Primary Stage 6 Mathematics for Year 6

Calculators
As in Stage 5, it is important that learners become confident users of calculators. They need to recognise that the calculator is a tool of which they are in control and to understand how it can help them to develop their mathematics. Learners can be taught how to use a calculator effectively and to recognise how and when it is appropriate to do so; by first deciding if mental and pencil-and-paper methods are quicker or more reliable. Note that to use a calculator effectively requires a secure knowledge of number, which has to be the prime aim.

Number
Numbers and the number system

- Count on and back in fractions and decimals, e.g. 1/3s, 0.1s, and repeated steps of whole numbers (and through zero).
- Know what each digit represents in whole numbers up to a million.
- Know what each digit represents in one- and two-place decimal numbers.
- Multiply and divide any whole number from 1 to 10 000 by 10, 100 or 1000 and explain the effect.
- Multiply and divide decimals by 10 or 100 (answers up to two decimal places for division).
- Find factors of two-digit numbers.
- Find some common multiples, e.g. for 4 and 5.
- Round whole numbers to the nearest 10, 100 or 1000.
- Round a number with two decimal places to the nearest tenth or to the nearest whole number.
- Make and justify estimates and approximations of large numbers.
- Order and compare positive numbers to one million, and negative integers to an appropriate level.
- Use the >, < and = signs correctly.
- Estimate where four-digit numbers lie on an empty 0 – 10 000 line.
- Order numbers with up to two decimal places (including different numbers of places).
- Recognise and extend number sequences.
- Recognise and use decimals with up to three places in the context of measurement.
- Recognise odd and even numbers and multiples of 5, 10, 25, 50 and 100 up to 1000.
- Make general statements about sums, differences and multiples of odd and even numbers.
- Recognise prime numbers up to 20 and find all prime numbers less than 100.
- Recognise the historical origins of our number system and begin to understand how it developed.
- Compare fractions with the same denominator and related denominators, e.g. 3/4 with 7/8.
- Recognise equivalence between fractions, e.g. between 1/100s, 1/10s and 1/2s.
- Recognise and use the equivalence between decimal and fraction forms.
- Order mixed numbers and place between whole numbers on a number line.
- Change an improper fraction to a mixed number, e.g. 17/8 to 2 1/8.
- Reduce fractions to their simplest form, where this is 1/4, 1/2, 3/4 or a number of fifths or tenths.
- Begin to convert a vulgar fraction to a decimal fraction using division.
- Understand percentage as parts in every 100 and express 1/2, 1/4, 1/3, 1/10, 1/100 as percentages.
- Find simple percentages of shapes and whole numbers.
- Solve simple problems involving ratio and direct proportion.
Calculation

Mental strategies
- Recall addition and subtraction facts for numbers to 20 and pairs of one-place decimals with a total of 1, e.g. 0.4 + 0.6.
- Derive quickly pairs of one-place decimals totalling 10, e.g. 7.8 and 2.2, and two-place decimals totalling 1, e.g. 0.78 + 0.22.
- Know and apply tests of divisibility by 2, 4, 5, 10, 25 and 100.
- Use place value and number facts to add or subtract two-digit whole numbers and to add or subtract three-digit multiples of 10 and pairs of decimals, e.g. 560 + 270; 2.6 + 2.7; 0.78 + 0.23.
- Add/subtract near multiples of one when adding numbers with one decimal place, e.g. 5.6 + 2.9; 13.5 – 2.1.
- Add/subtract a near multiple of 10, 100 or 1000, or a near whole unit of money, and adjust, e.g. 3127 + 4998; 5678 – 1996.
- Use place value and multiplication facts to multiply/divide mentally, e.g. 0.8 x 7; 4.8 ÷ 6.
- Multiply pairs of multiples of 10, e.g. 30 x 40, or multiples of 10 and 100, e.g. 600 x 40.
- Double quickly any two-digit number, e.g. 78, 7.8, 0.78 and derive the corresponding halves.
- Divide two-digit numbers by single-digit numbers, including leaving a remainder.

Addition and subtraction
- Add two- and three-digit numbers with the same or different numbers of digits/decimal places.
- Add or subtract numbers with the same and different numbers of decimal places, including amounts of money.
- Find the difference between a positive and negative integer, and between two negative integers in a context such as temperature or on a number line.

Multiplication and division
- Multiply pairs of multiples of 10, e.g. 30 x 40, or multiples of 10 and 100, e.g. 600 x 40.
- Multiply near multiples of 10 by multiplying by the multiple of 10 and adjusting.
- Multiply by halving one number and doubling the other, e.g. calculate 35 x 16 with 70 x 8.
- Use number facts to generate new multiplication facts, e.g. the 17x table from 10x + 7x tables.
- Multiply two-, three- or four-digit numbers (including sums of money) by a single-digit number and two- or three-digit numbers by two-digit numbers.
- Divide three-digit numbers by single-digit numbers, including those leaving a remainder and divide three-digit numbers by two-digit numbers (no remainder) including sums of money.
- Give an answer to division as a mixed number, and a decimal (with divisors of 2, 4, 5, 10 or 100).
- Relate finding fractions to division and use them as operators to find fractions including several tenths and hundredths of quantities.
- Know and apply the arithmetic laws as they apply to multiplication (without necessarily using the terms commutative, associative or distributive).

Geometry

Shapes and geometric reasoning
- Classify different polygons and understand whether a 2D shape is a polygon or not.
- Visualise and describe the properties of 3D shapes, e.g. faces, edges and vertices.
- Identify and describe properties of quadrilaterals (including the parallelogram, rhombus and trapezium), and classify using parallel sides, equal sides, equal angles.
- Recognise and make 2D representations of 3D shapes including nets.
- Estimate, recognise and draw acute and obtuse angles and use a protractor to measure to the nearest degree.
Check that the sum of the angles in a triangle is 180°, for example, by measuring or paper folding; calculate angles in a triangle or around a point.

**Position and movement**
- Read and plot co-ordinates in all four quadrants.
- Predict where a polygon will be after one reflection, where the sides of the shape are not parallel or perpendicular to the mirror line, after one translation or after a rotation through 90° about one of its vertices.

**Measure**

**Length, mass and capacity**
- Select and use standard units of measure. Read and write to two or three decimal places.
- Convert between units of measurement (kg and g, l and ml, km, m, cm and mm), using decimals to three places, e.g. recognising that 1.245 m is 1 m 24.5 cm.
- Interpret readings on different scales, using a range of measuring instruments.
- Draw and measure lines to the nearest centimetre and millimetre.
- Know imperial units still in common use, e.g. the mile, and approximate metric equivalents.

**Time**
- Recognise and understand the units for measuring time (seconds, minutes, hours, days, weeks, months, years, decades and centuries); convert one unit of time into another.
- Tell the time using digital and analogue clocks using the 24-hour clock.
- Compare times on digital and analogue clocks, e.g. realise quarter to four is later than 3:40.
- Read and use timetables using the 24-hour clock.
- Calculate time intervals using digital and analogue times.
- Use a calendar to calculate time intervals in days, weeks or months.
- Calculate time intervals in days, months or years.
- Appreciate how the time is different in different time zones around the world.

**Area and perimeter**
- Measure and calculate the perimeter and area of rectilinear shapes.
- Estimate the area of an irregular shape by counting squares.
- Calculate perimeter and area of simple compound shapes that can be split into rectangles.

**Handling data**

**Organising, categorising and representing data**
- Solve a problem by representing, extracting and interpreting data in tables, graphs, charts and diagrams, e.g. line graphs for distance and time; a price ‘ready-reckoner’ for currency conversion; frequency tables and bar charts with grouped discrete data.
- Find the mode and range of a set of data from relevant situations, e.g. scientific experiments.
- Begin to find the median and mean of a set of data.
- Explore how statistics are used in everyday life.

**Probability**
- Use the language associated with probability to discuss events, to assess likelihood and risk, including those with equally likely outcomes.

**Problem solving**

**Using techniques and skills in solving mathematical problems**
- Choose appropriate and efficient mental or written strategies to carry out a calculation involving addition, subtraction, multiplication or division.
Understand everyday systems of measurement in length, weight, capacity, temperature and time and use these to perform simple calculations.

Check addition with a different order when adding a long list of numbers; check when subtracting by using the inverse.

Recognise 2D and 3D shapes and their relationships, e.g. a cuboid has a rectangular cross-section.

Estimate and approximate when calculating, e.g. use rounding, and check working.

**Using understanding and strategies in solving problems**

Explain why they chose a particular method to perform a calculation and show working.

Deduce new information from existing information and realise the effect that one piece of information has on another.

Use logical reasoning to explore and solve number problems and mathematical puzzles.

Identify relationships between numbers and make generalised statements using words, then symbols and letters, e.g. the second number is twice the first number plus 5 \((n, 2n + 5)\); all the numbers are multiples of 3 minus 1 \((3n – 1)\); the sum of angles in a triangle is 180°.

Make sense of and solve word problems, single and multi-step (all four operations), and represent them, e.g. with diagrams or on a number line; use brackets to show the series of calculations necessary.

Solve simple word problems involving ratio and direct proportion.

Solve simple word problems involving percentages, e.g. find discounted prices.

Make, test and refine hypotheses, explain and justify methods, reasoning, strategies, results or conclusions orally.