The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Core – Perimeter and Area

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to calculate the perimeter of 2D shapes.	• Students will know how to calculate the perimeter of rectangles, triangles, trapezia and parallelograms. • Students will know that the units used to represent perimeter are mm, cm and m etc. • Students will know how to calculate the perimeter of special triangles. • Students will know how to calculate the perimeter of compound shapes. • Students will know how to use inverse operations to find the missing lengths of shapes when given the perimeter. • Students will know how to solve real life problems involving perimeter.	**Perimeter –** the distance around the outside of a shape **Compound shape –** a shape made up of two or more geometric shapes	• Students need to identify and recall properties of regular and irregular 2D shapes.	<u>Steps to Success – Perimeter</u> 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. <u>Steps to Success – Perimeter of compound shapes</u> **Step 1:** Firstly, identify whether or not you need to find any missing lengths, if it is necessary subtract the smaller length from the larger length. **Step 2:** Add up the lengths of all the sides. **Step 3:** Don't forget to write your units – cm or mm or m.	
To learn how to calculate the area of rectangles, parallelograms and triangles.	• Students will know that the units used to represent area are mm^2, $cm^2$and m^2etc. • Students will know how to calculate the area rectangles. • Students will know how to calculate area of a parallelogram. • Students will know how to calculate the area of a triangle. • Students will know to ignore any additional lengths in the rectangles, parallelograms and triangles. • Students will know how to use inverse operations to find the missing lengths of shapes when given the area. • Students will know how to solve real life problems involving area.	**Area –** the amount of space inside a 2D shape **Parallelogram** – a four-sided shape with two pairs of parallel opposite sides.	• Students need to know how to multiply integers and decimals. • Students need to know how to identify rectangles, parallelograms and triangles.	<u>Steps to Success – Area of shapes</u> **Step 1** – Identify the formula from the list needed: • Area of a **Square/Rectangle** = Base x Height • Area of a **Parallelogram** = Base x Height • Area of a **Triangle** = ½ x Base x Height **Step 2** – Substitute the measurements into the required formula. **Step 3** – Don't forget to write your units cm^2 or mm^2or m^2.	
To learn how find the area of compound shapes and trapezia.	• Students will know how to calculate the area of compound shapes. • Students will know how to use inverse operations to find the missing sides of a compound shape. • Students will know how to calculate the area of a trapezium. • Students will know how to use inverse operations to find the height or missing side of a trapezium. **Opportunity for challenge:** • Students will know how to solve problems involving the area of compound shapes. • Students will know how to solve problems involving the area of trapezia.	**Area –** the amount of space inside a 2D shape **Trapezium –** a quadrilateral with one pair of sides parallel. **Compound shape –** a shape made up of two or more geometric shapes	• Students need to know how to find the area of rectangles and triangles. • Students need to know how to substitute in to expressions/formulae.	<u>Steps to Success – Area of trapezia ½(a+b)h</u> **Step 1:** Label your trapezium, a and b are the **parallel** lengths of your trapezium and h is the **perpendicular** height. **Step 2:** Substitute a, b and h into the formula ½(a + b)h. **Step 3:** Calculate using BIDMAS. **Step 4:** Don't forget to write your units - cm^2 or mm^2or m^2. To calculate the missing sides of a trapezia, the **inverse** operations of ½(a + b)h will be used. <u>Steps to Success – Area of compound shapes</u> **Step 1:** Firstly, identify whether or not you need to find any missing lengths, if it is necessary subtract the smaller length from the larger length. **Step 2:** Divide the compound shape into smaller shapes, and calculate the area of each individual shape. **Step 3:** To find the total area of the compound shape, add the area of the individual shapes together.	

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				Step 4: Don't forget to write your units - cm^2 or mm^2or m^2.	
To learn how to find the circumference of a circle.	• Students will know how to calculate the circumference of a circle when given the diameter or radius. • Students will know how to calculate the perimeter of a semi-circle. • Students will know how to calculate the perimeter of a quarter circle. • Students will know how to calculate the perimeter of a three-quarter circle finding the circumference. • Students will know how to solve problems involving the circumference of circles. **Opportunity for challenge:** • Students will know how to find the arc length of a sector.	Circumference – the perimeter of a circle Arc – a part of a curve, a part of the circumference of a circle Radius – a straight line from the centre to the circumference of a circle or sphere Diameter – a straight line passing from side to side through the centre of a circle or sphere	• Students need to know how to round to a given decimal place or significant figure. • Students need to know how to identify the radius, diameter and circumference of a circle.	<u>Steps to Success: Circumference of a circle</u> **Step 1:** Find the diameter of your circle, if you are given the radius, double it to find the diameter. **Step 2:** Substitute your diameter into the formula – π x d **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator, check to see if the question wants you to round or answer in terms of π. <u>Steps to Success: Circumference of a semi-circle/quarter circle</u> **Step 1:** Find the diameter of your circle, if you are given the radius, double it to find the diameter. **Step 2:** Substitute your diameter into the formula – π x d **Step 3:** Divide the circumference of the circles by 2 for semi circle, 4 for quarter of a circle. **Step 4:** Add the diameter onto the circumference of the semi circle	
To learn how to find the area of a circle.	• Students will know how to calculate the area of a circle. • Students will know how to calculate the area of a semi-circle. • Students will know how to calculate the area of a quarter circle. • Students will know how to calculate the area of a three-quarter circle. • Students will know how to solve problems involving the area of circles. **Opportunity for challenge:** • Students will know how to find the area of a sector.	Area – the amount of space inside a 2D shape	• Students need to know how to round to a given decimal place or significant figure. • Students need to know how to substitute value into expressions/formulae.	<u>Steps to Success: Area of a circle</u> **Step 1:** Find the radius of your circle, if you are given the diameter, half it to find the radius. **Step 2:** Substitute your radius into the formula – πr^2 **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator, check to see if the question wants you to round or answer in terms of π <u>Steps to Success: Area of a semi circle/quarter circle</u> **Step 1:** Find the radius of your circle, if you are given the diameter, half it to find the radius. **Step 2:** Substitute your radius into the formula – $\frac{\pi r^2}{2}$ for a semi circle or $\frac{\pi r^2}{4}$ for a quarter circle. **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator, check to see if the question wants you to round or answer in terms of π	
To learn how to calculate missing sides using Pythagoras' Theorem.	• Students will know how to find the hypotenuse, using Pythagoras' theorem. • Students will know how to find the shorter sides of the triangle using Pythagoras' theorem.	Hypotenuse – the longest side in a right-angled triangle. It can always be found opposite the right angle Theorem – a statement that has been proven to be true	• Students need to know how to use BIDMAS involving square numbers.	<u>Steps to Success: Using Pythagoras' Theorem to find the hypotenuse.</u> **Step 1:** 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 $a^2+b^2=c^2$, 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. **Step 2:** Label your diagram. **Step 3:** Next we substitute the values into the equation $a^2+ b^2= c^2$ **Step 4:** Calculate the square numbers and then add the values (BIDMAS). **Step 5:** Don't forget to square root your value to get the length of the side.	

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				Step 6: Round your answer to an appropriate degree of accuracy if necessary. **Step 7:** Check that your answer looks right. Is the hypotenuse the longest side? **Steps to Success: Using Pythagoras' Theorem to find one of the perpendicular sides.** **Step 1:** 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 $a^2+b^2=c^2$, 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. **Step 2:** Label your diagram. **Step 3:** Next we substitute the values into the equation $a^2+ b^2= c^2$ **Step 4:** Rearrange the equation to get either $a^2= c^2- b^2$ OR $b^2= c^2- a^2$ **Step 5:** Calculate the square numbers and then add the values (BIDMAS). **Step 6:** Don't forget to square root your value to get the length of the side. **Step 7:** Round your answer to an appropriate degree of accuracy if necessary. **Step 8:** Check that your answer looks right. Is the hypotenuse the longest side?	
To learn how to solve problems using Pythagoras' Theorem.	• Students will know how to use Pythagoras' theorem to solve a multi-step problem with 2 triangles. • Students will know how to use Pythagoras' Theorem to solve problems involving perimeter or area. **Opportunity for challenge:** • Students will know how to use Pythagoras' theorem to solve more complex worded problems.		• Students need to know how to use Pythagoras' Theorem to find the missing side in a right-angled triangle.	**Steps to Success: Using Pythagoras' Theorem to find the hypotenuse.** **Step 1:** 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 $a^2+b^2=c^2$, 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. **Step 2:** Label your diagram. **Step 3:** Next we substitute the values into the equation $a^2+ b^2= c^2$ **Step 4:** Calculate the square numbers and then add the values (BIDMAS). **Step 5:** Don't forget to square root your value to get the length of the side. **Step 6:** Round your answer to an appropriate degree of accuracy if necessary. **Step 7:** Check that your answer looks right. Is the hypotenuse the longest side? **Steps to Success: Using Pythagoras' Theorem to find one of the perpendicular sides.** **Step 1:** 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 $a^2+b^2=c^2$, 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. **Step 2:** Label your diagram. **Step 3:** Next we substitute the values into the equation $a^2+ b^2= c^2$ **Step 4:** Rearrange the equation to get either $a^2= c^2- b^2$ OR $b^2= c^2- a^2$ **Step 5:** Calculate the square numbers and then add the values (BIDMAS). **Step 6:** Don't forget to square root your value to get the length of the side. **Step 7:** Round your answer to an appropriate degree of accuracy if necessary. **Step 8:** Check that your answer looks right. Is the hypotenuse the longest side?	
To learn how to calculate missing sides in right-angled triangles using trigonometry.	• Students will know how to calculate missing sides in right angled triangles using SOHCAHTOA. • Students will know how to use the formula triangles for SOHCAHTOA to find missing sides.	Trigonometry – Relationships between side lengths and angles of triangles Hypotenuse – the longest side in a right-angled triangle. It can always be found opposite the right angle Opposite – for right angled triangles the opposite is	• Students will need to substitute values into expressions/formulae.	**Steps to Success – Calculating a missing side using SOHCAHTOA:** **Step 1:** Label the sides O, H and A. **Step 2:** Circle the side you know and the side you are trying to find. **Step 3:** Identify the trigonometric function you are using (sin, cos or tan). **Step 4:** Substitute the lengths and angles into the correct place in the formula triangle. **Step 5:** Write down the calculation you need to do and then use your calculator to work out the answer. **Step 6:** Round your answer to an appropriate degree of accuracy, this is usually given in the question.	

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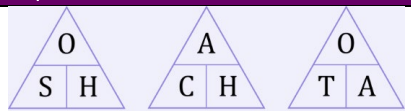
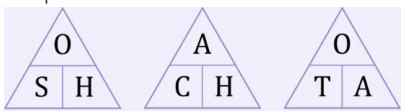
		the side opposite the angle that we know or are trying to find. Adjacent – next to			
To learn how to calculate missing angles in right-angled triangles using trigonometry.	• Students will know how to calculate missing angles in right angled triangles using SOHCAHTOA. **Opportunity for challenge:** • Students will know how to solve multi-step problems involving more than one right-angled triangle using SOHCAHTOA. • Students will know how to use trigonometry to solve simple problems involving perimeter or area.		• Students need to know how to find the missing sides of a right-angled triangle using trigonometry.	<u>Steps to Success – Calculating a missing angle using SOHCAHTOA:</u> **Step 1:** Label the sides O, H and A. **Step 2:** Circle the two sides you know. **Step 3:** Identify the trigonometric function you are using (sin, cos or tan). **Step 4:** Substitute the lengths and angles into the correct place in the formula triangle. **Step 5:** Write out the formula that is created. **Step 6:** Use the inverse trig function to calculate the missing angle (Sin^{-1}, Cos^{-1}, Tan^{-1}). **Step 7:** Round your answer to an appropriate degree of accuracy, this is usually given in the question. 	
To consolidate understanding of perimeter, area, Pythagoras and Trigonometry	• Students will need to identify if a question is area or perimeter and which calculation to use. • Students will know how to find the area of rectangles, parallelograms, triangles, trapezia, circles. • Students will know how to find the circumference of circles. • Students will know how to identify if the question is looking to use Pythagoras or Trigonometry. • Students will know how to find missing sides using Pythagoras and Trigonometry. • Students will know how to find missing angles using Trig MAY BE WORTH PLANNING THIS TO INCLUDE A HINGE POINT, WHAT STUDENTS GET WRONG IS WHAT THEY WORK ON.		• Students need to know how to find area and perimeter of basic shapes.	<u>Use steps from previous lessons.</u>	
Mini-Assessment 9					