The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Higher+ Geometry 2

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Steps to Success	Prior Knowledge: *In order to know this…*	Feedback
To learn how to solve problems involving perimeter and area	• Students will know how to solve problems involving perimeter and area of compound shapes (not including trapezia)	**Perimeter –** the distance around the outside of a shape **Area –** the amount of space inside a 2D shape	**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. **Steps to Success – Area of shapes** **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.	• Students should already know how to calculate the perimeter of a compound shape • Students should already know how to calculate the area of rectangles, squares, parallelograms and triangles	Exam Prep 6
To learn how to calculate the area of a trapezium	• Students will know that the formula for the area of a trapezium is $\frac{1}{2}(a+b)h$ where a and b are the parallel sides and h is the height of the trapezium • Students will know how to calculate the area of a trapezium • Students will know how to calculate the area of compound shapes involving trapezia • Students will know how to solve worded problems involving the area of a trapezium • Students will know how to work backwards to find missing lengths given the area of a trapezium	**Trapezium –** a quadrilateral with one pair of sides parallel. **Quadrilateral –** a four-sided shape	**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. **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	• Students should already know how to substitute numbers into formulae	Exam Prep 6

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			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 to solve problems involving the circumference of a circle	• Students will know how to calculate the perimeter of semi circles and understand why they have to add the diameter. • Students will know how to calculate the perimeter of quarter circles or three quarters of a circle • Students will know how to use inverse operations to find the missing radius or diameter when given the circumference. • Students will know how to solve problems involving circumference of circles.	**Circumference** – 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 **Arc –** a part of a curve, a part of the circumference 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 – 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. **Steps to Success: Circumference of a semi-circle/quarter 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 – 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	• Students should already know how to calculate circumference	Exam Prep 6
To learn how to calculate the arc length and perimeter for a sector	• Students will know how to calculate the arc length of the sector using the formula angle/360 x π x diameter • Students will know how to calculate the perimeter of the sector using the formula angle/360 x π x diameter + 2r • Students will know how to calculate the angle of a sector using inverse operations	**Arc –** a part of a curve, a part of the circumference of a circle	**Steps to Success: Arc length of a sector** **Step 1:** Identify the diameter, if given the radius multiply the measurement by 2 **Step 2:** Substitute your angle and diameter into the formula – $\frac{Angle\ of\ sector}{360} x\pi d$ **Step 3:** Type your calculation in the calculator.	• Students will need to know how to find fractions of amounts • Students will need to know that the angles around a point add to 360 • Students will need to know how to calculate the circumference of a circle	Exam Prep 6

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To learn how to solve problems involving the area of a circle	• Students will know how to calculate the area of semi circles • Students will know how to calculate the area of quarter circles or 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 area and circumference of circles.		**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 – 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. **Steps to Success: Circumference of a semi-circle/quarter 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 – 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 **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 – 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 **Steps to Success: Area of a semi circle/quarter 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 – $\frac{\pi r^2}{2}$ 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	• Students should already know how to calculate the area of a circle	Exam Prep 6

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To learn how to calculate the area of a sector	• Students will know how to calculate the area of a sector where the angle is not 90, 180 or 270 using the formula, angle/360 x πr^2, students will also be able to recall this formula. • Students will know how to calculate the angle of a sector using inverse operations	**Sector –** the area in a circle formed by two radii and an arc	**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:** $\frac{\theta}{360} \times \pi r^2$	• Students will need to know how to find fractions of amounts • Students will need to know that the angles around a point add to 360 • Students will need to know how to calculate the area of a circle	Exam Prep 6
To learn how to solve problems in 2D shapes using Pythagoras' Theorem	• Students will know how to find missing lengths in a right-angled triangle using Pythagoras' theorem • Students will know that to prove a triangle is right angled using Pythagoras' theorem they will substitute the values into the formula. • Students will know how to solve worded problems using Pythagoras' theorem • Students will know how to solve problems involving multiple connected right-angled triangles using Pythagoras' theorem	**Hypotenuse** – the longest side in a right-angled triangle. It can always be found opposite the right angle	**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 $a^2+ b^2= c^2$	• Students should already know how to calculate missing lengths using Pythagoras' theorem • Students will need to know how to rearrange formulae	

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			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 in 3D shapes using Pythagoras' Theorem	• Students will know how to find missing lengths in 3D shapes using Pythagoras' theorem		•	• Students should already know how to calculate missing lengths using Pythagoras' theorem	
To learn how to calculate missing sides and angles using SOHCAHTOA	• 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 and angles. • Students will know how to calculate missing sides and angles in right angled triangles using SOHCAHTOA • Students will know how to solve worded problems involving SOHCAHTOA • Students will know how to solve multi-step problems involving more than one right-angled triangle 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.	**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 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 down the calculation you need to do and then use your calculator to work out the answer. **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}).	• Students need to know how to rearrange formulae • Students need to know how to substitute numbers into formulae • Students need to know how to use a calculator	

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To learn how to solve problems in 3D shapes using SOHCAHTOA	• Students will know how to find missing lengths and angles in 3D shapes using SOHCAHTOA • Students will know how to use Pythagoras' theorem and SOHCAHTOA together to find missing sides and angles in 3D shapes		•	• Students will need to know how to find missing sides and angles using SOHCAHTOA and Pythagoras' theorem	