The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Support – Perimeter and Area

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Assessment
To learn how to calculate the perimeter of 2D shapes.	• Students will know that perimeter is the distance around the shape. • Students will know that for perimeter you find the sum of the lengths of each side including any value not immediately show on the shape. • Students will know that the units used to represent perimeter are mm, cm and m etc. • Students will know that perimeter is a measurement of length. • Students will know that to find the perimeter of a shape that is represent on a cm grid they must count the number of squares around the outside of shape. • Students will know how to calculate the perimeter of a rectangle. • Students will know how to calculate the perimeter of a trapezium. • Students will know how to calculate the perimeter of a parallelogram. • Students will know that compound shapes are shapes made up more than one shape. • Students will know how to calculate the perimeter of compound shapes. • Students will know how to solve real life problems involving perimeter. • Students will know how to use inverse operations to find the missing lengths of shapes when given the 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 know the properties of 2D polygons. • Students need to know how to add and subtract numbers. • Students need to know the different metric units used to measure length. • Students need to know how to convert between different lengths.	Mini-Assessment 9
To learn how to calculate the area of rectangles, triangles and parallelograms.	• Students will know that area is the space inside the shape. • Students will know that the units used to represent area are mm^2, $cm^2$and m^2etc. • Students will know that to find the area of a shape that is represent on a cm grid they must count the number of squares inside the shape. • Students will know how to calculate the area rectangles using the formula $A = length \times width$. • Students will know to ignore any additional lengths in the rectangle. • Students will know how to calculate the area of a triangle using the formula $A = ½\ base \times height$. • Students will know that the base and height are perpendicular to each other in every triangle. • Students will know that the reason we divide by 2 when finding the area of a triangle is because the $base \times height$ would give the area of a rectangle which is double the triangle. • Students will know to ignore any additional lengths in the triangle. • Students will know how to calculate area of a parallelogram using the formula $A = base \times height$. • Students will know to ignore any additional lengths in the parallelogram. • Students will know that the base and height are perpendicular to each other in every parallelogram. • 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 the properties of 2D polygons. • Students need to know how to multiply numbers. • Students need to know how to divide by 2.	Mini-Assessment 9

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To learn how find the area of compound shapes and trapezia.	• 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. • Students will know how to identify the parallel lines in a trapezium. • Students will know how to calculate the area of a trapezium using the formula $A = ½\ (a + b)\ \times\ height$, where a and b are the parallel sides of the 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. • Students need to know how to find the area of triangles. • Students need to know how to calculate using the order of operations. • Students need to know how to divide by 2. • Students need to know how to substitute in to a formula.	Mini-Assessment 9
To investigate the properties of a circle.	• Students will know how to label parts of a circle including radius, diameter, circumference, tangent, chord, segment, sector and centre. • Students will know how to draw parts of a circle including radius, diameter, circumference, tangent, chord, segment, sector and centre. • Students will know that multiplying the radius by 2 will give the length of the diameter. • Students will know that dividing the diameter by 2 will give the length of the radius. • Students will know that the circumference is the distance around the circle. • Students will know that the number π is an irrational mathematical constant. • Students will know that $\pi = 3.14$ … • Students will know that π is defined as the ratio of a circle's circumference to its diameter. • Students will know that if you divide the circumference of any circle by its diameter you will always get π . (Investigation) • Students will know how to type the π symbol on to a calculator.	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 divide integers. • Students need to know how to divide decimals. • Students need to know how to multiply and divide by 2.	Mini-Assessment 9
To learn how to find the circumference of a circle.	• Students will know how to calculate the circumference of a circle using the formula $C = \pi d$, where d is the diameter. • Students will know how to find the circumference of a circle where only the radius is given by using the formula $C = 2\pi r$, where r is the radius or by finding the diameter by multiplying the radius by 2 and then using the formula $C = \pi d$. • 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 by finding the circumference, dividing it by 2 and adding the diameter. • Students will know how to calculate the perimeter of a quarter circle by finding the circumference, dividing it by 4 (or multiply by $\frac{1}{4}$) and adding both radii. • Students will know how to calculate the perimeter of a three-quarter circle finding the circumference, dividing it by 4, multiplying by 3 (or multiply by $\frac{3}{4}$) and adding the radii. **Opportunity for challenge:** • Students will know how to solve problems involving the circumference of circles.	Circumference – the perimeter 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 body or figure, especially a circle or sphere π – the ratio of a circle's circumference to its diameter.	• Students need to know how to round to a given decimal place or significant figure. • Students need to know that multiplying the radius by 2 will give the length of the diameter. • Students need to know that dividing the diameter by 2 will give the length of the radius.	Mini-Assessment 9

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To learn how to find the area of a circle.	• Students will know how to calculate the area of a circle using the formula $A = \pi r^2$, where r is the radius. • Students will know how to calculate the area of a circle when a diameter is given by using the formula $A = \pi(\frac{d}{2})^2$, where d is the diameter or by dividing the diameter by 2 and using the formula $A = \pi r^2$. • 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 by finding the area of the circle and dividing it by 2. • Students will know how to calculate the area of a quarter circle by finding the area of the circle and dividing it by 4 (or multiply by $\frac{1}{4}$) . • Students will know how to calculate the area of a three-quarter circle finding the area dividing it by 4 and multiplying by 3 (or multiply by $\frac{3}{4}$). **Opportunity for challenge:** • Students will know how to solve problems involving the area of circles.	Area – the amount of space inside a 2D shape 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	• Students need to know how to label parts of a circle. • Students need to know how to round to a given decimal place or significant figure.	Mini-Assessment 9
To investigate the link between the three sides of a right-angled triangles.	• Students will know that when a triangle has a right angle (90°) and squares are made on each of the three sides, then the biggest square has the exact same area as the other two squares put together. Students will know that his discovery was made over 2000 years ago by Pythagoras. • Students will know that Pythagoras' theorem states that for all right-angled triangles, 'The square on the hypotenuse is equal to the sum of the squares on the other two sides'. They will know that we write this as $a^2+b^2=c^2$ where the hypotenuse must be labelled as c.	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 need to know how to find the area of squares. • Students need to know how to square and square root numbers.	Mini-Assessment 9
To learn how to calculate missing sides using Pythagoras' Theorem.	• Students will know how to find the hypotenuse, using Pythagoras' theorem • Students will know that the hypotenuse is the longest side in a right-angled triangle. • Students will know how to find the shorter sides of the triangle using Pythagoras' theorem. Students will know that they subtract when finding the shorter side. • 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.		• Students need to be able to identify right angled triangles. • Students need to be able to use basic mathematical operations. • Students need to be able to solve equations. • Students need to be able to square and square root numbers.	Mini-Assessment 9
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. • 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.	Trigonometry – a branch of mathematics that studies 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 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.	• Students need to be able to rearrange equations. • Students need to know that Pythagoras is used when the problem includes three sides.	Mini-Assessment 9

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To learn how to calculate missing sides in right-angled triangles using trigonometry. (Lesson 2)	• Students will know that to calculate the missing sides in a right-angled triangle using trigonometry they will use the inverse operation. **Opportunity for challenge:** • Students will know that to calculate the missing angle in a right-angled triangle using trigonometry they will use the inverse operation.		• Students need to be able to rearrange equations. • Students need to know that Pythagoras is used when the problem includes three sides.	Mini-Assessment 9