



The Sutton Academy

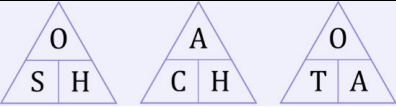
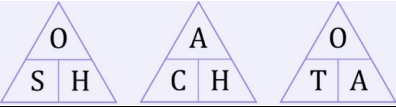
# Knowledge Rich Curriculum Plan

Year 8 Prime – Perimeter and Area

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
<b>To learn how to calculate the perimeter of 2D shapes.</b>	<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 that the units used to represent perimeter are mm, cm and m etc.</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 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>	
<b>To learn how to calculate the area of rectangles, parallelograms and triangles.</b>	<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.</li> <li>Students will know how to calculate area of a parallelogram.</li> <li>Students will know how to calculate the area of a 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>Parallelogram</b> – a four-sided shape with two pairs of parallel opposite sides.</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>	<p><b>Steps to Success – Area of shapes</b></p> <p><b>Step 1</b> – Identify the formula from the list needed:</p> <ul style="list-style-type: none"> <li>Area of a <b>Square/Rectangle</b> = Base x Height</li> <li>Area of a <b>Parallelogram</b> = Base x Height</li> <li>Area of a <b>Triangle</b> = <math>\frac{1}{2}</math> x Base x Height</li> </ul> <p><b>Step 2</b> – Substitute the measurements into the required formula.</p> <p><b>Step 3</b> – Don't forget to write your units <math>cm^2</math> or <math>mm^2</math> or <math>m^2</math>.</p>	
<b>To learn how find the area of compound shapes and trapezia.</b>	<ul style="list-style-type: none"> <li>Students will know how to calculate the area of compound shapes.</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 calculate the area of a 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>Area</b> – the amount of space inside a 2D shape</p> <p><b>Trapezium</b> – a quadrilateral with one pair of sides parallel.</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 know how to find the area of rectangles and triangles.</li> <li>Students need to know how to substitute in to expressions/formulae.</li> </ul>	<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>cm^2</math> or <math>mm^2</math> or <math>m^2</math>.</p> <p>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>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>	

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
				<b>Step 4:</b> Don't forget to write your units - $\text{cm}^2$ or $\text{mm}^2$ or $\text{m}^2$ .	
<b>To learn how to find the circumference of a circle.</b>	<ul style="list-style-type: none"> <li>Students will know how to calculate the circumference of a circle when given the diameter or radius.</li> <li>Students will know how to calculate the perimeter of a semi-circle.</li> <li>Students will know how to calculate the perimeter of a quarter circle.</li> <li>Students will know how to calculate the perimeter of a three-quarter circle finding the circumference.</li> <li>Students will know how to solve problems involving the circumference of circles.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to find the arc length of a sector.</li> </ul>	<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 circle or sphere</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 radius, diameter and circumference 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>\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, check to see if the question wants you to round or answer in terms of <math>\pi</math>.</p> <p><b>Steps to Success: Circumference of a semi-circle/quarter 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>\pi \times d</math></p> <p><b>Step 3:</b> Divide the circumference of the circles by 2 for semi circle, 4 for quarter of a circle.</p> <p><b>Step 4:</b> Add the diameter onto the circumference of the semi circle</p>	
<b>To learn how to find the area of a circle.</b>	<ul style="list-style-type: none"> <li>Students will know how to calculate the area of a circle.</li> <li>Students will know how to calculate the area of a semi-circle.</li> <li>Students will know how to calculate the area of a quarter circle.</li> <li>Students will know how to calculate the area of a three-quarter circle.</li> <li>Students will know how to solve problems involving the area of circles.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to find the area of a sector.</li> </ul>	<p><b>Area</b> – the amount of space inside a 2D 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 substitute value into expressions/formulae.</li> </ul>	<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>\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, check to see if the question wants you to round or answer in terms of <math>\pi</math></p> <p><b>Steps to Success: Area of a semi circle/quarter 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>\frac{\pi r^2}{2}</math> for a semi circle or <math>\frac{\pi r^2}{4}</math> for a quarter circle.</p> <p><b>Step 3:</b> Type your calculation in the calculator.</p> <p><b>Step 4:</b> Write your answer from the calculator, check to see if the question wants you to round or answer in terms of <math>\pi</math></p>	
<b>To learn how to calculate missing sides using Pythagoras' Theorem.</b>	<ul style="list-style-type: none"> <li>Students will know how to find the hypotenuse, using Pythagoras' theorem.</li> <li>Students will know how to find the shorter sides of the triangle 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 proven to be true</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>	

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
				<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>	
<p><b>To learn how to solve problems using Pythagoras' Theorem.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to use Pythagoras' theorem to solve a multi-step problem with 2 triangles.</li> <li>Students will know how to use Pythagoras' Theorem to solve problems involving perimeter or area.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to use Pythagoras' theorem to solve more complex worded problems.</li> </ul>		<ul style="list-style-type: none"> <li>Students need to know how to use Pythagoras' Theorem to find the missing side in a right-angled triangle.</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>	
<p><b>To learn how to calculate missing sides in right-angled triangles using trigonometry.</b></p>	<ul style="list-style-type: none"> <li>Students will know how to calculate missing sides in right angled triangles using SOHCAHTOA.</li> <li>Students will know how to use the formula triangles for SOHCAHTOA to find missing sides.</li> </ul>	<p><b>Trigonometry – Relationships between side lengths and angles of triangles</b></p> <p><b>Hypotenuse – the longest side in a right-angled triangle. It can always be found opposite the right angle</b></p> <p><b>Opposite – for right angled triangles the opposite is</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>	

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
		the side opposite the angle that we know or are trying to find. <b>Adjacent</b> – next to			
<b>To learn how to calculate missing angles in right-angled triangles using trigonometry.</b>	<ul style="list-style-type: none"> <li>Students will know how to calculate missing angles in right angled triangles using SOHCAHTOA.</li> <li><b>Opportunity for challenge:</b></li> <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> </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>	<b>Steps to Success – Calculating a missing angle using SOHCAHTOA:</b> <b>Step 1:</b> Label the sides O, H and A. <b>Step 2:</b> Circle the two sides you know. <b>Step 3:</b> Identify the trigonometric function you are using (sin, cos or tan). <b>Step 4:</b> Substitute the lengths and angles into the correct place in the formula triangle. <b>Step 5:</b> Write out the formula that is created. <b>Step 6:</b> Use the inverse trig function to calculate the missing angle ( $\sin^{-1}$ , $\cos^{-1}$ , $\tan^{-1}$ ). <b>Step 7:</b> Round your answer to an appropriate degree of accuracy, this is usually given in the question.  	
<b>To consolidate understanding of perimeter, area, Pythagoras and Trigonometry</b>	<ul style="list-style-type: none"> <li>Students will need to identify if a question is area or perimeter and which calculation to use.</li> <li>Students will know how to find the area of rectangles, parallelograms, triangles, trapezia, circles.</li> <li>Students will know how to find the circumference of circles.</li> <li>Students will know how to identify if the question is looking to use Pythagoras or Trigonometry.</li> <li>Students will know how to find missing sides using Pythagoras and Trigonometry.</li> <li>Students will know how to find missing angles using Trig</li> </ul> <p>MAY BE WORTH PLANNING THIS TO INCLUDE A HINGE POINT, WHAT STUDENTS GET WRONG IS WHAT THEY WORK ON.</p>		<ul style="list-style-type: none"> <li>Students need to know how to find area and perimeter of basic shapes.</li> </ul>	<u>Use steps from previous lessons.</u>	
Mini-Assessment 9					