Division?*

A. Single Division is where the quotient is found by the operation of Division simply, without the combination of any of the other first rules, and without having any remainder.

CASE 1.

Q. *What is peculiar in the 1st case of Single Division?*

A. The quotient is found by one single process of the divisor.

Q. *How are the parts to be arranged in this case?*

A. In a horizontal line—the dividend first, the devisor next, with the *statement* sign of division between them, and then the quotient separated by the sign of equality. This is just the reverse of the Multiplication Table, and may be usefully learned by heart.

EXAMPLES.

18 ÷ 2 = 9	30 ÷ 5 = 6	24 ÷ 8 = 3
16 ÷ 2 = 8	25 ÷ 5 = 5	16 ÷ 8 = 2
14 ÷ 2 = 7	20 ÷ 5 = 4	81 ÷ 9 = 9
12 ÷ 2 = 6	15 ÷ 5 = 3	72 ÷ 9 = 8
10 ÷ 2 = 5	10 ÷ 5 = 2	63 ÷ 9 = 7
8 ÷ 2 = 4	54 ÷ 6 = 9	54 9 = 6
6 ÷ 2 = 3	48 ÷ 6 = 8	45 9 = 5
4 ÷ 2 = 2	42 ÷ 6 = 7	36 9 = 4
27 ÷ 3 = 9	36 ÷ 6 = 6	27 9 = 3
24 ÷ 3 = 8	30 ÷ 6 = 5	18 9 = 2
21 ÷ 3 = 7	24 ÷ 6 = 4	99 ÷ 11 = 9
18 ÷ 3 = 6	18 ÷ 6 = 3	88 11 = 8
15 ÷ 3 = 5	12 ÷ 6 = 2	77 11 = 7
12 ÷ 3 = 4	63 ÷ 7 = 9	66 11 = 6
9 ÷ 3 = 3	56 ÷ 7 = 8	55 11 = 5
6 ÷ 3 = 2	49 ÷ 7 = 7	44 11 = 4
36 ÷ 4 = 9	42 ÷ 7 = 6	33 11 = 3
32 ÷ 4 = 8	35 ÷ 7 = 5	22 11 = 2
28 ÷ 4 = 7	28 ÷ 7 = 4	108 ÷ 12 = 9
24 ÷ 4 = 6	21 ÷ 7 = 3	96 12 = 8
20 ÷ 4 = 5	14 ÷ 7 = 2	84 12 = 7
16 ÷ 4 = 4	72 ÷ 8 = 9	72 12 = 6
12 ÷ 4 = 3	64 ÷ 8 = 8	60 12 = 5
8 ÷ 4 = 2	56 ÷ 8 = 7	48 12 = 4
45 ÷ 5 = 9	48 ÷ 8 = 6	36 12 = 3
40 ÷ 5 = 8	40 ÷ 8 = 5	24 12 = 2
35 ÷ 5 = 7	32 ÷ 8 = 4	

The number ten is omitted as a divisor in the above Table; because whenever 10 is the divisor, you have only to cut off the right hand figure of the dividend for a remainder, and the other figures are the quotient sought.

CASE 2.

Q. *How are the parts to be arranged in this case?*

A. Set the divisor first, and the operation sign between it and the dividend, and the quotient either at the right hand, or underneath, without the sign of equality.

EXAMPLES.

1.	2.	3.	4.
2) 24	3) 6390	4) 48884	5) 205555
12	2130		

5.	6.	7.	8.	9.
6) 546	7) 4907	8) 72808	9) 6399	10) 85690

LESSON XXIII.

DIVISION *combined with* MULTIPLICATION *and* SUBTRACTION.

Q. HOW *is this rule generally divided?*

A. Into Short and Long Division.

Q. *How are these distinguished?*

A. In Short Division, the divisor does not exceed 12: In Long Division, it consists of any greater number.

SHORT DIVISION.

Q. *What is the rule of operation?*

A. Inquire how often the divisor is contained in the first left hand figure of the dividend, and if that be too small to contain it, take the two first; set that number down for the first left hand figure of the quotient—*next*, multiply the divisor by the quotient figure, and subtract the product from the figure or figures taken in the dividend, and to the remainder annex the next figure of the dividend for a new dividend (performing this operation in your mind only) and extend the same process to each remaining figure of the dividend successively, setting down only the quotient.

Q. *How do you dispose of the final remainder?*

A. Annex it fraction-wise to the quotient, with the divisor under it, as in the first example following.

EXAMPLE.

5) 61231280	*Explanation.* 5 in 6, 1 (1) 1 left; in 11, 2 (2) 1 left; 5 in 12, 2 (2) 2 left; 5 in 23, 4 (4) 3 left; 5 in 31, 6 (6) 1 left; 5 in 12, 2 (2) 2 left; 5 in 28, 5 (5) 3 left; 5 in 30, 6 (6) and 0 left.
12246256	

2)71367413	6)3126010851	11)7312613107
3)42310812	7)7131267 19	12)3812617314
4)13812612	8)7012671 31	11)1622728131
5)61231281	9)1267131 08	12)1731261712

LESSON XXIV.

LONG DIVISION.

CASE 1.

Q. WHAT *is the general rule in Long Division?*

A. Set down the parts as in Short Division—multiply the divisor by the quotient figure, and set down the product at large; subtract it from the dividend, and to that remainder annex the next right hand figure in the dividend, for a new dividend. This operation must be repeated for every remaining figure in the dividend.

Q. *How do you prove division?*

A. It may be proved in two several ways, *viz.*

1. By multiplying the quotient by the divisor, and adding the remainder, if there be any, to the product—if this equal the dividend, the work is proved.

2. It may be done with less trouble and equal certainty, with an X, by a rule similar to that of proving multiplication. *First.* Add together all the fi-

gures in the divisor, casting out the *nines*, and set down the overplus upon the right side of the character. *Secondly*, do the same with the quotient, and set the overplus upon the left hand of the *sicks*. *Thirdly*, multiply those figures together, and casting the nines out of the product, set down the overplus at the top, for a standard figure.—*Lastly*, add all the figures of the dividend in the same manner, and set the overplus at the bottom, which if equal to the standard figure the operation is right.

Q. *What must be done in this case, if there be a remainder?*

A. Add all the figures of the Remainder, as in the other parts, and subtract the overplus from that of the Dividend, and that remainder will be the same number as the standard figure if the work be right. But if the overplus of the remainder, be larger than that of the Dividend, then borrow 9, which is the *terminus* figure, instead of 10, to subtract from; and to that difference add the overplus of the Dividend, which will equal the standard figure.

EXAMPLES.

91)7216587(793031
637

846
819

275
273

287
273

141
91
---
(50)

Proof, *with its Explanation.*

5
5 X 1
5

Divisor $9=9+1=1$ (1)
Quotient $7+3=1+3+1$ (5)
Standard $1\times5=5$ (5)
Dividend $7+2=0+1+6+5=3+8=2+7=0+1=(1)$
Rem. $5+0=5$ Lastly $1+9-5=5$ the proof figure.

82)3171261 7(19)73261714(3164)3191 7352(
73)27342694(381)73247231(6528)42697326(
64)47342637(773)32756373(2932)52436237(
55)73582063(947)23489734(33408)27364432(
48)76535754(762)32846273(73246)94264824(
37)34235772(7628)28937432(86257)37431749(
28)73264624(3247)34937352(23724)34285362(

CASE 2.

When cyphers ſtand at the end of the diviſor, they muſt be cut off, and the ſame number of figures muſt be cut off from the dividend.

The figures cut off in the dividend, muſt be annexed to the remainder at laſt.

EXAMPLES.

625|00)7126 53|52(528|000)7555|0 75(
426|00)7135 24|74(452|000)7565|3 585(

LESSON XXV.

Q. IS *there not a ſhorter method of performing Long Diviſion?*

A. Yes; a method which ſaves one half the number of figures.

Q. *How is it done?*

A. 1. When you multiply the diviſor by the quotient figure, ſubtract the figures of the product immediately from the dividend, without ſetting them down, according to the method of Compound Subtraction; and ſet down only the remainders.

2. When you have to borrow ten in the ſubtraction, add one to the number of tens which you have to carry in the multiplication, to the product of the next diviſor figure.

This method, by a little exerciſe, will become equally familiar and eaſy to the learner, and will be found very uſeful in practice.

Take the Example, wrought at large in Leſſon XXIV, *for an Example of this Rule.*

91)7216587 1(79303 1

846

275

287

141

(50)

Comparing this Example with the ſame wrought at large, we find 14 figures ſaved in 28.

LESSON XXVI.

Diviſion of Federal Money, by a Diviſor not exceeding 12.

Q. HOW *is the operation performed?*

A. 1. In the ſame manner as Short Diviſion of Whole Numbers; only obſerving to point off by itſelf the quotient of dollars in the dividend, for the ſame denomination in the quotient.

2. Where the higheſt denomination expreſſed in the dividend does not contain the diviſor, the firſt denomination in the quotient will be the ſame as the ſecond in the dividend.

EXAMPLES.

// 1.	// 2.	// 3.	// 4.
7)3·55 5(	6)45.25 8(	5)3 3(	5)44 4

// 5.	// 6.	// 7.	// 8.
9)672.07 7(	8)827.72 6(	4)25.66 6(	3)38.22 3(

℔ 9.	℔ 10.	℔ 11.	℔ 12.
11)576.16 7(	12)83.54 9(	11)100.83 3(	12)3.67 2(

CASE 2.

Long Division of Federal Money.

Q. *How is the operation performed?*

A. 1. Place the parts, and divide, just as in the division of whole numbers.

2. The placing of the separating point in the quotient, is by the same rule as in the former case of Short Division.

EXAMPLES.

℔ // / // /		
82)31.71 2(38 6		
711	℔	℔
552	95) 743.15 9(	2345)28754.19 6(
Rem. (60)	323) 826.60 0(	5432)69245.78 9(
less than a mill.	147)8968.07 0(	3254)89694.45 7(
	183)5096.00 9(	4523)48962.87 5(
	212)9125.00 0(	1765)98765.43 2(

For the mutual division of Decimal mixed quantities, the learner is referred to the division of Decimal Fractions, *in the* Third Part.

LESSON XXVII.

Addition of Mixed Quantities of the Vulgar Tables.

Q. WHAT *is the general rule of operation in the Addition of mixed quantities?*

A. After the several numbers in the statement are set down, according to rule in Lesson XII, add together all the numbers of the same denomination, beginning with the lowest denomination expressed in any of

the given quantities, and set down underneath it, in the sum total, the surplus which it contains over and above the complete number of its terminus; and for every time its terminus is contained, carry one to the next higher denomination.

2. The highest denomination in every table of mixed quantities consists of whole numbers, and is to be added as such.

3. Set down the amount of the last left hand denomination, in the highest denomination which it will admit.

Q. *What are the* PENCE TABLES, *so called?*

A. These following, viz.

2*d.* = 1/8	8*d.* = 6/8	2*s.* = 24*d*	8*s.* = 96*d.*
3*d.* = 2/6	9*d.* = 7/6	3*s.* = 36*d.*	9*s.* = 108*d.*
4*d.* = 3/4	10*d.* = 8/4	4*s.* = 48*d.*	10*s.* = 120*d.*
5*d.* = 4/2	11*d.* = 9/2	5*s.* = 60*d.*	11*s.* = 132*d.*
6*d.* = 5/0	12*d.* = 10/0	6*s.* = 72*d.*	12*s.* = 144*d.*
7*d.* = 5/10		7*s.* = 84*d.*	

Note. *This Table is to be learned by heart.*

EXAMPLES.

1. MONEY.

1.	2.	3.
£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
44,,12,, 6¼	25,,11,,11½	47,,12,, 6¼
31,,18,, 1½	16,,12,, 6	31,,17,, 3
47,,12,, 4	11,, 9,,10½	17,,13,,11¾
14,,12,,10¾	16,,12,, 4¼	18,,14,,10½
16,,14,,11	34,, 1,,10	16,,15,,11
19,,12,, 2	17,,14,,11¼	17,,14,, 4½
£. 175,, 2,,11½		

Explanation of the Example wrought.

I first add up the *farthings*, and find their amount to be 6; this being 2 over its *terminus*, or making one

penny halfpenny, I ſet down only the halfpenny, and carry the one to the place of pence: the amount of the pence I find 35, which, by the Pence Table, is 2/11; I therefore ſet down the 11 pence, and carry 2 to the place of ſhillings: the amount of the ſhillings I find 82, which being £.4,,2, I ſet down the 2 ſhillings, and carry 4 to the place of pounds: the number of pounds being added, I find the whole ſum total to be *one hundred and ſeventy-five pounds, two ſhillings and eleven pence halfpenny*.

2. TROY WEIGHT.

1.	2.	3.	4.
lb. oz. dw. gr.	*oz. dw. gr.*	*lb. oz. dw. gr.*	*lb. oz. dw. gr.*
4,,11,,13,,14	7,,13,,12	4,,10,,12,,13	7,,10,,12,,10
8,, 6,, 9,, 2	6,,10,,14	3,,10,,16,,12	3,, 4,,16,,13
	9,,12,,17	4,, 9,,16,,14	4,,13,,16,,12
13,, 6,, 2,,16	16,,13	3,, 3,,19,,13	4,, 3,,16,,13

The operation of the above examples being wrought by the ſame general rule with thoſe in the former Table, it is judged unneceſſary to infert a particular explanation in this and the following Tables.

3. AVOIRDUPOIS WEIGHT.

T. c. q. lb.	*T. c. q. lb.*	*c. q. lb.*	*lb. oz. dr.*
4,,12,,3,,16	7,,00,,1,,16	17,,3,,12	14,,10,,12
3,,15,,1,,13	1,,12,,3,,10	26,,2,,19	26,,12,,10
	3,, 4,,3,,17	24,,1,,12	29,,12,,12
8,, 8,,1,, 1	3,, 1, 2,,12	26,,3,, 9	27,, 2,, 3

4. APOTHECARY WEIGHT.

lb. ℥ ʒ ℈ *gr.*	*lb.* ℥ ʒ ℈ *gr.*	*lb.* ℥ ʒ ℈ *gr.*
3,,11,,7,,2,,19	7,,3,,3,,2,,10	7,,3,,4,,2,,10
6,, 3,,4,,2,, 3	3,,2,,2,, 4	6,,2,,7,,2,, 4
2,,7,,2,, 9	2,,3,,4,,2,, 8	3,,7,,2,,4,, 9
4,, 2,,2,,2,, 8	6,,2,,3,,2,,10	2,,3,,4,,0,, 10

5. Cloth Measure.

1.	2.	3.	4.
yds.qr.na.	ells.qr.na.	yds.qr.na.	yds.qr.na.
37,,2,,2	44,,0,,2	27,,2,,3	37,,2,,3
20,,3,,3	27,,3,,2	36,,3,,3	37,,2,,3
35,,3,,3	55,,4,,3	34,,1,,2	45,,3,,3
39,,3,,3	49,,3,,3	39,,4,,0	16,,2,,0

6. Land Measure.

1.	2.	3.
A. r. p.	A. r. p.	A. r. p.
27,,3,,22	37,,2,,32	26,,3,,36
32,,2,,23	35,,3,,33	43,,3,,33
35,,0,,20	16,,3,,37	34,,3,,35
36,,1,,34	39,,3,,36	46,,2,,28

7. Liquid Measure.

1.	2.	3.
Tier. g. q.	Hhd. gal.qts.	T.hhd.gal.qt.
37,,34,,3	27,,21,,2	7,,2,,46,,3
46,,40,,2	47,,13,,3	6,,3,,35,,2
66,,10,,3	49,,8,,2	7,,1,,41,,2
89,,31,,2	29,,12,,3	6,,2,,16,,1

8. Dry Measure.

1.	2.	3.	4.
Gal. qt. pt.	Pe.gal.qt.	B. p. qt.	Can.b. p. qt.
16,,3,,2	6,,1,,2	89,,3,,6	98,,2,,3
47,,1,,0	9,,0,,3	47,,2,,6	9,,3,,6
69,,3,,0	1,,1,,0	35,,3,,7	79,,3,,2
88,,0,,1	2,,0,,3	42,,0,,4	14,,3,,6

9. LONG MEASURE.

M. fur. p.	Yds. f. in.	Le. m. fur. p.	Yds. f. in.
17 : 7 : 19	44 : 2 : 7	56 : 2 : 7 : 30	16 : 0 : 0
26 : 1 : 9	16 : 0 : 4	48 : 1 : 2 : 18	56 : 2 : 9 : 1
60 : 3 : 16	39 : 1 : 10	54 : 2 : 1 : 20	48 : 1 : 4 : 2
40 : 4 : 19	46 : 2 : 4	90 : 2 : 7 : 9	45 : 2 : 8 : 2

10. TIME.

M. w. d.	H. m. sec.	M. w. d.	D. h. m. sec.
46 : 1 : 6	47 : 10 : 32	34 : 2 : 1	27 : 12 : 40 : 45
24 : 2 : 5	27 : 44 : 43	23 : 3 : 6	19 : 20 : 16 : 28
16 : 3 : 6	24 : 44 : 54	56 : 2 : 4	47 : 10 : 43 : 46
39 : 3 : 5	4 : 6 : 5	50 : 3 : 7	40 : 30 : 49 : 54

11. MOTION.

° ′ ″	° ′ ″	° ′ ″
47 : 40 : 54	47 : 56 : 49	47 : 13 : 32
46 : 25 : 36	27 : 10 : 31	70 : 59 : 44
47 : 56 : 59	56 : 54 : 35	98 : 56 : 54
54 : 45 : 56	90 : 45 : 34	44 : 36 : 59

LESSON XXVIII.

SUBTRACTION *of Mixed Quantities.*

Q. WHAT *is the rule of operation?*

A. After the given quantities are set down according to the rule in the Lesson XII, begin the subtraction in the lowest denomination expressed in either of the given sums or quantities, proceeding towards the left hand, subtracting each quantity in the subtrahend from that of the same denomination standing directly above it in the substratum, and setting down the dif-

ference directly underneath, in a third row, for the remainder; first drawing a line between the statement and the work, and observing to keep the several denominations separated by the proper marks.

2. If the quantity in any of the lower denominations in the *subtrahend* be smaller than the one standing above it in the *substratum*, take the upper number so many more than its *terminus*, and read the next denomination in the substratum one the less; but if it be a vacant denomination, or there are several vacant denominations coming together, call each and all of them in the work one less than its terminus, and the next left hand quantity one less than its figures. In the highest given denomination, the subtraction is ever the same as that of whole numbers.

If this mode of subtracting mixed quantities prove more unhandy to the young beginner than the common mode, the instructor can direct him to that, which is performed by subtracting the lower quantity from the terminus of its denomination, and to this difference adding the upper quantity for a remainder; add one in such case to the next left hand quantity in the sub trahend.

Note. *Proof is by the same method as in whole numbers.*

EXAMPLES.

1 MONEY.

	£. s. d.	£. s. d.	£. s. d.	£. s. d.
From	14,10,6½	41,15,3	76,11,4½	73,7,6
Take	3,17,7½	19,17,1½	13,17,7	19,14½
Rem.	£10,12,11			

2 TROY-WEIGHT.

	oz. dw. gr.	oz. dw. gr.	oz. dw. gr.	lb. oz. dw. gr.
From	78,10 12	78, 5,20	23,16,12	84, 4,11,12
Take	2,10,19	10, 4.19	5,19.14	17,10,11,17
Diff.				

Avoirdupois-Weight.

	C.qr.lb.	*C.qr.lb.*	*T.c.qr.*	*T.c.qr.lb.*
Bought	71,2,18	17,2,13	17,10,2	12,2,3,20
Sold	3,1,26	10,2,13	20,19,3	5,3,2,20
Unsold				

4. Apothecary-Weight.

	℥.℥.ʒ.*gr.*	℥.ʒ.ʒ.*gr.*	*lb.*℥.ʒ.*gr.*
From	65,4 2,10	47.5,1,16	48,2,2 0 19
Take	7,7,2,12	2 1,2,18	10,1,2,2,17

5. Long-Measure.

	L.m.f.p.	*Yd.f.in.b.c.*	*L.m.f.p.*
From	71,1.3,10	40 0,3,2	64,0,3.4
Take	25,2.5,20	26,0,2,2	23,2.3,20

6. Cloth-Measure.

	Yds.qr.na.	*Yds.qr.na.*	*Yds.qr.na.*
From	71.3,1	52,2,3	148.0,0
Take	14,2.3	16.1.3	86,0,3

7. Land-Measure.

	A. r. p.	*A. r. p.*	*A. r. p.*	*A. r. p.*
Purchased	12.1,12	25,3,17	28,1, 7	32.0, 9
Plowed	5 3,17	12,3.23	19,1,28	16,2.2.4
Rem. Unpl.				

8. Liquid-Measure.

	T.hhds.gal.	*T.hhds.gal.*	*Gal.qts.pts.*	*Gal.qts.pts.*
From	3, 2, 10	7, 2, 10	19, 2, 1	67, 1, 1
Take	1, 3, 19	1, 2, 28	12, 3, 0	12, 3, 0

9. DRY-MEASURE.

	B.p.qts.	*B.p.gal.qts.pts.*	*C.b.p.qts.*
From	45,2.4	67.0, 1, 3. 0	23.2, 5
Take	29 3.6	38,3, 0, 2, 1	7.4, 6

10. TIME.

	D. h.m. sec.	*W.d. h. m. sec.*	*W. d. h. m. sec.*
From	41,13,22,12	144, 10,30.34	35,3,23,13.30
Take	22,35.44.34	30.3,19.48,26	10,3,14. 6.35

11. MOTION.

	° ′ ″	° ′ ″	° ′ ″
From	48,20,24	47, 2,30	63.34.35
Take	35.38.34	20,24.56	49.34.44

LESSON XXIX.

Multiplication of the Mixed Quantities in the Vulgar Tables.

WHAT *do you observe in this kind of Multiplication?*

A. Multiply by a whole number; carry for the particular *terminus* of each denomination in the given quantity, as in Addition, and set down only the overplus.

In CASE 1, The multiplier does not exceed 12.

In CASE 2, Take two figures, which multiplied together, will make the multiplier, and multiply the given quantity by one of those figures, and that product by the other; as where the multiplier is 35, multiply by 7, and that product by 5.

CASE 1.

£. s. d.	lb.oz,dw.gr.	T. c. qr.lb.	Yds.f.in.b.c.
25,7,6¾	57,5,12.16	2,13,3,14	37,2.3,1
×4	×5	×6	×7

Yds.qr.na.	G.qt.pt.	A. r. p.	D. h. m. sec.	° ′ ″
56,3,2	28,3,1	26,3,36	57,54,44,45	30,16,20
×8	×9	×11	×12	×5

CASE 2.

£. s. d.	lb. oz. dw. gr.	T. c. qr. lb.
47,,14,,9½	39,,10,,17,,8	18,,6,,3,,15
×35	×48	×72

yds.qr.n.	T. gal.qr.	A. r. p.	D. h. m.	H. m. sec.
28,,2,,3	29,,17,,3	26,,3,,13	14,,19,,21	47,,13,,32
×36	×88	×63	×132	×144

LESSON XXX.

Division of Mixed Quantities in the Vulgar Tables.

Q. HOW *do you perform this Division?*

A. Place the parts as in Division of Whole Numbers; multiply the remainder in the division of each denomination, by the terminus of the next lower denomination, and to the product add the given quantity of that denomination for a new dividend.

£. s. d.	lb. oz. dw. gr.	T. c. qr. lb.
2)48,,12,,6½	3)14,,10,,3,,6	4)17,,1,,1,,14
£. 24,, 6,,3¼		

lb. oz. dr.	M. f. p.	Yds. f. in. b. c.
5)46,,12,,10	6)38,,2,,14	7)46,,0,,10,,2

Yds. qr. n.	Mo. w. d.	D. h. m. sec.	° ′ ″
8)16,,2,,2	9)48,,2,,2	12)46,,16,,12,,30	12)83,,4,,7

END OF THE FIRST PART.

The American Accomptant, *&c.*

PART II.

LESSON I.

COMMUTATION,

IN GENERAL.

Q. WHAT *is* Commutation?

A. It is the changing of numbers or quantities of one or more denominations, into others of different denominations, but of the same value.

Q. *How is Commutation generally distributed?*

A. Into Reduction* and Consolidation; and each of these again into those *direct* and *indirect*.

Q. *What is* Reduction?

A. Changing greater names into smaller, as pounds into shillings, dollars into dimes, days into hours, &c.

Q. *What is* Consolidation?

A. It is the reverse of Reduction, or changing small-

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* *The old division of this rule into* Reduction ascending *and* Reduction descending, *is discarded as an abuse of language: The first of these is a* self-contradiction, *and the latter a mere* tautology: *The one is* descending upward, *and the other* descending downward.

er names into greater, as shillings into pounds, cents into dollars; or a lower into a higher currency, as that of the State of New-York into the lawful money of New-England.

Q. *What is Commutation* direct?

A. It is either reducing or consolidating any given sum or quantity into other names of the same Table, as pounds into shillings, or shillings into pounds; dollars into cents, and cents into dollars, &c.

Q. *What is Commutation* indirect?

A. It is changing a given quantity in any table of currency, weight or measure, into the denominations of a different table—as changing Avoirdupoise into Troy weight, Liquid into Dry measure, lawful money of New-England into federal money, and the reverse.

LESSON II.

REDUCTION DIRECT.

Q. WHAT *is the general rule of performing* direct *Reduction?*

A. RULE. Multiply the highest denomination given by the terminus of the next lower denomination, adding to the product the given quantity of that denomination; This product multiply by the terminus of the next lower denomination, adding as before; and repeat the same process until the whole is reduced to the denomination required.

EXAMPLES *in each Table.*

1. Reduce £15,,12,,8½ into farthings.

Terminus of shill. × 20

312

Term. of pence, × 12

3752

Term. of farth. × 4

Answer, 15010

2. In £127,,15,,4 how many pence and groats?

Answer, 28984 *pence:* 7246 *groats.*

Note. *The Commutation of Federal Money might naturally be placed under the head of this Leſſon: but as it affords ſome curious and diſtinguiſhing rules, and is ſoon to be the univerſal Currency of the United States, it is judged beſt to reſerve it as the ſubject of a diſtinct Leſſon.*

Troy Weight.

lb. oz. dw. gr.

3. Reduce 15,,7,,16,,12 of gold into grains.

Term. of oz. × 12

Term. of dw. × 20

Term. of gr. × 24

Explanation.

15 × 12 + 7 = 187 : 187 × 20 + 16 = 3756 : 3756 × 24 + 12 = 90156, the number of grains in *lb.* 15,,7,,16,,12.

Anſ. 90156 *grains.*

Avoirdupois Weight.

T. c. qr. lb.

4. Reduce 25,,17,,3,,15, into ounces.

Term. of cwt. × 20

Term. of qr. × 4

Term. of lb. × 28

Term. of oz. × 16

Explanation.

25 × 20 + 17 = 517 : 517 × 4 + 3 = 2071 : 2071 × 28 + 15 = 58003 : 58003 × 16 = 928048 ounces.

Anſ. 928048 *ounces.*

Apothecary Weight.

lb. ℥ ʒ ℈ *gr.*

5. In 7,,3,,1,,2,,11 how many grains. *Ans.* 41871.

℥ × 12
87
ʒ × 8
697
℈ × 3
2093
gr. × 20
Ans. 41871 *grains.*

Explanation.

$\overbrace{7 \times 12}+3=87$: $\overbrace{87 \times 8}+1=697$: $\overbrace{697 \times 3}+2=2093$: $\overbrace{2093 \times 20}+11$ $=41871$ grains.

Long Measure.

6. In 75 miles, how many barley-corns?

Term. of 1. × 320
24000
l. of f. × $16\frac{1}{2}$
384000
12000
396000
of in. × 12
4752000
of b.c. × 3
Ans. 14256000 *barley-corns.*

Explanation.

$\overbrace{75 \times 320}=24000$ rods : $\overbrace{24000 \times 16\frac{1}{2}}$ 396000 feet : $\overbrace{396000 \times 12}=4752000$ inches : $\overbrace{4752000 \times 3}=14256000$ *b. c.*

CLOTH MEASURE.

Yds.qr.na.

7. In 17 ;3::3 how many nails?

Term. of qr. × 4

71

Term. of na. × 4

Anſ. 287 *nails.*

LAND MEASURE.

8. In 45 acres, how many ſquare inches?

Term. of r. × 160

7 00

in.in a r. × 198

Anſ. 1425600 *inches.*

LIQUID MEASURE.

9. A general, upon a field day, gave a puncheon of ſpirits to his ſoldiers, to drink his health: it was dealt out in the quantity of half a jill to a man: What was the number of the brigade? *Anſ.* 2560 *men.*

DRY MEASURE.

10. A merchant paid out £86,,13,,4 for 325 buſhels of wheat: How much did he give ℔ pint?

Anſ. 1 *penny per pint.*

TIME.

11. How many ſeconds in a year, conſiſting of 365 days, 5 hours, 48 minutes and 55 ſeconds?

Anſ. 30956935.

12. How many hours ſince the nativity of Chriſt, to the preſent hour?

MOTION.

13. How many ſeconds are contained in the twelve ſigns of the Zodiac? *Anſ.* 129600.

14. A certain city was laid out in a square form, intersected by 13 streets, at right angles, into small squares; each square contained 2 acres of ground; each quarter acre an house, and each house 7 persons: What was the number of squares, of acres, of houses, and of people. *Ans.* 144 *squares*, 288 *acres*, 2304 *houses*, *and* 16128 *people.*

LESSON III.

CONSOLIDATION DIRECT.

Q. WHAT *is* direct *Consolidation?*

A. It is changing a given sum or quantity, of a smaller, into a *larger* name of the *same* Table; as pence into pounds, days into years, &c.

Q. *What is the rule of operation?*

A. RULE. 1. Divide the given number by the *terminus* of its denomination; that quotient by the *terminus* of the next higher denomination, and so on, until you arrive to the denomination required; observing that the quotient rises one denomination higher at every division made. Or,

2. Divide the given sum or quantity by the *grand terminus* of its denomination, *viz.* that number which makes an unit in the denomination required: the quotient is the answer; and the remainder, if any, must be consolidated according to the other rule, it being of the same denomination as the dividend, or given quantity.

Q. *How is the grand terminus found?*

A. By multiplying all the intermediate *termini* together; or, in other words, finding how many in the denomination of the given quantity, make *one* in the higher denomination required.

EXAMPLES.

1. Consolidate 15010 farthings into pounds.

Rule 1.

4)15010(

12) 3752½ *pence.*

20) 312 *shill.* & 8 *d.*

Anf. £15.,12.,8½

Rule 2.

*C.t.*96|0)1501|0'£15.12 8½

541

610

×20

96|0)12200|12

260

68

×12 &c.

2. How many pounds are contained in 89916 grains of gold? *Anf.* 15*lb.* 7*oz.* 6*dwt.* 12*gr.*

3. In 27856*lb. Avoirdupoife*, how many tons?

A. 12*T.* 8*cwt.* 2*qrs.* 24*lb.*

4. In 8145*lb.* of wheat, how many buſhels, allowing 60*lb* to a buſhel? *A.* 135*buſh.* & 3*pecks.*

5. Reckoning the aforeſaid quantity of wheat at 1 penny 3 farthings per *lb.* how much is it per *buſh.* and what is the price of the whole?

A. 8/9 *per buſh.* and £59.,7.,9¾ *price of the whole.*

6. In 41871 grains, Apothecary weight, how many pounds? *A.* 7*lb.* 3℥ 1℈ 2℈ 11*gr.*

7. How many miles are contained in 14256000 barley-corns? *Anf.* 75.

8. In 12376 nails of cloth, how many yards?

A. 773½ *yards.*

9. In 2560 quarts, how many puncheons? *Anf.* 8.

10. In 59752 quarts, how many buſhels, *U. S.* meaſure, and how many of *Canada* meaſure?

A. 1867*buſh.* 1*peck*, U. S. *meaſure*:
1493*buſh.* 4*pecks*, Can. *ditto.*

11. If a man travels 13246 miles in 225360 min-

utes, improving only 12 hours in a day; what progreſs does he make in a minute; how many hours is he on horſeback, and how many days employed in performing the journey?

A. He progreſſes 18 *rods*, 13 *feet*, $4\frac{1392}{2250}$ *inches* per *min.* He is 3756 hours on horſeback, and is 313 days performing the journey.

LESSON IV.

INDIRECT COMMUTATION, *in general.*

Q. WHAT *is the general rule of operation?*

A. The general rule which applies in all caſes of exchange, between any two different tables of mixed quantities, is founded upon the reciprocal proportion exiſting between the particular kind of currency, weight or meaſure of the given ſum or quantity, and that into which it is to be changed. From the ſame principle alſo ſpring all the particular rules, which, for the benefit of ſhortening the work, may be applied in certain caſes.

Having found this reciprocal proportion, in as ſmall whole numbers as the proportion will admit, it being perhaps as 2 to 5, or 3 to 4, or 1 to 6, or whatever the proportion may be; then, if the operation be *Reduction*, or in the deſcending line of exchange, take the following

GENERAL RULE.

Multiply the given ſum or quantity by the larger proportional number, and divide that product by the ſmaller. If the ſmaller proportional number lack but *one* of the larger, then divide the given quantity by the ſmaller, and add the quotient to the dividend. If the ſmaller be a ſingle unit, then you have only to multiply by the larger.

For the reverse, or CONSOLIDATION.

Multiply by the smaller proportional, and divide by the larger. If the difference between them be but 1, then divide the given quantity by the larger, and subtract the quotient from the dividend. If the smaller be a single unit, then you have only to divide by the larger.

Give Examples under each branch of the aforementioned Rules.

1. REDUCTION.

1. Let it be required to change 75 English ells into ells Flemish.

Here the proportion being as 3 to 5, therefore

Multiply 75
by 5

Divide by 3)375(

Anf. 125 *Flemish ells.*

2. Reduce 56 bushels of wheat, *Canada* measure, into bushels of the *U. S.* *The proportion is as 4 to 5.*

4)56(
×14

Anf. 70 *bush. U. S.*

3. Reduce 39 Spanish milled dollars into pistareens. *Proportion 1 to 5.*

39
×5

Anf. 195 *pistareens.*

2. CONSOLIDATION.

1. Change 125 ells Flemish into English ells.

125
×3
—
5)375(
—
Anſ. 75 *Engliſh ells.*

2. Change 70 buſhels *U. S.* into *Canada* buſhels.

5)70(
—14
—
Anſ. 56 *Buſh. Can.*

3. In 195 piſtareens, how many Spaniſh dollars.

5)195(
—
Anſ. 39 *Span. doll.*

Note. *Further Examples may be ſeen, under the particular Rules, in the following Leſſons.*

LESSON V.

The mutual Exchange between each and all the various Money Currencies of *Pounds, Shillings* and *Pence.*

SECT. 1.

STERLING MONEY *exchanged.*

Q. HOW *do you reduce Sterling Money into Iriſh Money?*

A. RULE. Add one twelfth part.

Reduce £100 *S.* into *I. m.*	Reduce £49,,18,,8
12)100,,00,,00	12)49,,18,, 8
+8,, 6,, 8	+4,, 3,, 2½
Anſ. £108,, 6,, 8	*Anſ.* £54,, 1,,10½

Q. *How do you reduce Sterling into* Halifax money?

A. RULE. Add one *ninth* part. If the given sum be pounds simply, only annex a cypher, and divide by 9.

Reduce £100

9)1000(

Anf. £111,,2,,2$\frac{2}{9}$

Reduce £54,4,,6

9)54..4,,6(

+6,,0,,6

£60,,5,,0

Q. *How do you reduce Sterling money into the currency of* South-Carolina *and* Georgia?

A. RULE. Add one *twenty-feventh* part.

Reduce £100,,00,,0

27)100 (+3,,10,,4$\frac{1}{2}$

19 *A.* 103,,10,,4$\frac{1}{2}$

×20

27)380(10

10

×13

27)120(4

12

×4

27)48(1

(21)

Reduce £175,,15,,9

27)175,,15,,9(+6,,10,,2

13 *A.* 182,, 5,,11

×20

27)275(10

5

×12

27)60(2

(6)

Note. *In the above Examples, the common divifor and the quotient figures are repeatedly expreffed: this is only for the fake of greater perfpicuity, but is unneceffary to the practitioner.*

Q. *How do you reduce Sterling money into the currency of New Hampfhire, Maffachufetts, Rhode-Iland, Connecticut, Virginia, Vermont and Kentucky?*

A. RULE. Add *one third.*

Reduce £100 *Sterling.*	Reduce £27,,19,,6 *Sterl.*
3)100	+9,, 6,,6
+33,,6,,8	
Anſ. £133,,6,,8	*Anſ.* £.37,, 6,,0

Q. *How do you reduce Sterling money into the currency of New-Jerſey, Pennſylvania, Delaware and Maryland currency?*

A. RULE. Multiply the given ſum in Sterling money by 5, and divide the product by 3.

Reduce £100 *Sterling.* to *New-Jerſey*, &c.	Reduce £55,,14,,10 *Sterl.*
100	×5
×5	3)278,,14,, 2
3)500	*Anſ.* £92,,14,, 0½
Anſ. £166,,13,,4	

Q. *What is the rule of reducing Sterling money into the currency of New-York and North Carolina?*

A. RULE. Multiply by 16, and divide the product by 9.

Reduce £100 *Sterl.* to *New-York*, &c. currency.	Reduce £44,, 4,,4 *Sterl.*
100	×16
×16	9)707,, 9,,4
9)1600	*Anſ.* £78,,12,,1¼
Anſ. £177,,15,,6½	

SECT. 2.

IRISH MONEY *exchanged.*

Q. *How do you change Iriſh into Sterling money?*

A. RULE. From the given ſum deduct *one thirteenth* part.

Confolidate £100 *Iriſh* money into *Sterling*.

13)100
—7.,13.,10
Anſ. £92,, 6,, 2

Confol. £54,, 1,,10½ *Iriſh*.

13)54,, 1,,10½
—4,, 3,, 2½
Anſ. £49,,18,, 8

Q. *How do you change Iriſh into Halifax money?*

A. RULE. Add *one thirty-ninth* part to the given ſum.

Reduce £100 *Iriſh*, into *Halifax* money.

39) 100 (2,,11,,3¼
+100

£102,,11,,3¼ *Anſwer.*

Q. *How do you reduce Iriſh money into the currency of South-Carolina and Georgia?*

A. RULE. Multiply by 112, and divide the product by 117.

Reduce £100 *Iriſh* into *S. Carolina & Georgia* cur.

100×112=11200
117)11200(*A.*95,14,6.42/117
670
85
20
)1700(
530
62 &c.

Reduce £35,,7,,4 *Iriſh*, into *S. Car.* &c. currency.

Anſ. 33,,17,,1.27/117

Q. *What is the rule of reducing Iriſh money into the currency of New-Hampſhire, Maſſachuſetts, &c.?*

A. RULE. Multiply by 16, and divide the product by 13.

Reduce 100*l. Iriſh* into into L. M. of *N. E.*

100
×16
13)1600(*Anſ.* 123,,1,,6

Reduce 184,,13,,4 *Iriſh.*

184,,13,,4
×4×4=16
738,,13,,4
×4
13)2954,,13,,4(
Anſ. 227,, 5,, 9

Q. *By what method is the value of any ſum in Iriſh money found, in the currency of New-Jerſey, Pennſylvania, Delaware and Maryland?*

A. RULE. Multiply it by 20, and divide the product by 13.

Reduce £100 *Iriſh* into *New-Jerſey*, &c. currency.

100
×20
13) 2000(
Anſ. 153,,12,,3½

Reduce £48,,15,,3 *Iriſh.*

48,,15,,3
×5×4=20
243,,16,,3
×4
13)975,, 5,,0
Anſ. 75,, 0,,4

Q. *How do you reduce Iriſh money into the currency of New-York and North-Carolina?*

A. RULE. Multiply the given Iriſh ſum by 64, and divide the product by 39.

Reduce £100 *Irish* into *New-York*, &c. currency.

100
×64

39) 6400(*Anſ.* £164,,2
250
160
4
×20 &c.

Reduce £87,,14,,2 *Iriſh.*

87,,14,,2
×8×8=64

701,,13,,4
×8

39)5613,, 6,,8(
117
153
— *Anſ.* 143,,18,,10.
36
×20 &c.

SECT. 3.

HALIFAX MONEY *exchanged.*

Q. *How do you change Halifax money into Sterling?*

A. RULE. Deduct one tenth part from the Halifax ſum.

Conſolidate £100 Halifax into Sterling money,

10)100
—10

Anſ. 90.

Conſolidate 60*l.* 5*s.* Halifax into Sterling money,

10)60,,5
—6,,0,,10

Anſ. 54,,4,, 2

Q. *How is Halifax money changed into Iriſh money?*

A. RULE. Deduct one fortieth part.

Change 100*l.* Halifax into Iriſh money,

40)100
—2,,10

Anſ. 97,,10

Conſolidate 320*l.* 15*s.* 8*d.* Halifax.

40)430,,15,,8(—8,,00,,4¾

Anſ. 312,,15,,3¼

Q. *How do you confolidate this currency into South-Carolina and Georgia currency?*

RULE. Subtract a fifteenth part.

Change 100*l.* Halifax into South-Carolina, &c.

15)100
—6,, 8
Anf. 93,,12

Change 125*l.* 15*s.* Halifax.

125,,15
15)125,,15(—8,, 9
6 *Anf.* 118,, 6
20 &c.

Q. *How do you rednce Halifax money into the currency of New-Hampfhire, Maffachufetts, &c. currency.*

RULE. Add one fifth part.

Reduce 100*l.* Halifax into L. M. of N. E.

5)100
+20
Anf. 120

Reduce £87,,15,,10
+17,,11,, 2
Anf. 105,, 7,, 0

Q. *Give the rule of reducing Halifax money into N. Jerfey, Pennfylvania and Maryland currency.*

RULE. To the given fum add one half.

Reduce 100*l.* Halifax to N. Jerfey, &c. currency.

2)100
+50
Anf. 150

Reduce £327,,19,, 8
+163,,19,,10
Anf. 491,,19, 6

Q. *What is the method of changing Halifax money into the currency of New-York and North-Carolina?*

RULE. Multiply by 8, and divide the product by 5.

Reduce 100*l.* Halifax to N. Y. &c. currency.

100
×8

5)800(

Anf. 160

Reduce £157,,17,,7
×8

5)1263,, 0, 8

Anf. 252,,12 1½

SECT. 4.

SOUTH CAROLINA *and* GEORGIA *Currency exchanged.*

Q. *What is the method of conſolidating this currency into Sterling money?*

RULE. From the given ſum ſubtract one twenty-eighth part.

Change 100*l.* S. Carolina into Sterling money.

28)100

—3,,11,,5

Anf. 96,,8,,7

Conſolidate £182 5,,11 S. Carolina.

—6 10,, 2

Anf. 175,,15,,9

Q. *How do you change South-Carolina, &c. currency into Iriſh money?*

RULE. Multiply the given ſum by 117, and divide the product by 112.

Reduce 100*l.* S. Carol. into Iriſh money.

100×117=11700

112)11700(104,,9,,3 *Anf.*

500

52

20

)1040(

32

×12 &c.

Reduce £33,,17,,1 S. Car.

37,,17,,1

×9×13=117

304,,13,,9

× 3

112)3960,,18,,9(35,,7,,3

600

40

×20 &c.

Q. *How do you change South Carolina, &c. currency, into Halifax money?*

RULE. Add one fourteenth part.

Reduce 100*l.* S. Carol.

100

14)100(+7,,2,,10

107, 2,,10 *A.*

Reduce £118,, 6

14)118,,6(+8,, 9

Anf. 126,, 15

Q. *How do you reduce South-Carolina, &c. currency, into the lawful money of New England?*

RULE. Multiply the given sum by 9, and divide by 7.

Reduce 100*l.* S. Carol. into L. M. of N. E.

100

×9

7)900(128,,11,,5 *Anf.*

Reduce £132,,13,,4

×9

7)1194,,0, 0(

Anf. 170,,11,,5

Q. *How do you reduce this currency into that of New-Jersey, &c.?*

RULE. Multiply by 45, and divide the product by 28.

Reduce £100 S. Carol.

100×45=4500

28)4500(160,,8,,7 *Anf.*

270

180

12

×20

)240(

Reduce £234,, 5,,6

×9×5=45

2111,,11,,6

×5

28)10557,,27,,6(

Anf. 377,, 1,,3

Q. *How do you reduce the currency of South-Carolina and Georgia into that of New-York and North-Carolina?*

RULE. Multiply by 12, and divide by 7.

Reduce 100*l.* S. Carol. into N. Y. &c. currency.

100 × 12 = 1200

7)1200(

Anf. 171.,8,,6¾

Reduce £125,,15,,5

× 12

7)1509,, 5,,0(

Anf. 215..12,,1

SECT. 5.

LAWFUL MONEY *of* NEW ENGLAND *exchanged.*

Q. *How do you conſolidate this currency into Sterling money?*

RULE. From the given ſum ſubtract one fourth part,

Conſolidate 100*l.* N. E. into Sterling money.

4)100

—25

Anf. 75

Conſolidate £37,,6

4)37..6

—9,. 6,,6

Anf. 27,,9..6

Q. *How is this currency changed into Iriſh money?*

RULE. Multiply the given ſum by 13, and divide the product by 16.

Change 100*l.* N. H. &c. into Iriſh money.

100 × 13 = 1300

16)1300(81.,5 *Anf.*

20

4

× 20 &c.

Change £227,, 5,,9 N.H.

227,. 5,,9

× 13

16)2953,,14,,9(184,,11,,3

135

73 &c.

Q. *How do you change the currency of New-Hampſhire, Maſſachuſetts, &c. into Halifax money?*

RULE. From the given ſum deduct one ſixth part.

Change 100*l.* N. E.

6)100(

—16.,13..4

Anf. 83,, 6,,8

Conſolidate £105,, 7

6)105,,7 (—17,,11,, 2

Anf. 87,,15,,10

Q. *How do you change this currency into S. Carolina, &c. currency?*

RULE. Multiply the given sum by 7, and divide by 9.

Change 100*l.* N. E. into S. Carol. &c. currency.

9)700=100×7

Anf. 77,,15,,6

Change £170,,11,, 5 N. E.

×7

9)1193,,19,,11

Anf. 132,,13,, 4

Q. *How do you change the currency of N. Hampſhire, &c. into the currency of N. Jerſey, Pennſylvania, &c.?*

RULE. To the given ſum add one quarter.

Reduce 100*l.* N. E. into N. Jerſey, &c.

100÷4=25:100+25=125

Anf. 125

Reduce £247,,14,, 4

¼ is +61,,18, 7

Anf. 309,,13,,11

Q. *How do you reduce N. Hampſhire, &c. currency, into that of N. York and North Carolina?*

RULE. To the given ſum add its one third part.

Reduce 100*l.* N. E. into N. York, &c. currency.

3)100

+33,,6,,8

Anf. 133,,6,,8

Reduce £95,,13,,8

3)95,,13,, 8

+31, 17, 10½

Anf. 127,,11, 6½

SECT. 6.

The Currency of NEW-JERSEY, PENNSYLVANIA, DELAWARE *and* MARYLAND, *exchanged.*

Q. *How do you conſolidate thie Currency into Sterling money?*

RULE. Multiply the given ſum by 3, and divide the product by 5.

Change 100*l.* N. J. into Ster. ×3

5)300

Anſ. 60

Change £322,,18,,9 N. J. ×3

5)968,,16,,3

Anſ. 193,,15,,3

Q. *How do you conſolidate this currency into Iriſh money?*

RULE. Multiply the given ſum by 13, and divide the product by 20.

Change 100*l.* N. J. &c. currency into Iriſh money.

2|0)130|0=100×13

Anſ. 65

Conſol. £75,,00,,5 N. J. ×13

20)975,,5,,5

Anſ. 48,,15,, $3\frac{1}{4}$

Q. *How do you conſolidate N. Jerſey, &c. currency, into Halifax money?*

RULE. From the given ſum ſubtract one third part.

Change 100*l.* N. J. &c. into Halifax money.

3)100

—33,, 6,,8

Anſ. 66,,13,,4

Conſol. £491,,19,, 6

3)491,,19,,6—163,,19,,10

Anſ. 327,,19,, 8

In what manner do you conſolidate the currency of N. Jerſey, &c. into the currency of N. Hampſhire, &c.?

RULE. From the given ſum ſubtract one-fifth part.

Change 100*l.* N. J. &c. currency, into L. M. of N. E.

5(100

—20

Anſ. 80

Conſol. £309,,12,,11 N. J. —61,,18,, 6

Anſ. 247,,14, 4

In what manner do you reduce N. Jersey, &c. currency, into that of N. York and N. Carolina?

RULE. To the given sum add one fifteenth part.

Change 100*l.* N. J. cur. into that of N.Y. & N. C.

15 100
+6,,8
Anſ. 106,,8

Reduce £119,,19,, 9 N.J.

15)119,,19,,9(+7,,19,,11¼
Anſ. 127,,19,, 8¼

SECT. 7.

NEW-YORK *and* N. CAROLINA *Currency exchanged.*

Q. *In what manner do you conſolidate this currency into Sterling money?*

RULE. Multiply the given ſum by 9, and divide the product by 16.

Change 100*l.* N.Y, &c. into Sterling money.

100
×9
16)900(56,,5 *Anſ.*

Conſol. £78,,12,,2 N. Y.
×9
16)707,,9,,6
Anſ. 44,,4,,4

In what manner do you change N. York and N. Carolina currency into Iriſh money.

RULE. Multiply the given ſum by 39, and divide the product by 64.

Change 100*l.* N. Y. &c. into Iriſh money.

100
×39
64)3900(60,,18,,9 *Anſ.*
60
20 &c.

Conf. £143,,18,,10 N. Y.
143,,18,,10
×3×13=39
4311,,16,,6
×13
Anſ.
64)5613,,14,,6(87,,14,,3

How do you change N. York, &c. currency, into Halifax money?

RULE. Multiply the given sum by 5. and divide the product by 8.

Change 100*l.* N. Y. cur. into Halifax money.

8)500=100×5

Anſ. 62,,10

Conſ. £252,,12,, 2 N.Y.

×5

8)1263,,00,,10

Anſ. 157,,17,, 7¼

Q. *How do you conſolidate the currency of New-York and N. Carolina into that of S. Carolina and Georgia?*

RULE. Multiply the given ſum by 7, and divide the product by 12.

Change 100*l.* N. Y. &c. cur. into S. Carol. &c.

12)700=100×7

Anſ. 58,,6,,8

Conſol. £215,,12,,2 N.Y.

×7

12)1509,, 6,,2

Anſ. 125,,15,,6

Q. *How do you conſolidate N. York, &c. currency, into that of N. Hampſhire, Maſſachuſetts, &c.?*

RULE. From the given ſum deduct one quarter.

Change 100*l.* N. Y. into L. M. of N. E.

4)100

−25

Anſ. 75

Conſol. £127,,11,,6 N.Y.

1 *quarter* −31,,15,,4½

Anſ. 95,,16,,1½

Q. *How do you conſolidate New-York, &c. currency, into New-Jerſey, &c. currrency?*

RULE. Deduct one ſixteenth part.

Change 100*l.* N. Y. &c. into N. J. &c. currency.

16)100

−6,, 5

Anſ. 93,,15

Conſol. £127,,19,, 9

1 *ſixteenth* −7,,19,,11¼

Anſ. 119,,19,, 9¼

LESSON VI.

The Exchange between the several Tables of *Weights* and *Measures*.

SECT. 1.

AVOIRDUPOIS & TROY WEIGHT *exchanged.*

Q. HOW *do you change Avoirdupois weight into Troy weight?*

RULE. Take the given weight in one denomination, either pounds, ounces, or drams.

If in pounds, multiply them by 175 and divide the product by 144, and the quotient will be Pounds Troy;

If in ounces, multiply by 175 and divide by 192: the qnotient will be Troy ounces;

If in drams, multiply by 875, and divide by 768, and the quotient will be *penny weights.*

To reverse the operation, or to bring Troy into Avoirdupois weight, you have only to exchange the Multiplier and the Divisor and proceed as before.

EXAMPLES.

Change 56 *lb.* 12 *oz.* Avoirdupois into Troy weight.

$$\begin{array}{r} \times 16 \\ \hline 908\ oz. \\ \times 175 \\ \hline 192)158900(827 = \\ 130 \\ \hline 1460 \\ 116 \\ \times 20 \\ \hline)2320(12\ \&c. \end{array}$$

Tr. oz. = *lb. oz. dw. gr.* 68.,11,,12.,2 *Ans.*

The Reverſe.

Change 68*lb.* 11 *oz.* 12 *dw.* 2 *gr.* Troy weight, into Avoirdupois?

NOTE. In changing Troy grains into Avoirdupois weight, you have only to divide by 7000. Thus, 68 *lb.* 11 *oz.* 12 *dw.* 2 *gr.*=397250 *gr.*

7|000)397|250(56 *lb.* 12 *oz.* *Anſ.*

5250
×16

)84|000(12

SECT. 2.

VULGAR & FEDERAL AVOIRDUPOIS *exchanged.*

Q. *What is the Rule.*

RULE. Pounds being the ſame in both tables, the exchange is only between the ounces and drams; therefore to change ounces of the vulgar into thoſe of the federal table, multiply them by 10, and divide the product by 16—to exchange them back, multiply by 16 and divide by 10.

EXAMPLES.

Q. *What is the value of* 8 *oz. Avoird. in Fed. Avoird?*

8
×10

16)80(5 *oz.* *Anſ.*

Reverſe the operation. 5 *oz.* *Fed. Avoird.*

×16

10)80(8 *oz.* *Vulg. Avoird.*

SECT. 3.

AVOIRDUPOIS *and* FEDERAL TROY *or* AMERICAN WEIGHT *exchanged.*

Q. *What is the Rule?*

RULE. Change them by making uſe of the following numbers, as Multipliers and Diviſors, *viz.*

	Mult.	*Div.*	
For Avoirdupois pounds,	70	27	
ditto ounces,	175	108	
ditto drams,	4375	432	*quot. gr.*
In changing Federal Troy Pounds,	27	70	
ditto ounces,	108	175	
ditto penny wt.	864	875	*drams Avoird.*
ditto grains,	432	4375	

EXAMPLES.

Change 1 Ton into Federal Troy weight.

1 Ton = 2240 *lb.*

$\times 70$

lb. oz. dw. gr.

27)156800(5807 . 4 . 0 . $7\frac{11}{27}$ *Anſ.*

218

200

(11)

Change 5807*lb.* 4*oz.* 0*dw.* 7*gr.* $\frac{11}{27}$ Fed. Troy into Avoird.

5807.407$\frac{11}{27}$

27

70)156810.000

2240 *lb.* = 80 *qrs.* = 20 *cwt.* = 1 *Ton.* *Anſ.*

SECT. 4.

VULGAR *and* FEDERAL TROY WEIGHT *exchanged.*

Q. *What is the Rule?*

RULE. To change the vulgar into federal Troy weight, take the given weight in grains, annex a cypher, and divide by 27: the quotient will be Federal Troy weight, and of the ſame denomination.

2. To change federal into vulgar Troy weight, take the given weight in grains, multiply it by 27, point

off the right hand figure of the product, and the rest will be grains in Vulgar Troy.

EXAMPLES.

Change 57*lb.* 10*oz.* 8*dw.* 3*gr.* into Federal Troy weight.

×12	27)3333150(123450 grains.	
694	63	*lb. oz. dw.*
×20	93	123 · 3 · 5 *Anſ.*
13888	121	
×24	135 &c.	
333315		

The Reverſe.

Change 123*lb.* 4*oz.* 5*dw.* federal, into vulgar Troy weight.

123450
×27

3333150 *lb. oz. dw. gr.*
3333150 grains = 57,,10,,8,,3

SECT. 5.

FEDERAL AVOIRDUPOIS *and* FEDERAL TROY *exchanged.*

Q. *What is the Rule?*

RULE. To change federal Avoirdupois into federal Troy weight, multiply the given weight, in pounds, by 70, and divide the product by 27.

To change the other way, multiply by 27, and divide by 70.

EXAMPLES.

Change 100*lb.* fed. Avoird. into fed. Troy weight.

100×70=7000 *lb. oz. dw. gr.*
27)7000(259 · 2 · 5 · 9 $\frac{7}{27}$ *Fed. Troy. Anſ.*

10
250
(7)

lb. oz. dw. gr.

Change 259 . 2 . 5 . 9 $\frac{7}{17}$ Federal Troy.

259 . 259 $\frac{7}{17}$

× 27

7000) 7000 . 000

---

100 *lb.* Fed. Avoird. *Anſ.*

SECT. 6.

VULGAR TROY *and* FEDERAL AVOIRDUPOIS WEIGHT *exchanged.*

Q. *What is the Rule?*	*Mult.*	*Div.*
RULE. Change pounds *vulg.* Troy, by	144	175
Ounces *ditto* by	24	35
Penny weights into drams	12	35
Grains into drams	1	70
Change pounds *fed.* Avoird.	175	144
Ounces into ounces	35	24
Drams into grains	70	1

EXAMPLES.

Change 100*lb. vulg.* Troy into *fed.* Avoirdupois weight.

100 × 144 = 14400 *lb. oz. dr.*

175) 14400 (82 . 2 . 8 *Anſ.*

400

500

1500

(100)

Change 100*lb.* federal Avoirdupois into vulgar Troy weight.

100 X 175 = 17500 *lb. oz dw. gr.*

144)17500(121 . 6 . 6 . 16

310

220

76

X 12 &c.

NOTE. Apothecary weight *is not particularly conſider-ed in this Leſſon, becauſe* grains *in the vulgar table are preciſely of the value with thoſe in the vulgar table of Troy weight.*

SECT. 7.

VULGAR & FEDERAL LIQUID MEASURE *exchanged.*

Q *What is the Rule?*

RULE. To change the former into the latter, reduce the given weight to gallons, which are the ſame in both tables—then point off the firſt right hand figure for gallons, the ſecond for federal Barrels, and the reſt, if any, are Hogſheads.

2. To reverſe the exchange—fill the denominations of Barrels and Gallons with Cyphers, if ſignificant figures are wanting; you have, then, only to remove all the ſeparating points, and the exchange is made.

EXAMPLES.

Change 15 *Hhds.* 1 *Bar.* 15 gallons and an half into federal Liquid Meaſure.

15

X63

945 gall.

1 Bar. = 31½

Gall. 15½

Hhds. bar. gall.

992 gall. = 9 9 . 2 *fed. liq. meaſ.*

Change 9 *Hhds.* 3 Bar. and 2 gallons federal, into vulgar liquid meaſure.

Hhds. bar. gal.
9. 9. 2 *Hhds, bar. gal.*
992 gal. = 15,,1,,15½ *Vulg. Liq. mea. Anſ.*

LESSON VII.

Direct REDUCTION of Federal Money, and the other Federal Tables of *Mixed Quantities.*

Q. WHAT *is the general Rule of direct Reduction in all the Federal Tables.*

RULE. Remove the ſeparating points, and read all the denominations, as one ſimple whole number.—This reduces the given quantity into the loweſt denomination which it expreſſes—If a lower reduction be required, expreſs the remaining denominations by annexing as many Cyphers.

EXAMPLES.

Reduce 24.7.5.6 into Mills.

Anſ. 24756 Mills

Reduce 24 into Dimes, Cents & Mills

Anſ. 240
2400
24000

Q. *What if any of the middle denominations in the given ſum be wanting, as 5 Dollars and 5 Mills?*

A. Fill each and all of the vacant denominations with Cyphers; thus 5.00.5 and then reduce as before.

Viz. 5005

EXAMPLES of DIRECT REDUCTION *in the other* FEDERAL TABLES.

lb. oz. dw. gr.

Reduce 3. 7. 6. 5 into ounces, into penny weights and into grains.

lb. 3 . 7 . 6 . 5 *Anſ.*
oz. 37 . 6 . 5
dw. 376 . 5
gr. 3765

mwt. C. lb. oz. dr.
Reduce 6 . 5 . 43 . 2 . 1 into *cwt.* pounds, *oz. & dr.*
Anſ. *C.* 65 . 43 . 2 . 1
lb. 65 43 . 2 . 1
oz. 65432 . 1
dr. 654321

lb. ℥ ʒ ℈ *gr.*
Reduce 3 . 4 . 0 . 9 . 2 into ounces, into *dr.* into ſcr. &
Anſ. 34 . 0 . 9 . 2 [into grains.
340 . 9 . 2
3409 . 2
34092

Hhds. B. gal. pts.
Reduce 9 . 9 . 2 . 5 into barrels, gallons, & points.
Anſ. 99 . 2 . 5
992 . 5
9925

C. gr. gr. dez. part.
Reduce 3 . 4 . 5 . 6 into all the lower denominations.
Anſ. 34 . 5 . 6
3 . 45 . 6 N.B. There is no *direct* Reduction
3456 nor Conſolidation, in the Federal
tables of Cloth & of Dry Meaſure.

LESSON VIII.

Direct CONSOLIDATION of Federal *Mixed Quantities.*

Q. WHAT *is the general Rule of operation?*

RULE. From the higheſt given denomination, point off, figure by figure, as many figures upon the right

hand, as that denomination is below the denomination ſought or required ; and theſe figures thus pointed off will be the lower denominations in their juſt order.— If you omit *Dimes* in the Table of Federal Money, then point off two figures for *Cents.*

EXAMPLES.

Conſolidate 57564 Mills into all the higher denominations.

Anſ. //579.6.4
$579.6.4
$57.9.6.4

This ſpecimen is judged ſufficient to exemplify the foregoing Rule ; and alſo to ſupercede the neceſſity of ſtating any examples of direct Conſolidation, in any of the other Federal tables, inaſmuch as they are all upon the ſame principle, and performed in preciſely the ſame method.

Q. *What is the reaſon or propriety of the foregoing rules of reducing and conſolidating Federal quantities ?*

A. Becauſe the ſeveral denominations in each table ſtand conected by a *decimal* ratio ; each denomination being a decimal integer of the next lower, and a decimal fraction of the next higher denomination.

LESSON IX.

How to change the various Currencies of Pounds, Shillings and Pence, into Federal Money.

1. STERLING MONEY.

Q. HOW *do you reduce* Sterling *into Federal money ?*

RULE. If the given ſum be Pounds only, multiply by 40, and divide by 9 ; the Quotient will be Dollars : if there be any Remainder, reduce it to the lower denominations by annexing Cyphers and dividing.

2. If the given ſum conſiſt of Pounds and Shillings, reduce it to Shillings, then double them and divide as before.

3. If there be Pounds, Shillings and Pence, reduce them to pence, and divide by 54, the number of pence in a Dollar.

EXAMPLES.

Reduce 36*l.* Sterling into Federal money.

36
×40
9)1440
Anf. ℔ 160

Reduce £36.,9 into Fed. money.
×20
729
×2
9)1458(162 *Anf.*

Reduce £579.,17.,9 Ster. into Federal money.

579.,17.,9
×20
11597
×12
54)139173(2577.27.7*A.*
311
417
393 &c.
&c.

SECT. 2.

IRISH MONEY *federalized.*

Q. *How do you reduce this currency into Federal money?*

RULE. Reduce the whole sum to half pence, and divide by 117.

EXAMPLES.

Reduce £78,,4.,,6 Irish, into Federal money.

78,,4.,,6
×20
1564
×12
18774
×2
37548 *Half pence.*

117(37548(℔ 320.92.3 *Anf.*
244
108.0
27.0
36.0

SECT. 3.

HALIFAX MONEY *federalized.*

Q. *How do you reduce this currency into Federal money?*

RULE. If the given ſum be in pounds only, multiply by 4. and the product will be dollars.

If in ſhillings, divide by 5.

If in pence, divide by 60, and the quotients, in either caſe, will be dollars. The remainders, if any, reduce as in the former Sections, by annexing cyphers and continuing the diviſion.

EXAMPLES.

Reduce £45,,17,,9 Hal. into Federal money.

```
  45,,17,,9
  × 20
  ----
  917
  × 12
  ------
6|0)1101|3(183 . 55 Anſ.
```

Reduce £68,,14 Hal. into Federal money.

```
  68,,14
  × 20
  ----
5)1374(
  ----
  274 . 8 Anſ.
```

SECT. 4.

SOUTH CAROLINA & GEORGIA Currency *federalized.*

Q. *What is the Rule?*

RULE. If the given ſum be pounds only, multiply by 30, and divide the product by 7: the quotient will be dollars.

If there be ſhillings, or ſhillings and pence, reduce the whole to pence, and divide by 56: the quotient will be dollars.

EXAMPLES.

Reduce £.349 S. Car. &c. cur. into Fed. money.

```
  349
  × 30
  ----
7)10470(
  1495 . 71 . 4 Anſ.
```

Reduce £765,,3,,9 S.C.

```
  × 20
  ----
  15303
  × 12
  ------
56)183645(3279.37 . 5 A.
```

SECT. 5.

NEW-HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE-ISLAND, VERGINIA, VERMONT *and* KENTUCKY currency, *federalized.*

Q. *How do you change this currency into federal money?*

RULE. If the sum consist of pounds only, annex a cypher and divide by 3, and if *one* remains it is // 33.3; if *two* it is // 66.6.

If there be pounds, shillings and pence, divide the pounds by 3; take the remainder and the shillings in the given sum, in shillings; divide them by 6, and annex the quotient figure to the quotient of the pounds, for dollars, the value of the remaining shillings and pence, if any, find by the table in the appendix.

EXAMPLES.

Reduce £ 157 N. E. into Federal money.

3)1570(

℔ 523·33·3

Reduce £ 575..17..8

3)575(1919.61 *Anf.*

6) 57(

Remaining 3/8 = // 61

DECIMAL RULE*.

Set down the shillings, pence, &c. in decimals of a pound; annex the left hand decimal figure to the pounds, and divide by 3. the quotient will be the federal money value complete.

---

* *The decimal rule of Commutation in this, and several of the other currencies, is of all others, the easiest and best for the practitioner, as it superseds the use of a table for the smaller denominations. It is therefore hoped that the irregularity of anticipating decimal operations in this part of the work will be excused; as the learner may pass over them, until he has first obtained a competent knowledge of decimal Arithmetic.*

EXAMPLES.

Reduce £575,,17,,8 L.M. of N. E. into federal money. 178 = .883 therefore

3)5758.83(

$1919.61 *Anf.*

SECT. 6.

NEW-JERSEY, PENNSYLVANIA, DELAWARE & MARYLAND currency, *federalifed.*

Q. *What is the Rule?*

RULE. If there be pounds only, multiply them by 8 and decide the product by 3; the quotient will be dollars.

If there be ſhillings, or ſhillings and pence, reduce the whole to pence, annex a cypher and divide by 9, the quotient will be cents; therefore point off the two right hand figures for cents, and the reſt will be dollars.

EXAMPLES.

Reduce £345 N. J. currency into Fed. money.

345
×8

3)2760(

$920 *Anf.*

Reduce £534,,9,,11 N. J. cur.

×20

10689
12

9)128279(

$1425.32.2 *Anf.*

DECIMAL RULE.

Take the given ſum in pounds and decimals, multiply by 8 and divide by 3; the quotient will be federal money.

Reduce £534,,19,,11 N. J.

534.996
×8

3)4279.968

$1426.65.6 *Anf.*

SECT. 7.

NEW-YORK *and* NORTH-CAROLINA currency *fed.*

Q. *What is the Rule?*

RULE. If there be pounds only annex a cypher, and divide by 4, the quotient will be dollars; and if there be any remainder, (which will ever be 2) it is half a dollar, or 5 dimes.

If there be ſhillings and pence, divide the pounds as before without annexing a cypher; if there be any remainder it is pounds; reduce them to ſhillings, in your mind only, add them to the ſhillings in the given ſum, and divide them by 8, annexing the quotient figure to the former quotient, for dollars. As to the remaining pence, you may either annex a cypher to them and divide by 96, for dimes and cents; or find their federal money value in the table.

EXAMPLES.

1 Reduce £450. N. Y. currency into Fed. money.

4)4500(

$\$$1125 *Anſ.*

2 Reduce £575 into Federal money.

4)5750

$\$$1437.50 *Anſ.*

The remainder 2 being $\$$5 or //50.

3. Reduce £692,,12.,6 N. Y. currency into Fed. money.

8)4)692.,12.,6

1731 & 4ſ6 left = //56.2

Or 96)54.0(= // 56.2

1731.56.2 *Anſ.*

Explanation of the 3d example. Dividing 692 by 4, the quotient is 173 without any remainder. Next divide the 12ſ by 8 and the quotient figure 1 annex to 173, making $\$$1731.

DECIMAL RULE.

The given ſum expreſſed in pounds, and decimals multiply by 2.5,—the product is federal money. Take the 1ſt and 3d examples in the laſt rule.

Reduce £450 N.Y. cur.
×2.5

$1125 0 *Anſ.*

Reduce £692,,12,,6 N. Y. currency.
£692,,12,,6=692.625
×2.5

Anſ. $1731.56.25

LESSON X.

How to change Federal money into the ſeveral Currencies of Pounds, Shillings and Pence.

1. *Into* Sterling Money.

Q. WHAT *is the Rule?*

Rule. Multiply the given ſum by 4.5 which reduces it to ſhillings and decimals; to change the decimals into pence, multiply them by 12, and from the product point off the ſame number of right hand figures; the figure or figures upon the left of the point will be pence.

Examples.

Conſolidate $183.55 into Sterling money.

183.55
×4.5

2|0)8|4|5.975
×12

£41..5..11.700 *Anſ.*

Conſolidate $247.44.5
×4.5

2|0)111|3.5025
×12

Anſ. £55,,13..6.0300

SECT. 2.

Into Irish Money.

Rule. Multiply the given ſum by 39 and divide the product by 160; the quotient will be in Iriſh money, in pounds and decimals.

EXAMPLES.

Consolidate $240 into Irishmoney.

```
   240
  ×39
 ------
16.0)93.0 (58 . 5
 ---        ×20
 ---        ----
Ans. 136  £58 10|0
 ---      ====
   8.0
  ---
   (0)
```

Consol. $320.92.4 into Irish money

```
                ×39
              ---------
16|0)1251|6.036
              ---------
              78.2252
                  ×20
              ---------
              4.5040
                  12
Ans. £78..4,,6(0480)
              ======
```

SECT. 3.

Into HALIFAX MONEY.

Q. *How do you change federal money into this currency?*

RULE. Divide the dollars by 4 and the quotient will be pounds; annex the lower denominations to the remainder, if any, and annex a cypher to that number; then halve that number and cut off the left hand figure or figures, less than 20, for shillings; the others multiply by 12, and cut off just as many right hand figures from the product, the left are pence, &c. Or,

RULE 2, Multiply the given sum by 60, the quotient will be pence Halifax money; which consolidate according to rule in Lesson 3d.

EXAMPLES.

Consolidate $183.55 into Halifax money.

```
4)183.55(£45..17,,9 Ans.
  ---      ====
  32)550
  ---
   17.75
   ×12
   ---
   9.00
   ---
```

Or, $183.55

```
          ×60
12)11013.00 Pence
2|0)   91|7-9
      ---------
      £45..17..9 Ans.
      =====
```

SECT. 4.

Into SOUTH-CAROLINA *and* GEORGIA currency.

Q. *What is the Rule?*

RULE. Multiply the given sum by 7, and divide the product by 30, the quotient will be pounds and decimals; change the decimals as in Section 2.

EXAMPLES.

Consol. ℔ 1495.71.5 into S.C & Georg. cur.

1495.715
×7

30)10|7|0.005

£349 *Anf.*

Consol. 3279.37.5 into S. C. cur.

×7

30)2295|5.625

765.1875
×6

2|7506
×12

Anf. £765,,3,,9|0000

SECT. 5.

Into NEW-HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE-ISLAND, VIRGINIA, VERMONT & KENTUCKY currency.

Q. *How do you change Federal money into the Lawful money of New-England?*

RULE. Multiply the given sum by 6; then point off as many right hand figures from the product, as there were figures below dollars—the rest are shillings; the figures pointed off are decimals of a shilling, which commute into pence, as in Section 1.

EXAMPLES.

Consolidate ℔ 523.33.4 into L. M. of N. E.

523.334
×6

2|0)3140.004

£157 *Anf.*

Change ℔ 1919.61 into L. M. of N. E.

1919.61
×6

2|0,11517.66
×12

£575,,17,,7.92 *Anf.*

SECT. 6.

Into the Currency of NEW-JERSEY, PENNSYLVANIA, DELAWARE *and* MARYLAND.

Q. *What is the Rule?*

RULE. Multiply the given sum by 3, and divide the product by 8; the quotient will be pounds and decimals.

EXAMPLES.

Consolidate ℳ920 into the currency of N.J. &c.

920
×3

8)2760(

£345 *Ans.*

Consol. ℳ1425.32.3 into N.J. &c.

1425.323
×3

8)4275.969

£534.496
×20

9.920
×12

£534..9..11.04 *A.*

SECT. 7.

Into NEW-YORK *and* NORTH CAROLINA *Currency.*

Q. *What is the Rule of changing Federal Money into this Currency?*

RULE. Multiply the given sum by 8, and the product will be shillings, or shillings and decimals: commute them as in Section 1. Or,

Multiply the given sum by .4, and the product will be pounds, or pounds and decimals.

EXAMPLES.

Consolidate ℳ1731.56.2 into N. Y. &c. currency.

1731.562
×8

20)13852.496
×12

£6..12..5.952 *Ans.*

Or 1731.562
×.4

692.6248
20

12.4960
12

£692..12..5.9520

LESSON XI.

How to change the Ratio of any number of Pence or Shillings upon the Pound, into the equivalent number of Cents upon the Dollar, and the reverſe.

Q. WHAT *is the Rule?*

RULE. 1. To change ſhillings upon the pound, multiply them by 5, and the product will be the equivalent number of cents upon the dollar.

2. To change pence upon the pound into the ſame ratio of cents upon the dollar, you have only to annex a cypher to the pence, and divide them by 24; the quotient will be the true number of cents.

RULE 2. To reverſe the operation, or change cents upon the dollar into pence upon the pound, multiply the given number of cents into 24; then cut off the right hand figure of the product, and the reſt are the number of pence ſought.

The following Tables will ſhew the mutual proportions, *viz.*

1	Penny upon the Pound	=	0.4	upon the Dollar.
2	*ditto*	*ditto* =	0.8	*ditto*
3	*ditto*	*ditto* =	1.25	*ditto*
4	*ditto*	*ditto* =	1.6	*ditto*
5	*ditto*	*ditto* =	2.1	*ditto*
6	*ditto*	*ditto* =	2.5	*ditto*
7	*ditto*	*ditto* =	2.9	*ditto*
8	*ditto*	*ditto* =	3.4	*ditto*
9	*ditto*	*ditto* =	3.75	*ditto*
10	*ditto*	*ditto* =	4.2	*ditto*
11	*ditto*	*ditto* =	4.6	*ditto*
12	*ditto*	*ditto* =	5	*ditto*

1 Cent upon the	Dollar	=	$s.0,,2\frac{1}{4}$	upon the Pound.
2 *ditto*	*ditto*	=	$0,,4\frac{2}{4}$	*ditto*
3 *ditto*	*ditto*	=	0,,7	*ditto*
4 *ditto*	*ditto*	=	$0,,9\frac{1}{2}$	*ditto*
5 *ditto*	*ditto*	=	1,,0	*ditto*
6 *ditto*	*ditto*	=	$1,,2\frac{1}{2}$	*ditto*
7 *ditto*	*ditto*	=	$1,,4\frac{3}{4}$	*ditto*
8 *ditto*	*ditto*	=	1, 7	*ditto*
9 *ditto*	*ditto*	=	$1,,9\frac{1}{2}$	*ditto*
10 *ditto*	*ditto*	=	2,,0	*ditto*

EXAMPLES.

1. Supposing a public tax to be levied of $3d\ \frac{1}{2}$ upon the pound, what would the same ratio of assessment be, counting upon dollars?

$$3d\ \tfrac{1}{2} \times 10 = 35\ //$$

$$24\ )\ 35\ (\ 1 \cdot 4\tfrac{11}{24}\ \textit{Ans.}$$

110

2. A merchant made 33 per cent. advance upon the prime cost in the sale of his goods; how much did he advance upon the pound?

$$\begin{array}{r} 33 \\ \times 24 \\ \hline 12)\,79.2 \\ \hline 6.6 = 6s7\frac{1}{5}\ \textit{Ans.} \end{array}$$

3. A bankrupt's estate was divided among his creditors, at the average proportion of 13s4 upon the pound; what proportion was that in Federal money?

Ans. //66.6 *upon the Dollar.*

NOTE. *The amounts are calculated by the same rules as those of Simple Interest, in the Third Part.*

LESSON XII.

How to apportion the Price of Avoirdupois Weight, (112 to the *Cwt.*) upon the same number of Hundreds in Federal Avoirdupois, or reckoning only 100*lb.* to the *Cwt.*

Q. WHAT *is the Rule?*

RULE. To the number of Dollars in the given price, annex the dimes and cents, or two cyphers if it consist only of dollars, and divide that number by 112: the quotient will be the answer. Or,

If there be two or more hundreds in the given weight, multiply the number of hundreds into the given price, increased as before, and divide by the whole number of pounds in the given weight of Vulgar Avoirdupois.

EXAMPLES.

1. At 1 Dollar per *Cwt.* (vulg. Avoird.) what is the price of 1 *Cwt.* Federal Avoirdupois?

112)100.0(89.3 nearly. *Ans.*

1040

320

(96)

2. If a ton of iron cost £100 what is the price of 1000 *lb. Fed. Avoird.*?

1. Ton = 2240*lb.*)100000(44.642 *Ans.*

10400

14400

9600

(640)

LESSON XIII.

TARE AND TRET.

Q. WHAT *are we to understand by the terms,* Tare, Tret, *and* Cloff ?

A. Certain allowances made by merchants and tradesmen in selling their goods by weight., viz.

TARE is an allowance made to the buyer, for the weight of the box, barrel, or bag, &c. in which the purchased goods are contained, and is varied according to circumstances, being at so many pounds *per* box, &c. or at so much *per Cwt.* or at so much in the gross weight.

TRET is an allowance of 4*lb.* in every 104*lb.* for waste, dust, &c.

CLOFF is allowance of 3*lb.* upon every 3 *Cwt.*

Q. *What are the distinctions of* GROSS, SUTTLE, *and* NEAT WEIGHT ?

A. Gross weight, means the whole weight both of the article of traffic, and the barrel, box, cask or chest in which it is contained, without any deduction.

Suttle weight is when part of the allowance is deducted from the gross, as when the Tare is taken out and the Tret remains to be deducted—or, when the Tare and Tret are subtracted, and the Cloff is still to come out.

Neat weight, is what remains after all allowances are deducted.

Q. *How is the Neat weight found, when either one or all of the foregoing allowances are to be made ?*

RULE. Multiply the Tare, and the weight upon which it is predicated, or the number of chests, casks, &c. together, subtract the product from the gross weight and the remainder will be the neat weight required.

2. When Tret is allowed with Tare—Divide the Suttle by 26, the quotient is the Tret ; subtract this from the suttle and the remainder is Neat.

3. When Tare, Tret and Cloff are allowed, fubtract the Tare and Tret as before, and then divide the futtle by 168, and the quotient will be the Cloff, which fubtract from the futtle, and the remainder will be the Neat.

EXAMPLES.

In 15 barrels of flour, each weighing 2 *Cwt.* 1 *qr.* 14 *lb.* grofs, Tare 12*lb.* per barrel, what is the Neat weight, in each of the three aforementioned cafes of allowances?

1. *Tare deducted.*

12×15=180 *lb.* *Cwt. qrs. lb.*

Or *Cwt.* 1,,2,,2 2,, 1,, 14 grofs *wt.* of 1 *bll.*

×5×3=15

Cwt. 11,,3,,14

×3

35..2,,14 Grofs *wt.* of the whole.

— 1,,2,, 2 Tare fubtracted.

Anf. 34,,0..12 Neat.

2. *Tare & Tret deducted.*

Cwt.

26)34.,0,,12 Suttle.

— 1,,1,, 6,,14,,12 Tret fubtracted.

Cwt. 32,,3.,5 ,, 1 ., 4 Neat.

3 *Tare, Tret & Cloff, allowed.*

Cwt. qrs. lb.

32,, 3 .. 5=3675 *lb.* Suttle.

168)3675 1,,14 Cloff fubtracted.

315 112)3653,,2

127

×16 &c. *Cwt.* 32,,2,,13,,2 Neat. *Anf.*

NOTE. *It is considered as needless to add any further examples under the foregoing Rule, as the same general principles apply in every case of the kind; and all, in fact, are wrought by the rules of* Direct Proportion.

LESSON XIV.

Commutation between the Federal Troy weight of American, British, Portuguese, French and Spanish Gold, and Federal money.

1. AMERICAN, BRITISH, & PORTUGUSE Gold.

Q. HOW *do you change the federal Troy weight of this standard Gold into federal money?*

RULE. Remove all the separating points on the left of penny-weights, and pounds, ounces and penny-weights are dollars. Remove the point between grains and cents, and they are cents, in federal money.

If there are only pounds given, annex two cyphers. If ounces only, or pounds and ounces, annex 1 cypher, and they are reduced to dollars.

EXAMPLES.

What is the value, in Federal money, of 2*lb.* 3*oz.* 4*dw.* 5*gr.* of American, British, or Portuguese gold?

lb. oz. dw. gr. cts. Reduce 5*lb.* *lb. oz.* Red. 3*oz.*

2 . 3 . 4 . 5 . 0 *Anf.* $500 Red. 5 . 6 *Anf.* $30

Anf. $560

$234.50 *Anf.*

2 FRENCH *and* SPANISH Gold.

Q. *How do you change the federal Troy weight of this gold into federal money?*

RULE. 1. Take the given weight in grains, multi-

ply it by 985; from the product point off the four right hand figures, and the rest are dollars. Or,

RULE 2. Subtract the given weight from itself, placing the first left hand figure of the Subtrahend under the third from the left hand in the Substratum—from this remainder subtract one half of the given weight; the second remainder is the federal money value; set the point at the left hand of the figure standing directly under the unit figure of the grains in the given weight, which will separate the dollars and cents.

EXAMPLES.

What is the federal money value of 3*lb*.4*oz*.5*dw*.6*gr*. of French or Spanish gold?

3456 ×985

Or, 3456.. 1st subst. or given *wt*.
*—3456 1st Subtrahend.

₰340 41.6|0 *Anf.*

342144. 1st Rem. & 2d Subst.
—17280 Half the given *wt*. subt.

₰340.41.6|0 *Anf.*

What is the federal value of 1*lb*. of French gold?

1000 grains. ×985

Or, 1000.. 1st Subtra. or given *wt*.
— 1000 1st Subtrahend.

₰98.50|00 *Anf.*

99000 1st Rem. & 2d Subst.
—500 Half the given *wt*. subtracted.

₰98.50.0 *Anf.*

NOTE. *This last Example will tend to explain the principle of the 2d Rule, as it shews its operation to be in effect the same as that of multiplying the given weight by* 985.

---

* *This operation may be still further shortened by the Rule of Combined Subtraction, in Part I, Lesson XVII, Case 1; setting the figures thus,* viz.

3456..
3456]
1728 [
₰340.41.6

Q. *How do you reverse the foregoing operations, or find the weight, in federal Troy, of any sum of gold accounted in federal money?*

RULE. If it be American, British or Portuguese gold, point off, in the given sum, cents for cents, dimes for grains; the first right hand figure of the dollars for penny-weights, the second for ounces, and the rest, if any, are pounds.

EXAMPLES.

What is the weight of ℔234.50 in Federal Troy weight?

Anf. *lb.*2.3.4.5

What is the weight of 500, of 560, and of 30℔.

Anf. 5*lb.* *Anf.* 5*lb.*6*oz.* *Anf.* 30*z.*

Q. *How do you find the federal Troy weight of any sum of French or Spanish gold, accounted in fed. money?*

RULE. Take the given sum in *mills*, divide by 985, and the quotient wil be penny-weights, federal Troy weight. If there be any remainder, annex a cypher, and divide again for grains and cents.

EXAMPLES.

What is the federal Troy weight of ℔340.41.6 in French gold?

985)340416(*dw.*345.6=3*ld.* 4*oz.* 5*dw.* 6*gr.* *Anf.*

4491

5516

591.0

(0)

LESSON XV.

Commutation between Vulgar Troy Weight and Federal Money.

Q. WHAT *are the Rules?*

RULE 1. To aſcertain the value of the weight of any given quantity of coined gold (expreſſed in Vulg. Troy weight) in Federal money, *firſt*, reduce the given weight to Federal Troy weight, by the rule in Leſſon VI, Sect. 4: *nextly*, into Federal money by the rules in the laſt Leſſon.

RULE 2. To find the weight of any given ſum of Federal money, in coined gold, *firſt*, change the ſum into Federal Troy weight, by the rule in the laſt Leſſon, and *next* into Vulg. Troy, by rule in Leſſon VI, Sect. 4.

1. AMERICAN, BRITISH *and* PORTUGUESE Gold, *into* Federal money.

Reduce *lb* 5,,3.,6,,1 into Fed. money.

```
   ×12
   ---
    63
   ×20
   ----
   1266
   ×24
   -----
27)303850(lb.11.2.5.3.7 Fed. Troy.
   --
   33      ℔:125.37 Anſ.
   --      ====
    68 &c.
```

Reduce *lb.*5,,1,,4,,9
×12
61
×20
1224
×24
27)293850(10883.3
*lb.*10.8.8.3.3 Fed. T.
℔1088.33 *Anf.*

By Rule 2.

What is the Vulg. Troy weight of ℔1125.37?
1125.37 is
*lb.*11.2.5.3.7 or
*gr.*11253.7 Fed. Troy.
×27
1|0)30384|9.9
24)30385 or nearly.
2|0)1261—1 *gr.*
12(63—6 *dw.*
*lb.*5,,3.6,,1 *Anf.*

What is the Vulg. Troy weight of ℔1088.34?
*gr.*10883.4 Fed. Tr. wt.
×27
24)29385|1.8
2|0)1224—9 *gr.*
12)61—4 *dw.*
*Anf. lb.*5,,1,,4,,9 Vulg. T.

FRENCH *and* SPANISH Gold, *by Rule* 1.

What is the value of 56322 grains, Vulg. Troy weight, of French gold, in Federal money?

$56322 \times 10 \div 27 = 20860$ *gr.*
20800 .. [Fed. Tr.

20860
10430

$\$2054.71.0$ *Ans.*

What is the value, in Fed. money, of 5751 *gr.* (Vulg. Troy) French gold?

$5751 \times 10 \div 27 = 2130$ *gr.*
2130
$\times 985$

$\$209.80.5'0$ *Ans.*

The Reverse, by Rule 2d.

What is the vulgar Troy weight of $\$2054.71$?

985)2054710(2086 *dwt.* Federal Troy.

8471
5910
(0)

2086
$\times 27$
56322 *grs.* *Ans.*

What is the vulgar Troy weight of $\$209.80.5$?

985)209805 (213
1280
2955
(0)

$\times 27$
5751 grains. *Ans.*

LESSON XVI.

Exchange between the Weight of Foreign Gold and each of the currencies of Pounds, Shillings and Pence, which are used in the United States.

SECT. 1.

South-Carolina *and* Georgia Currency.

Q. HOW *do you find the value of any given weight of Britiſh or Portugueſe gold, in this currency?*

Rule. Reduce the given weight to grains, and divide by 116; the quotient will be pounds in this currency.

Reverſe.

Rule. Reduce the given ſum to pence, then multiply by 29, and divide by 60; the quotient will be grains, Vulg. Troy.

Examples.

What is the value, in S. Car. &c. currency, of 27*lb.* 5*oz.* 7*dw.* 8*gr.* of Britiſh or Portugueſe gold?

		£.	ſ.	d.
lb. 27,,5,,7,,8	116)158096(1362,,17,,11 $\frac{5}{29}$			
×12	116			
329	420			
×20	348			
6587	729			
×24	696			
158096	336			
	290			
	104			
	×20 &c.			

What is the weight of £1362,,17,,11 $\frac{5}{29}$ S. Car. &c. currency, in Britiſh or Portugueſe gold?

1362,,17,,11 $\frac{5}{29}$
× 20
27257
× 12
327095 $\frac{5}{29}$

327095 $\frac{5}{29}$ *
× 29
(0)9485760
24)158096 grains.
20)6587—8*gr.*
12)329—7*dw.*
lb. 27,,5,,7,,8 *Anſ.*

FRENCH *and* SPANISH Gold.

RULE. Divide the whole number of grains in the given weight by 124; the quotient will be pounds S. C. &c.

Reverſe.

RULE. Multiply the whole number of pence in the given ſum by 31, and divide the product by 60; the quotient will be grains, Vulg. Troy.

EXAMPLES.

What is the value of 158069 *grs.* of French or Spaniſh gold, in the currency of S. Car. &c.

124)158096(1274,,19,,4 $\frac{8}{31}$
340
929
616 &c.

What is the weight, in French and Spaniſh gold, of £1274,,19,,4 $\frac{8}{31}$ S. Car.

£. *pence.*
1274,,19,,4 $\frac{8}{31}$ = 305992 $\frac{8}{31}$
× 31
60(9485760
Anſ. 158096 *gr.*

* *Multiplying* $\frac{5}{29}$ *by* 29. *makes juſt* 5: *ſo that, in all caſes of this kind, you have only to add in the Numerator, or upper number in the fraction.*

SECT. 2.

New-England, &c. Currency.

Engliſh and *Portugueſe* Gold.

Rule. Multiply pounds (weight) by 64; the quotient will be pounds currency.

An ounce being £5,,6,,8, therefore multiply this ſum by the number of ounces.

A penny-weight being 5*ſ*4, multiply the number of penny-weights into this ſum.

Multiply the grains into 2½*d*, and add the ſeveral products together. Or

Divide the whole number of grains in the given weight by 90; the quotient will be pounds, N. E. currency.

Reverſe.

Rule. Reduce pounds, or pounds and ſhillings, to ſhillings, cut off the right hand figure, and divide by 128; the quotient will be pounds weight: the figure to cut off, bring down to the laſt remainder. Or

Multiply the whole number of pence in the given ſum by 8, and divide the product by 8; the quotient will be grains.

Examples.

What is the value of *lb.*56,,11,,12,,8 *gr.* in the L. M. of N. E.

*lb.*56	£5,, 6,,8	*ſ.*5,,4	*d.*2½
×64	×11*oz.*	×12*dw.*	×8 *gr.*
£3584,,00,,0	58,,13,,4	3,,4,,0	1*ſ*8
58,,13,,4			
3,, 4,,0			
1,,8			
£3645,,19,,0 *Anſ.*			

Or, *lb.* 56,,11,,12,,8 = 328136 grains.

9|0)328136

3645

86

×20 &c. = £3645,,19 *Anſ.*

What is the weight of £3645,,19 N. E. in Britiſh, &c. gold?

3645,,19

×20

128)72919(*lb.* 56,,11,,12,,8 *Anſ.*

891

1239

×12

)14868(11

&c.

Or, £3645,,19 = 875028 pence.

×3

8)2625084(

Anſ. 328135½ grains.

This lacks half a grain, becauſe there was one ninth of a ſhilling remainder, in the ſecond example.

FRENCH *and* SPANISH Gold.

RULE. Multiply the whole number of grains by 3, and divde the product by 274; the quotient will be pounds, N. E.

Reverſe.

RULE. Multiply the whole number of pence by 137, and divide the product by 360; the quotient will be grains.

EXAMPLES.

What is the value in N. E. money, of 56*lb.* 11*oz.* 12*dw.* 8*gr. Fr.* or *Sp.* gold?

328136 grains.

×3

274)984408(

Anf. £3592,,14,,7$\frac{2}{137}$

What is the weight, in French or Spaniſh gold, of £3592,,14,,7$\frac{2}{137}$ N. E.?

862255$\frac{2}{137}$ *d.*

×137

36'0)118128960(328136

328136*gr.*=*lb.* 56. 11 12,8

SECT. 3.

NEW-JERSEY, *&c.* Currency.

Engliſh and *Portugueſe* Gold.

Q. *How do you find the value of Engliſh gold, in this currency?*

RULE. Divide the whole number of grains by 72; the quotient will be pounds currency.

Reverſe.

RULE. Multiply the whole number of pence by 3, and cut off the right hand figure of the product; the reſt are grains.

EXAMPLES.

What is the value, in N. Jerſey, &c. currency, of 328136 *grs.* Britiſh or Portugueſe gold?

72)328136(4557,,8,,10$\frac{2}{3}$ *Anf.*

What is the weight of £4557,,8,,10$\frac{2}{3}$ N. Jerſey, &c. currency, in Britiſh, &c. gold?

£4557,,8,,10$\frac{2}{3}$=1093862$\frac{2}{3}$ pence.

×3

328136,0

328136 grains=56*lb.* 11*oz.* 12*dw.* 8*gr. Anf.*

FRENCH *and* SPANISH Gold.

RULE. Multiply the whole number of grains in the given weight by 75, and divide the product by 26; the quotient will be pence.

Reverse.

RULE. Multiply the pence by 26, and divide the product by 75; the quotient is grains.

EXAMPLES.

What is the value of 328136 *grs.* of French or Spanish gold, in N. Jersey, &c. currency?

328136
×75

26)24610·00

12)946546$\frac{4}{26}$

20)78871$\frac{3}{13}$—10

£3943, 18. 10$\frac{4}{26}$ *An.*

What is the weight, in French or Spanish gold, of £3943,,18,,10$\frac{4}{26}$ N. J. cur.

946546$\frac{4}{26}$*d.*
×26

75)24610·00(328136
328136*gr.*=*lb.* 56,,11,,12,,8

SECT. 4.

NEW-YORK *and* NORTH-CAROLINA Currency.
British and Portuguese Gold.

RULE. Annex a cypher to the whole number of grains, and divide by 675; the quotient will be pounds currency.

Reverse.

RULE. Multiply the whole number of pence by 9 and divide the product by 32; the quotient will be grains.

EXAMPLES.

What is the value of 328136 *grs.*?

675)3281360(4861..5·5$\frac{7}{9}$

5813

4136 &c.

What is the weight of £48,6,..5..5$\frac{7}{9}$ N. Y. &c. in French or Span. gold?

Pence mult. by 9, produce
32)10500352(328136*gr.*
=56*lb.* 11*oz.* 12*dw.* 8*gr.*

FRENCH *and* SPANISH Gold.

RULE. Annex a cypher to the whole number of grains in the given weight, and divide by 685; the quotient will be pounds, New-York, &c. currency.

Reverse.

RULE. Multiply the whole number of pence in the given sum by 137, and divide the product by 480; the quotient will be grains.

EXAMPLES.

What is the value of 328136 *grs.* in N. Y. &c. currency? £. *f. d.*

685)3281360(4790,6,$1\frac{79}{137}$

What is the weight of £4790,,6,,$1\frac{79}{137}$ N.York, currency, in *Fr.* or *Sp.* gold?

328136 *grs. Anſ.*

LESSON XVII.

RECAPITULATION of all the foregoing Rules of Exchange, in one univerſal Rule, by the help of the following Tables.

TABLE 1.

Shewing the reciprocal proportions between all the different Currencies of Pounds, Shillings, &c. and Federal Money, reſpectively.

	Ster.	*S.C.*	*Ir.*	*Hal.*	*N.F.*	*N.Y.*	*Fed.*	
Federal.	9/40	7/30	39/160	1/4	3/10	3/8	2/5	
N. York, &c.	9/16	7/12	39/65	5/8	3/4	15/16		5/2
N. Jer. &c.	3/5	28/45	13/20	2/3	4/5		16/15	8/3
N. Eng. &c.	3/4	7/9	13/16	5/6		5/4	4/3	10/3
Halifax.	9/10	14/15	39/40		6/5	3/2	8/5	4/1
Iriſh.	12/13	112/117		40/39	16/13	20/13	64/39	160/39
S. Carol. &c.	27/28		117/112	15/14	9/7	45/28	12/7	30/7
Sterling.		28/27	13/12	10/9	4/3	5/3	16/9	40/9

TABLE 2.

Shewing the reciprocal proportions between the several Tables of Weight.

		Avoirdupois weight. lb.	oz.	dr.	Troy weight. lb.	oz.	dw.	gr.
Fed. Troy, or American wt.	lb	27 / 70	216 / 35	3456 / 35	15 / 32	45 / 8	900 / 8	2700 / 1
	oz	27 / 700	108 / 175	1728 / 175	3 / 64	9 / 16	45 / 4	270 / 1
	dw	27 / 7000	54 / 875	864 / 875	3 / 640	9 / 160	9 / 8	27 / 1
	gr	27 / 70000	27 / 1375	432 / 4375	3 / 6400	9 / 1600	9 / 80	27 / 10
Fed. Avoirdupois.	lb.		16 / 1	256 / 1	175 / 144	175 / 12	875 / 3	7000 / 1
	oz.	1 / 10	16 / 10	256 / 10	35 / 288	35 / 24	175 / 6	700 / 1
	dr.	1 / 100	16 / 100	64 / 25	7 / 576	7 / 48	35 / 12	70 / 1
Troy weight.	lb.	14 / 175	2304 / 175	7372 / 875		12 / 1	240 / 1	5760 / 1
	oz.	12 / 175	92 / 175	2072 / 175	1 / 12		20 / 1	480 / 1
	dw.	3 / 875	48 / 875	768 / 875	1 / 240	1 / 20		24 / 1
	gr.	1 / 70	2 / 875	32 / 875	1 / 5760	1 / 480	1	
Avoird. weight.	lb.		16 / 1	256 / 1	175 / 144	175 / 12	875 / 3	7000 / 1
	oz.	1 / 16		16 / 1	175 / 2304	17 / 192	875 / 48	875 / 2
	dr.	1 / 256	1 / 16		35 / 7373	175 / 3072	875 / 768	875 / 32

		Fed. Avoirdupois			Fed. Troy, or American wt.			
		lb.	oz.	dr.	lb.	oz.	dw.	gr.
Fed. Troy, or American wt.	lb	27	27	270		10	100	1000
		70	7	7		1	1	1
	oz	27	27	7	1		10	100
		700	70	7	10		1	1
	dw.	27	27	27	1	1		10
		7000	700	70	100	10		1
	gr.	27	27	27	1	1	1	
		70000	7000	700	1000	100	10	
Fed. Avoirdupois	lb.		16	256	70	70	7000	0000
			1	1	27	27	27	27
	oz.	1		16	7	7	700	7000
		16		1	27	27	27	27
	dr.	1	1		7	7	70	7000
		100	10		270	27	27	27
Troy weight.	lb.	14	28	256	32	64	640	6400
		17	35	7	15	3	3	3
	oz.	12	24	48	8	16	160	1600
		175	35	7	45	9	9	9
	dw.	8	6	12	8	4	8	80
		875	175	3	900	45	9	9
	gr	1	1	1	1	1	1	10
		7000	700	70	2700	270	27	27
Avoird. weight	lb		10	100	70	700	7000	70000
			1	1	27	27	27	27
	oz	1	10	00	35	175	875	4375
		16	16	16	216	108	54	27
	dr.	1	10	25	3456	175	875	4375
		256	256	64	35	1728	864	432

NOTE. *Read these two pages as one Table.*

Table 8.

Proportions between the weight of coined Gold and the several currencies of the United States.

		Fed. money.	*S. Carolina and Georgia currency.*			*N. England, &c. currency.*			*N. Jersey, &c. currency.*			*New-York, &c. currency.*		
		ℳ	£.	*f.*	*d.*	£.	*f.*	*d.*	£.	*f.*	*d.*	£.	*f.*	*d.*
American, British and Portuguese Gold.	*lb.*	640	1440	28800	345600	64	1280	15360	80	1600	1928	256	5120	20480
		3	29	29	29	1	1	1	1	1	1	3		1
	oz.	160	120	2400	28800	16	320	1280	20	400	1600	64	1280	5120
		9	29	29	29	3	3	1	3	3	1	9	9	3
	dw.	8	6	120	2400	4	16	64	2	20	80	16	64	256
		9	29	29	29	15	3	1	6	3	1	45	9	3
	gr.	1	1	5	120	1	2	8	1	1	10	2	8	32
		27	116	20	29	90	9	3	72	18	3	135	27	9
French and Spanish Gold.	*lb.*	20800	0720	34400	1612800	3590	71800	2001000	10300	206000	2472000	11470	229400	2752000
		137	137	137	137	137	137	137	137	137	137	137	137	137
	oz.	2400	560	11200	134400	720	14400	172800	900	18000	216000	960	19200	230400
		137	137	137	137	137	137	137	137	137	137	137	137	137
	dw.	120	28	560	6720	36	720	8640	45	900	10800	48	960	11520
		137	137	137	137	137	137	137	137	137	137	137	137	137
	gr.	5	7	70	840	3	30	360	5	25	75	2	40	480
		137	822	411	411	274	137	137	416	104	26	137	137	137

Q. *How are the foregoing Tables to be applied?*

RULE. Look the particular currency or weight of the given ſum or quantity, and the particular denomination in which it is taken, in the left hand column; *next*, the particular currency or weight into which it is to be changed, by the index at the top, and the check at their common angle of meeting contains their reciprocal proportion; *then*, multiply the given ſum or quantity by the upper proportional number, and divide the product by the lower one; the quotient will be the anſwer ſought.

EXAMPLES *under each of the Tables.*

1. Reduce £65, Iriſh money, into the currency of N. Jerſey, &c.

By the Table, the proportionals are found be 20 *and* 13,

Therefore £65

×20

13)1300(£100 N. Jerſey, &c. *Anſ.*

2. Reduce 578 drams, Avoird. into grains, Tr. wt,

The tabular numbers are 875 *and* 32.

578

×875

32)505750(15804 *Anſ.*

185

257

150

(22)

3. What is the value, in pence, N. England, &c. currency, of 540 grains of Britiſh gold?

The tabular numbers are 8 *and* 3.

540
×8

3)4320

1440 pence. *Anſ.*

LESSON XVIII.

Miſcellaneous Queſtions for exerciſe.

1. WHAT is the Federal money value of £5725,, 15,,6 Sterling money? *Anſ.* $25147.889

2. An Invoice of goods from Dublin amounts to £7572,,5. Required the ſum in Federal money?

Anſ. $31065.641

3. To what ſum in S. Carolina and Georgia currency, will 4100 Federal dollars amount?

Anſ. £956,,13..4

4. What ſum in Federal money, equals £137,,18,,4 Halifax currency? *Anſ.* $751.664

5. To what ſum in Federal money does the debt of Great Britain amount, eſtimated at £400 000 000 Sterling? *Anſ.* $1777777777·77 7

6. What is the weight of the laſt mentioned ſum of dollars in Engliſh gold coin?

Anſ. 8333333*lb.* 4*oz.* Vulg. Troy.

7. What is the Avoirdupois weight of this ſum of gold? *Anſ.* 3061 *Tons*, 4*Cwt.* 1*qr.* 26*lb.* 13*oz.*.2*dr.*

8. How many cents upon the dollar is 3/6 upon the pound? *Anſ.* //.17.5

9. What is the Federal money value of £268..12,,8 N. England &c. currency? *Anſ.* $895 443

10. What number of dollars muſt I receive in lieu of £432,,15 N. Jerſey, &c. currency? *Anſ.* $1154.

11. I bring my action against Jacobus Van Scheldt of the state of N. York, upon a note of hand given for £237,,12, for what sum must I declare in Federal money? *Ans.* ℳ594

12. A. exchanged with B. 132 bushels of Maize at 2/6 per bushel, for Wheat at 4/6 per bushel; how many bushels of Wheat must A. receive?

Ans. 73*Bush.* 1*peck*, 2*qts.* 1*pt.*

13. Giles Jackson, farmer, traded with Robert Howard and Co. merchants—delivered 25 bushels of flaxseed at ℳ.88 7, 40 bushels of oats at ℳ.50 3, and 10 bushels of potatoes at ℳ22; How many yards of cloth may he take up at ℳ2.82 per yard? *Ans.* 39 yds.

14. James Dawson exchanged rum with Job Fullerton, 185 *gal.* at ℳ1.75, for brandy at ℳ2 33 3—how many gallons must Dawson receive?

Ans. 138*gal.* 3*qts.*

15. J. Tucker exchanged with Jonathan Olmstead, 47 yards of cambric at ℳ1.52 6 per *yd.* for callicoes at ℳ1.32, and chintzes at ℳ1.52 6 per yard; how many yards must he have of each sort? *Ans.* 31.5 yards.

16. A land jobber purchased 1575 acres at 2/6 the acre; 3240 acres at 2/2; and 725 acres at 3/6; then sold the whole for 12/ per acre—what was the average advance upon the acre, and what the amount of his neat proceeds. *Ans.* 8/11¼ the average advance.

£2491,,5 Neat proceeds.

17. A merchant bought wheat in Vermont for the N. York market, 5526 bushels at 12/ per bushel, expecting to sell it at 20/; but finding the market fast rising he stored it in the city with directions to his factor, not to sell it under 24/; the price arose to 23/10, and then suddenly fell to 8/. What did the merchant lose in his wheat, exclusive of the expence of transportation, storage, wastage, lying out of his property, &c. *Ans.* £1105,,4

18. At the close of the American war, the Congress of the United States settled with the officers of the ar-

my, by commuting their half pay for life, theretofore promiſed them, into 5 years full pay in hand. Col. Broadſword received for his commutation money £628 N. England currency—What ſum would he have received in Federal money, upon the other eſtabliſhment, had he lived 30 years? *Anſ.* £6280.

19. John Thimbleton, a monied ſpeculator, bought up old continental ſecurities, in ſoldiers notes, to the amount of £10560, at the depreciated rate of 2/6 upon the pound. Afterwards, under the new Federal government, the credit of thoſe ſecurities was eſtabliſhed at par. *Queſtion.* How much was Mr. Thimbleton enriched at the expence of the war-worn veteran?

Anſ. £9240

20. Daniel Buller borrowed of Jonathan Leaſon £51,,17,,6 Lawful money of N. England, to diſcharge himſelf from the cuſtody of the officer, by whom he was held on execution. About 17 years afterwards, in the time of the American war, Mr. Buller ſold a couple of yearling ſteers for that ſum of money, in bills of public credit, or continental money, ſo called, at the time that it was depreciated 2000 per cent, and very cheerfully made a lawful tender of the money, in diſcharge of his debt to Leaſon. *Queſtion.* How much ought honeſt Mr. Buller to have paid in continental money; what was the real value of what he paid; and what was the diſtance between good conſcience and actual conduct?

Anſ. The real value of what he paid was £2,,16,,10½. What he ought to have paid in continental money was 400 times as much, viz. £1148,,1,,4

His gratitude to his friend, was, to cheat him of £49. 0,,7½ L. M. - Or, £1096,,3,,10, Continental money.

LESSON XIX.

The denominations of the Money of Account of various Foreign Nations, with their respective values in Federal money.

France.

	$ // /
1 Denier - -	=0.00.08
12 Deniers = 1 Sol. -	=0.00.95
20 Sols = 1 Livre Tournois	=0.19 0

Spain.

	$ // /
1 Marvedie - -	=0.00.3
34 Marvedies = 1 Real Plate	=0.10. 0
10 Real Plate = 1 Dollar	=1.00.0

Portugal.

	$ // /
1 Ree - - -	=0.00.12½
10 Rees = 1 Half Vintin	=0.01.24
10 Half Vintin = 1 Testoon	=0.12.4
10 Testoons = 1 Mill Ree	=1.24 0

Russia.

	$ // /
1 Muscoque - - -	=0 00 5
2 Muscoques = Copee - -	=0.01 0
10 Copees = 1 Grievener -	=0.10 0
10 Grieveners = 1 Rouble. -	=1.00 0

Sweden.

	$ // /
1 Runstick - - -	=0.00 52
32 Runsticks = 1 Copper Dollar	=0.16 7
6 Copper Dollars = 1 Rix Dollar	=1.00 0

Denmark.

	$ // /
1 Schilling - - -	=0.01 04
16 Schillings = 1 Mark -	=0.16.7
6 Marks = 1 Rix Dollar -	=1.00 0

UNITED NETHERLANDS.

	£ // /
1 Penning - - -	=0 00 03
16 Pennings = 1 Stiver - -	=0.01.45
20 Stivers = 1 Guilder -	=0.39 0

HAMBURGH.

1 Phenning - - -	=0.00.13
12 Phennings=1 Schilling Lub.	=0 01 1
16 SchillingsLub.=1 MarcBanco	=0.33 3

CHINA.

1 Cash - - - -	=0.00.148
10 Cash = 1 Cadarene - -	=0.01.48
10 Cadarenes = 1 Mace -	=0.14 8
10 Mace = 1 Tale - -	=1.48 0

BENGAL.

1 Pice - - - -	=0.00.32
12 Pices = 1 Anas - -	=0.03 9
16 Anas = 1 Rupee - -	=0.55 5

INDIA.

1 Pice - - - -	=0.00 7
8 Pices = 1 Fanam - -	=0.05 4
36 Fanams = 1 Pagoda -	=1.94 0

LESSON XX.

The Weights and Measures of different places.

1 WEIGHT.

One hundred pounds weight, of England, Scotland, Ireland, and America, amount to,

	lb.	oz.
At Geneva,	81,,	7
At Rouen, the viscounty weight,	88,,	0
At Frankfort and Nuremburgh,	89..	7
At Rochelle,	90,,	9
At Amsterdam, Paris, Bourdeaux, &c.	91,,	8
At Hamburgh,	93,,	5
At Leipsic,	96,,	1

	lb. oz.
At Liege,	96,, 5
At Antwerp, or Brabant,	96,, 8
At Seville, Cadiz, &c.	97,, 0
At Portugal,	104,,13
At Lyons, the city weight,	106., 0
At Thoulouſe, and upper Languedoc	107,,11
At Marſeilles, and Provence,	113,, 0
At Leghorn,	132,,11
At Genoa,	137,, 4
At Venice,	152,, 0
At Milan,	153.,11
At Naples,	154.,10

2. Cloth Measure.

One hundred yards of America, England, Scotland and Ireland, equal,

Of France, England, Olnaburg & Geneva,	80 Ells.
Of Amſterdam, Haerlem, Leyden, the Hague, Rotterdam, &c.	133⅓ Ells.
Of Antwerp and Bruſſels,	131⅔ Ells.
Of Hamburgh, Frankfort, Leipſic, Bern, Baſil, and Cologne,	160 Ells.
Of Breſlau, in Sileſia,	166⅗ Ells.
Of Dantzick,	150 Ells.
Of Bergen and Drontheim,	146⅔ Ells.
Of Sweden or Stockholm,	154 Ells.
Of St. Gall for Linen,	114⅔ Ells.
——— for Cloth,	149⅓ Ells.
Of Marſeilles and Montpelier,	46⅔ Canes.
Of Thoulouſe and Upper Languedoc,	50 Canes.
Of Genoa,	40⅔ Canes.
Of Rome,	44 Canes.
Of Caſtile and Piſcay,	107 Vares.
Of Cadiz and Andaluſia,	109⅕ Vares.
Of Portugal or Liſbon,	81⅓ Vares.
Of Portugal or Liſbon,	133⅓ Covedos.
Of Venice,	136 Braſſes.

Of Bergamo, &c.	104⅓ Braſſes.
Of Florence and Leghorn,	154⅔ Braſſes.
Of Milan,	171⅓ Braſſes.

3. Dry Measure.

Eighty two American or Wincheſter Buſhels equal at

Aiguillon 41 Sacks,
Albi 25 Setiers,
Alicant 12 Cahizes,
Alkmaar 36 Sacks,
Amersfort 16 Muddes,
Amſterdam 27 Muddles, or 1 Laſt,
Antwerp 32½ Veertels,
Arles 49 Setiers,
Bayonne 36 Sacks,
Beaucaire 28 Setiers,
Beaumont 36 Sacks,
Bergen-op-Zoom, 63 Siſters,
Bois-le-Duc, 20½ Mouwers,
Bommel 18 Muddes,
Bourdeaux 38 Boiſſeau,
Breda 33 Veertels,
Bruges 17½ Hoedts,
Bruſſels 25 Sacks,
Bueren 21 Muddes,
Cadillac 33⅓ Sacks,
Cadiz 52 Hanegas,
Cahors 100 Cartes,
Campen 24½ Mudd,
Carcaſſone 35 Setiers,
Clairac 34½ Sacks,
Cleves 16¼ Mouwers,
Condom 41 Sacks,
Coningſberg 1 Laſt,
Copenhagen 42 Tuns,
Dantzick 1 Laſt,
Delf 29 Sacks,
Deventer 36 Muddes,

Doefbourgh 22 Mouwers,
Dort, or Dordrecht 24 Sacks,
Dunkirk 18 Razieres,
Edam 27 Muddes,
Elling 1 Laft,
Embden 15¼ Tuns,
Erfelfteyn 21 Muddes,
Franckfort 27 Malders,
Ghent 56 Halfters,
Genoa 25 Mines,
Gimond 20 Sacks,
Graveline 22 Razieres,
Haerlem 38 Sacks,
Hamburgh $\frac{12}{13}$ths of a Laft,
Huefden 17¼ Muddes,
Hoorn, or Horn, 44 Sacks,
Ireland 38 Bufhels,
La Brille 40 Sacks,
La Reole 30 Sacks,
Lavour 21 Setiers,
Lifle in Flanders, 38 Razieres,
Lifbon 216 Alquiers,
Leghorn 40 Sacks,
Lorrain 27 Muddes,
Lubeck 95 Schepels,
Middlebourgh 48½ Sacks,
Montfort 21 Muddes,
Paris 19 Setiers,
Porto Port 180 Alquiers,
Purmerent 27 Muddes,
Rabaftens 17 Setiers,
Rhenen 20 Muddes,
Ruremond 68 Schepels,
Riga 46 Loopens,
Rotterdam 29 Sacks,
St. Gilles 20 Charges,
St. Omer 22½ Razieres,
St. Valery 19 Setiers,

Saumur 19 Setiers,
Steenbergen 35 Veertels,
Stockholm 23 Tons,
Terveer 39 Sacks,
Thiel 21 Muddes,
Thoulouſe 26 Setiers,
Tongres 15 Muddes,
Tonnington 34 Tons,
Venloo 21¾ Mouwers,
Vianden 20 Muddes,
Utrecht 25 Muddes,
Zurick Zee 40 Sacks.

NOTE. *For the operation of exchange between the different monies, weights and meaſures in the two laſt Leſſons, apply the Rule of Three or the rules of Decimal Commutation, in the Third Part.*

END OF THE SECOND PART.

The American Accomptant, *&c.*

PART III.

DECIMAL PRACTICE.

LESSON I.

General Questions.

Q. WHAT *is meant by a* Fraction?

A. A part or parts of an unit, and is so called in contradistinction to an integer or whole number.

Q. *How many kinds of Arithmetical Fractions are there?*

A. Two; Vulgar* and Decimal Fractions.

Q. *May not the same fractional part of an integer be expressed in either?*

A. Yes.

Q. *What is incidental to all fractions?*

A. Two numbers; one called the numerator and the other the denominator. The former is always expressed; the latter is either expressed or understood.

Explain them.

The Numerator expresses the number of single parts

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* *As the use of* vulgar *fractions may be advantageously superseded by that of* decimals, *they are viewed as an unnecessary branch of common school education, and therefore omitted in this Compendium.*

contained in the fraction; the Denominator, the whole number of parts which compose the Integer. Thus $\frac{4}{5}$ and .8, that is, four fifths and eight tenths: Here the first is a Vulgar, and the latter a Decimal fraction; the numbers 4 and 8 are numerators, and 5 and 10 their denominators. Increasing or diminishing the numerator has the like effect upon the value of the fraction, as nine tenths is more, and seven tenths less than *eight* tenths; but to increase the denominator lessens, and to diminish it, augments the fraction; four fourths being an integer, and four sixths less than four fifths.

Q. *In what respects do vulgar and decimal fractions differ?*

A. Principally with respect to their *notation*, their *denominators*, their *mode* of operation, and their *utility*.

In a vulgar fraction, the numerator and denominator are both noted, or written down, and the one set over the other: in decimals, the numerator only is expressed.

In vulgar fractions, the denominator may be any number whatever; in decimal fractions, the denominator is ever a decimal number, or unity, with one or more cyphers annexed.

Vulgar fractions admit of *improper* fractions, or fractions greater than an integer, such as $\frac{8}{7}$; but decimals are always *proper* fractions, or less than an integer.

Their difference in mode of operation and utility, may be better understood by example and practice, than by any particular description.

LESSON II.

Notation of Decimal Fractions.

Q. IN *what respect does the Notation of decimals differ from that of whole numbers?*

A. 1. Decimal fractions are diſtinguiſhed by a dot or point, (thus .) ſet at the left hand of the fractional number, which may be called the *Siniſter* point. This is of great and neceſſary uſe in decimals, as it ſupplies the place of the denominator, and deſignates the magnitude of the fraction. As it divides the fraction from the integral figures, it is termed the *Seperatrix*.

2. Decimal fractions decreaſe infinitely towards the right hand; whole numbers increaſe infinitely towards the left; both ſtarting from unity as a fixed central point, according to the following

TABLE.

C Millions	X Millions	Millions	C Thouſands	X Thouſands	Thouſands	Hundreds	Tens	Units	Tenth parts	Hundredth parts	Thouſ. parts	X Thouſ. parts	C Thouſ. parts	Millionth parts	X Millionth parts	C Millionth parts
0	8	7	6	5	4	3	2	1	.2	3	4	5	6	7	8	9

NOTE. *The decimal places, counting from the point towards the right, are alſo called* Primes, Seconds, Thirds, Fourths, *&c.*

Therefore it is evident, that,

3, The magnitude of a decimal fraction, compared with another, does not depend upon the number of its figures, but upon the value of its firſt left hand figure: for inſtance, a fraction beginning with any figure leſs than 9, ſuch as, .8573024, &c. if extended to an infinite number of figures, will not equal .9

Q. *How do you enumerate, ſo as to read a decimal fraction?*

A. The numerator being expreſſed by the figures actually ſet down, enumerate and read them as you would the ſame figures in a whole number. To find the denominator, conſider the ſiniſter point as ſtanding for 1

and all the figures upon its right hand for ſo many cyphers; then, by the common method, enumerate and read them accordingly, which will give you the denominator of the fraction. Thus, the following fractions, .1, .15, .236, .0001. by this rule are to be read, *one tenth, fifteen hundredths, two hundred and thirty ſix thouſandths, one ten thouſandth; which, written in the manner of vulgar fractions, would ſtand.*

$$\frac{1}{10},\ \frac{15}{100},\ \frac{236}{1000},\ \frac{1}{10000}.$$

Q. *What is the effect of removing the ſiniſter point?*

A. If you remove it towards the right hand, it multiplies the fraction by 10 at every figure; thus, .235 being 2.35, becomes two integers and thirty-five hundredths: remove it another figure, and it is 23.5, twenty-three and five tenths: remove it another figure, which is the ſame as taking it away, and it becomes a ſimple whole number, 235.

But removing the point towards the left hand has directly the contrary effect: It divides, and makes the quantity ten times the leſs at every figure it is removed; thus 235 becomes 23.5, 2.35, .235, .0235, and ſo on.

Q. *What are the effects of cyphers at the right or the left hand of a decimal fraction?*

A. At the right hand they neither increaſe nor diminiſh its value; but place them upon the left hand of the fraction, and they make it ten times the leſs for every cypher ſo placed.

Q. *What is the reaſon of this?*

A. Becauſe, in the firſt caſe, the numerator is increaſed juſt in the ſame proportion with the denominator, and .1, *one tenth*, becomes .10, *ten hundredths;* but in the other caſe the denominator only is increaſed, which diminiſhes the fraction, and makes .1, *one tenth*, no more than .01, *one hundredth*. Therefore,

Any two or more decimal fractions, however differing in their magnitude, may be expreſſed by an equal number of figures, and have the ſame common denomina-

tor. So these decimals, .8, .05, .456, .0003, may be written .8000, .0500. .4560. 0003.

Q. *How may a whole number be decimally expressed?*

A. By annexing one or more cyphers, separated by the sinister point—thus, 39 0 24.000.

LESSON III.

Exercises in Decimal Notation.

Q. HOW *do you read the following decimal fractions? which is the largest. and which the smallest of them?*

.3	.51004	.889
.25	.020304	.000[illegible]00405
.50	.0070[illegible]0	.000060000
.499	.888[illegible]0001	.99
.0621	.888999[illegible]02	.0000000009

Q. *How do you write down in figures the following decimal fractions expressed in writing*, viz.

Five, hundredths.

Twenty-five, thousandths.

Three hundred and seventy-six, ten thousandths.

Six hundred and four thousand and seventy-one, millionths.

Twenty thousand, eight hundred and thirty-three, millionths.

One hundred and ninety one, ten thousandths.

Six thousand, eight hundred and seventy-five, hundred thousandths.

Two thousand and eighty three, millionths.

Forty-one thousand, six hundred and sixty-six, ten millionths.

Seven thousand and two, hundred thousandths.

Six thousand, six hundred and ninety-six, hundred millionths.

Twenty-seven thousand & nine, hundred thousandths.

Eight hundred and seventy-three, thousand millionths.

Forty-seven, hundred thousand millionths.

LESSON IV.

Decimal Points.

Q. WHAT *other Decimal Points are uſed in this Compendium, and what are they called?*

A. The *Dexter* point, the *Surdal* point, and the *Antiſurdal* point.

Explain them.

1. The *Dexter* point, placed thus, 5', when applied to the dividend, according to the rules of diviſion hereafter given, denotes that the figures upon its left hand will quotient integers, and thoſe upon its right, fractions. It is alſo uſed in reducing a decimal fraction into its proper value, in the lower denominations of a vulgar table; and then it ſhews that the figures upon the left hand only are made uſe of, and thoſe upon its right thrown away, being ſmaller than the ultimate fraction, or loweſt denomination of that table.

2. The Surdal point is a colon, (:) This is a ſign of rejection: It is uſed in Diviſion, in caſe the dividend cannot be exactly meaſured by the diviſor; and being applied to the laſt remainder, (thus, 537:) denotes it to be a ſurd number, of no further account or uſe in the operation. It is alſo applied to any fraction or part of a fraction which is thrown away.

3. The *Antiſurdal* point placed over a figure (thus $\dot{5}$) denotes that figure to be read one larger than its nominal value. It is placed over the right hand quotient figure, to force a ſtop in diviſion, where the remainder is ſuch as would continue the diviſion forever, without bringing out the fraction with perfect exactneſs.

It is alſo uſed in reducing decimals, for the ſame purpoſe as the Dexter point, where its right hand figure is as large as 5, or larger.

Q. *May not the ſame number, ſum, or quantity, be both an Integer and a Fraction?*

A. Yes. This is ever the case with the middle denominations in mixed quantities. For instance a dime is a fraction of a dollar, and an integer of a cent and a mill. The highest denomination is never a fraction, and is called the *ultimate integer:* The lowest denomination is never an integer, and called the *ultimate fraction.* The intermediate denominations, are in relation to each other, integers or fractions, and, as such, may be called *mesne* integers, and *mesne* fractions.

LESSON V.

Addition of Decimals.

Q. HOW *is the Addition of Decimals performed?*

A. 1. Place the sinister points in a perpendicular line, and the first left hand figure of each fraction in the next column, and so on.

2. Add the several numbers together, and set down their sum total just as in simple Addition of whole numbers.

3. Place the sinister point in the sum total, directly under those in the statement, and the left hand figure, or figures, will be integers; those upon the right, decimals.

Q. *How is the Addition of Integers and Fractions performed?*

A. Place the fractions as before, the integers upon the left hand of the point; then add all together as whole numbers, and place the sinister point in the sum total as before.

Examples *in Fractions.*

·4	·37	·375	·4502	·56843	·348659
·5	·25	·625	·2954	·73846	·648341
·9	·62	1...	·7456	1.30689	·997...

·4	·54	·573	·2954	·34865	·986431
·7	·06	·052	·0008	·08437	·34128
·8	·3	·001	·0095	·92803	·5934
·2	·025	·06	·0524	·04395	·19

EXAMPLES *of Integers and Fractions.*

£		℔			*yds.*		
245·073		22·52	6		54·	78	
542 065		33·26	5		24·56		
479·5		44·69	5		974·5		

Bushels.	*lb.*	*oz.*	*dw.*	*gr.*	*Mwt.*	*c.*	*lb.*	*oz.*	*dr.*
67·125	3	4	5	6	4	6	37	5	8
56·25	2	8	3	7	7	8	25	4	2
38·375	3	7	0	7		·4	37	3	6

NOTE. *Where, as in the foregoing examples, the right hand figure, or figures in the sum total are cyphers, it is needless to express them.*

LESSON VI.

SUBTRACTION of Decimal Fractions.

Q. HOW *is this Subtraction performed?*

A. RULE. Set down the numbers as in Addition, placing the Substratum, or that fraction whose left figure is the larger, uppermost; then perform the subtraction as in whole numbers, and place the sinister point in the remainder, directly under that in the Subtrahend. When the Substratum and Subtrahend con-

fift of unequal numbers of figures, you may repreſent right hand cyphers, by as many dots.

EXAMPLES.

·735	·6....	·4562843	·004..
·24	·57892	·36.....	·00032
·511	·02108		

Of Integers and Fractions.

532·45	235 43	857·6542	35·1.
421·34	159·54	47·3456	27·09

Of the Federal Tables.

	lb. oz. dw. gr.	*Buſhels.*	*Mwt. c. lb. oz. dr.*
£33·26 5	3· 7 0 7	13·25	7· 8 25 4 2
22·52 6	2. 8 3 7	9·75	4· 6 37 5 8

NOTE. *For exvmples in the other Federal tables, ſee Part* I, *Leſſon XVI.*

LESSON VII.

MULTIPLICATION of Decimals.

Q. HOW *do yqu multiply Decimal Fractions?*

A. RULE. Multiply the factors together in the common method, whether they are pure or mixed fractions, as if they were whole numbers, or, which will be much ſhorter, by Croſs Multiplication as in Part I, Leſſon XX, and then place the ſiniſter point in the product, as many figures from the right hand, as there

were decimal figures in both the factors ; and if there are not so many figures in the product, supply their deficiency by prefixing cyphers.

In multiplying together two mixed quantities, whether of the same, or of different tables, observe the following directions, viz.

1. In the thing bought or sold, make that denomination the integer, upon which the price is predicated.

2. Take that factor for the Multiplier which has the fewer figures.

3. If, in either factor, any or all the middle denominations are vacant, as in 3 dollars and 5 cents, or 4 pounds and 6 grains, then fill each vacant denomination with as many cyphers, as it will admit significant figures.

4. After you have fixed the sinister point in the product, count off from that towards the right hand, the lower denominations in their order, to the lowest denomination ; there, (in case there are figures still further towards the right) apply the dexter point ; but if the next figure be as large, or larger than 5 set the antisurdal point, and the remaining figures in either case are thrown away.

5. The product will belong to the same table with that of the price.

Q. *What do you observe that is still further distinguishing and curious in the multiplication of Fractions ?*

A. To multiply a fraction by a fraction, diminishes its value and makes the product less than either factor ; and to multiply an integer by a fraction invariably makes the product less than the multiplicand.

Q. *What is the reason of this ?*

A. It is because a fraction in its nature and operation is an exact contrast to an integer, having single unity for the middle term. Thus to multiply by 1, neither adds nor diminishes, but to multiply by any number more than 1 increases, therefore to multiply by any part, or parts less than unity or 1, of course dimi-

niſhes; ſo that to multiply one half by one half, is the ſame thing as dividing it by 2, or halving it into a quarter.

EXAMPLES *in pure Fractions.*

1.	2.	3.	4.
·75	·537	·7354	·73542
×·5	× 9²	×.867	×.0007
·375	·49404	.6375918	.0005147 9 4

In Integers & Fractions.

5.	6.	7.	8.
35·57	47.65	53.008	864.453
× 7²	×.003	×.32	×468.354
25 6104			

In the Federal Tables.

9.	10.	11.
℔ // /	*lb.oz.dw.gr.*	*Mwt. c. lb. oz.*
25·47 3	19·7 5 6	35·3 64 3
×·365	×48	×7.009
9 29 7645:		

12. What coſt 17 *lb.* 6 ℥ 5 3 4 ℈ of medicine, at //33 ℔ *oz.*?

℥ 176.54 ×·33=℔ 58.25 8 *Anſ.*

13. I contract with Ned Sawyer for 48968 feet of pine boards, at ℔ 4·45 ℔ thouſand feet: what muſt I pay him for the whole?

Td. 48.968×4.45=℔ 217.90 7 *Anſ.*

14. A merchant purchaſed 217.55 yards of Holland, at //75 ℔ *yd.* what is the amount of the whole?

217.55×·75=℔ 163.16 5 *Anſ.*

15. I took Sampſon Whiſkey's note for 644 gallons of cider *(federal meaſure)* at ℔ 5.50 ℔ hogſhead: what was the ſum of the note?

Hhd. 6.64 × 5.5 = ℔ 38 52 *Anſ.*

16. What is the worth of 65.625 buſhels of flax-ſeed, at /// 83 ℔ buſhel?

Buſh. 65.625 × .833 = ℔ 54.66 5 *Anſ.*

17. The farmer purchaſed of the bloomer 5 *cwt.* 3*qr.* 25*lb.* of iron, and paid him in wheat, at the rate of 6.625 buſhel ℔ *cwt.* what was the number of buſhels paid?

Cwt. 53.25 × 6.625 = ℔ 353.03 1 *Anſ.*

NOTE. *The foregoing Examples in Decimal Multiplication, the author conceives, preſent a method of calculation more compendious in practice, and leſs puzzling in theory to the learner, than that of dividing by the* aliquot parts *of the given price, and by parts of a part, &c. with a different ratio for every different price, according to the method preſcribed in the old complicated rule denominated* Practice; *and alſo to ſuperſede the uſe of making ſeveral multipliers to bring out the total product of a compoſite number, in the rule commonly called* Compound Multiplication.

LESSON VII.

DIVISION of Decimals.

Q. HOW *do you place the parts in Decimal Diviſion?*

A. Juſt in the ſame order as in the Diviſion of whole numbers?

Q. *What is to be done with the laſt remainder?*

A. Annex a cypher to it and continue the diviſion, until you have exhauſted the dividend, and completed the fraction in the quotient.

Q. *Where the dividend may be exactly measured by the divisor, what is the fraction called, arising from that division?*

A. A *terminate* decimal.

Q. *Is it not sometimes the case, that the last remainder is such a number as will not give the quotient fraction with perfect exactness; altho' you annex cyphers, and continue the division ever so long?*

A. Yes; and such decimals, in contradistinction to the former, are called *infinite* or *circulating* decimals, and sometimes *repeating* decimals, because one or more figures always repeat, *ad infinitum;* as .666, .32573257, &c.

Q. *How is such a decimal to be terminated?*

A. It is unnecessary to protract the quotient to any greater number of figures, than what will contain the ultimate fraction sought; then force a stop by applying the surdal point to the last remainder, denoting it thrown away; and if the number in the last remainder equals, or exceeds the one half of that expressed in the divisor, set the antisurdal point over the last figure in the quotient.

This method reduces the circulating, into a terminate decimal; and, tho' it does not ascertain the fraction with perfect exactness, yet the variation is so very inconsiderable, that what is wanting in exactness, is abundantly compensated in practical convenience.

Q. *What do you further remark as particular in the nature of Decimal Division?*

A. That it is just the reverse of Whole Numbers, in that, dividing an integer by a fraction, or a fraction by a fraction, instead of diminishing, increases its value, or the quotient will ever be greater than the dividend.

Q. *What is the method of dividing Decimal fractions*?*

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* *Division of decimals is the most complex of any of the fundamental rules in decimal Arithmetic, and, indeed, the*

A. The general rule is to divide as in Whole Numbers, enlarging the number of the dividend, if neceſſary, by annexing one or more cyphers; then, in the queſtion, count off as many decimal places, as the dividend has more than the diviſor; and if there are not ſo many places in the quotient, ſupply the defect with left hand cyphers. For the greater eaſe, and clearer apprehenſion of the learner, this General Rule may be diſtributed into the ſeveral following Caſes, in which all the various modifications of decimal numbers are pointed out, with a particular Rule directly applied to each.

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only one which is not perfectly ſimple and eaſy. The great difficulty is, to know, with preciſion, in what place to ſet the ſmiſter point in the quotient. The General Rule is, indeed, juſt and extenſive, and, to the man of figures well verſed in the art, ſufficiently clear and explicit. It is the young learner, *however, who has that practical knowledge ſtill to acquire, who needs the benefit of a written rule; and yet is benefited by it no further, and no faſter, than he underſtands it, and becomes able to apply it. But, in the caſe before us, ſo diverſified are the examples in decimal Diviſion, by the different relations of the operating parts, the different modifications of the decimal numbers, and their different effects upon the value of the quotient, that it muſt be very difficult, if not impracticable, to ſtate any one general rule, ſufficiently definite to be at once clearly comprehended and eaſily applied by the young ſtudent. To remedy this inconvenience, the author is induced to vary from the common method, by analyſing the General Rule, and claſſing the different caſes which ariſe, under as many* particular *rules: theſe, being more ſimple, may be more eaſily applied; as the ſtudent, in any propoſed example, will readily ſee under which Caſe it falls, and there find a familiar rule, explicitly in point.*

CASE 1.

Decimals divided by Decimals.

RULE. If the Divisor and Dividend are both decimals only, and the Dividend have the smaller number of decimal places, make them equal, by annexing one or more right hand cyphers. Then,

If the divisor be a smaller fraction than the dividend, or just equal to it, the quotient will be integers, until all the figures in the dividend are brought down; but, after you annex a cypher to the last remainder, all the subsequent quotient figures will be decimals. But,

If the divisor be the larger fraction, annex one or more cyphers to the dividend, until the number will contain the divisor, and the quotient will be only fractions.

EXAMPLES.

1.	2.	3.
Divide .75 by .3	.8 ÷ 648 ..	.648 ÷ .8
.30) 75(2.5	.648).800(1.234	.8).648(
150	1520	.81
(0)	2240	
	2960	
	.3608	

CASE 2.

Integers divided by larger Integers.

RULE. When the divisor and dividend are both integers, and the dividend the smaller, annex a cypher or cyphers to the dividend, until it be large enough to divide, and prefix as many cyphers, save one, to the quotient.

EXAMPLES.

4.

Divide 225 by 250

250)225.0(.9

(0)

5.

Divide 5 by 379

379)5.00(.013+

121.0

73.0

351

CASE 3.

Decimals divided by Integers.

RULE. When the Divisor is an Integer, and the dividend a Decimal, expressed by a smaller number, annex one or more cyphers to the dividend, and prefix as many left hand cyphers to the quotient, and if there were any left hand cyphers in the dividend, prefix as many more to the quotient; which will be a fraction, as much smaller than the dividend, as the divisor was larger.

EXAMPLES.

6.

Divide .7 by 8

8).70(.0875

60

40

(0)

7.

.66÷96

96).6600(.000625

240

480

(0)

8.

.17÷680

680).1700(.0025

3400

(0)

CASE 4.

Decimals divided by Integers.

RULE. If the Divisor be an Integer, and the dividend a Decimal, expressing a larger number than the divisor; place the first significant figure, in the quotient, as far from the finisher point, as the right hand figure of the first dividual is from its point.

EXAMPLES.

9.	10.	11.
Divide .16 by 4	.175÷90	.4÷1234 ..
4).16(.04	90).175(.00194	1234).4000(.000324
	850	2980
	400	5120
	40:	1184:

CASE 5.

Integers divided by Decimals.

RULE. If the divisor be Decimals and the dividend Integers, annex, decimally, to the dividend, as many cyphers as there are figures in the divisor; and the quotient will be Integers, until all the dividend-figures are brought down.

EXAMPLES.

12.	13.	14.
Divide 75 by .015	659÷.7	5÷.375 ..
.015)75.000(5000	.7)659.0(	375)5.000(13.333
	941.428 ..	1250
		1250:

CASE 6.

Integers and Decimals divided by Decimals.

RULE. If the divisor be Decimals only, and the dividend Integers and Decimals, then annex to the integers, by the *dexter* point, as many of the decimal figures as there are figures in the divisor, (thus, 72.34·5) and if there be not so many decimal places in the dividend, supply them with cyphers, (thus, 72.300·) and the quotient, arising from all the figures upon the left of the dexter point, will be Integers.

EXAMPLES.

15.
Divide 168.81 by .3
.3) 68.8·1(
562.7

16.
72.0003÷08
.08)72.00 03(
900.00375

17.
9.68÷.053
.053)9.680·(182.6
438
140
340
22:

CASE 7.

Decimals divided by Integers and Decimals.

RULE. If the divisor be Integers and Decimals, and the dividend Decimals only, and expressing a larger number than the divisor, divide as in whole numbers, and the quotient will be decimals. But,

If the dividend be the smaller number, annex cyphers until you can divide, prefixing to the quotient as many cyphers, save one, as you annexed to the dividend.

EXAMPLES.

18.
Divide .6125 by 4.5
4.5).6125(.136
162
275
5:

19.
Divide .45 by 63.95
63.95).45000(.007036
23500
43150
4780:

CASE 8.

Integers and Decimals divided by Integers.

RULE. If the divisor be integers only, and the dividend Integers and Decimals: the quotient of the dividend integers will be integers, and those of the decimals, decimals. But,

If the Dividend Integers will not contain the divisor, annex a sufficient number of the decimal figures by the dexter point, prefixing to the quotient as many cyphers, save one, as there are figures between the dexter and sinister point in the dividend.

EXAMPLES.

20.

Div. 9.6 by 3

3)9.6(3.2

21.

75)6.50(.0866

500

50:

22.

1474.227÷54

54)1474.227(27.3005

394

162

...270

0

CASE 9.

Integers divided by Integers and Decimals.

RULE. If the divisor be Integers and Decimals, and the dividend Integers only, and greater in value than the divisor, then annex to the dividend as many decimal cyphers, as there are decimal figures in the divisor, and the quotient will be integers, until the last figure in the dividend is brought down. But,

If the dividend be smaller in value than the divisor, annex only so many cyphers as will make it larger and then the quotient will be decimals.

EXAMPLES.

23

Divide 810 by 32.4

32.4)810.0(25

1620

(0)

24.

Divide 54 by 432.8

432.8)54.00(.1247

10720

20640 &c.

CASE 10.

Integers and Decimals, divided by Integers and Decimals.

RULE. If the divisor and dividend both consist of Integers and Decimals, make the number of decimal figures equal in each; place the dexter point to the dividend, and the quotient will be integers: But, if the dividend does not contain the divisor, then annex to it a right hand cypher, and the quotient will be decimals.

EXAMPLES.

25.

Divide 75.3 by 3.75

3.75)75.30(20.08

3000

(0)

26.

Divide 75.6 by 151.2

151.2)75.6(.5

(0)

CASE 11.

The Divisor an Integer and Decimal Denominator.

RULE. When the divisor is an integer, and its number any Decimal Denominator, such as 10, 100, 1000, &c. whether the dividend be integers only, or integers and decimals, or decimals only, you have but to remove the sinister point as many figures towards the left hand as there are cyphers in the divisor.

EXAMPLES.

27. Divide 10. by 100. .1 *Anf.*

28. 45.57÷10 =4.557

29. .3÷1000 =.00039

CASE 12.

The Divisor a Decimal, formed by a single Unit.

RULE. If the divisor be a decimal made by a single unit, or an unit and any number of left hand cyphers, such as .1, .01, .001, &c. remove the sinister point in the dividend as many figures towards the right, as there are figures in the divisor; or annex as many cyphers, without the point, as the case may be.

EXAMPLES.

30. Div. 10 by .1 = 100

31. $4.557 \div .01 = 455.7$

32. $.00039 \div .001 = .39$

PROMISCUOUS EXAMPLES.

	Dividend.		*Divisor.*		*Quotient.*
33)	13.62	÷	4	=	33.905
34)	74621	÷	.9	=	82912
35)	39.255	÷	367	=	.1069
36)	.7394	÷	734	=	.00099
37)	4.9869	÷	4.5	=	1.1077
38)	.09875	÷	.984	=	.10035
39)	583	÷	841.	=	.006932
40)	78	÷	.983	=	79.3489
41)	72.8745	÷	23	=	3.1684
42)	28	÷	.007563	=	3702.23
43)	56	÷	70	=	.8
44)	.932	÷	37.5	=	.024853
45)	.45	÷	55.7	=	.08969
46)	480	÷	27.3	=	17.58

LESSON VIII.

COMMUTATION of Decimals.

Q. HOW *do you change a* vulgar *into a* decimal *fraction?*

RULE. Annex a cypher or cyphers to the numerator, and divide by the denominator; the quotient will be a decimal fraction of the same value.

EXAMPLES.

Change $\frac{3}{4}$

4)3.0(.75

Change $\frac{5}{20}$

20)5.0(.25

Change $\frac{3}{474}$

474)3.000(.00632

1560

1380

432

LESSON IX.

Of Mixed Quantities.

Q. WHAT *is the General Rule of changing* meſne *or ultimate fractions into the decimal parts of a* meſne *or ultimate integer, in all the tables of mixed quantities ?*

RULE. The ſame as that in the laſt Leſſon, after expreſſing the given ſum or quantity in the form of a vulgar fraction, as thus, 18*ſ* is $\frac{18}{20}$ of a pound; 6*d.* is $\frac{6}{240}$ of a pound, and $\frac{6}{12}$ of a ſhilling; 3 farthings are $\frac{3}{4}$ of a penny, $\frac{3}{48}$ of a Shilling, and $\frac{3}{960}$ of a Pound.

1. *Of* MONEY.

EXAMPLES.

What are the decimal parts of a Pound in 18 Shillings. 18*ſ* = $\frac{18}{20}$ of a Pound. Therefore 18÷20

20)18.0(.9*£*

=

What are the decimal parts of a Shilling and of a Pound in 6 Pence ?

6*d.* = $\frac{6}{12}$ of a Shilling, and $\frac{6}{240}$ of a Pound.

ſ. *£.*

12)6.0(.5 240)6.00(.025

What are the decimal parts of a Penny, of a Shilling, and of a Pound, in 3 Farthings ?

$\frac{3}{4}$ Penny $\frac{3}{48}$ Shilling $\frac{3}{960}$ Pound.

d. *ſ.* *£.*

4)3.0(.75 48)3.00(.0625 960)3.000(.003125

120 1200

240 2400

(0) 4800

(0)

Therefore,

Farthings.	*Pence.*	*Shillings.*	*Pounds.*
3 =	.75 =	.0625 =	.003125
	6.0. =	.5... =	.025...
		18.0... =	.9.....
$6\frac{3}{4}$ =	6.75 =	.5625 =	.028125
$18/6\frac{3}{4}$ =	=======	18.5625 =	.928125
$£1,,18,,6\frac{3}{4}$ =	==========	==========	1.928125

SECT. 2.

Another method of changing Shillings, Pence and Farthings into an equivalent decimal of a Pound.

RULE. 1. Write the given numbers perpendicularly under each other for dividends, inverting their order, or beginning with the ſmalleſt denomination.

2. Oppoſite to each dividend, in a left hand column, ſet the terminus of each for its diviſor, with the ſign of Diviſion between them.

3. Divide the higheſt dividend by its terminus, and annex the quotient as decimal parts to the next lower dividend; proceeding with all the remaining dividends in the ſame manner; and the laſt quotient will be the equivalent decimal of the given ſum.

Change $18/.\ 6d.\ \frac{3}{4}$, into the decimal of a pound.

4) 3.00
12) 6.75
20) 18.5625,
.928125 the decimal required.

Here, in dividing 3 by 4, I annex two cyphers, and the quotient is .75, which I annex to the 6*d*. This quotient, *viz*. 6.75, being pence and decimal parts of a penny, I divide by 12, and the quotient, .5625, I annex to the 18*ſ*. for decimal parts of a ſhilling. This quotient, divided by 20, gives the decimal ſought.

SECT. 3.

FEDERAL MONEY.

In federal money, no other Commutation is required, but only to read together all the lower denomina-

tions, as one aggregate decimal of that denomination propoſed for the integer; prefixing cyphers, as the caſe may require, and ſetting the point accordingly. This will be ſufficiently explained by the following

SCALE.

Conſolidation.

℔ ℔ ″ ′		″		℔		℔
1	=	.1	=	.01	=	.001
		1.0	=	.1	=	.01
				1.0	=	.1
1 1	=	1.1	=	.11	=	.011
1 1 1	=	11.1	=	1.11	=	.111
1 1 1 1	- - - - - -				=	1.111
1 0 1 1.	- - - - - -				=	1.011
1 0 0 1	- - - - - .				=	1.001

Reduction.

℔		℔ ″		″ ′		℔ ℔ ″ ′
1.001	- - - - - -				=	1 0 0 1
1.011	- - - - - - -				=	1 0 1 1
1.111	- - - - - -				=	1 1 1 1
.111	=	1.11	=	11.1	=	1 1 1
.011	=	0.11	=	1.1	=	0 1 1
.1	=	1.0	=	10.0	=	1 0 0
.01	- - -		=	1.0	=	0 1 0
.001	- - - - - -				=	0 0 1

LESSON X.

The ſame.

Q. IS *there not a ſhorter method of conſolidating ſhillings, pence and farthings, into decimals?*

A. Yes, by the following rules, *viz.*

RULE. 1. To change Shillings into decimals, halve them, and prefix the ſiniſter point; thus, the decimal of 14*ſ.* is .7. If it be any odd number of ſhillings, halve them with a ſuppoſed cypher annexed; thus, 19*ſ.* is 190÷2=.95. For 1 ſhilling, prefix a cypher to the

half, or, in other words, put the significant decimal figure in the place of hundreds; thus, 1*s.*=.05: Or you may multiply any odd number of shillings by 5, for parts of a hundred.

2. To change Pence into decimals of a Pound, multiply them by 4, and the product will be thousandths; to which add 1 for every 24 it contains.

3. To change Farthings into decimals of a Pound, call every farthing .001: This falls short of perfect exactness, but immaterially.

EXAMPLE.

Consolidate 18*s*/6¼, into the decimal of a Pound.

18÷2 =.9
6×4+1 =.025
3×.001 =.003

£.928 *the decimal required.*

This formal addition of the decimals, is only to make the example the more plain; but is unnecessary to the decimal practitioner; who may perform the additionin his mind only, and read the decimal merely by inspection. Let him but observe to add the third of the pence-decimal to the place of Hundreds, in that of Shillings, and the farthing-decimal to the place of Thousandths; and the operation is performed almost at a glance: Thus, 18*s*/6¼=.928. In this case, he has only to take the half of 18, or 9, and annex to it the product of 4 times 6, with the addition of 1 for the 24 and 3 for the farthings, or 28, making .928.

Q. *What is the shorter method of writing pence and farthings in the decimal of their* mean *integers?*

RULE. 1. To express pence in the decimal of a shilling, multiply them by 8, and add to the product 1 for every 3 in the given number, placing the sinister point. This, in 3*d.* 6*d.* and 9*d.* will be perfectly exact; in the others it will fall a trifle short; therefore it will be best to add 1 for 2*d.* 2 for 5*d.* 3 for 8*d.* and 4 for 11*d.*

2. To change Farthings into the decimal of a Shilling, multiply them by .021, and prefix a cypher: into the decimal of a Penny, by multiplying them into .25.

Change 9 pence into the decimal of a ſhilling.

$9 \times 8 + 3 = .75$ *Anſ.*

Change 3 farthings into the decimal of a ſhilling and of a Penny.

$3 \times .021 = .063$ *Shilling.*
$3 \times .25 = .75$ *Penny.*

LESSON XI.

How to change the lower Denominations of the ſeveral Tables of Weights & Meaſures into Decimal parts of their reſpective Integers.

Q. IS *there not another and ſhorter method of performing this operation, than by the* General Rule, *in* Leſſon IX?

A. Yes, by the medium of the following decimal Tables of weights and meaſures, conciſely expreſſing the decimal of each lower denomination, in relation to all its integers, or higher denominations.

RULE. Multiply the number of each denomination in the given quantity, into that number which expreſſes the decimal of 1 of the ſame denomination and integer in the table, and add their products together, for the whole Decimal.

1. TROY-WEIGHT*.

gr.	*dw.*	*oz.*	*lb.*
1 =	.0417 =	.0021 =	.00018
1.	=	.05 =	.00416
	1.	=	.083.

EXAMPLES.

1. What are the decimal parts of a pound in 20 grains?

.00018 *the decimal of* 1 *grain.*

×20

.00360

Anſ. .0036

2. Change 9*grs.* 13*grs.* and 18*grs.* into their reſpective decimals of a Penny-weight.

Anſ. 9*gr.* = .37, 13*gr.* = .54, 18*gr.* = .75.

Change 13 *dwt.* 7 *gr.* into decimals of an ounce. *A.* .664

21 *grs.*	*ditto*	.0441
19 *grs.*	*Penny-weight,*	.7923
20 *grs.*	*Pound,*	.0036
13 *dwts.*	*ditto.*	.054
17 *dw.* 3 *gr.*	*ditto.*	.70944
11 *oz.*	*ditto.*	.924
23 *grs.*	*ditto.*	.00414

* Ounces *Troy, may be changed into decimals of a Pound in the ſame manner as Pence into decimals of a Shilling.* Penny-weights *into decimals of a Pound wt. as Pence into decimals of a Pound currency: and into decimals of an Ounce by halving them like Shillings.* Grains *into decimals of an Ounce by doubling them, and adding to the product* 1 *for every* 24 *it contains, which will be parts of a thouſand; into decimals of a Penny wt. by multiplying them into* 4, *and adding to the product one for every* 24 *it contains.*

SECT. 2.

AVOIRDUPOIS-WEIGHT.

oz.	*lb.*	*qrs.*	*Cwt.* *	*Ton.*
1 =	.063 =	.0023 =	.0005 =	.000025
	1. =	.036 =	.008 =	.0005
		1. =	.25 =	.0125
			1. =	.05.

NOTE. *Drams are omitted as too minute to be of any special account in common practice.*

EXAMPLES.

Answers.

Change 14 *Cwt.* into the decimals of a Ton = .7
ditto 2 *qrs.* - - - *ditto* = .025
ditto - - - *Hund.* = .5
25*lb* - - - - Ton = .0125
ditto - - - Hund. = .2
ditto - - - Quarter = .9
110*oz.* - - - - Ton = .000275
ditto - - - - *Cwt.* = .0055
ditto - - - - Quarter = .0253
ditto - - - Pound = .693
7*lb.* 3*oz.* - - - Ton = .003575
ditto - - - *Cwt.* = .0575
ditto - - - Quarter = .2589
3*qrs.* 7*lb.* 8*oz.* - Ton = .0447
ditto - - - *Cwt.* = .89
16*Cwt.* 1*qr.* 27*lb.* 15*oz.* Ton = .814225

SECT. 3.

APOTHECARY-WEIGHT.

gr.	℈	ʒ	℥	*lb.*
1 =	.05 =	.016 =	.002 =	.00018
	1. =	.33 =	.041 =	.0035
		1. =	.125 =	.001
			1. =	.083

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* *Hundreds may be decimalized in the same manner as Shillings.*

EXAMPLES.

			Pound.
Change	12 *grs.* =	*into dec. of a*	= .00216
	2 ℈ =		= .007
	7 ℥. =		= .007
	2 ʒ =		= .168
	2 ℥. 7 ʒ. 2℈. 12 *gr.*		= .18716

SECT. 4.

LONG-MEASURE.

A League is .05 of a Degree.

A Mile is .017 of a Degree, and $\frac{1}{33}$ of a League.

A Furlong is .002 of a Degree, .041 of a League, and .125 of a Mile.

A Rod is .000052 of a Degree, .001 of a League, .003 of a Mile and .025 of a Furlong.

A Yard is .000015 of a Degree, .0003 of a League, .0009 of a Mile, .003125 of a Furlong, and .29 of a Rod.

A Foot is .0000125 of a Degree, .000025 of a League, .00018 of a Mile, .00151 of a Furlong, .06 of a Rod, and $\frac{1}{3}$ of a Yard.

An Inch is .00000008$\frac{7}{9}$ of a Degree, .0000052 of a League, .0000157 of a Mile, .000126 of a Furlong, .005 of a Rod, .028 of a Yard, and .084 of a Foot.

EXAMPLES.

		Answers.
Change 7 Inches into the dec. of a	League	= .0000364
1 Foot and 7 Inches,	*ditto*	= .0000614
3 yards, 1 foot, 7 inches	*ditto*	= .0009614
32 Rods, 3 yds. 1 foot, 7 inches	*ditto*	= .0329614
Furlongs, 6,,32,,3,,1,,7 inches	*ditto*	= .3369614
Miles, 2,,6,,32,,3,,1,,7 inches	*ditto*	= .9549614

SECT. 5.

Cloth-Measure.

Nail.	*Quarter.*	*Yard.*	*Fl. Ell.*	*Eng. Ell.*
1 =	.25 =	.0625 =	.084 =	.05
	1. =	.25 =	.34 =	.2
		1. =	1.25 =	.8
			1. =	.6

& .75 of a yard.

Examples.

Change 4 *yds.* 3 *qrs.* 2 *na.* into the dec. of an Eng. Ell.

4 × .8 = 3 .2
3 × .2 = .6
2 × .05 = .1

Anſ. 3 .9 *Eng. Ells.*

SECT. 6.

Land Measure.

Sq. foot.	*yd.*	*Pole.*	*Rood.*	*Acre.*
1 =	.11 =	.00037 =	.00001 =	.00000229
	1. =	.034 =	.0016 =	.00038
		1. =	.025 =	.0625
			1. =	.25

Examples.

Change 6 feet into the decimal of a *yard*, = .67
3 yds. 6 feet. - - - *Pole* = .10416
1 Pole, 27 yds, 8 feet - - *ditto* = .98896
1 Rood, 15 Poles, 12 yds. 7 feet, *Rood* = .39427
2 Roods, 25 Poles, 8 yds. 3 feet, *Acre* = .659296 89

SECT. 7.

Liquid Measure.

Pt.	*qt.*	*gall.*	*bar.*	*tierce.*	*hhd.*	*punch.*	*pipe.*	*tun.*
1 =	.5 =	.125 =	.004 =	.003 =	.002 =	.0015 =	.001 =	.0005
	1. =	.25 =	.008 =	.006 =	.004 =	.003 =	.002 =	.001
		1. =	.0318 =	.024 =	.016 =	.012 =	.008 =	.004
			1. =	.75 =	.5 =	.375 =	.25 =	.125
				1. =	.67 =	.5 =	.334 =	.167
					1. =	.75 =	.5 =	.25
						1. =	.667 =	.334
							1. =	.5

EXAMPLES.

Change 1 *gal.* 3 *qts.* 2 *pts.* into the dec. of a *Bar.* = .6352
1 *bar.* 9 *gal.* 3 *qts.* 1 *pt.* - - *Tierce.* = .987
1 *tierce*, 1 *bar.* 23 *gal.* 3 *qts.* - - *Hhd.* = 1.55
1 *hhd.* 2 *tierces*, 13 *gall.* 2 *qts.* - *Pun.* = 1.412
1 *pun.* 1 *hhd.* 1 *tr.* 1 *b.* 1 *g.* 1 *qt.* - *Pipe.* = 1.764

SECT. 8.

DRY MEASURE.

Quart.	*gallon.*	*peck.*	*bush. U. S.*	*bush. Can.*
1 = .25	= .125	= .03125	= .025	
1.	= .5	= .125	= .1	
	1.	= .25	= .2	
		.1	= .8	

EXAMPLES.

Change 3 *pecks*, 1 *gal.* 2 *qts.* into the decimal of a *bush.* U. S. - - - - = .9375
Ditto, - - *bush. Can.* .75

SECT. 9.

Of TIME*.

Day.	*Week.*	*Month.*	*Year.*
1 = .14	= .034	= .003	
1.	= .25	= .02	
	1.	= .083	

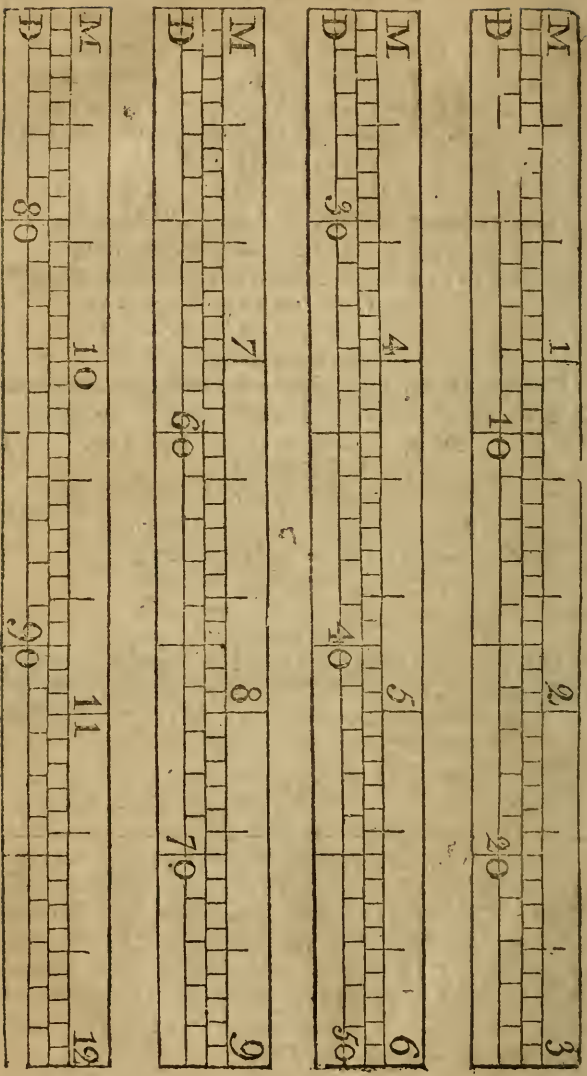
EXAMPLE.

What is the decimal of a year in 7 months, 3 weeks, and 3 days?

Months 7 × .083 = .581
Weeks 3 × .02 = .06
Days 3 × .003 = .009
Anſ. .65. of a year.

---

* *The above decimal table of Time is not conformed to a mathematical exactneſs, but to the purpoſe of greater convenience in common practice, and particularly to the uſual method of reckoning Time in the calculation of Inteſt, in which its utility principally conſiſts. For this reaſon, alſo, it does not deſcend to hours, minutes and ſeconds. Thoſe who wiſh to be more minute, may apply the general rule, or conſult the decimal Table.*


M
D
1
10
2
20
3
M
D
3 0
4
4 0
5
5 0
6
M
D
6 0
7
7 0
8
8 0
9
M
D
8 0
10
9 0
11
10 0
12

To facilitate the art of decimalizing *Time*, the foregoing Scale is propoſed, deſigned as an uſeful companion to the man of buſineſs, eſpecially in the calculation of intereſt; as it will enable him to find the decimal of any requiſite part of a year, merely by inſpection, and in a decimal of only two places of figures.

Explanation of the Scale.

The Scale repreſents the period of 1 year divided into 100 equal parts; each ſtave contains one quarter or .25 of a year. The ſpace M divides the year into the 12 months and numbers them; the narrow ſpace next below it ſubdivides the months into periods of two days; on the line D are marked the decimal parts of a year, having 100 for the integer or decimal denominator, and numbered at every ten. Therefore to find the decimal of any part of a year, find the given time upon the Scale, by the months and days; this being done take the mark ſtanding directly, or the neareſt under it, for the number of its decimal.

Apply the laſt example for a ſpecimen.

Look 7 months and 24 days upon the Scale, and the decimal directly under it is .65, the ſame as before.

LESSON XII.

Reduction of Decimals.

Q. WHAT *is the common and general rule of operation in reducing decimals of all the tables of mixed quantities?*

Rule. Multiply the given decimal by the *terminus* of the denomination next lower than its integer; then point off from the product as many right hand figures as there were decimal figures in the multiplicand; the figures pointed off are ſo many of that denomination, of which the multiplier was the terminus, and the figures pointed off are decimals of that denomination, and muſt be multiplied by the next lower terminus, and ſo on, as before.

EXAMPLES *in each Table.*

Reduce .928125 of a pound to its equivalent value in shillings, pence, &c.

.928125
×20

S. 18.5625(00
×12

D. 6.75(00
×4

Q. 3.00 *Anf.* 18*s*6¾

2. Reduce .9877 of a pound Troy weight.
Anf. 11*oz.* 13*dw.* 1*gr.*

3 Reduce .913955 of a Ton.
Anf. 18*Cwt.* 1*qr.* 3*lb.* 4*oz.* 2*dr.*

4 Reduce .9549614 of a League.
M. fur. r. yds. f. in.
Anf. 2,,6,,36,,4,,0,,7.

5 Reduce .572 of an Engliſh Ell.
Anf. 2*qrs.* 3*nails.*

6. Reduce .23916 of a pound (Apothecary-weight.)
Anf. 2℥. 6℥. 2℈. 1*7gr.*

7. Reduce .65929689 of an Acre.
Anf. 2*Roods*, 25*P.* 14*yds.* 7*feet.*

8. Reduce .987 of a Tierce.
Anf. 1*bar.* 10*gal.* 1*pint.*

9. Reduce .9375 of a Buſhel U. S.
Anf. 3*pecks.* 1*gal.* 2*qts.*

10. Reduce .735 of a year.
Anf. 8*mo.* 3*weeks*, 2*days.*

LESSON XIII.

Decimal Commutation of Money continued.

Q. WHAT *ſhorter method is there of reducing the decimals of this Table?*

RULE. If the integer be pounds, point off with the *dexter* point the three left hand figures, or with the antisurdal point, if the fourth be as large or larger than 5, then multiply them by 2, setting down the product of the left hand figure only, which is so many Shillings.

If this be an odd number, then subtract *five* from the second figure, and to the remainder annex the 3d figure, and after casting out 1 for every 25, divide by 4; the quotient will be pence and the remainder farthings. If the Shillings be an even number, then the *second* and *third* figures form a dividend as they stand. In this way the reduction may be performed merely by inspection.

EXAMPLES.

1. Reduce .928·125 of a pound.

Ans. 18*s*/6$\frac{3}{4}$ *See the reverse, in page* 205

2. Reduce .579 of a pound.

Ans. 11*s*/7

Explanation.

Example 1. Take off the three left hand figures, 928, with the dexter point, the rest are thrown away: then say, twice 8 is 16—twice 2 is 4, and 1 is 5; then twice 9 is 18, which last product only I set down for shillings; that being an even number, I take the 2d and 3d figures as they stand, subtracting only 1 for the 25 which they contain, which leaves 27 for a dividend; this divided by 4, gives quotient 6 for pence, and remainder 3 for farthings.

Example 2. $2\times9=18$; $2\times7=14+1=15$; $2\times5=10+1=11$; which I set down for shillings: this being an odd number, subtract 5 from the second figure 7, which leaves 2—the 9 annexed makes 29: 1 subtracted for the 25, leaves 28; this divided by 4, quotients 7 pence.

NOTE. *If there be only two decimal figures, annex a right hand cypher; if there be but one, double it, and you have it in shillings.*

LESSON XIV.

A concise Decimal method of exchanging the several Currencies of Federal Money, and Pounds, Shillings and Pence.

Q. HOW *do you apply the following Table, for the exchange of currencies?*

RULE: After changing the parts of a Pound, if any, into decimals, look for the *currency* of the given sum at the left hand, and for *that* of the sum required, at the top: tracing from them, mark the decimal where their rows meet; then multiply by that tabular number, and the product will be the answer sought.

	Sterl.	*S. C.*	*Irish.*	*Hal.*	*N. E.*	*N. J.*	*N. Y.*	*Fed.*
Federal.	.225	.233	.244	.25	.3	.375	.4	
N. York.	.5625	.584	.609	.625	.75	.9375		2.5
N. J. &c.	.6	.622	.65	.667	.8		1.007	2.667
N. E. &c.	.75	.778	.8125	.834		1.25	1.334	3.334
Halifax.	.9	.934	.975		1.2	1.5	1.6	4
Irish.	.923	.957		1.003	1.23	1.538	1.641	4.003
S. Car.	.964		1.0446	1.007	1.286	1.607	1.714	4.286
Sterling.		1.004	1.084	1.112	1.334	1.667	1.778	4.447

EXAMPLES.

Consolidate £133,,12, N. Jersey, &c. currency, into S. Carolina and Georgia currency.

133.6
Tabular number, × .622

Ans. 83.099·2=£83,,01,,11¼.

Reduce £34,,7,,6 Halifax, into the currency of N. E.

34·375
Tabular number, × 1.2

Ans. 41.2500=£41,,5

Conſolidate ℳ315.75, into the currency of N.Y,&c.
Tabular number, ×.4

£126.300=£126,,6 *Anſ.*

For further examples, under this rule, the learner may turn back to Leſſons V, IX and X, of the Second Part.

LESSON XV.

Exchange between various foreign Monies of account, and Federal Money.

RULE. Look the federal money value of the money unit of the given foreign currency in Leſſon XIX, Second Part; then, if the operation be Conſolidation, multiply, if Reduction, divide by that decimal number, and the product or quotient is the anſwer required.

EXAMPLES.

Change 5379 livres Tournois into federal money.
×.19

ℳ680.01 *Anſ.*

NOTE. *To reverſe the exchange in this and all the following Examples, you have only to reverſe the operation by the ſame decimal.*

Change 574 mill rees of Portugal into federal money.
×1.24

ℳ711.76 *Anſ.*

Change 1000 guilders into federal money.
×.39

ℳ390.00 *Anſ.*

Change 1235 marcs banco of Hamburgh.

3)1235(

$411.66 7 *Anſ.*

Change 440 Chineſe tales into federal money.

×1.48

$651.20 *Anſ.*

Change 749 rupees of Bengal into federal money.

×.555

$415.695 *Anſ.*

Change 683 pagodas of India into federal money.

×1.94

$1325.02 *Anſ.*

LESSON XVI.

PROPORTION.

Q. WHAT *is the nature and effect of this rule?*

There are ever three numbers, or terms given, by which to find a fourth. Theſe numbers are either ſimple and expreſſed, or complex and involved in two or more factors, and bear relation to each other in a comparative proportion, as hereafter explained. Of theſe four terms, the firſt and ſecond form an *Hypotheſis* or Suppoſition, ſtating a certain *cauſe* as producing a certain *effect*—the third and fourth terms form a *conſequence* deduced from the ſecond and third, inferring, as an anſwer to the queſtion, a certain other cauſe or effect, correſponding in kind with that given in the Hypotheſis.

Q. *What are the general and common diviſions of this Rule?*

A. 1. *Direct* Proportion, or Sngle Rule of Three.
2. *Indirct* Proportion or Rule of Three inverſe.
3. *Compound* Proportion or Double Rule of Three.
Give a conciſe explanation of each.

A. Direct proportion, is where the anſwer ſought is the *effect* of a certain given cauſe in the Conſequence, and is of the ſame kind with the 2d. term, or the effect ſtated in the Hypotheſis; and bears the ſame proportion to it, as the cauſe in the Conſequence does to the cauſe in the Hypotheſis—or, the fourth term bears the ſame relation to the ſecond, as the third does to the firſt. This is arguing from cauſe to effect, as, if 4 men eat 1 Buſhel of wheat in a week, *then* 16 men will eat 4 Buſhels in the ſame time. Which numbers may be thus divided and claſſed.

Hipotheſis.	*Conſequence.*
cauſe. effect.	*cauſe. effect.*
4 men. 1 Buſhel.	16 men. 4 Buſhels.

2. *Indirect* Proportion, is when the anſwer required is the *cauſe* of the effect ſtated in the Conſequence, and bears the ſame proportion to the ſecond term, or the effect in the Hypotheſis, as the firſt term, or cauſe in the Hypotheſis, does to the third given term, or the effect in the Conſequence. This is the reverſe of the former, or reaſoning from the effect to its cauſe; that is, if ſuch a given effect be produced by ſuch a particular cauſe, what cauſe is neceſſary to produce another certain given effect. *Example.* If ℔ 100 in 12 months gain 6 *pr. cent.* intereſt, ℔ 150 will gain the ſame ſum in 8 months.

Hypotheſis.	*Conſequence.*
cauſe. effect.	*cauſe. effect.*
℔ 100 in 12*m.* 6	℔ 100 in 8*m.* 6 intereſt

3. *Compound* Proportion, may be either direct or indirect and commonly conſiſts of five numbers. It is where two of the given terms are complex and lie involved in the ſquare of two or more given numbers, connecting with the cauſe or effect, ſome certain ci-

cumſtance or quality, material to the queſtion, and inſeperable in its operation; ſuch as, *the* diſtance *of goods carried—the* number, quantity, weight &c. *of any commodity bought or ſold—the* time *of money lent, or advanced as ſtock in trade* &c &c. Example. If £100 at intereſt 10 months gain 5, what ſum will 150 gain in 5 months? Here the cauſe in the Hypotheſis is a complex term, conſiſting of 2 numbers, 100 and 10 months; and ſo alſo in the Conſequence 150 and 5 months.

Q. *How are the given numbers to be prepared for the work, in every kind of Proportion?*

A. 1. Expreſs the correſponding parts in numbers of the ſame name or denomination, and the fractional numbers, if any, in decimals.

2. Take that or thoſe numbers which expreſs the cauſe in the Hypotheſis, and write them down in one line; then its effect, at a convenient diſtance towards the right hand, and draw a line from one to the other.

3. Place the terms of the Conſequence in the ſame manner, each under its coreſponding term, or number of the ſame name in the Hyphotheſis; ſupplying the vacant term or number with the letter Q, and then draw a tranſverſe line from the effect in the Hypotheſis to the cauſe in the Conſequence, connecting the horizontal lines in the form of the letter Z.

Q. *What is the general Rule of operation in all kinds of Proportion?*

A. After ſtating the terms as above, then obſerve the following Rule, viz.

Rule. If the queſtion or Q falls under the *effect*, it is Direct Proportion, if under *cauſe* it is Indirect Proportion—in the *firſt* caſe, multiply the number or numbers, if any, conſtituting the cauſe in the line of Conſequence, with the number or numbers expreſſing the effect in the line of Hypotheſis, at the other end of the croſs line, for a *Dividend*; and all the other

numbers together for a Divisor. In the *second* case, multiply the first mentioned terms together for a divisor, and all the numbers standing at the other two corners for a Dividend; and the quotient, in either case, is the answer, or fourth term; and of the same name or denomination with the number standing above Q. See the illustration of the Rule in the following

EXAMPLES.

1. If $4\frac{1}{2}$ yards of Broadcloth cost 18 Dallars what must I pay for 90 yards?

Cause.. Effect.

Statement. { *Hypothesis,* 4.5 *yds* Z 18
Consequence, 90 Z Q.

Operation Q. = 90 × 18 ÷ 4.5 = 360 ℳ

Here the Q falling under *effect*, the proportion is *direct*.

2. If 360 dollars purchase 90 yards of broadcloth, what is the price of 4.5 yards?

Cause. Effect.

Hyp. ℳ 360 Z 90 *yds.*
Con. Q. Z 4.5

Q. = 360 × 4.5 ÷ 90 = ℳ 81. *Ans.*

Here the Q, falling under *cause*, denotes *Indirect* Proportion, and the number opposite it, (90) is, of course, the divisor. These two examples mutually prove each other; they may also be proved in another method, by this rule, *viz.* that the square of the two *extremes*, if the operation be true, will ever be equal to the square of the *mesnes*—that is, the product of the 1st and 4th terms, in the order they are stated, will be the same number as that of the 2d and 3d.

Proof. { 4.5 × 360 = 18 × 90 = 1620
360 × 4.5 = 90 × 18 = 1620

3. If ℳ 100, at interest 10 months, gain 5, what will 150 gain in 5 months?

Statement.

	Cauſe.		*Effect.*
Hyp.	100 for	10 months,	5 int.
Con.	150	5	Q.

Operation. $150\times5\times5\div100\times10=\text{£}3.75$ *Anſ.*

Here the firſt and third term, being complex, the example is in Compound Proportion, while the place of the queſtion denotes it to be *direct*.

Proof. $100\times10\times3.75=150\times5\times5=3750$.

4. If £150 gain 3.75, in 5 months; what principal will gain £5 intereſt in 10 months?

Statement.

	Cauſe.		*Effect.*
Hyp.	150,	5 months,	3.75
Con.	Q.	10	5

Operation. $150\times5\times5\div10\times3.75=\text{£}100$. *Anſ.*

Proof. $150\times5\times5=100\times10\times3.75=3750$.

Here the Q falling under *cauſe*, the rule of Indirect Proportion applies, and the 2d and 3d terms involve the diviſor.

5. If 64 Canada buſhels are equal to 80 buſhels of the United States meaſure, and each of the former contains 40 quarts; how many quarts does the U. S. buſhel contain?

Statement.

	Cauſe.			*Effect.*
Hyp.	64	*C.b.* 40 *qts.*		equal the whole*.
Con.	80		Q.	equal the ſame.

Operation. $64\times40\div80=32$ *qts.* *Anſ.*

6. If 8*lb.* of Hyſon tea coſt £3,,2, what will be the expence of 39*lb.*?

Cauſe. *Effect.*

Hyp. 8*lb.* cauſes the expence of £3.1

Con. 39*lb.* Q. (*how much?*)

Anſ. £15.1125=15,,2,,3.

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* *Where the effects in both parts are the ſame, neither of them can be the object of inquiry, nor need to be expreſſed.*

7. If £100, in 12 months, gain £6 intereſt; what principal will gain the ſame ſum in 8 months?

Cauſe. *Effect.*

Hyp. £100, in 12 months, Z a ſum of intereſt.
Con. Q. 8 the ſame ſum.

Anſ. £150.

8. If I pay my landlord $2.25 for 1 week's board, what will be his bill for 30 weeks?

Anſ. $67.50.

9. If a footman performs a journey in 3 days, when the days are 16 hours long; how many days of 12 hours length, will it requre for him to perform the ſame journey? *Anſ.* 4 days.

10. If 27 grains of American gold be equal to 1 dollar, what is the worth of 1*lb.* 9*oz.* 8*dw.* 6*gr.*?

Anſ. $380.66 6.

11. If 3*lb.* of ſtandard gold be worth £256 of the currency of N.York; what is the weight of £1000?

Anſ. 11*lb.* 8*oz.* 11*d.* 21*gr.*

12. How many yards of carpeting that is 1.5 yard wide, will cover a floor that is 18 feet wide and 30 feet long? *Anſ.* 60.

13. If 1 ton can be tranſported 40 miles for 5 dollars, how many *cwt.* may be carried 100 miles for 8 dollars?

Anſ. 12*cwt.* 3*qrs.* 5*lb.* 9$\frac{3}{5}$*oz.*

14. If 72 gallons of Brandy coſt 111. dol. //60, what would 97.5 *gall.* coſt? *Anſ.* $151.12 5

15. How long muſt I lend my friend $123.45 to requite his kindneſs in lending me $54.36, for 327 days. *Anſ.* 144 days.

16. If 82 buſhels of the United States are equal to 19 ſetiers of Paris, how many ſetiers are contained in 410 buſhels? *Anſ.* 95 ſetiers.

17. If 44 canes of Rome be equal to 100 yards of America; how many yards are contained in 57 canes?

Anſ. 129.54 yards.

18. If 37 dollars equal 25 Chineſe tales, what is the federal money value of 212.5 tales?

Anſ. $314.5.

19. How many ſhingles will it require to cover the roof of a houſe 40 feet in length, and of 18 feet rafters, allowing each ſhingle to cover 24 ſquare inches?

Anſ. 17280.

20. What number of Bricks will it require to build an houſe, 40 feet long and 30 feet wide, with a wall of 17 feet to the eaves, and 1 foot thick, allowing 27 inches to 1 cubic foot, and a deduction of 1 quarter for the ſpace of doors and windows?

Anſ. 26808 Bricks.

21. If 67½ acres be plowed by 6 men in 15 days; how many acres can 18 men plow in 60 days?

Anſ. 8100 acres.

22. If 9 tailors can make 36 ſuits of clothes in 6 days; how many tailors, in 36 days, can clothe an army of 2520 men? *Anſ.* 17.5 tailors.

23. How many yards of ſhalloon, 5 quarters wide, will line 15 coats, each containing 3½ yards of cloth, of 3 quarters wide? *Anſ.* 31.5 yards.

24. A. put 257 dollars to intereſt for 8 months, and then received, for principal and intereſt, 267 dollars, 28 cents: I demand at what rate *per cent. per annum* he received intereſt?

Anſ. 6 *per cent. per ann.*

25. At the rate of 6 *per cent. per ann.* what principal will amount to 100 dollars in 12 months?

Anſ. $94.34, *almoſt.*

26. If a ſtick of timber 56 feet long, 9 inches broad, and 13 inches thick, coſt £11,,18; what is the worth of 6 ſticks, 37 feet long, 10 inches broad, and 7 inches thick? *Anſ.* £28.224.

27. If 40 men in 15 days can perform a certain piece of work, how many men will accompliſh another 3 times as great, in a fifth part of the time?

Anſ. 600 men.

28. How much Sugar at 9 pence *pr.? lb.* muſt be given in barter for 127*lb.* of Tea at 3/6 *pr.? lb.* ?

Anſ. 27*lb.* 3 *oz.*

29. A farmer ſold wheat to his merchant, to the amount of 342 dollars, 75 //; at the rate of 75 cents *pr.* Buſhel—what was the number of Buſhels ſold?

Anſ. 457.

30. But the merchant failing before payment, was able to remit but 64 // upon the dollar—how much did the farmer loſe? and what were his avails?

Anſ. Avails ℔ 219.36
Loſs 122.39

31. The farmer, contriving how to regain his property in the uſual method of ſpeculation, veſted the avails of his wheat in weſtern wild lands, at the price of 62 // *pr.* acre, and afterwards ſold the ſame for ℔ 1.75 *pr.* acre—What gain *pr. cent.* did he make? and what was his whole profit.

Anſ. ℔ 182.25 8 *pr. cent.*
399.80 whole profit.

32. The farmer now reſolved to commence the more elegant life of a merchant—accordingly repairs to New-York, lays out the whole avails of his lands in goods, and takes up as much more on 6 months credit—he retails them chiefly upon truſt, at the advance of 25 *per cent.* upon the firſt coſt, in addition to the expence of tranſportation. At the end of 6 months, he found his buſineſs in the ſituation following, *viz.* His wife and daughters had taken up, in articles of dreſs, furniture, ſugars, ſpices, &c. &c. to the amount of 500 dollars—his clerk embezzled 117 dollars, // 92—as much as 340 dollars worth of his goods were ſo illy choſen as to be perfectly unſaleable—all the reſt of his goods were retailed, and the money received in, 144 dollars, // 79. Six of his cuſtomers who owed him in all 191 dollars, // 69, abſconded—*Queſtion.* How much *per. cent.* excluſive of all contingent expences, did the farmer-merchant loſe? what was the ſum

total of his loſs—and how much did he realize in the end? *Anſwer.*

He loſt ℔ 74.41 3 *pr. cent.*
1149.61 in the whole.
And realized but 398.29.

LESSON XVII.

EQUATION OF PAYMENTS.

Q. WHAT *is the nature and uſe of this Rule?*

A. It is to find an equitable mean time for the payment of a debt, or ſeveral debts, due at different times.

Q. *What is the rule of operation?*

A. Take the debt, or the ſum total of the ſeveral debts, for a diviſor; and the ſum of the products, made by multiplying each payment with its reſpective time, for a dividend; and the quotient will be the equated time.

EXAMPLES.

1. S. owes T. £597,,15, of which £143 is to be paid in 5 months and 12 days; £287 in 8 months and 18 days, and £167,,15 in 14 months: but S. agreeing to diſcharge the whole debt in one payment, to how long a pay-day is he entitled?

143 × 5.54 = 779.35
287 × 8.72 = 2402.64
167.75 × 14 = 2348.50

597.75)5530.49(9.2522 = 9*mo.* 7 days.

NOTE. *Find the decimal parts of time in the above example, by the Scale in page* 214.

2. There is due to a merchant the ſum of 1148 dollars, from one man, in three ſeveral notes of hand; one for 135 dollars, //15, becoming due in 3 months; another for 684 dollars, in 6 months and ten days, and the reſt in a third note, in 12 months. The debtor takes up thoſe notes, and gives one note for the whole debt: What time of payment muſt the note expreſs?

Anſ. 7 months and 20 days.

LESSON XVIII.

PARTNERSHIP.

Q. WHAT *is* Partnerſhip?

A. It is where two or more merchants, or others, by voluntary agreement, form a company, and unite their property in a common ſtock, for their mutual advantage in buſineſs.

Q. *What is incidental to ſuch a partnerſhip?*

A. 1. Each partner muſt ſhare in the eventual gain or loſs of the company, in proportion to his individual ſhare of ſtock in the common capital, unleſs otherwiſe ſtipulated in the agreement of the company.

2. The contracts of each partner are binding upon the whole company, and the reverſe; and they are ſeverally liable for each other's debts contracted during the time of their partnerſhip.

Q. *How is a partnerſhip diſſolved?*

A. By the mutual agreement of its members, and a public notification given of the ſame, according to the cuſtom of merchants, and the rules preſcribed by law.

Q. *How is Partnerſhip divided?*

A. 1. Into Simple Partnerſhip, that is, when the ſtocks of each partner continue for an equal term of time. And,

2. Compound Partnerſhip, that is, when the ſtocks continue an unequal length of time.

SECT. 1.

SIMPLE PARTNERSHIP.

Q. *To what other caſes in practice does this rule apply, beſides that of mercantile and other companies formed by voluntary aſſociation?*

A. It applies to the diviſion of the eſtate of a bankrupt, or an inſolvent inteſtate, among his individual creditors, according to the ſum of their ſeveral claims—

to the aſſeſſment of ſchool, town, county or ſtate taxes, where they are made up by a common ratio of pence upon the pound, or cents upon the dollar, &c. and indeed to all imaginable caſes, where, by the operation of law, or the principles of equity and common juſtice, a common loſs or gain, according to a certain proportion, is to be ſhared by a number of individuals.

Q. *What is the rule of operation?*

Rule. As the ſum of the ſeveral ſtocks is to the total gain or loſs; ſo is each man's ſhare in ſtock, to his ſhare of the gain or loſs.

By this rule of ſtating, make as many ſeveral operations in Direct Proportion, as there are partners in company, or perſons concerned in the gain or loſs.

Q. *How is the truth of the operation proved?*

A. By adding all the ſhares together, and finding their ſum equal to the whole loſs or gain: Or,

By inverting the operation, making the total gain or loſs, the firſt term; the ſum of the ſeveral ſtocks, the ſecond, and each man's ſhare of the gain or loſs, the third.

Examples.

1. A. and B. purchaſed goods in company. A. paid 12 dollars, and B. 27: their gain in the ſale of the goods was 9 *doll.* 75 *cts.* What was each man's ſhare?

A.	B.
12+27=39 Z 9.75	39 Z 9.75
12 Q.=$3 *Anſ.*	27 Q.=6.75. *Anſ.*

2. George Selby, merchant, broke for 25000 *doll.* The whole amount of his property was but 9875 *doll.* How much upon the dollar could he average to his creditors? and what was their reſpective loſſes, who ſeverally claimed as follows, *viz.* J. S. 7239*doll.* 75*cts.* A. W. 3257*doll.* 75*cts.* R. N. 5486*doll.* 55*cts.* and G. L. 9016*doll.* 45*cts.*? *Anſ.* .39 5 *upon the doll.*

J. S. loſt	$4380.10 7	R. N. loſt	3319 36 3
A. W.	1970.63 6	G. L.	5454.98 4

3. A town-tax is to be made up, of 3 cents upon the dollar, aſſeſſed upon a number of men, according to the amount of their rateable property in their ſeveral liſts, annexed to their names, as follow, *viz.* James Grimſtead 2745*doll.* 25*cts.* Charles Tucker 1263*doll.* 34*cts.* Jonathan Hooke 857*doll.* 43*cts.* Eleazer Carey 420*doll.* 67*cts.* Iſaiah Warner 89*doll.* 85*cts.* and Nicholas Heiſter 3568*doll.* 72*cts.* What was each man's tax?

Anſwer.

J. G.	82.35 3
C. T.	37.90
J. H.	25.72
E. C.	12.62
I. W.	2.69 6
N. H.	107.06 2

NOTE. *In this laſt Example, and in all others of the ſame kind, you need only to multiply each man's ſtock or liſt, by the rate of the tax, or the number of cents expreſſed in decimals of a dollar, as .03, and the product will be the anſwer ſought.*

Take James Grimſtead's liſt for an example, and it will ſufficiently explain the rule to the learner.

2745.25
Multiplied by .03

J. G.'s tax, 82.3575

SECT. 2.

COMPOUND PARTNERSHIP.

Q. *What is Compound Partnerſhip?*

A. It is where the ſtocks continue an unequal term of time, and each partner is to ſhare in the whole gain or loſs, in proportion to the *compound* ratio of his particular ſtock and time taken together: Wherefore it is called *Compound Partnerſhip.*

Q. *What is the rule of ſtating?*

RULE. Multiply each man's ſtock into its time, and add the ſeveral products together, for a firſt term in

Direct Proportion. Take the whole gain or loss for the second term; and each particular product, or the square of each man's stock and time for the third term.

Q. *How is this rule proved?*

A. As in Simple Partnership.

EXAMPLES.

1. A. and B. were joint tenants of a mill, in the building of which A. laid out 150 dollars, and B. 270. At the end of 7 months, A. sold his share to B. and at the end of the first year B. sold the mill. They then made a settlement; and, the year's profit of the mill being ascertained at 350 dollars; what was each man's share?

$150 \times 7 = 1050$
$270 \times 12 = 3240$

	A.	B.
	4290 Z 260	4290 Z 260
	1050 L Q.	3240 L Q.
Ans.	A. 63.63 6	B. 196.36 4

2. Three merchants traded together: A. put in 400 dollars, for 9 months; B. 333*doll.* 33*cts.* for 16 months, and C. 366*doll.* 67*cts.* for 14 months. They gained 350 dollars. What was coming to each?

Ans. To A. 89.57
B. 132.70
C. 127.73

3. Jacob M'Ewen, Giles Jackson, John Hastings, and Anthony Minot, were joint tenants of a certain toll bridge, which they held for the term of 14 years, by charter. Their whole expence in building the bridge was 25745*doll.* 50*cts.* of which M'Ewen paid 4896.67, Jackson 1675, Hastings 12392.37, and Minot 6780.96. At the end of $2\frac{1}{2}$ years, M'Ewen sold out to Peter Thomson; at the end of 5 years, Jackson sold out to Jeremiah Apthorp; at the end of 10 years, Hastings sold his share to James Hawkins; at the ex-

piration of the fourteen years, the whole tollage amounted to £30000 : What was each man's ſhare?

	Anſwers.
M'Ewen,	£1018.90 3
Jackſon,	697.07
Haſtings,	10314.87 1
Minot,	7901.52 8
Thomſon,	4686.95 3
Apthorp,	1254.72 7
Hawkins,	4125.94 8

LESSON XIX.

SIMPLE INTEREST.

Q. WHAT *is* Simple Intereſt?

A. It is the profit ariſing from a ſum of money lent, or for the forbearance of any debt due. Upon the ſame principle, and by the ſame rule of operation, it alſo extends to the premiums given for *factorage, brokerage, ſtorage, inſurance, buying and ſelling of ſtocks, &c. &c.*

Q. *What are the technical parts of this Rule?*

A. 1. The PRINCIPAL, or the ſum lent, or due.

2. The RATIO, or Rate *pr. cent.* which is a certain ſum, payable for every 100 pounds or dollars principal; and in the ſame proportion for any ſum greater or ſmaller.

3. The TIME, or length of forbearance for which intereſt is to be computed.

4. The INTEREST, or premium due for forbearance, according to the given Ratio and Time.

5. The AMOUNT, or principal and intereſt added together,

LESSON XX.

How to reckon Intereſt upon any Sum, at any Rate *pr. cent.* for 1 Year; the ſame Rule equally applying to *Factorage*, *Brokerage*, *Storage*, *Impoſt*, *Inſurance*, *buying* and *ſelling* of *Stocks*, &c.

Q. WHAT is *the Rule in this Caſe?*

A. 1. Expreſs the principal decimally, if there be parts of a pound, or of a dollar, in the given ſum.

2. Multiply the principal by the Ratio, decimally expreſſed, and the product is the intereſt ſought, in pounds and decimals, or in dollars and cents.

SECT. 1.

The PRINCIPAL, in *Pounds*, *Shillings*, *&c.*

EXAMPLES.

1. What is the intereſt of £35,,10,,6, for 1 year, at 6 *pr. cent?*

Princ. 35·525
Ratio, ×·06

Intereſt, 2.13150 = £2,,2,,7½.

NOTE. *If the* Ratio *be* 5 *per cent. you have only to read the pounds and decimals, principal, as ſhillings and decimals, intereſt.*

2. What is the intereſt of £175,,3,,6, at 5 *pr. cent?*
Anſ. f. 175·175 = £8,,15,,2.

3. What is the intereſt of £987,,17,,9 at ½ *pr. cent.*
Anſ. £4,,18,,9½

Anſwers.

4. Of £325,,17,,11, at 1 *pr. cent.**? £3,,5,,2
5. Of 231,,5,,9, at 2 *pr. cent.*? 4,,12,,6

* *In this ratio you have only to remove the decimal point two figures towards the left hand.*

	£.	Answers.
6.	263,,7,,4½, at 3 *pr. cent.*?	£7,,10
7.	823,,5,,5, at 4 *pr. cent.*?	32,,18,,7¼
8.	5721,,15,,8t at 5 *pr. cent.*?	286,,1,,9
9.	89,,12,,6, at 6 *pr. cent.*?	5,,7,,6½
10.	6520,,4,,5, at 7 *pr. cent.*?	456,,8,,3¾
11.	375,,13,,4, at 8 *pr. cent.*?	30,,1
12.	257,,16, at 9 *pr. cent.*?	23,,4
13.	345,,6,,8, at 10* *pr. cent.*?	34,,10,,7
14.	192,,1,,1, at 11 *pr. cent.*?	21,,2,,6
15.	3752,,17,,1, at 12 *pr. cent.*?	450,,6,,7¾

SECT. 2.

Federal Money.

1. What is the intereſt of ℔ 118.40, for 1 year, at 6 *pr. cent. pr. ann.*?

118.40.
×.06
℔ 7.1040 *Anſ.*

2. What is the intereſt of ℔ 583.92, at 5 *pr. cent.* for 1 year?

Note. *At 5 r. cent. intereſt on Federal money, nothing more is neceſſary, but to remove the point one figure towards the left hand and then halve the ſum as follows:*

2) 58.392
℔ 29.196 *Anſw.*

Again, remove the decimal point in the principal as before: and, if the ratio be 9 *pr. cent.* ſubtract the principal from itſelf; but, if 11 *pr. cent.* add it; obſerving, in either caſe, to ſet the firſt left hand figure of the lowermoſt number, under the ſecond in the upper number. See the next examples.

3. What is the intereſt of ℔ 385.29, for 1 year, at 9 *pr. cent.*?

---

* *At* 10 per cent *ratio, only remove the decimal point in the principal one figure towards the left hand, and the intereſt is found.*

38.529 .
−3.8529

$34,6761 *Anf.*

4. What is the intereſt of $67.45, at 11 *pr. cent.* for one year?

6.745 .
×.6745

$7.4195 *Anf.*

5. What is the intereſt of $3292.80, at ½ *per cent.*?

Anf. $16.46 4

Anſwers.

6. $1086, at 1 *per cent.*? $10.86
7. 769, at 2 *per cent.*? 15.38 9
8. 887.89, at 3 *per cent.*? 26.33 7
9. 2744.23, at 4 *per cent.*? 10.77
10. 19072.62, at 5 *per cent.*? 953.63
11. 278.75, at 6 *per cent.*? 16.72 5
12. 853.34, at 7 *per cent.*? 59.73
13. 252.20, at 8 *per cent.*? 20.20
14. 119.50, at 9 *per cent.*? 10.755
15. 1151.12, at 10 *per cent.*? 115.112
16. 640.35, at 11 *per cent.*? 70.43 8
17. 622.77, at 12 *per cent.*? 75.73

LESSON XXI.

How to compute intereſt at 6 *per cent. per ann.* for any length of time.

Q. WHAT *conciſe Rule have you of caſting intereſt at 6* per cent. *for any length of time?*

A. RULE. Multiply the principal by one half the given time, reckoning in months and decimals, and point off for decimals in the product, two figures more than the number of decimal figures in both the factors.

EXAMPLES.

1. What is the intereſt of £38,,10 for 8 months and a half at 6 *per cent, per ann.* ?

38.5
×4.25

1.63625=£1,,12,,8¾ *Anſ.*

	Principal.	*Ratio.*	*Time.* yr. mo. d.	*Intereſt.*
2.	£127,,15,,6	6 *per cent.*	13,, 7	£8,,13,,4½
3.	87,, 9,,2	*do.*	11,, 8	5,, 0,,9
4.	1000	*do.*	1	3,,5
5.	1,, 1,,1	*do.*	7,, 5,,24	9,,5¾
6.	63,,17,,4	*do.*	8,,19	2,,15,,2¼
7.	529,,19,,9	*do.*	5,, 7,, 6	178,, 1,,6
8.	137,,13,,9	*do.*	16,, 8	137,,13,,9

SECT. 2.

FEDERAL MONEY.

1. What is the intereſt of ₰128.34, for 8½ months?

×4.25

Anſ. 5.454·450

	Principal.	*Ratio.*	*Time.* yr. mo. d.	*Intereſt.*
2.	₰425.91	6 *per cent.*	1,, 1,, 7	₰28.74 8
3.	291.53	*do.*	11,, 8	16.76
4.	212.89	*do.*	8,,19	9.16
5.	1766.63	*do.*	5,,7,, 6	595·54

LESSON XXII.

Where the Principal is in the Currency of N. England, or N. York, &c. to find its Intereſt or Amount in Federal Money.

1. *Intereſt for* 1 *Year, at* 6 *per cent.*

RULE. Multiply the principal, if N. E. money,

by .2; if N. Y. &c. currency, by .15, and if at 7 *per cent.* by .175

EXAMPLES.

1. Intereſt required in federal money, on £127,,3, N. E.

127.15
×.2

$25.530 *Anſ.*

2. Intereſt required, at 6 and at 7 *per cent.* on £235,,8, N. Y.

235.4
×.15

$35.310 *Anſ.* at 6 ℔ *ct.*

235.4
×.175

41.1950 *Anſ.* at 7 ℔ *cent.*

2. *The Amount, from* 1 *to* 7 *per cent. and from* 1 *to* 12 *years, by the following Tables.*

RULE. Multiply by that tabular number ſtanding where the given time and ratio meet.

1. NEW-ENGLAND *Money.*

yr	*rat.* 1	2	3	4	5	6	7
1	3.367	3.4	3.734	3.47	3.5	3.534	3.567
2	3.4	3.467	3.534	3.6	3.334	3.734	4.8
3	3.434	3.534	3.667	4.734	3.834	3.934	4.334
4	3.467	4.6	3.734	3.867	4.	4.134	4.267
5	3.5	3.667	3.834	4.	4.167	4.334	4.5
6	3.534	3.634	3.934	4.134	4.34	4.534	4.734
7	3.567	3.8	4.034	4.267	4.5	4.734	4.967
8	3.6	3.867	4.134	4.4	4.667	4.934	5.2
9	3.634	3.934	4.234	4.534	4.834	5.134	5.434
10	3.667	4.	4.334	4.667	5.	5.334	5.667
11	3.7	4.667	4.333	4.8	5.167	5.534	5.9
12	3.734	4.134	4.534	4.934	5.34	5.734	6.134

2. NEW-YORK, *&c. Currency.*

yr.	*rat.* 1	2	3	4	5	6	7
1	2.525	2.55	2.575	2.6	2.625	2.65	2.67
2	2.55	2.6	2.65	2.7	2.75	2.8	2.85
3	2.575	2.65	2.725	2.8	2.875	2.95	3.025
4	2.6	2.7	2.8	2.9	3.	3.1	3.2
5	2.625	2.625	2.875	3.	3.125	3.25	3.375
6	2.65	2.8	2.95	3.1	3.25	3.4	3.55
7	2.675	2.85	3.025	3.2	3.375	3.55	3.725
8	2.7	2.9	3.1	3.3	3.5	3.7	3.9
9	2.725	2.95	3.175	3.4	3.625	3.85	4.075
10	2.75	3.	3.25	3.5	3.75	4.	4.25
11	2.775	3.05	3.325	3.6	3.825	4.15	4.275
12	2.8	3.1	3.4	3.7	4.	4.3	4.6

EXAMPLES.

1. Required the amount in federal money, of £287, N. E. on interest 7 years, at 5 *per cent.*

287

Tabular number, 4.5

$1291.5 *Anf.*

2. The amount of £37.9, N. Y. in 4 years, at 7 *per cent.* *Tab. number*, 3.2

$121.28 *Anf.*

LESSON XXIII.

How to compute Interest for any Principal, Ratio, or Time.

RULE. Find the decimal parts of a year, if any, by the Scale, page 214, and multiply the principal by the product of the ratio and time.

EXAMPLES.

1. Required the interest of £113,,4,,9, for 2 months and 23 days, at 2 *per cent. per annum.*

2mo. 2d.=.17×.02=.0034 113.2375
×.0034

.38500750=7/8½ *Anſ.*

2. Intereſt on ℳ187.62, at 3 *per cent.* for 1 year, 9 months and 3 days.

187.62
1yr. 9mo. 3d.=1.76×.03 = .0528

9.806336=ℳ9.80 6 *A.*

	Principal.	*Ratio.*	*Time.*	*Intereſt.*
3	£85,,7,,7	4 *per cent.*	*mo.*4,,2	£1,,3,,7¼
4	ℳ331.58	5	*yr.*1,,6,,6	ℳ8.62 1
5	£27,,10,,5	6	*mo.*6,,19	£0,,18,,2
6	ℳ1728.72	7	*mo.*7,,18	ℳ76.23 6
7	£77,,15,,3	8	*yr.*1,,3,,9	£7,,10,,7½
8	ℳ222.70	9	*mo.*9,,16	ℳ15.93 4
9	£0,,18,,1	10	*mo.*10,,15	£0,,1,,7

LESSON XXIV.

How to reckon Intereſt, by Days, on any Principal, and on ſeveral Principals, for different Times—Accounts-current, Inſtalments, &c.

RULE. Multiply each principal by its reſpective number of days, and divide the product, or the ſum of the products (when more than one) after removing the decimal point two figures towards the left, if

At 5 *per cent.* by 73.
At 6 *do.* by 56.
At 7 *do.* by 51. And the quotient will be the anſwer.

EXAMPLES.

1. What is the intereſt of 36*doll.* for 125 days, at 5 *pr. cent pr. ann.*?

36×125÷7300=0.61 6 *Anſ.*

2. What is the intereſt of 360 dollars, for 87 days, 118 for 125 days, and 400 for 158 days, at 6 *per cent. per annum?*

Principal.		*Time.*
360	×	87=31720
118	×	125=20750
400	×	158=63200

56)1156.70(₰20.66, *nearly.*

3. The purchaſer of my eſtate is to pay me 1700 dollars in 4 yearly inſtalments of 425 dollars each, with intereſt on each, from the time of contracting, at 7 *per cent. per annum.* What is the whole intereſt ariſing upon the ſeveral inſtalments?

Anſ. ₰297.40

LESSON XXV.

Intereſt on Bonds and Obligations, having partial Payments endorſed.

RULE 1. Compute the intereſt upon the whole principal, for the whole time; then ſeparately upon each indorſement for its reſpective time, and ſubtract the whole amount of the one from that of the other.

RULE 2. *(Eſtabliſhed by the Superior Court of the State of Connecticut,* A. D. 1784.) "Compute the intereſt to the time of the firſt payment; if that be "one* year or more from the time the intereſt commenced; add it to the principal, and deduct the "payment from the ſum total. If there be after payments made, compute the intereſt on the balance "due to the next payment, and then deduct the payment as above; and in like manner from one pay-

* *By comparing this with the Introduction, the ſecond paragraph of page 38, the reader will obſerve a ſmall miſtake of the author, in the conſtruction of this rule.*

" ment to another, till all the payments are abſorbed ; " provided the time between one payment and ano- " ther be one year, or more. But if any payment be " made before one year's intereſt hath accrued, then " compute the intereſt on the principal ſum due on " the obligation for 1 year, add it the principal, and " compute the intereſt on the ſum paid, from the time " it was paid, up to the end of the year ; add it to " the ſum paid, and deduct that ſum from the princi- " pal and intereſt, added as above.

" If any payments be made of a leſs ſum than the " intereſt ariſen at the time of ſuch payment, no in- " tereſt is to be computed but only on the principal " ſum, for any period."

Take the following note of hand, by both rules, for an

EXAMPLE.

Value received, I promiſe to pay to George Appleton, the ſum of one hundred and twenty dollars, with lawful intereſt. [6 *per cent. per annum.*] Witneſs my hand. PETER FRISBIE.

January 1, 1795.

Endorſed thus :

June 1, 1795. Rec'd on the within note 50*doll.*
Oct. 1, 1795. Rec'd - - - 40*doll.*
The laſt payment was made January 1, 1796.

By Rule 1.

120*doll.* Principal, or ſum of the note.
7.20 Intereſt for the whole time.

127.20 Amount.

50 Firſt payment.
1.75 Intereſt.

51.75 Amount.

40 Second payment.
.60 Intereſt.

40.60 Amount.

51.75
40.60 } Several amounts of payments.

92 35 Total amount—ſubtract it from amt. of debt.

℔34.85 Remains due on the note.

By Rule 2.

120 *loll.* Note.
7.20 Intereſt for one year.

127.20 Amount.
51.75 Firſt payment, deducted.

75.45 Due June 1, 1795.
4.52 Intereſt for 1 year.

79.97 Amount.
41.60 Second payment, deducted.

38.37 Due October 1, 1795.
.57 Intereſt to January 1, 1796.

℔38.94 Amount, or ſum due, by Rule 2.
34.85 Ditto, by Rule 1.

4.09 Difference.

Contraction of Rule 1.

Rule. Point off the right hand figure of each principal for a decimal; multiply each by its particular time, and add the products. If the principal were pounds, &c. the ſum total will be ſhillings and decimals; but if federal money, halve it for dimes, in-

tereſt, which, added to the laſt principal, gives the ſum due.

Reſume the former Example.

		Time.	
1ſt Principal,	$12.0	× 5*mo.*	= 60
2d *do.* - -	7.0	× 4	= 28
3d *do.* - - -	3.0	× 3	= 9
			2)97
			4.85 Intereſt.
			30 Laſt principal.
			$34.85 Amount due.

NOTE. *To find either the Principal, Time, or Ratio, when the other terms are expreſſed in the queſtion, apply the* Rule of Three, *according to the ſpecimens in the 7th, 15th, 24th and 25th Examples, in* Leſſon XVI.

LESSON XXVI.

COMPOUND INTEREST.

Q. WHAT *is* Compound Intereſt?

A. It is Intereſt upon Intereſt, or taking the amount of principal and intereſt for the firſt year, as a new principal for the ſecond year, and the amount of the ſecond, for that of the third, and ſo on.

Q. *Is there not a ſhorter proceſs of reckoning Compound Intereſt?*

A. Yes. Take a different *time*, which bears the ſame proportion to the given time, as Compound does to Simple Intereſt; then reckon Simple Intereſt on the given principal for that *aſſumed* time, which will be its Compound Intereſt for the given time: and if there be any fractional part of a year, make a ſecond operation at Simple Intereſt for that.

By the following Table, containing the given time in the left hand column, and the assumed time written against it at the right hand, from 4 to 10 *per cent.* Compound interest may be reckoned upon any principal, for any number of complete years, from 2 to 20, by operation of the Rule in Lesson XXIII.

NOTE. *The table is not calculated to give the Compound Interest with perfect exactness; yet the variation is so very small, that it will conveniently answer every practical purpose.*

Given Time. Years.	4 ℔ *ct.*	5 ℔ *ct.*	6 ℔ *ct.*	7 ℔ *ct.*	8 ℔ *ct.*	9 ℔ *ct.*	10 ℔ *ct.*
2	2.04	2.05	2.06	2.07	2.08	2.09	2.1
3	3.12	3.15	3.18	3.21	3.24	3.28	3.31
4	4.25	4.3	4.37	4.43	4.05	4.57	4.64
5	5.42	5.52	5.63	5.74	5.86	5.98	6.1
6	6.64	6.8	6.97	7.14	7.33	7.52	7.71
7	7.93	8.14	8.39	8.64	8.92	9.2	9.48
8	9.24	9.55	9.89	10.24	10.63	11.03	11.43
9	10.61	11.	11.48	11.96	12.48	13.12	13.57
10	12.04	12.57	13.17	13.8	14.	15.29	15.83
11	13.54	14.2	14.96	15.86	16.15	17.66	18.42
12	15.09	15.93	16.86	18.07	18.49	20.24	21.27
13	16.69	17.72	18.87	20.43	21.02	23.05	24.41
14	18.33	19.6	21.	22.96	23.75	26.11	27.86
15	20.09	21.58	23.26	25.67	26.69	29.45	31.66
16	21.9	23.65	25.8	28.57	29.88	33.09	35.84
17	23.5	25.83	28.49	31.67	33.32	37.06	40.43
18	25.44	28.02	31.34	35.09	37.04	41.39	45.48
19	27.58	30.32	34.36	38.64	41.05	46.11	51.04
20	29.84	32.74	37.56	42.44	45.38	51.25	57.16

RULE. Multiply the principal by the product of the *assumed* time and given ratio, and that product will be the Compound Interest for the given time,

EXAMPLES.

What is the compound intereſt of £235·75, for 7 years, at 4 *per cent. per annum?*

Aſſumed time is 7·93 — 235·75
Ratio, X.04 — ·3172

·3172 — £74·779900 *Anſ.*

	Principal.	*Time.*	*Ratio.*	*Comp. Intereſt.*
2.	£623.16	8 *years.*	5 *per cent.?*	£297.56
3.	75·50	9 *do.*	6 *do.*	52.
4.	326.61	3 *do.*	7 *do.*	73·39
5.	350.	7 *do.*	8 *do.*	249.76
6.	115.55	6 *do.*	9 *do.*	78.20 5
7.	327·45	5 *do.*	10 *do.*	199·74 4
8.	121.21	6½ *do.*	5 *do.*	45·27 2
9.	144.	18 *do.*	6 *do.*	270·77 7

LESSON XXVII.

DISCOUNT.

Q. WHAT *is* Diſcount?

A. It is the reverſe of Intereſt, being a ſum allowed to the debtor for the payment of a debt before it becomes payable; or, it is the payment of ſo much preſent money, as, being put out to intereſt, would amount to the given ſum, due in future payment.

Q. *How is the diſcount, and preſent worth of any ſum of money, found?*

A. By the Rule of Proportion, in Leſſon XVI, and ſtated as follows, *viz.*

RULE 1. To find the *Diſcount*, take the amount of 100 dollars, or pounds, for the given time and ratio, for the firſt term; the given ratio, for the ſecond, and the principal for the third.

RULE 2. To find the *preſent worth*, take 100 for the ſecond term, and the given principal for the third.

RULE 3. Subtract either the discount, or present worth when found, from the principal, and the remainder will be the other sum.

EXAMPLES.

1. What is the discount of 100 dollars, for 1 year, at 6 *per cent.*?

106 Z 6
100 Z Q. = $5.66 *Ans.*

2. What is the present worth of 100 dollars, payable in 1 year, discounting at 6 *per cent. per annum*?

106 Z 100
100 Z Q. = $94.34 *Ans.*

Note. *These examples mutually prove each other, as either answer, being subtracted from* 100 *dollars, leaves the other.*

3. What is the discount of $175.55, for 2.5 years, at 5 *per cent. per annum*? *Ans.* $19.50 4

4. What is the present worth of 350 dollars, payable in 4 years, at 7 *per cent. per ann.* discount?

Ans. $273.4375

SECT. 2.

Discount, at Compound Interest.

RULE. Take the *assumed* time for the given time, by the Table, and calculate the discount at Simple Interest upon that.

1. What is the present worth of 350 dollars, payable in 4 years, at 7 *per cent. per annum*, compound interest discount?

Assumed time 4.3 × *ratio* 7 = 131.01 Z 100
350 Z Q. = $267.15 5

2. What is the compound interest discount on 500 dollars, for 8 years, at 6 *per cent. per annum*?

Ans. $186.20 6

3. What is the present worth of 1000 dollars, payable in 12 years, discounting in compound interest, at 10 *per cent. per annum*? *Ans.* $319.79 5

A COMPENDIOUS TREATISE ON

BOOK-KEEPING;

OR,

ACCOMPTANTSHIP REDUCED TO PRACTICE.

THE importance of Accomptantſhip is ſo generally known, and its utility ſo univerſally acknowledged, that any commendation will be unneceſſary, further than to obſerve, that a thorough knowledge of the art is eſſential to the character of a Man of Buſineſs. The *Italian* method of Book-Keeping is ſo perfect a ſyſtem of its kind, that the mercantile world have generally adopted it in the management of accompts. Its principles are founded in reaſon, ſince it is evident, that no tranſaction can be made, that is not accountable to another. It is my object, therefore, to give a conciſe ſpecimen of Book-Keeping, in the method of double-entry.

Of BOOKS *of* ACCOMPT.

Three books are indiſpenſably neceſſary for every man in mercantile buſineſs, *viz.* the WASTE-BOOK, JOURNAL, and LEDGER; beſides a number of ſubſidiary books, according to the variety and extent of his buſineſs.

1. *The* WASTE-BOOK.

The *Waſte-Book* contains the ſubject matter from which the two other books are formed. It opens with an Inventory of the ſeveral articles compoſing a merchant's ſtock, together with the debts incumbering it; after which follow the daily occurrences of trade, ſuch as buying, ſelling, &c. In this book, every tranſaction relating to a merchant's buſineſs, ought to be explicitly entered, without paying that particular attention to method and ſtyle which ought to be obſerved in the Journal, where the ſeveral Debits and Credits are clearly aſcertained.

2. *The* JOURNAL.

The *Journal* is a book preparatory to the Ledger, into which every entry from the Waſte-Book, ought to be fairly tranſcribed in a legible hand, and in that kind of laconic ſtyle peculiar to merchants. This book is conſidered by men of mercantile buſineſs as eſſentially neceſſary, and indeed its utility is obvious—the hurry in which entries are frequently made in the Waſte-Book—the inaccuracy and negligence of young clerks who are allowed to write in that book—the difficulty of poſting from it into the Ledger, together with the miſtakes that would probably ariſe from that practice, are good and ſubſtantial reaſons with merchants for uſing this intermediate book, *The Journal.*

The principle upon which this method of Book-Keeping is founded, precludes the neceſſity of writing the word *Credit*, at all in the Journal; for, as before obſerved, no tranſaction can be made that is not accountable to another; that is, no charge can in reaſon be made, that does not anſwer to ſome correſponding credit. Hence ariſes the neceſſity of raiſing fictitious accompts, as *Profit and Loſs*, &c.—The Journal ſhould be written in a fair hand, with great attention to neatneſs and accuracy.

3. *The* LEDGER.

The *Ledger* is the grand book of accompt, made up from the Journal, wherein the ſeveral articles compoſing the different accompts, are ſo arranged under their proper heads, as to exhibit at one view, a true ſtatement of a merchant's affairs, which is the ſole end and deſign of Accomptantſhip.

Every accompt in the Ledger ought to be opened in a fair text hand; and great care ſhould be taken that no blots or eraſements happen in this book.

Of SUBSIDIARY BOOKS,

I have not room to ſay much. The Invoice and Letter Books are uſed by moſt men in buſineſs. The others, ſuch as Bill-Book, Book of Commiſſions, Book

of Accompts current, &c. are of such a nature, that they must be left to the ingenuity and discretion of merchants, to use, as the variety and extent of their business may require.

General Rules *for Journalizing, and for posting into the Ledger.*

In Journalizing, or transcribing from the Waste-Book into the Journal, it is necessary to keep, in idea, this fundamental principle, that, when any accompt, whether real, personal, or fictitious, is charged, some other accompt must be discharged to the same amount. Hence the necessity of clearly expressing the corresponding Credit, to every Debit in the Journal. The term, *Profit and Loss*, was invented to supply the defect of a debtor or creditor, when no other accompt could in reason be debited or credited, for any things received in, or paid out. So likewise the term, *Stock*, has been substituted for the Merchant's own name.

In posting from the Journal into the Ledger, the date of the transactions must be inserted in a column allotted for that purpose; after which, the accompt, Debited, or Credited, must be expressed, noting, in the column immediately preceding the money-columns, its reference to the folio in the Ledger, where its corresponding accompt is opened: and if an error be discovered in either the Debit or Credit side of the Ledger, make no erasement or interlineation to rectify it, but balance the error by a corresponding entry on the opposite page of the folio.

To the Ledger, an *Index* is necessary, wherein the names, and titles of every accompt, are arranged in alphabetical order, quoting the folio where such accompt stands.

Of Balancing.

Merchants are induced, once in every year, or oftener, to balance their books; as well to shew the true state of their affairs, as to determine whether their ac-

compts have been kept with accuracy. To accomplish this, pursue the following

DIRECTION.

Begin with the first accompt in your Ledger, omitting, however, the accompts of Stock, and of Profit and Loss; personal accompts unclosed, must be evened by balance—the balance being in your favor, carry it to the debit side of Balance-accompt; if against you, carry it to the credit side. In accompt of goods, if any remain unsold, (which will appear by adding up each side of the inner columns, ruled for that purpose) carry the difference of quantity, at the original cost, to the debit side of Balance-accompt—then balance the money column, by Profit and Loss: If gained by this article, Profit and Loss must be credited; if lost, that accompt must be debited for the difference. In this way, proceed thro' the Ledger; after which, balance Profit and Loss accompt, and carry the difference to Stock-accompt. *Lastly*, balance Stock-accompt; and if the difference between the debit and credit side of this accompt, will even Balance-accompt, your books are, most assuredly, kept accurately; if not, there is, as certainly, some error—for the discovery of which, your books must be pricked over, and the whole foregoing process gone thro' a second time.

GENERAL OBSERVATIONS.

After all, it will be extremely difficult for a *retailer* strictly to adhere to the formality of this method of Book-Keeping. The great variety of articles in which he deals, the small quantities in which they are dealt out, together with the hurry and confusion in which business is frequently transacted in a retail-shop, render it almost impracticable to keep an accurate Sales-accompt of the quantity of commodities sold. To obviate this difficulty, men acquainted with business in the retail line, have adopted the practice of opening

a general accompt, termed *Merchandize General*, to which all purchaſes and ſales of merchandize have reference. The foregoing rules for balancing are equally applicable to this method, only it will be neceſſary in this caſe, at the time of balancing, to take an Inventory of all goods remaining on hand, which come under the common denomination of *Merchandize general.*

In a book of this kind, it is impoſſible to comment with minuteneſs upon each particular branch of ſo extenſive a ſyſtem, as the Italian method of Book-keeping: The general rules and fundamental principiples, only, can be compriſed in this imperfect compendium. It is hoped, however, that the foregoing rules and obſervations, exemplified and illuſtrated by the following practical Specimen, will convey a general knowledge of the art to the ſtudent, and thus anſwer the important purpoſe for which they are introduced.

WASTE-BOOK. (1)

Lanſingburgh, September 1ſt, 1796.

Inventory of the money, effects and debts, belonging to, and owing by me, PETER LOVETRADE.		℔	/
I have in Caſh	℔1500		
3 Puncheons Rum, 600 *gall.* which I value at 1.25 ℔ *gall.*	750		
100 Rolls Plug Tobacco 1400*wt.* .14	196		
200 Sides Sole Leather, 3225*wt.* at .18	580.50		
1500 Buſh. Salt, at .75	1125		
4 qr. Caſks Sherry Wine, 130*gall.* at 1.12 ℔ *gall.*	145.60		
4 Hhd. Molaſſes, 440*gall.* at .60 per *gall.*	264.		
John Hamilton owes me, per note, on demand,	231.19		
William Jones, pr. acct.	97.71		
Benjamin Conner, pr. *do.*	110.		
		5000	
I owe as follows:			
To Henry Bell, per acct.	℔250.		
To John Farrow, per *do.*	75.		
To Joſeph Redfield, per note, 15 days to run	375.		
		700	
6th.			
Sold for Caſh 47 ſides Sole Leather, 630*wt.* at .21 pr. *lb.*		132	30
10th.			
Rec. of J. Hamilton in full of his note		231	19

(2) *WASTE-BOOK.*

	℔	″
September 15th.		
Paid my note to Joseph Redfield, in full	375	
20th.		
Sold Abram Cunningham 1 Punch. Rum, 123*gall.* 1 50 per *gall.* 184.50 350 Bush. Salt, at 1.10 per *bush.* 385. 1 Hhd. Molasses, 108*gall.* at .75 81. To pay at 30 days.	650	50
24th.		
Paid Henry Bell in full	10	
26th.		
Paid District Collector, for licence to retail Spiritous Liquors & Wines	10	
27th.		
Bought for Cash $376\frac{20}{60}$ *bush.* Wheat, at 1.50 per Bushel	564	50
30th.		
Paid Charges this Month	34	15
October 3d.		
Sold James Carey 37 Sides Sole Leather, 592*lb.* at .22 per *lb.* and rec'd in money 76.24 His note at 30 days for remainder 54.	130	24
5th.		
Paid John Farrow, in full,	75	
8th.		
Rec'd of William Jones, in full,	97	71
10th.		
Bought for Cash $432\frac{40}{60}$ *bush.* Wheat, at 1.50 per Bushel	657	64
12th.		
Rec'd of Benjamin Conner, in full,	110	

WASTE-BOOK. (3)

October 14th.

Ship'd for New-York, on board the sloop Tryall, Capt. Hickok, 815*buſh.* Wheat, at meaſure, conſign'd to him for ſales and return; and paid charges of boating, &c. till on board — £ 24 45

17th.

Sold for Caſh one Puncheon Rum, containing 120*gall.* at 1.45 — 174

20th.

Sold Peter Olds 600*buſh.* Salt, at 1.10, to pay at 20 days — 660

22d.

Sold Joſhua Johnſon 2 Caſks Sherry Wine, 67*gall.* at 1.50, for which rec'd his note, at 30 days, for — 100 50

25th.

Rec'd of Abram Cunningham 347*buſh.* Wheat, on acct. at 1.55 — 537.85

10 Caſks Flaxſeed, cont'g 700*buſh* at 1.60, and caſks at £1 each — 122.

659 85

Paid Abram Cunningham the balance due him on acct. of his Wheat and Flaxſeed — 9 25

27th.

Bought of Nicholas Grocer, New-York, 4 Cheſts Bohea Tea, weighing, nett, 1388*lb.* at .35 per *lb.* — 485.80

500*lb.* Lump Sugar, at .26 — 156.

For which gave my note at 60 days. — 641 80

29th.

Capt. Hickok has returned from N. York, and I have ſettled with him on the ſales of my Wheat: it weighed out 806$\frac{40}{60}$ *buſh.* Sold at 1.84 pr. *buſh.* 1484.26½

Deduct for Freight, &c. 34.26½

Nett Proceeds rec'd in full. — 1450

(4) *WASTE-BOOK.*

	£	s
October 31st.		
Paid Charges this Month	51	23
November 1st.		
Barter'd 250 *bush.* Salt, at 1.12, for 20 Casks Flaxseed, cont'g 140*bush.* at 2.	280	
Paid Cash for the Casks, at 1. each	20	
3d.		
Rec'd of James Carey 20*bush.* Wheat, at 1.52	30 40	
Cash in full of his note	23.60	
	54	
Paid Freight and Charges on my Tea and Sugar, this day rec'd from N. York	5	
5th.		
Bought $639\frac{45}{60}$*bush.* Wheat of Joseph Farmer, at 1.76 per Bushel; for which paid as follows:		
Salt 250*bush.* at 1.12	280.	
Bohea Tea, 1 Chest, nett 349*lb.* at .42 per *lb.*	146.58	
50 Sides Sole Leather, 750*lb.* at .21	175.50	
200*lb.* Lump Sugar, at .29	58.	
1 Puncheon Rum, 120*gall.* at 1.48	189.44	
1 *qr.* Cask Sherry Wine, 33*gall.* at 1.50	49.50	
Cash in full	244 94	
	1125	96
10th.		
Bought for Cash 450*bush.* Wheat, at 1.76 per Bushel	792	
12th.		
Sold for Cash 2*hhd.* Molasses, 218*gall.* at .72 per Gallon	156	96
Rec'd of Peter Olds, in full	600	

WASTE-BOOK. (5)

	£	s.
——— *November 16th.* ———		
Sold Abram Perkins 1 Puncheon Rum, 120 *gall.* on account of which I have received 56 *bush.* Wheat, at 1.75 per Bushel 98.		
And his draught on Wm. Johnstone, for remainder 82.		
	180	
——— 19*th.* ———		
Lent Peter Punctual, to be paid on demand,	100	
——— 23*d.* ———		
Ship'd for New-York, on board sloop Hare, Capt. Johnson, 1473 *bush.* Wheat, at measure, with orders to sell for Cash, and purchase for me 4 Puncheons Rum; paid charges till on board	47	10
——— 28*th.* ———		
Rec'd of Joshua Johnson, in full of his note	100	50
——— 30*th.* ———		
Paid Charges this Month	39	25
——— *December 1st.* ———		
Ship'd my 30 Casks of Flaxseed on board the Ranger, Capt. Green, consigned to Henry Stewart, New-York, to sell for my account: Paid Charges till on board	4	50
——— 7*th.* ———		
Settled with Capt. Johnson on the sale of my Wheat: weigh'd in New-York 1455½ *bush.* at 2.25 per Bushel, and receiv'd as follows, in full:		
4 *hhd.* Rum, 488 *gall.* at 1.25 610.		
Charges on *do.* 5.		
Do. on Wheat 59 28		
Cash in full 26 0.59		
	3274	87

(6) *WASTE-BOOK.*

		£	ll
December 12th.			
Sold Jonathan Brewſter, at 60 days,			
1 Puncheon Rum, 117*gall.* at 1,50	175.50		
1 Cheſt Tea, 347*lb.* at .40	138.20		
100*lb.* Lump Sugar, .30	30.		
		343	70
15th.			
Rec'd advice from Henry Stewart, that my 30 Caſks of Flaxſeed had arrived ſafe. Amount, with Charges,		455	10
17th.			
Paid Capt. Green the Freight and Charges on my Flaxſeed		28	60
20th.			
Rec'd of Peter Punctual in full of borrowed money		100	
26th			
Rec'd in full of Abram Perkins, a draught on William Johnſtone		82	
28th			
Taken up my note to Nicholas Grocer, of 641.80, as follows :			
Paid in money	423.		
in a draught on Henry Stewart at ſight	218.80	641	80
31ſt.			
Paid charges this month		47	
January 2d, 1797.			
Sold Robert Dunſton at 45 days			
37 Rolls Tobacco, 518*lb* at .17	88.06		
23 ſides Sole Leather 299*lb.* .21	62.79		
12 Lumps Sugar 146*lb.* .29	43.34		
		194	19
12th			
Rec'd of Jonathan Brewſter 120 *buſh.* Wheat, at 1,25 per. Buſhel, in part		150	

WASTE-BOOK. (7)

January 18th.		$	//
Sold George Gordon 1 Hhd. Rum 126 gallons at 1.45 per gall.	182.70		
13 Rolls Tobacco 195*lb.* at .17 per *lb.*	33.15		
to pay at 30 days	——	215	85
25th			
Rec'd advice from Henry Stewart, New-York that he hath sold my Flaxseed—Nett proceeds pr. account of sales transmitted me, amounting to 541.13, for which received a post bill on Albany bank in full		322	33
31st		32	57
Paid charges this month.			
February 2d.			
Sold Andrew King ¼ Hhd. Rum 119 gallons at 1.50. per gallon 178.50 10 sides Sole Leather 130*lb.* at .21 27.30 for which rec'd his note at 90 days——		205	80
6th			
Bartered with Derick Hough of Vermont as follows: viz. 1 chest Tea 353*lb.* at .42 pr. *lb.* 182.26 350 *lb.* Tobacco at .18 pr. *lb.* 63. Delivered. ——		245	26
For 1300 *lb.* Cloverseed at .12 pr. *lb.* 156 600 Bushels Rye at .90 per Bush. 540 Received. ——		696	
10th			
Bought 750 Bushels Wheat of Thomas Taylor at 1.25 pr. Bushel, for which paid as follows: Cash 337.50 My note at 3 months 600.		937	50

(8) *WASTE-BOOK.*

	£	s.
February 13*th.*		
Rec'd of Jonathan Brewſter in part	100	//
16*th*		
Rec'd of George Gordon 130 Buſhels Rye at .90 per Buſhel in part	117	
20*th*		
Sold Joel Kent		
1 Puncheon Rum 128 *gal.* at 1.50 per *gall.* 192		
32 ſides Sole Leather 45 $\frac{1}{2}$ *lb.* at .21 per *lb.* 95.34		
10 Rolls Tobacco 120*lb.* at 18 pr. *lb.* 21.60		
	308	94
Rec'd as follows in part		
Caſh 115.50		
Rye 70 Buſhels at .90 per Buſh. 63		
	178	50
25*th*		
Sold Derick Hough of Vermont pr. his order 1 *qr.* caſk Sherry Wine, 30 gallons, at 1.50 per gallon.	45	
28*th*		
Paid charges this month, including ſtore-houſe rent 6 months	137	96

JOURNAL. (1)

Lanſingburgh, 1ſt September, 1797.

			£	s	d
	Sundries Dr. to Stock				
1	Caſh for ready money	1500.			
2	Rum 5 Puncheons 600 gallons at 1.25 per gallon	750.			
2	Tobacco 100 Rolls 1400 *lb.* at .14	196.			
3	Sole Leather 200 ſides *wt.* 3225 *lb.* at .18 per *lb.*	580.50			
3	Salt 1500 Buſhels at .75	1125.			
2	Sherry wine 4 caſks 130 gallons at 1.12 per gallon	145.60			
3	Molaſſes 4 Hhds. 440 gallons at .60	264.			
4	Bills receivable for John Hamilton's note on demand	231 19			
4	William Jones per acct.	97.71			
4	Benjamin Conner per do.	110.			
5			5000		
5	Stock Dr. to Sundries				
5	To Henry Bell per acct.	250.			
5	To John Farrow per do.	75.			
5	To bills payable for my note to Joſeph Redfield 15 days to run	375.			
			700		
	---- *6th* ----				
1	Caſh Dr. to Sole Leather 132.30				
3	Rec'd for 45 ſides *wt.* 630 *lb.* at .21 pr. *lb.*		132	30	
	---- *10th* ----				
1	Caſh Dr. to Bill's receivable 231.19				
4	Rec'd in full of John Hamilton's note		231	19	
	---- *15th* ----				
5	Bills payable Dr. to Caſh 375.				
1	Paid my note to Joſeph Redfield		375		

(2) JOURNAL.

	September 20th.		
6	Abm. Cunningham Dr. to sundries 650.50		
2	To Rum for 1 Puncheon 123 *gal.* at 1.50	184 50	
3	To Salt for 350 Bushels 1.10	385.	
3	To Molasses 1 Hhd. 108 *gl.* at .75	81.	
	to pay at 30 days		650 50
	24th		
5	Henry Bell Dr. to Cash 250.		
1	Paid him in full		250
	26th		
6	Profit and Loss Dr. to Cash 10.		
1	Paid district Collector for Licence to sell Spirituous Liquors and Wines		10
	27th		
6	Wheat Dr. to Cash 564.50		
1	Paid for 376 $\frac{2}{60}$ Bushels at 1.50 pr. bush.		564 50
	30th.		
6	Profit and Loss Dr. to Cash		
1	Paid charges this month		34 15
	October 3d		
	Sundries Dr. to Sole Leather 130 24		
1	Cash	76.24	
4	Bills receivable for James Carey's note		
3	at 30 days for the balance of 37 sides 592 *lb.* at .22 per. *lb.*	54.	
			130 24
	5th		
5	John Farrow Dr. to Cash 75.		
1	Paid him in full		75
	8th		
1	Cash Dr. to William Jones 97.71		
4	Rec'd in full		97 71
	10th		
6	Wheat Dr. to Cash 657.64		
1	Paid for 432 $\frac{4}{60}$ Bushels at 1.50 pr. bush.		657 64
	12th		
1	Cash Dr. to Benjamin Conner 100.		
4	Rec'd in full.		100

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		£	s.
	October 14th.		
6	Wheat Dr. to Cash 24 45		
1	Paid charges of shipping 815 Bushels at measure, pr. the Tryall, Capt. Hickok. consigned to him for sales and returns.	24	45
	17th.		
1	Cash to Rum 174.		
2	Rec'd for 1 Puncheon 120 *gal.* at 1.45 per gallon.	174	
	20th.		
2	Peter Olds Dr. to Salt 660.		
3	For 600 Bushels at 1.10 per Bushel to pay at 90 days.	660	
	22d.		
4	Bills received Dr. to Sherry wine 100.50		
—	for 2 casks 67 gallons at 1.50 per *gall.*		
2	sold Joshua Johnston per note at 30 days.	100	50
	25th.		
	Sund. Dr. to Abm. Cunningham 659 85		
6	Wheat 347 Bushels at 1.55 537.85		
4	Flaxseed 10 casks containing 70 *bush.*		
6	at 1.60 and 1. each for the casks 122.	659	35
6	Abram Cunningham Dr. to Cash 9.35		
1	Paid the balance due him.	9	35
	27th.		
	Sundries Dr. to Bills payable 641.80		
7	Bohea Tea for 4 chests, nett		
	wt. 1388 *lb.* at .35 per *lb.* 435 80		
7	Lump Sugar 600 *lb.* at .26 per *lb.* 156.		
5	Bought of Nicholas Grocer, New-York, per my note at 60 days	641	80
	29th		
1	Cash Dr. to Wheat 1450		
6	Rec'd of Capt. Hickok in full of nett proceeds on the sales of 806 $\frac{4}{60}$ bush.	1450	

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			$	ll
	October 31st.			
6	Profit and Loſs Dr. to Caſh 51.23			
1	Paid charges this month		51	23
	November 1st.			
4	Flaxſeed Dr. to Sundries 300.			
3	To Salt 250 Buſhels at 1.12 per Buſhel.			
	Bartered for 20 caſks ſeed 140 Buſhels at 2. per Buſhel	280.		
1	To Caſh paid for the caſks at 1. each	20.		
			300	
	3d.			
	Sundries Dr. to Bills receivable 54.			
6	Wheat 20 Buſhels at 1.52 per Buſhel	30.40		
1	Caſh received of James Carey in full of his note	23.60		
4			54	
6	Profit and Loſs Dr. to Caſh 5.			
1	Paid charges on my Tea and Sugar this day rec'd from New-York		5	
	5th.			
6	Wheat Dr. to Sundries 1125.96			
3	To Salt for 250 Buſhels at 1.12 per Buſhel	280.		
7	To Bohea Tea 1 cheſt, nett 349 *lb.* at .42 per *lb.*	146.58		
3	To Sole Leather 50 ſides 750 *lb.* at .21 per *lb.*	157.50		
7	To Lump Sugar 200 *lb.* at .29 pr. *lb.*	58.		
2	To Rum 1 Puncheon 120 gallons at 1.48 per gallon	189.44		
2	To Sherry Wine 33 gallons at 1.50	49.50		
1	To Caſh paid Joſeph Farmer in full for $639\frac{45}{66}$ Buſhels.	244.94		
			1125	96

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		£	//
	November 10th.		
6	Wheat, Dr. to Cash 792.		
1	Paid for 450 *bush.* at 1 76 per *bush.*	792	
	12th.		
1	Cash, Dr. to Sundries 816.96		
3	To Molasses, Rec'd for 2 Hhd, 218 *galls.* at .72 per *gall.* 156.96		
2	To Peter Olds, Rec'd in full, 660.		
		816	96
	16th.		
1	Sundry accounts Dr. to Rum, 180.		
	Cash in payment of 1 Puncheon, 120 *galls.* at 1.50 per *gall.* 98,		
4	Bills Rec'd. for Abram Perkins		
2	draught on Wm. Johnston, 82.		
		180	
	19th.		
7	Peter Punctual, Dr. to Cash 100.		
1	lent him to be repaid on demand.	100	
	23d.		
6	Wheat, Dr. to Cash, 47.10		
1	Paid Shipping charges on 1473 *bush.* at measure per the Hare, Capt. Johnston, consigned to him for sales and return.	47	10
	28th.		
1	Cash Dr. to Bills receivable 100.50.		
4	Rec'd in full of Joshua Johnston's note.	100	50
	30th.		
6	Profit and Loss, Dr. to Cash, 39.25		
1	Paid charges this month.	39	25

(5) *JOURNAL.*

			$	″
	December 1st.			
4	Flaxseed, Dr. to Cash, 4.50.			
—	Paid charges till on board the Ranger, Capt. Greene.		4	50
1	Consigned to Henry Stewart, New-York.			
	7th.			
	Sundries Dr. to Wheat,			
2	Rum, 4 Hhds. 488 *galls.* at 1.25 per *gall.* and charges on do. from New-York	615.		
1/6	Cash Rec'd of Capt. Johnston, in full of nett proceeds on the sales of 1455½ *bush.*	2600.59½	3215	59
	12th.			
7/2	Jonathan Brewster, Dr. to Sundries,	343.70		
	To Rum for 1 Puncheon 117 *galls.* at 1.50	175.50		
7	Tea, 1 Chest, 347*lb.* at .40	138.20		
7	Lump Sugar, 100*lb.* at .30 to pay at 60 days.	30.	343	70
	15th.			
7/4	Henry Stewart, my acct. of Flaxseed, Dr. to Flaxseed .455.10			
	Consigned to him 30 Casks to sell for my account.		455	10
	17th.			
4/1	Flaxseed, Dr. to Cash, 28.60			
	Paid Capt Greene for freight and charges.		28	60
	20th.			
1/7	Cash, Dr. to Peter Punctual, 100.			
	Rec'd in full.		100	

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(7)

			$	″
	December 26th.			
1	Cash, Dr. to Bills receivable, 82.			
4	Rec'd Perkins on Johnston, in full.		82	
	28th.			
5	Bills payable, Dr. to Sundries	641.80		
1	To Cash,	423.		
8	To Henry Stewart, my account current for my draughts	218.80		
	Taken up my account to Nicholas Grocer.		641	80
	31st.			
6	Profit and Loss, Dr. to Cash, 47.			
1	Paid charges this month.		47	
	January 2d, 1797.			
8	Robert Dunston, Dr, to Sund.	194.19		
2	To Tobacco, 37 Rolls, 518*lb.* at .17 per *lb.*	88.06		
3	To Sole Leather, 299*lb.* at .21	62.79		
7	To Lump Sugar, 146*lb.* at .29 to pay at 45 days.	43.34	194	19
	12th.			
6	Wheat, Dr. to Jonathan Brewster,	150.		
7	Rec'd. 120 *bush.* at 1.25 per *bush.* in part.		150	
	18th.			
8	George Gordon, Dr. to Sund.	215.85		
2	To Rum, for 1 Hhd. 126 *galls.* at 1.45 per *gall.*	182.70		
2	To Tobacco, 13 Rolls, 195*lb.* at .17 per *lb.* payable in 30 days.	33.15	215	85

(8) *JOURNAL.*

		℔	///
	January 25th.		
8	Henry Stewart, my acct. cur.		
7	Dr. to do. my acct. of Flax-seed, 541.13		
	For nett proceeds of 90 Casks per account of sales transmitted me.	541	13
1	Cash, Dr. to Henry Stewart,		
8	my account current.		
	Rec'd a post bill in full.	322	33
	31st.		
6	Profit and Loss, Dr. to Cash, 32.57		
1	Paid charges this month.	32	57
	February 2d.		
4	Bills receivable, Dr. to Sund. 205.80		
2	To Rum 1 Puncheon, 119*galls.*		
	at 1.50 per *gall.* 178.50		
3	To Sole Leather, 130*lb.* at .21		
	per *lb.* 27.30		
	Sold Andrew King, and rec'd his note at 90 days.	205	80
	6th.		
8	Derick Hough, Dr. to Sund. 245.26		
7	To Bohea Tea for 1 Chest 353*lb*		
	at .42 per *lb.* 182.26		
2	To Tobacco, 350*lb.* at .18 63.		
	delivered in Barter.	245	26
	Sundries, Dr. to Derick Hough, 696.		
8	Cloverseed for 1300*lb.* at .12		
	per *lb.* 156.		
9	Rye for 600 *bush.* at .90 per		
8	*bush.* rec'd in Barter. 540.		
		696	

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		£	s	d
	10th.			
	937.50			
	337.50			
	bush.			
	Wheat, bought [illegible]. 600.			
		937	50	
	13th.			
1/7	Cash, Dr. to Jonathan Brewster, 100. Rec'd in part.	100		
	16th.			
9/8	Rye, Dr. to George Gordon, 117. Rec'd 130 *bush.* at .90 per *bush.* in part.	117		
	20th.			
9/2	Joel Kent, Dr. to Sundries 308.94			
	To Rum, 1 Puncheon, 128 *gall.* at 1.50 192.			
3	To Sole Leather, 454 *lb.* at .21 95.34			
2	To Tobacco, 120 *lb.* at .18 21.60			
		308	94	
	Sundries, Dr. to Joel Kent, 178,50			
1	Cash, 115.50			
9	Rye, for 70 *bush.* at .90 pr. *bush.* 63.	178	50	
9	25th.			
8/2	Derick Hough, of Vermont, Dr. to Sherry Wine, 45. for 1 Qr. Cask, 30 *galls.* at 1.50 per *gall.* per order.	45		
	28th.			
6/1	Profit and Loss, Dr. to Cash, 137,96 Paid charges this month, including Store-House rent 6 mo.	137	96	

ALPHABET.

A.	B.	C,
	Bills Rec'able 4	Cash 1
	Bell Henry 5	Conner Benj. 4
	Bills Payable 5	Cuningham A. 6
	Brewster Jona. 7	Clover Seed 8
D.	E.	F.
Dunston Robt. 8		Farrow John 5
		Flaxseed 4
G.	H.	I.
GordonGeorg. 8	Hough Derick 8	Jones William 4
K.	L.	M.
Kent Joel 9	Leather Sole 3	Molasses 3
N.	O.	P.
	Olds Peter 2	Profit and Loss 6
		Punctual Peter 7
Q.	R.	S.
	Rum 2	Salt 3
	Rye 9	Stock 5
		Sugar (Lump) 7
		Stewart Henry &c. 7
		Do. do. my account cur. 8
T.	U.	V.
Tobacco 2		
Tea (Bohea) 7		
W.	Y.	Z.
Wine (Sherry) 2		
Wheat 6		

( ) LEDGER.

1796.		Dr. CASH.			
Sept.	1	To Stock,	5	1[illegible]	
	6	To Sole Leather,	3	13[illegible]	[illegible]5
	10	To Bills Receivable,	4	23	9
Oct.	3	To Sole Leather,	3	76	24
	8	To William Jones, in full,	4	97	71
	12	To Benjamin Connor, do.	4	110	
	17	To Rum, for 1 Puncheon, 120 *galls.*	2	174	
	29	To Wheat, per Capt. Hickok, on sales,	6	1450	
Nov.	3	To Bills receivable, in full of Carey's,	4	23	60
	12	To Sundries per Journal,		816	96
	16	To Rum, in part payment of 1 Puncheon,	2	98	
	28	To Bills receivable in full of Johnston's,	4	100	50
Dec.	7	To Wheat on sales, per Capt. Johnston,	6	2600	59
	20	To Peter Punctual,	7	100	
	26	To Bills receivable, Perkins on Johnston in full	4	82	
1797. Jan.	25	To Henry Stewart, my acct. current in full,	8	322	33
Feb.	13	To Jonathan Brewster, in part,	7	100	
	20	To Joel Kent,	9	115	50
				8130	92

(1) *LEDGER.*

1796.		Contra Cr.		£	s
Sept.	15	By Bills payable Joseph Redfield,	5	375	
	24	By H. Bell paid him in full	5	250	
	26	By Profit and Loss,	6	10	
	27	By Wheat,	6	564	50
	30	By Profit and Loss,	6	34	15
Oct.	5	By John Farrow in full,	5	75	
	10	By Wheat,	6	657	64
	14	By do. paid shipping charg.	6	24	45
	25	By Abram Cunningham,	6	9	35
	31	By Profit and Loss, paid charges this month,	6	51	23
Nov.	1	By Flaxseed,	4	20	
	3	By Profit and Loss, paid charges on Tea & Sugar	6	5	
	5	By Wheat paid Joseph Farmer in full,	6	244	94
	10	By do. paid for 450 *bush.* at 1.76 per *bush.*	6	792	
	19	By Peter Punctual to be paid on demand,	7	100	
	23	By Wheat paid charges of Shipping,	6	47	10
	30	By Profit and Loss paid charges this month,	6	39	25
Dec.	1	By Flaxseed paid charges,	4	4	50
	7	By do. paid do.	4	28	60
	28	By Bills payable,	5	432	
1797.	31	By Profit and Loss,	6	47	
Jan.	31	By do.	6	32	57
Feb.	10	By Wheat,	6	337	50
	28	By Profit and Loss,	6	137	96
March	1	By Balance remaining,		3820	18
				8130	92

1796.		Dr. RUM.	*galls.*			//
Sept.	1	To Stock for	600	5	750	
Dec.	7	To Wheat for	488	6	615	
1797.		To Profit and Loss gained		6	235	39
March	1					
			1088		1600	39
		Dr. TOBACCO.	*lbs.*			
Sept.	1	To Stock,	1400	5	196	
1797.		To Profit & Loss gained		6	40	1
March	1					
			1400		236	19
		Dr. SHERRY WINE.	*gall.*			
Sept.	1	To Stocks,	130	5	145	60
1797.		To Profit and Loss gained		6	19	40
March	1					
			130		165	
		Dr. PETER OLDS.				
Oct.	20	To Salt, at 20 days,		3	660	

LEDGER. (2)

1796.		Contra Cr. *galls*		£	//
Sept.	2	By Abram Cunningham,	12	5	184 50
Oct.		by Cash at 1.45 per *gall.* for	120		174
Nov.	5	By Wheat at 1.48 per *do.*	12	9	189 44
	16	By Sundries,	12		180
Dec.	2	By Jonathan Brewster at 60 days for	117	7	175 50
Jan.	18	By George Gordon,	12		182 70
Feb.	2	By Bills receivable,	11		178 50
	20	By Joel Kent,	12		192
March	1	By Balance remaining at prime cost,	115		143 75
			1085		1600 39

1797.		Contra Cr. *lbs.*		£	//
Jan.	2	By Robert Dunston for	518	2	88 16
	18	By George Gordon,	195	8	33 15
Feb.	6	By Derick Hough,	350		63
	20	By Joel Kent,	120	0	21 60
March	1	By Balance at prime cost	217	0	30 38
			1400		236 19

		Contra Cr. *galls.*		£	//
Oct.	22	By Bills receivable for	67	4	100 50
Nov.	5	By Wheat,	33	6	49 50
'97Feb.	25	By Derick Hough,	30	8	45
			130		195

		Contra Cr.		£	//
Nov.	12	By Cash in full,		1	660

(3) *LEDGER.*

1796.		Dr. SOLE LEATHER.	*lbs.*		℔	//
Sept.	1	To Stock,	3225	5	580	50
1797.						
March	1	To Profit and Loss gained		6	91	57
			3225		672	07
		Dr. MOLASSES.	*galls.*			
Sept.	1	To Stock,	440	5	264	
1797.						
March	1	To Profit and Loss gained		6	42	36
			440		306	36
		Dr. SALT.	*bush.*			
Sept.	1	To Stock,	1500	5	1125	
1797.						
March	1	To Profit and Loss gained		6	517	50
			1500		1642	50

(3) *LEDGER.*

1796.		Contra Cr.	*lbs.*		℔	//
Sept.	6	By Cash,	630	1	132	30
Oct.	3	By Sundries,	592		130	24
Nov.	5	By Wheat,	750	6	157	50
1797.						
Jan.	2	By Robert Dunlop,	290	8	62	79
Feb.	2	By Bills receivable,	130	4	27	30
	20	By Joel Kent,	454	9	95	34
March	1	By Balance remaining at prime cost,	370	9	66	60
			3225		672	07

		Contra Cr.	*galls.*			
Sept.	20	By Abram Cunningham,	108	6	81	
Nov.	12	By Cash,	218	1	156	96
1797.						
March	1	By Balance remaining,	114	9	68	40
			440		306	36

		Contra Cr.	*bush.*			
Sept.	20	By Abram Cunningham,	350	6	385	
Oct.	20	By Peter Olds at 1.10 per *bush.* for	600	2	660	
Nov.	1	By Flaxseed,	250	4	280	
	5	By Wheat,	250	6	280	
1797.						
March	1	By Balance on hand at prime cost,	50	9	37	50
			1500		1642	50

'96.		Dr. BILLS Rec. *when payable.*					℔	//
Sept.	1	To Stock for J. Hamilton's on demand				5	231	19
Oct.	3	To Sole Leather, J. Carey's	Nov.		3	3	54	
	22	To Sherry Wine, Joshua Johnston's,			22	2	100	50
Nov.	16	To Rum, A. Perkins on Wm. Johnston,				2	32	
'97.								
Feb.	2	To Sundries, And'w King's note.	May		3		205	80
							673	49
		Dr. WILLIAM JONES.						
Sept.	1	To Stock,				5	97	71
		Dr. BENJ. CONNER.						
Sept.	1	To Stock,				5	110	
		Dr. FLAXSEED. *casks. bush.*						
Oct.	25	To Abram Cunningham, for	10	70		6	122	
Nov.	1	To Sundries,	20	140			300	
Dec.	1	To Cash paid charges,				1	4	50
	17	To do. paid do.				1	28	60
			30	210			455	10

LEDGER. (4)

'96.		Contra Cr.			£	s.	d.
Sept.	10	By Cash John Hamilton's in full,		1	231	19	
Nov.	3	By Sundries in full of James Carey's,			54		
	28	By Cash in full of Joshua Johnston's,		1	100	50	
Dec.	26	By do. Perkins on Johnston,		1	82		
'97.							
Mar.	1	By Balance for Andrew King's note,		9	205	80	
					673	49	
		Contra Cr.					
Oct.	8	By Cash in full,		1	97	71	
		Contra Cr.					
Oct.	12	By Cash in full,		1	110		
		Contra Cr.					
Dec.	15	By Henry Stewart, my acct. of Flaxseed,	ca. bu. 30 210	7	455	10	
			30 210		455	10	

(5) *LEDGER.*

1796.		Dr. STOCK.		℔	″
Sept.	1	To Sundries per Journal,		700	
1797.					
March	1	To Balance the nett of my eſtate.	9	6006	24
				6706	24
		Dr. HENRY BELL.			
Sept.	24	To Caſh in full,	1	250	
		Dr. JOHN FARROW.			
Oct.	5	To Caſh in full,	1	75	
		Dr. BILLS PAYABLE.			
Sept.	15	To Caſh paid my note, Joſeph Redfield,	1	375	
Dec.	28	To Sundries paid do. to Nicholas Grocer,		641	80
1797.					
March	1	To Balance for my note to Taylor,	9	600	
				1616	80

LEDGER. (5)

1796.		Contra Cr.			℔	ℓ
Sept.	1	By Sundries per Journal,			5000	
1797.						
March	1	By Profit and Lofs, nett gain laft 6 months,		6	1706	24
					6706	24
		Contra Cr.				
Sept.	1	By Stock per account,		5	250	
		Contra Cr.				
Sept.	1	By Stock per account,		5	75	
		Contra Cr.				
Sept.	1	By Stock to Jo-	*when pa.*			
		feph Redfield,	Sept. 16	5	375	
Oct.	27	By Sundries to N. Grocer,	Dec. 27		641	80
1797.						
Feb.	10	By Wheat to T. Taylor,	May 10	6	600	
					1616	80

1796.		Dr. A. CUNNINGHAM.			£	s.	d.
Sept.	20	To Sundries at 30 days,			650	50	
Oct.	25	To Cash,		1	9	35	
					659	85	
		Dr. PROFIT & LOSS.					
Sept.	26	To Cash paid for license to retail Liquors, &c.		1	10		
	30	To do. paid char. this month			34	15	
Oct.	31	To do. paid do. do.			51	23	
Nov.	3	To do. paid do. on my Tea and Sugar,			5		
	30	To do. paid char. this month			39	25	
Dec.	31	To do. paid do. do.			47		
'97 Jan.	31	To do. paid do. do.			32	57	
Feb.	28	To do. do.			137	96	
March	1	To Wheat for short meas.		6	6	30	
		To Stock for neat gain since 1st Sept. last,		5	1706	24	
					2069	70	
		Dr. WHEAT.	*bu.*	*lb.*			
Sept.	7	To Cash,	376	20	564	50	
Oct.	0	To do.	432	40	1 657	64	
	4	To do. paid charges of Shipping,			1 24	45	
	5	To A. Cunningham for	347		6 537	85	
Nov.	3	To Bills rec. for	20		4 30	40	
	5	To Sundries for	639	45	1125	96	
	0	To Cash for	450		1 792		
	23	To do. paid charges of Shipping,			1 47	10	
'97 Jan.	2	To J. Brewster,	120		7 150		
Feb.	10	To Sundries for	750		937	50	
March	1	To Profit and Loss gained,			6 891	99	
			3125	45	5759	39	

LEDGER. (6)

1796.		Contra Cr.			℔	″
Oct.	25	By Sundries per Journal,			659	85
					659	85
1797.		Contra Cr.				
March	1	By Rum gained,		2	235	39
		By Tobacco do.		2	40	19
		By Sherry Wine do.		2	49	40
		By Sole Leather do.		3	91	57
		By Molaſſes do.		3	42	36
		By Salt do.		3	517	50
		By Wheat do.		6	891	99
		By Bohea Tea gained,		7	99	89
		By Lump Sugar do.		7	15	38
		By Henry Stewart, my account of Flaxſeed,		7	86	08
					2069	70
1796.		Contra Cr.				
Oct.	29	By Caſh paid Capt. Hickok on ſales,	*buſh. lbs.* 806 40	1	1450	
Dec.	7	By Sundries per Journal,	1455 30		3215	59
1797. March	1	By Balance on hand,	870	9	1087	50
		By Profit and Loſs for ſhort meaſure,	335	6	6	30

1796.		Dr. BOHEA TEA.	chests.	lbs.	$	¢
Oct.	27	To Bills payable,	4	1388	5	485 80
'97. Ma.	1	To Profit and Loss gained,				99 89
			4	1388		585 69
		Dr. LUMP SUGAR.		lbs.		
Oct.	27	To Bills payable,		600	5	156
'97. Ma.	1	To Profit and Loss gained,				15 38
				600		171 38
		Dr. PETER PUNCTUAL.				
Nov.	19	To Cash lent to be repaid on demand,			1	100
		Dr. JONA. BREWSTER.				
Dec.	12	To Sundries per Journal,				3437 0
						3437 0
		Dr. HENRY STEWART.				
Dec.	15	To Flaxseed to sell for my acct. 30 Casks,			4	455 10
'97. Ma.	1	To Profit and Loss,				86 03
						541 13

LEDGER. (7)

		Contra Cr.	*chests.*	*lbs.*		£ s. d.
Nov.	5	By Wheat, for	1	349	6	146 5 8
Dec.	12	By Jonathan Brewfter for,	1	347	7	138 2 0
'97 Feb.	6	By Derick Hough,	1	353	8	182 2 6
March.	1	By Balance remaining,	1	339	9	118 6 5
			4	1388		585 6 9

		Contra Cr.	*lbs.*		£ s. d.
Nov.	5	By Wheat,	200	6	58
Dec.	12	By Jonathan Brewfter,	100	7	30
'97 Jan.	2	By Robert Dunfton,	146	8	42 3 4
March.	1	By Balance remaining,	154	9	40 0 4
			600		171 3 8

		Contra Cr.		£ s. d.
Dec.	20	By Cafh in full,	1	100

		Contra Cr.		£ s. d.
1797. Jan.	12	By Wheat in part,	6	150
Feb.	13	By Cafh do.	1	100
March.	1	By Balance,	9	93 7 0
				343 7 0

		Contra Cr.		£ s. d.
1797. Jan.	25	By do. my acct. current,	8	541 1 3
				541 1 3

(8) *LEDGER.*

				£	/
1797.		Dr. HENRY STEWART. (my acct. current.)			
Jan.	25	To do. my account of Flaxseed,	7	54	3
			–		
		Dr. ROBERT DUNSTON			
Jan.	2	To Sundries per Journal,		194	19
			–		
		Dr GEORGE GORDON.			
Jan.	18	To Sundries per Journal,		215	85
			–		
		Dr. DERICK HOUGH.			
Feb.	6	To Sundries,		24	26
	25	To Sherry Wine per order,	2	4	
March	1	To Balance due him,	9	405	74
				696	
			–		
		Dr. CLOVER SEED.			
Feb.	6	To Derick Hough, 1300	8	16	

LEDGER. (8)

1796.		Contra Cr.			£	s.	d.
Dec.	23	By Bills payable for my draught,		5	218	80	
1797.							
Jan.	25	By Cash rec'd. in full,		1	322	33	
					541	13	
		Contra Cr.					
March	1	By Balance,		9	194	19	
		Contra Cr.					
Feb.	16	By Rye in part,		9	117		
March	1	By Balance,		9	98	85	
					215	85	
		Contra Cr.					
Feb.	6	By Sundries per Journal,			696		
		Contra Cr.					
March	1	By Balance,	1300	9	16		

(9) *LEDGER.*

1797.		Dr. RYE.	*bush.*		ℳ	//
Feb.	6	To Derick Hough,	600	8	540	
	16	To George Gordon,	130	8	117	
	20	To Joel Kent,	70	9	63	
			800		720	
		Dr. JOEL KENT.				
Feb.	20	To Sundries per Journal,			308	94
		Dr. BALANCE.				
March.	1	To Cash remaining,		1	3820	18
		To Rum 1 Puncheon 115 *galls.* at 1.25 per *gall.*		2	143	75
		To Tobacco, 217*lb.* at .14		2	30	38
		To Sole Leather 370*lb.* at .18 per *lb.*		3	66	60
		To Molasses 1 Hhd. 114 *galls.* at .60 per *gall.*		3	68	40
		To Salt 50 *bush.* at .75		3	37	50
		To Bills receivable for Andrew King's note,		4	20	80
		To Wheat 870*bush.* at 1.25		6	108	50
		To Bohea Tea 1 Chest 339*lb.* at .35 per *lb.*		7	118	65
		To lump Sugar 154*lb.* at .26		7	40	04
		To Robert Dunlson,		8	19	19
		To George Gordon,		8	98	85
		To Clo. Seed 1300*lb.* at .12		8	150	
		To Rye 800 *bush.* at .90		9	20	
		To Jonathan Brewster,		7	9	0
		To Joel Kent,			130	44
					61	98

				£	s
		Contra Cr. *buſh.*			
March	1	By Balance on hand,	800	720	
1797.		Contra Cr.			
Feb.	20	By Sundries per Journal,		178	50
March	1	By Balance,	9	130	44
				308	94
		Contra Cr.			
March	1	By Bills payable to Thomas Taylor,	5	600	
		By Derick Hough, due him,	8	405	74
		By Stock, the nett of my eſtate,	5	6006	24
				7011	98

THE following method of BOOK-KEEPING, by ſingle entry, will be found convenient and uſeful to Farmers, Mechanics, many Country merchants, and indeed to all whoſe buſineſs and connections are not very extenſive.

RULE. Commence the Ledger (which is the only book of account to be uſed) with a blank alphabetical Index, indented and lettered in the uſual form, to be filled with names, and paginal references, as occaſion requires. *Nextly*. Open every man's accompt with his name, written in a fair text hand; then enter the ſpecific articles of debt, and thoſe of

1795.	TIMOTHY FAIRDEAL Dr.	℔	///
Jan. 15.	To 45 buſhels of Wheat, at 1.50, to be paid in 60 days,	72	50
Mar. 18	To 3 days' work, myſelf, waggon and team, at 2.25 per day, to tranſport a load of Salt,	6	75
	To my expences in the aforeſaid journey,	4	
May 7.	To 6 days' plowing, 1 man at .50, 1 boy at .30, and 2 yoke of oxen at .50 per day,	7	80
June 10	To 1 barrel of Vinegar, at /// 12.5 per gallon,	4	
July 17	To 3 *cwt.* Bar Iron, at 5.	15	
Aug. 1.	To 2½ days' work, reaping, at .75,	1	87
Sept. 21	To the uſe of my Cider-mill 4½ days, at .66,	2	97
		114	89

corresponding credit upon the opposite pages of the folio, inserting the dates of the several entries in the left hand column, and the prices carried out in the right hand, in two ruled columns, for Dollars and Cents; alloting the whole, or but a part of a folio, to each man's accompt. *Lastly.* Balance the book, by comparing the sum total of the debit, with that of the credit side, and carrying the difference, whether in favor of debtor or creditor, to its proper page, in a new accompt, unless it should be previously discharged by payment, note of hand, or settlement on book. See the following Specimen.

1795.	Contra Cr.	$	ℓ
Mar. 16	By Cash for 45 bushels Wheat,	72	50
April 3.	By do. in part pay for transporting a load of Salt from Albany,	5	56
May 1.	By 10½ yards check'd Linen, at .42,	4	41
27.	By the settlement of my note to Peter Dun,	13	37
Oct. 5.	By Cash for the balance due, *or*		
Oct. 5.	By your note for the balance due,	19	05
	Or,		
Oct. 5.	Reckoned and settled all accounts, and find due to Jonathan Homespun, to balance, $19.05. *Timothy Fairdeal, Jonathan Homespun.*		
		114	89

A FEW FORMS IN CLERKSHIP.

An OBLIGATORY BOND.

KNOW all men, by these presents, that I, R. W. of in the county of am held and firmly bound to N. H. of in the penal sum of to be paid to the said N. H. his certain attorney, executors or administrators; to which payment, well and truly to be made and done, I bind myself, my heirs, executors and administrators, firmly, by these presents. Signed with my hand, and sealed with my seal. Dated at this day of A. D. 1797.

The Condition of this obligation is such, That if the above bounden R. W. &c. *(Here insert the condition.)* Then this obligation to be void, and of none effect; otherwise to remain in full force and virtue.

Signed, sealed and delivered, in the presence of }

A GENERAL DISCHARGE.

RECEIVED of L. T. of twenty dollars, in full of all debts, dues and demands. Witness my hand, this day of 1797.

A BILL *of* SALE.

KNOW all men, by these presents, that I, A. B. of for and in consideration of to me in hand paid by C. D. of the receipt whereof I hereby acknowledge, have bargained, sold and delivered, and, by these presents, do bargain, sell and

deliver, unto the said C. D. *(Here specify the property sold.)* To HAVE and to HOLD the aforesaid bargained premises, unto the said C. D. his executors, administrators and assigns, forever. And I, the said A. B. for myself, my executors and administrators, shall and will warrant and defend the same against all persons, unto the said C. D. his executors, administrators and assigns, by these presents. In witness whereof, I have hereunto set my hand and seal, this day of 1797.

In presence of

A BILL *of* DEBT.

KNOW all men, by these presents, that I, F. G. of do owe and am indebted unto J. K. of the sum of which said sum I promise to pay unto the said F. G. his executors, administrators or assigns, on the day of next ensuing.—Witness my hand and seal, this day of A. D. 1797.

A GENERAL LETTER *of* ATTORNEY.

KNOW all men, by these presents, that I, A. B. of have made, ordained, constituted and appointed, and, by these presents, do make, ordain, constitute and appoint C. D. of my true and lawful attorney, for me, and in my name, and for my use, to ask, demand, sue for, recover and receive, of and from all person and persons whatsoever, all sum and sums of money, debts, dues, claims and demands whatever, now due, owing or accruing to me, and to give good and sufficient discharges for the same, and to adjust, settle or compound all debts

or demands due to me, and to accept such security or satisfaction for the same as he shall think fit. And I do hereby give and grant to my said attorney, my full and whole power in and concerning the premises, and will ratify and confirm whatever he shall lawfully act or do therein. *In witness whereof*, I have hereunto set my hand and seal, the day of A. D. 1797.

Signed, sealed and delivered, in presence of

A LETTER *of* CREDIT.

SIR,

THE bearer, Mr. H. T. being on his travels, may have occasion for money: Please to furnish him, as occasions may require, taking his receipts; and your draughts for the value shall receive due honor, from,

Sir, your humble servant,

C. A.

To Mr. S. J. Merchant, London.

A LEASE *of a* HOUSE.

KNOW all men, by these presents, that I, J. C. of in county, for and in consideration of the sum of received to my full satisfaction of P. T. of this day of in the year of our Lord, 1797, have demised and to farm let, and do, by these presents, demise and to farm let, unto the said P. T. his heirs, executors, administrators and assigns, one certain piece of land, lying and being situated in said bounded, &c. *(Here describe the boundaries)* with a dwelling house thereon

ſtanding, for the term of 1 year from this date. To HAVE and to HOLD, to him the ſaid P. T. his heirs, executors, adminiſtrators and aſſigns for ſaid term, for him the ſaid P. T. to uſe and occupy, as to him ſhall ſeem meet and proper. And the ſaid J. C. doth *further covenant*, with the ſaid P. that he hath good right to let and demiſe, the ſaid letten and demiſed premiſes in manner aforeſaid, and that he the ſaid J. during ſaid time will ſuffer the ſaid P. quietly to HAVE and to HOLD, uſe, occupy and enjoy ſaid demiſed premiſes, and that ſaid P. ſhall have, hold, uſe, occupy, poſſeſs, and enjoy the ſame, free and clear of all incumberances, claims, rights and titles whatſoever. In witneſs whereof, I the ſaid J. C. have hereunto ſet my hand and ſeal this day of 1797.

J. C.

Signed, ſealed and delivered, in preſence of

An INLAND BILL *of* EXCHANGE.

℔ 83.34 B. Auguſt 17, 1796.

TWENTY days after date, pleaſe to pay to Mr. S. B. or order, eighty-three dollars, and thirty-four cents, and place it to my account, as per advice from your humble ſervant,

E. P.

To Mr. T. W. Merchant, New-York.

A PROTEST *on an* INLAND BILL *of* EXCHANGE.

KNOW all men, that I, S. B. on this day of 1796, at the uſual place of abode of

Mr. T. W. have demanded payment of the Bill (of which the above is a copy) which the said T. W. did not pay; wherefore I the said S. B. do hereby protest the said Bill. Dated at New-York, this day of 1796.

A DEED *of* BARGAIN *and* SALE.

To all People to whom these Presents shall come, Greeting.

KNOW ye, that I, N. O. of in the county of for the consideration of two hundred dollars, received to my full satisfaction of J. L. of said do give, grant, bargain, sell and confirm unto the said J. L. his heirs and assigns forever, a certain piece or parcel of Land, situated and lying in said containing acres, and bounded, &c. TO HAVE and to HOLD the above granted, and bargained premises, with the appurtenances thereof, unto him the said J. L. his heirs and assigns forever, to his and their own proper use and behoof. And also, I the said N. do for myself, my heirs, executors and administrators, covenant with the said J. L. his heirs and assigns, that at and until the ensealing of these presents, I am well seized of the premises as a good indefeasible estate in *fee-simple*, and have good right to bargain and sell the same in manner and form as is above written, and that the same is free of all incumberances whatsoever. *And furthermore*, I, the said N. O. do by these presents, bind myself, and my heirs forever to warrant and defend the above granted and bargained premises to him the said J. L. his heirs and assigns, against all claims and demands whatsoever. In witness whereof, I have hereunto set my hand and seal this first day of January, A. D. 1797. N. O. (L.S.)

Signed, sealed and delivered, in presence of

NOTE. *The foregoing Inſtrument becomes a* MORTGAGE DEED, *by annexing a conditional clauſe like the following:* viz..

Provided nevertheleſs, if the ſaid N. O. his heirs, executors and adminiſtrators, ſhall well and truly pay to the ſaid J. L. his heirs, executors or adminiſtrators, a certain note of hand, by him the ſaid N. O. well executed, bearing date the day of A. D. 1796, for the ſum of according to the tenor thereof, then this deed is to be void.

A DEED *of* QUIT-CLAIM.

TO all perſons to whom theſe preſents ſhall come. Greeting. *Know ye*, that I, R. S. of for the conſideration of ſeventy dollars, received to my full ſatisfaction of B. G. of have remiſed, releaſed, and forever quit-claimed unto the ſaid B. G. all right and title which I the ſaid R. have in and to a certain piece or parcel of land, ſituated in ſaid containing acres, and bounded, &c. TO HAVE and to HOLD all my right and title in and to ſaid remiſed, releaſed and quit-claimed premiſes, with the appurtenances thereof, to him the ſaid B. his heirs and aſſigns forever, to his and their own proper uſe and behoof. *And furthermore*, I the ſaid R. do for myſelf, my heirs, my executors and adminiſtrators, covenant with the ſaid B. his heirs and aſſigns, that from and after the enſealing of theſe preſents, I the ſaid R. will have and claim no right, in or to the above remiſed, releaſed, and quit-claimed premiſes. In teſtimony whereof, I have hereunto ſet my hand and ſeal, this day of A. D. 1796.

A Table, shewing the value of Shillings, Pence, &c. from a Farthing to a Pound, in Federal Money.

fa.	*SC. &c.*	*NE &c.*	*NJ &c*	*NY &c*
	$ // /	$ // /	$ // /	$ // /
1	0.00 4	0.00 3	0.00 2	0.00 25
2	0.00 9	0.00 7	0.00 5	0.00 5
3	0.01 3	0.01	0.00 8	0.00 8
*d.*1	0.01 8	0.01 4	0.01 1	0.01
2	0.03 5	0.02 8	0.02 2	0.02
3	0.05 3	0.04 2	0.03 3	0.03 1
4	0.07	0.05 6	0.04 5	0.04 2
5	0.08 9	0.07	0.04 6	0.05 2
6	0.10 7	0.08 3	0.06 8	0.06 2
7	0. 2 5	0.09 7	0.07 9	0.07 3
8	0.14 3	0.11 1	0.09	0.08 3
9	0.16 1	0.12 5	0.10 1	0.09 4
10	0.17 9	0.13 9	0.11 2	0.10 4
11	0.19 6	0.15 3	0.12 3	0.11 4
*s.*1	0.21 4	0.16 7	0.13 4	0.12 5
2	0.42 9	0.33 3	0.26 8	0.25
3	0.64 4	0.50	0.40 3	.37 6
4	0.85 8	0.66 7	0.53 8	.50 2
5	1.07 2	0.83 3	0.67 2	.62 5
6	1.28 7	1.	0.80 7	.75
7	1.50 1	1.16 7	0.94 1	.87 5
8	1.71 5	1.33 3	1.07 6	1.
9	1.92 9	1.50	1.21	1.12 5
10	2.14 4	1.66 7	1.34 4	1.25
11	2.35 8	1.83 3	1.47 9	1.37 5
12	2.57 2	2.	1.61 3	1.50
13	2.78 7	2.16 7	1.74 8	1.62 5
14	3.00 0	2.33 3	1.88 2	1.75
15	3.21 4	2.50	2.	1.87 5
16	3.43	2.66 7	2.13 4	2.
17	3.04 4	2.83 3	2.26 8	2.12 5
18	3.85 8	3.	2.40 3	2.25
19	4.07 2	3.16 7	2.53 8	2.37 5
£1	4.28 7	3.33 3	2.67 2	2.50

A Table, *shewing the value of Foreign and Federal Gold Coins, by weight, from a Grain to a Penny-weight.*

	American, British & Portug. Gold.												French & Spanish Gold.											
	S. C.			N. E.			N. J.			N. Y.			S. C.			N. E.			N. J.			N. Y.		
Gr.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.	ſ.	d.	q.
1	0	2		0	2	3	0	3	1	0	3	2	0	2		0	2	2		3		0	3	2
2	0	4		0	5	1	0	6	3	0	7			4		0	5	1		6	2	0	7	
3	0	6	1	0	8		0	10		0	10	3		6			7	3		9	3	0	10	2
4	0	8		0	10	3	1	1	1	1	2	1		8	1		10	2	1	1		1	2	
5	0	10	1	1	1	1	1	4	3	1	5	3		10	1	1	1		1	4	3	1	5	2
6	1	0	2	1	4		1	8		1	9	1	1	0	1	1	3	3	1	7	3	1	9	
7	1	2	2	1	6	3	1	11	1	2	0	3	1	2	1	1	6	2	1	11		2	0	2
8	1	4	2	1	9	1	2	2	3	2	4	1	1	4	1		9		2	2	1	2	4	
9	1	6	3	2			2	6		2	8		1	6	2	1	11	2	2	5	2	2	7	2
10	1	8	3	2	2	3	2	9	1	2	11	2	1	8	2	2			2	8	3	2	11	
11	1	10	3	2	5	1	3	0	3	3	3		1	10	2	2	4	3	3			3	2	2
12	2			2	8		3	4		3	6	2	2	0	2	2	7		3	3		3	6	
13	2	3		2	10	3	3	7	1	3	10	1	2	2	2		10		3	6	3	3	9	2
14	2	5		3	1	2	3	10	3	4	1	3	2	4	2	3	0	3	3		0		4	1
15	2			3	4		4	2		4	5	1	2	6	2	3	3	2	4	1	1	4	4	2
16	2	9	1	3	6	2	4	5	1	4	8	3	2	8	3	3	6		4	4		4	8	
17	2	11	1	3	9	1	4	8		5	0	1	2	10	3	3	8		3	4	7	3	11	2
18	3	1	1	4			5			5	4		3	0	3	3	11	1	4	11		5	3	
19	3	3	2	4	2		5	3	1	5	7	2	3	2	3	4	2		5	2	1	5	6	2
20	3	5	2	4	5	1	5	6		5	11		3	4	3	4	4		5	5		5	10	
21	3	7	2	4	8		5	10		6	2	2	3	6	3	4	7	1	5	9		6	1	2
22	3	9	3	4	10	3	6	1	1	6	6	1	3	8	3	4	9	3	6	0	1	6	5	
23	3	11	3	5	1	1	6	4	3	6	9	3	3	10	3	5	0		6	3		6	8	2
24	4	1	3	6	4		6	8		7	1	1	4	1		5	2	1	6	6		7		

E R R A T A.

In some of the Copies the following Errors are noticed, and corrected in the following manner.

In the Introduction, page xxiii, line 7th, for 93, read 98.

In page 55, line 7th from the bottom, for 4.98 7, read 4.28 6; and in line 9th, for 4.81 4, read 4.10 3.

Correct the running title, from page 82 to page 90; for Subtraction, read *Addition*.

In page 93, 11th line above Lesson XXI, for *To 75 do.* read *To 57 do.*

Read the answer to Question 28th, page 227th, *592lb. 10oz.*

In Lesson V of the Second Part, there are a few Examples, under Section 3d and 4th, erroneously wrought; particularly the 5th, 6th and 8th of Sect. 3d, and the 9th and 10th Examples of Sect. 4, which are not so easily corrected in an *Errata*. The man of figures, however, it is hoped, will candidly correct them, and any others which he may find, when he considers the extreme difficulty of publishing the first edition of such a work perfectly correct.

THE END.

A List of the Names of Subscribers for the AMERICAN ACCOMPTANT.

☞ *Official titles, and honorary additions, are inserted in the following list, as far as they are known to the editor.*

VERMONT.

JOHN ADAMS
Calvin Adams
Hēber Allen
Heman Allen
Samuel Allen
Abel Allis
Charles Ames
Robert Anderson
Robert Anderson
Ambrose Atwater, jun.
Joseph Atwill
Joseph Austin
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