The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Support – 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 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 simple 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 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 use area to solve simple real-life problems.	**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 identify the parallel lines in a trapezium. • Students will know how to calculate the area of a trapezium **Opportunity for challenge:** • Students will know how to use inverse operations to find the missing sides of a compound shape. • Students will know how to use inverse operations to find the height or missing side of a trapezium.	**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. **Step 4:** Don't forget to write your units - cm^2 or mm^2or m^2.	

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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. • Students will know how to find the circumference of a circle. • Students will be able to leave answers in terms of π and rounded to an appropriate degree of accuracy. • Students will know how to find the circumference of a circle when the diameter or radius is known (mixture). • 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. **Opportunity for challenge:** • Students will know how to solve problems involving the circumference of circles.	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 body or figure, especially a circle or sphere π – the ratio of a circle's circumference to its diameter. Circumference – the perimeter of a circle	• 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: 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 when the radius is given. • Students will know how to calculate the area of a circle when a diameter is given. • Students will know how to find the area of a circle when the diameter or radius is known (mixture). • 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. **Opportunity for challenge:** • Students will know how to solve problems involving the area of circles.	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 consolidate understanding of area and perimeter.	• Students will know how to find the perimeter of shapes, including compound shapes. • Students will know how to find the circumference of circles and semi circles. • Students will know how to find the area of rectangles, triangles, parallelograms, compound shapes, trapezia and circles		•	Use steps from previous lessons.	

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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. • Students will know how to identify whether they need to add or subtract when using Pythagoras' theorem. They will know that it is important to label the sides. **Opportunity for challenge:** • Students will know how to solve simple problems involving 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 proved, or can be proved	• Students will need to substitute values into expressions/formulae. • Students need to be able to square and square root 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. **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? <u>Steps to Success: Using Pythagoras' Theorem to find one of the perpendicular sides.</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:** 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. (Lesson 1)	• Students will know the trigonometric ratio sine, cosine and tan. • Students will know how to label the sides of a right-angled triangle; hypotenuse, opposite, adjacent. Students will know hypotenuse to mean, the longest side of a right-angled triangle, opposite to be the side opposite the angle in the question and adjacent being the side next to the angle.	Trigonometry – the 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	• Students will need to substitute values into expressions/formulae.	<u>Steps to Success – Calculating a missing side using SOHCAHTOA:</u> **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 trig function you are using (sin, cos or tan).	

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	• Students will know how to identify the correct trigonometric ratio, by eliminating the side that they do not need. • Students will know how to use the correct trigonometric ratio to find the missing side in a triangle. • Students will know how to input the trigonometric values onto a calculator. • Students will know how to fill in the trigonometric triangles.	**Adjacent** – 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 **Opposite** – for right angled triangles the opposite is the side opposite the angle that we know or are trying to find.		**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.	
To learn how to calculate missing sides in right-angled triangles using trigonometry. (Lesson 2)	• Students will know how to find the missing side in a right-angled triangle by using trigonometry. **Opportunity for challenge:** • Students will know how to find the missing angle in a right-angled triangle using trigonometry.		• Students need to know how to label a right-angled triangle and pick the appropriate trigonometric ratio needed to find the missing side.	**Steps to Success – Calculating a missing angle using SOHCAHTOA:** **Step 1:** Label the sides O, H and A. **Step 2:** Circle the two sides you know. **Step 3:** Identify the trig 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}).	
Mini-Assessment 9					