JAMES COOK
LEARNING TRUST

YEAR 5

MATHS CURRICULUM

KNOW IT

New Learning | Prior Learning

YEAR 5

PLACE VALUE

- Roman Numerals to 1000
- Roman Numerals 1-100
- Know the value of each digit in a 7-digit number.
- Know the value of each digit in 4 digit numbers.
- Count forwards/backwards in steps of powers of 10 for any given number up to 1,000,000.
- Count forwards and backwards crossing zero
- Count in multiples of 7, 9, 25 and 1000
- Find 1000 more or less.
- Count backwards through 0 to include negative numbers.

CALCULATIONS

- Know the prime numbers to 20 are 2,3,5,7,11,13,17,19.
- Know all times tables up to 12 x
- Know all division facts for times tables up to 12 x

FRACTIONS, DECIMALS & PERCENTAGES

- 0.1 = $^{1}/_{10}$= 10%
- 0.01= $^{1}/_{100}$ = 1%
- 0.5=$^{50}/_{100}$ =50%
  0.25 = $^{25}/_{100}$=25%
- 0.2 = $^{1}/_{5}$= 20%
  0.4 = $^{2}/_{5}$ = 40% etc
- Recognise the per cent symbol (%) means number of parts per 100.
- $^{1}/_{10}$= 0.1 $^{1}/_{100}$=0.01 ¼= 0.25 ½ = 0.5 ¾ = 0.75 $^{100}/_{100}$ = 1 whole
- Count in thousandths forwards and backwards.
- Count in hundredths forwards and backwards.

MEASURES

- Area of a rectangle = l x w
  Perimeter of a rectangle = (2 x l) + (2 x w)
- 1000ml=1l
- 1 litre = 1.75 pints
- inch = 2.5 cm; 1 foot = 12 inches
- 1 kg = 2.2lb
- 1000m=1km

GEOMETRY

- Angles at a point (1 whole turn) total 360°
- Angles on a straight line (and half a turn) total 180°
- Reflex angles are greater than 180° and less than 360°
- Acute angles are less than 90°
- Obtuse angles are between 90° and 180°
- Know isosceles, equilateral, right angle and scalene triangle.
- Identify rhombus

New Learning | Prior Learning

TEACH IT: NUMBER & PLACE VALUE

YEAR 5

KEY OBJECTIVES

- Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit.
- Read, write, order and compare numbers beyond 1000.
- Recognise the place value of each digit in a 4 digit number.
- Count forwards or backwards in steps of power of 10 for any given number up to 1,000,000.
- Count in multiples of 6, 7, 9, 25 & 1000.
- Find 1000 more/less than a given number.
- Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000.
- Round any number to the nearest 10, 100 or 1000.
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.
- Count backwards through 0 to include negative numbers.
- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.
- Read Roman numerals to 100 (I to C).

POSSIBLE TEACHING SEQUENCE

Read, write, order and compare...

⇒ Know the value of TTh, HTh and M.

⇒ Read and write up to 7 digit numbers and estimate their position on a blank number line.

⇒ Partition in different combinations e.g. 1, 256,000 is equal to 12 HTh and 56 thousands.

⇒ Use <, >, = signs.

⇒ Order a given set of numbers-could include Roman numerals in list.

Count forwards and backwards...

⇒ Recognise powers of 10 and associate with place value columns.

⇒ Count in steps of powers of 10 from a multiple of 10; count from any given multiple.

⇒ Bridge TTh, HTh and M.

Round any number up to 1,000,000...

⇒ Identify the digit within the number rounding to.

⇒ Recognise position of number in relation to power of 10 either side and place on number line.

⇒ Determine which multiple the number is closest to and round to given multiple.

⇒ Spot patterns and apply when rounding e.g. 4 or below, round down.

Interpret negative numbers...

⇒ Understand the concept of zero and the concept of negative numbers in context e.g. temperature, money overdrafts etc

⇒ Count backwards/forwards crossing zero in different steps e.g. 1, 5, 10, 100 etc

⇒ Use negative symbol and terminology e.g. negative 4 not minus 4.

⇒ Estimate where negative numbers come on a number line.

Read Roman numerals...

⇒ Introduce Roman numeral M and D.

⇒ Know the rules of reading Roman numerals.

STEM SENTENCES

- 'There are ten thousands in a ten thousand.'
- 'There are ten, ten thousands in a hundred thousand.'
- 'There are ten hundred thousands in a million.'
- '4,321,000 is 4 millions and 321 thousands;

  4,321,000 is 43 hundred thousands and 21 thousands etc.'
- When rounding to the nearest___, if the _____digit is 4 or less, round down. If the ____ digit is 5 or more than round up.'

KEY TERMINOLOGY

- **Represent**
- **Representation**
- **Value**
- **Sequence**
- **Identify**
- **Estimate/ Approximate**
- **Ten thousands (see STEM sentence)**
- **Hundred thousands**
- **Millions**
- **Roman Numerals**
- **Digit**
- **Partition**
- **Inequality symbol**
- **Ascending**
- **Descending**

COMMON MISCONCEPTIONS

- Saying digits instead of reading a number e.g. reading 56,078 as 5, 6, 0, 7, 8 rather than 56 thousands and seventy eight.
- Reading thousands digits as a hundreds number e.g. 2, 432, 107 '432' instead of 432 thousands.
- Dropping the digits prior to the value you are rounding e.g. round 123,456 to the nearest 1000, pupil gives answer of 3000.
- Looking at the wrong column when rounding e.g. looking at 10,000 column when rounding to the nearest 10,000.

KEY VOCABULARY

⇒ **Round**-giving a number a nearby value when you don't need it to be exact.

⇒ **Negative number –** any number less than zero written with a negative sign.

⇒ **Positive number**– any number greater than zero.

⇒ **Multiple–** product of one number multiplied by another number.

⇒ **Power of 10**-ten multiplied by itself a certain number of times.

New Learning | Prior Learning

TEACH IT: ADDITION & SUBTRACTION

YEAR 5

KEY OBJECTIVES

- Add and subtract numbers mentally with increasingly large numbers.
- Add, subtract numbers mentally including:
  - 4 digit number and ones
  - 4 digit number and tens
  - 4 digit number and hundreds.
- Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).
- Add and subtract numbers with up to 4 digits using formal written methods of columnar addition and subtraction.
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

POSSIBLE TEACHING SEQUENCE

Add and subtract mentally including…

⇒ Count forwards and backwards in ones, tens, thousands, tens of thousands and hundreds of thousands.
⇒ Know the place value of numbers up to 1 million.
⇒ Use place value to add and subtract multiples of 10, 100, 1,000, 10,000, 100,000 and 1 without bridging. *Moving onto including bridging.*
⇒ Use knowledge of number bonds to help them bridge.
⇒ Use rounding and adjusting to add numbers close to multiples of 10.
⇒ Use visual aids such as number lines and jottings to help them keep track of their calculations.

Add and subtract numbers with more than 4 digits…

⇒ Read and write numbers up to 1 million.
⇒ Use knowledge of place value to line the numbers accurately (up to 1 million)
⇒ Use a range of manipulatives to demonstrate their understanding, including pictorial representations
⇒ Add/subtract numbers up to 6 digits with no regrouping/exchanging.
⇒ Add/subtract numbers up to 6 digits with one regroup/ exchange.
⇒ Add/subtract numbers up to 6 digits with more than one exchange.
⇒ Know '0' as a place holder.

For above addition & subtraction also refer to Calculation Policy.

Use rounding to check…*See Place Value for Rounding Guidance.*

⇒ Round to the nearest 10, 100, 1000, 10,000, and 100,000.
⇒ Use knowledge of rounding to estimate and give approximate answers.

STEM SENTENCES

- 'I know that 6 hundreds + 7 hundreds= 13 hundreds/1300 so I know that 6 thousands + 7 thousands= 13 thousands/13,000.'
- 'I know that 13—6 = 7 so I know that 130 - 60 = 70 and 1300 - 600=700.'
- 'For calculations that involve both + and - steps, we can + then-or-then +; the final answer is the same.'
- ' In column addition/subtraction, we start at the right hand side.'
- 'If the column sum is equal to 10 or more then we must regroup.'
- 'Subtraction cannot be done in any order.'
- ' When using column subtraction, if the digit on the top is lower in value than that of the digit on the bottom then exchange.'

KEY TERMINOLOGY

- **Mental**
- **Efficient**
- **Calculate**
- **Calculation**
- **Partition**
- **Add**
- **Addition**
- **Sum**
- **Total**
- **Plus**
- **Altogether**
- **Subtract**
- **Difference**
- **Fewer**
- **Less**
- **Takeaway**
- **Minus**
- **More**
- **Combined**
- **Column**
- **Row**
- **Exchange**
- **Regroup**

COMMON MISCONCEPTIONS

- Children may be unsure which number to place on top of the calculation and why this matters. For example: 3,454 – 3,212. Some children may place the smallest number on top and therefore complete the calculation incorrectly.
- Failing to understand place value in a calculation.
- Inaccurate application of number bonds when calculating mentally e.g. 4000-570=3530.
- Using formal written methods for every calculation rather than choosing the most efficient method.

	Th	H	T	O
	3	6	2	9
	7	8	3	
+				

KEY VOCABULARY

⇒ **Approximate**: an estimation of an answer or rounding a number to its nearest place value.
⇒ **Commutative law**: In addition and multiplication, numbers can be added or multiplied in any order.
⇒ **Multi-step**: mathematical problems that require more than one operation

New Learning | Prior Learning

TEACH IT: MULTIPLICATION & DIVISION

YEAR 5

KEY OBJECTIVES

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers.
- Recognise and use factor pairs and commutativity in mental calculations e.g. 7 x 6 = 7 x 3 x 2.
- 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.
- Use the distributive law to multiply 2 digit numbers by 1 digit.
- Multiply two digit and 3 digit numbers by a one digit
- Multiply and divide numbers mentally, drawing upon known facts.
- Recall multiplication and division facts from multiplication tables up to 12 x 12.
- Use place value, known and derived facts to multiply and divide mentally including, multiplying by 0 and 1; dividing by 1; multiplying together 3 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
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)

POSSIBLE TEACHING SEQUENCE

Identify multiples and factors...

⇒ Continue to embed rapid recall of times tables and related division facts

⇒ Use the vocabulary factor, multiple and product and identify all the factors of a given number e.g. the factors of 20 are 1, 2, 4, 5, 10 and 20.

⇒ Identify factors systematically so that none are missed out.

Know and use the vocabulary of prime numbers…. Establish…

⇒ Recognise that numbers with only 2 factors are prime numbers & apply knowledge of multiples and divisibility tests to identify the prime numbers less than 100.

⇒ Understand that 73 children can only be organised as 1 group of 73 or 73 groups of 1, whereas 44 children could be organised as 1 group of 44, 2 groups of 22, 4 groups of 11, 11 groups of 4 etc.

⇒ Explore the pattern of primes on a 100-square, explaining why there will never be a prime number in the tenth column and the fourth column.

Multiply numbers up to 4-digits…

⇒ Develop and refine written methods for multiplication. Moving from expanded layouts (such as the grid method) towards a compact layout for HTO × O and TO × TO calculations.

⇒ Approximate answer before starting a calculation and use this to check answer sounds sensible e.g. 56 × 27 is approximately 60 × 30 = 1800.

Multiply and divide numbers mentally…

⇒ Rehearse multiplication facts and use these to derive division facts, to find factors of two-digit numbers and to multiply multiples of 10 and 100, e.g. 40 × 50.

⇒ Use factors to work out a calculation such as 16 × 6 by thinking of it as 16 × 2 × 3.

⇒ Use strategies such as round and adjust e.g. 39 x 20 calculate 40 x 20 then subtract 20 and doubling and halving e.g. 3.5 x 12 = 7 x 6.

Divide numbers up to 4 digits by…

⇒ Extend written methods for division to include HTO ÷ O, including calculations with remainders. Increase efficiency of methods used: see calculation policy.

Recognise and use square and cube numbers…

⇒ Use knowledge of multiplication facts to derive quickly squares of numbers to 12 × 12 and the corresponding squares of multiples of 10.

STEM SENTENCES

- 'For every group of 10, there are 2 groups of five.'
- 'If I double one factor, I must halve the other factor for the product to stay the same.'
- 'If I multiply one factor by two, I must halve the other factor for the product to stay the same.'
- 'If I multiply the dividend by __, I must multiply the divisor by __ for the quotient to stay the same.'
- 'If I divide the dividend by 2, I must divide the divisor by 2 for the quotient to stay the same.'
- '1 is a factor of all positive integers.'
- 'Every positive integer is a factor of itself.'
- 'The smallest factor of a positive number is always 1.
- 'The largest factor of a positive integer is always itself.'
- 'Numbers that have more than two factors are composite numbers.
- If you change the order of factors, the product always remains the same.
- When a number is divided by 10, the digits move one place to the right.
- When a number is multiplied by 10, the digits move one place to the left.

KEY TERMINOLOGY

- **Multiples**
- **Factors**
- **Common Factors**
- **Prime**
- **Composite**
- **Squared (²) number**
- **Cubed (³) number**
- **Dividend**
- **Divisor**
- **Quotient**
- **Integer**
- **Product**
- **Tenth**
- **Hundredth**
- **Thousandth**
- **Commutative**

COMMON MISCONCEPTIONS

- Just adding a zero when multiplying by powers of 10. Making reference to decimal numbers where this '*cheat*' does not work, i.e. 0.7 x 10 = 7 ***not*** 0.70
- Not using a 'place holder' when multiplying by a 2 digit number.
- Confusing a multiple and a factor
- When finding the product of a squared number (²), children may 'x' the number by 2 and not by itself.
- When finding the product of a cubed number (³), children may 'x' the number by 3 and not by itself and itself again.

PATTERNS

♦ Please refer to the Y3 and Y4 curriculum for multiplication patterns.

KEY VOCABULARY

⇒ **Multiple**-the product of one number x by another.

⇒ **Factor**-a whole number that divides exactly into another.

⇒ **Prime number**: a number divisible by only 2 factors: 1 and itself.

⇒ **Composite number**: has factors **in** addition to 1 and itself.

⇒ The number that is divided is called the **dividend** and the number which the **dividend** is being divided by is the **divisor**. The answer to a division problem is the **quotient.**

⇒ **Integer**: a whole number.

⇒ **Squared number** (²): the product of a number x by itself.

New Learning | Prior Learning

TEACH IT: FRACTIONS, DECIMALS & PERCENTAGES YEAR 5

Key Objectives

- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.
- Compare and order fractions whose denominators are all multiples of the same number.
- Recognise and show, using diagrams, families of equivalent fractions.
- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number.
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number.
- Add and subtract fractions with the same denominator beyond one whole.
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
- Read and write decimal numbers as fractions.
- Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.
- Recognise and write decimal equivalents for tenths, hundredths, ¼, ½, ¾.
- Read, write, order and compare numbers with up to 3 decimal places.
- Compare and order numbers with the same number of decimal places up to two decimal places.
- Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place.
- Round decimals with one decimal place to the nearest whole.
- Recognise the percent symbol and understand that percent relates to number of parts in 100 and write percentages as a fraction (with denominator 100) and as a decimal.
- Find the effect of dividing a 1 or 2 digit number by 10 and 100, identifying the value of the digit in the answer as ones, tenths and hundredths.
- Know percentage and decimal equivalents of ½, ¼, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$ and those fractions with a denominator of a multiple of 10 and 25.

Possible Teaching Sequence

Identify, name… Compare and order…

⇒ Explore visual representations of equivalent fractions, linking to common factors and multiples.

⇒ Apply knowledge of equivalent fractions to ensure a given set of values all have the same denominator.

⇒ Compare and order fractions in ascending and descending order, and using <, > and =.

⇒ Count up and down in fraction steps, including mixed numbers e.g. 1, 1½, 2, 2½.

Recognise mixed…

⇒ Building on prior learning that equivalent numerators and denominators equal a whole, recognise proper and improper fractions.

⇒ Use bar models to show how many parts are in an improper fraction/mixed number and use to convert between two, recording as mathematical statements.

Add and subtract…

⇒ Use equivalence to convert denominators to the same multiple.

⇒ Recognise we subtract/add parts (numerator) that we have, writing answer as a mixed number.

Multiply proper fractions…

⇒ Recognise multiplication sentence as repeated addition and represent this visually, counting number of parts that result.

⇒ Extend this to mixed numbers, multiplying wholes and parts separately and then totalling at the end.

Read and write decimals…Recognise and use thousandths…

⇒ Recognise a decimal as a fraction of a whole.

⇒ Recognise value of t, h, th in relation to diving a whole by 10, 100, 1000.

⇒ Link knowledge of fractions to decimals e.g. 23 ÷ 1000 = $^{23}/_{100}$= 0.023.

Read, write, order…

⇒ Recognise the value of t, h, th in relation to a whole through use of visual representations and apply knowledge to comparing.

⇒ Recognise what 2 or 3 decimal places means.

Round decimals…

⇒ Recognise which whole or tenth are either side of the decimal being rounded and place decimal in relation to these on a number line, recognising which value it is closer to.

Recognise percent…Know percentage…

⇒ Know and understand % symbol, linking to place value knowledge of decimal t, h and fractions out of 100.

⇒ Use knowledge to convert between F, D and P.

⇒ Use equivalence to convert common fractions to out of 100 and changes these to decimals and percentages.

Stem Sentences

- 'When adding/subtracting fractions, check that the denominators are the same, then add/subtract the parts.'
- 'To find an equivalent fraction, you must multiply/divide both the numerator and denominator in the same way.'
- 'When comparing fractions with the same denominators, the greater the numerator, the greater the fraction.'
- 'If numerators are the same, the greater the denominator, the smaller the fraction.'
- 'I know that $/_{1000}$ is the same as ÷1000.'
- '1 whole is a thousand, thousandths.'

Key Terminology

- **Fraction**
- **Tenths**
- **Hundredths**
- **Thousandths**
- **Equal**
- **Part**
- **Equivalent**
- **Whole**
- **Factors**
- **Multiples**
- **Decimal point**
- **Improper fraction**
- **Decimal**
- **Numerator**
- **Denominator**

Common Misconceptions

- Not fully understanding that a whole can be made up of parts, such as in the context of mixed numbers.
- Only converting denominators and not numerators or vice-versa
- Adding/subtracting the denominators e.g ¾ + ⅝ = $^{8}/_{12}$
- Multiplying both numerator and denominator by a whole e.g. ½ x 3 = $^{3}/_{6}$
- Reading a decimal as zero point three hundred and 24 instead of zero point three two four.
- Thinking a thousandth is greater than a tenth e.g. 0.1 < 0.009.

Key Vocabulary

⇒ **Mixed number –** a number made up of a whole number and a fraction.

⇒ **Percent/Percentage** - a part out of a hundred.

⇒ **Decimal place –**the position of a digit to the right of the decimal point.

⇒ **Proper fraction –** a fraction where the numerator is less than the denominator.

⇒ **Improper fraction –** a fraction where the numerator is greater than the denominator; a fraction larger than a whole.

New Learning | Prior Learning

TEACH IT: MEASURES

YEAR 5

KEY OBJECTIVES

- Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre).

- Convert between different units of measure e.g. km to m/ hours to minutes.
- Estimate, compare and calculate different measures including money in pounds and pence.

- 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.

- Measure and calculate the perimeter of a rectilinear figure (including squares) in cm and m.
- Find the area of rectilinear shapes by counting squares.

- 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 .

- 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.

POSSIBLE TEACHING SEQUENCE

Convert between different units of measure…

⇒ Throughout use practical equipment and take measurements themselves
⇒ Identify what kilo means
⇒ Convert from km to m and kg to g and vice versa. Use dividing and x by 1000
⇒ Convert fractions of km to m
⇒ Use bar models and double number lines to visualise conversions
⇒ Compare m with km etc.
⇒ Milli means 1000. Repeat above for mm to m and ml to l and vice versa
⇒ Repeat for cm and m.

Understand and use approximate equivalences between metric…

⇒ Physically use the measurements in the classroom alongside metric units
⇒ Use given stem sentences to compare measurements given in diff units
⇒ Use bar models to help with conversions.

Measure and calculate the perimeter…

⇒ Measure perimeter of rectangles without grids – accurate use of ruler
⇒ Measure perimeter of rectilinear (compound) shapes – accurate use of ruler
⇒ Encourage marking off of sides as they add them up to prevent repetition of counting or omission of sides
⇒ Consider alternative methods when dealing with rectangles e.g. l+w+l+w or (l+w) x 2
⇒ Use perimeter and labelled sides to work out unknown lengths.

Calculate and compare the area of rectangles…

⇒ Recap counting squares to find the area and that area is the amount of space a shape covers and is measured in squared units (cm2 and m2)
⇒ Use a formula to calculate the area: area = l x w
⇒ Estimate areas of rectangles, calculate and compare / order
⇒ Is a square a rectangle? How should we calculate its area?
⇒ Can we use Area = l x w for any shape?
⇒ Calculate area of compound shapes – split into 2 separate rectangles
⇒ Split compound shapes in different ways and calculate areas
⇒ Find area of a compound shape by making it a complete rectangle and using subtraction of area of added piece
⇒ Find area of irregular shapes by counting squares – identify whole and part squares; find 2 parts that can make an approximate whole.

Estimate volume and capacity…

⇒ Understand that volume is the amount of solid space something takes up
⇒ Use cm cubes to make solid shapes & relate to the units for volume – cm3
⇒ Make different shapes with the same volume and discuss how the volume is the same / still takes up the same amount of space
⇒ Compare and order different solids that are made of cubes
⇒ Begin to calculate volume without counting cubes
⇒ Identify how volume and capacity differ
⇒ Estimate, measure and compare both volumes and capacities
⇒ Explore how containers can be different shapes but still hold the same capacity.

STEM SENTENCES

- 'To convert km / kg / l to m /g / ml multiply by 1000.'
- To convert m/ g / ml to km / kg / l divide by 1000.'
- 'To convert cm to m divide by 100.'
- 'To convert m to cm multiply by 100.'
- '1 inch is approximately 2.5cm.'
- '1kg is approximately 2 pounds.'
- '1 pint is approximately ½ a litre.'
- Perimeter is the distance around the outside of a 2D shape.'
- 'Area is the amount of space a shape covers and is measured in squared units.'
- 'Capacity is the amount a container or object can hold.'
- 'Volume is the amount of solid space occupied by an object.'

KEY TERMINOLOGY

- **Mass**
- **Weight**
- **Scale**
- **Length**
- **Volume**
- **Capacity**
- **Perimeter**
- **Increments/divisions · a.m. · p.m. ·**
- **Distance**
- **Area**
- **Analogue · Digital · Standard units · Non-standard units**
- **Regular / irregular**
- **Rectilinear / compound shapes**
- **Approximate**
- **Inches, pints, pounds**

COMMON MISCONCEPTIONS

- Not knowing the difference between perimeter and area.
- Not knowing the difference between volume and capacity.
- Thinking that 100g = 1kg and 100 m = 1km or 1000cm = 1m
- Difficulties converting between minutes and hours e.g. 0.75 hours = 75 minutes
- Believing time is a decimal and using the column method to calculate differences in time

KEY VOCABULARY

⇒ **Capacity** –the amount a container or object can hold, (measured in ml/l).

⇒ **Volume**– amount of solid space occupied by an object (measured in cm^3).

⇒ **Perimeter**-the distance around the outside of a 2D shape.

⇒ **Area**-the amount of space a shape covers

New Learning | Prior Learning

TEACH IT: GEOMETRY

YEAR 5

KEY OBJECTIVES

- Identify 3D shapes, including cubes and cuboids from 2D representations.
- 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.

- Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.

- Know that 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-360°;
  - angles at a point on a straight line and ½ a turn;
  - other multiples of 90°.

- Identify acute and obtuse angles and compare and order angles up to two right angles by size.

- 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.

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

POSSIBLE TEACHING SEQUENCE

Identify 3D shapes...

⇒ Know terminology associated with 3D shapes e.g. faces, edges, vertices, base, parallel faces.

⇒ Identify how 3D shapes are constructed from faces consisting of 2D shapes.

⇒ Recognise specific features of 3D shapes from different representations, including 2D images.

Know angles... Draw given angles...

⇒ Building on acute and obtuse (Y4) identify angles that are greater than 180° and associate with terminology.

⇒ Recognise angles within a range of representations (e.g. irregular shapes) and state whether they are acute, obtuse or reflex.

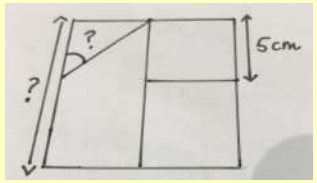
⇒ Know angles are measured in degrees and how to use a protractor.

⇒ Estimate the size of and measure angles, including reflex, in a range of representations using angle knowledge to justify their answers.

Identify angles...

⇒ Building on knowledge from Y3 of turns and right angles, recognise a quarter turn as 90°, a ½ turn as 180° (straight line), a ¾ turn as 270° and a full turn as 360°.

Use the properties...



Children should use the idea that they can form another square within the rectangle to determine that angle ? is ½ a right angle and use ideas such as parallel sides in rectangles are equal lengths to determine the length of the missing side.

Identify, describe and represent...

⇒ Know that the concept of translate is to move.

⇒ Calculate how many units a vertex has been translated by.

⇒ Translate each vertex and join to complete a shape.

⇒ Building on Y4, reflect shapes within 1 quadrant and write new coordinates.

STEM SENTENCES

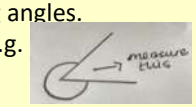
- 'A reflex angles is greater than 180° but less than 360°.'
- 'When we read coordinates, we read x then y.'
- 'Parallel lines are lines that never meet and are an equal distance apart.'
- 'Perpendicular lines meet at a right angle.'
- 'To translate a shape, count the jumps.'

KEY TERMINOLOGY

- **Acute**
- **Obtuse**
- **Regular**
- **Irregular**
- **Polygon**
- **Vertices**
- **Faces**
- **Base**
- **Edges**
- **Reflection**
- **Translation**
- **Parallel**
- **Protractor**
- **Perpendicular**
- **Diagonal**
- **coordinate**

COMMON MISCONCEPTIONS

- Not counting hidden vertices, faces and edges on a 2D representation of a 3D shape.
- Reading the wrong scale when measuring angles.
- Measuring acute angle instead of reflex e.g.



- Not recognising reflex angles within irregular shapes e.g.

- Counting squares not jumps when translating
- Translating, instead of flipping a shape around a mirror line.

KEY VOCABULARY

⇒ **Prism**— a 3D shape with two parallel faces that are the same 2D shape. All the other faces are rectangles.

⇒ **Pyramid**-a 3D shape with triangular sides that meet at a point. The base is a 2D shape.

⇒ **Regular** – a shape with all sides and angles equal.

⇒ **Irregular** – a shape where sides and angles are different sizes and lengths.

New Learning | Prior Learning

TEACH IT: STATISTICS

YEAR 5

KEY OBJECTIVES

- Solve comparison, sum and difference problems using information presented in a line graph.
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.
- Interpret and present discrete and continuous data using appropriate graphical methods including bar charts and time graphs.
- Complete, read and interpret information in tables, including timetables.

POSSIBLE TEACHING SEQUENCE

⇒ **Solve comparison, sum and difference problems...**
⇒ Reading between intervals, giving an estimate of the value that is represented
⇒ Use ruler to support reading of axes
⇒ Writing a story to explain what is happening in a line graph
⇒ Draw axis with different scales, understanding which multiples are most appropriate for labelling intervals on axes and impact on accuracy
⇒ Collect own data to represent in line graphs. Links to science e.g. measuring shadows over time, melting and dissolving substances or plant growth
⇒ Solving comparison, sum and difference problems:
⇒ Determine highest and lowest values
⇒ Calculate differences between highest and lowest values
⇒ Calculate length of time taken for a certain event
⇒ Generate own questions .

Complete, read and interpret information in tables…
⇒ Interpret discrete data from a table
⇒ Collect, present and interpret own information
⇒ Read and interpret two way tables
⇒ Complete missing information on a two way table
⇒ Extract information from a timetable.

STEM SENTENCES

- 'What does the x axis represent? The x axis represents…'
- 'What does the y axis represent? The y axis represents…'
- 'X runs along the bottom, y goes up the side.'

KEY TERMINOLOGY

- **Interpret**
- **Represent**
- **Scale**
- **Data**
- **Intervals**
- **Table**
- **Timetable**
- **Interval**
- **Axis**
- **Multiples**
- **Constant rate**
- **Two way table**

COMMON MISCONCEPTIONS

- Mixing up the x and y axis.
- Uneven intervals when drawing their own graphs.
- Plotting information on the graph incorrectly.
- Believing that the larger durations of time on a timetable equate to the fastest.
- When reading two way tables, pupils might just look at either the row or column but not both.
- When solving questions on a two way table about bus/train times they may use column subtraction/addition to get a time instead of a number line.

KEY VOCABULARY

⇒ **Interval–** between 2 points or values.
⇒ **Scale-**a series of marks equally spaced apart on an axis.
⇒ **Discrete–** data that has a finite value and does not change e.g. the number of people in each group in a completed survey.
⇒ **Continuous–** data that is continually changing as it is measured over time e.g. the temperature over a year.
⇒ **Line graph–** uses lines to join points that represent data.

New Learning | Prior Learning

YEAR 5

APPLY IT: PROBLEM-SOLVING & REASONING

PROBLEM-SOLVING AND REASONING SHOULD BE APPLIED THROUGHOUT ALL TEACHING NOT JUST WITHIN ISOLATED LESSONS.

PROBLEM-SOLVING AND REASONING.

The following strategies are a very powerful way of developing pupils' problem-solving and reasoning skills and can be used flexibly across all strands of maths.

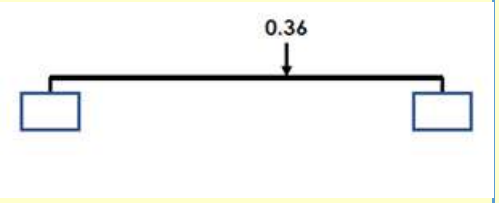
- **Spot the mistake/Which is different?**
- **True or false?**
- **What comes next?**
- **Do, then explain.**
- **Make up an example/Write more statements/ Create a question/Another and another.**
- **Possible answers/other possibilities.**
- **Missing numbers/Missing symbols/Missing information.**
- **Working backwards/Use of inverse/Undoing/ Unpicking.**
- **Hard and easy questions/Order from easiest to hardest.**
- **What else do you know?/Use a fact.**
- **Fact families.**
- **Convince me/Prove it/Generalising/Explain thinking**
- **Connected calculations.**
- **Make an estimate/Size of an answer.**
- **Always, sometimes, never.**
- **Making links/Application.**
- **Can you find?**
- **Odd one out.**
- **Complete/continue the pattern.**
- **Ordering.**
- **The answer is…**
- **Visualising**
- **Answer free zone.**
- **Justify.**

PROBLEM-SOLVING AND REASONING EXAMPLES FOR YEAR 5

Place Value

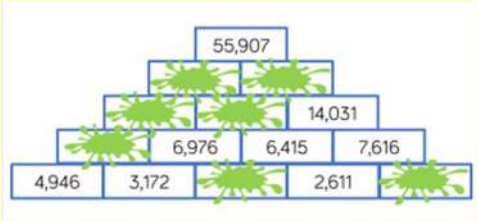
Different Ways

What could the start and end numbers be?

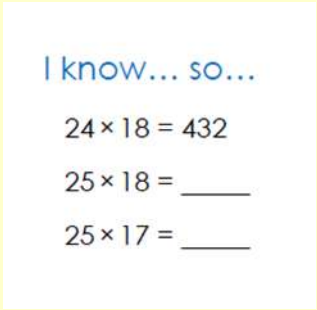


Addition & Subtraction

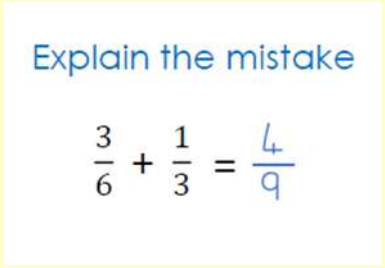
Complete the pyramid using addition and subtraction.



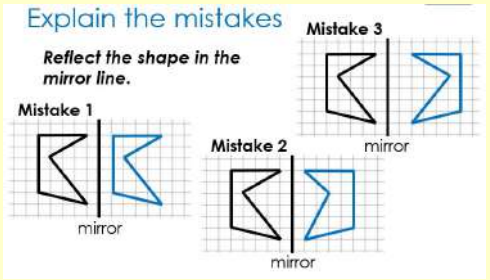
Multiplication & Division



Fractions

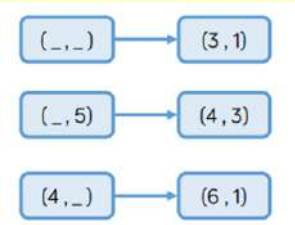


Geometry-Shape

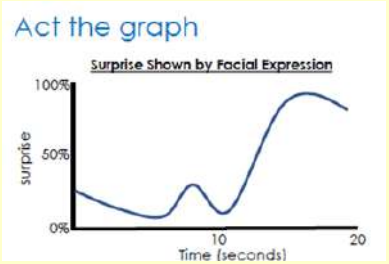


Geometry-Position & Direction

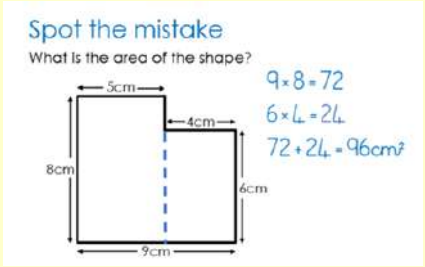
These coordinates have all been translated in the same way. Can you work out the missing ones?



Statistics



Measures



True or false?

1·5 kg + 600 g = 2·1 kg + 300 g

32 cm + 1·05 m = 150 cm – 0·13 m

¾ ℓ + 0.05 ℓ = half of 1·6 ℓ

Explain your reasoning.