



The Sutton Academy

# Knowledge Rich Curriculum Plan

Year 11 Foundation – Geometry 3

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
<p><b>To learn how to convert metric units for measures.</b></p> <p><b>Complete in starters.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to convert units for length including mm, cm, m, km.</li> <li>Students will know how to convert units for mass including mg, g, kg, tonnes.</li> <li>Students will know how to convert units for volume including ml, cl, l.</li> <li>Students will know how to make simple conversions between units of length including mm, cm, m, km.</li> <li>Students will know how to make simple conversions between units of mass including mg, g, kg, tonnes.</li> <li>Students will know how to make simple conversions between units of volume including ml, cl, l.</li> <li>Students will know how to make multi-step conversions between different units of length, mass and volume. E.g. mm to m etc.</li> </ul>	<p><b>Convert</b> – change/ swap to</p> <p><b>Metric</b> – The metric system is a system of measurement that uses the meter, litre, and gram as base units of length (distance), capacity (volume), and weight (mass)</p> <p><b>Capacity</b> – the maximum amount that something can contain.</p> <p><b>Volume</b> – the amount of space inside a 3D object</p> <p><b>Mass</b> – the weight of an object</p> <p>Vocabulary may be split up into the sections of the lesson.</p>	<ul style="list-style-type: none"> <li>Students need to know how to multiply and divide by powers of 10.</li> </ul>		
<p><b>To learn how to calculate perimeter of 2D shapes.</b></p> <p><b>Complete in starters.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to calculate the perimeter of rectangles, triangles, trapezia and parallelograms.</li> <li>Students will know how to calculate the perimeter of special triangles.</li> <li>Students will know how to calculate the perimeter of compound shapes.</li> <li>Students will know that the units used to represent perimeter are mm, cm and m etc.</li> <li>Students will know how to use inverse operations to find the missing lengths of shapes when given the perimeter.</li> <li>Students will know how to solve real life problems involving perimeter.</li> </ul>	<p><b>Perimeter</b> – the distance around the outside of a shape</p> <p><b>Compound shape</b> – a shape made up of two or more geometric shapes</p>	<ul style="list-style-type: none"> <li>Students need to identify and recall properties of regular and irregular 2D shapes.</li> </ul>	<p><b>Steps to Success – Perimeter</b></p> <p>To calculate the perimeter, add the length of all of the sides together. Remember even if there are only two measurements on the shape if it has 4 sides you will need to add 4 numbers.</p> <p><b>Steps to Success – Perimeter of compound shapes</b></p> <p><b>Step 1:</b> Firstly, identify whether or not you need to find any missing lengths, if it is necessary subtract the smaller length from the larger length.</p> <p><b>Step 2:</b> Add up the lengths of all the sides.</p> <p><b>Step 3:</b> Don't forget to write your units – cm or mm or m.</p>	
<p><b>To learn how to calculate the area of rectangles, parallelograms and triangles.</b></p>	<ul style="list-style-type: none"> <li>Students will know that the units used to represent area are <math>mm^2</math>, <math>cm^2</math> and <math>m^2</math> etc.</li> <li>Students will know how to calculate the area rectangles using the formula <math>A = length \times width</math>.</li> <li>Students will know how to calculate area of a parallelogram using the formula <math>A = base \times height</math>.</li> <li>Students will know that the base and height are perpendicular to each other in every parallelogram.</li> <li>Students will know how to calculate the area of a triangle using the formula <math>A = \frac{1}{2} \times base \times height</math>.</li> <li>Students will know that the base and height are perpendicular to each other in every triangle.</li> <li>Students will know to ignore any additional lengths in the rectangles, parallelograms and triangles.</li> <li>Students will know how to use inverse operations to find the missing lengths of shapes when given the area.</li> <li>Students will know how to solve real life problems involving area.</li> </ul>	<p><b>Area</b> – the amount of space inside a 2D shape</p> <p><b>Quadrilateral</b> – a four-sided shape</p> <p><b>Parallelogram</b> – a four-sided shape with two pairs of parallel opposite sides.</p> <p><b>Perpendicular</b> – at an angle of 90 degrees.</p>	<ul style="list-style-type: none"> <li>Students need to know how to multiply integers and decimals.</li> <li>Students need to know how to identify rectangles, parallelograms and triangles</li> </ul>		

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<p><b>To learn how to calculate the area of compound shapes and trapezia.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to calculate the area of a compound shapes, by separating and calculating the areas of the more basic shapes.</li> <li>Students will know how to calculate the area of compound shapes, by separating them in to rectangles or triangle and finding the sum of the areas of each individual shape.</li> <li>Students will know how to use inverse operations to find the missing sides of a compound shape.</li> <li>Students will know how to identify the parallel lines in a trapezium.</li> <li>Students will know how to calculate the area of a trapezium using the formula <math>A = \frac{1}{2}(a + b) \times \text{height}</math>, where a and b are the parallel sides of the trapezium.</li> <li>Students will know how to use inverse operations to find the height or missing side of a trapezium.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to solve problems involving the area of compound shapes.</li> <li>Students will know how to solve problems involving the area of trapezia.</li> </ul>	<p><b>Compound</b> - a thing that is composed of two or more separate elements.</p> <p><b>Compound shape</b> – a shape made up of two or more geometric shapes</p> <p><b>Trapezium</b> – a quadrilateral with one pair of sides parallel.</p> <p><b>Parallel</b> – two lines that are the same distance apart and never touch</p> <p><b>Inverse</b> – opposite of</p>	<ul style="list-style-type: none"> <li>Students need to know how to calculate the area of rectangles and triangles.</li> </ul>	<p><b>Steps to Success: – Area of compound shapes</b></p> <p><b>Step 1:</b> Firstly, identify whether or not you need to find any missing lengths, if it is necessary subtract the smaller length from the larger length.</p> <p><b>Step 2:</b> Divide the compound shape into smaller shapes, and calculate the area of each individual shape.</p> <p><b>Step 3:</b> To find the total area of the compound shape, add the area of the individual shapes together.</p> <p><b>Step 4:</b> Don't forget to write your units - <math>\text{cm}^2</math> or <math>\text{mm}^2</math> or <math>\text{m}^2</math>.</p> <p><b>Steps to Success – Area of trapezia <math>\frac{1}{2}(a+b)h</math></b></p> <p><b>Step 1:</b> Label your trapezium, a and b are the <b>parallel</b> lengths of your trapezium and h is the <b>perpendicular</b> height.</p> <p><b>Step 2:</b> Substitute a, b and h into the formula <math>\frac{1}{2}(a + b)h</math>.</p> <p><b>Step 3:</b> Calculate using BIDMAS.</p> <p><b>Step 4:</b> Don't forget to write your units - <math>\text{cm}^2</math> or <math>\text{mm}^2</math> or <math>\text{m}^2</math>. To calculate the missing sides of a trapezia, the <b>inverse</b> operations of <math>\frac{1}{2}(a + b)h</math> will be used.</p>	
<p><b>To learn how to calculate the circumference and area of a circle.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to calculate the circumference of a circle using the formula <math>C = \pi d</math>, where d is the diameter.</li> <li>Students will know how to find the circumference of a circle where only the radius is known.</li> <li>Students will know how to find the circumference of a circle when the diameter or radius is known (mixture).</li> <li>Students will know how to find the circumference of a circle in terms of <math>\pi</math>.</li> <li>Students will know how to calculate the arc length of a semi-circle.</li> <li>Students will know how to calculate the perimeter of a semi-circle.</li> <li>Students will know how to calculate the arc length of a quarter circle.</li> <li>Students will know how to calculate the perimeter of a quarter circle.</li> <li>Students will know how to calculate the arc length of a three-quarter circle.</li> <li>Students will know how to calculate the perimeter of a three-quarter circle.</li> <li>Students will know how to calculate the area of a circle using the formula <math>A = \pi r^2</math></li> <li>Students will know how to find the area of a circle in terms of <math>\pi</math>.</li> <li>Students will know how to calculate the area of semi circles, quarter circles and three-quarters of a circle.</li> <li>Students will know how to use inverse operations to find the missing radius or diameter when given the area.</li> <li>Students will know how to solve problems involving the area of circles.</li> </ul> <p><b>Opportunity for challenge:</b></p>	<p><b>Circumference</b> – the perimeter of a circle</p> <p><b>Arc</b> – a part of a curve, a part of the circumference of a circle</p> <p><b>Radius</b> – a straight line from the centre to the circumference of a circle or sphere</p> <p><b>Diameter</b> – a straight line passing from side to side through the centre of a body or figure, especially a circle or sphere</p> <p><b>Perimeter</b> – the distance around the outside of a shape</p>	<ul style="list-style-type: none"> <li>Students need to know how to round to a given decimal place or significant figure.</li> <li>Students need to know how to identify the parts of a circle.</li> </ul>	<p><b>Steps to Success: Circumference of a circle</b></p> <p><b>Step 1:</b> Find the diameter of your circle, if you are given the radius, double it to find the diameter.</p> <p><b>Step 2:</b> Substitute your diameter into the formula – <math>C = \pi \times d</math></p> <p><b>Step 3:</b> Type your calculation in the calculator.</p> <p><b>Step 4:</b> Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.</p> <p><b>Steps to Success: Perimeter of a semi-circle</b></p> <p><b>Step 1:</b> Find the diameter of your circle, if you are given the radius, double it to find the diameter.</p> <p><b>Step 2:</b> Substitute your diameter into the formula – <math>C = \pi \times d</math></p> <p><b>Step 3:</b> Divide the circumference of the circles by 2. This will give you the arc length.</p> <p><b>Step 4:</b> To find the perimeter of the semi-circle you will then need to add the diameter to your arc length.</p> <p><b>Step 5:</b> Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.</p> <p><b>Steps to Success: Area of a circle.</b></p> <p><b>Step 1:</b> Find the radius of your circle, if you are given the diameter, half it to find the radius.</p> <p><b>Step 2:</b> Substitute your radius into the formula – <math>A = \pi r^2</math></p> <p><b>Step 3:</b> Type your calculation in the calculator.</p> <p><b>Step 4:</b> Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.</p> <p><b>Steps to Success: Area of a semi-circle.</b></p> <p><b>Step 1:</b> Find the radius of your circle, if you are given the diameter, half it to find the radius.</p> <p><b>Step 2:</b> Substitute your radius into the formula – <math>A = \pi r^2</math> and then dividing you answer by 2 to get the area of the semi-circle.</p>	<p>Needed two lessons - SOU</p>

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	<ul style="list-style-type: none"> <li>Students will know how to solve problems involving the circumference of circles.</li> <li>Students will know how to calculate the area of compound shapes involving circles or parts of circles.</li> </ul>			<p><b>Step 3:</b> Type your calculation in the calculator.</p> <p><b>Step 4:</b> Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.</p>	
To learn how to calculate missing sides using Pythagoras' Theorem.	<ul style="list-style-type: none"> <li>Students will know how to find missing lengths in a right-angled triangle using Pythagoras' theorem.</li> <li>Students will know how to prove a triangle is right angled using Pythagoras' theorem.</li> </ul>	<p><b>Hypotenuse</b> – the longest side in a right-angled triangle. It can always be found opposite the right angle</p> <p><b>Theorem</b> – a statement that has been proved, or can be proved</p>	<ul style="list-style-type: none"> <li>Students need to know how to use BIDMAS involving square numbers.</li> </ul>	<p><b>Steps to Success: Using Pythagoras' Theorem to find the hypotenuse.</b></p> <p><b>Step 1:</b> In order to find the missing side of a triangle using Pythagoras' theorem, we need to work out which side corresponds to each of the letters a, b and c in the equation <math>a^2+b^2=c^2</math>, remembering that the longest side is the hypotenuse which is known as c. a and b will be either one of the two perpendicular sides.</p> <p><b>Step 2:</b> Label your diagram.</p> <p><b>Step 3:</b> Next we substitute the values into the equation <math>a^2+ b^2= c^2</math></p> <p><b>Step 4:</b> Calculate the square numbers and then add the values (BIDMAS).</p> <p><b>Step 5:</b> Don't forget to square root your value to get the length of the side.</p> <p><b>Step 6:</b> Round your answer to an appropriate degree of accuracy if necessary.</p> <p><b>Step 7:</b> Check that your answer looks right. Is the hypotenuse the longest side?</p> <p><b>Steps to Success: Using Pythagoras' Theorem to find one of the perpendicular sides.</b></p> <p><b>Step 1:</b> In order to find the missing side of a triangle using Pythagoras' theorem, we need to work out which side corresponds to each of the letters a, b and c in the equation <math>a^2+b^2=c^2</math>, remembering that the longest side is the hypotenuse which is known as c. a and b will be either one of the two perpendicular sides.</p> <p><b>Step 2:</b> Label your diagram.</p> <p><b>Step 3:</b> Next we substitute the values into the equation <math>a^2+ b^2= c^2</math></p> <p><b>Step 4:</b> Rearrange the equation to get either <math>a^2= c^2- b^2</math> OR <math>b^2= c^2- a^2</math></p> <p><b>Step 5:</b> Calculate the square numbers and then add the values (BIDMAS).</p> <p><b>Step 6:</b> Don't forget to square root your value to get the length of the side.</p> <p><b>Step 7:</b> Round your answer to an appropriate degree of accuracy if necessary.</p> <p><b>Step 8:</b> Check that your answer looks right. Is the hypotenuse the longest side?</p>	
To learn how to solve problems involving the use of Pythagoras' Theorem.	<ul style="list-style-type: none"> <li>Students will know how to solve problems involving multiple right-angled triangles using Pythagoras' theorem.</li> <li>Students will know how to solve simple perimeter and area problems involving the use of Pythagoras' Theorem.</li> <li>Students will know how to solve worded problems using Pythagoras' theorem.</li> </ul>		<ul style="list-style-type: none"> <li>Students need to know how to find missing sides using Pythagoras' theorem.</li> </ul>		

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to calculate missing sides and angles in right angled triangles using trigonometry.	<ul style="list-style-type: none"> <li>Students will know that <math>\sin = \frac{\text{Opposite}}{\text{Hypotenuse}}</math></li> <li>Students will know that <math>\cos = \frac{\text{Adjacent}}{\text{Hypotenuse}}</math></li> <li>Students will know that <math>\tan = \frac{\text{Opposite}}{\text{Adjacent}}</math></li> <li>Students will know how to use the formula triangles for SOHCAHTOA to find missing sides.</li> <li>Students will know how to calculate missing sides in right angled triangles using SOHCAHTOA.</li> <li>Students will know how to calculate missing angles in right angled triangles using SOHCAHTOA.</li> </ul>	<p><b>Trigonometry</b> – a branch of mathematics that studies relationships between side lengths and angles of triangles</p> <p><b>Hypotenuse</b> – the longest side in a right-angled triangle. It can always be found opposite the right angle</p> <p><b>Adjacent</b> – next to, in maths the adjacent side in a right-angled triangle is the side that is adjacent to the angle, forming the angle with the hypotenuse</p> <p><b>Opposite</b> – for right angled triangles the opposite is the side opposite the angle that we know or are trying to find.</p> <p><b>Inverse - Opposite</b></p>	<ul style="list-style-type: none"> <li>Students will need to substitute values into expressions/formulae.</li> </ul>	<p><b>Steps to Success – Calculating a missing side using SOHCAHTOA:</b></p> <p><b>Step 1:</b> Label the sides O, H and A.</p> <p><b>Step 2:</b> Circle the side you know and the side you are trying to find.</p> <p><b>Step 3:</b> Identify the trigonometric function you are using (sin, cos or tan).</p> <p><b>Step 4:</b> Substitute the lengths and angles into the correct place in the formula triangle.</p> <p><b>Step 5:</b> Write down the calculation you need to do and then use your calculator to work out the answer.</p> <p><b>Step 6:</b> Round your answer to an appropriate degree of accuracy, this is usually given in the question.</p> <p><b>Steps to Success – Calculating a missing angle using SOHCAHTOA:</b></p> <p><b>Step 1:</b> Label the sides O, H and A.</p> <p><b>Step 2:</b> Circle the two sides you know.</p> <p><b>Step 3:</b> Identify the trigonometric function you are using (sin, cos or tan).</p> <p><b>Step 4:</b> Substitute the lengths and angles into the correct place in the formula triangle.</p> <p><b>Step 5:</b> Write out the formula that is created.</p> <p><b>Step 6:</b> Use the inverse trig function to calculate the missing angle (<math>\sin^{-1}</math>, <math>\cos^{-1}</math>, <math>\tan^{-1}</math>).</p> <p><b>Step 7:</b> Round your answer to an appropriate degree of accuracy, this is usually given in the question.</p>	
To learn how to solve problems involving the use of trigonometry.	<ul style="list-style-type: none"> <li>Students will know how to solve multi-step problems involving more than one right-angled triangle using SOHCAHTOA.</li> <li>Students will know how to use trigonometry to solve simple problems involving perimeter or area.</li> <li>Students will know how to solve worded problems involving SOHCAHTOA</li> </ul>		<ul style="list-style-type: none"> <li>Students need to know how to find the missing sides of a right-angled triangle using trigonometry.</li> </ul>		
Exam Preparation 7					