



Ryton Federation Mathematics Curriculum Year 5

Understanding and investigating with numbers (whole numbers)

Place value, ordering and rounding

- **Count forwards or backwards in steps of powers of 10 from 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.** *Order a given set of negative and positive integers.*
- **Read, write, order and compare numbers to at least 1 000 000 and determine the place value of each digit.** Continue to use number in context, including measurement.
- Extend and apply understanding of the number system to decimal numbers and fractions.
- *Use the vocabulary of comparing and ordering numbers including use of $>$, $<$ symbols and $=$ sign.*
- **Read Roman numerals to 1 000 (M) and recognise years written in Roman numerals.** *Appreciate the difference between the Roman numeral system and our own number system from a place value viewpoint.*
- **Round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000**
- *Apply understanding of the number system to solve **number problems and practical problems** involving numbers, money or measures. Explain methods and reasoning orally and in writing, including using diagrams and symbols.*

Properties of numbers and number sequences

- *Continue to practice to Recognise multiples of numbers up to 12×12 , to Recognise patterns in sequences of multiples and connections between them. Know and apply tests of divisibility.*
- **Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.** *Identify common multiples.*
- **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.**
- **Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).**
- Use understanding of the terms factor, multiple and prime, square and cube numbers to construct equivalence statements (e.g. $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$).
- Recognise and describe linear number sequences, including those involving fractions and decimals and find the term to term rule.
- *Apply understanding of number properties to solve routine and non-routine problems and puzzles involving numbers, money or measure.*
- *Explore and discuss patterns, properties and relationships that arise in the number system using appropriate mathematical vocabulary.*
- *Develop lines of enquiry through conjecturing relationships and generalisations and testing ideas. Identify examples for which a statement is true or false.*

Fractions, decimals and percentages

- Continue to develop understanding of fractions as numbers, measures and operators by finding, *naming and writing*, fractions of numbers and quantities.
- Extend and apply understanding of the number system to decimal numbers and fractions
- **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 (e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$).**
- Connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.
- **Add and subtract fractions with the same denominator and with denominators that are multiples of the same number** extending to calculations that exceed 1 as a mixed number.
- **Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.**
- Connect multiplication by a fraction to using fractions as operators (fractions of) and to division. This relates to scaling by simple fractions, including fractions > 1 .
- Continue to practice counting forwards and backwards using fractions and decimals, including bridging through zero, for example on a number line.
- **read and write decimal numbers as fractions (e.g. $0.71 = \frac{71}{100}$).**
- **Recognise and use thousandths and relate them to tenths, hundredths, decimal equivalents** and measures.
- **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.**
- Mentally add and subtract tenths, and one-digit whole numbers and tenths.
- **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 fraction.**
- **Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25.**
- Make connections between percentages, fractions and decimals e.g. 100% represents a whole quantity, 1% is $\frac{1}{100}$... and relate this to finding ‘fractions of’.
- Understand that percentages, decimals and fractions are different ways of expressing proportions.
- Recognise and describe linear number sequences, including those involving fractions and decimals and find the term to term rule.
- *Apply understanding of fractions, decimals up to three places and percentages to solve routine and non-routine problems and puzzles involving numbers, shapes, money or measures. Explain methods and reasoning orally and in writing, including using diagrams and symbols.*

Developing and applying calculation

Addition and subtraction

- *Continue to practice using known facts and understanding of place value to quickly derive sums and differences using whole numbers and decimals.*
- **Add and subtract numbers mentally with increasingly large numbers** e.g. *Use place value and known facts to subtract one near multiple of 1000 from another e.g. $6070 - 4097$ or $12\ 462 - 2300 = 10\ 162$.*
- *Mentally add and subtract tenths, and one digit whole numbers and tenths.*
- *Use and explain a range of mental strategies appropriate to the numbers involved, sometimes supporting explanations with jottings or informal recording.*
- **Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).**
- *Add and subtract decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (e.g. $0.83 + 0.17 = 1$) using formal written methods when appropriate.*
- **Add and subtract fractions with the same denominator and with denominators that are multiples of the same number.**
- **Use rounding, estimation and inverse operations to check answers to calculations and determine, in the context of a problem, levels of accuracy.**
- *Understand and use the relationships between the four operations and the principles of the arithmetic laws; commutative, associative and distributive. (Distributivity can be expressed as $a(b+c) = ab + ac$)*
- **Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why**
- *Solve calculation problems using information from a range of table and charts.*
- *Apply understanding of number operations to solve number puzzles and non-routine problems and explain reasoning*
- *Use and explain the equals sign to indicate equivalence, including in missing number problems (e.g. $13 + 24 = 12 + 25$; $33 = 55 - \Delta$).*
- *Use a calculator to solve problems when the numbers involved are appropriate, including decimals and fractions, and interpret the display correctly for the context.*

Multiplication and division

- **Multiply and divide numbers mentally drawing upon known facts** *place value and properties of numbers to support mental calculation with larger numbers.*
- **Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.**
- *Use knowledge of place value and multiplication facts to derive related multiplication and division facts involving decimals e.g. 0.8×7 , $4.8 \div 6$.*
- **Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including short multiplication and long multiplication for two-digit numbers.**
- **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** as fractions, as decimals or by rounding.
- **Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.**

- Connect multiplication by a fraction to using fractions as operators (fractions of) and to division. This relates to scaling by simple fractions, including fractions > 1 .
- *Understand and use the relationships between the four operations and the principles of the arithmetic laws; commutative, associative and distributive.* (Distributivity can be expressed as $a(b+c) = ab + ac$).
- *Use rounding, estimation and inverse operations to check answers to calculations and determine, in the context of a problem, levels of accuracy.*
- **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.**
- Use multiplication and division as inverses e.g. by multiplying and dividing by powers of ten in scale drawings or by powers of 1000 in converting between units such as kilometres and meters.
- *Solve calculation problems including using information from a range of tables and charts*
- *Apply understanding of number operations to solve number puzzles, routine and non – routine problems and explain reasoning.*
- Use and explain the equals sign to indicate equivalence, including in missing number problems (e.g. $2 \times 24 = 12 \times 4$; $33 = 5 \times \diamond$).
- *Use a calculator to solve problems when the numbers involved are appropriate, including decimals and fractions, and interpret the display correctly for the context.*

Measurement

- *Continue to use read and write standard metric units and their abbreviations, developing fluency in their relationships.*
- *Suggest suitable units and equipment for measuring and read scales to an appropriate degree of accuracy.*
- **Convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) using knowledge of place value and multiplication / division.**
- **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 squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes.** *For rectangles use the formula, length \times breadth = area, expressed in words or symbols.*
- Use the relations of perimeter or area to find unknown lengths, missing measures questions such as these can be expressed algebraically e.g. $4 + 2b = 20$ for a rectangle of sides 2cm and bcm and perimeter 20cm.
- Calculate area from scale drawings using given measurements.
- **Estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water).**

- *Continue to read the time, interpret timetables and use units of time, including to **solve problems involving converting between units of time.***
- **Use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling.** *Information required to solve a problem is often drawn from tables, including timetables, graphs and charts.*
- *Apply measuring skills to an appropriate degree of accuracy, alongside the skills of thinking mathematically to solve problems. These should include practical problems and might involve construction of shapes or artefacts, often in a cross curricular context.*
- *Make and explain connections between number, measures and shape.*

Geometry

Properties of shapes

- *Continue to compare and classify geometric shapes based on developing knowledge and understanding of their properties.*
- **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.**
- *Use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, e.g. through using dynamic geometry ICT tools.*
- **Identify 3D shapes, including cubes and other cuboids, from 2D representations.**
- **Know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles.**
- **Draw given angles and measure them in degrees (°).**
- **Identify:**
 - **angles at a point and one whole turn (total 360°)**
 - **angles at a point on a straight line and ½ a turn (total 180°)**
 - **other multiples of 90°.**
- *Become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. Use conventional markings for parallel lines and right angles.*
- *Use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.*
- *Solve problems, involving reasoning about shapes and their properties. Explain solutions orally or using writing, diagrams, practical materials or dynamic geometry ICT tools*

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.**
- *Recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.*
- *Recognise and use the eight compass directions.*

- *Solve problems, involving reasoning about shapes and their properties. Explain solutions orally or using writing, diagrams, practical materials or dynamic geometry ICT tools.*

Statistics

Interpreting, constructing and presenting data

- **Complete, read and interpret information in (a wide range of charts and) tables, including timetables.**
- **Solve comparison, sum and difference problems using information presented in a line graph.**
- Connect work on coordinates and scales to their interpretation of time graphs.
- Begin to decide which representations of data are most appropriate and why.
- *Pose questions that can be answered using information presented in different graphs charts and tables.*
- *Understand and use Venn and Carroll diagrams to support reasoning about numbers or shapes.*
- *Apply the skills of collecting, representing and interpreting statistical data across the curriculum within and beyond mathematics, sometimes in response to an enquiry of interest to and suggested by pupils.*