Lowbrook Academy

We aim for all Lowbrook Children to be able to:

- ***Develop mathematical fluency***
- ***Reason mathematically***
- ***Problem solve***
- ***Make connections across mathematical ideas***
- ***Apply knowledge in other subject areas***

MATHS INFORMATION BOOKLET

YEAR 5

YEAR 5 STRATEGIES

Here are the strategies that you can use to help develop your child's addition, subtraction, multiplication and division skills.

MENTAL MATHS STRATEGIES

Together with 1-12 x multiplication and division facts and their basic addition facts, children in year 5 should be able to use the following strategies:

Addition and Subtraction of multiples of 10, 100 0r 1000 and adjust
Add 9, 19, 29 or 11, 21, 31… By adding 10, 20, 30… then adjusting by 1.

458 + 71 = 529
Is the same as the sum of 458 + 70 and then add 1

583 – 71 = 512
Is the same as 583 -70 then take away 1

Double numbers by partitioning
Double 62 = 124
(double 60 = 120 double 2 = 4)
(60 + 4 = 124)

Quadruple (x4) numbers
By doubling numbers twice

Half of any number up to 100, partition into place value and halve

Half of 22 = 20 + 2 = 10 + 1 =11
Half of 51 = 50 + 1 = 25 + 0.5 = 25.5

Multiplying and dividing any number by 10 and a 100

When multiplying by 10 move the digits 1 place to the left and use zero as a placeholder.
24 x 10 = 240
When multiplying by 100 move the digits 2 places to the left and use zeros as placeholders.
24 x 100 = 2400
When dividing by 100 move the digits 2 places to the right and use zeros as placeholders
45 ÷ 100 = 0.45
When multiplying a decimal number by 10 keep the decimal point where it is and move the digits one place to the left
3.4 x 10 = 34

Multiplication of multiples of 10 and 100 based on known facts

40 x 40 = 4 x 4 = 16 so 40 x 40 = 1600

Squares of all numbers up to 20

5 x 5 = 25, 12 x 12 = 144, 19 x 19 = 361

Cube numbers of 2, 3, 4, 5, and 10

3 x 3 x 3 = 27, 10 x 10 x 10 = 1000

Recall Prime Numbers up to 19, establish whether a number up to 100 is prime.

ADDITION

Add several numbers of increasing complexity (4 digits)

Longer lists of numbers could be separated into 2 or more calculations, with the subtotals added to give a final total.
e.g.

$$\begin{array}{r} 81059 \\ 3668 \\ 15301 \\ +\ 20551 \\ \hline 120579 \\ \hline {\scriptstyle 1\ 1\ 1\ 1} \end{array}$$

Adding several numbers with different numbers of decimal places (including money and measures):
• Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.
• Empty decimal places should be filled with zero to show the place value in each column.
e.g.

$$\begin{array}{r} 23.361 \\ 09.800 \\ 59.770 \\ 09.800 \\ 01.300 \\ \hline 104.031 \\ \hline {\scriptstyle 3\ 3\ 1} \end{array}$$

Problem Solving
Pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, plus, addition, column, tens boundary, hundreds boundary, , vertical, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

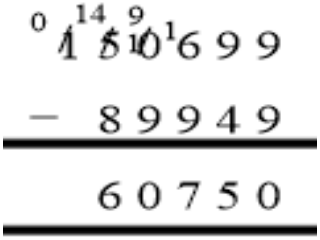
Key skills for addition at Year 5:
• Add numbers mentally with increasingly large numbers, using and practicing a range of mental strategies e.g. add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds.
• Use rounding to check answers and accuracy.
• Solve multi-step problems in contexts, deciding which operations and methods to use and why.
• Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
• Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
• Add numbers with more than 4 digits using formal written method of column addition.

SUBTRACTION

Subtracting with increasingly large and more complex numbers and decimal values.

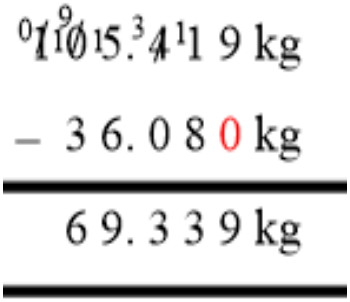
Using the compact column method to subtract more complex integers

e.g. 150669 – 89949 =



Using the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

e.g. 105.419 – 36.08 =



Missing number/digit problems:

Make use of inverse operations.
e.g.
? - 8 = 24 so 24 + 8 = 32
343 - ? = 152 so 342 - 152 = 191

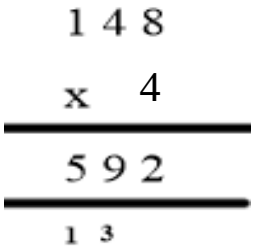
Pupils should be able to apply their knowledge of a range of mental strategies, mental recall skills, and informal and formal written methods when selecting the most appropriate method to work out subtraction problems.

Key vocabulary: equal to, take, take away, less, how many more, how many / less than, back, how many left, how much less is, difference, count on, tens, ones, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Year 5:
• Subtract numbers mentally with increasingly large numbers.
• Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy.
• Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
• Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
• Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
• Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0.
• Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

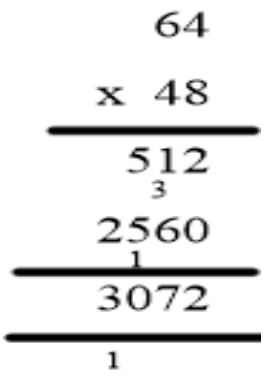
MULTIPLICATION

Short Multiplication
In the ones column, 4 x 8 = 32. Write the 2 in the ones column and 'carry' the 3 into the tens.
In the tens column, 4 x 4 = 16 plus 3 tens carried in makes 19.
Write 9 in the tens column and 'carry' 1 into the hundreds column.
In the hundreds column, 4 x 1 = 4 plus the 1 hundred carried from the tens column makes 5.
e.g.



Long Multiplication

64 x 8 on the first row
In the ones column, 8 x 4 = 32: write down the 2 and carry the 3.
In the tens column, 8 x 6 = 48 plus the 3 carried in makes 51.
64 x 40 on the second row
Multiply the answer by 10 first by putting a zero in the ones column which moves all the digits one place to the left.
In the tens column, 4 x 4 = 16; write down the 6 and carry the 1.
In the hundreds column, 4 x 6 = 24 plus the 1 carried in makes 25.
e.g.

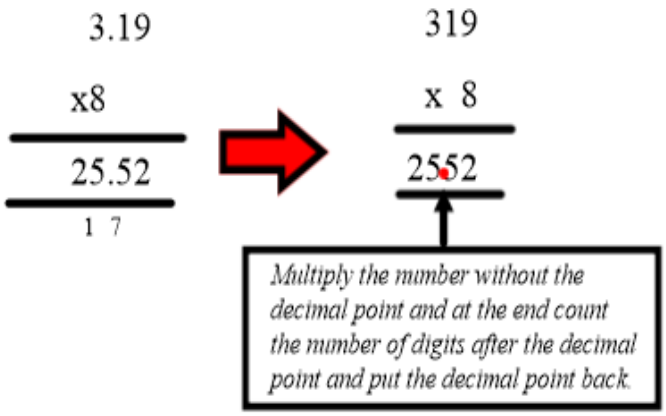


Missing number problems: Continue using a range of equations with appropriate numbers
e.g. 4 x ? = 320 so 320 ÷ 4 = 80

Multiplying with decimal numbers

Remind children:
• Line up the decimal points in the question and the answer.
• The single digit belongs in the ones column.

e.g. 3.19 x 8



Children should be able to:
- Use rounding and place value to approximate and check answers.
- Use short multiplication to multiply numbers with more than 4 digits, iIncluding numbers with up to 2 decimal places by a single digit.
- Use long multiplication to multiply numbers with at least 4 digits by 2 digits.

Key vocabulary: group of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times…, partition, total, multiple, product, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'.

Key skills for multiplication at Year 5:
- Identify multiples and factors, using knowledge of multiplication tables to 12x12.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

DIVISION

Divide at least 4 digit numbers by both single digit and 2 digit numbers

Short division, for dividing by a single digit

Short division with remainders:

Children should continue to use this method, but with numbers up to at least 4 digits. They should understand how to express remainders as fractions, decimals, whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where pupils have to consider the most appropriate way to express the remainder.

$$4\overline{)749} = 187 \text{ r } 1 \qquad 4\overline{)749} = 187\tfrac{1}{4} \qquad 4\overline{)749.00} = 187.25$$

Calculating a decimal remainder

In the above example, rather than expressing the remainder as r1, a decimal point is added after the units because there is still a remainder, and the one remainder is carried on to zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved.

Key Vocabulary: share, share equally, one each, two each, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisor, dividend, divisible by, factor, inverse, quotient, prime number, prime factors, composite number (non-prime)

Key number skills needed for division at Year 5:

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Year 4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding: e.g. 98 ÷ 4 = 24 r 2 = 24 ½ = 24.5.
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple ratios.

FRACTIONS, DECIMALS AND PERCENTAGES

Finding a fraction of an amount

To find a fraction of an amount divide the number by the denominator and then multiply the answer by the numerator.
e.g.

$\frac{3}{8}$ of 24 = 9
24 ÷ 8 = 3
3 x 3 = 9

Changing an improper fraction to a mixed fraction

An improper fraction is a top-heavy fraction.
e.g. $\frac{15}{7}$

If a fraction is top heavy it means it is more than one whole. If the numerator is the same as the denominator then the fraction is whole.

$$\frac{15}{7} = \frac{7}{7} + \frac{7}{7} + \frac{1}{7} = 2\frac{1}{7}$$

To change this into a mixed fraction divide the numerator by the denominator and turn the remainder into a fraction. e.g. 15 ÷ 7 = 2 r1 = $2\frac{1}{7}$

Changing a mixed fraction to an improper fraction

A mixed fraction contains some whole numbers and fractions.
e.g.

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

To change this into an improper fraction multiply the denominator by the whole number and add the answer to the numerator.

$$1\frac{2}{5} = 1 \text{ x } 5 = 5 + 2 = 7$$

$$1\frac{2}{5} = \frac{7}{5}$$

Finding equivalent fractions

(Hint! Whatever you do to the numerator you must do to the denominator)
Equivalent fractions are fractions that have the same value. They are **equal**.

You can make equivalent fractions by multiplying or dividing **both the numerator and the denominator** by the same amount. You only multiply or divide, **never add or subtract**, to get an equivalent fraction. Remember to only divide when the numerator and denominator would still be whole numbers.
e.g.

$$\underset{}{\overset{(x2)}{\frac{1}{2}}} = \overset{(x2)}{\frac{2}{4}} = \frac{4}{8}$$

OR

$$\underset{}{\overset{(\div 3)}{\frac{18}{36}}} = \overset{(\div 6)}{\frac{6}{12}} = \frac{1}{2}$$

Simplifying fractions

Simplifying fractions means to make the fraction as simple as possible.
There are 2 methods for simplifying fractions.

Method 1:
Divide the numerator and denominator by the greatest common factor. This is the largest number that goes exactly into the numerator and denominator.
e.g.

$$\underset{}{\overset{(\div 8)}{\frac{16}{24}}} = \frac{2}{3}$$

(Remember these fractions are equivalent!)

In this example, the greatest common factor is 8. Divide both the numerator and denominator by 8 to get the fraction in its simplest form.

Method 2:
Divide the numerator and the denominator by a number that will go into both of them exactly and repeat the step until the fraction is in its simplest form. (A good starting point would be your easy times tables - 2, 3, 5, 10)

e.g.

$$\frac{10}{20} \overset{(\div 5)}{=} \frac{2}{4} \overset{(\div 2)}{=} \frac{1}{2}$$

OR

$$\frac{24}{108} \overset{(\div 2)}{=} \frac{12}{54} \overset{(\div 2)}{=} \frac{6}{27} \overset{(\div 3)}{=} \frac{2}{9}$$

Finding a common denominator

When ordering fractions or adding them find a common denominator. Common Denominator means that the denominators in two (or more) fractions are common, or **the same.**
There are two methods for this.

Method 1: Look at a set of fractions

$$\frac{1}{2} \quad \frac{1}{4} \quad \frac{3}{8}$$

Find a common denominator for these fractions.

Look at the highest denominator that (in this example) is 8.
Find out if the other denominators divide into 8 without any remainders.
In this example they do!
Change the other two fractions so that they have 8 as a common denominator.

Remember the rule: Whatever you do to the denominator you <u>must</u> do to the numerator!

$$\frac{1}{2} \overset{(x4)}{=} \frac{4}{8} \qquad \frac{1}{4} \overset{(x2)}{=} \frac{2}{8}$$

The fractions, with the common denominator would be

$$\frac{4}{8} \quad \frac{2}{8} \quad \frac{3}{8}$$

Remember that these fractions still have the same value and are equivalent because both denominator and numerator were timed by the same number, therefore their value does not change.

Method 2: Look at a set of fractions

$\frac{2}{5}$ $\frac{1}{3}$ $\frac{3}{6}$

In this example the biggest denominator is 6. However, the other denominators will not go into 6 without any remainders. So a different method is needed.
This time, still use the biggest denominator which is 6, but count up in 6 x table until a number is found that the other denominators will also go into without remainders.

The number will be 30. Change all of the fractions so that their denominators are 30.

$$\underset{(x6)}{\frac{2}{5}} = \frac{12}{30} \qquad \underset{(x10)}{\frac{1}{3}} = \frac{10}{30} \qquad \underset{(x5)}{\frac{3}{6}} = \frac{15}{30}$$

Answer

$\frac{12}{30}$ $\frac{10}{30}$ $\frac{15}{30}$

Ordering fractions

Once a common denominator is found from a set of fractions, they can be ordered.

e.g.
To place these fractions into ascending order.

$\frac{5}{6}$ $\frac{3}{4}$ $\frac{2}{8}$ $\frac{1}{2}$

Find the common denominator, which is 24. Change the fractions to all have 24 as a denominator.

$$\underset{(x4)}{\frac{5}{6}} = \frac{20}{24} \qquad \underset{(x6)}{\frac{3}{4}} = \frac{18}{24} \qquad \underset{(x3)}{\frac{2}{8}} = \frac{6}{24} \qquad \underset{(x12)}{\frac{1}{2}} = \frac{12}{24}$$

Remember as these fractions are equivalent (the same value) they can now be ordered in ascending order. However, the answer needs to be written with the fractions that were in the original question.

Answer $\frac{2}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{6}$ and **NOT** $\frac{6}{24}$ $\frac{12}{24}$ $\frac{18}{24}$ $\frac{20}{24}$

Adding fractions

Once a common denominator has been found from a set of fractions, they can be added.
e.g.

$$\frac{1}{6} + \frac{3}{4} + \frac{1}{3}$$

The common denominator in this example is 12 and all the fractions will have 12 as a denominator.

$$\underset{(x2)}{\frac{1}{6}} = \frac{2}{12} \qquad \underset{(x3)}{\frac{3}{4}} = \frac{9}{12} \qquad \underset{(x4)}{\frac{1}{3}} = \frac{4}{12}$$

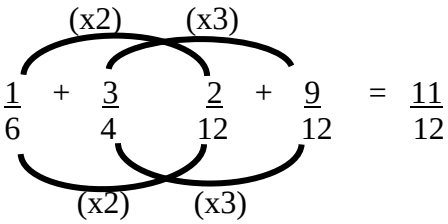
Add the fractions as the denominators are the same.

$$\frac{2}{12} + \frac{9}{12} + \frac{4}{12} = \frac{15}{12} \text{ or } 1\frac{3}{12}$$

So

$$\frac{1}{6} + \frac{3}{4} + \frac{1}{3} = \frac{15}{12} \text{ or } 1\frac{3}{12}$$

The common denominator in this example is 12 therefore, both fractions need to be converted into twelfths before they can be added:



Multiplication of Fractions

Multiply simple pairs of proper fractions, writing answer in simplest form:
e.g.

$$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

Know that when you multiply by a whole number you place it over 1
e.g.

$$3 \times \frac{3}{8} = \frac{3}{1} \times \frac{3}{8} = \frac{9}{8} = 1\frac{1}{8}$$

Conversion

Fractions, decimals and percentages are all closely linked and can be converted (changed) to be each other. So a **fraction** can be converted into a percentage and decimal, a **percentage** can be converted into a fraction or a decimal and a **decimal** can be converted into a percentage or fraction.

Conversion Facts

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{1}{5}$	0.2	20%
$\frac{1}{10}$	0.1	10%

Converting a fraction to a percentage

All percentage is out of 100. Find a number that the denominator can be multiplied by to make 100.

For example $\frac{4}{25}$

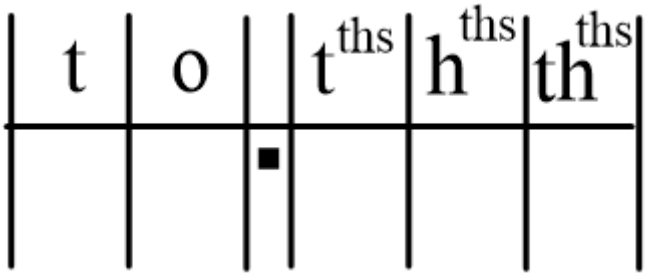
Multiply 25 by 4 to equal 100,
Multiply the numerator by the *same* number (25)

$$\frac{4}{25} \overset{(x4)}{=} \frac{16}{100} = 16\%$$

Converting a fraction to a decimal

To convert a fraction to a decimal use knowledge of place value.

Think of this:



If a denominator is 10, 100, or 1000, knowledge of place value needs to be applied.

e.g.

$\frac{3}{10}$ is 3 10^{th}'s and (from using the place value chart) your child will know that 0.3 is the decimal equivalent.

Similarly, to converting a fraction to a percentage, if the denominator was not 10, 100 or 1000 find a number that can be multiplied by the denominator by to make 100, and multiply the numerator by the **same** number.
e.g.

$$\frac{4}{25} \overset{(x4)}{=} \frac{16}{100} = 0.16$$

Converting a percentage into a decimal

To convert a percentage to a decimal you divide the percentage by 100.

e.g. 68% = 68 ÷ 100 = 0.68

Converting a percentage into a fraction

To convert a percentage into a fraction, put the number over 100 (as it is that amount out of 100) and then simplify the fraction if you can.

E.g. $65\% = \frac{65}{100} \overset{(\div 5)}{=} \frac{13}{20}$ $(\div 5)$

Converting a decimal into a fraction

To convert a decimal again use place value as an aid.

Firstly: look at the decimal.
If the numbers in the decimal goes up to the 10^{th}'s column then the answer is going to be that number over 10.

e.g. $0.8 = \frac{8}{10}$

If the numbers in the decimal goes up to the 100^{th}'s column then the answer is going to be that number over 100.

e.g. $0.85 = \frac{85}{100} \overset{(\div 5)}{=} \frac{17}{20}$ $(\div 5)$

If the numbers in the decimal goes up to the 1000^{th}'s column the answer will be that number over 1000.

e.g. $0.848 = \frac{848}{1000} \overset{(\div 2)}{=} \frac{424}{500} \overset{(\div 2)}{=} \frac{212}{250} \overset{(\div 2)}{=} \frac{106}{125}$ $(\div 2)$ $(\div 2)$

Converting a decimal into a percentage

To convert a decimal into a percentage, multiply the number by 100
Example 1

$0.32 = 0.32 \times 100 = 32 = 32\%$

Example 2

$0.625 = 0.625 \times 100 = 62.5 = 62.5\%$

Find a percentage of an amount

Quick tips to find percentages of amounts.

To find 10% divide the number by 10. This is because 100% is the whole and to find 10% divide the number into 10 parts.

e.g.

Find 10% of 650.
$650 \div 10 = 65$
So, 10% of 650 = 65

To find 1% you divide the number by 100. This is because 100% is the whole and to find just 1% divide the number into 100 parts.
e.g.

Find 1% of 73
73 ÷ 100 = 0.73
So, 1% of 73 = 0.73

Known facts to learn

25% is the same as working out $\frac{1}{4}$ (one quarter)
50% is the same as working out $\frac{1}{2}$ (one half)
75% is the same as working out $\frac{3}{4}$ (three quarters)

Applying these facts a percentage of any amount can be calculated.

To find 5%, find 10% and then halve it
To find 20% find 10% and double it
To find 30% find 10% and multiply it by 3
To find 40% find 10% and multiply it by 4
To find 60% find 50% and 10% and add the answers together
To find 3% find 1% and multiply it by 3
To find 0.5% find 1% and half it.

At Lowbrook we aim to equip the children with a range of techniques and various methods of problem solving to enable them to choose which strategies they prefer to use. Our aim is for all our children to develop resilience and independence and to have confidence in their own abilities.

Magma Maths
Using Magma Maths for homework have made it possible for you to watch all methods of calculations we use in Year 5. It improves mathematical understanding providing interactive learning with instant feedback and allows children to show their thinking on a digital canvas.

Purple Mash
Purple Mash is used daily in school and at home so that children can practice their Times Tables.

Games to help mathematical understanding:

Scrabble	adding multiplying (doubling trebling) good for vocabulary development and spelling.
Yahtzee	adding multiplication and probability.
TT Rockstars	Practicing of X Tables
Chess/draughts	strategy and logical thinking.
Darts	addition and subtraction.
Rummikub	numbers strategy game.
Monopoly	monetary transactions (financial literacy) probability.

Useful Websites.
https://www.topmarks.co.uk/
https://www.bbc.co.uk/bitesize/subjects/z6vg9j6
https://www.theschoolrun.com/
https://www.ttrockstars.com