



The Core Knowledge Sequence UK

Mathematics: Year 6

I. NUMBERS AND THE NUMBER SYSTEM

A. WHOLE NUMBERS

- Read and write whole numbers in figures and words.
- Know what each digit represents in whole numbers and partition, compare, order and around these numbers.
- Recognise and extend number sequences formed by counting on or back from any number in whole number or decimal steps of constant size, extending beyond zero when counting backwards, e.g. a sequence of square or triangular numbers.
- Identify Roman numerals from 1 to 1000 (I – M), and recognise years written in Roman numerals.
- Find the difference between a positive and a negative integer, or two negative integers, in context such as the number line or temperature.

B. FRACTIONS

- Order a set of fractions by converting them to fractions with a common denominator.
- Convert improper fractions to mixed numbers and vice versa.
- Express a larger whole number as a fraction of a smaller one, e.g. $7/3 = 2\frac{1}{3}$.
- Reduce a fraction to its simplest form by cancelling common factors.
- Determine the lowest common denominator (LCD) of fractions with unlike denominators.
- Add or subtract mixed numbers, e.g. $2\frac{3}{4} + 4\frac{5}{6}$.
- Add or subtract fractions with like or unlike denominators, e.g. $\frac{1}{5} + \frac{2}{5}$, $\frac{3}{4} - \frac{2}{3}$.
- Identify the reciprocal of a given fraction and know that the product of a given number and its reciprocal equals 1.
- Multiply simple unit fractions by fractions, e.g. $\frac{1}{4} \times \frac{2}{3}$, and multiply a pair of proper fractions, e.g. $\frac{3}{4} \times \frac{2}{3}$, expressing the answer in its simplest form.
- Divide proper fractions by whole numbers, e.g. $\frac{2}{3} \div 4$, expressing the answer in its simplest form.
- Use a fraction as an operator to find fractions of numbers or quantities, e.g. $\frac{5}{8}$ of 48, $\frac{7}{10}$ of £50.
- Associate a fraction with division to calculate a decimal fraction equivalent.

C. DECIMALS

- Explain what each digit represents in decimals with up to three decimal places, and partition such numbers.
- Compare decimals with up to three decimal places using the signs $<$, $>$, and $=$.
- Order a set of decimals with up to three decimal places and position them on a number line.
- Round decimals to the nearest whole number, tenth and hundredth.
- Relate fractions to their decimal representations, e.g. $0.45 = \frac{45}{100}$.

D. PERCENTAGES

- Recall, derive and use equivalences between fractions, decimals and percentages.
- Find percentages of whole numbers or quantities, e.g. 45% of 160, 15% of £70.

E. RATIO AND PROPORTION

- Use the vocabulary of ratio and proportion to describe the relationship between two quantities.

- Scale numbers or quantities up or down.
- Create simple scale drawings.
- Recognise equivalent ratios and reduce a given ratio to its simplest form.

II. NUMBER OPERATIONS AND CALCULATIONS

A. ADDITION AND SUBTRACTION

- Use the principles of the commutative and associative laws as they apply to addition.
- Use known number facts and place value to mentally add or subtract decimals, e.g. $3.6 + 8.7$, $9.4 - 5.8$.
- Use efficient written methods to add and subtract whole numbers and decimals.

B. MULTIPLICATION AND DIVISION

- Use the principles of the commutative, associative and distributive laws as they apply to multiplication:
 - example of commutative law: $8.4 \times 7 = 7 \times 8.4$
 - example of associative law: $16.8 \times 50 = 16.8 \times (10 \times 5)$ or $(16.8 \times 10) \times 5 = 168 \times 5 = 840$
 - example of distributive law: $7.6 \times 95 = 7.6 \times (100 - 5) = (7.6 \times 100) - (7.6 \times 5) = 760 - 38 = 722$
- Recall quickly multiplication facts up to 12×12 and the corresponding division facts.
- Recall square numbers to 12×12 , e.g. 12^2 , and the corresponding square roots, e.g. $\sqrt{144}$, and use known square numbers to derive squares of multiples of 10.
- Identify and use multiples, common multiples, lowest common multiples (LCM), factors, common factors and highest/greatest common factors (HCF/GCF).
- Know and use the meanings of prime number, prime factor and composite number.
- Use known number facts and place value to mentally multiply or divide decimals by a one-digit number, e.g. 5.8×6 , $8.6 \div 3$.
- Use efficient written methods to:
 - multiply a two-, three- or four-digit number by a two-digit number, e.g. 574×42 ;
 - multiply decimals with one or two decimal places by a one-digit or two-digit number, e.g. 6.8×12 , $\text{£}9.25 \times 8$;
 - divide a three-digit or four-digit number by a two-digit number, including division with remainders, rounding up or down depending on the context, e.g. $465 \div 16$;
 - divide decimals with one or two decimal places by a one-digit or two-digit number, e.g. $\text{£}14.65 \div 4$, $54.6 \div 12$.

C. MIXED OPERATIONS

- Use knowledge of rounding, number operations and inverse relationships to estimate and check calculations.
- Use brackets to solve multi-step calculations.

III. MEASUREMENT

A. LENGTH, MASS, CAPACITY, VOLUME AND TEMPERATURE

- Estimate, measure and record lengths, masses, capacities and temperatures using standard units (km, m, cm, mm, kg, g, l, ml, °C) to a suitable degree of accuracy.
- Convert between different units of measure using decimals to three places, e.g. $2.475 \text{ kg} = 2475 \text{ g}$, or vice versa.
- Read and interpret scales on a range of measuring instruments.
- Understand and use equivalencies between metric and common imperial units still in everyday use.
- Use the formula, and the standard units cm^3 and m^3 , to calculate the volume of cubes and cuboids.

B. TIME

- Read a timetable using 24-hour clock notation and calculate time intervals.

C. MONEY

- Use all four operations, fractions and percentages to solve problems involving money.

D. PERIMETER AND AREA

- Measure and calculate the perimeter of regular and irregular polygons.
- Use the formula, and a variety of standard units (mm^2 ; cm^2 ; m^2 ; km^2), to calculate the area of rectangles and related compound shapes.
- Use the formulae to calculate the area of triangles and parallelograms.
- Use the formulae to calculate the surface area of cubes and cuboids.

IV. GEOMETRY**A. 2-D SHAPES AND 3-D SOLIDS**

- Identify, visualise, describe and classify triangles, quadrilaterals, regular polygons and 3-D solids.
- Make and draw shapes with increasing accuracy and apply knowledge of their properties.
- Illustrate and name the parts of a circle including radius, diameter, circumference, arc and chord.

B. POSITION, DIRECTION AND MOVEMENT

- Use coordinates in all four quadrants to read and plot specified points.
- Draw the position of a shape after one or two translations on a coordinate plane.
- Estimate angles, and use a protractor to draw and measure angles with increasing accuracy.
- Calculate angles in a straight line, in a triangle, in a quadrilateral and around a point.

C. SYMMETRY

- Draw the reflection of a shape:
 - in a mirror line touching the shape at a point, where all sides of the shape are not necessarily parallel or perpendicular to the mirror line;
 - in two mirror lines at right angles, where the sides of the shape are parallel or perpendicular to the mirror line.
- Identify all the symmetries of 2-D shapes, cubes, cuboids and other common 3-D solids, including prisms.

V. DATA**A. DATA**

- Collect, process, represent, interpret and discuss data in a frequency table, bar chart (with grouped discrete data), line graph or pie chart.
- Find and interpret the mode, range, median and mean of a set of data.

B. PROBABILITY

- Use the language of probability to describe the chance or likelihood of particular events.
- Express the probability of a given event as a fraction or percentage, or on a probability scale from 0 to 1.

VI. PROBLEM SOLVING AND REASONING

- Represent and interpret numerical and symbolic patterns and relationships.
- Solve mathematical problems and puzzles involving numbers or shapes.
- Suggest and test hypotheses involving numbers or shapes.
- Solve multi-step problems involving whole numbers, decimals, fractions and percentages, in the context of numbers or measurements, including money and time.

VII. PRE-ALGEBRA

- Construct and use simple expressions and formulae expressed in words then symbols.
- Generate and describe linear number sequences.
- Recognise variables and solve basic equations using variables, e.g. What is $7 - c$ if c is 3.5?