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. • Students will know how to make multi-step conversions between different units of length, mass and volume. E.g. mm to m etc. • Students will know how to make conversions between squared units. E.g. cm^2 *to* m^2 **Opportunity for challenge:** • Students will know how to make conversions between cubic units. E.g. cm^3 *to* m^3	**Convert –** change a value from one form to another **Metric** –A system of measurement that uses the meter, litre, and gram as base units of length, volume and mass **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.	**Key conversions:** Length: • $1cm = 10mm$ • $1m = 100cm$ • $1km = 1000m$ Mass: • $1g = 1000mg$ • $1kg = 1000g$ • $1tonne = 1000kg$ Volume: • $1ml = 10cl$ • $1litre = 1000ml$	
To learn how to calculate 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 you need to find any missing lengths, if it is necessary subtract the smaller length from the larger parallel 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 that the base and height are perpendicular to each other in every parallelogram. • Students will know how to calculate the area of a triangle. • 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 **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.	**Key formulae:** Rectangles: $Area = length \times width$ Parallelograms: $Area = base \times height$ Triangles: $Area = ½ \times base \times height$	

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To learn how to calculate the area of compound shapes and trapezia.	• 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. • 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 $A = ½\ (a + b)\ h$, 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 compound shapes. • Students will know how to solve problems involving the area of trapezia.	**Compound shape –** a shape made up of two or more geometric shapes **Trapezium –** a quadrilateral with one pair of sides parallel. **Parallel –** two lines that are the same distance apart and never touch **Inverse –** opposite of **Formula sheet**	• Students need to know how to calculate the area of rectangles and triangles. • Students need to know how to substitute into expressions/formulae.	**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. **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. **Key formulae:** Rectangles: $Area = length \times width$ Triangles: $Area = ½ \times base \times height$ Trapezia: $Area = ½(a + b)h$	
To learn how to calculate 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 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 circle or sphere **Formula sheet**	• 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.	

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To learn how to find the arc length and perimeter of a sector.	• Students will know how to find the length of an arc. • Students will know how to find the perimeter of a sector. **Opportunity for Challenge:** • Students will know how to find the arc length or perimeter of a sector in terms of Pi.	Sector – A part of the circle, formed by 2 radii and an arc of the circle Formula sheet	• Students need to know how to find the circumference of a circle.	**Steps to Success – Arc lengths and perimeter of a Sector.** To calculate arc length, you need to find the fraction of the circle that you have, this is the same as the angle in the sector divided 360 degrees. You then multiply the fraction by the **circumference** of the circle. **The formula for arc length is:** $\frac{\theta}{360} \times \pi \times diameter$ If you need to find the perimeter of the sector you must remember to add on the two radii once you have calculated the **arc length.**	
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, where r is the radius. • Students will know how to find the area of circle when the diameter is known. • 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. **Opportunity for challenge:** • Students will know how to calculate the area of compound shapes involving circles or parts of circles.	Formula sheet	• Students need to know how to identify the different 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. **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 find the area of a sector.	• Students will know how to find the area of a sector. **Opportunity for Challenge:** • Students will know how to find the area of a sector in terms of Pi.	Formula sheet	• Students need to know how to find the area of a circle.	**Steps to Success – Area of a Sector.** To calculate the area of a **sector** you need to find the fraction of the circle that you have, this is the same as the angle in the sector divided 360 degrees. You then multiply the fraction by the area of the circle. **The formula for the area of a sector is:** $\frac{\theta}{360} \times \pi r^2$	
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.	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 Formula sheet	• 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?	

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				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 involving the use of Pythagoras' Theorem.	• Students will know how to solve problems involving multiple right-angled triangles using Pythagoras' theorem. • Students will know how to solve simple perimeter and area problems involving the use of Pythagoras' Theorem. • Students will know how to solve worded problems using Pythagoras' theorem.	Formula sheet	• Students need to know how to find missing sides using Pythagoras' theorem.		
To learn how to calculate missing sides and angles 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 calculate missing angles 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 the side opposite the angle that we know or are trying to find. Adjacent – next to Inverse - Opposite	• 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. **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}).	

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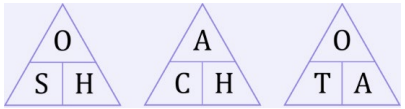
				Step 7: Round your answer to an appropriate degree of accuracy, this is usually given in the question. 	
To learn how to solve problems involving the use of trigonometry.	• Students will know how to solve multi-step problems involving more than one right-angled triangle using SOHCAHTOA. • Students will know how to use trigonometry to solve simple problems involving perimeter or area. **Opportunity for challenge:** • 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.		
Exam Preparation 6					