The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Prime – Perimeter, Area, Pythagoras and Trigonometry

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 and area of 2D shapes.	• Students will know how to find the perimeter of 2D shapes. • Students will know how to solve basic problems involving the perimeter of 2D shapes. • 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 $m\ ^2$etc. • 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.	Perimeter – the distance around the outside of a shape Area – the amount of space inside a 2D shape Quadrilateral – a four-sided shape	• Students need to know the properties of 2D polygons.	Mini-Assessment 7
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. • 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. • Students will know how to solve real life problems involving the areas of compound shapes and trapezia.	Trapezium – a quadrilateral with one pair of sides parallel.	• 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 7
To learn how to find the circumference and area 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 circumference of a circle, without a calculator, giving their answer in terms of π. • Students will know how to calculate the perimeter of a semi-circle by finding the circumference, dividing it by 2 and adding the diameter.	Circumference – the perimeter of a circle Perimeter – the distance around the outside of a shape 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	• 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. • Students need to that the number π is an irrational mathematical constant. • Students need to know that $\pi = 3.14\ldots$ • Students need to know how to type the π symbol on to a calculator.	Mini-Assessment 7

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
	• 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. • 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 circle, without a calculator, giving their answer in terms of π. • 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 solve problems involving the area and circumference of circles.	of a body or figure, especially a circle or sphere	• 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. • Students need to that the number π is an irrational mathematical constant. • Students need to know that $\pi = 3.14$ … • Students need to know how to type the π symbol on to a calculator.	
To learn how to calculate the area and arc lengths of sectors.	• Students will know how to calculate the area of a sector using the formula, $Area\ of\ a\ Sector = \frac{\theta}{360}\pi r^2$ • Students will know how to calculate the arc length of the sector using the formula $Arc\ Length = \frac{\theta}{360}\pi d$ Opportunity for challenge: • Students will know how to calculate the angle of a sector given its area. • Students will know how to calculate the radius of a sector given its area. • Students will know how to calculate the angle of a sector given its arc length using inverse operations. • Students will know how to calculate the radius of a sector given its arc length.		• Students need to know how to find the area and circumference of a circle.	Mini-Assessment 7
To learn how to calculate missing sides using Pythagoras' Theorem.	• 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 • 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.	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 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 7

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	• Students will know how to use Pythagoras' Theorem to solve problems involving perimeter or area.			
To learn how to calculate missing sides using Pythagoras' Theorem including in 3D shapes.	• Students will know how to use Pythagoras' theorem to solve 3D problems, including calculating the lengths of diagonals.		• Students needs to be able to find missing sides using Pythagoras' Theorem.	Mini-Assessment 7
To learn how to calculate missing sides in right-angled triangles using trigonometry.	• 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 7
To learn how to calculate missing angles in right-angled triangles using trigonometry.	• Students will know that to calculate the missing angle in a right-angled triangle using trigonometry they will use the inverse operation. • Students will know how to use trigonometry to solve problems involving perimeter or area.		• Students need to know how to find the missing sides of a right-angled triangle using trigonometry and Pythagoras' theorem.	Mini-Assessment 7