

## Maths Progress 9 - 1

**Awarding Grades** – grades will predominantly be awarded using **numerical grade boundaries** (see assessment below) on regular **formal assessments**; topic tests, progress in class and homework tasks may also be taken into consideration.

Topic Areas – Number; Algebra; Ratio, Proportion and Rates of change; Geometry and Measures; Probability; Statistics.

The aim is for all students to become fluent in the fundamentals of Mathematics, be able to reason mathematically and solve problems by applying their mathematics to ensure they reach their potential.

Target grades will only be achieved by the accurate application of mathematical knowledge and techniques across the syllabus, in particular to problems where the skills required are not obvious.

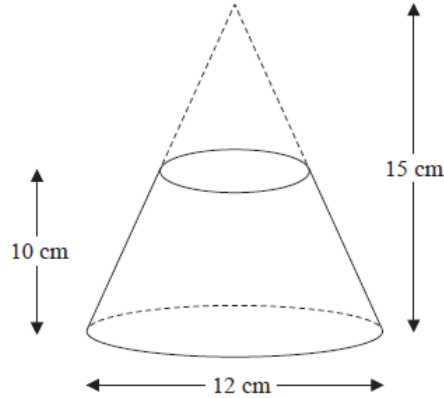
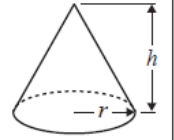
Detail of the programme of study can be found at:

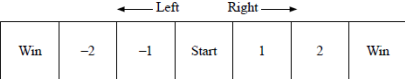
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/239058/SECONDARY\\_national\\_curriculum\\_-\\_Mathematics.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf) - for KS3

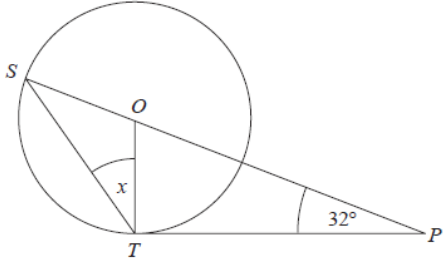
<http://qualifications.pearson.com/content/dam/pdf/GCSE/mathematics/2015/specification-and-sample-assesment/gcse-maths-2015-specification.pdf> - for GCSE

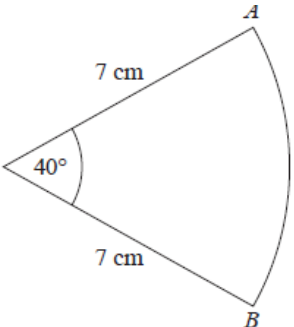
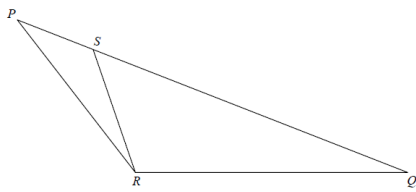
	<b>AO1 Use and apply standard techniques</b> Foundation 50% Higher 40%	<b>AO2 Reason, interpret and communicate mathematically</b> Foundation 25% Higher 30%	<b>AO3 Solve problems within mathematics and in other contexts</b> Foundation 25% Higher 30%	<b>Examples from Algebra and Geometry topics of the progression of knowledge and understanding assessed at each level</b>
<b>Grade 9</b>	Is awarded for the top 20% of those students achieving a level 7 or 8 in the final GCSE exams ( <i>subject to change</i> )			

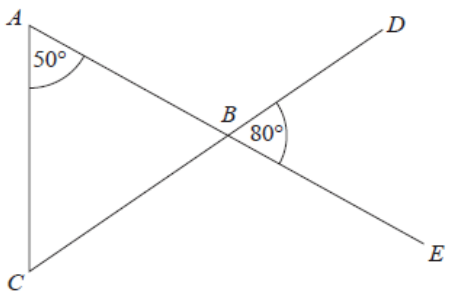
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<b>Grade 8</b>	<ul style="list-style-type: none"> <li>perform procedures accurately</li> </ul>	<ul style="list-style-type: none"> <li>interpret and communicate complex information accurately</li> <li>make deductions and inferences and draw conclusions</li> <li>construct substantial chains of reasoning, including convincing arguments and formal proofs</li> <li>interpret results in the context of the given problem</li> <li>critically evaluate methods, arguments, results and the assumptions made</li> </ul>	<ul style="list-style-type: none"> <li>generate efficient strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes</li> <li>make and use connections, which may not be immediately obvious, between different parts of mathematics</li> <li>interpret results in the context of the given problem</li> </ul>	

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<b>Grade 8</b>	<p>Solve algebraically the simultaneous equations</p> $x^2 + y^2 = 25$ $y - 2x = 5$ <p>2H Q20</p>	<p>Louis and Robert are investigating the growth in the population of a type of bacteria. They have two flasks A and B. At the start of day 1, there are 1000 bacteria in flask A. The population of bacteria grows exponentially at the rate of 50% per day.</p> <p>(a) Show that the population of bacteria in flask A at the start of each day forms a geometric progression.</p> <p>The population of bacteria in flask A at the start of the 10th day is <math>k</math> times the population of bacteria in flask A at the start of the 6th day.</p> <p>(b) Find the value of <math>k</math>.</p> <p>At the start of day 1 there are 1000 bacteria in flask B. The population of bacteria in flask B grows exponentially at the rate of 30% per day.</p> <p>(c) Sketch a graph to compare the size of the population of bacteria in flask A and in flask B.</p> <p>3H Q17</p>	<p>A frustum is made by removing a small cone from a large cone as shown in the diagram.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Volume of cone = <math>\frac{1}{3}\pi r^2 h</math></p>  </div> <p>The frustum is made from glass. The glass has a density of <math>2.5 \text{ g / cm}^3</math>. Work out the mass of the frustum. Give your answer to an appropriate degree of accuracy.</p> <p>2H Q22</p>	<ul style="list-style-type: none"> <li>deduce turning points of quadratic functions by completing the square</li> <li>solve two simultaneous equations in two variables (linear/non-linear) algebraically</li> <li>Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones</li> </ul>

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<h1 style="writing-mode: vertical-rl; transform: rotate(180deg);">Grade 7</h1>	<p>Solve <math>x^2 - 5x + 3 = 0</math>            Give your solutions correct to 3 significant figures.</p> <p><i>2H Q11</i></p>	<p>Solid <b>A</b> and solid <b>B</b> are mathematically similar.            The ratio of the surface area of solid <b>A</b> to the surface area of solid <b>B</b> is 4 : 9            The volume of solid <b>B</b> is 405 cm<sup>3</sup>.            Show that the volume of solid <b>A</b> is 120 cm<sup>3</sup>.</p> <p><i>1H Q18</i></p>	<p>Here is a board for a game.</p> <div style="text-align: center;">  </div> <p>Jim begins with a counter on <b>Start</b>.            He rolls a fair dice.            He moves his counter one square to the right when the dice lands on 1 or on 2 or on 3 or on 4.            Otherwise he moves his counter one square to the left.            Jim rolls the dice twice and moves his counter twice.</p> <p>(a) Work out the probability that his counter will then be on the square with 2 on it            Jim puts the counter back on the <b>Start</b> square.            He rolls the dice 3 times and moves his counter three times.</p> <p>(b) Work out the probability that his counter will then be on the square with -1 on it.            Jim wins the game when his counter lands on a square with <b>Win</b> on it.</p> <p>Jim says:            "I cannot win in an even number of throws of the dice."</p> <p>(c) Explain whether or not Jim is correct.</p> <p><i>1H Q14</i></p>	<ul style="list-style-type: none"> <li>• solve quadratic equations by using the quadratic formula</li> <li>• know and apply Area = <math>\frac{1}{2} ab \sin C</math> to calculate the area, sides or angles of any triangle</li> </ul>

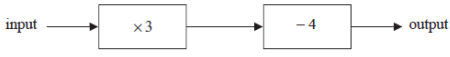
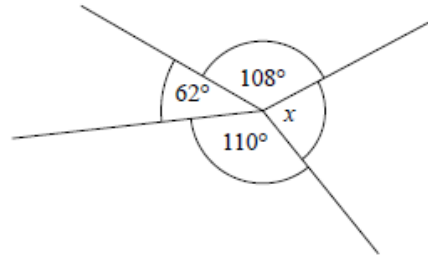
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<b>Grade 6</b>	<p>There are 80 students at a language school. All 80 students speak at least one language from French, German and Spanish.</p> <p>9 of the students speak French, German and Spanish. 19 of the students speak French and German. 28 of the students speak French and Spanish. 17 of the students speak Spanish and German. 45 students speak French. 50 students speak Spanish.</p> <p>(a) Draw a Venn diagram to show this information.</p> <p>One of the 80 students is selected at random.</p> <p>(b) Find the probability that this student speaks German but not Spanish.</p> <p>Given that the student speaks German,</p> <p>(c) Find the probability that this student also speaks French.</p> <p><i>H2 Q11</i></p>	 <p><i>S and T are points on the circumference of a circle, centre O. PT is a tangent to the circle. SOP is a straight line. Angle OPT = 32° Work out the size of the angle marked x. You must give a reason for each stage of your working.</i></p> <p><i>2H Q11</i></p>	<p>One uranium atom has a mass of <math>3.95 \times 10^{-22}</math> grams.</p> <p>(a) Work out an estimate for the number of uranium atoms in 1 kg of uranium.</p> <p>(b) Is your answer to (a) an underestimate or an overestimate? Give a reason for your answer.</p> <p><i>1H Q11</i></p>	<ul style="list-style-type: none"> <li>Solve linear equations in one unknown with fractional coefficients</li> <li>Solve problems including examples of solids in everyday use</li> </ul>

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<b>Grade 5</b>	<ul style="list-style-type: none"> <li>perform routine single- and multi-step procedures effectively by recalling, applying and interpreting notation, terminology, facts, definitions and formulae</li> </ul>	<ul style="list-style-type: none"> <li>interpret and communicate information effectively</li> <li>make deductions, inferences and draw conclusions</li> <li>construct chains of reasoning, including arguments</li> <li>evaluate methods and results</li> </ul>	<ul style="list-style-type: none"> <li>generate strategies to solve mathematical and non-mathematical problems by translating them into mathematical processes, realising connections between different parts of mathematics</li> <li>interpret results in the context of the given problem</li> </ul>	
<b>Grade 5</b>	<p>The diagram shows a sector of a circle of radius 7 cm.</p>  <p>Work out the length of arc <math>AB</math>. Give your answer correct to 3 significant figures.</p> <p><i>1H Q17</i></p>	<p>In a shop, all normal prices are reduced by 20% to give the sale price. The sale price of a TV set is then reduced by 30%.</p> <p>Mary says, "30 + 20 = 50, so this means that the normal price of the TV set has been reduced by 50%."</p> <p>Is Mary right? You must give a reason for your answer.</p> <p><i>1H Q15</i></p>	<p>Triangle <math>PQR</math> is similar to triangle <math>PRS</math>.</p>  <p><math>PSQ</math> is a straight line Angle <math>PQR =</math> angle <math>PRS</math>. <math>PS = 2</math> cm. <math>PR = 5</math> cm. Work out the length of <math>SQ</math>.</p> <p><i>3F Q18</i></p>	<ul style="list-style-type: none"> <li>solve two simultaneous equations in two variables (linear/linear)</li> <li>solve quadratic equations algebraically by factorising</li> <li>surface area and volume of spheres, pyramids, cones and composite solids</li> <li>calculate arc lengths, angles and areas of sectors of circles</li> </ul>

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Grade 4	<p>Solve <math>4x + 5 = x + 26</math></p> <p><i>1F Q19 - not on higher</i></p>	<p>Here are the first six terms of a Fibonacci sequence. 1 1 2 3 5 8</p> <p>The rule to continue a Fibonacci sequence is, the next term in the sequence is the sum of the two previous terms.</p> <p>(a) Find the 9th term of this sequence. The first three terms of a different Fibonacci sequence are <math>a</math> <math>b</math> <math>a + b</math></p> <p>(b) Show that the 6th term of this sequence is <math>3a + 5b</math></p> <p><i>3H Q3/ 3F Q20</i></p>	<p>In a company, the ratio of the number of men to the number of women is 3 : 2</p> <p>40% of the men are under the age of 25</p> <p>10% of the women are under the age of 25</p> <p>What percentage of all the people in the company are under the age of 25?</p> <p><i>1H Q5/ 1F Q25</i></p>	<ul style="list-style-type: none"> <li>• solve linear equations in one unknown on both sides of the equation algebraically</li> <li>• construct plans and elevations of 3D shapes</li> </ul>
Grade 3	<p>Change 72 km/h into m/s.</p> <p><i>3F Q16</i></p>	 <p><i>ABE</i> and <i>CBD</i> are straight lines. Show that triangle <i>ABC</i> is an isosceles triangle. Give a reason for each stage of your working.</p> <p><i>2F Q13</i></p>	<p>Sam buys 20 boxes of oranges. There are 25 oranges in each box. Each box of oranges costs £7. Sam sells <math>\frac{2}{5}</math> of the oranges he bought. He sells each of these oranges for 40p. He then sells all of the remaining oranges at 3 oranges for 50p. Did Sam make a profit or did Sam make a loss? You must show working to justify your answer.</p> <p><i>1F Q16</i></p>	<ul style="list-style-type: none"> <li>• solve linear equations in one unknown algebraically</li> <li>• know and apply formulae to calculate volume of cuboids and other right prisms (including cylinders)</li> <li>• know the formulae: circumference of a circle = <math>2\pi r = \pi d</math>, area of a circle = <math>\pi r^2</math>; calculate perimeters of 2D shapes, including circles; areas of circles and composite shapes</li> </ul>

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<b>Grade 2</b>	<ul style="list-style-type: none"> <li>recall and use notation, terminology, facts and definitions; perform routine procedures, including some multi-step procedures</li> </ul>	<ul style="list-style-type: none"> <li>interpret and communicate basic information; make deductions and use reasoning to obtain results</li> <li>provide basic evaluation of methods or results</li> </ul>	<ul style="list-style-type: none"> <li>solve problems by translating simple mathematical and non-mathematical problems into mathematical processes</li> <li>interpret results in the context of the given problem</li> </ul>	
<b>Grade 2</b>	<p>There are only black pens and green pens in a box. The ratio of the number of black pens in the box to the number of green pens in the box is 2 : 5</p> <p>What fraction of the pens are black?</p> <p><i>1F Q10</i></p>	<p>Adam says, "When you multiply an even number by an odd number the answer is always an odd number." (b) Write down an example to show Adam is wrong.</p> <p>Betty says, "When you multiply two prime numbers together the answer is always an odd number." (b) Betty is wrong. Explain why.</p> <p><i>2F Q11</i></p>	<p>Jan writes down one multiple of 9 and two different factors of 40. Jan adds together her three numbers. Her answer is greater than 20 but less than 30 Find three numbers that Jan could have written down.</p> <p><i>2F Q6</i></p>	<ul style="list-style-type: none"> <li>use and interpret algebraic manipulation, including:             <ul style="list-style-type: none"> <li><math>ab</math> in place of <math>a \times b</math></li> <li><math>3y</math> in place of <math>y + y + y</math> and <math>3 \times y</math></li> <li><math>a^2</math> in place of <math>a \times a</math>, <math>a^3</math> in place of <math>a \times a \times a</math>, <math>a^2b</math> in place of <math>a \times a \times b</math></li> <li><math>a/b</math> in place of <math>a \div b</math></li> <li>coefficients written as fractions rather than as decimals</li> <li>brackets</li> </ul> </li> <li>know and apply formulae to calculate areas of triangles, parallelograms, trapezia</li> </ul>



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Grade 1a	<p>1 yard is 36 inches. 10 cm is an approximation for 4 inches. Work out an approximation for the number of cm in 2 yards.</p> <p><i>3F Q8</i></p>	<p>Here is a number machine.</p>  <p>(a) Work out the <b>output</b> when the input is 4 (b) Work out the <b>input</b> when the output is 11 (c) Show that there is a value of the input for which the input and the output have the same value.</p> <p><i>3F Q7</i></p>	<p>There are 6760 people at a rugby match. 3879 of the people are men. 1241 of the people are women. <math>\frac{1}{4}</math> of the children are girls. Work out how many boys are at the rugby match.</p> <p><i>3F Q3</i></p>	<ul style="list-style-type: none"> <li>understand and use the concepts and vocabulary of expressions, equations, formulae, inequalities, terms and factors</li> <li>Calculate the area of simple shapes made from rectangles</li> </ul>
Grade 1b	<p>Write the following numbers in order of size. Start with the smallest number. 0.61 0.1 0.16 0.106</p> <p><i>1F Q1</i></p>	<p>Write down the value of the 3 in the number 4376</p> <p><i>2F Q1</i></p>	<p>(a) Complete the following sentences. (i) A cuboid has six ..... (ii) A ..... is a straight line from the centre of a circle to its circumference.</p>  <p>(b) Explain clearly why angle <math>x</math> cannot be a right angle.</p> <p><i>3F Q2</i></p>	<ul style="list-style-type: none"> <li>Know and use the order of operations</li> <li>Find the perimeter of a square/rectangle by counting</li> </ul>

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<b>Grade 1c</b>	Write down the 20th odd number. <i>1F Q2</i>	<i>Starting to show evidence of being able to reason, interpret and communicate mathematically</i>	<i>Starting to show evidence of being able to solve problems within mathematics and in other contexts</i>	<ul style="list-style-type: none"> <li>Describe simple functions in words (e.g. add 3, multiply by 6, subtract 4)</li> <li>Understand and measure perimeters of rectangles and regular polygons</li> </ul>
<b>WT</b>	<i>Students are working towards achieving 1c</i>			

## Assessment

### Test Scores:

This data will be subject to change as results are standardised for each cohort.

New tables will be included as National Scores are validated.

### Year 7 Baseline Tests (September 2016)

Baseline Test Grades	
Grade	%
3c	80
2a	75
2b	65
2c	55
1a	40
1b	25
1c	15
WT	0

Year End Test Grades

Year 7 Main		Year 7 Extension		Year 8 Main		Year 8 Extension		Year 9 Main		Year 9 Extension	
Grade	%	Grade	%	Grade	%	Grade	%	Grade	%	Grade	%
3a	95	4a	95	4a	95	5a	95	5a	95	6a	95
3b	90	4b	90	4b	90	5b	90	5b	90	6b	90
3c	80	4c	80	4c	80	5c	80	5c	80	6c	80
2a	70	3a	70	3a	70	4a	70	4a	70	5a	70
2b	60	3b	60	3b	60	4b	60	4b	60	5b	60
2c	50	3c	50	3c	50	4c	50	4c	50	5c	50
1a	40	2a	40	2a	40	3a	40	3a	40	4a	40
1b	30	2b	30	2b	30	3b	30	3b	30	4b	30
1c	15	2c	25	2c	25	3c	25	3c	25	4c	25
WT	0			1a	20	2a	20	2a	20	3a	20
				1b	15	2b	15	2b	15	3b	15
				1c	10	2c	10	2c	10	3c	10
								1a	5		