

Year 6 - Maths

Number - Number and Place Value

Pupils should be taught to:

- read, write, order and compare numbers up to 10,000,000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero

Number - Addition, Subtraction, Multiplication and Division

Pupils should be taught to:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Number - Fractions (including decimals and percentages)

Pupils should be taught to:

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions >1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]
- divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
- associate a fraction with division and calculate decimal fractions equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

Ratio and Proportion

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts

- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving similar shapes where the scale factor is known or can be found
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

Algebra

Pupils should be taught to:

- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables

Measurement

Pupils should be taught to:

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles

- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]

Geometry - Properties of shapes

Pupils should be taught to:

- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circle, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

Geometry - Position and Direction

Pupils should be taught to:

- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes

Statistics

Pupils should be taught to:

- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average

Note: Please see appendices for Year 6 Termly Instant Recall Facts

Year 6 Calculations

Addition

Missing number / digit problems- including decimals and negative numbers.

$$\square - 15 = 6$$

$$21 - \square = -5$$

Mental methods should be confident when working mentally.

Written methods

As Year 5, progressing to larger numbers, including multi-step problems, aiming for both conceptual understanding and procedural fluency with columnar method to be secured.

Continue calculating with decimals, including those with different numbers of decimal places.

Children need to be able to perform written addition accurately and efficiently in preparation for Year 6 calculation SATs paper.

Problem Solving

Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding and develop mastery.

Year 6 Calculations

Subtraction

Missing number / digit problems including algebra - including decimals and negative numbers.

$$10 + \blacksquare = 26 - \blacksquare$$

$$10\,000\,000 = 9\,000\,100 + \blacksquare$$

$$7 - 2 \times 3 = \blacksquare ; (7-2) \times 3 = \blacksquare ; (\blacksquare - 2) \times 3 = 15$$

If $a = 34$ what is the value of $a+a$

If $b = 64$ what could $c =$

$$2b = 2c + b$$

Mental methods should be confident to use mental methods where appropriate.

Written methods

As Year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with decomposition to be secured.

Continue calculating with decimals, including those with different numbers of decimal places.

Children need to be able to perform written subtraction accurately and efficiently in preparation for Year 6 calculation paper.

Year 6 Calculations

Multiplication

Key Instant Recall Facts

In preparation for secure methods of calculation, children will develop instant recall of the following facts during Year 6:

- Recall prime numbers to 50

Missing number problems

$$4 \square \times 7 = 301$$

$$\square 3 \times 6 = 138$$

$$\square 2 \times 5 = 60$$

$$2 \square \times 3 = 72$$

$$6 \times 5 \times 4 = \square$$

$$284 \times 47 = \square$$

$$20.61 \times 10 = \square$$

$$34.9 \times 6 = \square$$

$$319 \times 6 = \square$$

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits and encourage children to explain their thinking behind the calculation.

Mental methods

- Identifying common factors and multiples of given numbers
- Solving practical problems where children need to scale up
- Relate to known number facts

Written methods

Continue to refine and deepen understanding of written methods including fluency for using long multiplication. Children need to be efficient with this method for up to four digits by two digits, including decimals.

$$3.51 \times 4.9 = 17.199$$

$$\begin{array}{r} 351 \\ \times 49 \\ \hline 3159 \\ 14040 \\ \hline 17199 \end{array}$$

Replace decimal point in answer. Estimate first so avoid error when placing it.
ie. $4 \times 5 = 20$, so answer must be 17

Year 6 Calculations

Division

÷ = signs and missing numbers

$$56 \div 8 = \quad 248 \div 5 = \quad 98.4 \div 100 = \quad 2751 \div 21 =$$

Continue using a range of equations but with appropriate numbers and be able to explain the thinking behind their calculation.

Quotients should be expressed as decimals and fractions.

Formal written method ~ short division

We continue by dividing a 4 digit number by a 1 digit number using the **short division** method.

$$1504 \div 8 =$$

$$\begin{array}{r} 0188 \\ 8 \overline{) 1504} \\ \underline{1504} \\ 0 \end{array}$$

$$1994 \div 8 =$$

$$\begin{array}{r} 0249.25 \\ 8 \overline{) 1994.00} \\ \underline{1994.00} \\ 0 \end{array}$$

In calculations with a remainder show how to give the answer as a fraction and a decimal.

$$249 \text{ R } 2 = 249 \frac{2}{8} = 249 \frac{1}{4} = 249.25$$

We then move onto dividing up to 4 digit numbers by 2 digit numbers using the short division method supported by jottings, such as the first few numbers in the multiplication table of the divisor.

$$\begin{array}{r}
 0246 \\
 \hline
 12 \overline{) 2952}
 \end{array}$$

12

24

36

48

60

$$\begin{array}{r}
 0157.6 \\
 \hline
 15 \overline{) 2364.0}
 \end{array}$$

15

30

45

60

75

90

105

120

Write down multiples in a list to help you mentally work out divisions and remainders.