

Mathematics Teaching sequence – Year 5

Children should engage with appropriate number and practical problems **throughout each topic**.

Statements highlighted in yellow have been identified as ‘ready to progress’ objectives: key concepts which are essential building blocks for the next steps in learning. These objectives must be embedded across the year so that children are fluent.

Resources to support teaching of these specific objectives can be found here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1017683/Maths_guidance_KS_1_and_2.pdf

<https://www.ncetm.org.uk/classroom-resources/exemplification-of-ready-to-progress-criteria/>

Year 5	
Autumn Term	Key vocab for topic
<p><u>Number and Place value (2 weeks)</u></p> <ul style="list-style-type: none"> Determine the place value of each digit in numbers, including 10,000, 100,000 and 1,000,000 (including representing/partitioning numbers in different ways e.g. part-whole, number line). Count forwards and backwards in powers of 10 for numbers up to 1,000,000. Read and write numbers up to 1,000,000. Read Roman numerals to 1000 (M) and recognise years written in Roman numerals. Compare and order numbers up to 1,000,000. Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000. Recognise negative numbers in context. Count forwards and backwards with positive and negative whole numbers, including through zero. <p>Review week (1 week)</p> <p><u>Addition and subtraction (2 weeks)</u></p> <ul style="list-style-type: none"> Add and subtract whole numbers with more than 4 digits mentally (using knowledge of place value). Use formal written method of column addition to add numbers with more than 4 digits (crossing the boundaries). Use formal written method of column subtraction with more than 4 digits, with exchange. Solve multi-step problems, and determine operations and methods appropriate to problem context. <p><u>Check answers to calculations (+ and -)</u></p> <ul style="list-style-type: none"> Use rounding to check answers. Use rounding to determine levels of accuracy of answers in context. <p><u>Multiplication/division (3 weeks)</u></p>	<p>Place value Millions Hundreds of thousands Tens of thousands Thousands Hundreds Tens Ones Place holder Roman numerals Greater than Less than Equals to Ascending Descending Positive Negative</p> <p><i>Addition vocab: sum, totals, altogether, combine, plus, more</i> <i>Subtraction: finding the difference, minus, less than, left, take away</i> <i>Crossing the boundary</i> <i>Exchange</i> Place value columns Operations: addition and subtraction</p>

By the end of year 4, children should be able to recall multiplication and division facts for tables up to 12 x 12.

Secure fluency in multiplication table facts, and corresponding division facts, through continued practice throughout year 5.

- Multiply whole numbers by 10,100 and 1000. Understand this as equivalent to making a number 10 or 100 times the size.
- Divide whole numbers by 10,100 and 1000. Understand this as equivalent to making a number 1 tenth or 1 hundredth times the size.
- Identify and find multiples of positive, whole numbers.
- Identify and find factors of positive, whole numbers.
- Find all factors pairs of a number and the common factors of two numbers, expressing a given number as a product of 2 or 3 factors.
- Multiply and divide numbers mentally drawing upon known facts e.g. 30×4 (use fact $3 \times 4 = 12$)
- Know that a prime number only has two factors (itself and 1) and therefore, can only be divided by itself and 1.
- Establish whether a number (up to 100) is prime.
- Recall prime numbers up to 19.
- Know that a composite number is a whole number that is not prime (has more than one factor).
- Identify non-prime numbers as composite numbers.
- Know that prime factors are factors that are also prime numbers.
- Identify prime factors of a number.
- Solve problems involving multiplication and division, including using knowledge of factors and multiples.
- Know that a square number is a whole number multiplied by itself and the notation is 2 .
- Recognise square numbers.
- Know that a cube number is a whole number multiplied by itself twice e.g. $4 \times 4 \times 4$ and the notation is 3 .
- Recognise cube numbers.
- Solve problems involving multiplication and division, including using knowledge of squares and cubes.

Statistics (1 week)

- Know that a line graph shows change over time.
- Interpret information from a line graph, including solving comparison, sum and difference problems.

Fractions (1 week)

- Identify, name and write equivalent fractions (visually represented) of a given fraction, including tenths and hundredths; understand that they have the same value and the same position in the linear number system.

Most efficient method
Mental
Formal (written)

To the nearest...
Closest
Furthest
Most/least accurate

Place value vocab, including:

Decimal point

Tenths

Hundredths

Thousandths

Move digits to the right x
number of places

Move digits to the left x
number of places

Powers of 10

Share/split

Factor pairs

Common factor

Prime number

Prime factor

Composite number

Language associated with multiplication: product, repeated addition, groups/lots of

Language associated with division: share, split equally, equal groups, dividend, divisor, quotient, division bracket

Statistics

Line graph

Data representation

Plot data points

Title

Labelling

Key

Equal intervals

X – Axis

Y – Axis

Trends

Compare/comparison

Greater/less than

Sum

<ul style="list-style-type: none"> Recognise mixed numbers and know that a mixed number consists of wholes and parts (fraction). Recognise improper fractions and know that they have a greater numerator than denominator. Convert from improper fractions to mixed numbers. Convert from mixed numbers to improper fractions. <p>Multiplication (1 week)</p> <p>Using a formal written method</p> <ul style="list-style-type: none"> Multiply numbers up to 4 digits by a 1-digit number (short multiplication revision). <p>Autumn Term review (2 weeks)</p>	<p>Difference</p> <p>Square number Notation (²) Expanded form e.g. 4 x 4 Cube number Notation (³) Expanded form 4 x 4 x 4 Multiplying by itself</p>
<p>Spring Term</p> <p>Fractions (1 week)</p> <ul style="list-style-type: none"> Write mathematical statements >1 as a mixed number e.g. $\frac{3}{4} + \frac{2}{4} = \frac{5}{4} = 1 \frac{1}{4}$ Compare fractions with denominators that are all multiples of the same number. Order fractions with denominators that are all multiples of the same number. Add and subtract fractions with the same denominator. Add fractions with denominators that are multiples of the same number. Subtract fractions with denominators that are multiples of the same number. <p>Multiplication (1 week)</p> <p>Using the formal written method of long multiplication (expanded then compact)</p> <ul style="list-style-type: none"> Multiply 2 digit numbers by 2 digit numbers. Multiply 3 digit numbers by 2 digit numbers. Multiply 4 digit numbers by 2 digit numbers. Multiply 2 digit numbers mentally drawing upon known facts (done previously). Identify and use the most efficient multiplication method to answer questions e.g. known facts, short multiplication, long multiplication, moving digits. <p>Division (1 week)</p> <p>Using the formal written method of short division</p> <ul style="list-style-type: none"> Divide up to 4 digits by a 1-digit number. Know that when the divisor is not a multiple of the dividend, there will be remainders e.g. $123 \div 2$. There will be remainders as 123 is not a multiple of 2 (all multiples of two are even). 	<p>Place value vocab (Th, H, T, O) Multiplicand Multiplier Known facts (times tables knowledge) Short multiplication Moving digits Long multiplication (formal written method)</p> <p><i>Language associated with division: share, split equally, equal groups, dividend, divisor, quotient, division bracket</i></p> <p>Mental method Short division Known facts Most efficient method</p>

- Interpret remainders appropriately for the context.
- Divide 2 digit numbers mentally drawing upon known facts (done previously).
- Identify and use most efficient division method to answer questions e.g. using known facts or short division.
- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.

Review week – 1 week (multiplication and division)

Decimals (2 weeks)

- Read and write numbers with up to three decimal places.
- Identify and recognise place value of each digit in numbers up to 2 dp E.g. In 0.52, there are 5 tenths and 2 hundredths (or 52 tenths) using partitioning (standard and non-standard).
- Know equivalences:
 - 10 tenths = 1 one
 - 1 is 10 times greater 0.1.
 - 100 hundredths =1 one, 1 is 100 times the size of 0.01.
 - 10 hundredths = 1 tenth
 - 0.1 is 10 times greater than 0.01.
- Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts.

- Read and write decimal numbers (up to 3dp) as fractions e.g.

$$0.71 = \frac{71}{100}$$

- Read and write decimal numbers as mixed numbers and improper fractions.

E.g. $1.61 = 1 \frac{61}{100}$ (mixed number) = $\frac{161}{100}$ (improper fraction)

- Recognise, use and write thousandths as decimals e.g. know that 0.004 is equivalent to $\frac{4}{1000}$.
- Relate decimal equivalences of thousandths to tenths and hundredths.

$$0.2 = 0.20 = 0.200$$

$$\frac{2}{10} = \frac{20}{100} = \frac{200}{1000} \quad (= \frac{1}{5})$$

$\frac{30}{100}$ and $30/1,000$ are both equivalent to 0.03. Encourage checking by division as $3 \div 100 = 0.03$ and $30 \div 1000 = 0.03$.

- Write improper fractions and mixed numbers with thousandths as decimals.

E.g. $\frac{1101}{1000} = 1.101$ $3 \frac{101}{1000} = 3.101$

- Reason about the location of any number with up to 2dp by compare decimal numbers up to three decimal places using greater than, less than and equals signs e.g. $1.056 > 1.05$
- Order decimal numbers up to three decimal places.

Parts
Whole
Denominator
Numerator
Unit fraction
Non-unit fraction
Simplifying
Equivalent
Vinculum (fraction line)
Halves
Tenths
Quarters
Eighths
Thirds
Sixths
Fifths
Associate fraction line with division
Mixed numbers
Proper fractions
Improper fractions
Convert
Greater than 1
Multiples
Common denominator
Lowest common multiple
Highest common multiple
Operator
Scaling

Decimal point
Decimal places (dp)
Place value
Tenths
Hundredths
Thousandths
Mixed number
Improper fractions
Relate
See previous fraction vocab

Per cent
Out of 100
Denominator
Numerator

- Compare and order decimals and fractions (tenths, hundredths, thousandths) by converting fractions to decimals.

E.g. $0.34 > \frac{32}{1000}$

$\frac{32}{1000} = 0.032$ is less than 0.34 as there are no tenths.

- Compare and order decimals, improper fractions and mixed numbers by converting them to decimals first e.g.

$2\frac{52}{1000}$, $2\frac{51}{100}$, 2.5, $\frac{232}{100}$

2.052 2.51 2.5 2.32 (then order)

- Identify the previous and next multiple of 1 and 0.1 in numbers with 2 dp.
- Round decimals to the nearest whole number.
- Round decimals with two decimal places to one decimal place.

Percentages (2 weeks)

- Know that the % symbol means per cent which is the number of parts per 100.
- Write percentages as a fraction with the denominator 100.
- Recognise and write percentages as a decimal. E.g. 33 out of 100 squares are shaded = $33\% = \frac{33}{100} = 0.33$.
- Know the percentage and decimal equivalences of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and fractions with denominator of a multiple of 10 and 25.
- Solve problems with percentage and decimal equivalences of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and fractions with denominator of a multiple of 10 and 25.

Measurement (2 weeks) – perimeter and area

- Know that the perimeter of a 2D shape is the distance all around it.
- Measure and calculate the perimeter of composite, rectilinear shapes in centimetres and metres.
- Use knowledge of 2D shape properties to calculate lengths of missing shape sides and the perimeter e.g. squares have four equal sides.
- Know that the area is the total surface of/space inside a shape.
- Know that area can be calculated using number of squares (non-standard unit of measure), square centimetres with the notation of (cm²) or square metres with the notation of (m²).
- Calculate and compare the area of rectangles (including squares) using standard units.
- Estimate the area of irregular shapes e.g. using non-standard units of measure such as squares/half squares.

Equivalences
Multiples

Place value
Place holders
Greater
Less than
Smallest
Largest
Ascending
Descending

Nearest whole
Nearest tenth
Nearest hundredth

Perimeter
2D shape
Shape properties
Parallel sides
Equal sides
Sum of sides/lengths
Standard measurement units: centimetres, metres.
Composite, rectilinear shapes
Compound shapes
Non-standard units: squares, half squares
Square centimetres (cm²)
Square metres (m²)
Area

<p>Fractions (1 week)</p> <ul style="list-style-type: none"> • Multiply proper fractions by whole numbers (supported by concrete resources and diagrams). • Multiply mixed numbers by whole numbers (supported by concrete resources and diagrams). • Calculate fractions of amounts (finding non-unit fractions of quantities). • Use fractions as operators (when fractions act as a function in a calculation) e.g. know that $\frac{1}{4}$ of 8 means $\frac{1}{4} \times 8$. • Solve problems involving multiplication and division, including scaling by simple fractions. <p>Review week- (1 week)</p>	<p>Area of a rectangle = Base x Height Estimate</p>
<p>Summer Term</p>	
<p>Geometry - Angles and properties of shape (2 weeks)</p> <ul style="list-style-type: none"> • Know that angles are measured in degrees. • Recognise, estimate and compare angles measured in degrees e.g. acute, obtuse and reflex angles and relate them to right angles. • Identify: <ul style="list-style-type: none"> –angles at a point and one whole turn total 360°. –angles at a point on a straight line and $\frac{1}{2}$ turn total 180°. –other multiples of 90° e.g. $\frac{3}{4}$ turn = 270°. • Know that angles are measured using a protractor. • Know and follow the steps to measure angles accurately with a protractor: <ol style="list-style-type: none"> 1) Line up the zero line of the protractor with one of the angle lines. 2) Line up centre mark with the exact point of the angle. 3) Follow scale from the zero mark to the completed turn. 4) Read the angle from the correct scale. • Draw given angles and measure them in degrees. • Check the accuracy of drawn lines and angles by measuring them with relevant equipment e.g. ruler (in cm/mm), protractor (in degrees). • Calculate angles on a straight line and angles around a point. • Calculate angles in shapes, applying knowledge of angle facts. <p>Decimals (1 week)</p> <p>In order to problem solve with decimal notation (using all four operations) in different contexts e.g. money:</p> <ul style="list-style-type: none"> • Add decimals with up to 3 decimal places. • Apply place-value knowledge to known additive number facts (scaling facts by 1 tenth or 1 hundredth), for example: $8 + 6 = 14$ $0.8 + 0.6 = 1.4$ $0.08 + 0.06 = 0.14$ 	<p>Angles Measure Protractor Degrees Acute Obtuse Reflex Right angle At/around a point Straight line Shape properties Whole turn Half turn Quarter turn Clockwise Anticlockwise Total Interior angles Knowledge of 2D shapes</p> <p>Decimal places</p>

- Subtract decimals with up to 3 decimal places.
- Add and subtract decimals with different numbers of decimal places.
- Use the most efficient method to add and subtract decimals e.g. formal written method/using knowledge of number bonds.
- Multiply decimals by 10, 100 and 1000. Understand this as equivalent to making a number 10 or 100 times the size.
- Divide decimals by 10, 100 and 1000. Understand this as equivalent to 1 tenth or 1 hundredth times the size.
- Apply place-value knowledge to known multiplicative number facts (scaling facts by 1 tenth or 1 hundredth), for example:
 $3 \times 4 = 12$ $0.3 \times 4 = 1.2$ $0.03 \times 4 = 0.12$

Measure – converting units (2 weeks)

- Know that to compare or calculate between measurements, first convert them into the same unit of measure.
- Use multiplication and division by 10,100 and 1000 to convert between units of measure using common decimals and fractions:
 - centimetres and millimetres (length)
 - metres and centimetres (length)
 - kilometres and metres (length)
 - kilograms and grams (mass)
 - litres and millilitres (capacity)
 - pounds and pence (money)
- Use all four operations to solve problems involving measure [for example, length, mass, capacity, money] using decimal notation, including scaling.
- Estimate capacity using non-standard units of measure e.g. water.
- Know that imperial units are old units of measure used before metric units of measure.
- Know what could be measured using imperial units.
- Understand and use approximate equivalences between imperial and metric units of measure for length, mass and capacity:
- Know that the symbol for approximate is \approx
- Know that approximate equivalences for units of measure (metric \approx common imperial units) are:
 - $2.5 \text{ cm} \approx 1 \text{ inch}$ (length)
 - $1 \text{ kg} \approx 2.2 \text{ pounds}$ (mass)
 - $4.5 \text{ l} \approx 1 \text{ gallon}$ (capacity) and $1 \text{ gallon} \approx 8 \text{ pints}$.
- Use knowledge of metric and imperial equivalences, multiplication and division to solve problems.

Tenths
 Hundredths
 Thousandths
 Efficiency
 Formal
 Mental
 Moving digits right
 Moving digits left

Same unit of measure
 Metric
 Length
 Millimetres
 Centimetres
 Metres
 Kilometres
 Mass
 Grams
 Kilograms
 Capacity
 Litres
 Millilitres
 Four operations
 Decimal notation
 Money
 Scaling
 Estimate
 Non-standard
 Imperial units
 Approximate
 Inch
 Pounds
 Gallon
 Pints

Review (1 week)

Converting between units of time – (1 week)

- To understand fraction and decimal equivalences of minutes and hours e.g. $\frac{1}{4}$ hour = $\frac{1}{4}$ of 60 = 15 minutes not 25 minutes.
So 4.25 hours = 4 $\frac{1}{4}$ hours = 4 hr 15 mins
- Apply knowledge that
60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
12 months = 1 year
to solve problems involving converting between different units of time.

Equivalences
Hours
Minutes
Seconds
Days
Weeks
Months
Years
Units

Statistics (tables, including timetables) - 1 week

- Interpret information presented in timetables (showing 12 and 24 hour times) and two-way tables (representing more than one data set).
- Using addition and subtraction to answer questions about timetables and two-way tables to include comparing, ordering and working out duration.
- Complete information in tables, including time tables.

Interpret
Timetables
Two-way tables
Data set
Addition
Subtraction
Compare
Order
Duration

Geometry – properties of shapes (1 week)

- Identify regular polygons as 2D shapes which have all equal angles and all equal length sides.
- Give examples of a regular polygon and explain its properties e.g. parallel and perpendicular lines, a square is the only regular quadrilateral as it has all equal angles and all equal length sides.
- Identify irregular polygons as 2D shapes which do **not** have all equal angles or all equal length sides.
- Distinguish between regular and irregular polygons based on reasoning.
- Identify and reason about 3D shapes, including cubes and cuboids, from 2D representations.

Regular polygons
2D shapes
Equal angles
Equal length sides
Parallel lines
Perpendicular lines
Regular quadrilateral
Irregular polygons
3D shapes
Cubes
Cuboids
Faces
Vertices
Sides
2D representations

Measure - volume (1 week)

- To know that volume is the amount of space that an object fills.
- Know that volume can be measured in unit cubes, represented with the notation (3).
- Compare volume of objects.

Volume
3D shapes
Unit cubes
Compare

<ul style="list-style-type: none"> • Know that if two shapes are made from the same number of unit cubes, then they have the same volume. The cubes can be arranged differently to make different shapes. • Estimate volume using non-standard units of measure e.g. 1 cm³ blocks. • Use all four operations to solve problems involving volume, using decimal notation and including scaling. 	<p>Non-standard Length / height Width Depth Volume = L x W x D Decimal notation Scaling</p>
<p>Review week (1 week)</p>	
<p><u>Geometry (position and direction) – (1 week)</u></p>	
<ul style="list-style-type: none"> • Identify, describe and represent the position of a shape following a reflection. • Know that the shape has not changed and the new shape will be at equal distance from the reflection (mirror) line as the original shape. • Identify and represent the position of a shape following a reflection with co-ordinates, describing using the language of co-ordinates. E.g. Calculate the reflection with co-ordinates by calculating the distance from the mirror line to the point and using this to work out the value of the new coordinates, noting which coordinates will change and which ones will stay the same. • Identify, describe and represent the position of a shape following a translation. Know that the shape has not changed; it has moved in a direction. • Identify and represent the position of a shape following a translation with co-ordinates, describing using the language of co-ordinates. 	<p>Positioning Shape Reflection Equal distance Reflection (mirror) line Co-ordinates Translation Position Direction</p>
<p>2 weeks assess and review</p>	