Mathematics Curriculum Policy

Key Stage 1 and 2

2018-2019

Willowbrook
PRIMARY ACADEMY
brighter futures, learning together

The National Curriculum

The national curriculum for mathematics aims to ensure that all children:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions"

In Years 1-6, children follow the Abacus scheme of planning for mathematics.

These lessons are linked to the national curriculum and ensure that children practice and apply the relevant skills for their age. Our approach promotes the spiral curriculum which enables children to build upon previous learning as they progress through the primary phase.

In addition to this, to ensure children gain a deeper understanding in mathematics we use a range of problem solving and reasoning activities. These include resources available from Abacus, the assessments that children complete and supplementary resources from the NCETM/White Rose documents.

Our mathematics curriculum is organised on a year-to-year basis as set out by the National Curriculum. Each NC objective is then broken down further by the Abacus scheme and taught sequentially to ensure that children develop a rich conceptual understanding.

### The fundamentals of the CPA approach

This moves children from the concrete resources, pictorial representations and finally to the abstract. New learning will need manipulatives to support understanding. Once this is achieved, pictorial/visual images will be used. Ultimately, children need to be working at an abstract level.

Each class at Willowbrook uses mathematical manipulatives to help build conceptual understanding. Children are taught to move autonomously between physical, pictorial and symbolic representations of concepts to assist them in their fluency and mathematical reasoning. They are encouraged to source and use necessary physical manipulatives to assist their learning. To scaffold this structure, teachers apply the CPA approach to aid learning (based upon Bruner's, Enactive, Iconic and Symbolic stages of learning).

Growth Mindset

At Willowbrook, we promote a growth mindset approach. The term "growth mindset" comes from the groundbreaking work of Carol Dweck. We believe that children can grow in intelligence, by thinking with a growth mindset, when faced with difficulty and challenge.
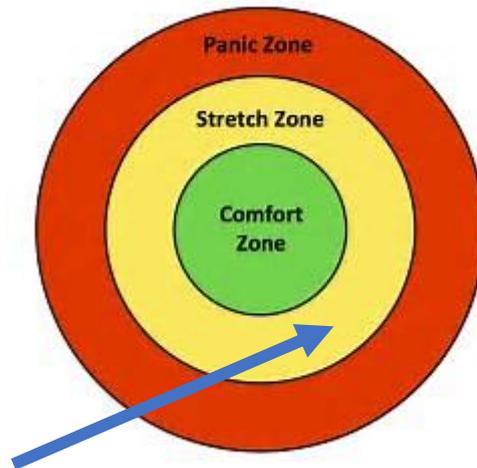
Children need to be challenged so that are being stretched, which in turn places them in their learning zone.

Challenge

In both Key Stages, teachers provide children with challenges with choice so that children can challenge themselves and have greater ownership of their learning. Children move themselves on when they feel ready and are able to deepen their thinking within the same objective.

Ofsted supplementary subject-specific guidance for mathematics

Grade descriptors – achievement of children in mathematics
Outstanding (1)

- children understand important concepts and make connections within mathematics.
- Children develop a broad range of skills in using and applying mathematics. They show exceptional independence and take the initiative in solving problems in a wide range of contexts, including the new or unusual.
- Children think for themselves and are prepared to persevere when faced with challenges, showing a confidence that they will succeed.
- Children embrace the value of learning from mistakes and false starts.
- When investigating mathematically, children reason, generalize and make sense of solutions.
- Children show high levels of fluency in performing written and mental calculations and mathematical techniques.
- Mathematical language and symbols are used accurately in children' work and in discussions.
- Children develop a sense of passion and commitment to the subject.

Mathematical Talk

Mathematical talk is essential to develop children's understanding of mathematics. Purposeful talk can clarify, refine and extend understanding of important mathematical language and concepts.

Children are encouraged to talk and clarify, as well as question to encourage mathematical thinking and reasoning. There are regular opportunities for children to participate in focused mathematical dialogue and it is important that these discussions take place at all stages of their learning.

Cross curricular and applied learning

At Willowbrook, teachers provide a highly enriching curriculum during afternoon sessions which builds upon mathematics skills. In addition to mathematics sessions, children have a weekly cross-curricular lesson which provides them with opportunities to build a sense of enjoyment and curiosity, reason mathematically and develop an appreciation of the vast applications of mathematics. During these sessions, learning is applied through multiple disciplines to help children see that mathematics is an integrated whole, not merely isolated pieces of knowledge.

Marking and Feedback

Marking and feedback is used to ensure children understand what they have done well and how to improve. This is accomplished using verbal and written feedback which is given in lessons as well as when marking books after the lesson.

Marking and feedback can involve addressing a misconception or providing further challenge, through appropriate questioning or reasoning/problem solving challenges, which link to the learning in the lesson.

Times Tables

The National Curriculum expectation of times tables in each Year Group is as follows:

Year 1: Count on or back in ones, twos, fives and tens

Year 2: 2x, 5x, 10x

Year 3: 3x, 4x, 8x

Year 4: 6x, 7x, 9x, 11x, 12x

Year 5: All x and ÷ facts (12x12)

Year 6: All x and ÷ facts (12x12) and related language/symbols.

It is important for children to become fluent in calculation and they need to have learnt the multiplication tables by heart before they leave primary school.

The quick recall of multiplication and division facts (times tables) is essential for all children. The ability to recall these facts quickly enables children to answer related questions with ease.

To support their learning of times tables, children will use Times Table Rock stars in years 1 to 6. The aim of this scheme is to motivate and engage children in their learning of their times tables up to 12 x 12.

Early Years Foundation Stage

It is widely appreciated that a child's mathematical understanding is greatly influenced during their early years of life. At Willowbrook, we strive to ensure that children' first experiences of mathematics within school are both positive and practical. During these early years, children are given opportunities to explore the number system, develop mathematical vocabulary through exploration and imitation, learn to represent groups and numbers, and develop early reasoning skills.

Children work towards the following Early Learning Goals:

Early Learning Goal 11 - Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

Early Learning Goal 12 - Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

EYFS: Number Sense essential learning which is intrinsically linked to all four operations which provide a firm foundation

Children need to be confident with:
Number sense
- knowing what a number is and where it fits in (including 0)- recognition, ordering, sequence
- teen numbers
- conceptual variation- identifying and representing number in different ways
- recognises numerals of personal significance- age, door number, bus number…

Counting:
- counting forwards and backwards reliably from 1 to 20, starting from one or 20 as well as starting from different points (7, 6, 5… as well as 20, 19, 18…) with consecutive numbers and with missing numbers
- count 1-1 with concrete objects, count out a given amount from a group/ set of objects, know that the final number we say is the amount that we have got, collected or counted
- count skips, jumps, claps, hops…
- Says the number that is one more/ one less than a given number.

Partitioning
- number bonds to 5, 7, then to 10, and then build upon facts to 10 to approach facts to 20 with the same confidence
- splitting amounts in to smaller amounts, including splitting the same amount in different ways (whole- part, part)

Programmes of Study:

Teachers will refer to the objectives set out by the Programmes of Study, Abacus scheme and NCETM/White Rose documents when planning, to ensure that there is an appropriate level of challenge. Throughout the EYFS, KS1 and KS2, mathematical vocabulary will be introduced and used in context.

By the end of each key stage, children are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study as set out below.

Year 1 Programme of Study

Number – number and place value	
count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number	
count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens	
given a number, identify one more and one less	
identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least	
read and write numbers from 1 to 20 in numerals and words.	
Number – addition and subtraction	
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	
represent and use number bonds and related subtraction facts within 20	
add and subtract one-digit and two-digit numbers to 20, including zero	
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? - 9.	
Number – multiplication and division	
solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	
Number – Fractions	
recognise, find and name a half as one of two equal parts of an object, shape or quantity	
recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.	
Measurement	
compare, describe and solve practical problems for: o lengths and heights (e.g. long/short, longer/shorter, tall/short, double/half) o mass or weight (e.g. heavy/light, heavier than, lighter than) o capacity/volume (full/empty, more than, less than, quarter) o time (quicker, slower, earlier, later)	
measure and begin to record the following: o lengths and heights o mass/weight o capacity and volume o time (hours, minutes, seconds)	
recognise and know the value of different denominations of coins and notes	
sequence events in chronological order using language (such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening)	
recognise and use language relating to dates, including days of the week, weeks, months and years	
tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	
Geometry – Properties of Shapes	
recognise and name common 2-D and 3-D shapes, including: o 2-D shapes (e.g. rectangles (including squares), circles and triangles) o 3-D shapes (e.g. cuboids (including cubes), pyramids and spheres).	
Geometry – Position and direction	
describe position, directions and movements, including half, quarter and three-quarter turns.	

Year 2 Programme of Study

Number – number and place value	
count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward	
recognise the place value of each digit in a two-digit number (tens, ones	
identify, represent and estimate numbers using different representations, including the number line	
compare and order numbers from 0 up to 100; use <, > and = signs	
read and write numbers to at least 100 in numerals and in words	
use place value and number facts to solve problems.	

Number – addition and subtraction	
solve problems with addition and subtraction: • using concrete objects and pictorial representations, including those involving numbers, quantities and measures • applying their increasing knowledge of mental and written methods	
recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	
add and subtract numbers using concrete objects, pictorial representations, and mentally, including: • a two- digit number and ones • a two-digit number and tens • two two-digit numbers • adding three one-digit numbers	
show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot	
recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	

Number – multiplication and division	
recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	
calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	
show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	
solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	

Number – Fractions	
recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity	
write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and ½.	

Measurement	
choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels	
compare and order lengths, mass, volume/capacity and record the results using >, < and =	
recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value	
find different combinations of coins that equal the same amounts of money	
solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change	
compare and sequence intervals of time	
tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times	
know the number of minutes in an hour and the number of hours in a day.	

Geometry – Properties of shapes	

identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line	
identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces	
identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]	
compare and sort common 2-D and 3-D shapes and everyday objects.	

Geometry – Position and Direction	
order and arrange combinations of mathematical objects in patterns and sequences	
use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).	

Statistics	
interpret and construct simple pictograms, tally charts, block diagrams and simple tables	
ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity	
ask and answer questions about totalling and comparing categorical data.	

Year 3 Programme of Study

Number – number and place value	
count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number	
recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	
compare and order numbers up to 1000	
identify, represent and estimate numbers using different representations	
read and write numbers up to 1000 in numerals and in words	
solve number problems and practical problems involving these ideas.	

Number – addition and subtraction	
add and subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds	
add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	
estimate the answer to a calculation and use inverse operations to check answers	
solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	

Number – multiplication and division	
recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	
write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	
solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	

Number – Fractions	
count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10	
recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators	
recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators	
recognise and show, using diagrams, equivalent fractions with small denominators	

add and subtract fractions with the same denominator within one whole [for example 5/7 + 1/7 = 6/7]	
compare and order unit fractions, and fractions with the same denominators	
solve problems that involve all of the above.	
Measurement	
measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	
measure the perimeter of simple 2-D shapes	
add and subtract amounts of money to give change, using both £ and p in practical contexts	
tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks	
estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight	
know the number of seconds in a minute and the number of days in each month, year and leap year	
compare durations of events [for example to calculate the time taken by particular events or tasks].	
Geometry – Properties of Shapes	
draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	
recognise angles as a property of shape or a description of a turn	
identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle	
identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	
Statistics	
interpret and present data using bar charts, pictograms and tables	
solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	

Year 4 Programme of Study

Number – number and place value	
count in multiples of 6, 7, 9, 25 and 1000	
find 1000 more or less than a given number	
count backwards through zero to include negative numbers	
recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)	
order and compare numbers beyond 1000	
identify, represent and estimate numbers using different representations	
round any number to the nearest 10, 100 or 1000	
solve number and practical problems that involve all of the above and with increasingly large positive numbers	
read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.	
Number – addition and subtraction	
add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	
estimate and use inverse operations to check answers to a calculation	
solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	
Number – multiplication and division	
recall multiplication and division facts for multiplication tables up to 12 × 12	

use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers	
recognise and use factor pairs and commutativity in mental calculations	
multiply two-digit and three-digit numbers by a one-digit number using formal written layout	
solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	

Number – Fractions

recognise and show, using diagrams, families of common equivalent fractions	
count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.	
solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number	
add and subtract fractions with the same denominator	
recognise and write decimal equivalents of any number of tenths or hundredths	
recognise and write decimal equivalents to ¼, ½, ¾	
find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths	
round decimals with one decimal place to the nearest whole number	
compare numbers with the same number of decimal places up to two decimal places	
solve simple measure and money problems involving fractions and decimals to two decimal places.	

Measurement

Convert between different units of measure [for example, kilometre to metre; hour to minute]	
measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres	
find the area of rectilinear shapes by counting squares	
estimate, compare and calculate different measures, including money in pounds and pence	
read, write and convert time between analogue and digital 12- and 24-hour clocks	
solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	

Geometry – Properties of Shapes

compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	
identify acute and obtuse angles and compare and order angles up to two right angles by size	
identify lines of symmetry in 2-D shapes presented in different orientations	
complete a simple symmetric figure with respect to a specific line of symmetry.	

Geometry – Position and Direction

describe positions on a 2-D grid as coordinates in the first quadrant	
describe movements between positions as translations of a given unit to the left/right and up/down	
plot specified points and draw sides to complete a given polygon	

Statistics

interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.	
solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	

Year 5 Programme of Study

Number – number and place value	
read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	
count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000	
interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	
round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000	
solve number problems and practical problems that involve all of the above	
read Roman numerals to 1000 (M) and recognise years written in Roman numerals	

Number – addition and subtraction	
add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
add and subtract numbers mentally with increasingly large numbers	
use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	
solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	

Number – multiplication and division	
identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers	
know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers	
establish whether a number up to 100 is prime and recall prime numbers up to 19	
multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers	
multiply and divide numbers mentally drawing upon known facts	
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	
multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	
recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)	
solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes	
solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	
solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	

Number – Fractions (including decimals and percentages)	
compare and order fractions whose denominators are all multiples of the same number	
identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	
recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 1 1/5]	
add and subtract fractions with the same denominator and denominators that are multiples of the same number	
multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	
read and write decimal numbers as fractions [for example. 0.71 = 71/100]	
recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	
round decimals with two decimal places to the nearest whole number and to one decimal place	
read, write, order and compare numbers with up to three decimal places	
solve problems involving number up to three decimal places	

recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal	
solve problems which require knowing percentage and decimal equivalents of 1/2 , 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25.	

Measurement

convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)	
understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints	
measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres	
calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes	
estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]	
solve problems involving converting between units of time	
use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	

Geometry – Properties of Shapes

identify 3-D shapes, including cubes and other cuboids, from 2-D representations	
know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	
draw given angles, and measure them in degrees (o)	

identify:
    • angles at a point and one whole turn (total 360o)
    • angles at a point on a straight line and ½ a turn (total 180o)
    • other multiples of 90o	

use the properties of rectangles to deduce related facts and find missing lengths and angles	
distinguish between regular and irregular polygons based on reasoning about equal sides and angles	

Geometry – Position and Direction

identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	

Statistics

solve comparison, sum and difference problems using information presented in a line graph	
complete, read and interpret information in tables, including timetables.	

Year 6 Programme of Study

Number – number and place value	
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	
solve number and practical problems that involve all of the above.	

Number – addition, subtraction, multiplication and division	
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	
solve problems involving addition, subtraction, multiplication and division	
use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy	

Number – Fractions (including decimals and percentages)	
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, ¼ x 1/2 = 1/8)	
divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6]	
associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 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	
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	

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 ($cm3$) and cubic metres ($m3$), and extending to other units [for example, $mm3$ and $km3$].	
Geometry – Properties of Shapes	
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 circles, 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 – Properties of Shapes	
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	
interpret and construct pie charts and line graphs and use these to solve problems	
calculate and interpret the mean as an average	