THE

ART OF READY RECKONING;

OR,

MENTAL AND PRACTICAL

ARITHMETIC.

REDUCED TO A SYSTEM, AND PUBLISHED FOR THE PUBLIC OF CANADA; BEING PARTICULARLY ADAPTED FOR MEN OF BUSINESS, AS WELL AS FOR SCHOOLS.

BY JOHN BRASS.

[THIS SYSTEM WILL PROVE A VALUABLE ACQUISITION, AND FURNISH EVERY FACILITY IN CALCULATION TO THE ADULT AS WELL AS TO THE JUVENILE, ALL THOSE USEFUL AND READY METHODS OF OPERATION KNOWN ONLY TO THE FEW, AND WHICH ARE ALMOST TREATED AS A MYSTERY, ARE HERE INTRODUCED TO THE PUBLIC IN ORDER THAT THE INFORMATION MAY BECOME GENERAL.]

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TO THE PUBLIC.

DEAR FRIENDS,

In submitting this new system of calculation to your notice, I have undertaken a task which should have fallen to the lot of a more influential person than myself; but, as none other has stepped forward to the aid of the youth of this Province, (more particularly those whose daily avocations require them to be expert and ready reckoners,) I trust this humble attempt will meet with your approbation. The liberal encouragement I have already met with, leads me to believe that any endeavour to promote the public welfare is ever encouraged by a discerning and enlightened people, however humble the attempt may be.

I am, dear friends,

Your very obedient servant,

THE AUTHOR.

TORONTO, March, 1851.

INTRODUCTION.

As THIS WORK is undertaken with a desire to emancipate Youth from the various difficulties imposed upon them by long established custom, I have ventured so far out of the beaten track, that it will be found to differ very materially from every other treatise on Arithmetic, and as this I believe is the first attempt made by any individual to arrange and establish a practical system of Mental Arithmetic, adapted to the currency of the country, I take the earliest opportunity of submitting myself to public protection and patronage; should this be awarded me, it is probable that at no distant period I may considerably add to the work.

I doubt not but a glance will suffice to show that this work, though intended for the use of Schools, is not less valuable to the Adult and business Man, for its operations are by no means confined; nor should any store be without it for the benefit of its clerks, as it entirely supersedes the old and tedious method of calculation, both in brevity and in simplicity, which enables them to calculate at a glance, with equal accuracy, that which by the old rules would require considerable time, and in many instances be attended with difficulty; but with regard to its merits on this head I shall not say more, but trust to its general utility for its appreciation.

With regard to its adaptation for Schools, I flatter myself that every Teacher will at once perceive its utility. The beauty and simplicity of the questions, and the arrangement of the lessons (unequalled by any other work,) for practice upon the black-board, are not amongst the least of its recommendations, as they will be found to simplify the art, and facilitate the progress of the learner, not only to his (the Teacher's) satisfaction, but to the delight of his Pupils and the pleasure of their Parents. I have introduced the most familiar illutrations of particular cases and examples, so as to render the subject as intelligible and attractive as possible; to form useful exercises for the developement of the mental faculties; to excite the emulation of the young student, and create a desire to enrich his mind by the acquisition of information which will prove advantageous to him through life.

The principal cause of turning my attention to this subject is the interest which a liberal and enlightened Government manifest in attempts to diffuse knowledge over that great surface of the community, which is occupied by its less affluent members, both by the election of fit and proper persons to superintend this desirable object, and the appropriation of funds to promote it, and which have been as happy in their results as they have been rapid in their course. The people that are thus favored ought not to be indifferent to the task of fostering the seeds of genius, which, scattered by the hand of Heaven itself, fall as often upon the waste and steril land, as upon that which is more indebted to the labors of cultivation.

The most unthinking, as well as the most prejudiced, must be struck with the fact, that the period in which we live is extraordinary and momentous. Amongst the civilized masses of Europe, an unparalleled revolution is at work; they have awoke from that ignorance in which they had slept for ages, and have sprung up in their new character of thinking beings, qualified to enquire and to discuss, and despising both the despotism and the bigotry that would prohibit or impede their improvement. The intellectual spirit is moving upon the chaos of minds which ignorance and necessity have thrown into collision and confusion, and the result will be a new Creation. At no period of history has there been so great a developement of the human faculties as there is in our own time; and the cause of the present height of mental powers is well worthy the study of the philosopher. But a few centuries ago, a learned man was gazed at as a miracle, and ignorance was so common, that it passed unheeded; but in the present day learned men are so numerous, that only the most talented geniuses are at all conspicuous in society; and to be ignorant is to be despised. That midnight of ignorance which enveloped the human intellect has now passed away, and the bright orb of science, which at intervals sheds its feeble rays through the gloomy darkness of mental degradation, and was often extinguished by ignorance and superstition, has at length burst forth a quenchless light, and spreads its bright effulgence through nations.

Those who have encountered the tedious process of Arithmetic, and acquired a knowledge of the principles of the art, are best aware of the difficulties the student has to conquer. There is nothing so discouraging in Arithmetic, or that has tended so much to retard the progress of the learner, as that of fixing in the mind, by the common exercise of memory, those tables of cramp'd and unconnected sentences and subjects, with which the art is so much burdened. There is not, perhaps, in the whole range of our acquirements, any thing more difficult to be remembered; there is nothing in them that we can embody; they, in themselves, form no point of association that the mind can cling to; but are, as a writer happily observes, like grains of sand that have no coherence.

To remedy this inconvenience and promote that continuous chain of thought which is necessary to be preserved in giving effect to the most simple operations of the mind, whether that assistance be derived from mnemonical association, or any other aid or connection capable of improving the recollective faculties, were indeed an object of the greatest importance. The very bases of Arithmetic are method, locality, and association; and it is the various operations of these, that I wish to render more simple and interesting to the student.

The association of ideas in the natural order of the mind, we find to be the most powerful and efficacious means of reminiscence, wherever one object becomes linked with another we more easily recollect it than where it is apart or isolated.

It will be proper for those who are desirous of attaining a thorough knowledge of Arithmetic, to study the art under a practical teacher, who will demonstrate patiently, every rule as he proceeds, and not suffer his pupil to waste his time in useless trials and conjecture. It depends not altogether upon the capacity of the learner, but the clear communication of his preceptor to remove the difficulties, which, though simple, appear insuperable to the tyro, and often make him retract from his pursuit of gaining the best and most fruitful acquisitions of knowledge. It is not the number of books (in any art or science), but on their proper selection, and the ability of the master to explain them, that the rich harvest of the student's intelligence depends; a pupil may gather more real wisdom from a single volume, when it is well digested to him than by carelessly perusing the pages of a hundred folios.

When the Multiplication Table is known by the pupil, as it were at his fingers' ends, he should be taught the universal pence or money table; which is done by the three divisors, 4, 12 and 20. Any number of farthings divided by 4 bring them into pence; any number of pence divided by 12 bring them into shillings; and any number of shillings divided by 20 bring them into pounds. These divisors are unlimited in their capacities, and much more easy and intelligible than the common confined pence table, hitherto published in every system of Arithmetic, and it excites my astonishment that no Author ever before suggested it. Another observation, and one of the greatest importance, which I wish seriously to impress upon the mind of the preceptor is, the necessity of his pupils proving every question of Arithmetic before they write down the facit or answer. Arithmetic is the science of truth, and contains no fallacies. By proof alone the analysis of the science is known; an operation may be worked mechanically from the force of memory, (without its being in the least understood,) as I have experienced when a pupil; but it can be proved only by comparisons of the mind, which alone elicit the truth of the principles of the question.

The pupil by my method will have something to encourage his perseverance,—the beauty and utility of the questions. By the old plodding system, he toils upon a barren waste, unanimated by any cheering prospect, not even that of the application or utility of his labor; nor have I, in the whole course of my experience, ever met with a pupil, who, on entering into Reduction, after serving an apprenticeship in the Weights and Measures by the old method, was capable of solving the most simple question in any of its rules.

The great object I am striving to effect, in my new system of instruction, is to give the learner a sound practical knowledge of those branches which are more especially applicable to the affairs of life, or which can render him useful and respectable in the line for which he is destined.

DEFINITION OF ARITHMETIC.

Arithmetic is a science which explains the properties and shows the uses of numbers.

Unity, or a *Unit*, is the number one. Every other number is an assemblage of units.

For facilitating the management of numbers in arithmetic, they are expressed by signs or characters.

In modern Arithmetic, all numbers are expressed by means of ten characters: the nought, or cypher, or zero, 0, which has no value; and the nine significant figures, or digits, 1, 2, 3, 4, 5, 6, 7, 8, 9, which denote respectively the numbers one, two, three, four, five, six, seven, eight, nine.

The idea of these figures is supposed to have been given by the ten fingers of the hands, which, no doubt, were made use of in computation before arithmetic was systematized.

When either of these significant figures stands by itself, or when it is followed by no other figure, it expresses merely its simple value; but when it is followed by one figure, it signifies ten times its simple value; when by two, one hundred times; when by three, one thousand times; and so on by a ten-fold increase for each figure that follows it. The increased value thus denoted by a figure in consequence of its position is called its local value.

Though the nought or cypher, of itself, as its name imports, stands for nothing: yet, being placed close to other figures, on their right, the combination increases their value in the same ten-fold proportion.

Suppose I want to note down in figures five hundred and three—I must put a cypher in ten's place between the 5 and 3, otherwise it would appear to be only 53: and if I place a cypher on the right hand of 1, it instantly becomes ten.

An *even number* is that which can be divided into two equal parts: as 2, 4, 6, 8, 10, 12, &c.

An *odd number*, on the contrary, is that which cannot be halved, or which, if it can be divided by 2, always leaves a unit for the remainder, as 1, 3, 5, 7, 9, &c.

A *prime number* is that, which divided by any number, between 1 and itself, would leave a remainder.

A *composite number* is the result of two or more inferior numbers multiplied together, and the inferior numbers are called its components parts—thus 18, for instance, being a composite, 3 and 6 are its component parts, and on this principle all the answers in the multiplication table are composite numbers.

An *integer* is any whole number, consisting of one unit or more of only one kind or denomination, as 3, 8, 12, 50, 100, &c.

A *fraction* is a part of a unit and is expressed by two numbers, the one below the other, with a line between them, thus $\frac{1}{2}$.

A *mixed number* is an integer and fraction together, thus $2\frac{3}{4}$.

A *common measure* is a number that will exactly divide other numbers and leave no remainder, as 4 which measures 8 and 12 exactly; it is commonly used in reducing fractions to their lowest terms and in abridging terms in the Rule of Three.

An *aliquot* part is an even part of a number or quantity; such a part as, when taken a certain number of times, will exactly make that number. It is always known by having 1 for the upper figure of the fraction, and is generally employed in calculating the value of commodities.

The five rules upon which the whole of arithmetic depends are Notation or Numeration, Addition, Subtraction, Multiplication, and Division; the last four of which are either simple or compound. Simple is when the given numbers are all of the same denomination, as all pounds; but if the operation consists of several names, as pounds, shillings, pence, &c., it is termed compound.

Notation teaches to write or express numbers by figures.

Numeration is the art of reading or discovering the values of numbers already expressed by characters.

Numbers are divided into periods of six figures, and half periods of three figures—commencing at the right hand and counting towards the left.

Addition teaches the sum of numbers: it is the adding or collecting of several numbers into one amount, and the answer or number found is called their sum or total.

Subtraction teaches the difference of numbers: it is the taking of a less number from a greater in order to discover the difference between them. The greater number is called the minuend, the less the subtrahend; and the answer or number found the remainder.

Multiplication teaches the product of numbers: it is the art of finding the amount of any given number when repeated a certain number of times, and is therefore a short method of performing addition. The upper line or number to be increased is called the multiplicand. The lower line or number by which it is to be increased is called the multiplier; and the answer or number produced by this operation is called the product. Both the multiplicand and multiplier are sometimes called factors from their making or producing the product.

Division teaches the separation of numbers: it is the art of finding how many times one number is contained in another, or dividing of any sum into any number of parts proposed, and is therefore a short method of performing Subtraction. The number to be divided is called the dividend; the number by which we divide is called the divisor; the number which this operation produces is called the quotient or answer to the question; and when there is any number over at last it is termed the remainder.

There are two modes of Division, the one is called short, and the other long. The former is that in which the several Multiplications and Subtractions are performed mentally, and the quotient set under the dividend. This is preferable to the latter when the divisor is a composite number, or any whole number below 13.

In dividing by component parts, the true remainder may be found by multiplying the last remainder (if any) by the first divisor, and including the first remainder (if any) which will produce the true remainder.

Reduction teaches to bring money, weights, and measures from one name or denomination to other numbers of a different denomination, without altering their value, and is performed by Multiplication and Division.

In reduction there are two branches or problems: the one is termed descending, the other ascending.

Reduction descending, is the reducing numbers of a higher denomination to those of a lower denomination, in which case multiply by as many of the lower as make one of the higher. Thus, to reduce £5 to shillings, multiply by 20, the number of shillings in a pound, which gives 100 shillings, the answer.

Reduction ascending, is the bringing a less denomination to a greater; in which case divide by as many of the less name as make one of the greater. For instance, to reduce 100 shillings to pounds, divide by 20, which gives £5, the answer.

Simple proportion, or the Rule of Three, teaches from three given numbers to find a fourth, called the answer, which, when found, shall have the same ratio or proportion to the third as the second has to the first.

Questions in the Rule of Three are of two kinds, viz: direct and inverse.

Direct proportion is more requiring more, or less requiring less, for when the proportion is direct a greater third term always requires a greater answer, and a less third term a less answer; that is, an answer less than the second or middle term. Thus, if six yards of cloth cost 12 shillings, 10 yards of the same will cost 20 shillings;—more yards requiring more money is direct proportion. Or if 10 yards of cloth cost 20 shillings, six yards will cost 12 shillings;—less in quantity requiring less money, is direct also.

Inverse proportion is more requiring less, or less requiring more: for such is the peculiar nature of the questions, a greater third term (that is, one that is greater than the first term) requires a less answer (that is, an answer less than the second or middle term); and, in like manner, a less third term requires a greater answer. Thus, if 4 men take 12 days to do a piece of work, 8 men could do it in half the time;—more men requiring less time is inverse. Or if 8 men take 6 days to do a piece of work, four men would require double the time;—less men requiring more time is likewise inverse.

In stating questions in this rule write down that number for the middle, term which is of the same denomination as the answer to the question, with two dots before and four after it; on the right, place the term which requires the answer; and, on the left, the remaining term of the same name or kind with that on the right.

The next step is to reduce the right and left hand terms to one, and the same denomination and the middle term to the lowest denomination mentioned in that term.

Before solving the question, it must be observed that the third or last term be of the same name or description as the first. The middle term must be reduced, if necessary. The question discovered to be inverse or direct, and the terms abridged, if possible, which will greatly shorten the operation.

If the question be direct, the method of solving it is to multiply the second and third terms together, and divide the product by the first term for the answer. But if the question be inverse, multiply the first and second terms together and divide their product by the third; and in both cases the quotient will be the answer required in the same denomination as the second term. In those cases, where the answer requires to be brought to another name, reduction is necessary before the work is complete.

To prove questions in the Rule of Three, it is only necessary to note down the answer of the former statement for a middle term; the first term for a third, and the third for a first. and proceed as before to find an answer similar to the middle term of the former statement,

The terms in direct proportion are abridged by dividing the first and second, or the first and third terms, by a common measure (which, of course, should leave no remainder); and inverse proportion by dividing the third term, and either the second or first terms (but not both at once,) by some common measure; and in both cases the quotients thus found may be used instead of the original terms.

Compound proportion, or the double Rule of Three, teaches from any odd number of terms greater than three being given to find another term, called the answer, which, when found, must bear the same proportion to the one in question of the same name or kind, as the remaining terms considered, as two distinct bodies bear to each other.

To state the terms, put that number in the middle, which is of the same denomination or quality as the required term, with two dots before and four after it: on the right, place all the terms which require the answer, and on the left, all the remaining terms, observing that like names be opposite to each other.

The statement will then exhibit, on the left hand, all the terms of supposition to which the middle term appears to be an answer; and, on the right, all the conditional terms for which the answer of the question is required.

The inverse terms may be discovered and managed thus: consider each first and third term, along with the middle term, as a separate statement in the single Rule of Three, and apply the two definitions commencing with the words "direct proportion" and "inverse proportion" to it—which, if found to be inverse, exchange the terms by placing the third where the first was, and the first where the third was.

To find whether a statement is "direct" or "inverse," if it requires more, mark with a cross the less extreme for the divisor; if it requires less, mark the greater, which will at once decide the question.

Before solving the question, observe that the terms opposite to each other be of the same name, the inverse terms exchanged, the middle term reduced, (if necessary,) and the terms abridged, if possible.

In solving the question, multiply all the right hand terms together for a third term, and all the left hand terms together for a first; these two thus found along with the middle term form a statement in the single Rule of Three, direct. Then multiply the second and third terms together and divide their product by the first, which gives the answer in the name in which the middle term was left.

Practice is a short method of finding the value of any quantity of goods by the use of aliquot parts,—or, in other words, such a part as, when repeated a certain number of times, will exactly make that quantity or number.

Tare and Tret.—The whole weight of any commodity, including the package, or whatever else contains the goods, is called its *gross weight.*

Tare, Tret and Clough, are certain allowances made by merchants in selling goods by weight.

Tare is an allowance to the buyers for the weight of the package, &c., and is either at so much for the whole, at so much per hogshead, chest, cask, &c., or at so much per hundred weight.

Tret is an allowance to the vendor of 4 lbs. upon every 104 lbs. after the tare is deducted on account of dust or other waste.

Clough is an allowance of 4 lbs. in every 3 cwt. after the tare and tret are deducted for the turn of the scale when the goods are retailed.

Suttle is what remains after some of the allowances are deducted. Thus, after the tare is deducted from the gross, the remainder is called tare suttle; and after the tret is deducted from the tare suttle, the remainder is called tret suttle.

The *Neat* or *Net Weight* is what remains after all deductions have been made.

Interest is the sum to be paid by a person for the use of money which he owes. The money due is called the principal. The sum of the principal and interest is called the amount. The rate is the money allowed for the use of one hundred pounds for any given time, but usually for a year.

Compound Interest is when interest is charged, not only on the original principal, but also on the interest as it becomes due.

In interest, five quantities are concerned: the principal, the rate, the time, the interest, and the amount; and any three, except the principal, the interest, and the amount, being given, the rest can be found.

It is scarcely necessary to remark that per cent. means per hundred, and per annum per year.

Discount is an allowance made for advancing money before it becomes due, and generally consists of the interest of the sum up to the time at which it becomes due. Three days, called days of grace, are always allowed after the time a bill is nominally due before it is legally due.

Commission is the sum which a merchant charges for buying or selling goods for another.

Brokerage is a smaller allowance of the same nature, a per centage usually paid to brokers for negotiating bills, or transacting other money concerns.

Insurance or *Assurance* is a contract by which one party on being paid a certain sum or premium by another on account of property that is exposed to risk engages in case of loss to pay the owner of the property the sum insured on it.

Equation of Payments is a rule which teaches to find a just time for paying a debt at once, which is due at different times.

Profit and Loss is that branch of arithmetic which treats of the gains or losses on mercantile transactions.

Exchange teaches us to find how much of the money of one country is equivalent to a given sum of the money of another. The par of exchange between the two countries signifies the intrinsic value of the money of the one compared with that of the other, and is estimated by the weight and quality of the coin.

Fellowship is the method of determining the respective gains or losses of the partners in a mercantile company. Partnership may be of two kinds—single, and double. In single fellowship, the stocks or sums contributed by the several partners all continue in trade for the same time. In double fellowship, the stocks continue in trade for different periods.

Alligation is a rule which is chiefly employed in calculations respecting the compounding or combining of articles of different kinds, and is of three kinds, viz: medial, alternate, and partial.

Alligation Medial is when the quantities and rates of the ingredients are given to find the value of the compound.

Alligation Alternate is when the rates of the ingredients are given to find what quantity of each will compose a mixture at a given rate.

Alligation Partial is when the whole composition or one of its ingredients is limited to a certain quantity.

Involution is the method of finding any assigned power of a given number—or, as it is also expressed, the method of raising a number to any proposed power: for example, 2 multiplied by two, gives 4; the second power or square which, multiplied by two, gives 8; the third power or cube, and so on.

Evolution, or the extraction of roots, is the method of finding a number, the continual product of which, repeated a given number of times as factor, will amount to a given number, and is the reverse of Involution.

Position is a rule by which a true answer may be found to a question which cannot be solved by any of the ordinary rules of arithmetic, by adopting certain numbers to use as if they were the true ones.

It is called single when one false number, and double when two are requisite to find the answer.

Progression is of two kinds, viz: arithmetical, and geometrical. Arithmetical is that in which the terms either all increase, or all decrease, by the same quantity; and this quantity is called their common difference. Geometrical is that in which the successive terms all increase by a common multiplier, or all decrease by a common divisor. Either of which is called their ratio.

The *Purchasing of stocks* is the buying and selling of shares in the public funds.

Barter is the exchanging of one commodity for another in such a way that neither party may sustain loss.

Mensuration is the art of measuring any thing that has length, breadth, or thickness.

Annuities.—An annuity is a fixed sum of money payable at the ends of equal periods of time, such as years, half years, or quarters. Annuities are of two kinds: certain, and contingent. The former are those which commence at a fixed time and continue for a determinate number of years; the latter are those whose commencement, or continuance, or both, depend on some contingent event, usually the life or death of one or more individuals.

Vulgar fractions.—When an operation in Division is performed, the remainder, with the divisor placed under it, forms a vulgar fraction; and these, admitting of being added, subtracted, multiplied, and divided, have in consequence been formed into a distinct rule, called vulgar fractions.

Decimal fractions.—A decimal fraction is a fraction whose denominator is 1, with as many cyphers annexed as there are figures in the numerator: the denominators therefore being 10, 100, 1000, &c., are seldom or never used in the calculation, which renders the operations similar to simple addition, subtraction, multiplication, and division. Decimals are distinguished by a dot prefixed to them, called the decimal point.

The signs used in arithmetic are certain symbols or characters which denote what is to be performed in a shorter, better, and more significant manner than can be expressed by words at length.

The character $=$ (equal to) is the sign of equality, as 12d. $=$ 1 shilling; that is, twelve pence are equal to one shilling.

The character $+$ (plus or more) is the sign of addition, as $4 + 6 = 10$; that is, four added to six are equal to ten.

The character $-$ (minus or less) is the sign of subtraction, as $8 - 5 = 3$; that is, eight lessened by five are equal to three.

The character $\times$ (multiplied by) is the sign of multiplication, as $5 \times 6 = 30$; that is, five multiplied by six are equal to thirty.

The character $\div$ (divided by) is the sign of division, as $6 \div 2 = 3$; that is, six divided by two are equal to three.

The character $:$ (is) $::$ (so is) $:$ (to) are the signs of proportion, as $2 : 4 :: 8 : 16$; that is, as two are to four, so are eight to sixteen.

QUESTIONS UPON THE DEFINITIONS.

It is important that every Pupil as he progresses in the science of Arithmetic should first learn the rule he is about to enter upon by rote, that he may, as it were, have it at his fingers' ends, and thoroughly understand the principles he is going to work upon, and to keep those ever present to his memory that he has previously learnt. It is advisable for the teacher to question him upon the definitions, and for whose assistance the following questions are intended:

What is Arithmetic?
What is a Unit?
What is every other number?
How are the numbers in Arithmetic expressed?
By how many characters are all numbers expressed?
What are they?
From what did the idea of these figures first originate?
When one of these figures stands by itself, what does it express?
When followed by two? By three?
What is the increased value called?
What does the nought or cypher of itself import?
In what proportion does it increase the value of other figures when placed on the right?
How would you note down the figures, five hundred and three? *
If you place a cypher on the right hand of 1, what does it become? If two? If three?
What is an even number? Give examples.
What is an odd number? Give examples.
What is a prime number?
What is a composite number?
What Table consists entirely of composite numbers?
What is an integer? Give examples.
What is a fraction?
How is it expressed? Give examples.
What is a common measure?
For what is it commonly used?
What is an aliquot part?
How is it always known, and for what employed?
How many rules does the whole of Arithmetic depend upon? Name them.
How are they divided?
What is meant by simple? What by compound?
What does Notation teach?
What is Numeration?
How are numbers divided?
What does Addition teach?
What is the answer called?
What does Subtraction teach?
What is the greater number called? The less? The answer?
What does Multiplication teach?
What is it a short method of performing?
What is the number to be increased called?
What is the number it is to be increased by called?
What is the answer called?

* The Teacher can here suggest a variety of numbers as fancy may dictate.

Why are the multiplicand and multiplier sometimes called factors?
What does Division teach?
What is it a short method of performing?
What is the number to be divided called?
What is the number to be divided by called?
What is the answer called?
How many modes of division are there?
What are they?
What is the short method?
How may the true remainder be found when dividing by component parts?
What does Reduction teach?
How many branches or problems are there in Reduction?
What are they termed?
What is Reduction descending?
How do you reduce numbers from a higher to a lower denomination?
What is Reduction ascending?
How do you bring a less denomination to a greater?
What does Simple Proportion, or Rule of Three teach?
Of how many kinds are questions in this rule? What are they?
What is Direct Proportion?
What is Inverse Proportion?
When more money requires more goods, in what rule is your question?
If less time requires more men, in what rule is your question?
If less money requires less goods, in what rule is your question?
If more time requires less men, in what rule is your question?
How do you state your question in this rule?
If you want money for your answer, of what kind must your second term be?
If you want weight, of what kind must your second term be?
If measure, if time, what must your second term be?
If your right and left hand terms are not of one denomination, what are you to do?
If the middle term is not of one denomination, what are you to do?
Having your terms reduced, how do you proceed to solve Direct Proportion?
Having your terms reduced, how do you proceed to solve Inverse Proportion?
What rule is necessary to complete the work?
How can you prove questions in the Rule of Three?
When is your question in Direct Proportion?
When in Inverse Proportion?
What terms do you abridge in Direct Proportion?
What terms do you abridge in Inverse Proportion?
What does Compound Proportion, or Double Rule of Three teach?
How do you state the terms?
What will the statement then exhibit on the left?
What will it exhibit on the right?
How may the inverse terms be discovered and managed?
How do you find whether a statement is direct or inverse in this rule?
How do you solve questions in this rule?
What is Practice?
What is Tare and Tret?
What is Tare, Tret and Clough?
What is Tare?
What is Tret?
What is Clough?
What is Suttle?
What is Neat or Net Weight?
What is Interest?
What is the money due called?
What is the principal and interest called?
What is the rate?

What is Compound Interest?
How many quantities are concerned in Interest? What are they?
What does per cent. mean? And what per annum?
What is Discount?
How many days are allowed after a Bill becomes nominally due?
What are they called?
What is Commission?
What is Brokerage?
What is Insurance or Assurance.
What does Equation of Payments teach?
What branch of Arithmetic is Profit and Loss?
What does Exchange teach?
What is Fellowship, and how divided?
What is the difference between Single and Double Fellowship?
What is Alligation?
How is it divided?
What is Alligation Medial?
What is Alligation Alternate?
What is Alligation Partial?
What is Involution?
What is Evolution?
What is Position, and of how many kinds?
When is it Single? When Double?
Of how many kinds is Progression?
What is Arithmetical Progression?
What is Geometrical Progression?
What is the purchasing of Stocks?
What is Barter?
What is Mensuration?
What are Annuities? Of how many kinds are they, what are they?
What is a certain Annuity?
What is a contingent Annuity?
On what account was a distinct rule for Vulgar Fractions formed?
What is a Decimal Fraction?
Are the Denominators ever used in calculations?
What are the operations similar to?
How are Decimals distinguished?
What are the signs used in Arithmetic?
Name the characters?

What is the character Equal to, the sign of? Plus or More, Minus or Less, Multiplied by, Divided by, Is: so is :: to :,	When questioned upon these characters, the Pupil should represent them on the black board.

A COMPLETE SET
OF
ARITHMETICAL TABLES
ARRANGED IN A SUPERIOR MANNER TO ANY THAT HAVE EVER BEEN PUBLISHED.

NUMERATION TABLE.

IX.	Hundreds of millions....................................	555.555.555
VIII.	Tens of millions........................	55.555.555
VII.	Millions	5.555.555
VI.	Hundreds of thousands..	555.555
V.	Tens of thousands..	55.555
IV.	Thousands...	5.555
III.	Hundreds..	555
II.	Tens..................	55
I.	Units....................................	5

MULTIPLICATION TABLE.

Twice	3 times	4 times	5 times	6 times	7 times	8 times	9 times	10 times	11 times	12 times
1 are 2	1 are 3	1...... 4	1 are 5	1...... 6	1...... 7	1...... 8	1 are 9	1 are 10	1 are 11	1 are 12
2... 4	2... 6	2...... 8	2......10	2......12	2......14	2......16	2...... 18	2...... 20	2...... 22	2...... 24
3... 6	3... 9	3......12	3......15	3......18	3......21	3......24	3...... 27	3...... 30	3...... 33	3...... 36
4... 8	4...12	4......16	4......20	4......24	4......28	4......32	4...... 36	4...... 40	4...... 44	4...... 48
5...10	5...15	5......20	5 25	5......30	5......35	5......40	5...... 45	5...... 50	5...... 55	5...... 60
6...12	6...18	6......24	6......30	6......36	6......42	6......48	6...... 54	6...... 60	6...... 66	6...... 72
7...14	7...21	7......28	7......35	7......42	7......49	7......56	7...... 63	7...... 70	7...... 77	7...... 84
8...16	8...24	8......32	8......40	8......48	8......56	8......64	8...... 72	8...... 80	8...... 88	8...... 96
9...18	9...27	9......36	9......45	9......54	9... ..63	9......72	9...... 81	9...... 90	9...... 99	9......108
10...20	10...30	10......40	10......50	10......60	10......70	10......80	10...... 90	10......100	10......110	10......120
11...22	11...33	11......44	11......55	11......66	11......77	11......88	11...... 99	11......110	11......121	11......132
12...24	12...36	12......48	12......60	12......72	12......84	12......96	12......108	12......120	12......132	12......144

THE FARTHINGS TABLE.

4	farthings make	.... 1 penny.	28	farthings make	.... 7 pence.
8	ditto	.... 2 pence.	32	ditto	.... 8 do.
12	ditto	.... 3 do.	36	ditto	.... 9 do.
16	ditto	.... 4 do.	40	ditto	.... 10 do.
20	ditto	.... 5 do.	44	ditto	.... 11 do.
24	ditto	.... 6 do.	48	ditto	.... 12 p. or a shilling.

THE PENCE TABLE.

		S.	D.				S.	D.
12 pence make		1	0	156 pence make			13	0
24	ditto	2	0	168	ditto		14	0
36	ditto	3	0	180	ditto		15	0
48	ditto	4	0	192	ditto		16	0
60	ditto	5	0	204	ditto		17	0
72	ditto	6	0	216	ditto		18	0
84	ditto	7	0	228	ditto		19	0
96	ditto	8	0	240	ditto	£1	0	0
108	ditto	9	0	480	ditto	2	0	0
120	ditto	10	0	720	ditto	3	0	0
132	ditto	11	0	960	ditto	4	0	0
144	ditto	12	0	1200	ditto	5	0	0

THE SHILLINGS TABLE.

		£	S.			£	S.
20 shillings make		1	0	120 shillings make		6	0
30	ditto	1	10	130	ditto	6	10
40	ditto	2	0	140	ditto	7	0
50	ditto	2	10	150	ditto	7	10
60	ditto	3	0	160	ditto	8	0
70	ditto	3	10	170	ditto	8	10
80	ditto	4	0	180	ditto	9	0
90	ditto	4	10	190	ditto	9	10
100	ditto	5	0	200	ditto	10	0
110	ditto	5	10				

NOTE.—1 £ = 20s. = 240d. = 960 qr.

£ s. d. and q. being the initial letters of the four Latin words *lib, solidi, denarii,* and *quadrantes,* are respectively used to denote pounds, shillings, pence, and farthings. The character / is a corruption of the long ʃ, arising from rapidity in making it.

$\frac{1}{4}$ denotes .... one farthing.
$\frac{1}{2}$ do. .... two farthings, or a half a penny.
$\frac{3}{4}$ do. .... three farthings.

WEIGHTS AND MEASURES.

TROY WEIGHT.

*24	grains (gr.)	make	1 pennyweight	marked	dwt.
20	pennyweights	do.	1 ounce	do.	oz.
12	ounces	do.	1 pound	do.	lb.

NOTE.—1 lb. = 12 oz. = 240 dwts. = 5760 gr.

This weight was formerly used for weighiug articles of every kind; it is now used in weighing gold, silver, jewels, and liquors, and in philosophical experiments.

QUESTIONS.

How many ounces make a pound Troy?
How many pennyweights?
How many grains?
For what was this weight formerly used?
For what is it now used?

AVOIRDUPOIS WEIGHT.

16	drams (dr.)	make	1 ounce	marked	oz.
16	ounces	do.	1 pound	do.	lb.
14	pounds	do.	1 stone	do.	st.
28	pounds, or 2 stone	do.	1 quarter	do.	qr.
4	quarters, or 8 stone, or 112 lbs.	do.	1 hundred weight.	do.	cwt.
20	hundred weight	do.	1 ton	do.	T

NOTE.—1 T = 20 cwt. = 80 qrs. = 1120 st. = 2240 lb. = 35840 oz. = 573,440 dr.

1 lb. avoirdupois	=	14 oz.	11 dwt.	$15\frac{1}{2}$ gr.	troy.
1 oz. do.	=		18 do.	$5\frac{1}{4}$ gr.	do.
1 dr. do.	=		1 do.	$3\frac{1}{2}$ gr.	do.

By this weight are weighed all coarse and heavy goods, such as groceries, butter, cheese, butcher's meat, bread, corn, and most of the common necessaries of life; likewise, all metals, except gold and silver.

In long weight, 30 lbs. avoirdupois = 1 quarter; 4 quarters or 120 pounds = 1 hundred weight.

A ton of stones is 21 hundred, long weight.

QUESTIONS.

How many hundred weight make a ton?
How many quarters, how many pounds?
How many ounces and drams in a ton weight?
What is weighed by this weight?
What metals are excepted?
What weight is applied to gold and silver?
How many lbs. avoirdupois make 1 qr. long weight?
How many lbs. in a long hundred weight?
How many hundreds iu a ton of stones?

* The original of all weights used in England was a grain or corn of wheat gathered out of the middle of the ear, and being well dried, 32 of them were to make 1 dwt., 20 dwts., 1 oz.; and 12 oz., 1 lb. But, in later times, it was thought sufficient to divide the same dwt. into 24 equal parts, still called grains, being the least weight now in common use; and from thence the rest are computed as in the tables.

APOTHECARIES WEIGHT.

20 grains (gr.)	make	1 scruple	marked	scr.	or	℈
3 scruples	do.	1 dram	do.	dr.	or	ʒ
8 drams	do.	1 ounce	do.	oz.	or	℥
12 ounces	do.	1 pound.				

NOTE.—1 lb. = 12 oz. = 96 dr. = 288 scr. = 5760 grs.

Apothecaries use this weight in compounding their medicines, but buy and sell their commodities by avoirdupois weight.

The apothecaries lb. and oz., and the lb. and oz. Troy are the same, only differently subdivided.

Physicians write their prescriptions according to the following table and characters:

20 gr. Troy	make	1 scruple	marked	℈j
60 gr. do.	do.	1 dram	do.	ʒj = ℈iij
480 gr. do.	do.	1 ounce	do.	℥j = ʒviij
5760 gr. do.	do.	1 pound	do.	℔j = ℥xij

QUESTIONS.

How many oz. make a lb. apothecaries weight?
How many drs., how many scruples, and grains?
How do apothecaries use this weight?
What weight do they buy and sell their medecines by?
Are the apothecaries lb. and oz. and oz. and lb. Troy the same?
Describe the characters used by physicians?

LONG MEASURE.

3 barley corns in length (b. c.)	make	1 inch	marked	in.
12 inches	do.	1 foot	do.	ft.
3 feet	do.	1 yard	do.	yd.
$5\frac{1}{2}$ yards	do.	1 pole	do.	pl.
40 poles	do.	1 furlong	do.	fur.
8 furlongs	do.	1 English mile	do.	E. m.
3 miles	do.	1 league	do.	lea.
$69\frac{1}{2}$ statute miles, or 60 geographical miles	do.	1 degree	do.	deg. or °

360 degrees the circumference of the earth and of all circles.

NOTE.—1 E. m. = 1760 yds. = 5280 ft. = 63,360 in. = 190,080 b. c.

A fathom is 2 yards, or 6 feet; a hand (used in measuring horses) is 4 inches; a span, nine inches.

Long measure is used to ascertain the distance from one place to another, or anything else where length is considered, without regard to breadth.

QUESTIONS.

How many yards make a mile, long measure?
How many feet, how many inches, how many barley corns?
What length is a fathom?
How many inches make a hand, used in measuring horses?
How many inches make a span?
What is long measure used for?

SQUARE, OR LAND MEASURE.

THE MEASURE OF SURFACES.

144	square	inches (sq. in.)	make	1	square	foot	marked	sq. ft.
9	do.	feet	do.	1	do.	yard	do.	sq. yd.
30¼	do.	yards	do.	1	do.	pole	do.	pl.
16	do.	poles	do.	1	do.	chain	do.	ch.
40	do.	poles	do.	1	do.	rood	do.	rd.
10	do.	chains	do.	1	do.	acre	do.	ac.
4	do.	roods	do.	1	do.	acre	do.	ac.
160	do.	poles	do.	1	do.	acre	do.	ac.
640	do.	acres	do.	1	do.	mile	do.	m.

NOTE.—1 ac. = 160 pl. = 4,840 sq. yd. = 43,560 sq. ft. = 6,272,640 sq. in.

Square measure is used to measure all kinds of superficies, such as land, paving, plastering, roofing, tiling, and every thing that has length and breadth.

In measuring land, surveyors use a chain which is 4 poles or perches in length, and is divided into 100 equal parts, called links. They also compute by chains and links, but exhibit the result in acres, roods, and perches. 10 square chains, or 100,000 square links, are an acre. It may be observed also that a yard of land, mentioned by old writers, is 30 acres; and that 100 acres is a hide of land. A square is a figure which has four equal sides, each perpendicular to the adjacent ones. A square inch is a square, each of whose sides is an inch in length. A square yard is a square, each of whose sides is a yard in length, &c. The table of square measure is formed from the table of long measure, by multiplying each lineal dimension by itself: thus a square foot is = 12 × 12 = 144 square inches, &c.

QUESTIONS.

How many poles make an acre, square measure?
How many sq. yards, how many sq. feet, how many sq. inches?
For what is this measure used?
What is the length of the surveyors chain?
How is it divided? what are those parts called?
How do surveyors compute their work, and in what do they show the result?
How many square chains and links are there in an acre?
What is a square?
What is a square inch?
What is a square yard?
How is this table formed?

CUBIC,* OR SOLID MEASURE.

1728	solid inches (s. in.)	make	1 solid foot, marked	s. f.
27	—— feet	...	1 yard. do.	yd.
40	—— feet of rough timber ...	...	1 ton or load.	
50	—— feet of hewn timber ...	...	1 ton or load.	
42	—— feet	...	1 ton of shipping.	
277¼	—— inches	...	1 imperial wine, ale, beer or corn gallon.	
2218:16	—— inches	...	1 imperial standard bushel.	

* A cube is a figure contained by six equal squares. (Dice afford a familiar instance of this figure.) A cubic inch is a cube whose sides are each a square inch; a cubic foot, a cube whose sides are each a square foot, &c. A cubic number is produced by being multiplied twice into itself; thus 27 is equal to 3 × 3 × 3, and 1728 to 12 × 12 × 12.

Cubic or Solid Measure is used to measure all bodies that have length, breadth and depth, or thickness; as timber, stone and so forth.

A cubic yard of earth is called a load; 128 cubic feet, that is, a pile of wood, 8 feet long, 4 broad, and 4 deep, make a cord of wood; but 108 cubic feet make a stack.

QUESTIONS.

For what is Cubic or Solid Measure used?
What is a cube?
What is a cubic inch?
How is a cubic number produced?
What is a cubic yard of earth called?
How many feet in a cord of wood?
How many feet long should it be?
How many feet broad, and how many feet deep?
How many cubic feet in a stack of wood?

CLOTH MEASURE.

			Marked.
$2\frac{1}{4}$ inches (in.)	make	1 nail.	na.
4 nails	...	1 quarter.	qr.
4 quarters	...	1 yard. *	yd.
3 quarters	...	1 ell Flemish.	e. fl.
4 quarters $1\frac{1}{5}$ inch	...	1 ell Scotch.	e. s.
5 quarters	...	1 ell English.	e. e.
6 quarters	...	1 ell French.	e. fr.

NOTE.—1 yd. = 4 qr. = 16 na. = 36 in.

Cloth Measure is used in measuring all sorts of wrought silks, linens, woolen cloths, tapes, &c. The English ell is particularly used in measuring linens, called Hollands; and the Flemish ell, in tapestry.

QUESTIONS.

How many quarters make a yard, Cloth Measure?
How many nails, how many inches?
For what is Cloth Measure used?
For what is the English ell particularly used?
For what the Flemish ell?
From what is the standard length of the yard, used in this table, supposed to be derived?
In what year was it fixed upon?

DRY MEASURE.

			Marked.
2 pints (pts.)	make	1 quart.	qt.
2 quarts	...	1 pottle.	pot.
2 pottles	...	1 gallon.	gal.
2 gallons	...	1 peck.	pec.
4 pecks	...	1 bushel.	bu.
2 bushels	...	1 strike.	st.
4 bushels	...	1 coomb.	cm.
8 bushels	...	1 quarter.	qr.
4 quarters	...	1 chaldron.	ch.
5 quarters	...	1 wey.	wey.
2 weys or 80 bushels	...	1 last.	l.

NOTE.—1 l. = 10 qr. = 80 bu. = 320 pec. = 640 gal. = 2560 qts. = 5120 pt.

* The standard length in this table, from which all the others are derived, is supposed to be the yard; which is said to have been originally fixed in the year 1101, by King Henry the First, from the length of his arm.

This measure, which is a species of cubic measure, is used in measuring grain, seed, salt, and various kinds of dry articles. In many places, however, these are bought and sold by weight. The old bushel contains 8 gallons, dry measure, or $2150\frac{2}{5}$ cubic inches;—it should be, inside, 8 inches deep, and $18\frac{1}{2}$ inches wide throughout.

QUESTIONS.

How many quarters, bushels and pecks in a last, Dry Measure?
How many gallons, quarts and pints?
For what is this measure used?
How many gallons does the old bushel contain?
What is its measure in cubic inches?
How deep should it be?
How wide should it be throughout?

WINE MEASURE.

			Marked.
4 gills or noggins (g.).........	make	1 pint.	pt.
2 pints	...	1 quart.	qt.
4 quarts	...	1 gallon.	gal.
10 gallons	...	1 anker of brandy.	ank.
18 gallons	...	1 rundlet.	run.
$31\frac{1}{2}$ gallons	...	1 barrel.	bar.
42 gallons	...	1 tierce.	tier.
63 gallons	...	1 hogshead.	hhd.
84 gallons	...	1 puncheon.	pun.
2 hogsheads	...	1 pipe or butt.	P.
2 pipes	...	1 tun.	T.

NOTE.—1 T. = 4 hhd. = 252 gal. = 1008 qt. = 2016 pt. = 8064 g.

By this measure, wines, brandies, spirits, perry, cider, mead, vinegar, oil, &c., are measured; as also milk, but by custom only.

The old wine gallon, formerly in use, contained 231 cubic inches; the new, or imperial gallon, 277.274 cubic inches, that is, 277 cubic inches and 274-thousandth parts of a cubic inch; being about one-fifth, as nearly as possible, greater than the old wine gallon.

In the measure of foreign wines there are great varieties.

QUESTIONS.

How many hogsheads and gallons in a tun, Wine Measure?
How many quarts, pints and gills?
For what is this measure used?
How many cubic inches did the old wine gallon contain?
How many does the new or imperial contain?
How much do they differ in size?

ALE AND BEER MEASURE.

			Marked.
2 pints (pt.)	make	1 quart.	qt.
4 quarts	...	1 gallon.	gal.
9 gallons	...	1 firkin of beer.	b. fir.
2 firkins	...	1 kilderkin.	kil.
2 kilderkins or 36 gallons...	...	1 barrel.	bar.
3 kilderkins or 54 gallons...	...	1 hogshead.	hhd.
2 barrels or 72 gallons	...	1 puncheon.	pun.
2 hogsheads or 3 barrels ...	...	1 butt.	bt.
2 butts	...	1 ton.	T.

NOTE.—1 T. = 4 hhd. = 6 bar. = 24 fir. = 216 gal. = 864 qt. = 1728 pt.

The old ale and beer gallon contains 282 cubic inches, or 10 lbs. 3 oz. and $\frac{1}{4}$ of pure water; the new, or imperial gallon, (as before mentioned,) 277.274 cubic inches, which is about one sixtieth less than the old beer gallon, formerly used.

The hogshead of ale, in London, contains 48 gallons; the barrel, 32; the kilderkin, 16; and the firkin, 8.

QUESTIONS.

How many hogsheads and barrels make a ton, Beer Measure?
How many firkins, gallons, quarts and pints?
How many cubic inches did the old beer gallon contain?
What is the difference between it and the imperial gallon?
How many gallons does the hogshead of ale, in London, contain?
How many gallons does the barrel contain?

TIME.

			Marked.
60 thirds (th.)	made	1 second.	sec., or ″
60 seconds	...	1 minute.	m, or ′
60 minutes	...	1 hour.	hr.
24 hours	...	1 day.	d.
7 days	...	1 week.	w.
4 weeks	...	1 month.	m.
12 calender months	...	1 year.	yr.
13 lunar months	...	1 year.	yr.
365 days, 6 hours	...	1 year.	yr.
100 years	...	1 century.	cen.

NOTE:—1 yr. = 365d. = 8766 hrs. = 525960 m. = 31557600 sec.

The lunar month is uniformly 28 days, being the time which the moon takes in revolving round the earth.

The solar year is the space of time in which the sun moves through the 12 signs of the ecliptic. This, by the observations of the best modern astronomers, contains 365 days, 5 hours, 48 minutes, 48 seconds; the quantity assumed by the authors of the Georgian calendar is 365, 5 hours, 49 minutes. But in the civil or popular account, the year contains, as above, 365 days, 6 hours.

The year is divided into twelve portions, called calendar months; the first is January, containing 31 days; second, February, 28 days, and in leap year, 29; third, March, 31; fourth, April, 30; fifth, May, 31; sixth, June, 30; seventh, July, 31; eighth, August, 31; ninth, September, 30; tenth, October, 31; eleventh, November, 30; twelfth, December, 31; as indicated in the following well known, memorable lines:

Thirty days hath September,
April, June, and November,
F·bruary hath twenty-eight alone,
And all the rest have thirty-one,
Except in leap-year, when's the time
February's days are twenty-nine.

To find leap-year, divide the year by 4; if there be no overplus, it is leap-year; but if there be 1, 2, or 3, it is the 1st, 2nd or 3rd year after, respectively.

QUESTIONS.

How many days, hours, months and seconds in a year?
How many days in a lunar month?
What is a solar year?
What time does it comprise?
How many days does the civil year contain?
How is the year divided?
Which months have only 30, and which one 28 days?
How do you find leap-year?

MOTION, OR ASTRONOMICAL DIVISION OF A CIRCLE.

			Marked.
60 third (60‴)	made	1 second.	1″
60 seconds	...	1 minute.	1′
60 minutes	...	1 degree.	1°
30 degrees	...	1 sign.	
90 degrees	...	1 right angle, quadrant, or quarter of a circle.	
4 right angles, or 360 degrees	...	1 circumference of a circle.	

Motion is a geographical division of any line drawn round the circumference of the earth. 15 degrees of motion, or longitude, are equal to one hour, and 1 degree is equal to 4 minutes of time. This table is used in astronomical and geographical calculations.

The astronomical day commences at 12 o'clock at noon. The time before noon is marked A. M., ante meridiem; and the time after noon, P. M., post meridiem. The common or civil day begins at 12 o'clock the preceding night; of course the astronomical day begins 12 hours later than the common day.

It may be proper to remark, that the circumference, or a circle, is the line which contains it; that all straight lines drawn from the centre to the circumference are equal; that any of these lines is called a radius; and that a line drawn through the centre, and terminated both ways by the circumference, is called a diameter.

QUESTIONS.

What is motion?
How many degress of longitude are equal to an hour?
What time is one degree equal to?
For what is this table used?
When does the astronomical day commence?
How is the time before noon marked?
How is the time after noon marked?
What do these initials mean?
When does the common or civil day commence?
What is a circumference?
What is a radius?
What is a diameter?

TABLES OF ALIQUOT PARTS.

OF A POUND.

S.	D.		
10	0	is the	$\frac{1}{2}$
6	8		$\frac{1}{3}$
5	0		$\frac{1}{4}$
4	0		$\frac{1}{5}$
3	4		$\frac{1}{6}$
2	6		$\frac{1}{8}$
2	0		$\frac{1}{10}$
1	8		$\frac{1}{12}$
1	4		$\frac{1}{15}$
1	3		$\frac{1}{16}$
1	0		$\frac{1}{20}$
0	10		$\frac{1}{24}$
0	8		$\frac{1}{30}$
0	$7\frac{1}{2}$		$\frac{1}{32}$
0	6	is the	$\frac{1}{40}$
0	5		$\frac{1}{48}$
0	4		$\frac{1}{60}$
0	$3\frac{3}{4}$		$\frac{1}{64}$
0	3		$\frac{1}{80}$
0	$2\frac{1}{2}$		$\frac{1}{96}$
0	2		$\frac{1}{120}$
0	$1\frac{1}{2}$		$\frac{1}{160}$
0	$1\frac{1}{4}$		$\frac{1}{192}$
0	1		$\frac{1}{240}$
0	$0\frac{3}{4}$		$\frac{1}{320}$
0	$0\frac{1}{2}$		$\frac{1}{480}$
0	$0\frac{1}{4}$		$\frac{1}{960}$

OF A SHILLING.

s.	d.		
0	6	.... is the	$\frac{1}{2}$
0	4	....	$\frac{1}{3}$
0	3	....	$\frac{1}{4}$
0	2	....	$\frac{1}{6}$
0	$1\frac{1}{2}$	....	$\frac{1}{8}$

s.	d.		
0	1	.... is the	$\frac{1}{12}$
0	$0\frac{3}{4}$	....	$\frac{1}{16}$
0	$0\frac{1}{2}$	....	$\frac{1}{24}$
0	$0\frac{1}{4}$	....	$\frac{1}{48}$

OF VARIOUS SUMS.

s.	d.				s.	d.
2	6	... is ...	$\frac{1}{4}$	... of ...	10	0
			$\frac{1}{2}$	....	5	0
1	8	....	$\frac{1}{6}$	....	10	0
			$\frac{1}{3}$	....	5	0
1	3	....	$\frac{1}{8}$	....	10	0
			$\frac{1}{4}$	....	5	0
			$\frac{1}{2}$	....	2	6
0	10	....	$\frac{1}{12}$	....	10	0
			$\frac{1}{8}$	....	6	8
			$\frac{1}{6}$	....	5	0
			$\frac{1}{4}$	....	3	4
			$\frac{1}{3}$	....	2	6
			$\frac{1}{2}$	....	1	8
0	8	....	$\frac{1}{6}$	....	4	0
			$\frac{1}{5}$	....	3	4
			$\frac{1}{3}$	....	2	0
0	$7\frac{1}{2}$	....	$\frac{1}{8}$	....	5	0
			$\frac{1}{4}$	....	2	6
			$\frac{1}{2}$	....	1	3

s.	d.				s.	d.
0	5	... is ...	$\frac{1}{12}$	... of ...	5	0
			$\frac{1}{8}$	....	3	4
			$\frac{1}{6}$	....	2	6
			$\frac{1}{4}$	....	1	8
0	4	....	$\frac{1}{12}$	....	4	0
			$\frac{1}{10}$	....	3	4
			$\frac{1}{6}$	....	2	0
0	3	....	$\frac{1}{10}$	....	2	6
			$\frac{1}{8}$	....	2	0
0	$2\frac{1}{2}$	....	$\frac{1}{12}$	....	2	6
			$\frac{1}{8}$	....	1	8
			$\frac{1}{6}$	....	1	3
			$\frac{1}{4}$	....	0	10
0	$1\frac{1}{2}$	....	$\frac{1}{10}$	....	1	3
			$\frac{1}{8}$	....	1	0
			$\frac{1}{4}$	....	0	6
0	$0\frac{3}{4}$	....	$\frac{1}{8}$	....	0	6
			$\frac{1}{4}$	....	0	3

OF A TON.

Cwt.		
10	.... is the	$\frac{1}{2}$
5	....	$\frac{1}{4}$
4	....	$\frac{1}{5}$

Cwt.		
$2\frac{1}{2}$	.... is the	$\frac{1}{8}$
2	....	$\frac{1}{10}$
1	....	$\frac{1}{20}$

OF A HUNDRED.

qrs. lb		
2 or 56	.... is the	$\frac{1}{2}$
1 or 28	....	$\frac{1}{4}$
16	....	$\frac{1}{7}$
14	....	$\frac{1}{8}$
8	....	$\frac{1}{14}$
7	....	$\frac{1}{16}$
4	....	$\frac{1}{28}$

lb		
$3\frac{1}{2}$	.... is the	$\frac{1}{32}$
2	....	$\frac{1}{56}$
$1\frac{3}{4}$	....	$\frac{1}{64}$
1	....	$\frac{1}{112}$
$0\frac{1}{2}$	....	$\frac{1}{224}$
$0\frac{1}{4}$	....	$\frac{1}{448}$

OF A QUARTER.

lb		
14	.... is the	$\frac{1}{2}$
7	....	$\frac{1}{4}$
4	....	$\frac{1}{7}$
$3\frac{1}{2}$	....	$\frac{1}{8}$
2	....	$\frac{1}{14}$

lb		
$1\frac{3}{4}$	.... is the	$\frac{1}{16}$
1	....	$\frac{1}{28}$
$0\frac{1}{2}$	....	$\frac{1}{56}$
$0\frac{1}{4}$	....	$\frac{1}{112}$

ARITHMETIC.

Practical Arithmetic is the art of computing by numbers: and for that purpose nine significant figures, or digits, 1, one, 2, two, 3, three, 4, four, 5, five, 6, six, 7, seven, 8, eight, 9, nine, besides the 0, or cypher, have been adopted. These are sufficient for the expression of all numbers, whether simple or compound, from unity (the root of numbers) to infinity.

Notation is the writing or expression of numbers by those figures; and

Numeration is the reading or discovering of their value or amount, when written or expressed.

Besides their simple value, these figures have also a local one assigned to them, the value of every figure, in each successive place, towards the left, being always of ten times the amount or value which that same figure would be if it were placed in the situation of the preceding figure towards the right.

The nought, or cypher, of itself, as its name imports, stands for nothing; but in connexion with other figures it increases their value by removing them to a higher place (further to the left) in the series, in the same tenfold proportion.

As numbers admit of no other change than that of increase or decrease, there are but two radical principles in arithmetic, viz: Addition, and Subtraction.

If numbers are added or multiplied together, the result is greater than before. But, if they are subtracted from, or divided by each other, the result is less than before. Therefore, if an increase be required, add or multiply; and, if a decrease, subtract or divide.

Reduction teaches to change things of one name into things of another name; as to change pounds into shillings, pence, or farthings: this is called reducing them.

When I have things of a great value, as pounds, which I wish to change into things of a less value as shillings, pence, and farthings, I must always multiply, because I want to have more in number; and Multiplication always brings more.

When I have things of a little value, which I wish to change for things of a greater value, as to change farthings for pence, shillings, or pounds, I must always divide, because I want fewer in number; and Division always brings fewer.

NOTE.—For questions see those of the Definitions.

The formation of the figures is the first object to which the pupil in arithmetic must direct his attention; and, that being accomplished, his next step is the reading of those figures which teaches him the progession of numbers by unity. This can be best effected by the following table:

FORMATION OF THE FIGURES.

1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

PROGRESSION OF NUMBERS BY UNITY.

1,	1, 1, 1,	1, 1, 1,	1, 1, 1,
	1, 1, 1,	1, 1, 1,	1, 1, 1,
	2, 2, 2,	2, 2, 2,	2, 2, 2
	1, 1,	1, 1, 1,	1, 1, 1
	3, 3,	3, 3, 3,	3, 3, 3
	1,	1, 1, 1,	1, 1, 1
	4,	4. 4, 4,	4, 4, 4
		1, 1, 1,	1, 1, 1
		5, 5, 5,	5, 5, 5
		1, 1,	1, 1, 1
		6, 6,	6, 6, 6
		1,	1, 1, 1
		7,	7, 7, 7
			1, 1, 1
			8, 8, 8
			1, 1
			9, 9
			1
			10

The learner should practice the following primary exercises which require but this single rule—namely, to add or multiply each digit in succession to, or by itself; and prove Addition or Multiplication by Subtraction or Division.

ADDITION AND SUBTRACTION.

1, 2, 3, 4, 5, 6, 7, 8, 9
1, 1, 1, 1, 1, 1, 1, 1, 1

2, 3, 4, 5, 6, 7, 8, 9, 10
1, 1, 1, 1, 1, 1, 1, 1, 1

1, 2, 3, 4, 5, 6, 7, 8, 9

2, 3, 4, 5, 6, 7, 8, 9
2, 2, 2, 2, 2, 2, 2, 2

4, 5, 6, 7, 8, 9, 10, 11
2, 2, 2, 2, 2, 2, 2, 2

2, 3, 4, 5, 6, 7, 8, 9

3, 4, 5, 6, 7, 8, 9
3, 3, 3, 3, 3, 3, 3

6, 7, 8, 9, 10, 11, 12
3, 3, 3, 3, 3, 3, 3

3, 4, 5, 6, 7, 8, 9

4, 5, 6, 7, 8, 9
4, 4, 4, 4, 4, 4

8, 9, 10, 11, 12, 13
4, 4, 4, 4, 4, 4

4, 5, 6, 7, 8, 9

5, 6, 7, 8, 9
5, 5, 5, 5, 5

10, 11, 12, 13, 14
5, 5, 5, 5, 5

5, 6, 7, 8, 9

6, 7, 8, 9
6, 6, 6, 6

12, 13, 14, 15
6, 6, 6, 6

6, 7, 8, 9

7, 8, 9
7, 7, 7

14, 15, 16
7, 7, 7,

7, 8, 9

8, 9
8, 8

16, 17
8, 8

8, 9

9
9

18
9

9

MULTIPLICATION AND DIVISION.

1, 2, 3, 4, 5, 6, 7, 8, 9
1, 1, 1, 1, 1, 1, 1, 1, 1

1) 1, 2, 3, 4, 5, 6, 7, 8, 9

1, 2, 3, 4, 5, 6, 7, 8, 9

2, 3, 4, 5, 6, 7, 8, 9
2, 2, 2, 2, 2, 2, 2, 2

2) 4, 6, 8, 10, 12, 14, 16, 18

2, 3, 4, 5, 6, 7, 8, 9

3, 4, 5, 6, 7, 8, 9
3, 3, 3, 3, 3, 3, 3

3) 9, 12, 15, 18, 21, 24, 27

3, 4, 5, 6, 7, 8, 9

4, 5, 6, 7, 8, 9
4, 4, 4, 4, 4, 4

4) 16, 20, 24, 28, 32, 36

4, 5, 6, 7, 8, 9

5, 6, 7, 8, 9
5, 5, 5, 5, 5

5) 25, 30, 35, 40, 45
5, 6, 7, 8, 9

6, 7, 8, 9
6, 6, 6, 6

6) 36, 42, 48, 54

6, 7, 8, 9

7, 8, 9
7, 7, 7

7) 49, 56, 63

7, 8, 9

8, 9
8, 8

8) 64, 72

8, 9

9
9

9) 81

9

EXERCISES IN MENTAL CALCULATION.

Exercises of this kind are of great utility to the learner ; they not only impart a promptness in answering on the tables, but, at the same time, prepare the mind for that peculiar abstraction which is so requisite for mental calculation.

ADDITION.

How many are 4 and 5?	2 fives?	3 sixes?	4 eights?	5 nines?	6 sevens?
2 sixes?	4 sixes?	5 threes?	5 fours?	2 fours?	3 fours?

SUBTRACTION.

Take	5 from 30	4 from 24	4 from 20	5 from 15	5 from 10
	5 from 36	9 from 40	6 from 24	8 from 17	10 from 21

MULTIPLICATION.

What are	3 times 9?	4 times 6?	4 times 8?	4 times 9?
	6 times 4?	6 times 5?	6 times 6?	6 times 8?

DIVISION.

How many fives in 30?	5 in 25?	5 in 20?	5 in 15?	5 in 10?
sixes in 36?	6 in 30?	6 in 24?	6 in 18?	6 in 12?

What is one-half of 30? One-third of 30? One-fifth of 30?
One-sixth of 30? One-tenth of 30? One-fifteenth of 30?

What is a fifth part of 30? 2-fifths of 30? 3-fifths of 30? 4-fifths of 30? 5-fifths of 30?
a sixth of 30? 2-sixths of 30? 3-sixths of 36? 4-sixths of 30? 5-sixths of 30?

In 30, how many times 5? How many times 6? How many times 3?
How many times 10? How many times 15?

How many threes are there in 30? How many fives in 30? How many sixes in 30?
How many tens are there in 30? How many fifteens in 30?

If 24 be four-fifths, what is one-fifth? If 18 be three-fifths, what is one-fifth?
If 12 be two-fifths, what is one fifth?

If 25 be five-sixths, what is one-sixth? If 20 be four-sixths, what is one-sixth?
If 15 be three-sixths, what is one-sixth? If 10 be two-sixths, what is one-sixth?

What is the half of a fifteenth of 30? What is the third of one-tenth of thirty?
What is twice the tenth of 30? What is the fifth of a sixth of thirty?
What is one-third of one-half of 30?

Subtract the half, third and tenth of 30 from 30, and what proportion of 30 is left?

How many halves are there in five whole numbers?
How many halves in six whole numbers?

How many whole numbers in five halves?
How many whole numbers in six halves?

How many half-pence are there in 5 pence? How many half-pence in $7\frac{1}{2}$ pence?
In 5 half-pence, how many pence? In 6 half-pence, how many pence?
How many farthing in 5 pence? How many farthings in 6 pence?
How many pence in 30 farthings? How many shillings in 30 pence?
How many pence in 30 sixpences? How many pounds in 30 shillings?

If you give 5 pence for a quart of ale, how many quarts will 30 pence purchase?
How many at two pence? At three pence? At four pence?
How many at six pence? At ten pence? At fifteen pence?

If you borrow at 4 different times, 5 shillings each time, what do you owe?
If at 5 times, 6s. each? If at ten times, 3s. each? If at 15 times, 4s. each?

If you get 2 pence profit on an article, how many must you sell to get 30 pence?
How many at 6 pence? How many at 10 pence? How many at 15 pence?

If you sell 10 books for 30 pence, how much is that per book?
How much for 3 books? How much for 8 books? How much for 15 books?

If you spend 3 pence per day, how long will it take to spend 3 shillings?
If 4 pence per day? If 6 pence per week?
If 9 pence per day? If 18 pence per week?

If you lend 25 shillings to be repaid in 5 weeks, how much is that per week?
How much in 2 weeks? In 4 weeks? In 3 weeks? In 8 weeks?

A variety of other questions of the same nature as the foregoing, should (when requisite) be proposed to the learner before the teacher proceeds to exercise him in the Addition, Subtraction, Multiplication, Division, and Money Tables, in the following manner:

Teacher.	Pupil.	Teacher.	Pupil.	Teacher.	Pupil.
How many are 5 and 5?	10	5 from 10?	5		
5 times 5?	25	5 in 25?	5		
25 farthings?	$6\frac{1}{4}$d.	25 pence?	2s. 1d.	25 shillings?	1 5 0
5 and 6?	11	5 from 11?	6		
5 times 6?	30	5 in 30?	6		
30 farthings?	$7\frac{1}{2}$d.	30 pence?	2s. 6d.	30 shillings?	1 10 0
5 and 7?	12	5 from 12?	7		
5 times 7?	35	5 in 35?	7		
35 farthings?	$8\frac{3}{4}$d.	35 pence?	2s. 11d.	35 shillings?	1 15 0
5 and 8?	13	5 from 13?	8		
5 times 8?	40	5 in 40?	8		
40 farthings?	10d.	40 pence?	3s. 4d.	40 shillings?	2 0 0
5 and 9?	14	5 from 14?	9		
5 times 9?	45	5 in 45?	9		
45 farthings?	$11\frac{1}{4}$d.	45 pence?	3s. 9d.	45 shillings?	2 5 0
5 and 10?	15	5 from 15?	10		
5 times 10?	50	5 in 50?	10		
50 farthings?	$12\frac{1}{2}$d.	50 pence?	4s. 2d.	50 shillings?	2 10 0
5 and 11?	16	5 from 16?	11		
5 times 11?	55	55 pence?	4s. 7d.	55 shillings?	2 15 0
5 and 12?	17	5 from 17?	12		
5 times 12?	60	5 in 60?	12		
60 farthings?	15d.	60 pence?	5s.	60 shillings?	3 0 0

If necessary the pupil may proceed through the whole of the Multiplication Table in this manner.

It is particularly recommended that pupils should be well exercised in questions of this description, which will tend to call forth the latent powers of calculation, and greatly facilitate the working of the subsequent rules:

Add both simple and compound numbers together—

As: 6, 3, 2 and 5	7, 4, 3 and 8	9, 2, 6 and 2
5, 5, 9 and 7	1, 6, 8 and 9	6, 8, 8 and 7
67 and 9	73 and 8	94 and 7
326 and 5	472 and 7	598 and 6

Subtract simple from compound numbers—as:

From	76 take 4	From 83 take 6	From 97 take 9
	62 take 8	54 take 7	41 take 5
	150 take 6	197 take 9	263 take 7
	463 take 9	520 take 6	705 take 8

Multiply compound numbers by a simple number—as:

Multiply	15 by 8	26 by 6	45 by 4	53 by 9
	66 by 7	74 by 5	80 by 8	98 by 3
	125 by 4	298 by 6	222 by 9	406 by 7
	453 by 5	514 by 8	530 by 3	579 by 4

Divide compound numbers by a simple number—

As:	4 in 68	3 in 75	5 in 80	6 in 96
	3 in 129	8 in 152	7 in 168	9 in 279
	9 in 378	6 in 546	4 in 724	5 in 875
	7 in 1407	9 in 1989	6 in 3246	3 in 3366

It is of considerable importance in Mental calculation, that before the pupil is suffered to commence the lessons, varied questions of this nature should be put to him by way of examination:

	s.	d.		s.	d.		s.	d.		s.	d.	
Add	1	8	and	5	$2\frac{1}{2}$	together.	3	$5\frac{1}{4}$	and	2	10	together.
	4	$5\frac{1}{4}$	and	2	10		5	$6\frac{1}{2}$	and	1	$9\frac{1}{2}$	
	7	$0\frac{1}{2}$	and	6	$2\frac{1}{4}$		6	$11\frac{3}{4}$	and	8	7	
	9	$3\frac{3}{4}$	and	12	$2\frac{3}{4}$		10	$5\frac{1}{4}$	and	3	$4\frac{1}{2}$	
	13	$7\frac{1}{4}$	and	15	$9\frac{1}{2}$		16	7	and	9	$8\frac{3}{4}$	

	s.	d.		s.	s.	d.		s.	s.	d.		s.
Subtract	13	0	from	20	7	6	from	20	6	8	from	20
	18	5	from	20	8	$4\frac{1}{2}$	from	20	7	$8\frac{1}{2}$	from	20
	14	$0\frac{3}{4}$	from	20	2	10	from	20	13	4	from	20
	7	7	from	20	15	6	from	20	4	$4\frac{3}{4}$	from	20

	s.	d.		s.	d.		s.	d.		s.	d.	
Multiply	3	2	by 4	3	4	by 3	4	2	by 9	8	6	by 5
	9	5	by 6	11	8	by 7	13	6	by 4	18	8	by 8
	5	$3\frac{1}{2}$	by 8	7	6	by 6	6	$8\frac{1}{2}$	by 8	12	$4\frac{3}{4}$	by 12
	12	$8\frac{1}{4}$	by 2	13	$5\frac{1}{2}$	by 7	16	$4\frac{1}{2}$	by 5	19	$5\frac{1}{4}$	by 3

	s.	d.		s.	d.		s.	d.		s.	d.	
Divide	6	8	by 2	9	4	by 4	8	6	by 3	11	8	by 5
	12	3	by 7	13	6	by 6	15	6	by 8	19	8	by 9
	18	$9\frac{3}{4}$	by 3	17	$7\frac{1}{4}$	by 5	12	8	by 4	13	$9\frac{3}{4}$	by 2
	15	$7\frac{1}{2}$	by 6	16	3	by 10	18	$5\frac{1}{4}$	by 8	19	$6\frac{1}{2}$	by 12

AN IMPROVED MULTIPLICATION TABLE

OF

WHOLE NUMBERS, PENCE, AND SHILLINGS.

	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12 0 1 0	14 0 1 2	16 0 1 4	18 0 1 6	20 0 1 8 1 0 0	22 0 1 10 1 2 0	24 0 2 0 1 4 0
3	6	9	12 0 1 0	15 0 1 3	18 0 1 6	21 0 1 9 1 1 0	24 0 2 0 1 4 0	27 0 2 3 1 7 0	30 0 2 6 1 10 0	33 0 2 9 1 13 0	36 0 3 0 1 16 0
4	8	12 0 1 0	16 0 1 4	20 0 1 8 1 0 0	24 0 2 0 1 4 0	28 0 2 4 1 8 0	32 0 2 8 1 12 0	36 0 3 0 1 16 0	40 0 3 4 2 0 0	44 0 3 8 2 4 0	48 0 4 0 2 8 0
5	10	15 0 1 3	20 0 1 8 1 0 0	25 0 2 1 1 5 0	30 0 2 6 1 10 0	35 0 2 11 1 15 0	40 0 3 4 2 0 0	45 0 3 9 2 5 0	50 0 4 2 2 10 0	55 0 4 7 2 15 0	60 0 5 0 3 0 0
6	12 0 1 0	18 0 1 6	24 0 2 0 1 4 0	30 0 2 6 1 10 0	36 0 3 0 1 16 0	42 0 3 6 2 2 0	48 0 4 0 2 8 0	54 0 4 6 2 14 0	60 0 5 0 3 0 0	66 0 5 6 3 6 0	72 0 6 0 3 12 0
7	14 0 1 2	21 0 1 9 1 1 0	28 0 2 4 1 8 0	35 0 2 11 1 15 0	42 0 3 6 2 2 0	49 0 4 1 2 9 0	56 0 4 8 2 16 0	63 0 5 3 3 3 0	70 0 5 10 3 10 0	77 0 6 5 3 17 0	84 0 7 0 4 4 0
8	16 0 1 4	24 0 2 0 1 4 0	32 0 2 8 1 12 0	40 0 3 4 2 0 0	48 0 4 0 2 8 0	56 0 4 8 2 16 0	64 0 5 4 3 4 0	72 0 6 0 3 12 0	80 0 6 8 4 0 0	88 0 7 4 4 8 0	96 0 8 0 4 16 0
9	18 0 1 6	27 0 2 3 1 7 0	36 0 3 0 1 16 0	45 0 3 9 2 5 0	54 0 4 6 2 14 0	63 0 5 3 3 3 0	72 0 6 0 3 12 0	81 0 6 9 4 1 0	90 0 7 6 4 10 0	99 0 8 3 4 19 0	108 0 9 0 5 8 0
10	20 0 1 8 1 0 0	30 0 2 6 1 10 0	40 0 3 4 2 0 0	50 0 4 2 2 10 0	60 0 5 0 3 0 0	70 0 5 10 3 10 0	80 0 6 8 4 0 0	90 0 7 6 4 10 0	100 0 8 4 5 0 0	110 0 9 2 5 10 0	120 0 10 0 6 0 0
11	22 0 1 10 1 2 0	33 0 2 9 1 13 0	44 0 3 8 2 4 0	55 0 4 7 2 15 0	66 0 5 6 3 6 0	77 0 6 5 3 17 0	88 0 7 4 4 8 0	99 0 8 3 4 19 0	110 0 9 2 5 10 0	121 0 10 1 6 1 0	132 0 11 0 6 12 0
12	24 0 2 0 1 4 0	36 0 3 0 1 16 0	48 0 4 0 2 8 0	60 0 5 0 3 0 0	72 0 6 0 3 12 0	84 0 7 0 4 4 0	96 0 8 0 4 16 0	108 0 9 0 5 8 0	120 0 10 0 6 0 0	132 0 11 0 6 12 0	144 0 12 0 7 4 0

EXTENDED PENCE TABLE.

Pence.		£	s.	d.
100	.... are	0	8	4
200	....	0	16	8
240	....	1	0	0
300	....	1	5	0
400	....	1	13	4
480	....	2	0	0
500	....	2	1	8
600	....	2	10	0
720	....	3	0	0
800	....	3	6	8
900	....	3	15	0
960	....	4	0	0
1000	....	4	3	4
1100	....	4	11	8
1200	....	5	0	0
1300	....	5	8	4
1400	....	5	16	8
1440	....	6	0	0
1500	....	6	5	0
1600	....	6	13	4
1680	....	7	0	0
1700	....	7	1	8
1800	....	7	10	0
1900	....	7	18	4
1920	....	8	0	0
2000	....	8	6	8
2100	....	8	15	0
2160	....	9	0	0
2200	....	9	3	4
2300	....	9	11	8
2400	....	10	0	0

Pence		£	s.	d.
2500	.... are	10	8	4
2600	....	10	16	8
2640	....	11	0	0
2700	....	11	5	0
2800	....	11	13	4
2880	....	12	0	0
2900	....	12	1	8
3000	....	12	10	0
3100	....	12	18	4
3120	....	13	0	0
3200	....	13	6	8
3300	....	13	15	0
3360	....	14	0	0
3400	....	14	3	4
3500	....	14	11	8
3600	....	15	0	0
3700	....	15	8	4
3800	....	15	16	8
3840	....	16	0	0
3900	....	16	5	0
4000	....	16	13	4
4080	....	17	0	0
4100	....	17	1	8
4200	....	17	10	0
4300	....	17	18	4
4320	....	18	0	0
4400	....	18	6	8
4500	....	18	15	0
4560	....	19	0	0
4600	....	19	3	4
4700	....	19	11	8
4800	....	20	0	0

ABBREVIATIONS IN PRACTICE, AND THE RULE OF THREE.

General Rule.—To find the value of any number of yards, pounds, gallons, &c., at any price under a shilling per yard, lb. or gallon, &c.—First: Calculate (mentally) the value of the whole quantity at one penny per yard, lb. or gallon, &c., and then multiply that amount by the price of the article.

When a quarter of a yard, lb. or gallon, &c., occurs in the quantity, one farthing must be added to what it amounts to at a penny. When half a yard, lb. or gallon, &c., one half-penny must be added. When three quarters of a yard, lb. or gallon, &c., three farthings must be added.

If a farthing per yard, lb. or gallon, &c., occurs in the price of the article, one-fourth of the whole amount already found at a penny must be added, when multiplying that amount by the price, to find the sum total. When a half-penny per yard, lb. or gallon, &c., occurs, one-half must be added. When three farthings per yard, lb. or gallon, &c., occur, three-fourths must be added.

What will 60 lbs. of any article come to at 4d. per lb?

60 lbs. at one penny, are ...... 5s.
Multiplied by the price......... 4

£1 0 Ans.

What will 84 lbs. of flour cost at 6d. per lb?

7s.
6

£2 2 Ans.

What will 120 quarts of whiskey cost at 8d. per quart?

10s.
8

£4 0 Ans.

What will 132 lbs. of cheese cost at 9d. per lb?

11s.
9

£4 19 Ans.

What will 240 lbs. of sugar cost at $8\frac{1}{4}$ per lb?

£1
$8\frac{1}{4}$

£8 5 Ans.

☞ Here we multiply the £1 (what it comes to at a 1d.) by 8d., and add in the quarter of £1, what it comes to at $\frac{1}{4}$d.

What will 96 yards of calico cost at $10\frac{1}{2}$d. per yard?

8s.
$10\frac{1}{2}$

£4 4 Ans.

What will 84 yards of cloth cost at $7\frac{1}{2}$d. per yard?

7s.
$7\frac{1}{2}$

£2 12 6 Ans.

What will 108 quarts of cider cost at 8d. per quart?

9s.
8

£3 12 Ans.

What will 144 yards of Irish Linen cost at 10d per yard?

12s.
10

£6 0 Ans.

What will 132 quires of paper cost at $10\frac{1}{2}$d. per quire?

11s.
$10\frac{1}{2}$

£5 15 6 Ans.

What will 96 lbs. of rice cost at 7d. per lb?

8s.
7

£2 16 Ans.

What will 72 lbs. of butter cost at $11\frac{1}{2}$d. per lb?

6s.
$11\frac{1}{2}$

£3 9 Ans.

What will 480 lbs. of beef cost at $9\frac{1}{2}$d. per lb?

£2
$9\frac{1}{2}$

£19 0 Ans.

What will 720 lbs. of almonds cost at $8\frac{3}{4}$d. per lb?

£3
$8\frac{3}{4}$

£26 5 Ans.

What will 168 lbs. of starch cost at $6\frac{1}{4}$d per lb?

14s.
$6\frac{1}{4}$

£4 7 6 Ans.

X What will 120 lbs. of currants cost at $7\frac{1}{2}$d. per lb?

10s.
$7\frac{1}{2}$

£3 15 Ans.

What will $49\frac{3}{4}$ yards of lace cost at 10d. per yard?

s.	d.
4	$1\frac{3}{4}$
	10

£2 1 $5\frac{1}{2}$ Ans.

What will 130 dozen of apples cost at $3\frac{1}{2}$d. per dozen?

s.	d.
10	10
	$3\frac{1}{2}$

£1 17 11 Ans.

What will 272 lbs of figs cost at 5d. per lb?

£	s.	d.
1	2	8
		5

£5 13 4 Ans.

What will 96 pairs of gloves cost at $9\frac{3}{4}$d. per pair?

8s.
$9\frac{3}{4}$

£3 18 Ans.

What will 84 lbs. of soap cost at $6\frac{3}{4}$d. per lb?

7s.
$6\frac{3}{4}$

£2 7 3 Ans.

What will 960 lbs. of pork cost at $4\frac{3}{4}$d. per lb?

£4
$4\frac{3}{4}$

£19 0 Ans.

What will 27 yards of ribbon cost at 8d. per yard?

s.	d.
2	3
	8

18 0 Ans.

What will 38 lbs. of coffee cost at 6d. per lb?

s.	d.
3	2
	6

19 0 Ans.

What will 100 lbs. of lamb cost at 5d. per lb?

s.	d.
8	4
	5

£2 1 8 Ans.

What will 100 quarts of vinegar cost at $10\frac{1}{2}$d. per quart?

	s.	d.
	8	4
		$10\frac{1}{2}$
4	3	4 at 10d.
	4	2 at $\frac{1}{2}$d.

£4 7 6 Ans.

What will 150 dozen of oysters cost at $8\frac{1}{3}$d. per dozen?

s.	d.
12	6
	$8\frac{1}{3}$

£5 4 2 Ans.

What will 80 pecks of potatoes cost at 7d. per peck?

s. d.
6 8
7

£2 6 8 Ans.

What will 125 lbs. of honey cost at 11d. per lb?

s. d.
10 5
11

£5 14 7 Ans.

What will $90\frac{1}{4}$ yards of flannel cost at 7d. per yard?

s. d.
7 $6\frac{1}{4}$
7

£2 12 $7\frac{3}{4}$ Ans.

☞ Here the quarter is made up with the yards, which at the rate of 1d. per yard, is, of course, a farthing for the quarter.

What will $106\frac{1}{4}$ yards of cotton cost at 10d. per yard?

s. d.
8 $10\frac{1}{4}$
10

£4 8 $6\frac{1}{2}$ Ans.

What will $76\frac{1}{2}$ lbs. of veal cost at 7d. per lb?

s. d.
6 $4\frac{1}{2}$
7

£2 4 $7\frac{1}{2}$ Ans.

What will $130\frac{1}{2}$ lbs. of mutton cost at 4d. per lb?

s. d.
10 $10\frac{1}{2}$
4

£2 3 6 Ans.

What will $96\frac{3}{4}$ lbs. of soap cost at 8d. per lb?

s. d.
8 $0\frac{3}{4}$
8

£3 4 6 Ans.

What will $66\frac{3}{4}$ lbs. of molasses cost at 5d. per lb?

s. d.
5 $6\frac{3}{4}$
5

£1 7 $9\frac{3}{4}$ Ans.

What will 121 days work come to at $11\frac{3}{4}$d. per day?

s. d.
10 1
$11\frac{3}{4}$

£5 18 $5\frac{3}{4}$ Ans.

What will 180 pairs of buckles cost at $9\frac{3}{5}$d. per pair?

s. d.
15 0
$9\frac{3}{5}$

£7 4 0 Ans.

What will 65 bottles of ink cost at $7\frac{1}{10}$d. per bottle?

s. d.
5 5
$7\frac{1}{10}$

£1 18 $5\frac{1}{2}$ Ans.

What will 130 of any article cost at $5\frac{9}{10}$d. each?

s. d.
10 10
$5\frac{9}{10}$

£3 3 11 Ans.

What will 392 lbs. of glue cost at $6\frac{5}{8}$d. per lb?

£ s. d.
1 12 8
$6\frac{5}{8}$

£10 16 5 Ans.

What will $1200\frac{1}{2}$ yards of linen cost at $10\frac{1}{2}$d. per yard?

£ s. d.
5 0 $0\frac{1}{2}$
$10\frac{1}{2}$

£52 10 $5\frac{1}{4}$ Ans.

What will 1489 volumes of books cost at $10\frac{1}{4}$d. per volume?

£ s. d.
6 4 1
$10\frac{1}{4}$

£63 11 $10\frac{1}{4}$ Ans.

What will $534\frac{1}{2}$ ells of cloth cost at $8\frac{1}{2}$d. per ell?

£ s. d.
2 4 $6\frac{1}{2}$
$8\frac{1}{2}$

£18 18 $7\frac{1}{4}$

QUESTIONS UPON THE PRECEDING RULE.

How do you find the value of any number of yards, lbs. or gallons, when the price per yard, ℔ or gallon is in pence?

When a quarter of a yard, ℔ or gallon occurs in the quantity, what do you do?

When a half, what do you do?

When three quarters, what do you do?

If a farthing per yard, ℔ or gallon occurs in the price, how do you proceed?

If a half-penny, how do you proceed?

If three farthings, how do you proceed?

Why do you rate the whole quantity at 1d. per yard, ℔ or gallon?

Ans.—Because the price of the article is in pence.

What will 36 pounds of any article come to at 5d. per pound?—Answer, 15s.
What will 120 yards of any article come to at 7d. per yard?—Answer, £3 10s.
What will 240 pounds of cheese come to at 10d. per pound?—Answer, £10.
What will 720 pounds of sugar come to at 8d. per pound?—Answer, £24.
What will 960 pounds of any article come to at 11d. per pound?—Answer, £44.
What will 20 yards of ribbon come to at 9d. per yard?—Answer, 15s.
What will 1 cwt. of soap come to at $5\frac{1}{2}$d per pound?—Answer, £2 11s. 4d.
What will 65 pounds of coffee come to at $6\frac{1}{4}$d. per pound?—Answer, £1 13s. $10\frac{1}{4}$d.
What will 80 pounds of honey come to at $7\frac{1}{2}$d. per pound?—Answer, £2 10s.
What will 40 pecks of potatoes come to at $4\frac{3}{4}$d. per peck?—Answer, 15s. 10d.
What will 132 pounds of butter come to at $8\frac{1}{4}$d. per pound?—Answer, £4 10s. 9d.
What will 15 pounds of lamb come to at $3\frac{3}{4}$d. per pound?—Answer, 4s. $8\frac{1}{4}$d
What will $130\frac{1}{4}$ yards of flannel come to at 5d. per yard?—Answer, £2 14s. $3\frac{1}{4}$d.
What will $220\frac{1}{2}$ yards of lace come to at 7d. per yard?—Answer, £6 8s. $7\frac{1}{2}$d.
What will $460\frac{3}{4}$ yards of cotton come to at 9d. per yard?—Answer, £17 5s. $6\frac{3}{4}$d.
What will $22\frac{1}{2}$ quarts of whiskey come to at 11d. per quart?—Answer, £1 0s. $7\frac{1}{2}$d.
What will 50 pairs of buckles come to at $7\frac{1}{2}$d. per pair?—Answer, £1 10s. $2\frac{1}{2}$d.
What will 30 oranges come to at $2\frac{3}{4}$d. each?—Answer, 6s. $10\frac{1}{4}$d.
What will 840 yards of linen come to at $11\frac{1}{2}$d. per yard?—Answer, £40 5s.
What will $1260\frac{1}{4}$ yards of cotton come to at $3\frac{1}{2}$d. per yard?—Answer, £18 7s. $6\frac{3}{4}$d.
What will 100 bottles of ink come to at $11\frac{1}{4}$d. per bottle?—Answer, £4 13s. 9d.

ABBREVIATIONS IN PRACTICE, AND THE RULE OF THREE.

General Rule.—To find the value of any number of yards, pounds, gallons, &c., at the rate of a shilling, or any price above a shilling, per yard, pound or gallon, &c.—First: Calculate (mentally) the value of the whole quantity at one shilling per yard, lb. or gallon, &c., and then multiply that amount by the price of the article.

When a quarter of a yard, lb. or gallon, &c., occurs in the quantity, three pence must be added to what it amounts to at a shilling. When half a yard, lb. or gallon, &c., sixpence must be added. When three quarters of a yard, lb. or gallon, nine pence must be added.

When three pence per yard, lb. or gallon, &c., occurs in the price of the article, one-fourth of the whole amount already found at a shilling, must be added, when multiplying that amount by the price, to find the sum total. When sixpence per yard, lb. or gallon, &c., occurs, one-half must be added. When nine pence per yard, lb. or gallon, &c., occurs, three-fourths must be added.

What will 140 yards of any article cost at 6s. per yard?

140 at one shilling, is £7
Multiplied by the price, 6

£42 Ans.

What will 220 gallons of gin cost at 8s. per gallon?

£11
8

£88 Ans.

What will 360 gallons of rum cost at 11s. per gallon?

£18
11

£198 Ans.

What will 680 gross of buttons cost at 9s. per gross?

£34
9

£306 Ans.

What will 40 yards of broadcloth cost at 12s. 6d. per yard?

£2 at 1s.
$12\frac{1}{2}$ the price.

£25 Ans.

☞ Here we first reckon at 1s. per yard, multiply that amount by all the shillings in the price, at the same time bringing in the 6d. per yard, by adding half what it is at the shilling.

What will 160 yards of muslin cost at 6s. 6d. per yard?

£8
$6\frac{1}{2}$

£52 Ans.

What will 80 lbs. of pepper cost at 8s. 9d. per lb?

£4
$8\frac{3}{4}$

£35 Ans.

What will 240 bushels of wheat cost at 6s. 3d. per bushel?

£12
$6\frac{1}{4}$

£75 Ans.

What will 320 pairs of shoes cost at 5s. 3d. per pair?

£16
$5\frac{1}{4}$

£84 Ans.

What will $81\frac{1}{4}$ yards of silk cost at 7s. per yard?

£	s.	d.	
4	1	3	at 1s.
		7	the real price.
£28	8	9	Ans.

☞ Here the quarter is made up with the yards, which at the rate of a shilling per yard, is, of course, 3d. for the quarter.

What will $72\frac{1}{2}$ dozen stone bottles cost at 8s. per dozen?

£	s.	d.	
3	12	6	
		8	
£29	0	0	Ans.

What will $105\frac{3}{4}$ lbs. of green tea cost at 6s. per lb?

£	s.	d.	
5	5	9	
		6	
£31	14	6	Ans.

What will $92\frac{1}{4}$ lbs. of tobacco cost at 4s. per lb?

£	s.	d.	
4	12	3	
		4	
£18	9	0	Ans.

What will $49\frac{1}{2}$ lbs. of snuff cost at 3s. per lb?

£	s.	d.	
2	9	6	
		3	
£7	8	6	Ans.

What will 90 gallons of black ink cost at 4s. 1d. per gallon?

£	s.	
4	10 at a shilling.	
	4 at 1d., the real price.	
£18	7	6 Ans.

☞ Here 90 gallons at a 1d., being 7s. 6d., that sum is added, mentally, and brought into one line, viz: £18 7s 6d.

What will $52\frac{1}{2}$ gallons of oil cost at 7s. per gallon?

£	s.	d.
2	12	6
		7
£18	7	6 Ans.

What will $112\frac{1}{4}$ lbs. of gum arabic cost at 9s. per lb?

£	s.	d.
5	12	3
		9
£50	10	3 Ans.

What will $185\frac{5}{8}$ yards of satin cost at 12s. per yard?

£	s.	d.
9	5	$7\frac{1}{2}$
		12
£111	7	6 Ans.

What will $126\frac{5}{8}$ yards of damask cost at 8s. 6d. per yard?

£	s.	d.
6	6	$4\frac{1}{2}$
		$8\frac{1}{2}$
£53	14	$2\frac{1}{4}$ Ans.

What will 72 yards of flannel cost at $17\frac{1}{4}$d. per yard?

	s.	d.
Call the $17\frac{1}{4}$d.—	17	3
		6 times 12 are 72.
£5	3	6 Ans.

What will 87 lbs. of hops cost at 20d. per lb?

20s.

7 times 12 are 84—7 And 3 over, at 20d. is 5s. to be brought in.

£7 5 0 Ans.

☞ Here we state the price of the article in pence, viz: 20d., and multiply that by as many times 12, as there are in the yards, lbs., &c., calling the product shillings; and add thereto the remainder (if any) over the twelves, to make the answer.

What will $126\frac{1}{2}$ yards of cambric cost at $14\frac{1}{2}$d. per yard?

	s.	d.
	14	6
10 times 12 are 120		10 and $6\frac{1}{2}$ yards over, viz: 7s. $10\frac{1}{4}$d.
£7	12	$10\frac{1}{4}$ Ans.

What will 54 dozen of herrings cost at $16\frac{1}{4}$d. per dozen?

	s.	d.
	16	3
		4 times 12, and six over, viz: 8s. $1\frac{1}{2}$d.
£3	13	$1\frac{1}{2}$ Ans.

What will 63 score of oranges cost at 19d. per score?

	s.	
	19	
	5 times 12 are 60, and 3 over, viz: 4s. 9d.	
£4	19	9 Ans.

What will 144 pairs of silk gloves cost at 4s. $1\frac{1}{2}$d. per pair?

£	s.
7	4
	4—$1\frac{1}{2}$d.
£29	14 Ans.

What will 126 bundles of quills cost at 9s. 2d. per bundle?

£	s.
6	6
	9—2d.
£57	15 Ans.

What will $84\frac{1}{2}$ dozen of pencils cost at 3s. 3d. per dozen?

£	s.	d.
4	4	6
		$3\frac{1}{4}$—3d. is $\frac{1}{4}$ of 1s.
£13	14	$7\frac{1}{2}$ Ans.

What will 248 lbs. of tea cost at 5s. 9d. per lb?

£	s.
12	8
	$5\frac{3}{4}$
£71	6 Ans.

What will $145\frac{3}{4}$ lbs. of cloves cost at 8s. 4d. per lb?

	£	s.	d.		s.	d.
	7	5	9		12	$1\frac{3}{4}$
			8			4
Ans.	60	14	7	£2	8	7

What will 63 pairs of silk stockings cost at 8s. 4d. per pair?

£	s.
3	3
	$8\frac{1}{3}$
£26	5 Ans.

What will 126 gallons of wine cost at 9s. 8d. per gallon?

£	s.
6	6
	$9\frac{2}{3}$
£60	18 Ans.

What will 120 bushels of wheat cost at 6s. $5\frac{1}{2}$d. per bushel?

	£	s.	
At 1s.	6	10	at 1d.
Price,	6	$5\frac{1}{2}$	price.
Ans.	£38 15	£2 15	to bring in.

What will $246\frac{1}{2}$ yards of cloth cost at 6s. $8\frac{1}{2}$d. per yard?

	£	s.	d.	£	s.	d.
	12	6	6	1	0	$6\frac{1}{2}$
			6			$8\frac{1}{2}$
Ans.	82	13	$7\frac{1}{4}$	£8	14	$7\frac{1}{4}$

What will 140 pieces of calico cost at 26s. per piece?

£26 the shillings are called £
7 £ at 1s. per piece.

£182 Ans.

☞ Here the order is reversed; the shillings of the real price is set down first, and then multiplied by the number of £ that the quantity comes to at 1s., which brings out the answer in £.

What will 100 gallons of brandy cost at 27s. 6d. per gallon?

£	s.
27	10
	5
£137	10 Ans.

☞ Here we consider the 6d. in the price as 10s.

What will 136 yards of silk velvet cost at 14s. per yard?

136
7 = ½ of 14s., the price.

£95 4 Ans.

☞ Here instead of multiplying by the price 14s. and dividing by 20, we multiply by half the number of shillings, and double the unit of that production, which must then stand for shillings. The figures which stand before the unit are £.

What will $108\frac{3}{4}$ yards of cloth cost at 8s. per yard?

£	s.	d.
5	8	9
		8
£43	10	0 Ans.

What will 240 gallons of rum cost at 15s. $10\frac{1}{2}$d. per gallon?

£15
12 and add in 240 times $10\frac{1}{2}$d.

£190 10 Ans.

What will 190 gold seals cost at 42s. each?

42s.
$9\frac{1}{2}$

£399 Ans.

What will 458 lbs. of spice cost at 16s. per lb?

458
8

£366 8 Ans.

☞ Here the ½ of 16 is 8, which being the multiplier, say, 8 times 8 are 64; double the 4, which makes 8, put it down for shillings, and carry 6; then 8 times 5 are 40, and 6 to carry, are 46, put down 6 and carry 4; then 8 times 4 are 32 and 4 are 36; making £366 8s.

What will 7136 yards of cloth cost at 18s. per yard?

7136
9

£6422 8 Ans.

What will 413266 lbs. of indigo cost at 12s. per lb?

413266
6

£247959 12 Ans.

What will 4042 pair of boots cost at 15s. per pair?

2021
15*

£3031 10 Ans.

☞ When the price is not even, multiply half the quantity by all the shillings in the price, and double the unit figure as before.

* To multiply by any number above 12, and under 20, in one line, it is only necessary to multiply by the unit of the multiplier, and take in the back figure each time you multiply; thus, as above, 5 times 1 are 5, which doubled is 10, which stands for shillings; then, 5 times 2 are 10, and 1, the back figure, is 11, put down 1 and carry 1; then, 5 times nought is nought and 1 to carry is 1, and 2, the back figure, makes three, and so on.

QUESTIONS.

How do you find the value of any number of yards, lbs., gallons, &c., when the price is a shilling or above a shilling, per yard, lb. or gallon?

When a quarter of a yard, lb. or gallon, &c., occurs in the quantity, what do you do? Why?

When half a yard, &c., what do you do? Why?

When three quarters, &c., what do you do? Why?

How do you proceed when 3d. per yard, &c., occurs in the price? Why?

When 6d.? When 9d.? Why?

When the price contains pence and farthings, as well as shillings, how do you proceed?

How do you multiply by any number above twelve and under twenty, in one line?

What will 1400 bushels of wheat come to at 6s. per bushel?—Answer, £420.

What will 900 bushels of corn come to at 2s 6d. per bushel?—Answer, £112 10s.

What will 1 cwt. of pepper come to at 7s. 3d. per pound?—Answer, £40 12s.

What will 70 pairs of shoes come to at 10s. 9d. per pair?—Answer, £37 12s. 6d.

What will 80 yards of lace come to at 3s. $7\frac{1}{4}$d. per yard?—Answer, £14 10s.

What will 16 yards of silk come to at 9s. $6\frac{1}{2}$d. per yard?—Answer, £7 12s. 8d.

What will 100 yards of Irish linen come to at 2s. $4\frac{3}{4}$d. per yard?—Answer, £11 19s. 7d.

What will 13 pounds of coffee come to at 1s. $8\frac{3}{4}$d. per pound?—Answer, £1 2s. $5\frac{3}{4}$d.

What will $81\frac{1}{4}$ yards of cambric come to at 3s. per yard?—Answer, £12 3s. 9d.

What will $86\frac{1}{4}$ pounds of black tea come to at 4s. per pound?—Answer, £17 5s.

What will $90\frac{1}{4}$ pounds of green tea come to at 6s. per pound?—Answer, £27 1s. 6d.

What will $28\frac{1}{2}$ pounds of tobacco come to at 5s. per pound?—Answer, £7 2s. 6d.

What will $30\frac{3}{4}$ pounds of snuff come to at 7s. per pound?—Answer, £10 15s. 3d.

What will $140\frac{3}{4}$ yards of cloth come to at 8s per yard?—Answer, £56 6s.

What will $300\frac{5}{8}$ yards of satin come to at 11s. per yard?—Answer, £165 6s. $10\frac{1}{2}$d.

What will $56\frac{3}{8}$ yards of damask come to at 9s. 6d. per yard?—Answer, £26 15s. $6\frac{3}{4}$d.

What will 60 pounds of hops come to at 20d. per pound?—Answer, £5.

What will 96 yards of flannel come to at $17\frac{1}{4}$d. per yard?—Answer, £6 18s.

What will $112\frac{1}{2}$ yards of lace come to at $14\frac{1}{2}$d. per yard?—Answer, £6 15s. $11\frac{1}{4}$d.

What will $100\frac{1}{2}$ dozen of herrings come to at $6\frac{1}{2}$d. per dozen?—Answer, £6 8s. $2\frac{1}{4}$d.

What will 105 dozen of oranges come to at 19d. per score?—Answer, 8s. $3\frac{3}{4}$d.

What will 80 pair of silk gloves come to at 4s. 2d. per pair?—Answer, £16 13s. 4d.

What will $40\frac{1}{2}$ bundles of quills come to at 6s. 3d. per bundle?—Answer, £12 13s. $1\frac{1}{2}$d.

What will 50 pair of silk stockings come to at 7s. 4d. per pair?—Answer, £18 6s. 8d.

What will 146 gallons of wine come to at 12s. 8d. per gallon?—Answer. £92 9s. 4d.

What will 220 bushels of wheat come to at 6s. $5\frac{1}{2}$d. per bushel?—Answer, £71 0s. 10d.

What will $150\frac{1}{2}$ yards of cloth come to at 7s. $8\frac{1}{2}$d. per yard?—Answer, £58 0s. $1\frac{1}{4}$d.

What will 80 pieces calico come to at 25s. each?—Answer, £100.

What will 70 of gold seals come to at 30s. each?—Answer, £105.

What will 64 dozen of port wine come to at 42s. per dozen?—£134 8s.

What will 110 gallons of rum come to at 27s. 3d. per gallon?—Answer, £149 17s. 6d.

What will 200 yards of silk velvet come to at 16s. per yard?—Answer, £160.

What will 340 pounds of spice come to at 12s. per pound?—Answer, £204.

What will 2865 yards of cloth come to at 18s. per yard?—Answer, £2578 10s.

What will 1966 pounds of indigo come to at 13s. per pound?—Answer, £1277 18s.

What will 3872 pair of boots come to at 17s. per pair?—Answer, £3291 4s.

What will 482 pieces of linen come to at 19s. per piece?—Answer, £457 18s.

ABBREVIATIONS IN PRACTICE, AND THE RULE OF THREE.

Rule for calculating cwts., qrs., and lbs.—Add the quantity together, and find what number of pounds weight it amounts to—these must be considered as so many pence, should the price per pound be pence; then divide by 12 to bring those pence into shillings, and multiply the product of the operation by the price of the article which will show the value of the whole.

NOTE.—It will be observed that there are four different ways of working these sums. In the first, all the calculations are performed only mentally, except that of multiplying by the price of the article. In the second, the whole quantity is given in one line, and divided by 12, to bring that number of pounds weight (which is so many pence) into shillings. In the third, the cwt. is taken separately in one sum, and the qrs. and lbs. added afterwards. And in the fourth, one hundred pounds only are reckoned for the cwt., the qrs., and lbs. are added thereto, and the 12 lbs. in each cwt. are taken separately.

What will 2 cwt. 0 qr. 16 lbs. of sugar cost at 7d. per pound?

240 lbs. at 1d. is........ £1
Multiplied by the price, 7

£7 Answer.

What will 6 cwt. 1 qr. 20 lbs. of butter cost at 9d. per lb.?

£3
9

£27 Ans.

What will 8 cwt. 2 qrs. 8 lbs. of soap cost at $10\frac{1}{4}$d. per lb.

960 lbs. at 1d. is............ £4
Multiplied by the price... $10\frac{1}{4}$

£41 Ans.

What will 10 cwt. 2 qrs. 24 lbs. of raisins cost at $8\frac{1}{2}$d. per lb.

£5
$8\frac{1}{2}$

£42 10s. Ans.

What will 3 cwt. 0 qr. 24 lbs. of currants cost at 9d. per lb.?

12) 360 lbs. or as many pence,

30s. or £1 10s. at 1d. per lb.
9 the price,

£13 10s. Ans.

☞ Here we have divided by 12 to bring the lbs. (which are so many pence) into shillings.

What will 5 cwt. 1 qr. 12 lbs. of hops cost at 10d. per lb.?

12) 600

50s. or £2 10
10

£25 0 Ans.

What will 9 cwt. 0 qr. 12 lbs. of tallow cost at 6d. per lb.?

12) 1020

85s. or £4 5
6

£25 10 Ans.

What will 3 cwt. 2 qrs. 0 lb of figs cost at 8d. per lb.?

12) 392

32s. 8d. or £1 12 8
8

£13 1 4 Ans.

What will 9 cwt. 2 qrs. 16 lbs. of bees' wax cost at 5d. per lb.?

1008 the cwts.
72 the qrs. and lbs.

12) 1080

90s. or £4 10
5

£22 10 Ans.

What will 10 cwt. 1 qr. 4 lbs. of salt cost at $2\frac{1}{2}$d. per lb.

12) 1152

96s. or £4 16
$2\frac{1}{2}$

£12 0 Ans.

☞ Here we multiply by the price, $2\frac{1}{2}$d., taking in the half of £4 16s, for the half-penny.

What will 7 cwts. 2 qrs. 0 lb. of honey cost at 4d. per lb.?

784
56

12) 840

70s. or £3 10
4

£14 0 Ans.

What will 8 cwts. 2 qrs. 8 lbs. of flour cost at $3\frac{1}{4}$d. per lb.?

864 } The cwts., (omitting the 12 lbs. on each,) and the qrs. and lbs. added in
96 } The extra 12 lbs. on each cwt.

12) 960

80 or £4 0
$3\frac{1}{4}$

£13 0 Ans.

What will 15 cwts. of glue cost at $10\frac{1}{2}$d. per lb.

1500
180

12) 1680

140s. or £ 7
$10\frac{1}{2}$

£73 10 Ans.

What will 12 cwts. 3 qrs. 12 lbs. of bacon cost at $11\frac{3}{4}$d. per lb.?

1296
144

12) 1440

120s. or £ 6
$11\frac{3}{4}$

£70 10 Ans.

What will 10 cwts. 2 qrs. 12 lbs. of arrow-root cost at 2s. 6d. per lb.?

1068
120

2s. 6d. of a £1 is $\frac{1}{8}$) 1188

£148 10 Ans.

☞ Here the price is an aliquot part of £, and when that is the case nothing can be shorter than to take such part.

What will 16 cwts. 1 qr. 20 lbs. of copper cost at 1s. 4d. per lb.?

1648
192

1s. 4d. of a £ is $\frac{1}{15}$) 1840

£122 13 4 Ans.

What will 13 cwts. 3 qrs. 17 lbs. of coffee cost at 1s. 8d. per lb.?

1401
156

1s. 8d. of a £ is $\frac{1}{12}$) 1557

£129 15 Ans.

What will 11 cwts. 2 qrs. 25 lbs. of gambouge cost at 3s. 4d. per lb.?

1181
132

3s. 4d. of a £ is $\frac{1}{6}$) 1313

£218 16 8 Ans.

What will 18 cwts. 1 qr. 11 lbs. of gum arabic cost at 6s. 8d. per lb.?

1839
216

6s. 8d. of a £ is $\frac{1}{3}$) 2055

£685 Ans.

At £3 7s. 8d. per cwt., how much per lb.?

s. D.
Divided by 7) 67 8 Price per cwt.

9 and 4/8 over.
3

27 farthings = $6\frac{3}{4}$
Add $\frac{1}{2}$ for 4/8

$7\frac{1}{4}$d. per lb.

NOTE.—7s. is the price of $\frac{3}{4}$ of a cwt. at 1d. per lb., therefore 3 farthings must be reckoned for every 7s. contained in the price, 1 farthing for 2s. 4d., and a $\frac{1}{2}$d. for 4s. 8d.

What will 2 cwts. 2 qrs. 20 lbs. of sugar cost at 79s. 4d. per cwt.?

	£	s.	d.
300 lbs. at 1d. =	1	5	0
			$8\frac{1}{2}$
	£10	12	6 Ans.

NOTE.—79s. 4d. is $8\frac{1}{2}$d. per lb.

☞ 7s. is the price of $\frac{3}{4}$ of a cwt. at 1d. per lb. Therefore, 3 farthings must be reckoned for every 7s. contained in the price, 1 farthing for 2s. 4d., $\frac{1}{2}$d for 4s. 8d. Thus, 79s. 4d. ÷ by 7 gives 11 times and 2s. 4d. over = the 11 times $\frac{3}{4}$d. = $8\frac{1}{4}$d.; add 1 farthing for 2s. 4d., and you have the price, $8\frac{1}{2}$d. per lb.

What will 5 cwts. 1 qr. 16 lbs. of rice cost at 58s. 4d. per cwt.?

	£	s.	d.
604 lbs. at 1d. =	2	10	4
			$6\frac{1}{4}$
	£15	14	7 Ans.

What will 2 t. 5 cwts. 1 qr. 10 lbs. of hops cost at 4s. per lb.?

4480
598

4s. of a £ is $\frac{1}{5}$) 5078

£1015 12 Ans.

What will 49 lbs. of cheese cost at 81s. 8d. per cwt.?

	£	s.	d.
49 at 1d. is		4	1
			$8\frac{3}{4}$
	£1	15	$8\frac{3}{4}$ Ans.

What will $22\frac{3}{4}$ lbs. of glue cost at 84s per cwt.

s.	d.
1	$10\frac{3}{4}$
	9
17	$0\frac{3}{4}$ Ans.

At $7\frac{1}{2}$d. per lb., how much per cwt.?

	s.	d.	
	9	4	at 1d.
		7	and 4s. 8d. at $\frac{1}{2}$d. to add in.
£3	10	0	per cwt. Ans.

☞ *Rule.*—For every penny, reckon 9s. 4d.; for $\frac{1}{2}$d., 4s. 8d.; and for $\frac{1}{4}$d., 2s. 4d. This will give the price of a cwt. Then the whole amount in shillings reckoned as so many £, and every $\frac{1}{2}$d. as 10d. will give the price of a ton.

At $10\frac{3}{4}$d. per lb., how much per cwt. and per ton?

	s.	d.	
	9	4	at 1d.
		$10\frac{3}{4}$	7s. at $\frac{3}{4}$d. to add in.
£5	0	4	per cwt.
£100	6	8	per ton.

What will 9 cwts. 2 qrs. cost at 86s. 4d. per cwt.?

£4	6	4	price of 1 cwt.
		$9\frac{1}{2}$	cwt.
£41	0	2	Ans.

NOTE.—£2 3 2 to add in for the $\frac{1}{2}$ cwt. or 2 qrs.

What will 12 cwts. 1 qr. 14 lbs. cost at 48s. per cwt.?

£2	8	0	
	12		1 qr. 14 lbs. = 18s. to add in.
£29	14	0	Ans.

At £67 13 4 per ton, how much per cwt., and per lb.?

£3 7 8 per cwt.

$7\frac{1}{4}$ per lb. Ans.

☞ By having the price of a ton or cwt. to find the price of a lb., or any number of lbs.

Rule.—Take the pounds as shillings, and for every ten pence reckon $\frac{1}{2}$d.; this will give the price of a cwt. Then for every 7s. in the price of a cwt., reckon $\frac{3}{4}$d.; for 4s. 8d., $\frac{1}{2}$d.; and for 2s. 4d., a farthing; this will give the price of a lb.

At 46s. 8d. per cwt., how much per lb.?

There are 6 times 7s. = 42s. and 4s. 8d. over,

Which 6 times $\frac{3}{4}$d. = $4\frac{1}{2}$d.

And $\frac{1}{2}$d. for 4s. 8d.

as per above rule = $\frac{1}{2}$d.

5d. per lb. Ans.

What will 1 cwt. 2 qrs. of pepper cost at $5\frac{1}{4}$d. per ounce?

168 lbs. at 1s. is £8 8s.

$5\frac{1}{4}$d. per oz. is 7s per lb. 7

£58 16 Ans.

☞ The easiest way to calculate what any sum per ounce will amount to per lb. is to reckon only 8 ounces to the lb., and double the price of the article.

What will 1 cwt. 1 qr. 12 lbs. of mustard cost at $4\frac{1}{2}$d. per ounce?

152 lbs. at 1s................£7 12s.
$4\frac{1}{2}$d. per oz. is 6s. per lb. 6

£45 12 Ans.

What will 2 cwts. 1 qr. of cloves cost at $4\frac{1}{4}$d. per ounce?

252 lbs. at 1s.........£12 12
Reckon 6s. per lb. 6

75 12
4 4

Deduct $\frac{1}{3}$ of the 1s. per lb. as $4\frac{1}{4}$d. per oz. is only 5s. 8d. per lb. £71 8 Ans.

What will 2 cwts. 3 qrs. 7 lbs. of ginger cost at $4\frac{3}{4}$d. per oz ?

315 lbs. at 1s............£15 15
Reckon 6s. per lb. 6

Add one third of the 1s. per lb. as $4\frac{3}{4}$d. per oz. is 6s. 4d. per lb. £94 10
5 5

£99 15 Ans.

What will 5 cwts. 1 qr. 15 lbs. of mace cost at $5\frac{3}{4}$d. per oz.?

603 lbs. at 1s.......£30 3
8

Deduct $\frac{1}{3}$ of the 1s. per lb. as $5\frac{3}{4}$d. is only 7s. 8d. per lb. £241 4
10 1

£231 3 Ans.

QUESTIONS.

How do you find the value of any article when it consists of cwts., qrs., and pounds?
How many different methods are there of working this rule?
How are they performed?

What will 3 cwts. 1 qr. 14 lbs. of any article come to at 5d. per lb.?—Answer, £7 17 6.
What will 9 cwts. 3 qrs. 4 lbs. of any article come to at 8d. per lb.?—Answer, £36 10 8.
What will 2 cwts. 20 lbs. of any article come to at $4\frac{1}{4}$d. per lb.?—Answer, £4 6 5.
What will 7 cwts. 1 qr. 18 lbs. of any article come to at $7\frac{1}{2}$d. per lb.?—Answer, £25 18 9.
What will 5 cwts 2 qrs. 7 lbs. of any article come to at 10d. per lb.?—Answer, £25 19 2
What will 12 cwts. 1 qr. 3 lbs. of any article come to at $2\frac{1}{2}$d. per lb ?—Answer, £14 6 $5\frac{1}{2}$.
What will 17 cwts 3 qrs. 15 lbs. of any article come to at 2s. 6d. per lb.?—Answer, £250 7 6.
What will 8 cwts. 2 qrs. 6 lbs. of any article come to at 1s. 4d. per lb.?—Answer, £63 17 4.
What will 13 cwts. 1 qr. 17 lbs. of any article come to at 3s. 4d. per lb ?—Answer, £250 3 4.
What will 15 cwts. 1 qr. 11 lbs. of any article come to at 6s. 8d. per lb.?—Answer, £573.
What will 5 ts. 5 cwts. 1 qr. 10 lbs. of any article come to at 4s. per lb.?—Answer, £2359 12.
What will 3 cwts. 1 qr. 7 lbs. of any article come to at 60s. per cwt.?—Answer, £9 18 9.
What will 68 lbs. of any article come to at 74s 8d. per cwt.?—Answer, £2 5 4.
What will 1 cwt 3 qrs. 15 lbs. of any article come to at 79s. 4d. per cwt.?—Answer, £7 9 $5\frac{1}{2}$.
At $7\frac{1}{2}$d. per lb., how much per cwt., and per ton?—Answer, £3 10s. per cwt., and £70 per ton.
At $8\frac{3}{4}$d. per lb, how much per cwt. and per ton?—Answer, £4 1 8 per cwt., and £81 13 4 per ton.
At $11\frac{1}{2}$d. per lb., how much per cwt., and per ton?—Ans., £5 7 4 per cwt., and £107 6 8 per T.
What will 8 cwts. 2 qrs. of any article come to at 64s. per cwt.?—Answer, £27 4s.
At £77 per ton, how much per cwt., and per lb ?—Ans., £3 17s. per cwt., and $8\frac{1}{4}$d. per lb.
At £84 per ton, how much per cwt., and per lb.?—Ans., £4 4s. per cwt., and 9d. per lb.
At £165 13 4 per ton, how much per cwt., and per lb.?—Ans., £8 5 8 per cwt., and $17\frac{3}{4}$d. per lb.
At £51 6 8 per ton, how much per cwt., and per lb.?—Ans., £2 11 4 per cwt., and $5\frac{1}{2}$d. per lb.
What will 1 cwt. of pepper come to at $4\frac{1}{2}$d. per ounce?—Answer, £33 12.
What will 2 cwts. 2 qrs. 5 lbs. of cloves come to at $5\frac{1}{2}$d. per ounce?—Answer, £104 10.
What will 4 cwts. 1 qr. 17 lbs. of ginger come to at $5\frac{3}{4}$d. per ounce?—Answer, £188 19 8.
What will 9 cwts. 3 qrs. 19 lbs. of mace come to at $3\frac{1}{4}$d. per ounce?—Answer, £240 14 4.

INTEREST AND DISCOUNT TABLE FOR BUYING AND SELLING.

To gain so much per cwt. add to every shilling or pound prime cost.

To allow so much per cwt. subtract from every shilling or pound prime cost.

		S.	D.	
$2\frac{1}{2}$	per cent. is	0	6	in the £.
5	ditto	1	0	ditto
$7\frac{1}{2}$	ditto	1	6	ditto
10	ditto	2	0	ditto
$12\frac{1}{2}$	ditto	2	6	ditto
15	ditto	3	0	ditto
$17\frac{1}{2}$	ditto	3	6	ditto
20	ditto	4	0	ditto
$22\frac{1}{2}$	ditto	4	6	ditto
25	ditto	5	0	ditto
$27\frac{1}{2}$	ditto	5	6	ditto
30	ditto	6	0	ditto
$32\frac{1}{2}$	ditto	6	6	ditto
35	ditto	7	0	ditto
$37\frac{1}{2}$	ditto	7	6	ditto
40	ditto	8	0	ditto
$42\frac{1}{2}$	ditto	8	6	ditto
45	ditto	9	0	ditto
$47\frac{1}{2}$	ditto	9	6	ditto
50	ditto	10	0	ditto
60	ditto	12	0	ditto
70	ditto	14	0	ditto
80	ditto	16	0	ditto
90	ditto	18	0	ditto

		S.	D.		£	S.	D.	
$\frac{1}{4}$	in 1s. is	0	5	in £1 or	2	1	8	per ct.
$\frac{1}{2}$	ditto	0	10	ditto	4	3	4	do.
$\frac{3}{4}$	ditto	1	3	ditto	6	5	0	do.
1	ditto	1	8	ditto	8	6	8	do.
$1\frac{1}{4}$	ditto	2	1	ditto	10	8	4	do.
$1\frac{1}{2}$	ditto	2	6	ditto	12	10	0	do.
$1\frac{3}{4}$	ditto	2	11	ditto	14	11	8	do.
2	ditto	3	4	ditto	16	13	4	do.
$2\frac{1}{4}$	ditto	3	9	ditto	18	15	0	do.
$2\frac{1}{2}$	ditto	4	2	ditto	20	16	8	do.
$2\frac{3}{4}$	ditto	4	7	ditto	22	18	4	do.
3	ditto	5	0	ditto	25	0	0	do.
$3\frac{1}{4}$	ditto	5	5	ditto	27	1	8	do.
$3\frac{1}{2}$	ditto	5	10	ditto	29	3	4	do.
$3\frac{3}{4}$	ditto	6	3	ditto	31	5	0	do.
4	ditto	6	8	ditto	33	6	8	do.
$4\frac{1}{4}$	ditto	7	1	ditto	35	8	4	do.
$4\frac{1}{2}$	ditto	7	6	ditto	37	10	0	do.
$4\frac{3}{4}$	ditto	7	11	ditto	39	11	8	do.
5	ditto	8	4	ditto	41	13	4	do.
$5\frac{1}{4}$	ditto	8	9	ditto	43	15	0	do.
$5\frac{1}{2}$	ditto	9	2	ditto	45	16	8	do.
$5\frac{3}{4}$	ditto	9	7	ditto	47	18	4	do.
6	ditto	10	0	ditto	50	0	0	do.

COMPENDIUMS IN SIMPLE INTEREST,

FROM FIVE TO ONE AND A QUARTER PER CENT. PER ANNUM.

As THE INTEREST of £1, at 5 per cent. per annum, is 1s., and there being 12 months in a year, and 12 pence in a shilling, of course the interest is 1d. per month for each £, and so in proportion for any part of a pound.

Rule.—Calculate the interest for one month, by reckoning as many pence as there are pounds in the question—put down that amount, and multiply it by the number of months. When there are shillings as well as pounds in the question, one farthing, or quarter of a penny, for every five shillings or quarter of a pound, must be added to the amount of pence before you multiply.

What is the interest of £60 for 4 months at 5 per cent?

5s.
4
20s. Ans.

What is the interest of £96 for 8 months at 5 per cent?

8s.
8
£3 4 Ans.

What is the interest of £36 for 7 months at 5 per cent?

3s.
7
£1 1 Ans.

What is the interest of £120 for 9 months at 5 per cent?

10s.
9
£4 10 Ans.

What is the interest of £132 for 11 months at 5 per cent?

11s.
11
£6 1 Ans.

What is the interest of £156 for 10 months at 5 per cent?

13s.
10
£6 10 Ans.

What is the interest of £50 for 5 months at 5 per cent?

s. d.
4 2
5
£1 0 10 Ans.

What is the interest of £80 for 7 months at 5 per cent?

s. d.
6 8
7
£2 6 8 Ans.

What is the interest of £110 for 9 months at 5 per cent?

s. d.
9 2
9
£4 2 6 Ans.

What is the interest of £140 for 10 months at 5 per cent?

s. d.
11 8
10
£5 16 8 Ans.

What is the interest of £150 for 11 months at 5 per cent?

s.	d.
12	6
	11
£6 17	6 Ans.

What is the interest of £39 5s. for 3 months at 5 per cent?

s.	d.
3	$3\frac{1}{4}$
	3
9	$9\frac{3}{4}$ Ans.

☞ Here 5s. being $\frac{1}{4}$ of a £, and the interest of £1 for a month being 1d., a farthing is allowed for the interest of 5s. for a month.

What is the interest of £86 10s. for 4 months at 5 per cent?

s.	d.
7	$2\frac{1}{2}$
	4
£1 8	10 Ans.

What is the interest of £121 10s. for 5 months at 5 per cent?

s.	d.
10	$1\frac{1}{2}$
	5
£2 10	$7\frac{1}{2}$ Ans.

What is the interest of £87 15s. for 8 months at 5 per cent?

s.	d.
7	$3\frac{3}{4}$
	8
£2 18	6 Ans.

What is the interest of £130 15s for 15 months at 5 per cent?

£	s.	d.	
	10	$10\frac{3}{4}$	3 months.
		12	
6	10	9	Interest for 12 mths.
1	12	$8\frac{1}{4}$	Interest for 3 mths.
£8	3	$5\frac{1}{4}$	Ans.

What is the interest of £480 for $10\frac{1}{2}$ months at 5 per cent?

£2
$10\frac{1}{2}$

£21 Ans.

What is the interest of £260 for $7\frac{1}{4}$ months at 5 per cent?

£	s.	d.
1	1	8
		$7\frac{1}{4}$
£7	17	1 Ans.

☞ Here £260 at 1d. per month, being £1 1s. 8d., it is multiplied by the 7 months, and $\frac{1}{4}$ of the amonnt at 1d. brought in mentally for the $\frac{1}{4}$ of a month.

What is the interest of £720 for $5\frac{3}{4}$ months at 5 per cent?

£3
$5\frac{3}{4}$

£17 5 Ans.

What is the interest of £80 for $4\frac{1}{2}$ months at 5 per cent?

£	s.	d.
	6	8
		$4\frac{1}{2}$
£1	10	0 Ans.

What is the interest of £96 for 26 months at 5 per cent?

8s.
13 half the months.

5 4
5 4

£10 8 Ans.

What is the interest of £886 5s. 8d. for 1 year and 8 months at 5 per cent?

yr. m.	£	s.	d.
1 8 = 1s. 8d., is of a £ $\frac{1}{12}$)	886	5	8
	£73	17	$1\frac{1}{2}$ Ans.

☞ Here the years are considered as shillings, and the months as pence, and such part of the principal as those shillings and pence are of a £ are taken, which gives the answer.

What is the interest of £98 7s. 6d. for 2 years and 6 months at 5 per cent?

	£	s.	d.
2s. 6d. is of a £ $\frac{1}{8}$)	98	7	6
	£12	5	$11\frac{1}{4}$ Ans.

What is the interest of £324 4s. 8d. for 3 years and 4 months at 5 per cent?

	£	s.	d.
3s. 4d. is of a £ $\frac{1}{6}$)	324	4	8
	£54	0	$9\frac{1}{4}$ Ans.

What is the interest of £1284 10s. for 6 years and 8 months at 5 per cent?

	£	s.	d.
6s. 8d. is of a £ $\frac{1}{3}$)	1384	10	0
	£428	3	4 Ans.

What is the interest of £3000 for 8 month at 5 per cent?

	£	s.	d.
8d. is of a £ $\frac{1}{30}$)	3000	0	0
	£100	0	0 Ans.

RULE for $2\frac{1}{2}$ per cent. per annum.

Calculate at 5 per cent. and divide by 2, which will reduce it half.

Another method still shorter :—Reckon as many pence as there are pounds in the question—put down that amount, and multiply it by half the number of months.

What is the interest of £84 for 3 months at $2\frac{1}{2}$ per cent.?

	7s.	
	3	
2)	21	
	10	6 Ans.

What is the interest of £100 for 5 months at $2\frac{1}{2}$ per cent?

	s.	d.
	8	4
		5
2)	41	8
	20/10 Ans.	

What is the interest of £280 for 7 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
	1	3	4
			7
2)	8	3	4
	£4	1	8 Ans.

What is the interest of £530 for 9 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
	2	4	2
			9
2)	19	17	6
	£9	18	9 Ans.

What is the interest of £428 for 11 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
	1	15	8
			11
2)	19	12	4
	£9	16	2 Ans.

What is the interest of £90 for $11\frac{1}{2}$ months at $2\frac{1}{2}$ per cent?

	£	s.	d.
		7	6
			$11\frac{1}{2}$
2)	4	6	3
	£2	3	$1\frac{1}{2}$ Ans.

What is the interest of £100 for 12 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
		8	4
			12
2)	5	0	0
	£2	10	0 Ans.

What is the interest of £97 10s. for 5 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
		8	$1\frac{1}{2}$
			5
2)	2	0	$7\frac{1}{2}$
	£1	0	$3\frac{3}{4}$ Ans.

What is the interest of £920 for 8 months at $2\frac{1}{2}$ per cent?

	£	s.	d.
	3	16	8
			8
2)	30	13	4
	£15	6	8 Ans.

What is the interest of £112 for 8 months at $2\frac{1}{2}$ per cent?

£	s.	D.	
	9	4	
		4	half the months.
£1	17	4	Ans.

☞ This, and the four next questions, are worked by the shorter method.

What is the interest of £180 for 12 months at $2\frac{1}{2}$ per cent?

15s.
6 half the months.

£4 10 Ans.

What is the interest of £480 for 11 months at $2\frac{1}{2}$ per cent?

£	s.	d.	
2	0	0	
		$5\frac{1}{2}$	half the months.
£11	0	0	Ans.

☞ Here we multiply by (5) the months, and for the half month, take £1. Total, £11.

What is the interest of £140 for 9 months at $2\frac{1}{2}$ per cent?

s.	d.	
11	8	
	$4\frac{1}{2}$	half the months.
£2 12	6	Ans.

What is the interest of £320 15s. for 7 months at $2\frac{1}{2}$ per cent?

£	s.	d.	
1	6	$8\frac{3}{4}$	
		$3\frac{1}{2}$	half the months.
£4	13	$6\frac{1}{2}$	Ans.

RULE for $3\frac{1}{3}$ per cent per annum.

Calculate at 5 per cent and deduct $\frac{1}{3}$ from that amount,—the remainder will be the answer. Or multiply the interest for 1 month at 5 per cent by $\frac{2}{3}$ of the months, if more convenient.

What is the interest of £100 for 3 months at $3\frac{1}{3}$ per cent?

		s.	d.
For 1 month at 5 per cent =		8	4
			3
Deduct $\frac{1}{3}$)	1	5	0
	0	8	4
Answer,	0	16	8 at $3\frac{1}{3}$ per ct.

What is the interest of £151 for 7 months at $3\frac{1}{3}$ per cent?

		s.	d.
		12	7
			7
Deduct $\frac{1}{3}$)	4	8	1
	1	9	$4\frac{1}{4}$
	£2	18	$8\frac{3}{4}$ Ans.

What is the interest of £248 10s. for 12 months at $3\frac{1}{3}$ per cent?

£	s.	d.	
1	0	$8\frac{1}{2}$	
		8	is $\frac{2}{3}$ of 12 months.
£8	5	8	Ans.

What is the interest of £260 5s. for $1\frac{1}{2}$ years at $3\frac{1}{3}$ per cent?

	£	s.	d.	
	1	1	$8\frac{1}{4}$	
			12	is $\frac{2}{3}$ of 18 months.
Answer,	£13	0	3	at $3\frac{1}{3}$ per cent.

ANOTHER METHOD for $3\frac{1}{3}$ per cent per aunum.

Calculate the principal as pence, and multiply the amount by 8,—which will give the answer. The reason for multiplying by 8 is this—$3\frac{1}{3}$ is 8d. in the £.

What is the interest of £132 at $3\frac{1}{3}$ per cent per annum?

11s.
8

£4 8 Ans.

What is the interest of £240 at $3\frac{1}{3}$ per cent. per annum?

£1
8

£8 Ans.

What is the interest of £180 10s. at $3\frac{1}{3}$ per per cent per annum?

	s.	d.	
	15	$0\frac{1}{2}$	
		8	
£6	0	4	Ans.

What is the interest of £320 5s. at $3\frac{1}{3}$ per cent per annum?

£	s.	d.	
1	6	$8\frac{1}{4}$	
		8	
£10	13	6	Ans.

What is the interest of £560 5s. at $3\frac{1}{3}$ per cent per annum?

£	s.	d.	
2	6	$8\frac{1}{4}$	
		8	
£18	13	6	Ans.

What is the interest of £49 5s. at $3\frac{1}{3}$ per cent per annum?

s.	d.
4	$1\frac{1}{4}$
	8

£1 12 10 Ans.

What is the interest of £77 10s. at $3\frac{1}{3}$ per cent per annum?

s.	d.
6	$5\frac{1}{2}$
	8

£2 11 8 Ans.

What is the interest of £99 15s. at $3\frac{1}{3}$ per cent per annum?

s.	d.
8	$3\frac{3}{4}$
	8

£3 6 6 Ans.

What is the interest of £162 15s. at $3\frac{1}{3}$ per cent per annum?

s.	d.
13	$6\frac{3}{4}$
	8

£5 8 6 Ans.

Rule for $1\frac{1}{4}$ per cent per annum?

Calculate at 5 per cent, and take $\frac{1}{4}$, or multiply the interest for 1 month, at 5 per cent, by $\frac{1}{4}$ of the months.

What is the interest of £190 5s. for 6 months at $1\frac{1}{4}$ per cent?

s.	d.
15	$10\frac{1}{4}$
	6

$\frac{1}{4}$) 4 15 $1\frac{1}{2}$

Answer, £1 3 $9\frac{1}{4}$ at $1\frac{1}{4}$ per cent.

What is the interest of £236 10s. for 8 months at $1\frac{1}{4}$ per cent?

s.	d.
19	$8\frac{1}{2}$ for 1 month at 5 per cent.
	8

$\frac{1}{4}$) 7 17 8

Ans. £1 19 5 at $1\frac{1}{4}$ per cent.

What is the interest of £249 15s. for 3 years and 4 months at $1\frac{1}{4}$ per cent?

£	s.	d
1	0	$9\frac{3}{4}$
		10 is the $\frac{1}{4}$ of 40 months.

Ans. £10 8 1 half at $1\frac{1}{4}$ per cent.

What is the interest of £372 13 4d. for 12 months at $1\frac{1}{4}$ per cent?

£	s.	d.
1	11	$0\frac{2}{3}$
		3 is the $\frac{1}{4}$ of 12 months.

£4 13 2 Ans.

Rule for any rate and half rate per cent. per annum at $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, $5\frac{1}{2}$, &c., &c.

Multiply the principal by double the rate per cent.; cut off the unit of the product, and call it so many pence (the figures on the left will be so many shillings) and as many farthings, except 1 must be added to the pence as there are pence in number.

What is the interest of £140 at $2\frac{1}{2}$ per cent per annum?

£140
5

70/0 or £3 10s. Ans.

What is the interest of £260 at $3\frac{1}{2}$ per cent per annum?

£260
7

182/0 or £9 2s. Ans.

What is the interest of £395 at $4\frac{1}{2}$ per cent per annum?

£395
9

355/5 or £17 15 6. Add $\frac{5}{5}$ or 1d. as per rule. Ans.

What is the interest of £487 at $5\frac{1}{2}$ per cent per annum?

£487
11

535/7 Add $1\frac{1}{2}$d., viz, £26 15 $8\frac{1}{2}$. Ans.

QUESTIONS.

What is interest?
How do you calculate interest at 5 per cent?
How do you calculate interest at $2\frac{1}{2}$ per cent?
Why do you calculate at 5 per cent and take the half?
How do you calculate interest at $3\frac{1}{3}$ per cent?
Why do you multiply by 8 in finding the interest at $3\frac{1}{3}$ per cent?
What is the value of $3\frac{1}{3}$ per cent?
How do you calculate interest at $1\frac{1}{4}$ per cent?
Why do you divide by $\frac{1}{4}$ of the time at $1\frac{1}{4}$ per cent?
How do you calculate interest for any rate and half rate per cent?
What is the interest of £50 for 6 months at 5 per cent?—Answer, £1 5s.
What is the interest of £280 for 4 months at 5 per cent?—Answer, £4 13 4.
What is the interest of £320 for 5 months at 5 per cent?—Answer, £6 13 4.
What is the interest of £850 for 9 months at 5 per cent?—Answer, £31 17 6.
What is the interest of £70 for $6\frac{1}{4}$ months at 5 per cent?—Answer, £1 16 $5\frac{1}{2}$.
What is the interest of £96 for $7\frac{1}{2}$ months at 5 per cent?—Answer, £3.
What is the interest of £84 for $8\frac{3}{4}$ months at 5 per cent?—Answer, £3 1 3.
What is the interest of £234 17 6 for 1 year and 4 months at 5 per cent?—Answer, £15 13 2.
What is the interest of £420 15 4 for 2 years and 6 months at 5 per cent?—Ans., £52 11 11.
What is the interest of £90 7 6 for 4 years at 5 per cent?—Answer, £18 1 6.
What is the interest of £2341 18 7 for 6 years and 8 months at 5 per ct.?—Ans., £780 12 $10\frac{1}{4}$.
What is the interest of £80 for 4 months at $2\frac{1}{2}$ per cent?—Answer, 13s. 4d.
What is the interest of £200 for 12 months at $2\frac{1}{2}$ per cent?—Answer, £5.
What is the interest of £20 for 9 months at $2\frac{1}{2}$ per cent?—Answer, 7s. 6d.
What is the interest of £70 for 5 months at $2\frac{1}{2}$ per cent?—Answer, 14s. $8\frac{1}{4}$d.
What is the interest of £215 15s. for 7 months at $2\frac{1}{2}$ per cent?—Answer, £3 2 11.
What is the interest of £84 for 5 months at $3\frac{1}{3}$ per cent?—Answer, 11s. 8d.
What is the interest of £360 for 1 year and 8 months at $3\frac{1}{3}$ per cent?—Answer, £20.
What is the interest of £600 10s. for 3 years and 4 months at $3\frac{1}{3}$ per cent?—Ans., £66 14 $5\frac{1}{4}$.
What is the interest of £205 5s. at $3\frac{1}{3}$ per cent?—Answer, £6 16 10.
What is the interest of £500 15s. at $3\frac{1}{3}$ per cent?—Answer, £16 13 10.
What is the interest of £60 for 5 months at $1\frac{1}{4}$ per cent?—Answer, 6s. 3d.
What is the interest of £1000 for 9 months at $1\frac{1}{4}$ per cent?—Answer, £9 7 6.
What is the interest of £1800 for 12 months at $1\frac{1}{4}$ per cent?—Answer, £22 10s.
What is the interest of £190 at $2\frac{1}{2}$ per cent per annum?—Answer, £4 15s.
What is the interest of £365 at $3\frac{1}{2}$ per cent per annum?—Answer, £12 15 6.
What is the interest of £240 at $4\frac{1}{2}$ per cent per annum?—Answer, £10 16s.
What is the interest of £968 at $5\frac{1}{2}$ per cent per annum?—Answer, £53 4 $9\frac{1}{2}$.

PER CENTAGE TABLE

OF £100,

FROM ONE HUNDRED DAYS TO ONE DAY, AT DIFFERENT INTERESTS.

Days.	2 per Cent. 1¼d. per day, and add ¼d. every 3 days.			2½ per Cent. 1½d. & ½ farthing ⅌ day, and add ¼d. every 10 days			3 per Cent. 2d. per day, and deduct ¼d. every 10 days.			3½ per Cent. 2¼d. per day, and add ¼d. every 5 days.			4 per Cent. 2½d. per day, and add ¼d. every other day.			4½ per Cent. 3d. per day, and deduct ¼d. every 8 days.			5 per Cent. 3¼d. per day, and add ¼d. every 5 days.			6 per Cent. 4d. per day, and deduct ¼d. every 5 days.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
100	0	11	0½	0	13	9	0	16	5½	0	19	2	1	1	10½	1	4	9½	1	7	6	1	12	11
90	0	9	11¼	0	12	4½	0	14	9¾	0	17	3	0	19	8¼	1	2	3¾	1	4	9	1	9	7½
80	0	8	10	0	11	0	0	13	2	0	15	4	0	17	6	0	19	10	1	2	0	1	6	4
70	0	7	8¾	0	9	7½	0	11	6¼	0	13	5	0	15	3¾	0	17	4¼	0	19	3	1	3	0½
60	0	6	7½	0	8	3	0	9	10½	0	11	6	0	13	1½	0	14	10½	0	16	6	0	19	9
50	0	5	6¼	0	6	10½	0	8	2¾	0	9	7	0	10	11¼	0	12	4¾	0	13	9	0	16	5½
40	0	4	5	0	5	6	0	6	7	0	7	8	0	8	9	0	9	11	0	11	0	0	13	2
30	0	3	3¾	0	4	1½	0	4	11¼	0	5	9	0	6	6¾	0	7	5¼	0	8	3	0	9	10½
20	0	2	2½	0	2	9	0	3	3½	0	3	10	0	4	4½	0	4	11½	0	5	6	0	6	7
10	0	1	1¼	0	1	4½	0	1	7¾	0	1	11	0	2	2¼	0	2	5¾	0	2	9	0	3	3½
9	0	1	0	0	1	2½	0	1	6	0	1	8½	0	1	11½	0	2	2¾	0	2	5½	0	2	11¾
8	0	0	10½	0	1	1	0	1	4	0	1	6¼	0	1	9	0	1	11¾	0	2	2¼	0	2	7¾
7	0	0	9¼	0	0	11¼	0	1	2	0	1	4	0	1	6¼	0	1	9	0	1	11	0	2	3¾
6	0	0	8	0	0	9¾	0	1	0	0	1	1¾	0	1	3¾	0	1	6	0	1	7¾	0	1	11¾
5	0	0	6½	0	0	8	0	0	10	0	0	11½	0	1	1	0	1	3	0	1	4½	0	1	7¾
4	0	0	5¼	0	0	6½	0	0	8	0	0	9	0	0	10½	0	1	0	0	1	1	0	1	4
3	0	0	4	0	0	4¾	0	0	6	0	0	6¾	0	0	7¾	0	0	9	0	0	9¾	0	1	0
2	0	0	2½	0	0	3¼	0	0	4	0	0	4½	0	0	5¼	0	0	6	0	0	6½	0	0	8
1	0	0	1¼	0	0	1½	0	0	2	0	0	2¼	0	0	2½	0	0	3	0	0	3¼	0	0	4
Of a year																								
¼	0	10	0	0	12	6	0	15	0	0	17	6	1	0	0	1	2	6	1	5	0	1	10	0
½	1	0	0	1	5	0	1	10	0	1	15	0	2	0	0	2	5	0	2	10	0	3	0	0
¾	1	10	0	1	17	6	2	5	0	2	12	6	3	0	0	3	7	6	3	15	0	4	10	0
1	2	0	0	2	10	0	3	0	0	3	10	0	4	0	0	4	10	0	5	0	0	6	0	0

N. B. Other interests may be found by adding any of these together.

COMPENDIUMS IN SIMPLE INTEREST.

FROM SIX TO ONE AND A HALF PER CENT. PER ANNUM.

Rule.—Multiply the principal by the number of months—cut off the unit of that product, and reckon the other figures in that line as so many shillings. The unit figure thus cut off must be considered as pence, to which add as many fifths, to complete the sum total.

The interest of £1 for one month being $1\frac{1}{5}$d.; the interest of 16s. 8d. for the same time is 1d.; that of 12s. 6d. is $\frac{3}{4}$d.; that of 8s. 4d. is $\frac{1}{2}$d.; and that of 4s. 2d. is $\frac{1}{4}$d.

It would be sufficiently near for business to reckon for 5, 10, and 15 shillings, $\frac{1}{4}$d., $\frac{1}{2}$d. and $\frac{3}{4}$d.

What is the interest of £60 for 3 months at 6 per cent?

60
3
18/0 Ans.

What is the interest of £80 for 4 months at 6 per cent?

80
4
32/0 Ans.

What is the interest of £100 for 6 months at 3 per cent?

100
6
60/0 Ans.

What is the interest of £90 for 7 months at 6 per cent?

90
7
63/0 Ans.

What is the interest of £140 for 8 months at 6 per cent?

140
8
112/0 or £5 12 0 Ans.

What is the interest of £280 for 9 months at 6 per cent?

280
9
252/0 or £12 12 0 Ans.

What is the interest of £210 for 9 months at 6 per cent?

210
9
189/0 or £9 9 0 Ans.

What is the interest of £130 for 11 months at 6 per cent?

130
11
143/0 or £7 3 0 Ans.

What is the interest of £20 for 5 months at 6 per cent?

20
5
10/0 Ans.

What is the interest of £460 for 3 years and 4 months at 6 per cent?

460
40 months.
1840/0 or £92 Ans.

What is the interest of £980 for 1 year and 8 months at 6 per cent?

980
20 months.
1960/0 or £98 Ans.

What is the interest of £269 for 8 months at 6 per cent?

269
8
215/2d$\frac{2}{5}$. or £10 15 $2\frac{2}{5}$ Ans.

What in the interest of £16 for 7 months at 6 per cent?

16
7

11/2$\frac{2}{5}$d. Ans.

☞ Here the unit figure cut off, is by the rule considered as 2d. and two-fifths of a penny, which, with 11s., gives the amount 11s. 2$\frac{2}{5}$d.

What is the interest of £78 for 5 months at 6 per cent?

78
5

39/0 or £1 19 Ans.

What is the interest of £56 for 9 months at 6 per cent?

56
9

50/4d. $\frac{4}{5}$ or £2 10 4$\frac{4}{5}$ Ans.

What is the interest of £105 for 11 months at 6 per cent?

105
11

115/5d. and $\frac{5}{5}$ or £5 15 6 Ans.

☞ Here the unit figure cut off is 5, which is to be reckoned as 5d. $\frac{5}{5}$, and as five-fifths are equal to a penny, the pence are 6, which, with 115s. 5d., give £5 15 6, the answer.

What is the interest of £68 5s. for 7 months at 6 per cent?

68.5
7

47/7.15 or £2 7 8$\frac{3}{4}$ and $\frac{2}{5}$ Ans.

NOTE.—The 7d. and $\frac{7}{5} = 8\frac{2}{5}$d.

What is the interest of £51 10s. for 3 months at 6 per cent?

51.10
3

15/4.10 or £0 15 4$\frac{1}{2}$ and $\frac{4}{5}$ Ans.

What is the interest of S287 15s. for 2$\frac{1}{2}$ months at 6 per cent?

287.15
2$\frac{1}{2}$

71/9.5 or £3 11 10$\frac{1}{4}$ and $\frac{4}{5}$ Ans.

What is the interest of £98 15s. for 5 months at 6 per cent?

98.15
5

49/3.15 or £2 9 3$\frac{3}{4}$ and $\frac{3}{5}$ Ans.

RULE for 4 per cent. per annum.

Calculate at 6 per cent.—divide the product (after cutting off the unit figure,) by three, to reduce it $\frac{1}{3}$—then subtract that reduction from the amount at 6 per cent., and the remainder will be the answer.

What is the interest of £70 for 3 months at 4 per cent?

70
3

3) 21/0
7

14s. Ans.

What is the interest of £60 for 4 months at 4 per cent?

60
4

3) 24/0
8

16s.

What is the interest of £100 for 6 months at 4 per cent?

100
6

3) 60/0
20

40s. or £2 Ans.

What is the interest of £50 for 7 months at 4 per cent?

50
7

3) 35/0
11.8

23/4 or £1 3 4 Ans.

What is the interest of £78 for 8 months at 4 per cent?

78
8

3) 62/4
20/9$\frac{1}{4}$

41/6$\frac{3}{4}$ or £2 1 6$\frac{3}{4}$ Ans.

What is the interest of £256 for 9 months at 4 per cent?

256
9
3) 230/4
76/9¼
153.6¾ or £7 13 6¾ Ans.

What is the interest of £100 for 10 months at 4 per cent?

100
10
3) 100/0
33/4
66/8 or £3 6 8 Ans.

What is the interest of £80 for 11 months at 4 per cent?

80
11
3) 88/0
29/4
58/8 or £2 18 8 Ans.

What is the interest of £340 for 12 months at 4 per cent?

340
12
3) 408/0
136/0
272/0 or £13 12 0 Ans.

What is the interest of £400 for 6 months at 4 per cent?

400
6
3) 240/0
80/0
160/0 or £8 Ans.

What is the interest of £312 for 8 months at 4 per cent?

312
8
3) 249/6
83/2
166/4 or £8 6 4 Ans.

What is the interest of £146 for 3 years and 4 months at 4 per cent?

146
40
3) 584/0
194/8
389/4 or £19 9 4 Ans.

What is the interest of £89 10s. for 7 months at 4 per cent?

89.10
7
3) 62/6.10
20/10
41/8 and ¼d. for the ⅔ of 10s. Ans.

What is the interest of £281 for 2 years and 6 months at 4 per cent?

281
30
3) 843/0
281/0
56/2.0 or £28 2s. Ans.

RULE for 3 per cent. per annum.

Multiply the principal by the number of months as at 6 per cent.—divide the amount by 2, (after cutting off the unit figure,) and the remainder will be one half of 6 per cent.—the answer required.

Or, when the months are even, multiply the principal by half the months, which saves the trouble of calculating at 6 per cent.

What is the interest of £40 for 4 months at 3 per cent?

40
4
2) 16/0
8s. Ans.

What is the interest of £90 10s. for 5 months at 3 per cent?

90.10
5
2) 45/2.10
22/7½ or £1 2 7½ Ans.

What is the interest of £80 for 9 months at 3 per cent?

80
9

2) 72/0

36s. or £1 16 0 Ans.

What is the interest of £90 for 11 months at 3 per cent?

90
11

2) 99/0

49/6 or £2 9 6 Ans.

What is the interest of £140 for 12 months at 3 per cent?

140
12

2) 168/0

84/0 or £4 4s. Ans.

What is the interest of £375 for 8 months at 3 per cent?

375
4 the half of eight months.

150/0 or £7 10s. Ans.

What is the interest of £70 for 6 months at 3 per cent?

70
3 the half of 6 months.

21/0 or £1 1s. Ans.

☞ Here, as above, the principal is multiplied by half the months, to avoid going into 6 per cent.

What is the interest of £81 for 4 months at 3 per cent?

81
2 the half of 4 months.

16/2 Ans.

What is the interest of £86 for 7 months at 3 per cent?

86
$3\frac{1}{2}$ the half of 7 months.

30/1 or £1 10 1 Ans.

RULE for $3\frac{3}{4}$ per cent. per annum.

Calculate at 3 per cent., according to the rule for that purpose, and add thereto one-fourth of that amount.

What is the interest of £80 for 8 months at $3\frac{3}{4}$ per cent?

80
4 the half of 8 months.

Add $\frac{1}{4}$) 32/0 at 3 per cent.
8

£2 0 0 Ans. at $3\frac{3}{4}$ per cent.

What is the interest of £58 for 10 months at $3\frac{3}{4}$ per cent?

58
5 the half of 10 months.

Add $\frac{1}{4}$) 29/0 at 3 per cent.
7/3

£1 16 3 Ans. at $3\frac{3}{4}$ per cent.

What is the interest of £113 6s. 8d. for 9 months at $3\frac{3}{4}$ per cent?

£	s.	d.	
113	6	8	
		9	
$\frac{1}{2}$) 102/0	0	0	at 6 per cent.
Add $\frac{1}{4}$) 51			at 3 per cent.
12	9		
£3	3	9	Ans. at $3\frac{3}{4}$ per cent.

What is the interest of £128 11s. $5\frac{1}{2}$d. for 7 months at $3\frac{3}{4}$ per cent?

£	s.	d.	
128	11	$5\frac{1}{2}$	
		7	at 6 per cent.
$\frac{1}{2}$) 90/0	0	$2\frac{1}{2}$	at 3 per cent.
Add $\frac{1}{4}$) 45			
11	3		
£2	16	3	Ans. at $3\frac{3}{4}$ per cent.

RULE for 2 per cent. per annum.

Multiply the principal by the time, as at 6 per cent.—divide the amount by 3, (after cutting off the unit figure,) and the remainder will be $\frac{1}{3}$ of 6 per cent.—the answer required.

What is the interest of £40 for 5 months at 2 per cent?

```
     40
      5
3 ) 20/0
    6s. 8d. Ans.
```

What is the interest of £60 for 7 months at 2 per cent?

```
     60
      7
3 ) 42/0
    14s. Ans.
```

What is the interest of £90 for 8 months at 2 per cent?

```
     90
      8
3 ) 72/0
    24s. or £1 4 0 Ans.
```

What is the interest of £96 for 11 months at 2 per cent?

```
     96
     11
3 ) 105/6
    35s. 2d. or £1 15 2 Ans.
```

What is the interest of £32 for 4 months at 2 per cent?

```
     32
      4
3 ) 12/8
    4s. 2½d. and 2 remainder, Ans.
```

What is the interest of £215 5s. for 8 months at 2 per cent?

```
     £   s.
    215  5
         8
3 ) 172/2.0
Ans.  57/4½ {and 2 remainder, or £2 17 4½
```

What is the interest of £140 for 6 months at 2 per cent?

```
 140
   2 the third of 6 months.
 28/0 or £1 8s. Ans.
```

What is the interest of £999 10s. for 9 months at 2 per cent?

```
  £   s.
 999 10
      3 the third of 9 months.
 299/8.10 or £14 19 8½ Ans.
```

☞ Here, as above, the principal is multiplied by one-third of the months, which saves the trouble of finding the interest at 6 per cent.

RULE for $1\frac{1}{2}$ per cent. per annum.

Multiply the principal by the time, as at 6 per cent.—divide the amount by 4, (after cutting off the unit figure,) and the remainder will be one-fourth of 6 per cent.—the answer required.

What is the interest of £80 for 5 months at $1\frac{1}{2}$ per cent?

```
     80
      5
4 ) 40/0
    10s. Ans.
```

What is the interest of £100 for 7 months at $1\frac{1}{2}$ per cent?

```
    100
      7
4 ) 70/0
    17s. 6d. Ans.
```

What is the interest of £20 for 10 months at $1\frac{1}{2}$ per cent?

```
     20
     10
4 ) 20/0
    5s. Ans.
```

What is the interest of £96 for 9 months at $1\frac{1}{2}$ per cent?

```
     96
      9
4 ) 86/4
    21/7 or £1 1 7 Ans.
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QUESTIONS.

How do you calculate interest, at the rate of 6 per cent. per annum?
What is the interest of £1 for 1 month at 6 per cent. per annum?
How do you calculate interest at 4 per cent. per annum?
Why do you reduce it one-third?

Answer—Because 4 per cent. is one-third less than 6 per cent. per annum.

How do you calculate interest at $3\frac{3}{4}$ per cent?
Why do you add one-fourth of the amount found at 3 per cent?

Answer—Because three-fourths is one-fourth of 3 per cent.

How do you calculate interest at the rate of 2 per cent. per annum?
How do you calculate interest at the rate of $1\frac{1}{2}$ per cent per annum?
Why do you divide by 4?

Answer—Because one and a half is the fourth of 6 per cent.

What is the interest of £50 for 9 months at 6 per cent?—Answer, £2 5s.
What is the interest of £100 for 12 months at 6 per cent?—Answer, £6.
What is the interest of £280 for 7 months at 6 per cent?—Answer, £9 16s.
What is the interest of £20 for 4 months at 6 per cent?—Answer, 8s.
What is the interest of £117 for 5 months at 6 per cent?—Answer, £2 18s. 6d.
What is the interest of £178 for 3 months at 6 per cent?—Answer, £2 13s. $4\frac{3}{4}$d.
What is the interest of £469 for 8 months at 6 per cent?—Answer, £18 15s. 2d. $\frac{2}{5}$
What is the interest of £85 10s. for 7 months at 6 per cent?—Answer, £2 19s. $9\frac{1}{2}$d. $\frac{3}{5}$
What is the interest of £51 5s. for 5 months at 6 per cent?—Answer, £1 5s. $7\frac{1}{4}$d. $\frac{1}{5}$
What is the interest of £208 15s. for 9 months at 6 per cent?—Answer, £9 7s. $9\frac{3}{4}$d. $\frac{3}{5}$
What is the interest of £57 10s. for $3\frac{1}{2}$ months at 6 per cent?—Answer, £1 0s. $1\frac{1}{4}$d. $\frac{1}{6}$
What is the interest of £300 15s. for $11\frac{1}{4}$ months at 6 per cent?—Answer, £16 18s $3\frac{1}{2}$d. $\frac{3}{5}$
What is the interest of £100 for 5 months at 4 per cent?—Answer, £1 13s. 4d.
What is the interest of £20 for 8 months at 4 per cent?—Answer, 5s. 4d.
What is the interest of £17 10s. for 7 months at 4 per cent?—Answer, 8s. 2d.
What is the interest of £286 for 6 months at 3 per cent?—Answer, £4 5s. 9d. $\frac{3}{5}$
What is the interest of £90 for 15 months at 3 per cent?—Answer, £3 7s. 6d.
What is the interest of £22 10s. for 20 months at 3 per cent?—Answer, £1 2s. 6d.
What is the interest of £120 13s. 4d. for 9 months at $3\frac{3}{4}$ per cent?—Answer, £3 7s. $10\frac{1}{2}$d.
What is the interest of £200 for 6 months at $3\frac{3}{4}$ per cent?—Answer, £3 15s.
What is the interest of £520 for 10 months at $3\frac{3}{4}$ per cent?—Answer, £16 5s.
What is the interest of £36 for 5 months at 2 per cent?—Answer, 6s.
What is the interest of £140 10s. for 6 months at 2 per cent?—Answer, £1 8s. 1d.
What is the interest of £220 15s. for 9 months at 2 per cent?—Answer, £3 6s. $2\frac{1}{4}$d.
What is the interest of £80 for 12 months at 2 per cent?—Answer, £1 12s.
What is the interest of £30 for 9 months at $1\frac{1}{2}$ per cent?—Answer, 6s. 9d.
What is the interest of £400 for 1 year and 6 months at $1\frac{1}{2}$ per cent?—Answer, £9.
What is the interest of £15 for 3 months at $1\frac{1}{2}$ per cent?—Answer, 1s. $1\frac{1}{4}$d.

COMPOUND INTEREST,

AT FIVE AND SIX PER CENT PER ANNUM.

FIVE PER CENT.

FIND the first year's interest for 5 per cent. as in Simple Interest, add that interest to the principal; which sum becomes the second year's principal, and so on for any length of time.

What is the compound interest of £120 10s. for 2 years and 6 months at 5 per cent. per annum?

£	s.		s.	d.
120	10 at 1d.	=	10	$0\frac{1}{2}$d.
				12 months in a year.

1 year's interest, £6 0 6 which added to the principal makes £126 10s. 6d.

	£	s.	d.		s.	d.
Then,	126	10	6 at 1d.	=	10	$6\frac{1}{2}$
						12

£6 6 6 the second year's interest, which added to the former principal £126 10s. 6d. makes £132 17s., which taken as pence is = 11s. $0\frac{3}{4}$d.
6 months for half a year.

£3 6 $4\frac{1}{2}$ which added to the second year's principal, gives £136 3 $4\frac{1}{2}$, from which deduct first principal, or £120 10 0, which leaves the amount of interest, £15 13 $4\frac{1}{2}$ Ans.

A note became due at 3 months for £84 10s., but not being paid, it was renewed for 3 months longer, what amount of interest is to be paid upon the note when again due, 5 per cent. compound interest being allowed?

£	s.		s.	d.
84	10	=	7	$0\frac{1}{2}$
				3

£1 1 $1\frac{1}{2}$ int. for 3 mos.

	£	s.	d.		s.	d.
Then,	85	11	$1\frac{1}{2}$	=	7	$1\frac{1}{2}$
						3

£1 1 $4\frac{1}{2}$

Ans. £2 2 6

What is the compound interest of £600, forborne 3 years, at 5 per cent?

£		£	
600	first principal.	630	second principal.
5		5	
£30		£31.50	
Add 600		Add 630	
£630	{second principal.	£661	10s. 3rd yr's principal;

which, at 1d. is = £2 15 $1\frac{1}{2}$ per month.
12 months in a year.

33	1	6	third year's int.
31	10	0	second do.
30	0	0	first do.
£94	11	6	Ans.

NOTE.—When the amount is even, the shortest way is to multiply the principal by the rate; when it is not so, find the interest for one month, and multiply by the number of months in a year.

SIX PER CENT.

FIND the first year's interest, as at six per cent. Simple Interest, then proceed as in the preceding rule.

What is the compound interest of £27 10s. for 1 year and 5 months at 6 per cent?

	£	s.	
First principal,	27	10	
		12 months in a year.	
	£1	13	interest for one year.
Add first principal,	£27	10	
	£29	3	second principal.

£	s.
29	3
	5

14/5 15 = 14s. $6\frac{3}{4}$d.
Add £1 13 0

£2 7 6 $\frac{4}{5}$ being added, &c.
£2 7s. $6\frac{3}{4}$d. Ans.

A note became payable at 5 months for £280, but to oblige the payer it was renewed for 3 months, what is the amount of interest to be received upon that note, compound interest, at 6 per cent. being allowed?

£280	£287 second principal.
5	3
140/0 = £7	86/1 = £4 6 1⅕ to which

add interest of first principal, 7 0 0

£11 6 1⅕ Ans.

What is the compound interest of £173 15s. for 1 year and seven months and fifteen days at 6 per cent. per annum?

£ s.	£ s. d.
173 15	Then, 184 3 6 second principal.
12	7½
208/5 = £10 8s. 6d.	1289 4 6
	92 1 9

138/1 6 3 interest for seven months, fifteen days, or seven and a half months, or £6 18 1½ to which add
10 8 6 the year's interest, which gives
£17 6 7½ Ans.

COMMISSION AND BROKERAGE TABLE.

Value of goods or stock sold.	⅛ per Cent.			¼ per Cent.			⅜ per Cent.			½ per Cent.			⅝ per Cent.			¾ per Cent.			⅞ per Cent.			1 per Cent.		
£	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1000	1	5	0	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0	8	15	0	10	0	0
900	1	2	6	2	5	0	3	7	6	4	10	0	5	12	6	6	15	0	7	17	6	9	0	0
800	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0
700		17	6	1	15	0	2	12	6	3	10	0	4	7	6	5	5	0	6	2	6	7	0	0
600		15	0	1	10	0	2	5	0	3	0	0	3	15	0	4	10	0	5	5	0	6	0	0
500		12	6	1	5	0	1	17	6	2	10	0	3	2	6	3	15	0	4	7	6	5	0	0
400		10	0	1	0	0	1	10	0	2	0	0	2	10	0	3	0	0	3	10	0	4	0	0
300		7	6	0	15	0	1	2	6	1	10	0	1	17	6	2	5	0	2	12	6	3	0	0
200		5	0	0	10	0	0	15	0	1	0	0	1	5	0	1	10	0	1	15	0	2	0	0
100		2	6	0	5	0	0	7	6	0	10	0	0	12	6	0	15	0	0	17	6	1	0	0
90		2	3	0	4	6	0	6	9	0	9	0	0	11	3	0	13	6	0	15	9	0	18	0
80		2	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0	14	0	0	16	0
70		1	9	0	3	6	0	5	3	0	7	0	0	8	9	0	10	6	0	12	3	0	14	0
60		1	6	0	3	0	0	4	6	0	6	0	0	7	6	0	9	0	0	10	6	0	12	0
50		1	3	0	2	6	0	3	9	0	5	0	0	6	3	0	7	6	0	8	9	0	10	0
40		1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0
30		0	9	0	1	6	0	2	3	0	3	0	0	3	9	0	4	6	0	5	3	0	6	0
20		0	6	0	1	0	0	1	6	0	2	0	0	2	6	0	3	0	0	3	6	0	4	0
10		0	3	0	0	6	0	0	9	0	1	0	0	1	3	0	1	6	0	1	9	0	2	0
9		0	2¾	0	0	5½	0	0	8¼	0	0	10¾	0	1	1½	0	1	4¼	0	1	7	0	1	9¾
8		0	2½	0	0	5	0	0	7¼	0	0	9¾	0	1	0	0	1	2½	0	1	4¾	0	1	7¼
7		0	2¼	0	0	4¼	0	0	6¼	0	0	8½	0	0	10½	0	1	0½	0	1	2¾	0	1	5
6		0	1¾	0	0	3½	0	0	5½	0	0	7¼	0	0	9	0	0	10¾	0	1	0½	0	1	2½
5		0	1½	0	0	3	0	0	4½	0	0	6	0	0	7½	0	0	9	0	0	10½	0	1	0
4		0	1¼	0	0	2½	0	0	3¾	0	0	5	0	0	6	0	0	7¼	0	0	8½	0	0	9¾
3		0	1	0	0	1¾	0	0	2¾	0	0	3¾	0	0	4½	0	0	5½	0	0	6¼	0	0	7¼
2		0	0½	0	0	1¼	0	0	1¾	0	0	2½	0	0	3½	0	0	3¾	0	0	4¼	0	0	5
1		0	0¼	0	0	0½	0	0	1	0	0	1¼	0	0	1½	0	0	1½	0	0	2	0	0	2½

DEMONSTRATIONS IN DISCOUNT, INSURANCE, COMMISSION, AND BROKERAGE.

In many articles of manufacture it is customary to draw up the invoice, or bill of sale, subject to a discount of from 2 to perhaps 50 per cent. To reckon this, when the rate of discount forms an aliquot part, divide the gross sum by the aliquot part, subtract the amount from the gross sum, which will leave the net money, or the amount to be paid after taking off the discount.

Commission and brokerge at $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{8}$ per cent, are extremely useful to bankers and merchants, being allowances made by the one to the other for keeping the accounts and transacting business.

What is the discount on £486 11s. 8d. at 6d. per £?

6d. is the $\frac{1}{40}$) £486 11 8

Ans. £12 3 $3\frac{1}{2}$

What is the discount on £2347 8s. 6d. at 2d. per £?

2d. is the $\frac{1}{120}$) £2347 8 6

Ans. £19 11 $2\frac{3}{4}$ and $\frac{2}{5}$.

What is the discount on £331 10s. at $1\frac{1}{2}$d. per £?

$1\frac{1}{2}$d. is the $\frac{1}{160}$) £331 10 0

Ans. £2 1 $5\frac{1}{4}$

What is the discount on £100 at $10\frac{1}{2}$d. per £?

	s.	d.
At 1d. =	8	4
		$10\frac{1}{2}$
Ans. £4	7	6

What is the discount on £104 6s. 8d. at $7\frac{3}{4}$d. per £?

	s.	d.	
At 1d. =	8	8	
		$7\frac{3}{4}$	and $2\frac{1}{2}$d. to be added in for the 6s. 8d.
Ans. £3	7	$4\frac{1}{2}$	

What is the discount on £148 13s. 4d. at $9\frac{1}{4}$d. per £?

	s.	d.	
At 1d. =	12	4	
		$9\frac{1}{4}$	and add 6d. for the 13s. 4d.
Ans. £5	14	7	

What is the discount of £980 7s. 6d. at 2d. on the shilling?

2d. is the $\frac{1}{6}$) £980 7 6

Ans. £163 7 11

What is the discount of £180 3s. 9d. at $1\frac{1}{2}$d. on the shilling?

$1\frac{1}{2}$d. is the $\frac{1}{8}$) £180 3 9

Ans. £22 10 $5\frac{1}{2}$ and $\frac{1}{2}$ farthing.

What is the discount of £520 10s. at $\frac{3}{4}$d. on the shilling?

$\frac{3}{4}$d. is the $\frac{1}{16}$) £520 10 0

Ans. £32 10 $7\frac{1}{2}$

What is the discount of £97 16s. 8d. at $\frac{1}{2}$d. on the shilling?

$\frac{1}{2}$d. is the $\frac{1}{24}$) £97 16 8

Ans. £4 1 $6\frac{1}{4}$ and $\frac{1}{3}$.

What is the discount of £2184 at $\frac{1}{4}$d. on the shilling?

$\frac{1}{4}$d. is the $\frac{1}{48}$) £2184 0 0

Ans. £45 10 0

RULE.

If the discount to be taken off is an aliquot part of 100, divide the gross sum by that aliquot part, and it will give the discount, which being subtracted from the gross sum, leaves the net money or sum to be paid after taking off the discount.

What is the discount of £220 18s. 6d. at 5 per cent?

5 of 100 is the $\frac{1}{20}$) £220 18 6
11 0 11 discount.

Ans. £109 17 7

What is the discount of £384 5s. at 10 per cent?

10 of 100 is the $\frac{1}{10}$) £384 5 0
38 8 6 discount.

Ans. £345 16 6

What is the discount of £137 13s. 6$\frac{1}{2}$d. at 12$\frac{1}{2}$ per cent?

12$\frac{1}{2}$ is of 100 the $\frac{1}{8}$) £137 13 6$\frac{1}{2}$
17 4 2$\frac{1}{4}$ discount.

Ans. £120 9 4$\frac{1}{4}$

What is the discount of £80 4s. 10$\frac{1}{2}$d. at 20 per cent?

20 is of 100 the $\frac{1}{5}$) £80 4 10$\frac{1}{2}$
16 0 11$\frac{1}{2}$ $\frac{4}{5}$ discount.

Ans. £64 3 10$\frac{3}{4}$ $\frac{1}{5}$.

What is the discount of £300 at 25 per cent?

25 is of 100 the $\frac{1}{4}$) £300 0 0
75 0 0 discount.

Ans. £225 0 0

RULE.

If the discount required be not an aliquot part of 100, divide the sum by 20, and the quotient, which is the discount at 5 per cent., being multiplied by as many times 5 as is contained in the discount you wish to find, gives the answer.

What is the discount of £85 15s. at 15 per cent?

	£	s.	d.	
20)	85	15	0	
	4	5	9	discount at 5 per cent.
				3 times 5 are 15.
	£12	17	3	Ans.

What is the discount of £200 at 30 per cent?

£10 at 5 per cent.
6 times 5 are 30.

Ans. £60 at 30 per cent.

What is the discount of £342 6s. 8d. at 35 per cent?

	£	s.	d.	
20)	342	6	8	
	17	2	4	at 5 per cent.
				7 times 5 are 35.
	£119	16	4	at 35 per cent.

What is the discount of £466 2s. 8d. at 45 per cent?

£	s.	d.	
23	6	1$\frac{1}{2}$	at 5 per cent.
		9	times 5 are 45.
£209	15	1$\frac{1}{2}$	at 45 per cent.

Rule for Discount at $\frac{1}{2}$ per cent.

Cut off the unit figure of the £, consider those not cut off as shillings. The unit figure cut off is pence, to which add at many fifths of a penny. When the question contains shillings as well as pounds, if 4 or 5, add one farthing; if 8 or 10, add one half-penny; if 12 or 14, add three farthings; and if 16 or 18 and upwards, add one penny, to make up the answer.

What is the discount of £981 at $\frac{1}{2}$ per cent?

98/1 or £4 18 1 $\frac{1}{5}$ Ans

☞ Here the unit figure is cut off, which is considered as 1d. and $\frac{1}{5}$ of a penny.

What is the discount of £3274 16s 8d. at $\frac{1}{2}$ per cent?

327/4 16s. 8d. or £16 7 5 $\frac{4}{5}$ or $\frac{3}{4}$ Ans.

What is the discount of £3460 10s. at $\frac{1}{4}$ per cent?

	£	s.	d.	
346/0 10s. or $\frac{1}{2}$)	17	6	0$\frac{1}{2}$	at $\frac{1}{2}$ per cent.
Ans.	£8	13	0$\frac{1}{4}$	at $\frac{1}{4}$ per cent.

☞ Find the amount at $\frac{1}{2}$ per cent. and take half that sum.

What is the discount of £2665 17s. at $\frac{1}{8}$ per cent?

	£	s.	d.
266/5 17s. or $\frac{1}{4}$)	13	6	7
	£3	6	$7\frac{3}{4}$

☞ Find the amount at $\frac{1}{2}$ per cent. and take one-fourth of that sum.

TO FIND THE PRESENT WORTH.

RULE.

Find the amount of £100 for the rate and time, for a divisor, then divide the given sum, after multiplying it by £100, and the quotient will be the present worth.

What sum in ready money will discharge a debt of £925, due 1 year and 8 months hence, at 6 per cent?

100
20 the number of months.

200/0 = £10, which added to £100 makes £110. Then the debt multiplied by £100 gives £9250.0, which divided by 110 leaves £840 18s. 2d., the answer; thus:

£
11.0) 9250.0

£840 18 2 Ans.

What is the present worth of £600, due 4 years hence, at 5 per cent?

£
12) 6000

£500 Ans.

☞ NOTE.—Here, instead of dividing by 120, I have reduced the divisor and dividend one-tenth, as it shortens the operation and is equally correct with the former example—which might also have been reduced.

Offered for sale a debenture for £230, payable 7 years hence, what amount should I give for it to pay me 10 per cent?

£
17) 2300

£135 5 $10\frac{1}{2}$ Ans.

A person in want of cash, but holding provincial debentures to the amount of £600, payable in 3 years, is willing to allow me 20 per cent. if I will cash them, what amount must I give for them to realize that sum?

£
16) 6000

£375 Ans.

What must be discounted for the ready payment of £100, due 2 years hence, at 15 per cent.

£
13) 1000

£76 18 6 Ans.

Suppose I have a legacy of £550 left me, but it is not to be paid for 4 years, what is its present worth if I allow $12\frac{1}{2}$ per cent. discount?

£
15) 5500

£366 13 4 Ans.

INSURANCE.

DIVIDE the given sum by the aliquot part or parts which the rate of Insurance is of £100.

What is the insurance of £725 8s. 10d. at $12\frac{1}{2}$ per cent?

	£	s.	d.
$12\frac{1}{2}$ = to $\frac{1}{8}$)	725	8	10
	£90	13	$7\frac{1}{4}$ Ans.

A man's house estimated at £580 was insured against fire, for $2\frac{1}{2}$ per cent. a year, what insurance did he pay annually?

£
$2\frac{1}{2}$ = to $\frac{1}{40}$) 580

£14 10 Ans.

I possess stock to the amount of £750, the Mutual Insurance Company offer to protect me from loss by fire, for $1\frac{3}{4}$ per cent., what is the insurance money?

	£		
2 of 100 is the $\frac{1}{50}$)	75/0		
Deduct $\frac{1}{8}$)	15	0	0
	1	17	6 the excess of $1\frac{3}{4}$.
	£13	2	6 Ans.

What is the insurance upon a schooner and cargo, valued at £1875, at $7\frac{1}{2}$ per cent?

		£		
5 of 100 = to $\frac{1}{20}$)		1875		
$2\frac{1}{2} = \frac{1}{2}$)		93	15	0
		46	17	6
		£140	12	6 Ans.

I send a cargo of flour, valued at £485 6s., from Toronto to Halifax, N. S., and to prevent loss by casualties at sea, I insure the same at the rate of 3 per cent., what is the amount to be paid for insurance?

2 of 100 = to $\frac{1}{50}$)	485	6	0
1 of 2 = $\frac{1}{2}$)	9	14	$1\frac{1}{4}$
	4	17	$0\frac{3}{4}$
	£14	11	2 Ans.

Having property of the value of £160—it not being of a combustible nature—the various companies offer to insure it for $1\frac{1}{4}$ per cent., what would be the amount of the insurance?

£
$1\frac{1}{4}$ of 100 = to $\frac{1}{80}$) 160

£2 Ans.

COMMISSION.

When the Commission is one-eighth per cent. one-fortieth of the pounds will produce the shillings; to the remainder (if any) add one-fourth of itself and consider it farthings.

What is the commission on £4320 at $\frac{1}{8}$ per cent?

£
$\frac{1}{8} = \frac{1}{40}$) 4320

108s. or £5 8 commission.

What is the commission on £6288 at $\frac{1}{8}$ per cent?

£
$\frac{1}{8} = \frac{1}{40}$) 6288

157s. and 8 remainder.
2 or $\frac{1}{4}$ of itself added.

To be considered as 10 farthings.
£7 17 $2\frac{1}{2}$ commission.

What is the commission on £1280 at $\frac{1}{4}$ per cent?

£
$\frac{1}{4} = \frac{1}{20}$) 1280

64s. or £3 4s. commission.

☞ At $\frac{1}{4}$ per cent. $\frac{1}{20}$ of the pounds will produce the shillings; the remainder (if any) multiplied by $2\frac{1}{2}$ will be the farthings, to which add one, if the shillings in the given number amount to 20.

What is the commission on £2068 at $\frac{1}{4}$ per cent?

£
$\frac{1}{4} = \frac{1}{20}$) 2068

103s. and 8 remainder.
$2\frac{1}{2}$ multiplier; and add 1 as per rule.

To be considered as 21 farthings.
£5 3 $5\frac{1}{4}$ commission.

What is the commission on £300 at $\frac{1}{2}$ per cent?

£
$\frac{1}{2} = \frac{1}{10}$) 300

30s. or £1 10 commission.

☞ At $\frac{1}{2}$ per cent. $\frac{1}{10}$ of the pounds will produce the shillings; the remainder (if any) multiplied by 5 will be farthings, and for every five shillings of the given sum, add three farthings.

What is the commission on £7270 at $\frac{3}{4}$ per cent?

£
$\frac{1}{2} = \frac{1}{10}$) 7270

$\frac{1}{4} = \frac{1}{2}$) 727
363.6

1090.6 or £54 10 6 commission.

☞ At $\frac{3}{4}$ per cent., proceed as in the last rule at $\frac{1}{2}$ per cent., and to its result add half of the same.

Another Rule for Commission at $\frac{1}{2}$ per cent.

Cut off the unit figure of the £, consider those not cut off as shillings. The unit figure cut off is pence, to which add as many fifths of a penny. When the question contains shillings as well as pounds, if 4 or 5, add one-fourth of a penny; if 8 or 10, add a half-penny; if 12 or 14, add three farthings; if 16s. 8d. and upwards, add one penny to make up the answer.

What is the commission on £420 10s. at $\frac{1}{2}$ per cent?

£ s. d.
42/0 10s. or 2 2 $0\frac{1}{2}$ commission.

What is the commission on £974 4s. at $\frac{1}{2}$ per cent?

£ s. d.
97/4 4s. or 4 17 5 Ans.

☞ The unit figure cut off is 4d., to which add $\frac{4}{5}$ of a penny or three farthings, and one farthing for the 4s., which makes £4 17s. 5d., the answer required.

What is the commission on £1075 5s. at $\frac{1}{2}$ per cent?

107/5 5s. or £5 7 $6\frac{1}{4}$ commission.

What is the commission on £8497 at $\frac{1}{2}$ per cent?

849/7 or £42 9 $8\frac{2}{5}$ or $\frac{1}{4}$d. commission.

☞ The 7d. and $\frac{2}{5}$ is equal to $8\frac{2}{5}$d. or $8\frac{1}{4}$d.

What is the commission on £3522 10s. at 1 per cent?

£ s. D.
$1 = \frac{1}{100}$) 3522 10 0

Ans. £35 4 6 commission.

☞ When the commission is 1 per cent divide the given sum by 100; when 2 per cent, by 50; when $2\frac{1}{2}$ per cent, by 40; and so on.

What is the commission on £324 4s. 2d. at $2\frac{1}{2}$ per cent?

£ s. D.
$2\frac{1}{2}$ of 100 is $\frac{1}{40}$) 324 4 2

£8 2 $1\frac{1}{4}$ commission.

What is the commission on £2820 at $1\frac{1}{2}$ per cent?

$1 = \frac{1}{100}$) 2820

$\frac{1}{2} = \frac{1}{2}$ 28/4
14/2

£42 6s. commission.

☞ When the commission is $1\frac{1}{4}$, $1\frac{1}{2}$, or $1\frac{3}{4}$, $2\frac{1}{4}$, or $2\frac{3}{4}$ per cent, proceed as in the last rule, adding to the result the aliquot parts as above, according to the rate of the given commission, or find the commission at 1 per cent, and multiply it by the given rate.

What is the commission on £4240 10s. at $1\frac{3}{4}$ per cent?

$2 = \frac{1}{50}$) 4240 10

$\frac{1}{8}$ 84 16 $2\frac{1}{4}$
10 12 $0\frac{1}{4}$

£74 4 2 commission.

☞ The commission is here found as if at 2 per cent; and from the result $\frac{1}{8}$ of itself (the sum taken too much) is subtracted.

What is the commission on £1065 10 at $2\frac{3}{4}$ per cent?

$2\frac{1}{2}$ is $\frac{1}{40}$) £1065 10 0

$\frac{1}{4}$ is $\frac{1}{10}$) 26 12 9
2 13 $3\frac{1}{4}$ $\frac{1}{5}$

£29 6 $0\frac{1}{4}$ $\frac{1}{5}$ commission.

What is the commission on £1000 at 4 per cent?

1000
4

100) 4000

£40 commission.

☞ Multiply by the per centage, and divide by £100.

What is the commission on £468 6s. 8d. at $7\frac{1}{2}$ per cent?

468 6 8
$7\frac{1}{2}$

100) 3512 10 0

£35 2 6 commission.

What is the commission at 5 per cent on 8 cwts. 3 qrs. of cochineal sold at 14s. per lb.?

980 lbs.
7

5 of 100 is $\frac{1}{20}$) 686.0

£34 6s. commission.

☞ Here, instead of multiplying by the price, 14s., I multiply by half the price, which prevents the necessity of dividing by 20.

BROKERAGE.

Rule for Brokerage at $\frac{1}{2}$ per cent.

Cut off the unit figure of the £; consider those not cut off as shillings. The unit figure cut off is pence, to which add as many fifths of a penny. When the question contains shillings as well as £, if 4 or 5, add $\frac{1}{4}$d.; if 8 or 10, add $\frac{1}{2}$d.; if 12 or 14, add $\frac{3}{4}$d.; if 16s. 8d., and upwards, add 1d., to make up the answer.

What is the brokerage on £670 13s. 6d. at $\frac{1}{2}$ per cent?

67/0 13s. 6d. or £3 7 $0\frac{3}{4}$ brokerage.

What is the brokerage on £785 9s. at $\frac{1}{4}$ per cent?

£ s. d.
78/5 9s. or $\frac{1}{2}$) 3 18 $6\frac{1}{2}$

£1 19 $3\frac{1}{4}$ at $\frac{1}{4}$ per cent.

☞ Find at $\frac{1}{2}$ per cent, and divide by 2.

What is the brokerage on £8650 10s. at $\frac{1}{4}$ per cent?

£ s. d.
865/0 10s. or $\frac{1}{2}$) 43 5 $0\frac{1}{2}$
£21 12 $6\frac{1}{4}$ brokerage.

What is the brokerage on £3500 16s. 8d. at $\frac{1}{8}$ per cent?

£ s. d.
350/0 16s. 8d. or $\frac{1}{4}$) 17 10 1 at $\frac{1}{2}$ per cent.
£4 7 $6\frac{1}{4}$ at $\frac{1}{8}$ per cent.

☞ Find at $\frac{1}{2}$ per cent, and divide by 4.

What is the brokerage on £1785 at 2s. 6d. per cent?

2s. 6d. = $\frac{1}{800}$) £1785
£2 3 $4\frac{1}{2}$ brokerage.

☞ Divide the given sum by the aliquot part or parts which the rate of brokerage is of 100.

What is the brokerage on £8464 8s. 6d. at 7s. 6d. per cent?

5 is the $\frac{1}{400}$ £8464 8 6
2s. 6d. = $\frac{1}{2}$ 21 3 $2\frac{1}{2}$
10 11 $7\frac{1}{4}$
£31 14 $9\frac{3}{4}$ brokerage.

What is the brokerage on £2180 at 15s. per cent?

10s. = $\frac{1}{200}$ £2180 0 0
5s. = $\frac{1}{2}$ 10 18 0
5 9 0
£16 7 0 brokerage.

What is the brokerage on £4845 at 1s. 8d. per cent?

1s. 8d. = £$\frac{1}{12}$ £4845
100) 403 15s.
£4 0 9 brokerage.

What is the brokerage on £35683 6s. 8d. at 2s. 6d. per cent?

2s. 6d. = $\frac{1}{8}$) £35683 6 8
100) 4460 8 4
£44 12 1 brokerage.

What is the brokerage on £922 9s. $1\frac{1}{2}$d. at 3s. 4d. per cent?

£ s. d.
3s. 4d. = $\frac{1}{6}$) 922 9 $1\frac{1}{2}$
100) 153 14 $10\frac{1}{4}$
£1 8 $11\frac{3}{4}$ or £1 9s. nearly.

What is the brokerage on £1286 6s. 6d. at 3s. 6d. per cent?

£ s. d.
2s. 6d. = $\frac{1}{8}$) 1286 6 6
1s. = £ $\frac{1}{20}$ 160 15 $9\frac{3}{4}$
64 6 $3\frac{3}{4}$
100) 225 2 $1\frac{1}{2}$
£2 5 $0\frac{1}{4}$ brokerage.

What is the brokerage on £1862 10s. at 4s. per cent?

4s. = $\frac{1}{5}$) £1862 10 0
100) 372 10 0
£3 14 6 brokerage.

What is the brokerage on £737 10s. 3d. at 6s. 8d. per cent?

£ s. d.
6s. 8d. = $\frac{1}{3}$) 737 10 3
100) 245 16 9
£2 9 2 brokerage.

COMMISSION AND BROKERAGE TABLE.

	s.	d.				
For	2	0	or $\frac{1}{10}$	per cent. take	$\frac{1}{1000}$	of the sum.
	2	6	or $\frac{1}{8}$	per cent. take	$\frac{1}{800}$	of the sum.
	3	4	or $\frac{1}{6}$	per cent. take	$\frac{1}{600}$	of the sum.
	3	9	or $\frac{3}{16}$	per cent. take	$\frac{1}{600}$	and $\frac{1}{8}$ of the same.
	4	0	or $\frac{1}{5}$	per cent. take	$\frac{1}{500}$	of the sum.
	5	0	or $\frac{1}{4}$	per cent. take	$\frac{1}{400}$	of the sum.
	6	8	or $\frac{1}{3}$	per cent. take	$\frac{1}{300}$	of the sum.
	7	6	or $\frac{3}{8}$	per cent. take	$\frac{1}{400}$	and $\frac{1}{2}$ of the same.
	10	0	or $\frac{1}{2}$	per cent. take	$\frac{1}{200}$	of the sum.
	12	6	or $\frac{5}{8}$	per cent. take	$\frac{1}{200}$	and $\frac{1}{4}$ of the same.
	15	0	or $\frac{3}{4}$	per cent. take	$\frac{1}{200}$	and $\frac{1}{2}$ of the same.
	17	6	or $\frac{7}{8}$	per cent. take	$\frac{7}{800}$	from the sum.
£1	0	0	or 1	per cent. take	$\frac{1}{100}$	from the sum.
1	5	0	or $1\frac{1}{4}$	per cent. take	$\frac{1}{80}$	from the sum.
1	10	0	or $1\frac{1}{2}$	per cent. take	$\frac{1}{100}$	and $\frac{1}{2}$ of the same.
1	15	0	or $1\frac{3}{4}$	per cent. take	$\frac{1}{50}$	and $\frac{1}{8}$ of the same.
2	0	0	or 2	per cent. take	$\frac{1}{50}$	of the sum.
2	5	0	or $2\frac{1}{4}$	per cent. take	$\frac{1}{50}$	and $\frac{1}{8}$ of the sum.
2	10	0	or $2\frac{1}{2}$	per cent. take	$\frac{1}{40}$	of the sum.
2	15	0	or $2\frac{3}{4}$	per cent. take	$\frac{1}{40}$	and $\frac{1}{10}$ of the same.
3	0	0	or 3	per cent. take	$\frac{1}{50}$	and $\frac{1}{2}$ of the same.
3	10	0	or $3\frac{1}{2}$	per cent. take	$\frac{1}{40}$	and $\frac{1}{100}$ of the sum.
3	15	0	or $3\frac{3}{4}$	per cent. take	$\frac{1}{40}$	and $\frac{1}{2}$ of the same.
4	0	0	or 4	per cent. take	$\frac{1}{20}$	and $\frac{1}{5}$ of the same.
4	10	0	or $4\frac{1}{2}$	per cent. take	$\frac{1}{20}$	and $\frac{1}{10}$ of the same.
5	0	0	or 5	per cent. take	$\frac{1}{20}$	of the sum.
5	10	0	or $5\frac{1}{2}$	per cent. take	$\frac{1}{20}$	and $\frac{1}{10}$ of the same.
6	0	0	or 6	per cent. take	$\frac{1}{20}$	and $\frac{1}{5}$ of the same.
7	10	0	or $7\frac{1}{2}$	per cent. take	$\frac{1}{20}$	and $\frac{1}{2}$ of the same.
10	0	0	or 10	per cent. take	$\frac{1}{10}$	of the sum.
12	10	0	or $12\frac{1}{2}$	per cent. take	$\frac{1}{8}$	of the sum.

QUESTIONS.

What is Discount?—(*See definition.*)
How do you reckon Discount, when the rate is an aliquot part?
If the Discount is an aliquot part of 100, how do you proceed?
If the Discount is not an aliquot part of 100, how do you proceed?
How do you find the Discount at $\frac{1}{2}$ per cent?

	£	s.	d.			£	s.	d.
What is the Discount on	320	18	6	at 4d. per £?	Answer,	5	6	11½
	98	7	6	at 3d. per £?	"	1	4	7
	5200	15	0	at 10d. per £?...........	"	216	13	11½
	580	6	8	at 6d. per £?	"	14	10	2
	70	10	0	at 2d. on the shilling?	"	11	15	2
	120	5	0	at ¾d. on the shilling?	"	7	10	3¾
	2184	0	0	at 1d. on the shilling?	"	182	0	0
	22	10	0	at ½d. on the shilling?	"	0	18	9
	40	2	6	at ¼d. on the shilling?	"	0	16	8½
	100	0	0	at 5 per cent?...........	"	5	0	0
	628	13	4	at 10 per cent?	"	62	17	4
	3000	0	0	at 20 per cent?	"	600	0	0
	8540	10	0	at 25 per cent?	"	2135	2	6
	585	0	0	at 50 per cent?	"	292	10	0
	200	0	0	at 7½ per cent?	"	15	0	0
	900	0	0	at 15 per cent?	"	135	0	0
	360	0	0	at 17½ per cent?.........	"	63	0	0
	972	16	8	at 35 per cent?	"	340	9	10
	255	10	0	at 45 per cent?	"	114	19	6
	796	0	0	at ½ per cent?............	"	3	19	7⅕
	5350	0	0	at ½ per cent?............	"	26	15	0
	479	0	0	at ¼ per cent?............	"	1	3	11¼⅗
	9999	10	0	at ⅛ per cent?............	"	12	9	11¾⅕

What is Commission?—(*See definition.*)
To whom are Commission and Brokerage at ½, ¼ and ⅛ useful? Why?
How do you find the Commission at ⅛ per cent?
How do you find the Commission at ¼ per cent?
How do you find the Commission at ½ per cent?
How do you find the Commission at ¾ per cent?

	£	s.	d.			£	s.	d.
What is the Commission on	8240	0	0	at ⅛ per cent?	Answer,	10	6	0
	475	0	0	at ⅛ per cent?	"	0	11	10½
	3180	0	0	at ⅛ per cent?	"	3	19	6
	380	0	0	at ¼ per cent?	"	0	19	0
	1450	0	0	at ¼ per cent?	"	2	12	6
	1000	0	0	at ¼ per cent?	"	2	10	0
	5240	0	0	at ½ per cent?	"	26	4	0
	630	10	0	at ½ per cent?	"	3	3	0½
	2400	15	0	at ½ per cent?	"	12	0	0¾
	7960	0	0	at 1 per cent?	"	79	12	0
	80	4	2	at 2½ per cent?	"	2	0	1
	150	10	0	at 2¾ per cent?	"	4	2	9¼
	90	7	6	at 4 per cent?	"	3	12	3½
	120	13	6	at 7½ per cent?	"	9	1	0

What is Brokerage?—(*See definition.*)

What is the Brokerage on

£	s.	d.			£	s.	d.
300	15	6	at $\frac{1}{2}$ per cent?	Answer,	1	10	$0\frac{3}{4}$
980	4	0	at $\frac{1}{4}$ per cent?	"	2	9	0
2000	10	0	at $\frac{1}{4}$ per cent?	"	5	0	0
326	15	0	at $\frac{1}{8}$ per cent?	"	0	8	2
4308	12	0	at 15s. per cent?.........	"	32	6	$3\frac{1}{4}$
754	0	0	at 1s. 8d. per cent?......	"	0	12	$6\frac{3}{4}$
16500	0	0	at 3s. 4d. per cent?......	"	27	10	0
675	0	0	at 3s. 9d. per cent?......	"	1	5	$3\frac{3}{4}$
4680	0	0	at 6s. 8d. per cent?......	"	15	12	0

EXERCISES IN PROFIT AND LOSS, PURCHASE OF PROPERTY, AND AVERAGE CALCULATIONS.

When the gain or loss per cent. is required.

RULE.—Multiply the difference of the prime cost and selling price by 100, and divide the product by the prime cost; or, divide £100 by the proportional part which the selling price falls short of the prime cost.

What is the gain per cent. on any article bought at 4s. 2d. per ℔ and sold at 5s?

```
 s. d.
 5  0
 4  2
 ----
   10
   100
 ------
5/0 ) 100/0
 ------
```

Ans. 20 per cent.

Or, as the selling price (in the foregoing question) exceeds the prime cost $\frac{1}{5}$, divide 100 by $\frac{1}{5}$ and the quotient will be the rate per cent?

$$\frac{1}{5}\ )\ \underset{}{\overset{£}{100}}$$

Ans. 20 per cent.

When a selling price is required, according to a given gain or loss per cent.

RULE.—Add or subtract to or from the prime cost a gain or loss (according to the reason of the question,) proportional to the given gain or loss per cent.

At what rate must linen cloth, bought at $17\frac{1}{2}$d. per yard, be resold to gain 20 per cent?

20 of 100 is the $\frac{1}{5}$) $17\frac{1}{2}$
$3\frac{1}{2}$

Ans. 21 pence per yard.

What is the profit on 1 cwt. of sugar bought for £2 10s. 3d. and sold at $6\frac{1}{2}$d per ℔?

6d. of 1s. is the $\frac{1}{2}$) 112 lbs. at $6\frac{1}{2}$d.

$\frac{1}{2}$d. of 6d. is the $\frac{1}{12}$) 56
4 8

3 0 8 selling price.
2 10 3 cost price.

Ans. £0 10 5 gain.

What is gained per cent. on silk bought at 6s. 8d. per yard and sold at 7s. 6d?

s.	d.
7	6
6	8
	10

3 × 6s. 8d. = £1

2 6 = $\frac{1}{8}$ £100

Ans. £12 10 or $12\frac{1}{2}$ per cent?

NOTE.—In estimating a profit, as a rate per cent., the theory of the school, and the practice of traders, are at variance. Suppose we buy at four and sell at five, the Arithmetician reckons this as a gain of one on four, or 25 per cent.; while the Trader, counting on the selling price, makes it a gain only of one on five, or 20 per cent. The two following examples afford a general rule for working the latter plan.

An article which costs $15\frac{1}{4}$d. per lb is sold at $17\frac{1}{2}$d. per lb, what is the gain per cent. estimated on the selling price?

From $17\frac{1}{2}$d. = 70 farthings.
Take $15\frac{1}{4}$d. = 61 do.
Then as 70 is to 9 so is 100
9

70) 900 (13 per cent. nearly.

What should the above be rated at to obtain a profit of $7\frac{1}{2}$ per cent?

From 100
Take $7\frac{1}{2}$

As $92\frac{1}{2}$ is to 100

Or, as 185 is to 200
So is 61 farthings
200

185) 12200

Ans. 66 farth. nearly.

At what rate per cwt. must damaged sugar, bought at £2 15s. per cwt., be sold to sustain a loss of $2\frac{1}{2}$ per cent?

	£	s.	d.
$2\frac{1}{2}$ of 100 is $\frac{1}{40}$)	2	15	0
		1	$4\frac{1}{2}$
Ans.	£2	13	$7\frac{1}{2}$ per cwt.

At what rate per yard must damaged cloth, bought at 13s. 4d. per yard, be sold to sustain a loss of $12\frac{1}{2}$ per cent?

	s.	d.
$12\frac{1}{2}$ of 100 is $\frac{1}{8}$)	13	4
	1	8
Ans.	11	8 per yard.

TABLE *for calculating, by inspection, the profits and losses per cent.*

For ℔ cent.	s.	d.	in the £, take
For $2\frac{1}{2}$ ℔ cent., or	0	6	in the £, take $\frac{1}{40}$ of the prime cost.
$3\frac{3}{4}$	0	9	$\frac{1}{40}$ and $\frac{1}{2}$ of the same.
5	1	0	$\frac{1}{20}$ of the prime cost.
$6\frac{1}{4}$	1	3	$\frac{1}{20}$ and $\frac{1}{4}$ of the same.
$7\frac{1}{2}$	1	6	$\frac{1}{20}$ and $\frac{1}{2}$ of the same.
10	2	0	$\frac{1}{10}$ of the prime cost.
$12\frac{1}{2}$	2	6	$\frac{1}{8}$ of the prime cost.
15	3	0	$\frac{1}{10}$ and $\frac{1}{2}$ of the same.
20	4	0	$\frac{1}{5}$ of the prime cost.
25	5	0	$\frac{1}{4}$ of the prime cost.
30	6	0	$\frac{1}{5}$ and $\frac{1}{2}$ of the same.
50	10	0	$\frac{1}{2}$ of the prime cost.

NOTE.—To gain a profit of $2\frac{1}{2}$ per cent. add $\frac{1}{40}$ part of the prime cost to itself.—To sustain a loss of $2\frac{1}{2}$ per cent. deduct $\frac{1}{40}$ of the prime cost from itself.

QUESTIONS.

What is the gain per cent on goods purchased at 2s. 6d. per yard and sold at 3s. 6d.?—Answer, £40 per cent.

What is the gain per cent on goods bought at $10\frac{1}{2}$d. per lb. and sold at 1s.?—Answer, £14 5s. $8\frac{1}{2}$d. per cent.

What is the gain per cent on goods bought at 5s. per yard and sold at 6s. 2d.?—Answer, £23 6s. 8d. per cent.

What is the loss per cent on goods bought at 1s. $3\frac{1}{2}$d. per yard and sold at 1s.?—Answer, £22 11s. $7\frac{1}{4}$d. per cent.

At 2d. profit on the shilling, how much do I gain per cent?—Answer, £16 13s. 4d. per cent.

At what rate must Irish linen, bought at 2s. 6d. per yard, be sold to gain 10 per cent?—Answer, 2s. 9d. per yard.

At what rate must damaged silk, bought at 4s. 2d. per yard, be sold to sustain a loss of 5 per cent?—Answer, 3s. $11\frac{1}{2}$d. per yard.

What is the loss on 1 cwt. 2 qrs. of sugar, bought for £2 5s. 2d. per cwt. and sold at $4\frac{1}{2}$d. per lb.?—Answer, 4s. 9d.

At what rate per yard must cloth, bought at 9s. 6d. per yard, be sold to gain 15s. per cent?—Answer, 10s. 11d. per yard.

PURCHASE OF PROPERTY.

Rule.—In order to ascertain the rate per cent. obtained from the purchase of property of certain yearly value, divide the annual rental by the number of years purchase, and the result will be the per centage at which your money is expended.

Suppose the rental of an estate to be £150 per annum, and I give 12 years purchase for the property, what per centage do I obtain for my money?

£
12) 150

Ans. £12 10 or $12\frac{1}{2}$ per cent.

If property, which is let at £200 per annum, were sold for 18 years purchase, what rate per cent. would it realize?

£
18) 200

Ans. £11 2 $2\frac{1}{2}$ per cent.

An estate, worth £157 5s. per annum, was lately sold at 15 years purchase, what per centage does it return the purchaser?

£ s.
15) 157 5

Ans. £10 9 8 per cent.

When an estate of the annual rental of £177 6s. 8d. sells for 20 years purchase, what per centage does it yield?

£ s. d.
20) 177 6 8

Ans. £8 17 3 per cent.

If, for property of the value of £312 10s. per annum, 25 years purchase be required, what per centage would it give?

£ s.
25) 312 10

Ans. £12 10 or $12\frac{1}{2}$ per cent.

A person wishing to dispose of an estate, which he lets at £64 10s. per annum, offers it for nine years purchase, what per centage would that return?

£ s. d.
9) 64 10 0

Ans. 7 3 4 or $7\frac{1}{6}$ per cent.

Rule.—For any desired per centage on the purchase.

In order to ascertain what sum must be given for property, in order to obtain any desired per centage on the purchase, divide the annual rental by the per centage; the quotient will be the number of years purchase, which number of years purchase, multiplied by 100, gives the whole purchase money.

If the annual rental of an estate be £250, what number of years purchase, and what purchase money, must be given for it to yield 5 per cent?

£
5) 250

50 years purchase.
100

Ans. £5000 purchase money.

If the annual rental of an estate be £186, what number of years purchase, and what purchase money must be given for it to yield 6 per cent?

£
6) 186

31 years purchase.
100

Ans. £3100 purchase money.

The annual rental of an estate being £90, what number of years purchase, and what purchase money, must be given for it to yield 3 per cent?

£
3) 90

30 years purchase.
100

Ans. £3000 purchase money.

The annual rental of an estate being £324, what number of years purchase, and what purchase money must be given for it to yield $4\frac{1}{2}$ per cent?

9) £648

72 years purchase.
100

Ans. £7200 purchase money.

☞ Here both the rental and the per centage are doubled in order to avoid the fractions.

What principal, at 5 per cent. per annum, will produce a yearly income of £160?

```
      £160
       100
     -----
5 ) 16000
     -----
     £3200 Ans.
```

What principal, at $7\frac{1}{2}$ per cent. per annum, will produce a yearly income of £294?

```
        £
 15 ) 588
     -----
      39   4
          100
     ---------
    £3920  0 Ans.
```

AVERAGE CALCULATIONS.

Bought a quantity of gloves of the following description and wish to know the average price per pair, and the total amount of the said purchase?

	s.	d.	
12 pairs at	3	2	per pair
12	1	7	"
12	1	$9\frac{1}{2}$	"
12	2	$5\frac{3}{4}$	"
12	6	$2\frac{1}{4}$	"
12	4	9	"
12	5	$1\frac{1}{2}$	"
12	2	$10\frac{1}{4}$	"
12	3	$6\frac{3}{4}$	"
Pairs 108 lots 9)	31	6	
	3	6	average price.

108 pairs at 1s. each, is £5 8

$3\frac{1}{2}$

£18 18 total.

Sold 24 boxes of raisins, averaging 96 lbs. each, at the following prices, and wish to know the average price of each ℔, and the total amount?

	s.	d.	
2 boxes at	0	6	per ℔.
2	0	$7\frac{1}{4}$	"
2	0	$8\frac{1}{2}$	"
2	0	9	"
2	0	$9\frac{3}{4}$	"
2	0	$10\frac{1}{2}$	"
2	0	$11\frac{1}{4}$	"
2	1	$0\frac{1}{2}$	"
2	1	1	"
2	1	$2\frac{1}{4}$	"
2	1	4	"
2	1	5	"
24 lots 12)	11	3	
		$11\frac{1}{4}$	average per ℔.

24 boxes £9 12 0

8s. price of 1 box at 1d. per lb. $11\frac{1}{4}$ average price.

192s. = £9 12s. £108 0 0 total amount.

Having purchased several lots of books at the following prices, I wish to know the average price of each book, and the total amount of the said purchase?

	s.	d.		s.	d.
8 books at	3	$2\frac{1}{2}$	each,	25	8
10	2	8	......	26	8
7	4	$6\frac{1}{2}$	......	31	$9\frac{1}{2}$
9	1	9	......	15	9
12	7	$1\frac{1}{4}$	......	85	3
6	5	$0\frac{3}{4}$	......	30	$4\frac{1}{2}$
5	6	2	......	30	10
18	2	2	......	39	0
4	6	$3\frac{3}{4}$	......	25	3
7	3	0	......	21	0
5	4	$0\frac{1}{4}$	......	20	$1\frac{1}{4}$
3	8	$1\frac{1}{4}$	......	24	$3\frac{3}{4}$

94 books. 94) 376 or £8 16s. total.

4s. average price.

I bought 7 puncheons of brandy on the following terms, and wish to know what quantity they contain: what is the cost price per gallon, and what is the total amount of the purchase money?

No. 1	contains	109	gallons.
2	....	120	"
3	....	95	"
4	....	112	"
5	....	122	"
6	....	98	"
7	....	116	"

Gallons, 772 at 1s. = £38 12

12

Total, £463 4

	s.	d.	
First cost,	3	6	per gallon.
Freightage,	0	6	
Duty, ...	8	0	

12s. cost price per gallon.

THE READY RECKONER'S INDEX TO MENTAL CALCULATION,

Which shows the value of the dozen, gross, and score, at so much each.

D.	F.		£	S.	D.		£	S.	D.		£	S.	D.	
0	$\frac{1}{4}$	each is	0	0	3	per dozen,	0	3	0	per gross,	0	0	5	per score.
0	$\frac{1}{2}$	each is	0	0	6	per dozen,	0	6	0	per gross,	0	0	10	per score.
0	$\frac{3}{4}$	each is	0	0	9	per dozen,	0	9	0	per gross,	0	1	3	per score.
1	0	each is	0	1	0	per dozen,	0	12	0	per gross,	0	1	8	per score.
1	$\frac{1}{4}$	each is	0	1	3	per dozen,	0	15	0	per gross,	0	2	1	per score.
1	$\frac{1}{2}$	each is	0	1	6	per dozen,	0	18	0	per gross,	0	2	6	per score.
1	$\frac{3}{4}$	each is	0	1	9	per dozen,	1	1	0	per gross,	0	2	11	per score.
2	0	each is	0	2	0	per dozen,	1	4	0	per gross,	0	3	4	per score.
2	$\frac{1}{4}$	each is	0	2	3	per dozen,	1	7	0	per gross,	0	3	9	per score.
2	$\frac{1}{2}$	each is	0	2	6	per dozen,	1	10	0	per gross,	0	4	2	per score.
2	$\frac{3}{4}$	each is	0	2	9	per dozen,	1	13	0	per gross,	0	4	7	per score.
3	0	each is	0	3	0	per dozen,	1	16	0	per gross,	0	5	0	per score.
3	$\frac{1}{4}$	each is	0	3	3	per dozen,	1	19	0	per gross,	0	5	5	per score.
3	$\frac{1}{2}$	each is	0	3	6	per dozen,	2	2	0	per gross,	0	5	10	per score.
3	$\frac{3}{4}$	each is	0	3	9	per dozen,	2	5	0	per gross,	0	6	3	per score.
4	0	each is	0	4	0	per dozen,	2	8	0	per gross,	0	6	8	per score.
4	$\frac{1}{4}$	each is	0	4	3	per dozen,	2	11	0	per gross,	0	7	1	per score.
4	$\frac{1}{2}$	each is	0	4	6	per dozen,	2	14	0	per gross,	0	7	6	per score.
4	$\frac{3}{4}$	each is	0	4	9	per dozen,	2	17	0	per gross,	0	7	11	per score.
5	0	each is	0	5	0	per dozen,	3	0	0	per gross,	0	8	4	per score.
5	$\frac{1}{4}$	each is	0	5	3	per dozen,	3	3	0	per gross,	0	8	9	per score.
5	$\frac{1}{2}$	each is	0	5	6	per dozen,	3	6	0	per gross,	0	9	2	per score.
5	$\frac{3}{4}$	each is	0	5	9	per dozen,	3	9	0	per gross,	0	9	7	per score.
6	0	each is	0	6	0	per dozen,	3	12	0	per gross,	0	10	0	per score.
6	$\frac{1}{4}$	each is	0	6	3	per dozen,	3	15	0	per gross,	0	10	5	per score.
6	$\frac{1}{2}$	each is	0	6	6	per dozen,	3	18	0	per gross,	0	10	10	per score.
6	$\frac{3}{4}$	each is	0	6	9	per dozen,	4	1	0	per gross,	0	11	3	per score.
7	0	each is	0	7	0	per dozen,	4	4	0	per gross,	0	11	8	per score.
7	$\frac{1}{4}$	each is	0	7	3	per dozen,	4	7	0	per gross,	0	12	1	per score.
7	$\frac{1}{2}$	each is	0	7	6	per dozen,	4	10	0	per gross,	0	12	6	per score.
7	$\frac{3}{4}$	each is	0	7	9	per dozen,	4	13	0	per gross,	0	12	11	per score.
8	0	each is	0	8	0	per dozen,	4	16	0	per gross,	0	13	4	per score.
8	$\frac{1}{4}$	each is	0	8	3	per dozen,	4	19	0	per gross,	0	13	9	per score.
8	$\frac{1}{2}$	each is	0	8	6	per dozen,	5	2	0	per gross,	0	14	2	per score.
8	$\frac{3}{4}$	each is	0	8	9	per dozen,	5	5	0	per gross,	0	14	7	per score.
9	0	each is	0	9	0	per dozen,	5	8	0	per gross,	0	15	0	per score.
9	$\frac{1}{4}$	each is	0	9	3	per dozen,	5	11	0	per gross,	0	15	5	per score.
9	$\frac{1}{2}$	each is	0	9	6	per dozen,	5	14	0	per gross,	0	15	10	per score.
9	$\frac{3}{4}$	each is	0	9	9	per dozen,	5	17	0	per gross,	0	16	3	per score.
10	0	each is	0	10	0	per dozen,	6	0	0	per gross,	0	16	8	per score.
10	$\frac{1}{4}$	each is	0	10	3	per dozen,	6	3	0	per gross,	0	17	1	per score.
10	$\frac{1}{2}$	each is	0	10	6	per dozen,	6	6	0	per gross,	0	17	6	per score.
10	$\frac{3}{4}$	each is	0	10	9	per dozen,	6	9	0	per gross,	0	17	11	per score.
11	0	each is	0	11	0	per dozen,	6	12	0	per gross,	0	18	4	per score.
11	$\frac{1}{4}$	each is	0	11	3	per dozen,	6	15	0	per gross,	0	18	9	per score.
11	$\frac{1}{2}$	each is	0	11	6	per dozen,	6	18	0	per gross,	0	19	2	per score.
11	$\frac{3}{4}$	each is	0	11	9	per dozen,	7	1	0	per gross,	0	19	7	per score.
12	0	each is	0	12	0	per dozen,	7	4	0	per gross,	1	0	0	per score.

EASY METHODS OF RECKONING

By the Dozen, Gross, Score, &c.

PARTICULALY ADAPTED TO THE TRANSACTIONS OF THE RETAIL MERCHANT.

RULE FOR THE DOZEN AND GROSS.—The number of pence that one article is worth is the number of shillings that a dozen is worth. And the number of pence that a dozen is worth is the number of shillings that a gross is worth.

EXAMPLE.

At 4s. per bottle, what is the value of 1 dozen of sherry?

Here 4s. or 48d. taken as 48s. gives £2 8s. per dozen, Answer.

Again, £2 8s., or 576d., taken as 576s., gives £28 16s. per gross, Answer.

ANOTHER METHOD whereby the price of one being given, the value of a gross may be found, as follows :—Multiply the farthings in the price by 3, and call the product shillings.

EXAMPLE.

If 1 article cost 6¼d., what will 144 (a gross) cost?

In 6¼d. are 25 farthings, which, multiplied by 3, and called shillings, gives £3 15s. per gross, Answer.

ON THE CONTRARY, the cost of a gross being given ,you may find the price of one by dividing the cost in shillings by 3, and calling the product farthings.

EXAMPLE.

If a gross (144 articles) cost 75s., what is the price of one article?

Here 75 divided by 3, leaves 25, which, called farthings, gives 5¼d., Answer.

RULE FOR THE SCORE.—In reckoning by the score, let it be observed that the number of shillings which one article is worth is the number of pounds which a score of articles are worth; and that in calculating the value of large quantities by considering either the scores or dozens they contain, the easiest method will be to find the number of dozens or scores in the given quantity of articles, and then the price of one dozen or of one score, multiplied by that number, will give the amount.

EXAMPLE I.

At 25s. each, what will 180 articles cost?

As 1 score cost £25, that multiplied by 9 (the number of scores) gives £225, Answer.

EXAMPLE II.

At 10½d. each, what will 120 articles cost?

Observe that 1 dozen cost 10s. 6d., which, multiplied by 10, (the number of dozens) gives £5 5s., Answer.

NOTE.—When the question includes more than an exact number of dozens, calculate the value of the dozens, and add the amount of the extra ones. Thus, for example, 90 pairs of gloves at 2s. 3d. per pair:

	£	s.	d.
7 dozens at 25s. comes to	£8	15	0
6 extra at 2s. 3d.	0	13	6
	£9	8	6

RULES for enabling any person having a stated price per lb. to ascertain the value of any beast weighing a certain number of scores per quarter.

If at 3d. per lb., the number of scores in one quarter of the beast will be the number of pounds in money which the four quarters will come to.

If at 4d. per lb., the whole weight of the beast in scores, divided by 3, will give the price in pounds.

If at 6d. per lb., multiply the scores in 1 quarter of the beast by 2, and the product will give the price of the whole in pounds.

If at 8d. per lb., two-thirds of the whole weight of the beast in scores will give the price thereof in pounds.

If at 9d. per lb., multiply the scores in one quarter of the beast by 3, and the product will give the price of the whole in pounds.

RULE.—In order to find what any expenditure per day will amount to in a year, call the pence spent in one day pounds, multiply by 3, and divide by 2; to this add 5 times the daily expense, and the amount will be the expenditure for the year.

EXAMPLE.

What will 2s. 8½d. per day amount to in a year?

The 2s. 8½d., or 32½d., is called £32 10s. which, multiplied by 3, gives £97 10s.; this divided by 2, leaves £48 15s., to which add 5 times 2s. 8½d., or 13s 6½d., to make up the Answer, £49 8s. 6½d.

AGAIN.—If the expense per year be given, to find the expense per day, multiply the pounds by 2, adding 1 if the shillings are near 10; divide by 3, and call the product pence; from this sum deduct 1d. for every 6s. contained therein.

EXAMPLE.

If I spend £200 per annum, what is that per day?

Here £200 × 2 = 400; then 400 ÷ 3 and called pence = 133d., or 11s. 1d. from this; deduct 1½d., and the remainder, 10s. 11½d. will be the Answer.

ANOTHER METHOD.—Take the 365 days as pence, which will be £1 10 5, and multiply that sum by the number of pence given. Should the money spent include farthings, add 7s. 7¼d. for each farthing over in the year of 365 days. Should the expenditure per day be shillings, multiply £18 5s. (or 1s. per day for the year) by the given number of shillings.

EXAMPLE.

What will 10d. per day amount to in a year?

Here £1 10s. 5d. at 1d. per day, multiplied by 10 = £15 4 2, Answer.

AGAIN.—When the expenditure per month (30 days) is given, to find the expenditure per day call the pounds pence, and multiply by 8.

EXAMPLE.

If I spend £15 10s. per month, how much is that per day?

Here £15·10s. is called 1s. 3½d., which, multiplied by 8, gives 10s. 4d., the Answer.

RULE.—When by the price of an ounce you have to find the value of a lb., take the price in farthings, call them shillings, and divide by 3.

EXAMPLE.

At $7\frac{1}{2}$d. per ounce, what is the value of a lb.?

In $7\frac{1}{2}$d. are 30 farthings, call them 30s., ÷ 3, and 10s. per lb. is the Answer.

On the contrary, when by the price of a lb. you have to find the value of an ounce, take the shillings as farthings, and multiply by 3.

EXAMPLE.

At 10s. per lb., what is the price of an ounce?

Here 10s. as farthings, multiplied by 3, gives 30 farthings, or $7\frac{1}{2}$d. per ounce, Answer.

Rule.—When the price of one article is given, to find the value of 100 you must multiply the price by 5, and call the shillings pounds; and should there be any pence in the amount, when multiplied, add the same aliquot part of a pound as the pence are of a shilling.

EXAMPLE.

At 7s. 3d. each, what will 100 articles cost?

Here 7s. 3d., multiplied by 5, are called £36 and 3 over, for which add 5s.; total, £36 5s.

Another method.—For every farthing take as many pence, and twice as many shillings.

EXAMPLE.

At $7\frac{1}{2}$d. each, what will 100 articles cost?

Here $7\frac{1}{2}$d., or 30 farthings, as pence are 2s. 6d., and double the farthings as shillings are £3; total, £3 2 6d., Answer.

Rule.—When the cost of a cwt. is given, to find the price of a lb. consider first how many shillings make up the given price, multiply them by 3, and divide the product by 7, and the result will be the price per lb. in farthings.

EXAMPLE.

At 68s. per cwt., what is the price of a lb.?

Here 68s. multiplied by 3 gives 204s., which, divided by 7, leaves $29\frac{1}{7}$ as farthings, or $7\frac{1}{4}$d and $\frac{1}{7}$. Answer.

On the contrary, when the price of a lb. is given, to find the cost of a hundred weight, consider first how many farthings there are in the given price, double the number, and call the result shillings, to which add as many four-pences as the original number of farthings, and the amount will be the answer required.

EXAMPLE.

At $5\frac{1}{4}$d. per lb., what is the value of 1 cwt.?

The $5\frac{1}{4}$d., or 21 farthings, doubled as 42s., then, 21 groats, or 7s., added, gives £2 9s., Ans.

Another method.—Multiply 9s. 4d., which is the price of 1 cwt. at 1d. per lb., by the number of pence in the price of the article.

Note.—Should the price include farthings, add 2s. 4d. for one farthing, 4s. 8d. for two, and 7s. for three farthings

EXAMPLE.

At $5\frac{1}{4}$d. per lb., what is the value of 1 cwt.?

Here 1d. per lb., or 9s. 4d. multiplied by 5 gives £2 6 8, and add 2s. 4d. (for 112 farthings per lb.) total £2 9s. per cwt.

RULE.—For finding the value of several cwts. and qrs. at any given price per lb., multiply 9s. 4d. (the price of 1 cwt. at 1d. per lb.) by the given price, and then multiply that product by the number of cwts. and qrs.

EXAMPLE.

At $5\frac{1}{4}$d. per lb., what is the value of 10 cwts. 2 qrs.?

Here 112d., or 9s. 4d., multiplied by the price, $5\frac{1}{4}$d., gives £2 9s., which, multiplied by the quantity, $10\frac{1}{2}$ cwts., gives £25 14 6, Answer.

NOTE.—If besides cwts. and qrs. there should be lbs. in the question, the addition of as many pence will be requisite.

RULE.—When the price of a lb. is given to find the value of a ton, every three farthings in the given price must be reckoned as £7 per ton. Every odd farthing over any number of three will of course give £2 6 8 more to be added.

EXAMPLE.

If a lb. of cheese cost $8\frac{1}{2}$d., what is the value of a ton?

In $8\frac{1}{2}$d. are 34 farthings, divided by 3 you have 11 and 1 over. Now, 11 multiplied by 7 = £77, to which add £2 6 8 for the odd farthing over. Total, £79 6 8.

By having the price of a lb. you may find the value of a cwt. in the following manner. Consider the pence in the price of a lb. as farthings, and for every three farthings in the price reckon 7s., and for every odd farthing 2s. 4d. These added gives the price of a cwt.

EXAMPLE.

At $7\frac{1}{4}$d. per lb., how much per cwt.?

Here $7\frac{1}{4}$d. are 29 farthings, which divided by 3 gives 9 and 2 farthings over, then 9 multiplied by 7 gives 63s. to which add 4s. 8d. for the two farthings which makes £3 7 8, the Answer.

FINIS.