The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Foundation – Geometry 2

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to convert metric units for measures.	• Students will know how to convert units for length including mm, cm, m, km. • Students will know how to convert units for mass including mg, g, kg, tonnes. • Students will know how to convert units for volume including ml, cl, l. • Students will know how to make simple conversions between units of length including mm, cm, m, km. • Students will know how to make simple conversions between units of mass including mg, g, kg, tonnes. • Students will know how to make simple conversions between units of volume including ml, cl, l. **Opportunity for challenge:** • Students will know how to make multi-step conversions between different units of length, mass and volume. E.g. mm to m etc.	**Convert** – change/ swap to **Metric** – A system of measurement that uses the meter, litre, and gram as base units of length (distance), capacity (volume), and weight (mass) **Capacity –** the maximum amount that something can contain. **Volume** – the amount of space inside a 3D object **Mass** – the weight of an object Vocabulary may be split up into the sections of the lesson.	• Students need to know how to multiply and divide by powers of 10.		
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 how to calculate the perimeter of special triangles. • Students will know how to calculate the perimeter of compound shapes. • Students will know that the units used to represent perimeter are mm, cm and m etc. • 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.	**Steps to Success – Perimeter** 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. **Steps to Success – Perimeter of compound shapes** **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^2 etc. • Students will know how to calculate the area rectangles using the formula $A = length \times width$. • Students will know how to calculate area of a parallelogram using the formula $A = base \times height$. • Students will know that the base and height are perpendicular to each other in every parallelogram. • Students will know how to calculate the area of a triangle using the formula $A = ½ \times base \times height$. • Students will know that the base and height are perpendicular to each other in every 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 **Quadrilateral –** a four-sided shape **Parallelogram** – a four-sided shape with two pairs of parallel opposite sides. **Perpendicular -** at an angle of 90 degrees.	• Students need to know how to multiply integers and decimals. • Students need to know how to identify rectangles, parallelograms and triangles.		

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To learn how to calculate the area of compound shapes.	• Students will know how to calculate the area of a compound shapes, by separating and calculating the areas of the more basic shapes. • 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 use inverse operations to find the missing sides of a compound shape. **Opportunity for challenge:** • Students will know how to solve problems involving the area of compound shapes.	**Compound** - a thing that is composed of two or more separate elements. **Compound shape –** a shape made up of two or more geometric shapes **Inverse –** opposite of	• Students need to know how to find the area of rectangles and triangles.	**Steps to Success – Area of compound shapes** **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.	
To learn how find the area of trapezia.	• 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 height or missing side of a trapezium. **Opportunity for challenge:** • Students will know how to solve problems involving the area of trapezia.	**Trapezium –** a quadrilateral with one pair of sides parallel. **Parallel –** two lines that are the same distance apart and never touch **Inverse –** opposite of	• Students need to know how to substitute in to expressions/formulae.	**Steps to Success – Area of trapezia ½(a+b)h** **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.	
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 known. • Students will know how to find the circumference of a circle when the diameter or radius is known (mixture). • Students will know how to find the circumference of a circle in terms of π. • Students will know how to calculate the arc length of a semi-circle. • Students will know how to calculate the perimeter of a semi-circle. • Students will know how to calculate the arc length of a quarter circle. • Students will know how to calculate the perimeter of a quarter circle. • Students will know how to calculate the arc length of a three-quarter circle. • Students will know how to calculate the perimeter of a three-quarter circle. **Opportunity for challenge:** • Students will know how to solve problems involving the circumference of circles.	**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 body or figure, especially a circle or sphere **Perimeter –** the distance around the outside of a shape	• Students need to know how to round to a given decimal place or significant figure. • Students need to know how to identify the parts of a circle.	**Steps to Success: Circumference of a circle** **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 – C = π x d **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question. **Steps to Success: Perimeter of a semi-circle** **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 – C = π x d **Step 3:** Divide the circumference of the circles by 2. This will give you the arc length. **Step 4:** To find the perimeter of the semi-circle you will then need to add the diameter to your arc length. **Step 5:** Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.	
To learn how to calculate the area of a circle.	• Students will know how to calculate the area of a circle using the formula A= πr^2 • Students will know how to find the area of a circle in terms of π. • Students will know how to calculate the area of semi circles, quarter circles and three-quarters of a circle. • Students will know how to use inverse operations to find the missing radius or diameter when given the area. • 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 identify the parts of a circle.	**Steps to Success: Area of a circle** **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 – A = πr^2 **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.	

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	Opportunity for challenge: • Students will know how to calculate the area of compound shapes involving circles or parts of circles.			**Steps to Success: Area of a semi circle** **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 – A = πr^2 and then dividing you answer by 2 to get the area of the semi-circle. **Step 3:** Type your calculation in the calculator. **Step 4:** Write your answer from the calculator and round to an appropriate degree of accuracy – it will normally say in the question.	
To learn how to calculate missing sides using Pythagoras' Theorem.	• Students will know how to find missing lengths in a right-angled triangle using Pythagoras' theorem. • Students will know how to prove a triangle is right angled using Pythagoras' theorem. • Students will know how to solve problems involving multiple right-angled triangles using Pythagoras' theorem. **Opportunity for challenge:** • Students will know how to use Pythagoras' Theorem to solve problems involving perimeter or area. • Students will know how to solve worded problems 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 proved, or can be proved	• Students need to know how to use BIDMAS involving square numbers.	**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?	

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To learn how to calculate missing sides in right angled triangles using trigonometry.	• Students will know that $Sin = \frac{Opposite}{Hypotenuse}$ • Students will know that $Cos = \frac{Adjacent}{Hypotenuse}$ • Students will know that $Tan = \frac{Opposite}{Adjacent}$ • Students will know how to use the formula triangles for SOHCAHTOA to find missing sides. • Students will know how to calculate missing sides in right angled triangles using SOHCAHTOA.	**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 **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 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.	
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. • Students will know how to solve multi-step problems involving more than one right-angled triangle using SOHCAHTOA. • **Opportunity for challenge:** • Students will know how to use trigonometry to solve simple problems involving perimeter or area. • Students will know how to solve worded problems involving SOHCAHTOA.	**Inverse** - Opposite	• Students need to know how to find the missing sides of a right-angled triangle using trigonometry.	**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 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.	