

## KSA KEY 4 STAGE OVERVIEW (Long Term Planning)

### Subject: Mathematics (Higher Tier)

### Year 10

Week/ Lesson	Term	Topic	Knowledge	Skills
<b>Unit 1</b> 13 hours	Autumn T1	<b>Number</b> Unit 1a: Calculations, checking and rounding	<ul style="list-style-type: none"> <li>Students have a firm grasp of place value and be able to order integers and decimals and use the four operations.</li> <li>Students should have knowledge of integer complements to 10 and to 100, multiplication facts to <math>10 \times 10</math>, strategies for multiplying and dividing by 10, 100 and 1000.</li> <li>Students will have encountered squares, square roots, cubes and cube roots and have knowledge of classifying integers.</li> </ul>	<ul style="list-style-type: none"> <li>1.1 - Number Problems and reasoning</li> <li>1.2 - Place value and estimating</li> </ul>
		<b>Number</b> Unit 1b: Indices, roots, reciprocals and hierarchy of operations		<ul style="list-style-type: none"> <li>1.3 - HCF and LCM</li> <li>1.4 - Calculating with powers</li> <li>1.5 - Zero, negative and fractional indices</li> </ul>
		<b>Number</b> Unit 1c: Factors, multiples, primes, standard form and surds		<ul style="list-style-type: none"> <li>1.6 - Powers of 10 and standard form</li> <li>1.7 - Surds</li> </ul>
<b>Unit 1</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 2</b> 12 hours		<b>Algebra</b> Unit 2a: Algebra the basics, setting up, rearranging and solving equations	<ul style="list-style-type: none"> <li>Have the ability to use negative numbers with the four operations and recall and use the hierarchy of operations and understand inverse operations</li> <li>Be able to deal with decimals and negatives on a calculator</li> <li>Be able to use index laws numerically</li> </ul>	<ul style="list-style-type: none"> <li>2.1 - Algebraic indices</li> <li>2.2 - Expanding and factorising</li> <li>2.3 - Equations</li> <li>2.4 - Formulae</li> <li>2.7 - More expanding and factorising</li> </ul>
	<b>Algebra</b> Unit 2b: Sequences	<ul style="list-style-type: none"> <li>2.5 - Linear sequences</li> <li>2.6 - Non-linear sequences</li> </ul>		
<b>Unit 2</b> 2 hours	<b>Reteach, Review, Assess and Feedback</b>			
<b>Unit 3</b> 7 hours		<b>Interpreting and representing data</b>		<ul style="list-style-type: none"> <li>3.5 - Averages and range</li> </ul>

		<p><b>Unit 3a: Averages and range</b></p> <p><b>Interpreting and representing data</b></p> <p><b>Unit 3b: Representing and interpreting data and scatter graphs</b></p>	<ul style="list-style-type: none"> <li>• be able to read scales on graphs, draw circles, measure angles and plot coordinates in the first quadrant.</li> <li>• have experience of tally charts.</li> <li>• will have used inequality notation</li> <li>• must be able to find the midpoint of two numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• 3.1 - Statistical diagrams 1</li> <li>• 3.2 - Time series</li> <li>• 3.3 - Scatter graphs</li> <li>• 3.4 - Line of best fit</li> <li>• 3.6 - Statistical diagrams 2</li> </ul>
<b>Unit 3</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 4</b> 16 hours	<b>Autumn T2</b>	<p><b>Fractions, ratio and percentages</b></p> <p><b>Unit 4a: Fractions and percentages</b></p>	<ul style="list-style-type: none"> <li>• Know the four operations</li> <li>• Be able to find common factors</li> <li>• Have a basic understanding of fractions as being 'parts of a whole'</li> <li>• Can define percentage as 'number of parts per hundred'</li> <li>• Are aware that percentages are used in everyday life</li> </ul>	<ul style="list-style-type: none"> <li>• 4.1 - Fractions</li> <li>• 4.4 - Percentages</li> <li>• 4.5 - Fractions, decimals and percentages</li> </ul>
		<p><b>Fractions, ratio and percentages</b></p> <p><b>Unit 4b: Ratio and proportion</b></p>	<ul style="list-style-type: none"> <li>• 4.2 - Ratios</li> <li>• 4.3 - Ratio and proportion</li> </ul>	
<b>Unit 4</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 5</b> 10 hours		<p><b>Angles and trigonometry</b></p> <p><b>Unit 5a: Polygons, angles and parallel lines</b></p>	<ul style="list-style-type: none"> <li>• Should be able to rearrange simple formulae and equations, as preparation for rearranging trig formulae</li> </ul>	<ul style="list-style-type: none"> <li>• 5.1 - Angle properties of triangles and quadrilaterals</li> <li>• 5.2 - Interior angles of a polygon</li> <li>• 5.3 - Exterior angles of a polygon</li> </ul>
		<p><b>Angles and trigonometry</b></p> <p><b>Unit 5b: Pythagoras theorem and trigonometry</b></p>	<ul style="list-style-type: none"> <li>• Should recall basic angle facts</li> <li>• Should understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents</li> </ul>	<ul style="list-style-type: none"> <li>• 5.4 - Pythagoras' theorem 1</li> <li>• 5.5 - Pythagoras' theorem 2</li> <li>• 5.6 - Trigonometry 1</li> <li>• 5.7 - Trigonometry 2</li> </ul>
<b>Unit 5</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
		<b>End of Term Assessment</b>		
<b>Unit 6</b> 3 hours	<b>Spring T1</b>	<p><b>Graphs</b></p> <p><b>Unit 6a: Graphs: the basics and real life graphs</b></p>	<ul style="list-style-type: none"> <li>• Can identify coordinates of given points in the first quadrant or all four quadrants</li> <li>• Can use Pythagoras' Theorem and calculate the area of compound shapes</li> </ul>	<ul style="list-style-type: none"> <li>• 6.3 - Graphing rates of change</li> <li>• 6.4 - Real-life graphs</li> <li>• 6.5 - Line segments</li> <li>• 6.8 - More graphs</li> </ul>
		<p><b>Graphs</b></p> <p><b>Unit 6b: Linear graphs and coordinate geometry</b></p>	<ul style="list-style-type: none"> <li>• Can use and draw conversion graphs for these units</li> </ul>	<ul style="list-style-type: none"> <li>• 6.1 - Linear graphs</li> <li>• 6.2 - More linear graphs</li> <li>• 6.5 - Line segments</li> </ul>
		<p><b>Graphs</b></p>		<ul style="list-style-type: none"> <li>• 6.6 - Quadratic graphs</li> </ul>

		<b>Unit 6c: Quadratic, cubic and other graphs</b>	<ul style="list-style-type: none"> <li>Can use function machines and inverse operations</li> </ul>	<ul style="list-style-type: none"> <li>6.7 - Cubic and reciprocal graphs</li> <li>6.8 - More graphs</li> </ul>
<b>Unit 6</b> 2 hours	<b>Reteach, Review, Assess and Feedback</b>			
<b>Unit 7</b> 15 hours	<b>Area and volume</b> <b>Unit 7a: Perimeter, area and circles</b>	<ul style="list-style-type: none"> <li>Should know the names and properties of 3D forms</li> <li>The concept of perimeter and area by measuring lengths of sides will be familiar</li> <li>Should be able to substitute numbers into an equation and give answers to an appropriate degree of accuracy</li> <li>Should know the various metric units</li> </ul>	<ul style="list-style-type: none"> <li>7.1 - Perimeter and area</li> <li>7.4 - Circles</li> <li>7.5 - Sectors of circles</li> </ul>	
	<b>Area and volume</b> <b>Unit 7b: 3D forms and volume, cylinders, cones and spheres</b>		<ul style="list-style-type: none"> <li>7.3 - Prisms</li> <li>7.6 - Cylinders and spheres</li> <li>7.7 - Pyramids and cones</li> </ul>	
	<b>Area and volume</b> <b>Unit 7c: Accuracy and bounds</b>		<ul style="list-style-type: none"> <li>7.2 - Units and accuracy</li> <li>13.1 - Accuracy</li> </ul>	
<b>Unit 7</b> 2 hours	<b>Reteach, Review, Assess and Feedback</b>			
<b>Unit 8</b> 11 hours	<b>Transformations and constructions</b> <b>Unit 8a: Transformations</b>	<ul style="list-style-type: none"> <li>Be able to recognise 2D shapes</li> <li>Be able to plot coordinates in four quadrants and linear equations parallel to the coordinate axes</li> </ul>	<ul style="list-style-type: none"> <li>8.2 - Reflection and rotation</li> <li>8.3 - Enlargement</li> <li>8.4 - Transformations and combinations of transformations</li> </ul>	
	<b>Transformations and constructions</b> <b>Unit 8b: Constructions, loci and bearings</b>		<ul style="list-style-type: none"> <li>8.1 - 3D solids</li> <li>8.5 - Bearings and scale drawings</li> <li>8.6 - Constructions 1</li> <li>8.7 - Constructions 2</li> <li>8.8 - Loci</li> </ul>	
<b>Unit 8</b> 2 hours	<b>Reteach, Review, Assess and Feedback</b>			
<b>Unit 9</b> 11 hours	<b>Spring T2</b>	<b>Equations and inequalities</b> <b>Unit 9a: Solving quadratics and simultaneous equations</b>	<ul style="list-style-type: none"> <li>Understand the <math>\geq</math> and <math>\leq</math> symbols</li> <li>Can substitute into, solve and rearrange linear equations</li> <li>Be able to factorise simple quadratic expressions</li> <li>Be able to recognise the equation of a circle</li> </ul>	<ul style="list-style-type: none"> <li>9.1 - Solving quadratic equations 1</li> <li>9.2 - Solving quadratic equations 2</li> <li>9.3 - Completing the square</li> <li>9.4 - Solving simple simultaneous equations</li> <li>9.5 - More simultaneous equations</li> <li>9.6 - Solving linear and quadratic simultaneous equations</li> </ul>
		<b>Equations and inequalities</b> <b>Unit 9b: Inequalities</b>		<ul style="list-style-type: none"> <li>9.7 - Solving linear inequalities</li> </ul>
<b>Unit 9</b>	<b>Reteach, Review, Assess and Feedback</b>			

2 hours				
<b>Unit 10</b> 6 hours		<b>Probability</b> <b>Unit 10a: Probability</b>	<ul style="list-style-type: none"> <li>Understand that a probability is a number between 0 and 1, and distinguish between events which are impossible, unlikely, even chance, likely and certain to occur</li> <li>Be able to mark events and/or probabilities on a probability scale of 0 to 1</li> <li>Know how to add and multiply fractions and decimals</li> <li>Have an experience of expressing one number as a fraction of another number</li> </ul>	<ul style="list-style-type: none"> <li>10.1 - Combined events</li> <li>10.2 - Mutually exclusive events</li> <li>10.3 - Experimental probability</li> <li>10.4 - Independent events and tree diagrams</li> <li>10.5 - Conditional probability</li> <li>10.6 - Venn diagrams and set notation</li> </ul>
<b>Unit 10</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 11</b> 6 hours	<b>Summer T1</b>	<b>Multiplicative reasoning</b> <b>Unit 11a: Multiplicative reasoning</b>	<ul style="list-style-type: none"> <li>Be able to find a percentage of an amount and relate percentages to decimals</li> <li>Be able to rearrange equations and use these to solve problems</li> <li>Knowledge of <math>\text{speed} = \text{distance}/\text{time}</math>, <math>\text{density} = \text{mass}/\text{volume}</math></li> </ul>	<ul style="list-style-type: none"> <li>14.1 - Percentages (from four)</li> <li>14.2 - Growth and decay (from four)</li> <li>14.3 - Compound measures (from four)</li> <li>14.4 - Distance, speed and time (from four)</li> <li>14.5 - Direct and inverse proportion (from four)</li> <li>11.1 - Growth and decay</li> <li>11.2 - Compound measures</li> <li>11.3 - More compound measures</li> <li>11.4 - Ratio and proportion</li> </ul>
<b>Unit 11</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 12</b> 4 hours		<b>Similarity and congruence</b> <b>Unit 12a: Similarity and congruence in 2D and 3D</b>	<ul style="list-style-type: none"> <li>Be able to recognise and enlarge shapes and calculate scale factors</li> <li>Knowledge of how to calculate area and volume in various metric measures</li> <li>Be able to measure lines and angles, and use compasses, ruler and protractor to construct standard constructions</li> </ul>	<ul style="list-style-type: none"> <li>12.1 - Congruence</li> <li>12.2 - Geometric proof and congruence</li> <li>12.3 - Similarity</li> <li>12.4 - More similarity</li> <li>12.5 - Similarity in 3D solids</li> </ul>
<b>Unit 12</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 13</b> 13 hours		<b>More trigonometry</b>	<ul style="list-style-type: none"> <li>Be able to use axes and coordinates to specify points in all four quadrants</li> </ul>	<ul style="list-style-type: none"> <li>13.2 - Graph of sine function</li> <li>13.3 - Graph of cosine function</li> </ul>

		<b>Unit 13a: Graphs of trigonometric functions</b>	<ul style="list-style-type: none"> <li>Be able to recall and apply Pythagoras' Theorem and trigonometric ratios</li> <li>Be able to substitute into formulae</li> </ul>	<ul style="list-style-type: none"> <li>13.4 - The tangent function</li> <li>13.8 - Transforming trigonometric graphs 1</li> <li>13.9 - Transforming trigonometric graphs 2</li> </ul>
		<b>More trigonometry</b> <b>Unit 13b: Further trigonometry</b>		<ul style="list-style-type: none"> <li>13.5 - Calculating areas and the sine rule</li> <li>13.6 - The cosine rule and 2D trigonometric problems</li> <li>13.7 - Solving problems in 3D</li> </ul>
<b>Unit 13</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 14</b> 8 hours	<b>Summer T2</b>	<b>Further statistics</b> <b>Unit 14a: Collecting data</b>	<ul style="list-style-type: none"> <li>Understand the different types of data: discrete/continuous</li> <li>Have experience of inequality notation</li> <li>Be able to multiply a fraction by a number</li> <li>Understand the data handling cycle</li> </ul>	<ul style="list-style-type: none"> <li>14.1 - Sampling</li> </ul>
		<b>Further statistics</b> <b>Unit 14b: Cumulative frequency, box plots and histograms</b>		<ul style="list-style-type: none"> <li>14.2 - Cumulative frequency</li> <li>14.3 - Box plots</li> <li>14.4 - Drawing histograms</li> <li>14.5 - Interpreting histograms</li> <li>14.6 - Comparing and describing populations</li> </ul>
<b>Unit 14</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 15</b> 5 hours		<b>Equations and graphs</b> <b>Unit 15a: Quadratic, expanding more than two brackets, stretching graphs, graphs of circles, cubes and quadratics</b>	<ul style="list-style-type: none"> <li>Be able to solve quadratics and linear equations</li> <li>Be able to solve simultaneous equations algebraically</li> </ul>	<ul style="list-style-type: none"> <li>15.1 - Solving simultaneous equations graphically</li> <li>15.2 - Representing inequalities graphically</li> <li>15.3 - Graphs of quadratic functions</li> <li>15.4 - Solving quadratic equations graphically</li> <li>15.5 - Graphs of cubic functions</li> <li>15.6 - Using iteration to solve equations</li> </ul>
<b>Unit 15</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
		<b>End of Year Assessment</b>		

## KAT KEY 4 STAGE OVERVIEW (Long Term Planning)

### Year 11

Week/ Lesson	Term	Topic	Knowledge	Skills
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3 hours		<b>Monitoring and addressing gaps from mini low stakes assessment</b>		
<b>Unit 16</b> 8 hours	<b>Autumn T1</b>	<b>Circle theorems</b> <b>Unit 16a: Circle theorems</b>	<ul style="list-style-type: none"> <li>• Have a practical experience of drawing circles with compasses</li> <li>• Recall the words, centre, radius, diameter and circumference</li> <li>• Recall the relationship of the gradient between two perpendicular lines</li> </ul>	<ul style="list-style-type: none"> <li>• 16.1 - Radii and chords</li> <li>• 16.2 - Tangents</li> <li>• 16.3 - Angles in circles 1</li> <li>• 16.4 - Angles in circles 2</li> <li>• 16.5 - Applying circle theorems</li> </ul>
		<b>Circle theorems</b> <b>Unit 16b: Circle geometry</b>	<ul style="list-style-type: none"> <li>• Be able to find the equation of the straight line, given a gradient and a coordinate</li> </ul>	<ul style="list-style-type: none"> <li>• 16.5 - Applying circle theorems</li> </ul>
<b>Unit 16</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 17</b> 9 hours		<b>More algebra</b> <b>Unit 17a: Changing the subject of formulae (more complex) solving equations from algebraic fractions, rationalising surds, proof</b>	<ul style="list-style-type: none"> <li>• Be able to simplify surds</li> <li>• Be able to use negative numbers with all four operations</li> <li>• Be able to recall and use the hierarchy of operations</li> </ul>	<ul style="list-style-type: none"> <li>• 17.1 - Rearranging formulae</li> <li>• 17.2 - Algebraic fractions</li> <li>• 17.3 - Simplifying algebraic fractions</li> <li>• 17.4 - More algebraic fractions</li> <li>• 17.5 - Surds</li> <li>• 17.6 - Solving algebraic fraction equations</li> <li>• 17.7 - Functions</li> <li>• 17.8 - Proof</li> </ul>
			<b>Reteach, Review, Assess and Feedback</b>	
<b>Unit 17</b> 2 hours		<b>Reteach, Review, Assess and Feedback</b>		
<b>Unit 18</b> 9 hours	<b>Autumn T2</b>	<b>Vectors and geometric proof</b> <b>Unit 18a: Vectors and geometric proof</b>	<ul style="list-style-type: none"> <li>• Have used vectors to describe translations and have knowledge of Pythagoras' Theorem and the properties of triangles and quadrilaterals</li> </ul>	<ul style="list-style-type: none"> <li>• 18.1 - Vectors and vector notation</li> <li>• 18.2 - Vector arithmetic</li> <li>• 18.3 - More vector arithmetic</li> <li>• 18.4 - Parallel vectors and collinear points</li> <li>• 18.5 - Solving geometric problems</li> </ul>
		<b>Proportion and graphs</b> <b>Unit 19a: Reciprocal and exponential graphs; Gradient and area under graphs</b>	<ul style="list-style-type: none"> <li>• Be able to draw linear and quadratic graphs</li> <li>• Be able to calculate the gradient of a linear function between two points</li> <li>• Recall transformations of trigonometric functions</li> </ul>	<ul style="list-style-type: none"> <li>• 19.4 - Exponential functions</li> <li>• 19.5 - Non-linear graphs</li> <li>• 19.6 - Translating graphs of functions</li> <li>• 19.7 - Reflecting and stretching graphs of functions</li> </ul>
		<b>Proportion and graphs</b> <b>Unit 19b: Direct and inverse proportion</b>	<ul style="list-style-type: none"> <li>• Have knowledge of writing statements of direct proportion and forming an equation to find values</li> </ul>	<ul style="list-style-type: none"> <li>• 19.1 - Direct proportion</li> <li>• 19.2 - More direct proportion</li> <li>• 19.3 - Inverse proportion</li> </ul>
8 hours		<b>PPE1</b>		
6 hours		<b>QLA and Feedback from PPE1</b>		
	<b>Spring T1</b>			

