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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 7** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Number** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Understand positive and negative integers | Add and subtract negative integers | Round a number to one significant figure | Estimate answers to calculations involving division | Find the lowest common multiple (LCM) of two simple numbers |
| Round to the nearest integer | Round numbers to given powers of *10* and to a given number of decimal places | Multiply and divide negative integers | Use the terms square, positive and negative square root, cube and cube root | Find the highest common factor (HCF) of two simple numbers |
| Write an integer correct to the nearest *10* or *100* | Write down the place value of a digit, for example, what is the value of *4* in *0.24* | Add and subtract decimals | Recall integer squares from *2x2* to *15x15* and the corresponding square roots | Write a number as a product of its prime factors |
| Find the factors of a number | Order decimals, for example which is bigger, *0.24* or *0.3* | Find one number as a fraction of another | Recall the cubes of *2, 3, 4, 5* and *10* | Find the reciprocal of a number |
| Estimate answers to problems involving decimals | Multiply any three digit number by any two digit numbers without a calculator | Do calculations with simple fractions involving addition | Multiply two decimals such as *2.4 x 0.7* | Estimate answers to calculations |
| Find equivalent fractions  | Divide any three digit number by any two digit number without a calculator | Do calculations with simple fractions involving multiplication | Convert decimals to fractions and fractions to decimals | Solve numerical problems involving multiplication and division with numbers of any size  |
|   | Multiply whole numbers and decimals by *10, 100* and *1000* | Calculate cubes and cube roots (with and without the use of a calculator) | Do calculations with simple fractions involving subtraction | Use a calculator efficiently and appropriately |
|   | Divide whole numbers and decimals by *10, 100* and *1000* | Use function keys on a calculator for powers and roots | Increase or decrease a quantity by a given percentage | Find minimum and maximum values |
|   | Add and subtract decimals to two places | Compare fractions, decimals and percentages |   | Understand the effects of multiplying by numbers between *0* and *1* |
|  |   | Multiply and divide decimals to two places |  Round values to a specified number of significant figures |   | Divide a number by a decimal such as *1 ÷ 0.2* and *2.8 ÷ 0.07* |
|  |   | Simplify fractions such as *12/20* |   |   | Work out a percentage increase or decrease |
|  |   | Arrange fractions in order of size |   |  | Express one quantity as a percentage of another |
|  |   | Work out fractions of quantities such as *3/5* of *20* |   |  | Do calculations with mixed numbers |
|  |   | Estimate square roots |   |  | Do calculations with simple fractions involving division |
|  |   | Calculate squares and square roots (with and without the use of a calculator) |   |  | Start to identify upper and lower bounds of numbers |
|  |   | Understand that percentage means “out of one hundred” |   |  |  |
|  |   | Change a percentage to a fraction or a decimal and vice versa |   |  |  Se reverse percentages to calculate original values |
|  |   | Work out a percentage of a given quantity |   |   |   |
|  |   | Solve simple ratio and direct proportion problems |   |   |   |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 7** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Algebra** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Continue a sequence of numbers or diagrams | Find a particular term in a sequence involving positive numbers | Find a particular term in a sequence involving negative or fractional numbers | Multiply out expressions with brackets such as *5(3x – 2)* | Find a solution to a problem by forming an equation and solving it |
| Write down terms of a simple sequence | Write the term-to-term rule in a sequence involving positive numbers | Write the term-to-term rule in a sequence involving negative or fractional numbers | Factorise expressions | Form and solve equations such as *x² + x = 12*  using trial and improvement methods |
| Use coordinates in the first quadrant, such as plot the point *( 3 , 2 )* | Describe number patterns and relationships including multiply, factor and square | Simplify expressions with more than one variable such as *2a + 5b + a – 2b* | Write the terms of a sequence or series of diagrams given the nth term | Rearrange linear formulae such as *s = 4q – 7* |
| Use a formula written in words such as *cost = 20 x distance travelled in miles* | Simplify expressions with one variable such as *a + 2a + 3a* |  |  | Recognise the equations of straight line graphs such as *y = 3x – 5* |
|   | Use coordinates in all four quadrants | Solve equations such as *x/2 = 9* and *4x - 2 = 22* | Solve problems involving straight lines |  |
|   | Plot points of a conversion graph and read off positive values  | Read from a conversion graph for negative values | Solve linear equations with unknowns on each side such as *3x – 4 = 5 + x* |   |
|   | Use a simple formula such as *P = 2w + 2h* |  | Solve linear equations with brackets such as *2(5x + 1) = 28* |  |
|   | Substitute positive numbers into a simple formula | Write an expression from a problem |

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| Substitute numbers into more complicated formulae such as  |

 |   |
|   | Solve equations such as *4x = 24* and *x – 3 = 7* | Substitute negative numbers into a simple formula | *1* |   |
|   |  Identify integer values that satisfy an inequality | Use formulae from Mathematics and other subjects |  |  |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 7** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Geometry & Measures** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Identify Isosceles, equilateral and right-angled triangles | Draw a triangle given three sides, or two angles and a side, or two sides and the included angle | Show that angles of a triangle add up to *180ᵒ* and use this to find angles |  | Solve problems involving circles such as a finding the perimeter of a semicircle |
| Use the word “congruent” when triangles are identical  |  | Show that the exterior angle of a triangle is equal to the sum of the interior opposite angles |  |  |
| Find the perimeter of a shape by counting sides of squares | Express fractions of full turns in degrees and vice versa | Use angle properties of equilateral, Isosceles and right-angled triangles |  |  |
| Find the area of a square by counting squares | Recognise obtuse, acute and reflex angles | Find the area and perimeter of compound shapes |  |  |
| Estimate the area of an irregular shape by counting squares and part squares | Estimate angles | Calculate interior and exterior angles of a quadrilateral |  | Convert between measures of area |
|  | Measure and draw angles accurately to the nearest degree |  |  | Convert between measures of volume |
| Recognise and name shapes such as Isosceles triangle, parallelogram, rhombus, trapezium and hexagon | Understand the terms “perpendicular lines” and “parallel lines” |  |  | Classify a quadrilateral by geometric properties |
|  | Know angles on a straight line add up to *180ᵒ* |  |  | Solve problems using angle and symmetry properties of polygons and properties of intersecting and parallel lines |
|  | Know angles around a point add up to *360ᵒ* |  |  | Calculate interior and exterior angles of a regular polygon |
|   | Know angles in a triangle add up to *180ᵒ* |  | Calculate simple average speeds from distance-time graphs |  |
|  |  | Work out the perimeter of a simple rectangle |  | Draw a quadrilateral such as a kite or a parallelogram with given measurements |  |
|  |  | Work out the area of a simple rectangle |  | Explain that the lengths of two sides and a non-included angle do not define a unique triangle  |  |
|  |  | Draw all the lines of symmetry on a 2-D shape | Solve simple speed problems | Construct and recognise the nets of 3-D solids such as pyramids and triangular prisms  |  |
|  |  |  |  |  |  |
|  |  | Name, draw or complete 2-D shapes from information about their symmetry |  |  |  |
|  |  |  |  |  |  |
|  |  | Give a scale factor of an enlarged shape |  |  |

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|  |  | Convert one metric unit to another |  |  |  |
|  |  | Convert between metric and imperial units |  |  |  |
|  |  | Make sensible estimates of a range of measures in everyday settings |  |  |  |
|  |  |  |  |  | Solve more difficult speed problems |
|  |  |  |  |  | Understand and use compound measures such as speed and density |
|  |  |  |  |  | Recognise accuracy in measurements given to the nearest whole unit |
|  |  |  |  |  | Calculate complex average speeds from distance-time graphs  |
|  |  |  |  |  | Construct the perpendicular bisector of a line |
|  |  |  |  |  | Construct the perpendicular from a point to a line |
|  |  |  |  |  | Construct angles of *60ᵒ* and *90ᵒ* |
|  |  |  |  |  | Construct the bisector of an angle |
|  |  |  |  |  | Match one side and one angle of congruent triangles given some dimensions |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 7** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Algebra** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Continue a sequence of numbers or diagrams | Find a particular term in a sequence involving positive numbers | Find a particular term in a sequence involving negative or fractional numbers | Multiply out expressions with brackets such as *5(3x – 2)* | Find a solution to a problem by forming an equation and solving it |
| Write down terms of a simple sequence | Write the term-to-term rule in a sequence involving positive numbers | Write the term-to-term rule in a sequence involving negative or fractional numbers | Factorise expressions | Form and solve equations such as *x² + x = 12*  using trial and improvement methods |
| Use coordinates in the first quadrant, such as plot the point *( 3 , 2 )* | Describe number patterns and relationships including multiply, factor and square | Simplify expressions with more than one variable such as *2a + 5b + a – 2b* | Write the terms of a sequence or series of diagrams given the nth term | Rearrange linear formulae such as *s = 4q – 7* |
| Use a formula written in words such as *cost = 20 x distance travelled in miles* | Simplify expressions with one variable such as *a + 2a + 3a* |  |  | Recognise the equations of straight line graphs such as *y = 3x – 5* |
|   | Use coordinates in all four quadrants | Solve equations such as *x/2 = 9* and *4x - 2 = 22* | Solve problems involving straight lines |  |
|   | Plot points of a conversion graph and read off positive values  | Read from a conversion graph for negative values | Solve linear equations with unknowns on each side such as *3x – 4 = 5 + x* |   |
|   | Use a simple formula such as *P = 2w + 2h* |  | Solve linear equations with brackets such as *2(5x + 1) = 28* |  |
|   | Substitute positive numbers into a simple formula | Write an expression from a problem |

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| Substitute numbers into more complicated formulae such as  |

 |   |
|   | Solve equations such as *4x = 24* and *x – 3 = 7* | Substitute negative numbers into a simple formula | *1* |   |
|   |  Identify integer values that satisfy an inequality | Use formulae from Mathematics and other subjects |  |  |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 7** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Data Handling & Probability**  | **I can:** | **I can:**  | **I can:** | **I can:** | **I can:** |
|  | Work out the range for a set of numbers |  |  |  |
|  |  |  | Construct a stem and leaf diagram (ordered) |  |
| Construct and interpret a pictogram |  |  | Construct a frequency diagram |  |
| Interpret a pictogram | Write down the mode from a graph | Interpret a stem and leaf diagram | Interpret a time-series graph |  |
| Construct and interpret a bar chart |  | Design and use two-way tables for discrete and grouped data | Draw a scatter graph by plotting points on a graph | Draw a line of best fit on a scatter graph by inspection |
| Design and use tally charts for discrete data |  |  | Interpret a scatter graph | Identify possible sources of bias in the design and use of data collection sheets and questionnaires |
| Design and use tally charts for grouped data |  |  | Classify and know the difference between various types of a data | Specify hypotheses and test them |
|  | Express a probability as a fraction |   | Design and use data collection sheets and questionnaires |  |
|   | Display outcomes systematically  |   | Use a variety of different sampling methods  |  |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 8** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Number** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Add and subtract negative integers | Round a number to one significant figure | Estimate answers to calculations involving division | Find the lowest common multiple (LCM) of two simple numbers | Find the lowest common multiple (LCM) of two or more numbers |
| Round numbers to given powers of *10* and to a given number of decimal places | Multiply and divide negative integers | Use the terms square, positive and negative square root, cube and cube root | Find the highest common factor (HCF) of two simple numbers | Find the highest common factor (HCF) of two or more numbers |
| Write down the place value of a digit, for example, what is the value of *4* in *0.24* | Add and subtract decimals | Recall integer squares from *2x2* to *15x15* and the corresponding square roots | Write a number as a product of its prime factors | Round to a given number of significant figures |
| Order decimals, for example which is bigger, *0.24* or *0.3* | Find one number as a fraction of another | Recall the cubes of *2, 3, 4, 5* and *10* | Find the reciprocal of a number | Convert recurring decimals to fractions and fractions to recurring decimals |
| Multiply any three digit number by any two digit numbers without a calculator | Do calculations with simple fractions involving addition | Multiply two decimals such as *2.4 x 0.7* | Estimate answers to calculations | Identify recurring and terminating decimals |
| Divide any three digit number by any two digit number without a calculator | Do calculations with simple fractions involving multiplication | Convert decimals to fractions and fractions to decimals | Solve numerical problems involving multiplication and division with numbers of any size  | Convert between ordinary and standard index form representations |
| Multiply whole numbers and decimals by *10, 100* and *1000* | Calculate cubes and cube roots (with and without the use of a calculator) | Do calculations with simple fractions involving subtraction | Use a calculator efficiently and appropriately | Use standard index form with and without a calculator |
| Divide whole numbers and decimals by *10, 100* and *1000* | Use function keys on a calculator for powers and roots | Increase or decrease a quantity by a given percentage | Find minimum and maximum values | Work out reverse percentage problems |
| Add and subtract decimals to two places | Compare fractions, decimals and percentages |   | Understand the effects of multiplying by numbers between *0* and *1* | Understand how to use successive percentages |
|  | Multiply and divide decimals to two places |   |   | Divide a number by a decimal such as *1 ÷ 0.2* and *2.8 ÷ 0.07* | Work out compound interest |
| Simplify fractions such as *12/20* |   |   | Work out a percentage increase or decrease | Calculate proportional changes using a calculator |
| Arrange fractions in order of size |   |  | Express one quantity as a percentage of another |   |
| Work out fractions of quantities such as *3/5* of *20* |   |  | Do calculations with mixed numbers |   |
| Estimate square roots |   |  | Do calculations with simple fractions involving division |   |
| Calculate squares and square roots (with and without the use of a calculator) |   |  | Solve more complex ratio and proportion problems such as sharing out money between two groups in the ratio of their numbers |   |
| Understand that percentage means “out of one hundred” |   |  | Solve ratio and proportion problems using the unitary method |   |
| Solve simple ratio and direct proportion problems |   |   |   |   |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 8** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Algebra** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Find a particular term in a sequence involving positive numbers | Find a particular term in a sequence involving negative or fractional numbers | Multiply out expressions with brackets such as *5(3x – 2)* | Find a solution to a problem by forming an equation and solving it |

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| Solve fractional linear equations such as  |

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| Write the term-to-term rule in a sequence involving positive numbers | Write the term-to-term rule in a sequence involving negative or fractional numbers | Factorise expressions |  | Expand and simplify two expressions of the form *x ± n* |
| Describe number patterns and relationships including multiply, factor and square | Simplify expressions with more than one variable such as *2a + 5b + a – 2b* | Write the terms of a sequence or series of diagrams given the nth term | Rearrange linear formulae such as *s = 4q – 7* | Factorise quadratic expressions |
| Simplify expressions with one variable such as *a + 2a + 3a* | Draw lines such as *x = 3* and *y = x + 2* | Draw lines such as *y = 2x – 3* | Recognise the equations of straight line graphs such as *y = 3x – 5* | Simplify rational expressions involving quadratic expressions |
| Use coordinates in all four quadrants | Solve equations such as *x/2 = 9* and *4x - 2 = 22* | Solve problems involving straight lines | Find the gradients of straight line graphs | Solve quadratic equations such as *x² + 6x + 8 = 0* |
| Plot points of a conversion graph and read off positive values  | Read from a conversion graph for negative values | Solve linear equations with unknowns on each side such as *3x – 4 = 5 + x* |  | Rearrange formulae that include brackets, fractions and square roots  |
| Use a simple formula such as *P = 2w + 2h* | Interpret distance-time graphs | Solve linear equations with brackets such as *2(5x + 1) = 28* |  | Explore the gradients of parallel straight line graphs |
| Substitute positive numbers into a simple formula | Write an expression from a problem |

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| Substitute numbers into more complicated formulae such as  |

 |  | Solve more complex linear inequalities such as *x + 13 ˃ 5x – 3* |
| Solve equations such as *4x = 24* and *x – 3 = 7* | Substitute negative numbers into a simple formula | Solve problems involving graphs, such as finding where the line *y = x+ 5* crosses the line *y = 1* | Solve inequalities such as *3x ˃ 9* and *12 ≤ 3n < 20* | Solve a set of linear inequalities in 2 variables and represent the solution as a region of a graph  |
|  |   | Use formulae from Mathematics and other subjects | Draw graphs of simple quadratic functions such as *y = 2x²* and *y = x² + 2* | Solve linear inequalities such as *4x – 3 < 10* and *4x < 2x + 7* |  |
|  | Plot the graphs of straight lines such as *x = 3* and *y = 4* |  | Represent sets of solutions on the number line | Explain that each equation can be represented by a line on a graph and that the point of the intersections of the lines is the solution |
|   | Complete a table of values for equations such as *y = 3x + 3* and draw the graph |  |   |  |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 8** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Geometry & Measures** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Draw a triangle given three sides, or two angles and a side, or two sides and the included angle | Show that angles of a triangle add up to *180ᵒ* and use this to find angles | Find the area of a triangle, parallelogram, kite and trapezium | Solve problems involving circles such as a finding the perimeter of a semicircle | Use the angle properties of a circle |
| Draw a cuboid on an isometric grid and mark its dimensions | Show that the exterior angle of a triangle is equal to the sum of the interior opposite angles | Find the area and perimeter of compound shapes | Solve problems involving circles such as a finding the area of a semicircle | Use the tangent/chord properties of a circle |
| Express fractions of full turns in degrees and vice versa | Use angle properties of equilateral, Isosceles and right-angled triangles | Calculate the area of a circle to an appropriate degree of accuracy  | Calculate volumes of triangular prisms, parallelogram-based prisms and cylinders | Distinguish between formulae for perimeter, area and volume by considering dimensions |
| Recognise obtuse, acute and reflex angles | Find the area and perimeter of compound shapes | Calculate the circumference of a circle to an appropriate degree of accuracy  | Solve problems involving surface areas of prisms and cylinders | Find the upper and lower bounds of simple calculations (addition and subtraction) involving quantities given to a particular degree of accuracy |
| Estimate angles | Calculate interior and exterior angles of a quadrilateral | Reflect shapes in lines such as x = 2 *or* y = -1 | Convert between measures of area |  |
| Measure and draw angles accurately to the nearest degree |  |  | Convert between measures of volume | Discuss and interpret graphs modelling real situations |
| Understand the terms “perpendicular lines” and “parallel lines” | Find the volume of a cube or cuboid |  | Classify a quadrilateral by geometric properties | Match sides and angles of similar triangles given some dimensions |
| Know angles on a straight line add up to *180ᵒ* | Find the height of a cuboid given volume, length and breadth |  | Solve problems using angle and symmetry properties of polygons and properties of intersecting and parallel lines |  |
| Know angles around a point add up to *360ᵒ* |  |  | Calculate interior and exterior angles of a regular polygon |  |
| Know angles in a triangle add up to *180ᵒ* |  | Calculate simple average speeds from distance-time graphs | Find the midpoint of a line segment |  |
| Work out the perimeter of a simple rectangle |  | Draw a quadrilateral such as a kite or a parallelogram with given measurements | Use and understand coordinates in three dimensions |  |  |   |
| Work out the area of a simple rectangle | Use map scales to find distance | Explain that the lengths of two sides and a non-included angle do not define a unique triangle  | Reflect shapes in the line y = x *and* y = -x |   |
| Draw all the lines of symmetry on a 2-D shape | Solve simple speed problems |  |  |   |
| Give the order of rotational symmetry of a 2-D shape |   |  |  |   |
| Name, draw or complete 2-D shapes from information about their symmetry |   |  |  |   |
| Convert one metric unit to another |   |   |  |   |
| Convert between metric and imperial units |   |   | Compare the areas of an enlarged shape with the original shape |   |
| Make sensible estimates of a range of measures in everyday settings |   |   |  |   |
| Draw the net of a simple solid such as a cuboid |   |   | Solve more difficult speed problems |   |
|   |   |   | Understand and use compound measures such as speed and density |   |
|  |   |   |   | Recognise accuracy in measurements given to the nearest whole unit |   |
|   |   |   | Calculate complex average speeds from distance-time graphs  |   |
|   |   |   | Construct the perpendicular bisector of a line |   |
|   |   |   | Construct the perpendicular from a point to a line |   |
|   |   |   | Construct angles of *60ᵒ* and *90ᵒ* |   |
|   |   |   | Construct the bisector of an angle |   |

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| **Mathematics****KEY STAGE THREE ASSESSMENT FRAMEWORK, YEAR 8** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Data Handling and Probability** | **I can:**  | **I can:** | **I can:** | **I can:** | **I can:** |
| Work out the range for a set of numbers | Compare the mean and range of two distributions | Calculate the mean for a frequency distribution | Find the mean for grouped data | Construct a time-series graph and plot the moving average |
| Calculate the mean for a set of numbers | Calculate the ‘fx’ column for a frequency distribution | Construct a stem and leaf diagram (ordered) | Find the median class for grouped data | Use the trend line to estimate other values |
| Find the median for an even set of numbers | Construct a pie chart | Construct a frequency diagram | Find the modal class for grouped data | Construct and interpret a cumulative frequency diagram |
| Write down the mode from a graph | Interpret a stem and leaf diagram | Interpret a time-series graph | Use measures of average and range to compare distributions and make inferences | Use a cumulative frequency diagram to estimate the median and interquartile range |
| Compare two distributions using the range and one of the mode, median or mean | Design and use two-way tables for discrete and grouped data | Draw a scatter graph by plotting points on a graph | Draw a line of best fit on a scatter graph by inspection | Construct and interpret a box plot |
| Interpret a pie chart |  | Interpret a scatter graph | Identify possible sources of bias in the design and use of data collection sheets and questionnaires | Compare two sets of a data using box plots |
|  |  | Classify and know the difference between various types of a data | Specify hypotheses and test them |  |
|  |   | Design and use data collection sheets and questionnaires |  |  |
| Display outcomes systematically  |   | Use a variety of different sampling methods  |  |   |

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| **Mathematics - Key Stage Three Assessment Framework Year 9** **(Number)** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Number** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Round a number to one significant figure | Estimate answers to calculations involving division | Find the lowest common multiple (LCM) of two simple numbers | Find the lowest common multiple (LCM) of two or more numbers | Rationalise the denominator of a surd |
| Multiply and divide negative integers | Use the terms square, positive and negative square root, cube and cube root | Find the highest common factor (HCF) of two simple numbers | Find the highest common factor (HCF) of two or more numbers | Use index notation and index laws for simple fractional powers |
| Add and subtract decimals | Recall integer squares from *2x2* to *15x15* and the corresponding square roots | Write a number as a product of its prime factors | Round to a given number of significant figures | Use index notation and index laws for simple negative powers |
| Find one number as a fraction of another | Recall the cubes of *2, 3, 4, 5* and *10* | Find the reciprocal of a number | Convert recurring decimals to fractions and fractions to recurring decimals |   |
| Do calculations with simple fractions involving addition | Multiply two decimals such as *2.4 x 0.7* | Estimate answers to calculations | Identify recurring and terminating decimals |   |
| Do calculations with simple fractions involving multiplication | Convert decimals to fractions and fractions to decimals | Solve numerical problems involving multiplication and division with numbers of any size  | Convert between ordinary and standard index form representations |   |
| Calculate cubes and cube roots (with and without the use of a calculator) | Do calculations with simple fractions involving subtraction | Use a calculator efficiently and appropriately | Use standard index form with and without a calculator |   |
| Use function keys on a calculator for powers and roots | Increase or decrease a quantity by a given percentage | Find minimum and maximum values | Work out reverse percentage problems |   |
| Compare fractions, decimals and percentages |   | Understand the effects of multiplying by numbers between *0* and *1* | Understand how to use successive percentages |   |
|   |   | Divide a number by a decimal such as *1 ÷ 0.2* and *2.8 ÷ 0.07* | Work out compound interest |   |
|   |   | Work out a percentage increase or decrease | Calculate proportional changes using a calculator |   |
|   |  | Express one quantity as a percentage of another |   |   |
|   |  | Do calculations with mixed numbers |   |   |
|   |  | Do calculations with simple fractions involving division |   |   |
|   |  | Solve more complex ratio and proportion problems such as sharing out money between two groups in the ratio of their numbers |   |   |
|   |  | Solve ratio and proportion problems using the unitary method |   |   |

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| **Mathematics - Key Stage Three Assessment Framework Year 9** **(Algebra)** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Algebra** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Find a particular term in a sequence involving negative or fractional numbers | Multiply out expressions with brackets such as *5(3x – 2)* | Find a solution to a problem by forming an equation and solving it |

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| Solve fractional linear equations such as  |

 | Factorise harder quadratic expressions |
| Write the term-to-term rule in a sequence involving negative or fractional numbers | Factorise expressions | Form and solve equations such as *x² + x = 12*  using trial and improvement methods | Expand and simplify two expressions of the form *x ± n* | Solve direct and inverse proportion problems |
| Simplify expressions with more than one variable such as *2a + 5b + a – 2b* | Write the terms of a sequence or series of diagrams given the nth term | Rearrange linear formulae such as *s = 4q – 7* | Factorise quadratic expressions | Interpret the graphs of direct and inverse proportion relationships |
| Draw lines such as *x = 3* and *y = x + 2* | Draw lines such as *y = 2x – 3* | Recognise the equations of straight line graphs such as *y = 3x – 5* | Simplify rational expressions involving quadratic expressions | Change the subject of a formula where the subject appears twice |
| Solve equations such as *x/2 = 9* and *4x - 2 = 22* | Solve problems involving straight lines | Find the gradients of straight line graphs | Solve quadratic equations such as *x² + 6x + 8 = 0* | Use the gradients of perpendicular straight line graphs |
| Read from a conversion graph for negative values | Solve linear equations with unknowns on each side such as *3x – 4 = 5 + x* | Draw graphs of harder quadratic functions such as *y = x² + 3x - 5* | Rearrange formulae that include brackets, fractions and square roots  | Use the points of intersection of a quadratic graph and a straight line graph |
| Interpret distance-time graphs | Solve linear equations with brackets such as *2(5x + 1) = 28* | Draw graphs of harder quadratic functions such as *y = x² + 3x - 5* | Explore the gradients of parallel straight line graphs | Solve quadratic equations of the form *x² + bx + c = 0* using the quadratic formula |
| Write an expression from a problem |

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| Substitute numbers into more complicated formulae such as  |

 | Find the points of intersection of quadratic graphs with lines | Solve more complex linear inequalities such as *x + 13 ˃ 5x – 3* | Solve a pair of simultaneous equations where one is linear and one is quadratic |
| Substitute negative numbers into a simple formula | Solve problems involving graphs, such as finding where the line *y = x+ 5* crosses the line *y = 1* | Use graphs to find the approximate solutions of quadratic equations | Solve a set of linear inequalities in 2 variables and represent the solution as a region of a graph  | Construct the graphs of a circle (*x² + y² = r²*) |
| Use formulae from Mathematics and other subjects | Draw graphs of simple quadratic functions such as *y = 2x²* and *y = x² + 2* | Solve inequalities such as *3x ˃ 9* and *12 ≤ 3n < 20* | Solve a pair of simultaneous equations including two unknowns such as *2x + y = 5* and *2x + 2y = 4* |  |  |   |
| Plot the graphs of straight lines such as *x = 3* and *y = 4* |  |  |  | Solve linear inequalities such as *4x – 3 < 10* and *4x < 2x + 7* | Explain that each equation can be represented by a line on a graph and that the point of the intersections of the lines is the solution |   |
| Complete a table of values for equations such as *y = 3x + 3* and draw the graph |  |  |  | Represent sets of solutions on the number line | Complete tables for, and draw graphs of cubic functions |   |
|  |  |  |   |   | Use cubic graphs to solve equations |   |
|   |   |   | Complete tables for, and draw graphs of reciprocal functions |   |
|   |   |   |   |   | Use reciprocal graphs to solve equations |   |

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| **Mathematics - Key Stage Three Assessment Framework Year 9** **(Geometry and Measures)** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Geometry & Measures** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Show that angles of a triangle add up to *180ᵒ* and use this to find angles | Find the area of a triangle, parallelogram, kite and trapezium | Solve problems involving circles such as a finding the perimeter of a semicircle | Use the angle properties of a circle | Calculate the lengths of circular arcs |
| Show that the exterior angle of a triangle is equal to the sum of the interior opposite angles | Find the area and perimeter of compound shapes | Solve problems involving circles such as a finding the area of a semicircle | Use the tangent/chord properties of a circle | Calculate the areas of sectors |
| Use angle properties of equilateral, Isosceles and right-angled triangles | Calculate the area of a circle to an appropriate degree of accuracy  | Calculate volumes of triangular prisms, parallelogram-based prisms and cylinders | Distinguish between formulae for perimeter, area and volume by considering dimensions | Calculate the surface areas of cylinders, cones and spheres |
| Find the area and perimeter of compound shapes | Calculate the circumference of a circle to an appropriate degree of accuracy  | Solve problems involving surface areas of prisms and cylinders | Find the upper and lower bounds of simple calculations (addition and subtraction) involving quantities given to a particular degree of accuracy | Calculate the volume of cylinders, cones and spheres |
| Calculate interior and exterior angles of a quadrilateral | Reflect shapes in lines such as x = 2 *or* y = -1 | Convert between measures of area | Interpret velocity-time graphs | Prove the angle properties of a circle |
| Investigate tessellations | Rotate shapes around the origin | Convert between measures of volume | Discuss and interpret graphs modelling real situations | Prove the tangent and chord properties of a circle |
| Find the volume of a cube or cuboid | Identify reflective symmetry in 3-D solids | Classify a quadrilateral by geometric properties | Match sides and angles of similar triangles given some dimensions | Use the alternate segment theorem |
| Find the height of a cuboid given volume, length and breadth | Translate a shape using a description such as 4 units right and 3 units down | Solve problems using angle and symmetry properties of polygons and properties of intersecting and parallel lines | Find the distance between two points given their coordinates | Enlarge a shape by a negative scale factor |
| Reflect shapes in the axes of a graph | Enlarge a shape by a positive scale factor from a given centre | Calculate interior and exterior angles of a regular polygon | Use sine, cosine and tangent to calculate an angle in a right-angled triangle | Compare areas and volumes of enlarged shapes |
| Enlarge a shape by a positive scale factor | Calculate simple average speeds from distance-time graphs | Find the midpoint of a line segment | Use sine, cosine and tangent to calculate a side in a right-angled triangle | Add, subtract and multiply vectors |
| Find the measurements of the dimensions of an enlarged shape | Draw a quadrilateral such as a kite or a parallelogram with given measurements | Use and understand coordinates in three dimensions |  |  |  | Understand the relationship between parallel and perpendicular vectors |
| Use map scales to find distance | Explain that the lengths of two sides and a non-included angle do not define a unique triangle  | Reflect shapes in the line y = x *and* y = -x |   | Find the area of a 2-D shape given the area of a similar shape and the ratio |
| Solve simple speed problems | Construct and recognise the nets of 3-D solids such as pyramids and triangular prisms  | Rotate shapes about any point |   | Find the volume of a 3-D solid given the volume of a similar solid and the ratio |
|   | Draw plans and elevations of 3-D solids | Describe fully reflections and rotations about any point |   | Prove that two triangles are congruent |
|   | Describe the concept and points of a locus  | Find the centre of rotation and describe it fully |   | Prove the construction theorems |
|   |   | Combine reflections and rotations |   | Use Pythagoras’ Theorem in 3-D problems |
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| Translate a shape by a vector such as  |

 |   | Sketch and draw trigonometric graphs |
|   |   | Transform shapes by a combination of translation, rotation and reflection |   | Use the sine rule to find the missing sides and missing angles of any triangle |
|   |   | Compare the areas of an enlarged shape with the original shape |   | Use the cosine rule to find the missing sides and missing angles of any triangle |
|   |   | Enlarge a shape by a positive whole number or fractional scale factor |   | Use the formula to find the area of a non-right angled triangle |
|   |   | Solve more difficult speed problems |   |   |
|   |   | Understand and use compound measures such as speed and density |   |   |
|   |   | Recognise accuracy in measurements given to the nearest whole unit |   |   |
|   |   | Calculate complex average speeds from distance-time graphs  |   |   |
|   |   | Construct the perpendicular bisector of a line |   |   |
|   |   | Construct the perpendicular from a point to a line |   |   |
|   |   | Construct angles of *60ᵒ* and *90ᵒ* |   |   |
|   |   | Construct the bisector of an angle |   |   |
|   |   | Match one side and one angle of congruent triangles given some dimensions |   |   |
|   |   | Use Pythagoras’ Theorem to find the hypotenuse of a right-angled triangle |   |   |
|   |   | Use Pythagoras’ Theorem to find any side of a right-angled triangle |   |   |
|   |   | Use Pythagoras’ Theorem to find the height of an isosceles triangle |   |   |
|   |   | Use Pythagoras’ Theorem in practical problems |   |   |
|   |   | Construct accurately loci, such as those equidistant from two fixed points |   |   |
|   |   | Solve loci problems, such as identifying points less than *3cm* from point P |   |   |

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| **Mathematics - Key Stage Three Assessment Framework Year 9** **(Data Handling and Probability)** |
| **Learning Focus** | **Milestone 1** | **Milestone 2** | **Milestone 3** | **Milestone 4** | **Milestone 5**  |
| **Emerging** | **Developing** | **Securing** | **Mastering** | **Beyond** |
| **Data Handling & Probability** | **I can:** | **I can:** | **I can:** | **I can:** | **I can:** |
| Compare the mean and range of two distributions | Calculate the mean for a frequency distribution | Find the mean for grouped data | Construct a time-series graph and plot the moving average | Construct and interpret a histogram including unequal class intervals |
| Calculate the ‘fx’ column for a frequency distribution | Construct a stem and leaf diagram (ordered) | Find the median class for grouped data | Use the trend line to estimate other values | Use stratified sampling |
| Construct a pie chart | Construct a frequency diagram | Find the modal class for grouped data | Construct and interpret a cumulative frequency diagram | Understand dependent and independent outcomes |
| Interpret a stem and leaf diagram | Interpret a time-series graph | Use measures of average and range to compare distributions and make inferences | Use a cumulative frequency diagram to estimate the median and interquartile range | Understand probabilities associated with mutually exclusive events |
| Design and use two-way tables for discrete and grouped data | Draw a scatter graph by plotting points on a graph | Draw a line of best fit on a scatter graph by inspection | Construct and interpret a box plot | Use tree diagrams to find probabilities of successive independent events |
| Understand the difference between experimental and theoretical probabilities | Interpret a scatter graph | Identify possible sources of bias in the design and use of data collection sheets and questionnaires | Compare two sets of a data using box plots |   |
| Understand and use relative frequency | Classify and know the difference between various types of a data | Specify hypotheses and test them | Use relative frequency to find probabilities |   |
|   | Design and use data collection sheets and questionnaires | Understand relative frequency as an estimate of probability | Complete a tree diagram |   |
|   | Use a variety of different sampling methods  | Use relative frequency to compare outcomes of experiments |   |   |
|   | Use a two-way table to find a probability |   |   |   |
|   | Understand mutually exclusive events |   |   |   |
|   | Use the fact that the probabilities of mutually exclusive events add up to 1 |   |   |   |