

2019

# Curriculum Skills and Progression Mathematics



Nebula  
where stars are born

$$\frac{\partial}{\partial a} \ln f_{a, \sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a, \sigma^2}(\xi_1)$$
$$\int T(x) \cdot \frac{\partial}{\partial \theta} f(x, \theta) dx = M \left( T(\xi) \cdot \frac{\partial}{\partial \theta} \ln L \right)$$
$$\int T(x) \cdot \left( \frac{\partial}{\partial \theta} \ln L(x, \theta) \right) \cdot f(x, \theta) dx = \int T(x) \cdot \left( \frac{\partial}{\partial \theta} \ln L \right)$$

The Nebula Federation

Old Catton C of E Junior School

SKILLS MAP						
Mathematics – Year 2 (for reference and back-filling)						
Expected				Greater Depth		
<b>Pupils can ...</b> <ul style="list-style-type: none"><li>Partition two-digit numbers into different combinations of tens and ones. This may include using apparatus (e.g. 23 is the same as 2 tens and 3 ones which is the same as 1 ten and 13 ones)</li><li>Recall all number bonds to and within 10 and use these to reasons with and calculate bonds to and within 20. Know that is <math>7 + 3 = 10</math>, then <math>17 + 3 = 20</math></li><li>Can add and subtract 2 two-digit numbers within 100 (e.g. <math>48 + 35</math>) and can demonstrate and explain their method using concrete apparatus or pictorial representations</li><li>Can recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables to solve simple problems, demonstrating an understanding of commutativity as necessary (e.g. knowing they can make 7 groups of 5 from 35 blocks and writing <math>35 \div 5 = 7</math>; sharing 40 cherries between 10 people and writing <math>40 \div 10 = 4</math>; stating the total value of six 5p coins)</li><li>Can identify <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{2}</math>, <math>\frac{2}{4}</math>, <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity and knows that all parts must be equal parts of the whole</li><li>Can use different coins to make the same amount (e.g. pupil uses coins to make 50p in different ways; pupil can work out how many £2 coins are needed to exchange for a £20 note)</li><li>Can read and draw hands on the time on the clock to the nearest 15 minutes</li><li>Can describe properties of 2-D and 3-D shapes (e.g. the pupil describes a triangle: it has 3 sides, 3 vertices and 1 line of symmetry; the pupil describes a pyramid: it has 8 edges, 5 faces, 4 of which are triangles and one is a square)</li><li>Read scales in divisions of ones, twos, fives and tens</li></ul>				<b>Pupils can ...</b> <ul style="list-style-type: none"><li>Work in a systematic, logical way to find patterns, generalise and justify mathematical thinking</li><li>Read scales in divisions of ones, twos, fives and tens in a practical situation where not all numbers on the scale are given and estimate points in between</li><li>Use multiplication facts to make deductions outside known multiplication facts (e.g. a pupil knows that multiples of 5 have one digit of 0 or 5 and uses this to reason that <math>18 \times 5</math> cannot be 92 as it is not a multiple of 5)</li><li>Use reasoning about numbers and relationships to solve more complex problems and explain their thinking. E.g. solve more complex missing number problems (e.g. <math>14 + - 3 = 17</math>; <math>14 + \Delta = 15 + 27</math>)</li><li>Solve unfamiliar word problems that involve more than one step (e.g. which has the most biscuits, 4 packets of biscuits with 5 in each packet or 3 packets of biscuits with 10 in each packet?)</li><li>Read and draw on hands to show the time on the clock to the nearest 5 minutes</li><li>Describe similarities and differences of shape properties (e.g. finds 2 different 2-D shapes that only have one line of symmetry; that a cube and a cuboid have the same number of edges, faces and vertices but can describe what is different about them)</li></ul>		
<b>Key Vocabulary</b>						
Number and place value	Measure	Geometry (position and direction)	Geometry (properties of shape)	Fractions	Data/statistics	General/problem solving

Numbers to one hundred	Quarter past/to m/km, g/kg, ml/l	Rotation	Size	Three quarters, one third, a third	Count, tally, sort	Predict
Hundreds	Temperature (degrees)	Clockwise, anticlockwise	Bigger, larger, smaller	Equivalence, equivalent	Vote	Describe the pattern, describe the rule
Partition, recombine		Straight line	Symmetrical, line of symmetry		Graph, block graph, pictogram,	Find, find all, find different
Hundred more/less		Ninety-degree turn, right angle	Fold		Represent	Investigate
			Match		Group, set, list, table	
			Mirror line, reflection		Label, title	
			Pattern, repeating pattern		Most popular, most common, least popular, least common	

SKILLS MAP Mathematics – Year 3	
Expected	Greater Depth
<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>• Compare and order numbers up to 1000</li> <li>• Read and write numbers up to 1000 in numerals and words</li> <li>• Count in multiples of 4, 8, 50 and 100</li> <li>• Find 10 or 100 more or less than a given number</li> <li>• Recognise the place value of each digit in a three digit number (hundreds, tens, ones)</li> <li>• Solve number problems and practical problems involving place value</li> <li>• Add and subtract numbers mentally, including: a 3 digit number and ones, a 3 digit number and tens, a 3 digit number and hundreds</li> <li>• Add and subtract numbers with up to 3 digits using formal written methods of column addition and subtraction – see school calculation policy</li> <li>• Solve problems including missing number problems using number facts, place value and more complex addition and subtraction</li> <li>• Recall and use multiplication and division facts for the 3, 4 and 8 times tables</li> <li>• Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two digit numbers times one digit numbers, using mental and progressing to formal written methods</li> <li>• Count up and down in tenths: recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10</li> <li>• Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</li> <li>• Recognise and show, using diagrams, equivalent fractions with small denominators</li> <li>• Compare and order unit fractions and fractions with the same denominators</li> <li>• Add and subtract fractions with the same denominator within one whole</li> </ul>	<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>• Work in a systematic, logical way to find patterns, generalise and justify mathematical thinking</li> <li>• Reason and represent place value in different ways using mathematical language</li> <li>• Partition a 3-digit number and use that to work out its complement to 1000, explaining their reasoning using the language of place value</li> <li>• Calculate mentally using efficient strategies</li> <li>• Solve missing numbers problems such as <math>384 = 171 + ?</math></li> <li>• Use formal methods to solve problems, including multi-step and apply skills to create own multi-step problems using mathematical language:</li> <li>• Solve problems such as ‘A fish weighs 50g, another fish weighs 8 times as much, how much does the larger fish weigh?’</li> <li>• Solve problems such as, ‘Dad drives a truck. Last week he drove 267 miles on Monday, 186 on Tuesday and 198 on Wednesday. This week Dad drove 282 miles in total. What is the difference in mileage between this week and last week.’</li> <li>• Recognise relationships between fractions and decimals and express them as equivalent quantities - Jimmy has 6 marbles. This is 0.4 or <math>\frac{2}{5}</math>s of the total number. What is the total number of marbles</li> <li>• Calculate using fractions and decimals</li> <li>• Calculate <math>\frac{2}{4} + \frac{3}{4} = \frac{5}{4}</math> and <math>\frac{5}{4} - \frac{3}{4} = \frac{2}{4}</math>. They realise that <math>\frac{5}{4}</math> is greater than one and can suggest ways to record this</li> <li>• Calculate with measures (time, capacity, length, mass) - 6 toy cars balance 2 dolls. 4 dolls balance 1 toy robot. If the robot weighs 3 kg, what does each toy car weigh?</li> <li>• Use mathematical reasoning to compare angles - Can you draw a quadrilateral with: 1 right angle? 2 right angles? 5 right angles? <i>No right angles?</i> Can you draw a triangle with 1 right angle? 2 Right angles? Are some of these impossible, can you explain why?</li> </ul>

- Measure, compare, add and subtract: lengths (m/cm/mm): mass (kg/g) volume/capacity (l/ml) including measuring the perimeter of simple 2D shapes
- Add and subtract amounts of money to give change using both £ and p in practical contexts
- Tell and write the time from an analogue clock, including using Roman numerals from 1 to X11 and 12 hour and 24 hour clocks
- Record and compare time in respect to seconds, minutes and hours
- Know the number of days in a month, the number of months in a year and the number of days in a year – including a leap year
- Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn: identify whether angles are greater than or less than a right angle
- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines
- Interpret and present data using bar charts, pictograms and tables, including solving one step and 2 step questions using information presented in scales bar charts and pictograms and tables
- Draw 2D shapes using mathematical language
- Recognise 2D and 3D shapes in different positions and orientation and describe them

**Key Vocabulary**

Number and place value	Addition and subtraction	Multiplication and division	Measure	Geometry (position and direction)	Geometry (properties of shape)	Fractions	Data/statistics
Numbers to one thousand	Column addition and subtraction	Product  Multiples of four, eight, fifty and one hundred  Scale up	Leap year  Twelve-hour/twenty-four-hour clock  Roman numerals I to XIII	Greater/less than ninety degrees  Orientation (same orientation, different orientation)	Horizontal, vertical, perpendicular and parallel lines	Numerator, denominator  Unit fraction, non-unit fraction  Compare and order  Tenths Chart	Chart, bar chart, frequency table, Carroll diagram, Venn diagram  Axis, axes  Diagram

SKILLS MAP Mathematics – Year 4	
Expected	Greater Depth
<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>Count in multiples of 6, 7, 9, 25 and 1000</li> <li>Count backwards through zero to include negative numbers</li> <li>Order and compare numbers beyond 1000, including up to 2 decimal places</li> <li>Find a 100 more or less than a given number</li> <li>Recognise the place value of each digit in a four digit whole number</li> <li>Round any number to the nearest 10, 100 or 1000</li> <li>Read roman numerals up to 100</li> <li>Add and subtract numbers up to 4 digit using formal written methods – see school calculation policy</li> <li>Solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why</li> <li>Recall multiplication and division facts of multiplication tables up to 12 x 12</li> <li>Multiply 2 and 3 digit numbers by 1 digit number using a formal written layout – see school calculation policy</li> <li>Recognise and show, using diagrams (e.g. fraction walls), common equivalent fractions, including adding and subtracting fractions</li> <li>Can find fractions of a given quantity</li> <li>Count up and down in hundredths: recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten, including representing as a decimal</li> <li>Round decimals with one decimal place to the nearest whole number</li> <li>Solve simple measure and money problems involving fractions and decimals to two decimal places, including formal column method where appropriate</li> <li>Convert between different units of measure (kilometre to metre: hour to minute)</li> <li>Solve problems involving converting time between analogue and digit 12 and 24 hour clocks</li> </ul>	<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>Work in a systematic, logical way to find patterns, generalise and justify mathematical thinking.</li> <li>Reason about place value: <i>How many different ways can you write 5510. Pupils suggest ways such as 551 tens, 55 hundreds and 1 ten 5510 ones</i></li> <li>Arrange the digit cards 1 4 5 and 8 to make the number closest to 6000 and can justify their choice using the language of place value.</li> <li>Calculate mentally using efficient strategies: <i>Write 3 calculations in which you would use mental calculation strategies and 3 where you would apply a column method and explain the decision you made with each calculation Can work out <math>345 \times 6</math> mentally by calculating <math>300 \times 6</math> is 1800 <math>40 \times 6</math> is 240 and <math>5 \times 6</math> is 30 to get 2070</i></li> <li>Apply formal methods to solve multi-step problems: <i>Sarah buys 5 pens at £1.25 each, 3 pencils at 38p each and a ruler for 85p. How much change does she get from £10?</i></li> <li>Recognise relationships between fractions and decimals and express them as equivalent quantities: <i>Can you order these decimals and fractions on a number line? 0.35 <math>\frac{3}{4}</math> 0.5 <math>\frac{1}{5}</math> <math>\frac{4}{9}</math></i></li> <li>Calculate using fractions and decimals: <i>A soup recipe uses <math>\frac{3}{4}</math> as many onions as carrots. Jo is making the soup and has 8 carrots. How many onions does Jo use? Explain how you worked out the number of onions? Did you use the same method each time?</i></li> <li>Substitute values into a simple formula to solve problems: <math>3 \times a + 2 = 17</math> <i>What is the value of a?</i></li> <li>Calculate with measures (time, capacity, length, mass): <i>Converting and ordering across a range of measures</i></li> <li>Use mathematical reasoning to compare and order angles</li> <li>Compare angles in order to decide whether a polygon is regular</li> </ul>

<ul style="list-style-type: none"> <li>Compare and classify geometric shapes, using the language of orientation, including quadrilaterals and triangles, based on their properties and sizes, including Identifying acute, obtuse angles and right angles</li> <li>Measure and calculate the perimeter and area of rectilinear shapes – including squares in m and cm</li> <li>Identify lines of symmetry in 2D shapes presented in different orientations</li> <li>Plot specified points and draw sides to complete a given polygon</li> <li>Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs</li> <li>Describe and plot positions on 2D grids as co-ordinates, including describing movements as translation</li> </ul>						
<b>Key Vocabulary</b>						
Number and place value	Multiplication and division	Measure	Geometry (position and direction)	Geometry (properties of shape)	Fractions	Data/statistics
Tenths, hundredths Decimal (places)	Multiplication facts (up to 12x12)	Convert	Coordinates	Quadrilaterals	Equivalent decimals and fractions	Continuous data
Round (to nearest)	Division facts		Translation	Triangles		Line graph
Thousand more/less than	Inverse		Quadrant	Right angle, acute and obtuse angles		
Negative integers	Derive		x-axis, y-axis			
Count through zero			Perimeter and area			
Roman numerals (I to C)						

**Years 3 and 4 CROSS-CURRICULAR LINKS**

Science Units:

- Changing Sound - Measure: measuring lengths
- States of Matter – Measure: measuring temperature, reading scales on a thermometer
- Brilliant Bubbles – Measure: measuring mass and capacity
- Health and Movement – Data handling: Tally charts and pictograms
- Rocks, Fossils and Soils – Measure: reading and measuring time
- Light and Shadow – Data handling: Bar charts
  - Measure: measuring length
- Forces and Magnets – Measuring: reading scales on force meters and measuring length

Geography Units:

- Countries of the World – Number: Comparing numbers, reading large numbers
- Our European Neighbours – Number: Reading and comparing large numbers
- Volcanoes – Number: reading large numbers and decimals
- In the Desert – Number: negative numbers
- Rainforest – Data Handling: Line graphs



### PE Units:

- Athletics – Measure: measuring lengths and time

### ICT Units:

- We are Bug Fixers: develops skills in logical reasoning and problem solving
- We are Presenters: comparing times and distances
- We are Opinion Pollsters: children apply work in statistics on interpreting and presenting data
- We are Software Developers: children create a game to reinforce areas of mathematics
- We are Meteorologists: practise interpreting and presenting discrete and continuous data

SKILLS MAP Mathematics – Year 5	
Expected	Greater Depth
<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>Read, write, order and compare numbers to at least 1000000 and determine the value of each digit, including up to 3 decimal places</li> <li>Round any number up to 1000000 to the nearest 10, 100, 100, 10,000 and 100,000, including rounding to the nearest whole number and one decimal place</li> <li>Interpret negative numbers in context</li> <li>Count forwards and backwards with positive and negative whole numbers, including through zero</li> <li>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) – solve multi-step problems</li> <li>Add and subtract whole numbers with more than 4 digits mentally</li> <li>Solve problems involving multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. Including prime numbers, composite numbers, squares and cubes</li> <li>Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates (See calculation policy)</li> <li>Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</li> <li>Compare and order fractions whose denominators are all multiples of the same number</li> <li>Read and write decimal numbers as fractions</li> <li>Recognise fractions and decimal equivalents of percent</li> <li>Read, write, order and compare numbers with up to three decimal places</li> <li>Solve problems which require knowing percentage and decimal equivalents of a half, quarter, a fifth, two fifths and four fifths and those fractions with a denominator of a multiple of 10 or 25</li> <li>Recognise mixed numbers and improper fractions and convert them from one form to the other</li> </ul>	<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>Work in a systematic, logical way to find patterns, generalise and justify mathematical thinking</li> <li>Reason and represent place value in different ways using mathematical language: <i>Pupils can work the connection between finding the difference between negative numbers and subtracting them</i></li> <li>Calculate mentally using efficient strategies: <i>Pupils can write a variety of calculations derived from <math>15 + 63 = 78</math> and generalize to describe further calculations <math>20 \times 7 \times 5 = 20 \times 5 \times 7 = 100 \times 7 = 700</math></i></li> <li>Use formal methods to solve problems, including multi-step: <i>Sam and Tom have £67.80 between them. If Sam has £6.20 more than Tom, how much does Tom have?</i></li> <li>Solve problems between fractions and decimals and percentages and express them as equivalent quantities: <i>Jack and Jill each go out shopping. Jack spends <math>\frac{1}{4}</math> of his money. Jill spends 20% of her money. Frank says Jack spent more because <math>\frac{1}{4}</math> is greater than 20%. Alice says you cannot tell who spent more. Who do you agree with, Frank or Alice? Explain why?</i></li> <li>Use the numbers 3 4 5 and 6 makes this sum have the smallest possible answer: <i>I spent <math>\frac{3}{5}</math>s of my money and had £1.40 left to buy lunch. How much money did I have to begin with?</i></li> <li>Substitute values into a simple formula to solve problems</li> <li>Find the perimeter of a rectangle or the area of a triangle: <i>A rectangle has a perimeter of 20. What is the largest possible area it could have?</i></li> <li>Calculate with measures (time, capacity, length, mass) - <i>True or false? <math>1.5\text{kg} + 600\text{g} = 2.1\text{kg} + 300\text{g}</math> <math>32\text{cm} + 1.05\text{m} = 150\text{cm} - 0.13\text{m}</math> <math>\frac{3}{4}\text{L} + 0.05\text{L} = \text{half of } 1.6\text{L}</math> Explain your reasoning</i></li> <li>Apply angle properties in different contexts</li> <li>Construct a triangle with angles of 48 degrees 60 degrees and 72 degrees and draw any rectilinear shape, with given dimensions, to the nearest millimetre</li> </ul>

<ul style="list-style-type: none"> <li>• Add and subtract fractions with the same denominators and with denominators with the same multiples</li> <li>• Multiply proper fractions and mixed numbers by whole numbers</li> <li>• Convert between different units of metric measure (k/m) (cm/ml) (g/kg) (l/ml)</li> <li>• Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres</li> <li>• Calculate and compare the area of rectangles (including squares) and including using standard units, square cm and square m and estimate the area of irregular shapes</li> <li>• Estimate and identify the volume</li> <li>• Draw given angles and measure them in degrees</li> <li>• Distinguish between regular and irregular polygons based on reasoning about equal sides and angles, including finding missing lengths and angles</li> <li>• Identify angles at a point, straight line and a quarter turn</li> <li>• Identify and describe and represent the position of shapes after reflection and translation</li> <li>• Identify 3D shapes from 2D representations</li> <li>• Complete, read and interpret information in tables, including timetables and line graphs-identifying patterns and trends</li> </ul>						
<b>Key Vocabulary</b>						
Number and place value	Addition and subtraction	Multiplication and division	Measure	Geometry (position and direction)	Geometry (properties of shape)	Fractions, decimals and percentages
Powers of 10	Efficient written method	Factor pairs  Composite numbers, prime number, prime factors, square number, cubed number  Formal written method	Volume  Imperial units, metric units	Reflex angle  Dimensions	Regular and irregular Polygons	Proper fractions, improper fractions, mixed numbers  Percentage  Half, quarter, fifth, two fifths, four fifths  Ratio, proportion

SKILLS MAP Mathematics – Year 6	
Expected	Greater Depth
<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>• Demonstrate an understanding of place value, including large numbers and decimals (e.g. what is the value of the '7' in 276,541?; find the difference between the largest and smallest whole numbers that can be made from using three digits; <math>8.09 = 8 + 9 ?</math>; <math>28.13 = 28 + + 0.03</math>)</li> <li>• Round any whole numbers to a given degree of accuracy</li> <li>• Use negative numbers in context including calculating intervals across zero</li> <li>• Perform mental calculations including mixed operations and large numbers, using efficient strategies such as manipulating expressions using commutative and distributive properties to simplify the calculation (e.g. <math>53 - 82 + 47 = 53 + 47 - 82 = 100 - 82 = 18</math>; <math>20 \times 7 \times 5 = 20 \times 5 \times 7 = 100 \times 7 = 700</math>; <math>53 \div 7 + 3 \div 7 = (53 + 3) \div 7 = 56 \div 7 = 8</math>)</li> <li>• Use formal methods to solve multi-step problems (e.g. <i>find the change from £20 for three items that cost £1.24, £7.92 and £2.55; a roll of material is 6m long: how much is left when 5 pieces of 1.15m are cut from the roll?; a bottle of drink is 1.5 litres, how many cups of 175ml can be filled from the bottle, and how much drink is left?</i>) <i>Follow calculation policy</i></li> <li>• Use knowledge of the order of operations to carry out calculation using the four operations (BODMAS)</li> <li>• Recognise the relationship between fractions, decimals and percentages and can express them as equivalent quantities (e.g. one piece of cake that has been cut into 5 equal slices can be expressed as <math>\frac{1}{5}</math> or 0.2 or 20% of the whole cake)</li> <li>• Express a remainder as a decimal or fraction</li> <li>• Add and subtract fractions with different denominations and mixed numbers</li> </ul>	<p><b>Pupils can ...</b></p> <ul style="list-style-type: none"> <li>• Work in a systematic, logical way to find patterns, generalise and justify mathematical thinking</li> <li>• Have sufficient depth of knowledge and understanding to reason and explain mathematical concepts and procedures and use them to solve a variety of problems, using mathematical language</li> </ul>

<ul style="list-style-type: none"> <li>• Multiply pairs of proper fractions and divide fractions by whole numbers</li> <li>• Use common factors to simplify fractions, compare and order fractions including fractions greater than one</li> <li>• Calculate using fractions, decimals or percentages (<i>e.g. knowing that 7 divided by 21 is the same as <math>\frac{7}{21}</math> and that this is equal to <math>\frac{1}{3}</math>; 15% of 60; <math>11 \frac{2}{3} + 3 \frac{4}{5}</math>; <math>\frac{7}{9}</math> of 108; <math>0.8 \times 70</math>).</i></li> <li>• Substitute values into a simple formula to solve problems (<i>e.g. perimeter of a rectangle or area of a triangle</i>).</li> <li>• Generate and describe linear number sequences</li> <li>• Express missing number problems algebraically</li> <li>• Find pairs of numbers that satisfies an equations with 2 unknown</li> <li>• Enumerate possibilities of combinations of 2 variables</li> <li>• Calculate with measures (e.g. calculate length of a bus journey given start and end times; convert 0.05km into m and then into cm)</li> <li>• Convert between miles and km</li> <li>• Calculate and compare volumes of cubes and cuboids</li> <li>• Solve problems involving ratio and scale factor</li> <li>• Reason why shapes with the same area can have different perimeters (and vice versa)</li> <li>• Calculate areas of parallelograms and triangles</li> </ul>							
<b>Key Vocabulary</b>							
Number and place value	Addition and subtraction	Multiplication and division	Geometry (position and direction)	Geometry (properties of shape)	Fractions, decimals and percentages	Algebra	Data/statistics
Numbers to ten million	Order of operations	Order of operations  Common factors, common multiples	Four quadrants (for coordinates)	Vertically opposite (angles)  Circumference, radius, diameter	Degree of accuracy  Simplify	Linear number sequence Substitute Variables Symbol Known values	Mean  Pie chart  Construct

**Years 5 and 6 CROSS-CURRICULAR LINKS**

English Units:

- Power of Reading: The Promise – Data Handling: line graphs of emotions over time

Science Units:

- Healthy Bodies – Data Handling: bar and line graphs
- Earth and Space – Number: Calculation and ratio
  - Data Handling: line graph
  - Measure: scaled drawing
- Forces in Action – Data Handling: calculating mean, bar graph
  - Measure: measuring mass
- Properties and Changes of Materials – Data Handling: bar graph
- Seeing Light – Data Handling: bar graph

Geography Units:

- United Kingdom – Data Handling: bar graph
  - Measure: comparing lengths

### Design Technology Units:

- Fairgrounds – Measure: measuring lengths
- Christmas Fair – Measure: measuring mass and capacity
  - Number: calculating with money
- Bread – Measure: measuring mass and capacity
- Building Bridges – Measure: measuring length
- Biscuits – Measure: measuring mass and capacity
  - Data Handling: car graph
  - Geometry: nets

### ICT Units:

- We are Cryptographers: encryption and decryption use mathematical functions, frequency tables
- We are Artists: use knowledge of angles, 2D shapes, translations and that angles at a point total  $360^\circ$
- We are Project Managers: pupils can create a revision maths app
- We are App Developers: logical thinking and problem solving

Year 3 Objective

Term	1 <sup>st</sup> half-term			2 <sup>nd</sup> half-term	
<b>Autumn</b>	<b>Place Value:</b> <ul style="list-style-type: none"> <li>Count from 0 in multiples of 4, 8, 50 and 100</li> <li>Compare and order numbers up to 1000</li> <li>Read and write numbers to 100 in numerals and words</li> <li>Find 10 or 100 more or less than a given number</li> <li>Recognise the place value of each digit in a 3-digit number (HTU)</li> <li>Solve number problems and practical problems involving the above</li> </ul>	<b>Addition and Subtraction:</b> <ul style="list-style-type: none"> <li>Add and subtract numbers mentally (HTU<math>\pm</math>U, HTU <math>\pm</math> T, HTU <math>\pm</math> H)</li> <li>Add numbers with up to 3-digits using formal written methods</li> <li>Subtract numbers with up to 3-digits using formal written methods</li> <li>Estimate and use inverse operations</li> <li>Solve addition and subtraction 2-step problems in context (choose and explain methods)</li> </ul>		<b>Number Properties:</b> <ul style="list-style-type: none"> <li>Recall and use multiplication and division facts for the 3, 4 and 8 times tables</li> <li>Write and calculate mathematical statements for multiplication and division using times tables that they know (including TU <math>\times</math> U)</li> </ul>	<b>Multiplication and Division:</b> <ul style="list-style-type: none"> <li>Begin to use formal methods of multiplication and division (based on times table knowledge)</li> <li>Solve problems involving multiplication and division in context (including missing number problems)</li> </ul>
<b>Spring</b>	<b>Properties of Fractions and Decimals:</b> <ul style="list-style-type: none"> <li>Count up and down in tenths</li> <li>Recognise that tenths arise from dividing a number/object into 10 equal parts</li> <li>Recognise, find and write fractions of a set of objects</li> <li>Recognise and use fractions as numbers</li> <li>Recognise, and show with diagrams, equivalent fractions with small denominators</li> <li>Compare and order fractions with the same denominator</li> <li>Add and subtract fractions with the same denominator within one whole (<math>5/7 + 1/7 = 6/7</math>)</li> <li>Solve problems that involve the above</li> </ul>	<b>Time:</b> <ul style="list-style-type: none"> <li>Tell and write the time from: analogue clocks (including Roman Numerals), 12 hour clocks, 24 hour clocks</li> <li>Estimate and read time to the nearest minute</li> <li>Use vocabulary such as: o'clock, a.m./p.m., morning, afternoon, noon, midnight</li> <li>Know the number of seconds in a minute, the number of days in each month, year and leap year</li> <li>Compare how long two things have taken</li> </ul>		<b>Properties of Shape:</b> <ul style="list-style-type: none"> <li>Identify horizontal, vertical lines and pairs of perpendicular and parallel lines</li> <li>Draw 2-D shapes</li> <li>Make 3-D shapes using modelling materials</li> <li>Recognise 3-D shapes and describe them</li> </ul>	<b>Angles:</b> <ul style="list-style-type: none"> <li>Recognise that angles are a property of a shape or a description of a turn</li> <li>Identify right-angles</li> <li>Recognise that 2 right-angles make a half-turn, three make three quarters and four a complete turn</li> <li>Identify whether angles are greater than or less than a right angle</li> </ul>
<b>Summer</b>	<b>Data Handling:</b> <ul style="list-style-type: none"> <li>Interpret and present data using bar charts, pictograms and tables</li> <li>Solve one- and two-step problems using information from bar charts, pictograms and tables (How many</li> </ul>	<b>Money:</b> <ul style="list-style-type: none"> <li>Add and subtract amounts of money to give change (£ and p in practical contexts)</li> </ul>	<b>Solving Problems with Measure:</b> <ul style="list-style-type: none"> <li>Compare lengths (m/cm/mm)</li> <li>Compare mass (kg/g)</li> <li>Compare volume (l/ml)</li> <li>Measure lengths (m/cm/mm)</li> <li>Measure mass (kg/g)</li> </ul>	Revisions/Tests/Addressing Weaknesses	



## Curriculum Skills and Progression Map

	more? How many fewer?)		<ul style="list-style-type: none"><li>• Measure volume (l/ml)</li><li>• Add and subtract lengths, mass and capacity</li><li>• Measure perimeters of simple 2-D shapes</li></ul>	
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**Year 4 Objective**

<b>Term</b>	<b>1<sup>st</sup> half-term</b>			<b>2<sup>nd</sup> half-term</b>		
<b>Autumn</b>	<b>Place Value:</b> <ul style="list-style-type: none"> <li>Count in multiples of 6, 7, 9, 25 and 1000</li> <li>Order and compare numbers beyond 1000</li> <li>Find 1000 more or less than a given number</li> <li>Recognise the value of each digit in a 4-digit number (ThHTU)</li> <li>Read R.N.s to 100</li> <li>Round any number to the nearest 10, 100, 1000</li> <li>Count backwards through 0 to include negative numbers</li> <li>Solve number and practical problems involving the above with increasingly large numbers</li> </ul>	<b>Addition and Subtraction:</b> <ul style="list-style-type: none"> <li>Add and subtract numbers with up to 4-digits using formal written methods</li> <li>Estimate and use inverse operations to check answers to a calculation</li> <li>Solve addition and subtraction 2-step problems in context (choose methods, explain why)</li> </ul>	<b>Perimeter:</b> <ul style="list-style-type: none"> <li>Measure and calculate the perimeter of a rectilinear shape (including squares) in cm and m</li> </ul>	<b>Number Properties:</b> <ul style="list-style-type: none"> <li>Recall multiplication and division facts for tables up to 12 x 12</li> <li>Use place value, known and derived facts to multiply and divide mentally (including multiplying by 0 and 1; dividing by 1; multiplying 3 numbers)</li> <li>Recognise and use factor pairs and commutative in mental calculations</li> </ul>	<b>Multiplication and Division:</b> <ul style="list-style-type: none"> <li>Multiply 2-digit and 3-digit numbers by a 1-digit number using formal written methods</li> <li>Divide 2-digit numbers by 1-digit numbers using tables knowledge and bus-stop method</li> <li>Solve problems involving multiplication and division</li> </ul>	<b>Area:</b> <ul style="list-style-type: none"> <li>Find the area of rectilinear shapes by counting squares</li> </ul>
<b>Spring</b>	<b>Properties of Fractions and Decimals:</b> <ul style="list-style-type: none"> <li>Count up and down in hundredths</li> <li>Recognise that hundredths arise from dividing an object by 100 and dividing tenths by 10</li> <li>Round decimals with 1d.p. to the nearest whole number</li> <li>Compare numbers with the same number of dp.</li> <li>Recognise and show, using diagrams,</li> </ul>	<b>Fractions:</b> <ul style="list-style-type: none"> <li>Add and subtract fractions with the same denominator</li> <li>Recognise and write decimal equivalents to <math>\frac{1}{4}</math>, <math>\frac{1}{2}</math>, <math>\frac{3}{4}</math></li> <li>Recognise and write decimal equivalents of any number of tenths and hundredths</li> <li>Solve problems involving calculating quantities and fractions to divide quantities</li> <li>Solve simple measure and money problems</li> </ul>	<b>Time:</b> <ul style="list-style-type: none"> <li>Read, write and convert time between analogue and digital clocks (12 hour and 24 hour)</li> <li>Solve problems involving converting from hours to minutes; minutes and seconds; years to months; weeks to days</li> </ul>	<b>Properties of Shape:</b> <ul style="list-style-type: none"> <li>Compare and classify geometric shapes (including quadrilaterals and triangles) based on their properties</li> <li>Identify lines of symmetry in 2-D shapes</li> <li>Complete a simple symmetric figure across a line a symmetry</li> </ul>	<b>Angles:</b> <ul style="list-style-type: none"> <li>Identify acute, obtuse, and reflex angles</li> <li>Compare and order angles by size</li> </ul>	<b>Coordinates:</b> <ul style="list-style-type: none"> <li>Describe positions on a 2-D grid as coordinates in the first quadrant</li> <li>Plot specified points draw sides to complete a given polygon</li> </ul>

## Curriculum Skills and Progression Map

	<p>families of common equivalent fractions (1/2, 2/4, 3/6, 4/8)</p> <ul style="list-style-type: none"> <li>Find the effect of dividing a 1- or 2-digit number by 10 and 100 (identify value of digits in answers as ones, tenths, hundredths)</li> </ul>	involving fractions and decimals to 2 d.p.				
<b>Term</b>	<b>1<sup>st</sup> half-term</b>				<b>2<sup>nd</sup> half-term</b>	
<b>Summer</b>	<p><b>Data Handling:</b></p> <ul style="list-style-type: none"> <li>Interpret and present discrete and continuous data using bar charts</li> <li>Solve problems using information presented in bar charts, pictograms, tables and other graphs (comparison, sum and difference)</li> </ul>	<p><b>Transformation:</b></p> <ul style="list-style-type: none"> <li>Describe movements between positions as translations of a given unit to the left/right and up/down</li> </ul>	<p><b>Units of Measure:</b></p> <ul style="list-style-type: none"> <li>Convert between different units of measurement (km/m, hour/minute)</li> </ul>	<p><b>Solving Problems with Measures:</b></p> <ul style="list-style-type: none"> <li>Compare different measures, including money</li> <li>Estimate different measures, including money</li> </ul>	<p>Revisions/Tests/Addressing Weaknesses</p>	

Year 5 Objective

Term	1 <sup>st</sup> half-term			2 <sup>nd</sup> half-term		
<b>Autumn</b>	<b>Place Value:</b> <ul style="list-style-type: none"> <li>Count forward or backward in steps of 10 from any number (up to 1000000)</li> <li>Know value of each digit up to 1000000</li> <li>Read, write, order and compare numbers to at least 1000000</li> <li>Rounding (to the nearest 10, 100, 1000, 10000, 100000)</li> <li>Negative number counting</li> <li>Solve practical number problems involving the above</li> </ul>	<b>Addition and Subtraction:</b> <ul style="list-style-type: none"> <li>Commutativity</li> <li>Add and subtract numbers mentally</li> <li>Column addition (4+digit numbers)</li> <li>Column subtraction (4+digit numbers)</li> <li>Solve multi-step addition and subtraction problems (choose methods and explain why)</li> </ul>	<b>Perimeter:</b> <ul style="list-style-type: none"> <li>Measure and calculate the perimeter of composite rectilinear shapes</li> </ul>	<b>Number Properties:</b> <ul style="list-style-type: none"> <li>Prime numbers, prime factors and composite numbers</li> <li>Square numbers and cubed numbers (including notation)</li> <li>Identify multiples and factors (including common factors)</li> <li>Multiply and divide by 10, 100, 1000 including decimals</li> <li>Read Roman Numerals up to 1000</li> </ul>	<b>Multiplication and Division:</b> <ul style="list-style-type: none"> <li>Multiply and divide numbers mentally drawing upon known facts</li> <li>Multiply using a written method (up to 4-digit x 2-digit numbers)</li> <li>Divide numbers using written method (up to 4-digit ÷ 1-digit numbers)</li> <li>Solve problems involving multiplication and division (including simple scaling)</li> </ul>	<b>Area:</b> <ul style="list-style-type: none"> <li>Calculate and compare the area of rectangles (cm<sup>2</sup>, m<sup>2</sup>)</li> <li>Estimate the area of irregular shapes</li> <li>Estimate volume (1cm<sup>3</sup> blocks) and capacity (water)</li> </ul>
<b>Spring</b>	<b>Properties of Fractions and Decimals:</b> <ul style="list-style-type: none"> <li>Recognise and use tenths, hundredths and thousandths</li> <li>Round decimal with 2d.p. to nearest whole number and 1d.p.</li> <li>Read, write, order and compare numbers with up to 3d.p.</li> <li>Read and write decimal numbers as fractions (0.71 = 71/100)</li> <li>Identify and write equivalent fractions</li> <li>Cancel fractions</li> <li>Solve problems involving numbers up to 3d.p.</li> </ul>	<b>Fractions:</b> <ul style="list-style-type: none"> <li>Add and subtract fractions with the same denominator and denominators that are multiples of the same number</li> <li>Compare and order fractions (whose denominators are multiples of the same number)</li> <li>Multiply proper fractions and mixed numbers by whole numbers</li> <li>Recognise mixed numbers and improper fractions and convert from one to the other</li> </ul>	<b>Percentage:</b> <ul style="list-style-type: none"> <li>Recognise the % symbol</li> <li>Understand that percentage relates to 'number of parts per 100'</li> <li>Write percentage as a fraction and as a decimal</li> <li>Solve problems which require knowing percentage and decimal equivalents of <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{5}</math>, <math>\frac{2}{5}</math>, <math>\frac{4}{5}</math> and fractions with denominators of 10 or 25</li> </ul>	<b>Properties of Shape:</b> <ul style="list-style-type: none"> <li>Use properties of rectangles to identify missing lengths/angles</li> <li>Identify regular and irregular polygons</li> <li>Properties of 2-D shapes</li> <li>Properties of 3-D shapes</li> </ul>	<b>Angles:</b> <ul style="list-style-type: none"> <li>Estimate and compare acute, obtuse and reflex angles in degrees</li> <li>Draw given angles and measure in degrees</li> <li>Angles in a triangle (180°)</li> <li>Angles on a straight line (180°)</li> <li>Angles round a point (360°)</li> </ul>	<b>Coordinates:</b> <ul style="list-style-type: none"> <li>Identify and plot coordinates</li> <li>Plot specified points to complete polygons</li> </ul>

## Curriculum Skills and Progression Map

		<ul style="list-style-type: none"><li>Find fractions of amounts</li></ul>					
Term	1 <sup>st</sup> half-term				2 <sup>nd</sup> half-term		
Summer	<u>Data Handling:</u> <ul style="list-style-type: none"><li>Complete, read and interpret information from tables (including timetables)</li><li>Solve problems using information from bar charts, pictograms or line graphs</li></ul>	<u>Transformation:</u> <ul style="list-style-type: none"><li>Identify, describe and represent the position of a shape following a reflection or a translation</li></ul>	<u>Units of Measure:</u> <ul style="list-style-type: none"><li>Convert between different metric units of measure</li><li>Understand and use approximate equivalence between metric and imperial (inches, pounds, pints)</li></ul>	<u>Solving Problems with Measures:</u> <ul style="list-style-type: none"><li>Use all 4 operations to solve problems involving money, length, mass and volume (including scaling)</li></ul>	<u>Time:</u> <ul style="list-style-type: none"><li>Solve problems converting between units or time</li></ul>	<u>Sequences:</u> <ul style="list-style-type: none"><li>Recognise and describe number sequences (including fractions and decimals)</li><li>Identify term-to-term rule in the sequence</li></ul>	Revisions/Tests/ Addressing Weaknesses

Year 6 Objective

Term	1 <sup>st</sup> half-term			2 <sup>nd</sup> half-term		
<b>Autumn</b>	<b>Place Value:</b> <ul style="list-style-type: none"> <li>Read, write, order and compare numbers to 10000000</li> <li>Rounding (to the Determine the value of each digit in numbers up to 10000000</li> <li>Round any whole number to required degree of accuracy</li> <li>Use negative numbers in context, calculate across zero</li> <li>Solve practical number problems involving the above</li> <li>Multiply and divide by 10, 100, 1000 giving answers to 3 d.p.</li> </ul>	<b>Addition and Subtraction:</b> <ul style="list-style-type: none"> <li>Solve addition and subtraction multi-step problems (decide which operations/methods to use and explain why)</li> </ul>	<b>Number Properties:</b> <ul style="list-style-type: none"> <li>Identify common factors, common multiples and prime numbers</li> <li>Perform mental calculations, including with mixed operations and large numbers</li> </ul>	<b>Multiplication and Division:</b> <ul style="list-style-type: none"> <li>Multiply and divide</li> <li>Multiply using a written method (up to 4-digit x 2-digit numbers)</li> <li>Multiply 1 digit numbers with up to 2d.p. by whole numbers</li> <li>Divide numbers using written method (up to 4-digit ÷ 2-digit numbers) and interpret remainders as appropriate for context (whole, fraction, rounding)</li> <li>Use written division for answers with up to 2dp</li> <li>Solve problems involving +, -, x and ÷ using knowledge of order of operations</li> </ul>	<b>Properties of Fractions and Decimals:</b> <ul style="list-style-type: none"> <li>Use common factors to simplify fractions</li> <li>Use common multiples to express fractions in the same denomination</li> <li>Compare and order fractions (including fractions &gt;1)</li> <li>Identify the value of each digit to 3 d.p.</li> </ul>	<b>Fractions and Percentage:</b> <ul style="list-style-type: none"> <li>Add and subtract fractions with different denominators and mixed numbers (using concept of equivalent fractions)</li> <li>Multiply simple pairs of proper fractions writing answers in simplest form</li> <li>Associate fractions with division to calculate decimal fraction equivalents</li> <li>Recall and use equivalence between simple fractions, decimals and percentages (including in different contexts)</li> </ul>
<b>Spring</b>	<b>Algebra:</b> <ul style="list-style-type: none"> <li>Express missing number problems algebraically</li> <li>Use simple formulae</li> <li>Generate and describe linear number sequences</li> <li>Find pairs of numbers that satisfy an equation with 2 unknowns</li> <li>Enumerate possibilities of</li> </ul>	<b>Area and Volume:</b> <ul style="list-style-type: none"> <li>Recognise shapes with the same area can have different perimeters and vice versa</li> <li>Calculate the area of parallelograms and triangles</li> <li>Recognise when it is possible to use formulae for the area of shapes</li> <li>Calculate, estimate and compare volume of</li> </ul>	<b>Ratio and Proportion:</b> <ul style="list-style-type: none"> <li>Solve problems involving the relative size of 2 quantities (missing values found using x and ÷ facts)</li> <li>Solve problems involving the calculation of percentages</li> <li>Solve problems involving similar shapes where scale</li> </ul>	<b>Properties of Shape:</b> <ul style="list-style-type: none"> <li>Compare and classify geometric shapes based on their properties and sizes</li> <li>Describe simple 3-D shapes</li> <li>Draw 2-D shapes given dimensions and angles</li> <li>Recognise, describe and build simple 3-D shapes, including making nets</li> </ul>	<b>Angles:</b> <ul style="list-style-type: none"> <li>Find unknown angles in any triangles, quadrilaterals and regular polygons</li> <li>Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</li> </ul>	<b>Coordinates and Transformations:</b> <ul style="list-style-type: none"> <li>Draw and translate simple shapes on the coordinate plane, and reflect them in axes</li> <li>Describe positions on full coordinate grid (all 4 quadrants)</li> </ul>

	combinations of 2 variables	cubes and cuboids ( $\text{cm}^3$ , $\text{m}^3$ , $\text{km}^3$ ) <ul style="list-style-type: none"> <li>Recognise when it is possible to use the formulae for the volume of shapes</li> </ul>	factor is known or can be found <ul style="list-style-type: none"> <li>Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples</li> </ul>	<ul style="list-style-type: none"> <li>Illustrate and name parts of a circle, including radius, diameter and circumference</li> <li>Know diameter is twice the radius</li> </ul>		
<b>Term</b>	<b>1<sup>st</sup> half-term</b>			<b>2<sup>nd</sup> half-term</b>		
<b>Summer</b>	<b>Data Handling:</b> <ul style="list-style-type: none"> <li>Interpret and construct pie charts and line graphs and use these to solve problems</li> <li>Calculate and interpret the mean as an average</li> </ul>	<b>Solving Problems with Measures:</b> <ul style="list-style-type: none"> <li>Use, read and convert between standard units (length, mass, volume, time) from smaller units to larger and vice versa (up to 3 d.p.)</li> <li>Convert between miles and kilometres</li> <li>Solve problems involving the conversion of measure (up to 3 d.p.)</li> </ul>	<b>Revisions/Tests/ Addressing Weaknesses</b>		<b>Transition work</b>	

### How Maths Looks at OCJS

All children are timetabled an hour-a-day of maths; years 3 and 4 also receive half-an-hour of timetables lesson, where they are taught ways to remember their tables and given time to learn and practise their tables, this helps to increase their fluency and prepare them for the Year 4 Times Table Test. Years 5 and 6 have half-an-hour arithmetic lesson to help them practise and consolidate the written methods for the four operations and prepare them for the Key Stage 2 SATs arithmetic paper.

To prepare children for the year 4 Times Tables test and aid them in other areas of mathematics we have a whole school focus on times tables. To help us do this we use Times Tables Rock Stars and the Times Table Challenge:

- Times Table Rock Stars**

Times Tables Rock Stars is a carefully sequenced programme of daily times tables practice.

Each week concentrates on a different times table, with a recommended consolidation week for rehearsing the tables that have recently been practised every third week or so.

This format has very successfully boosted times tables recall speed for hundreds of thousands of pupils over the last 8 years in over 14,000 schools - both primary and secondary - worldwide.

Old Catton Junior School has bought into Times Table Rock Stars and every child has a licence to use it both in school and at home.

- **Times Table Challenge**

Throughout the school, in sets where it is needed, children have daily times table practise and try to complete the Times table challenge. If they complete 3 tests (20 questions in 2 minutes) for a times table, they get a sticker and once they complete all times tables up to 12x12 and multiple tables test they are awarded with a badge in celebration assembly.

### Sets

Maths at Old Catton is taught in ability sets, this enables us to provide lessons that ensure challenge for all children. The top sets enable higher attainers greater challenge, with higher level teaching, at a quicker pace and the lower sets enable lower ability learners to slow down to the pace they may need to catch up and grasp the basic concepts they may be lacking. However, in all sets the curriculum for each year is covered. Additional adults are also employed in the lower sets to provide extra support to those who need it, plus one-to-one provision for SEND children where necessary.

#### Year 3 and 4

Split into 5 sets:

Year 4 Top Set

Year 4 Middle Set

Year 3 Top Set

Year 3 Middle Set

Year 3 and 4 Bottom Set

#### Year 5

Year 5 Top Set



Year 5 Bottom Set

### Year 6

Year 6 Top Set

Year 6 Middle Set

Year 6 Bottom Set

### Working Walls

All classrooms have a maths working wall for children to use as a resource. It may include, key vocabulary related to the area that they are currently working on, examples of methods that they may need to use, WAGOLs (what a good one looks like) completed by either teacher or students, equipment or resources that they may need to use.

### Intervention

Half-termly Pupil Progress meetings between teachers and senior teachers identify both children who need extra help and support to fill-in gaps in their learning and children who have the potential to exceed their year group's expected level and these children may receive intervention with either teachers or teaching assistants.

Every year, in the Spring Term/Summer Term we identify Year 6 children who may benefit from additional intervention through teacher tuition. This allows teachers to offer small groups, intensive support in the run up to SATs. The sessions are provided after school with the permission from parents.

### Homework

We set weekly maths homework that gives the children a chance to consolidate what they have been learning in lessons and also provides parents with the opportunity to see what their child has been learning in maths and the potential for them to work with their child to assist them with their learning.

In Year 6, in the Spring and Summer Term we replace Maths homework with Revision Guide work. We have previously used the CGP Revision Guides, which school funds for all pupils, to supplement their preparation for the end of KS2 tests.

### **Maths Challenges**

In year 5 and 6 we select four children, who excel in Maths, to attend Maths Challenges, where they go and compete against different schools in a range of maths problems and puzzles. These promote teamwork and communication skills as the challenges encourage students to work collaboratively on a range of mathematical problems. They also encourage a love of problem solving as they aim to open young people's minds to the breadth and depth of mathematics.

### **Maths Days**

Maths Days or Weeks are often held to raise the profile and increase interest and enjoyment of maths in the school. These give children the chance to see more examples of maths in the real-world and get to use maths in fun and practical ways. Examples of this have been, using measurement, money, capacity, art, cooking and time in fun and creative ways. We have involved parents in some of these activities to encourage home/school to work effectively together to promote an enjoyment of maths.

### **Assessment**

Children are assessed in a variety of ways. Using Rising Stars tests at the end of each term and sometimes a shorter Rising Star test at half-terms, (with only three official data drops per year.) Year 6 take a past SATs paper every half-term to both help inform teachers of their progress and give them practise and to prepare them for the SATs at the end of the year.

Teachers also continually assess children in their groups, from their performance and the work that they complete in lessons.

Both of these assessments are recorded on Pupil Asset, the test results in the results area and the teacher assessment using DNA ticks to cover progress within units of work.

Analysis of test data is broken down to identify areas of strength and weakness in order to feed into next steps for teaching and fill gaps.

In order to move the children's learning on, we use next step marking and greater depth questions in pupil's books. These are designed to assess where the children have got to, with a clear next step set in order to progress their learning. This is completed independently to show the teacher individual understanding.

### Old Catton C of E Junior School Calculation Policy



The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

As children progress at different rates, some children need to use the strategies from previous or future year groups.

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

We want our children to be able to select an efficient method of their choice (whether this be mental or written) that is appropriate for a given task. They will do this by always asking themselves:

- Can I do this in my head?
- Can I do this mentally, with drawings or jottings to help me?
- Do I need to use a written method?

Our long-term aim is for children to be able to select an appropriate method of calculation and know that they have a reliable, written method to which they can turn when the need arises. This policy sets out the progression in written recordings from informal methods to expanded methods that are staging posts to a compact method, for each of the four number operations.

The policy promotes standard written methods that are efficient and work for any calculations including those that involve whole numbers or decimals.

## Addition

*the process of calculating the total of two or more numbers or amounts.*

### Prior skills required

To add successfully, children need to be able to:

- recall all the complements of 10;
- recall all addition pairs to 9 + 9
- add mentally a series of one-digit numbers, such as  $5 + 8 + 4$ ;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

The addition strategies taught from years 3 to 6 form a progression. Each method builds upon the preceding strategy.

### **The horizontally expanded addition method:**

Not crossing the ten-barrier:	Crossing the ten-barrier:
$72 + 25 =$	$58 + 64 =$
$\begin{array}{r} 70 \\ 20 \\ \hline 90 \end{array} + \begin{array}{r} 2 \\ 5 \\ \hline 7 \end{array} = 97$	$\begin{array}{r} 50 \\ 60 \\ \hline 110 \end{array} + \begin{array}{r} 8 \\ 4 \\ \hline 12 \end{array} = 122$

**The vertically expanded method of addition:**

Using whole numbers:	Using decimals:
$58 + 64 =$	$54.38 + 76.94 =$
$\begin{array}{r} 58 \\ + 64 \\ \hline 12 \\ \hline 110 \\ \hline 122 \end{array}$	$\begin{array}{r} 54.38 \\ + 76.94 \\ \hline 0.12 \\ 1.20 \\ 10.00 \\ \hline 120.00 \\ \hline 131.32 \end{array}$
	Zeros are used as place holders

**Compact column method of addition:**

Using whole numbers:	Using decimals:
$58 + 64 =$	$54.38 + 76.94 =$

$$\begin{array}{r} 58 \\ + 64 \\ \hline 122 \\ 1 \end{array}$$

$$\begin{array}{r} 54.38 \\ + 76.94 \\ \hline 131.32 \\ 11 \end{array}$$

### Subtraction

*Taking one quantity away from another*

*Finding the difference between two quantities*

#### Prior skills required

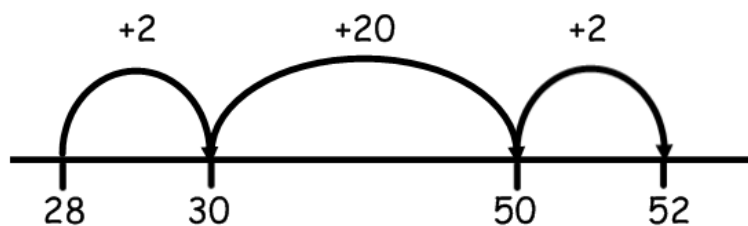
To subtract successfully, children need to be able to:

- recall all addition and subtraction facts to 20;
- subtract multiples of 10 (such as  $160 - 70$ ) using the related subtraction fact,  $16 - 7$ , and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into  $70 + 4$  or  $60 + 14$ ).

The subtraction strategies taught from years 3 to 6 form a progression. Each method builds upon the preceding strategy.

#### **The numberline method of subtraction:**

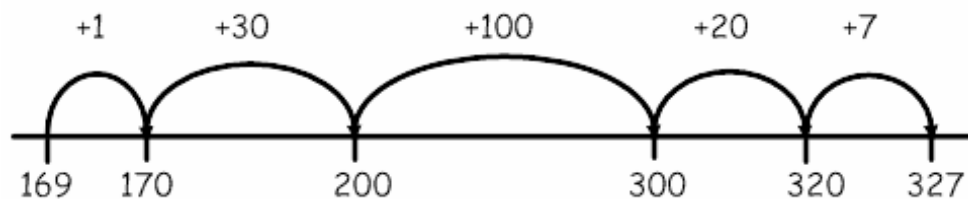
$$52 - 28 =$$



$$52 - 28 = 20 + 2 + 2 = \underline{24}$$

The numberline method of subtraction using larger numbers:

$$327 - 169 =$$



$$327 - 169 = 100 + 30 + 20 + 1 + 7 = \underline{158}$$



Once children are confident subtracting using the numberline, they can progress onto the expanded vertical method of subtraction.

**The expanded vertical method of subtraction (directly linked to the numberline method):**

$$327 - 169 =$$

3	2	7	
-	1	6	9
<hr/>			
		1	(170)
	3	0	(200)
1	0	0	(300)
	2	0	(320)
		7	(327)
<hr/>			
1	5	8	

**Horizontally expanded decomposition method of subtraction:**

$$327 - 169 =$$

$$\begin{array}{r}
 300^{200} + 20^{110} + 17 \\
 - 100 + 60 + 9 \\
 \hline
 100 + 50 + 8 = 158
 \end{array}$$

**Decomposition method of subtraction:**

$$327 - 169 =$$

$$\begin{array}{r}
 2\cancel{3}^{11} \cancel{2}^{17} \\
 - 1 \quad 6 \quad 9 \\
 \hline
 1 \quad 5 \quad 8
 \end{array}$$

An explanation of this method and how this can be taught using Dienes can be seen in Appendix 1.

This method can be extended to numbers of any size and numbers with decimals.

### **Multiplication**

*Repeated addition, e.g.  $a \times b$ , means add  $b$  lots of  $a$*

#### **Prior skills required**

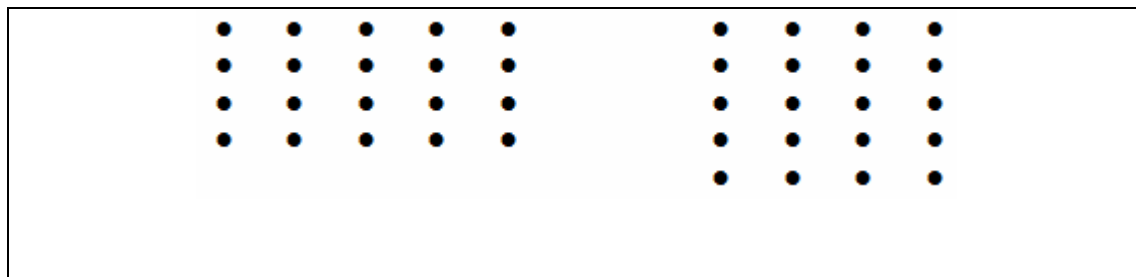
To multiply successfully, children need to be able to:

- recall all multiplication facts to  $12 \times 12$  (by the end of Year 4);
- partition number into multiples of one hundred, ten and one;
- work out products such as  $70 \times 5$ ,  $70 \times 50$ ,  $700 \times 5$  or  $700 \times 50$  using the related fact  $7 \times 5$  and their knowledge of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their knowledge of place value;
- add combinations of whole numbers using the column method.

The multiplication strategies taught from years 3 to 6 form a progression. Each method builds upon the preceding strategy.

Children should use **arrays** when starting multiplication, as it is very visual and they can count the dots to calculate or check answers:

$$4 \times 5 = 20$$

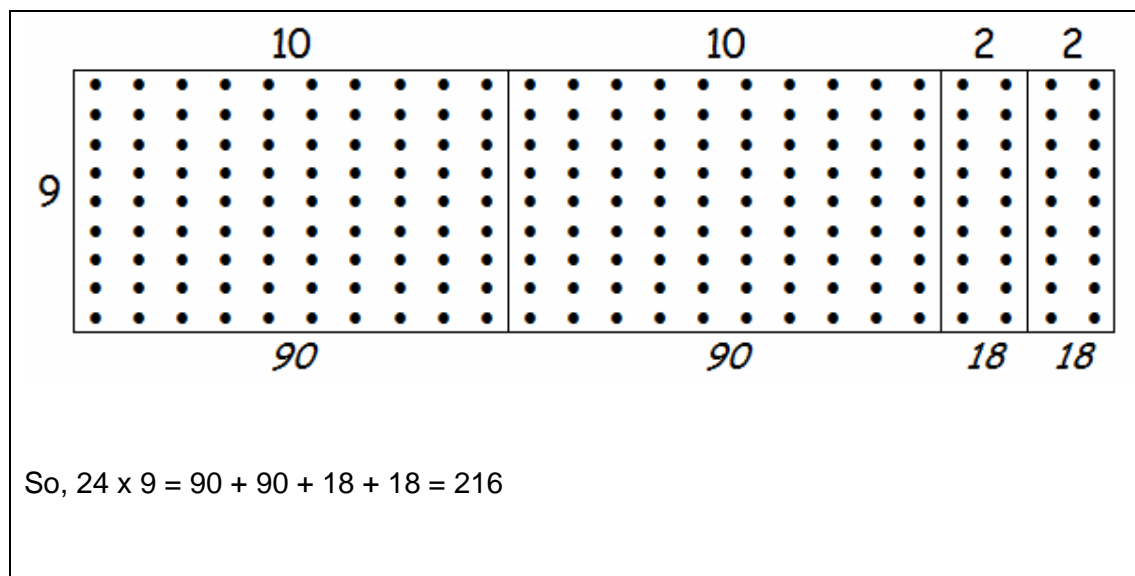


When the arrays get too large to count then the grid can be introduced.

**The grid method for multiplication:**

$$24 \times 9 =$$

*24 can be partitioned into more manageable numbers, e.g.  $10 + 10 + 2 + 2$*



This method holds for larger numbers:

$$34 \times 21 =$$

	10	10	1
10	$10 \times 10 = 100$	$10 \times 10 = 100$	$10 \times 1 = 10$
10	$10 \times 10 = 100$	$10 \times 10 = 100$	$10 \times 1 = 10$
10	$10 \times 10 = 100$	$10 \times 10 = 100$	$10 \times 1 = 10$
3	$10 \times 3 = 30$	$10 \times 3 = 30$	$3 \times 1 = 3$
1	$10 \times 1 = 10$	$10 \times 1 = 10$	$1 \times 1 = 1$

So,  $34 \times 21 = 100 + 100 + 100 + 100 + 100 + 100 + 30 + 30 + 10 + 10 + 10 + 3 + 1 = 714$

This method holds for however the numbers are partitioned; so children can partition numbers into multiplication tables that they are confident with.

The grid method can become more efficient as the children partition the numbers into tens and ones:

$$24 \times 9 =$$

	20	4
9	$9 \times 20$ = <b>180</b>	$9 \times 4$ = <b>36</b>

So,  $24 \times 9 = 180 + 36 = \underline{216}$

$$34 \times 21 =$$

	30	4
20	$20 \times 30$ = <b>600</b>	$20 \times 4$ = <b>80</b>
1	$1 \times 30$ = <b>30</b>	$1 \times 4$ = <b>4</b>

So,  $34 \times 21 = 600 + 80 + 30 + 4 = \underline{714}$

The grid method progresses to **expanded multiplication** (grid method without the grid):

$$24 \times 9 = 216$$

$$\begin{array}{r} 24 \\ \times 9 \\ \hline 180 \\ 36 \\ \hline 216 \\ 1 \end{array} \quad \begin{array}{l} (20 \times 9) \\ (4 \times 9) \end{array}$$

$$34 \times 21 = 714$$

$$\begin{array}{r} 34 \\ \times 21 \\ \hline 680 \\ 70 \\ \hline 714 \\ 1 \end{array} \quad \begin{array}{l} (30 \times 20) \\ (4 \times 20) \\ (30 \times 1) \\ (4 \times 1) \end{array}$$

This method then progresses to **short multiplication**:



$$24 \times 9 = 216$$

$$\begin{array}{r} 24 \\ \times 9 \\ \hline 216 \\ \hline \end{array}$$

And then onto **long multiplication**:

$$34 \times 21 = 714$$

$$\begin{array}{r} 34 \\ \times 21 \\ \hline 680 \\ 34 \\ \hline 714 \\ \hline \end{array} \quad \begin{array}{l} (34 \times 20) \\ (34 \times 1) \end{array}$$

These methods can also be extended to 4-digit numbers and decimals:

$$4512 \times 24 = 108288$$

			4	5	1	2	
x						2	4
	9	0	2	4	0		
	1	8	0	4	8		
	1	0	8	2	8	8	

(4512  $\times$  20)  
(4512  $\times$  4)

$$54.27 \times 8 = 434.16$$

			5	4	.	2	7
x							8
	4	3	4	.	1	6	
	3	2			6		

## Division

*Sharing, e.g.  $12 \div 3$ , means 12 shared equally between 3 people*

*Grouping, e.g.  $12 \div 3$ , means how many groups of 3 can you make out of 12*

### Prior skills required

To divide successfully, children need to be able to:

- understand and use the vocabulary of division – for example in  $18 \div 3 = 6$ , the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways;
- recall multiplication and division facts to  $12 \times 12$ , recognise multiples of one-digit numbers and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value;
- know how to find a remainder working mentally – for example, find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.
- understand division as repeated subtraction;
- estimate how many times one number divides into another – for example, how many sixes there are in 47, or how many 23s there are in 92;
- multiply a two-digit number by a single-digit number mentally;
- subtract numbers using the column method.

The division strategies taught from years 3 to 6 form a progression. Each method builds upon the preceding strategy.

### **Grouping on a numberline method of division:**

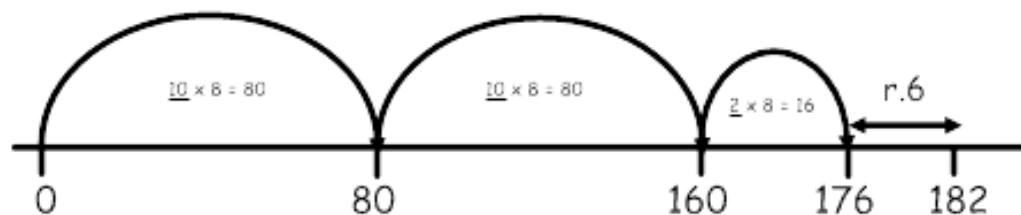
Using the Grouping ITP:

$$24 \div 4 =$$



This method can also be used for larger numbers and questions that involve remainders:

$182 \div 8 =$



So,  $182 \div 8 = 10 + 10 + 2$ , remainder 6 = 22 r.6

When children are confident with this method they can progress to the bus-stop method (short division).

**The bus-stop method of division (short division):**

$$825 \div 3 = 275$$

$$\begin{array}{r} 275 \\ 3 \overline{) 825} \end{array}$$

$$547 \div 3 = 182 \text{ r.1}$$

$$\begin{array}{r} 182 \text{ r.1} \\ 3 \overline{) 547} \end{array}$$

A full explanation of this method using base 10 (dienes) to ensure children understand the method, rather than just use it can be found in Appendix 2.

As children understand this method, the divisor can increase to 2-digits and then long-division will need to be used.

**Long-division:**

$$425 \div 25 = 17$$

$$\begin{array}{r}
 \begin{array}{ccc}
 0 & 1 & 7 \\
 25 \overline{) 425} \\
 \underline{0} & \downarrow & \\
 42 & & \downarrow \\
 \underline{- 25} & & \\
 175 & & \\
 \underline{- 175} & & \\
 000 & & 
 \end{array}
 \end{array}$$

A full explanation of this method can be seen in Appendix 3.

**Appendix 1**

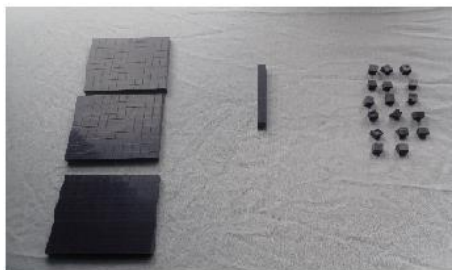
1.

$$\begin{array}{r} 327 \\ - 169 \\ \hline \end{array}$$



2. Start with the ones:  $7 - 9 =$   
 negative number, so convert one of  
 the tens into ones:

$$\begin{array}{r} 3\cancel{2}^{17} \\ - 169 \\ \hline \end{array}$$

3. So now,  $17 - 9 = 8$ :

4. Now look at the tens.  $10 - 60 =$   
 negative number, so convert one of  
 the hundreds into tens:

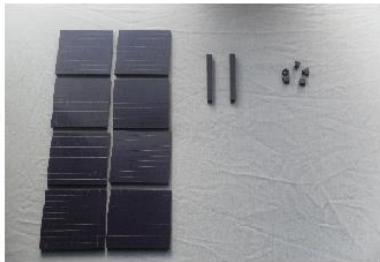




**Appendix 2**

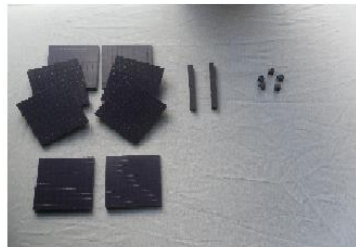
1.  $825 \div 3 =$

$$3 \overline{) 825}$$



2. Ask how many groups of 300 can you make out of 800?

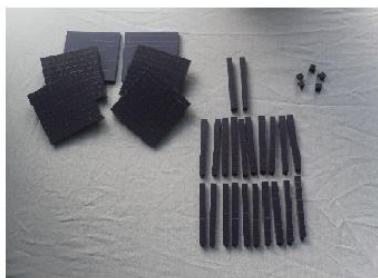
$$2 \overline{) 825}$$



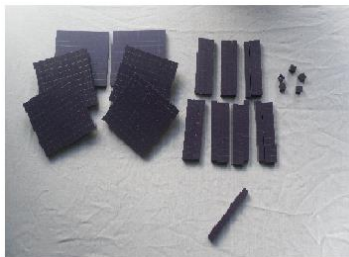
3. Convert the 2 remaining hundreds into tens:

4. Ask how many groups of 30 can you make out of 220?

$$\begin{array}{r} 2 \\ 3 \overline{) 8^2 2 5} \end{array}$$

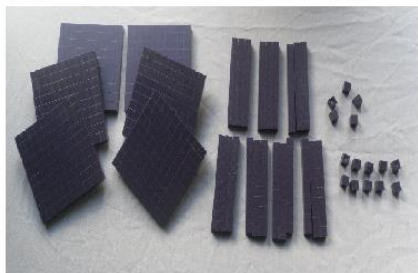


$$\begin{array}{r} 27 \\ 3 \overline{) 8^2 2 5} \end{array}$$



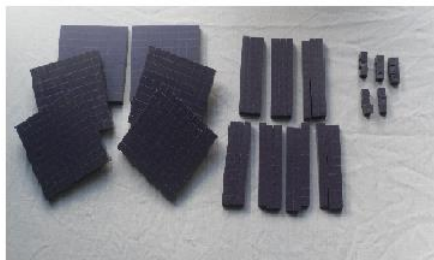
5. Convert the 1 remaining ten into ones:

$$\begin{array}{r} 27 \\ 3 \overline{) 8^2 2^1 5} \end{array}$$



6. Ask how many groups of 3 can you make out of 15?

$$\begin{array}{r} 275 \\ 3 \overline{) 8^2 2^1 5} \end{array}$$



**Appendix 3**

$\begin{array}{r} 25 \overline{)425} \end{array}$	$4 \div 25 = 0 \text{ remainder } 4$	The first digit of the <b>dividend</b> (4) is divided by the <b>divisor</b> .
$\begin{array}{r} 0 \\ 25 \overline{)425} \end{array}$		The whole number result is placed at the top. Any remainders are ignored at this point.
$\begin{array}{r} 0 \\ 25 \overline{)425} \\ 0 \end{array}$	$25 \times 0 = 0$	The answer from the first operation is <b>multiplied</b> by the <b>divisor</b> . The result is placed under the number divided into.
$\begin{array}{r} 0 \\ 25 \overline{)425} \\ 0 \\ 4 \end{array}$	$4 - 0 = 4$	Now we <b>subtract</b> the bottom number from the top number.
$\begin{array}{r} 0 \\ 25 \overline{)425} \\ 0 \downarrow \\ 42 \end{array}$		Bring down the next digit of the dividend.

$\begin{array}{r} 0 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \end{array}$	$42 \div 25 = 1 \text{ remainder } 17$	<b>Divide</b> this number by the divisor.
$\begin{array}{r} 01 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \end{array}$		The whole number result is placed at the top. Any remainders are ignored at this point.
$\begin{array}{r} 01 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \\ \underline{25} \end{array}$	$25 \times 1 = 25$	The answer from the above operation is <b>multiplied</b> by the divisor. The result is placed under the last number divided into.
$\begin{array}{r} 01 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \\ \underline{25} \\ 17 \end{array}$	$42 - 25 = 17$	Now we <b>subtract</b> the bottom number from the top number.

$  \begin{array}{r}  01 \\  25 \overline{) 425} \\  \underline{0} \phantom{0} \\  42 \\  \underline{25} \\  175  \end{array}  $		Bring down the next digit of the dividend.
$  \begin{array}{r}  01 \\  \color{red}{25} \overline{) 425} \\  \underline{0} \phantom{0} \\  42 \\  \underline{25} \\  \color{red}{175}  \end{array}  $	$175 \div 25 = 7 \text{ remainder } 0$	<b>Divide</b> this number by the divisor.
$  \begin{array}{r}  01\color{red}{7} \\  25 \overline{) 425} \\  \underline{0} \phantom{0} \\  42 \\  \underline{25} \\  175  \end{array}  $		The whole number result is placed at the top. Any remainders are ignored at this point.

$  \begin{array}{r}  017 \\  25 \overline{) 425} \\  \underline{0\downarrow} \\  42 \\  \underline{25\downarrow} \\  175 \\  \underline{175} \\  0  \end{array}  $	$25 \times 7 = 175$	<p>The answer from the above operation is <b>multiplied</b> by the divisor. The result is placed under the number divided into.</p>
$  \begin{array}{r}  017 \\  25 \overline{) 425} \\  \underline{0\downarrow} \\  42 \\  \underline{25\downarrow} \\  175 \\  \underline{175} \\  000  \end{array}  $	$175 - 175 = 0$	<p>Now we <b>subtract</b> the bottom number from the top number.</p>
		<p><b>There are no more digits to bring down. The answer must be 17</b></p>

## Examples of deeper learning questions

### Year 3

#### Deeper Learning

Are the following statements always, sometimes or never

true?

The sum of 2 odd numbers is even.

The sum of 3 odd numbers is even.

#### Deeper Learning

Are the following statements always, sometimes or never true?

Adding 5 to a number ending in 6 will sum to a number ending in 1.

Adding 8 to a number ending in 2 will always sum to a multiple of 10.

#### Deeper Learning

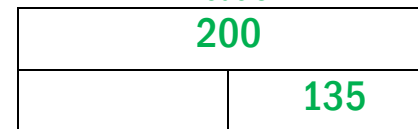
Are the following statements always, sometimes or never true?

Adding 5 to a number ending in 6 will sum to a number ending in 1.

Adding 8 to a number ending in 2 will always sum to a multiple of 10.

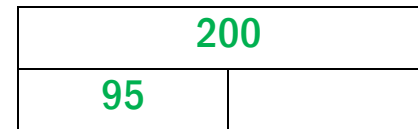
#### Deeper Learning

Identify the missing number in these bar models.



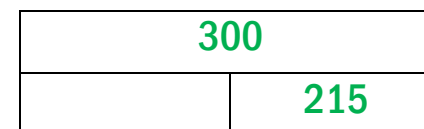
#### Deeper Learning

Identify the missing number in these bar models.



#### Deeper Learning

Identify the missing number in these bar models.



### Deeper Learning

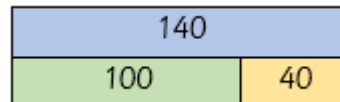
Using coins, find three ways to make £1

### Deeper Learning

Using coins, find three ways to make £2

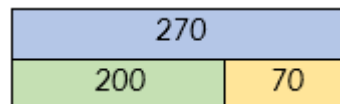
### Deeper Learning

Write the four number facts that this bar model shows.



### Deeper Learning

Write the four number facts that this bar model shows.



### Deeper Learning

Fill in the missing numbers.

$$49 + \underline{\quad} = 36$$

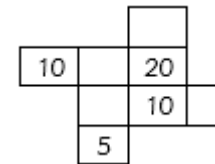
$$18 + \underline{\quad} = 63$$

$$\underline{\quad} - 25 = 58$$

$$\underline{\quad} - 48 = 34$$

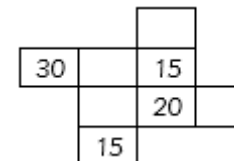
### Deeper Learning

Complete this diagram so that the three numbers in each row and column add up to 50.



### Deeper Learning

Complete this diagram so that the three numbers in each row and column add up to 50.



### Deeper Learning

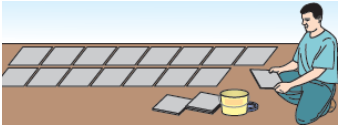
Write  $>$ ,  $=$  or  $<$  in each of the circles to make the number sentence correct.

$$87 + 25 \bigcirc 95 + 10$$

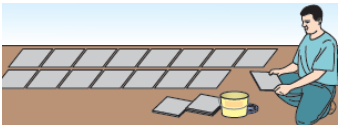


**Year 4**Deeper Learning

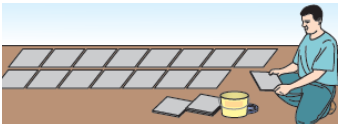
Roger has 96 slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a rectangular patio.

Deeper Learning

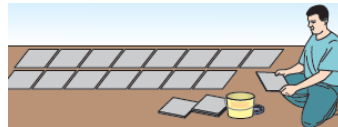
Roger has 88 slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a rectangular patio.

Deeper Learning

Sam has 120 slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a rectangular patio.

Deeper Learning

Sam has 144 slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a


Deeper Learning  
 Complete the following:

$$132 \div \underline{\quad} = 12$$

Deeper Learning

Putting the digits 1, 2 and 3 in the empty boxes, how many different calculations can you make? Which one gives the largest answer?

Which one gives the smallest answer?

$$\square \square \times \square = ?$$

Deeper Learning

Find the missing digits.

$$\begin{array}{r}
 2 \square \\
 \times \quad 8 \\
 \hline
 176
 \end{array}$$

Deeper Learning

Find the missing digits.

$$\begin{array}{r} 2 \square \\ \times \square \\ \hline 112 \end{array}$$

Deeper Learning

Find the missing digits.

$$\begin{array}{r} 1 \square 4 \\ \times \square \\ \hline 736 \end{array}$$

Deeper Learning

Place one of these symbols in the circle to make the number sentence correct:  
 $>$ ,  $<$  or  $=$ .

$8 \times 50$	$\bigcirc$	$50 \times 8$
$8 \times 50$	$\bigcirc$	$80 \times 5$
$300 \times 3$	$\bigcirc$	$5 \times 200$

Deeper Learning

Multiply a number by itself and then make one factor one more and the other one less.

What happens to the product?

E.g.

$$4 \times 4 = 16 \quad 6 \times 6 = 36$$

$$5 \times 3 = 15 \quad 7 \times 5 = 35$$

What do you notice?

Deeper Learning

The following problems can be solved by using the calculation  $8 \div 2$ . True or false?

There are 2 bags of bread rolls that have 8 rolls in each bag. How many rolls are

$$8 \div 2 = 4$$

A boat holds 2 people. How many boats are needed for 8 people?

I have 8 pencils and give 2 pencils to each person. How many people receive pencils?

Deeper Learning

Sam is planting onions in the vegetable plot in his garden.

He arranges the onions into rows of 4 and has two left over.

He then arranges them into rows of 3 and has none left over.

How many onions might he have had?

Explain your reasoning.

Deeper Learning

Tom ate 9 grapes at the picnic. Sam ate 3 times as many grapes as Tom.

How many grapes did they eat altogether?

Deeper Learning

Jo had 8 marbles. Lucy had 4 times as many marbles as JO.

How many marbles did they have altogether?

Deeper Learning

Two factors of 12 add up to 8.  
What are they?

Deeper Learning

Sara has 9 times as many football cards as Sam. Together they have 150 cards.

How many more cards does Sara have than Sam?

Deeper Learning

What do you notice about the following calculations? Can you use one calculation to work out the answer to other calculations?

$2 \times 3$	$6 \times 7$
$2 \times 30$	$6 \times 70$
$2 \times 300$	$6 \times 700$
$20 \times 3$	$60 \times 7$
$200 \times 3$	$600 \times 7$

<p>Can you write the number 30 as the product of 3 numbers? Can you do it in different ways?</p> <p><u>Deeper Learning</u> There are 7 guests coming to the party. She estimates that each guest, plus herself, will drink 500ml of lemonade each.</p>	<p>Can you write the number 30 as the product of 3 numbers? Can you do it in different ways?</p> <p><u>Deeper Learning</u> There are 7 guests coming to the party. She estimates that each guest, plus herself, will drink 500ml of lemonade each.</p>	<p>Can you write the number 30 as the product of 3 numbers? Can you do it in different ways?</p> <p><u>Deeper Learning</u> There are 7 guests coming to the party. She estimates that each guest, plus herself, will drink 500ml of lemonade each.</p>
<p>How many litre bottles of lemonade will she need to buy? If each litre costs £1.50, how much will it cost altogether? Show your working out.</p>	<p>How many litre bottles of lemonade will she need to buy? If each litre costs £1.50, how much will it cost altogether? Show your working out.</p>	<p>How many litre bottles of lemonade will she need to buy? If each litre costs £1.50, how much will it cost altogether? Show your working out.</p>

**Year 5**

$\frac{3}{4}$	○	$\frac{1}{2}$
$\frac{3}{8}$	○	$\frac{1}{2}$
$\frac{3}{4}$	○	$\frac{3}{8}$

Deeper Learning

Make each number sentence correct using =, > or <.

$1\frac{3}{4}$	○	$2\frac{1}{2}$
$\frac{3}{2}$	○	$1\frac{1}{2}$
$3\frac{3}{4}$	○	$3\frac{3}{8}$

Deeper Learning

Make each number sentence using =, > or <.

Deeper Learning

Write down two fractions where the denominator of one is a multiple of the denominator of the other.

Which is the larger fraction?

$\frac{2}{4}$	○	$\frac{1}{2}$
$\frac{2}{5}$	○	$\frac{4}{10}$
$\frac{2}{5}$	○	$\frac{5}{10}$

Deeper Learning

Make each number sentence using =, > or <.

Deeper Learning

Russel says  $\frac{3}{8} > \frac{3}{4}$  because  $8 > 4$ .

Do you agree? Explain your reasoning.

Deeper Learning

Mark and label on this number line where you estimate that  $\frac{3}{4}$  and  $\frac{3}{8}$  are positioned.

Deeper Learning

Mark and label on this number line where you estimate that  $\frac{1}{4}$  and  $\frac{5}{8}$  are positioned.

Deeper Learning

Mark and label on this number line where you estimate that  $\frac{1}{4}$  and  $\frac{7}{8}$  are positioned.

Deeper Learning

Choose numbers for each numerator to make this number sentence true.

$$\frac{\square}{15} > \frac{\square}{10}$$

Deeper Learning

Chiz and Caroline each had two sandwiches of the same size.

Chiz ate  $1\frac{1}{2}$  of his sandwiches.

Caroline ate  $\frac{5}{4}$  of her sandwiches.

Draw diagrams to show how much Chiz and

Deeper Learning

Chiz and Caroline each had two sandwiches of the same size.

Chiz ate  $1\frac{1}{4}$  of his sandwiches.

Caroline ate  $\frac{5}{4}$  of her sandwiches.

Fred said Caroline ate more because 5 is the biggest number.

Tammy said Chiz ate more because she ate a whole sandwich.

Explain why Fred and Tammy are both wrong.

Deeper Learning

Using the numbers 5 and 6 only once, make this sum have the smallest possible answer:

$$\frac{\square}{15} + \frac{\square}{10} =$$

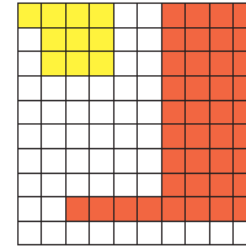
## Deeper Learning

Krysia wanted to buy a coat that cost £80. She saw the coat on sale in one shop at  $\frac{1}{5}$  off. She saw the same coat on sale in another shop at 25% off.

Which shop has the coat at a cheaper

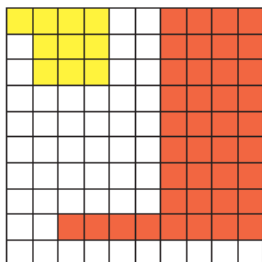
## Deeper Learning

Jack and Jill each go out shopping. Jack spends  $\frac{1}{4}$  of his money. Jill spends 20% of her money. Frank says Jack spent more because  $\frac{1}{4}$  is greater than 20%. Alice says you cannot tell who spent more. Who do you agree with, Frank or Alice? Explain why.



## Deeper Learning

Suggest another way to colour the grid to show clearly each fraction that is shaded. What fraction of the grid is shaded in total? How many different ways can you express the fraction of the grid that is shaded?



### Deeper Learning

Graham is serving pizzas at a party. Each person is given  $\frac{3}{4}$  of a pizza. Fill in the table below to show how many pizzas he must buy for each number of guests.

Guests	Pizzas
4	
6	
8	
10	

When will he have pizza left over?

### Deeper Learning

Graham is serving pizzas at a party.

Each person is given  $\frac{3}{4}$  of a pizza.

Graham has six pizzas.

How many people can he serve?

Write your answer as a multiplication

$$\frac{3}{4} \bigcirc \frac{1}{2}$$

$$\frac{3}{8} \bigcirc \frac{1}{2}$$

$$\frac{3}{4} \bigcirc \frac{3}{8}$$

### Deeper Learning

Make each number sentence correct using =, > or <.

$$1\frac{3}{4} \bigcirc 2\frac{1}{2}$$

$$\frac{3}{2} \bigcirc 1\frac{1}{2}$$

$$3\frac{3}{4} \bigcirc 3\frac{3}{8}$$

### Deeper Learning

Make each number sentence using =, > or <.

$$\frac{2}{4} \bigcirc \frac{1}{2}$$

$$\frac{2}{5} \bigcirc \frac{4}{10}$$

$$\frac{2}{5} \bigcirc \frac{5}{10}$$

### Deeper Learning

Make each number sentence using =, > or <.



Deeper Learning

Write down two fractions where the denominator of one is a multiple of the denominator of the other.

Which is the larger fraction?

Explain your reasoning.

Deeper Learning

Russel says  $\frac{3}{8} > \frac{3}{4}$  because  $8 > 4$ .

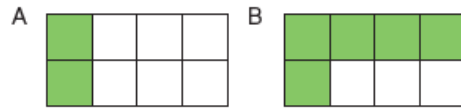
Do you agree?

Explain your reasoning.

Deeper Learning

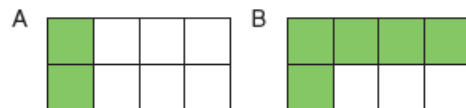
Choose numbers for each numerator to make this number sentence true.

$$\frac{\square}{15} > \frac{\square}{10}$$



### Deeper Learning

Each bar of toffee is the same. On Monday, Sam ate the amount of toffee shown shaded in A. On Tuesday, Sam ate the amount of toffee shown shaded in B.



Sam says he ate  $\frac{7}{8}$  of a bar of toffee.

Jo says Sam ate  $\frac{7}{16}$  of the toffee.

Explain why Sam and Jo are both

### Deeper Learning

Krysia wanted to buy a coat that cost £80. She saw the coat on sale in one shop at  $\frac{1}{5}$  off. She saw the same coat on sale in another shop at 25% off.

Which shop has the coat at a cheaper

**Year 6**Deeper Learning

Ali has made three sequences of shapes by sticking coloured squares together.

The sequence of red shapes starts



and so on.

The sequence of blue shapes starts



and so on.

The sequence of green shapes starts



and so on.

Ali says, 'If I put a red and a blue shape together, they will make a shape that is the same as one of the green shapes.'

Do you agree with Ali?

Explain your reasoning.

Deeper Learning

Which of the following statements do you agree with? Explain your decisions.

- There is a whole number that satisfies the symbol sentence  $5 \times \square - 3 = 42$
- There is a whole number that satisfies the symbol sentence  $5 + \square \times 3 = 42$
- There is a whole number that solves the equation  $10 - x = 4x$
- There is a whole number that solves the equation  $20 \div x = x$

Deeper Learning

I am going to buy some 10p stamps and some 11p stamps.  
I want to spend exactly 93p. Write this as a symbol sentence and find whole number values that satisfy your sentence.  
Now tell me how many of each stamp I should buy.

I want to spend exactly £1.93. Write this as a symbol sentence and find whole number values that satisfy your sentence.  
Now tell me how many of each stamp I should buy.

### Deeper Learning

I am going to buy some 11p stamps and some 17p stamps.  
I want to spend exactly 95p. Write this as a symbol sentence and find whole number values that satisfy your sentence.  
Now tell me how many of each stamp I should buy.

I want to spend exactly £1.95. Write this as a symbol sentence and find whole number values that satisfy your sentence.  
Now tell me how many of each stamp I should buy.

I want to spend exactly £1.59. Write this as a symbol number sentence.  
Can you convince yourself that you can't find whole number values that satisfy your symbol sentence?

Explain your reasoning.