The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Foundation+ – Geometry 1

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to find missing angles in triangles and quadrilaterals.	• Students will know that angles in a triangle add upto 180°. • Students will know that angles in an equilateral triangle are equal - 60°. • Students will know that two angles in an isosceles triangle are equal. • Students will know how to use angle facts to find the missing angles in triangles. • Students will know how to use angle facts to find missing angles in special triangles. • Students will know that angles in a quadrilateral add upto 360°. • Students will know how to use angle facts to find the missing angles in quadrilaterals. • Students will know how to solve multi-step problems involving angles in triangles, quadrilaterals and other basic angle rules (straight lines, around a point etc.) **Encourage students to write reasons for every missing angle that they find.**	**Isosceles Triangle –** a triangle with two equal sides and two equal angles **Quadrilateral –** a four-sided polygon, having four edges and four corners	• Students need to know how to find missing angles on straight lines and around a point. • Students need to know how to find vertically opposite angles.	**Steps to Success – Angles in a triangle** **Step 1:** Add up the angles you know. **Step 2:** Subtract the known angles from 180°. **Step 3:** Write: 'Angles in a triangle add upto 180°' as your reason. You also need to write any other reasons that you have used to find that angle. **Steps to Success – Angles in special triangles** **Step 1:** Identify the type of triangle and think about what makes this triangle different or special compared to normal ones. **Step 2:** You may be able to identify an angle without any calculation – place this on the diagram. If this is not the case then go to step 3. **Step 3:** Add up the angles you know. **Step 4:** Subtract the known angles from 180°. You be required to split this in half for some isosceles angles. If this is not the case then go straight to step 5. **Step 5:** Write: 'Angles in a triangle add upto 180°' as well as one of the reasons below. • Two angles in an isosceles triangle are equal. • The three angles in an equilateral triangle are equal and 60°. **Steps to Success – Angles in a quadrilateral** **Step 1:** Add up the angles you know. **Step 2:** Subtract the known angles from 360°. **Step 3:** Write: 'Angles in a quadrilateral add upto 360°' as your reason. You also need to write any other reasons that you have used to find that angle.	
To learn how to calculate interior angles in polygons.	• Students will know how to use angles in a triangle add up to 180° to find the angle sums of any polygon. • Students will know how to use the formula $(n-2)\times 180$ to find the sum of interiors angles of any polygon. • Students will know how to find one interior angle of a regular polygon using the formula $(n-2)\times 180$ and dividing by the number of angles of the polygon. • Students will know how to find the missing angle in an irregular polygon. • Students will know how to solve problems involving interiors angle in regular and irregular polygons.	**Polygon** – a closed shape with straight sides **Regular Polygon** – A polygon where all sides are the same length and all angles are equal **Irregular Polygon** – A polygon where all sides are not the same length and all angles are not equal **Interior** – Inside	• Students need to know that angles in a triangle add up to 180°. • Students need to recognise and identify different types of polygons.	**Steps to Success – Interior angles of a regular polygon** **Step 1:** Check that you shape is regular. Does it have equal sides and equal angles? **Step 2:** Calculate the sum of the interior angles by using the formula: $Sum\ of\ the\ interior\ angles = (n-2)\times 180$ Where, n, is the number of sides. **Step 3:** Divide this sum by how many equal angles the polygon has. **Steps to Success – Missing angle of an irregular polygon** **Step 1:** Check that you shape is irregular. Not all the sides or angle are equal. **Step 2:** Calculate the sum of the interior angles by using the formula: $Sum\ of\ the\ interior\ angles = (n-2)\times 180$ Where, n, is the number of sides. **Step 3:** Add up all the known angles. **Step 4:** Subtract the sum of the known angles from the sum of the interior angles to find the missing angle.	
To learn how to solve problems with exterior angles.	• Students will know how to find a single exterior angle of a regular polygon using 360°. • Students will know how to find the number of sides a regular polygon has using 360° and an exterior angle. • Students will know that interior and exterior angles add up to 180° as they sit on a straight line. • Students will know how to solve basic problems with a mixture of interior and exterior angles.	**Exterior** – Outside **Exterior angle** – is the angle between a side of a polygon and an extended adjacent side.	• Students need to be able to find an interior angle of a regular polygon.	**Steps to Success – Exterior angles of a regular polygon** **Step 1:** Check that you shape is regular. Does it have equal sides and equal angles? **Step 2:** The sum of exterior angles in any polygon is 360°. Divide 360° by the number of exterior angles to find the value of one exterior angle.	
To learn how to find missing	• Students will know that alternate angles are equal. • Students will know how to identify alternate angles.	**Parallel –** parallel lines are two lines that are side by	• Students need to know how to find missing angles	**Alternate angles**	

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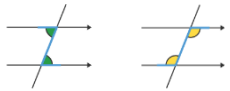
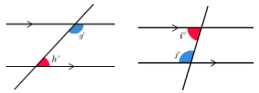
angles on parallel lines.	• Students will know that corresponding angles are equal. • Students will know how to identify corresponding angles. • Students will know that co-interior angles add upto 180°. • Students will know how to identify co-interior angles. **Encourage students to write reasons for every missing angle that they find.**	side and have the same distance continuously between them **Transversal –** a line that crosses at least two other lines **Some additional vocab is present in steps.**	on a straight line, at a point and vertically opposite.	**Alternate angles** are two angles, formed when a line crosses two other lines, that lie on opposite sides of the **transversal** line and on opposite relative sides of the other lines. If the two lines crossed are parallel, the alternate angles are equal. **Alternate angles** are equal.  <u>Corresponding angles</u> **Corresponding angles** are angles that occur on the same side of the transversal line and are equal in size. They are either both obtuse or both acute. **Corresponding** means matching. **Corresponding angles** are equal.  <u>Co-interior angles</u> **Co-interior angles** are angles on the same side of the **transversal** and inside the parallel lines. The two angles that occur on the same side of the transversal always add up to 180º. **Co-interior** angles add up to 180º. 	
To learn how to combine angle rules to find missing angles on parallel lines.	• Students will know how to identify the difference between alternate, corresponding and co-interior angles • Students will know how to find missing angles in parallel lines using a mixture of reasons. • Students will know how to give clear, accurate reasons for their answers. • Students will know how to apply the rules of angles in parallel lines and other angle facts to solve multi-step problems involving angles in parallel lines • Students will know how to use a mixture of parallel line rules and other angle facts to find missing angles. **Encourage students to write reasons for every missing angle that they find.**		• Students need to know how to find alternate, corresponding and co-interior angles.		
To learn how to draw and measure bearings.	• Students will know how to use a protractor and ruler to accurately measure bearings on a map, including measuring from A to B and B to A. • Students will know how to use a protractor to accurately draw bearings from A to B and B to A. • Students will know how to measure reflex bearings. • Students will know how to draw reflex bearings. • Students will know how to draw a point at a given bearing and distance from a point. • Students will know how to draw bearings from 2 points and show where these intersect. **Opportunity for challenge:** • Students will know how to solve problems involving bearings.	**Bearing –** angles measured clockwise from north involving 3 digits	• Students need to know how to measure and draw angles.	<u>Steps to Success- Measuring bearings</u> **Step 1:** Draw a line connecting the two points unless this has been drawn for you. **Step 2:** Identify which point you are measuring the bearing **from.** **Step 3:** Place the protractors centre on the bottom of the line with 0 on the **North** line. **Step 4:** Measure the size of the angle, remembering to measure **clockwise.** **Step 5:** Record your bearing, ensuring it has 3 digits. If the angle is less than 100, place a zero as the first digit. <u>Steps to Success- Measuring reflex bearings</u> **Step 1:** Draw a line connecting the two points unless this has been drawn for you. **Step 2:** Identify which point you are measuring the bearing **from.**	

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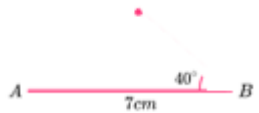
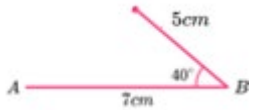
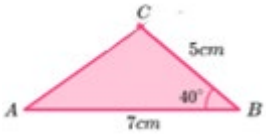
				Step 3: Measure the smaller angle. This will be **anticlockwise** from the North. **Step 4:** Subtract this angle from 360°. **Step 5:** Record your bearing, ensuring it has 3 digits. **Steps to Success- Drawing bearings** **Step 1:** Identify which point you are drawing the bearing **from.** **Step 2:** Draw the North line at that point unless it has been drawn for you. **Step 3:** Place the protractors centre on the bottom of the line with 0 on the **North** line. **Step 4:** Measure the angle in the question, remembering that bearings are measured **clockwise**. **Step 5:** Make a marking at the position of the angle, then draw through the point to the required measurement as given in the question. **Steps to Success- Drawing reflex bearings** **Step 1:** Identify which point you are drawing the bearing **from.** **Step 2:** Draw the North line at that point unless it has been drawn for you. **Step 3:** Subtract your angle from 360° Step 4: Place the protractors centre on the bottom of the line with 0 on the **North** line. **Step 4:** Measure the smaller angle, remembering that this time we are measuring **anticlockwise**. **Step 5:** Make a marking at the position of the angle, then draw through the point to the required measurement as given in the question.	
To learn how to accurately construct triangles.	• Students will know how to construct SAS triangles using a ruler and protractor. • Students will know how to construct ASA triangles using a ruler and protractor. • Students will know how to construct SSS triangles using a ruler and compass.	**Construct –**to draw a shape, line or angle accurately using a pair of compasses, a protractor and a ruler	• Students need to know how to draw angles accurately with a protractor. • Students need to know how to draw straight lines accurately with a ruler.	**Steps to Success- Constructing SAS Triangles** **Step 1: Draw the base.** Use a pencil and a ruler to draw the base.  **Step 2: At one end point measure one angle.** At point B use a protractor to measure the angle 40˚, make a mark.  **Step 3: At the end point draw a line.** Use a ruler to measure 5cm from point B, while making sure that the ruler lines up with the mark you made in step 2.  **Step 4: Complete the triangle.** Use your ruler to draw a straight line from point A to the end of the 5cm line drawn in step 3. 	

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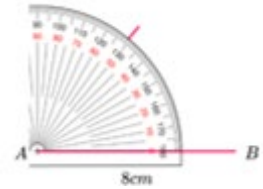
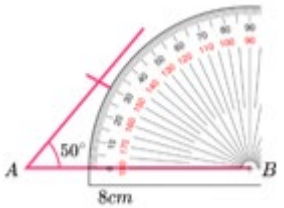
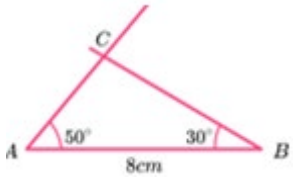
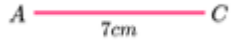
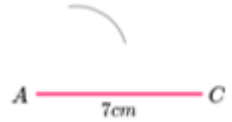
				Steps to Success- Constructing ASA Triangles **Step 1: Draw the base.** Use a pencil and a ruler to draw the base.  **Step 2: At one end point measure one angle.** At point A use a protractor to measure the angle 50˚, make a mark and then draw a straight line from point A through the mark. Make this line long.  **Step 3: At the other end point measure the second angle.** At point B use a protractor to measure the angle 30˚, make a mark and then draw a straight line from point B though the mark.  **Step 4: Complete the triangle.** Make sure that the two lines intersect each other to form the triangle. **Leave all construction lines visible!**  **Steps to Success- Constructing SSS Triangles** **Step 1: Draw the base.** Use a pencil and a ruler to draw the base. It is usually easier to use the longest side.  **Step 2: Set compasses for the second side and draw an arc.** Open the compasses to 4cm. Place the point on point A and draw an arc. Make sure this arc is longer than you think necessary. 	

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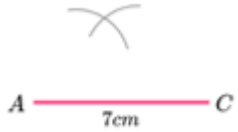
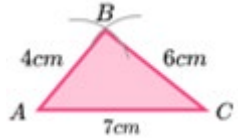
				Step 3: Set compasses for the third side and draw an arc. Open the compasses to 6cm. Place the point on point C and draw an arc. This second arc should cross the first arc. If they don't cross you may have to go make and draw the arc's longer.  **Step 4: Join up the intersection of the arcs.** Complete the triangle by joining the point where the arcs intersect to point A and point C. **Leave all construction lines visible!** 	
To learn how to construct angles and line bisectors.	• Students will know how to construct a perpendicular bisector of a line. • Students will know how to construct an angle bisector. • Students will know that the perpendicular distance from a point to a line is the shortest distance to the line. • Students will know how to construct a perpendicular line from a point to a line.	**Bisect –** cut into two equal parts **Bisector –** A line that splits an angle or line into two equal parts **Perpendicular –** at a right angle to	• Students need to know how to use a compass to draw circles with a known radius.	<u>Steps to Success- Constructing perpendicular bisectors</u> **Step 1: Use compasses to draw an arc.** Open the compasses to about three-quarters of the length of the line. Put the point of the compasses on one of the endpoints of the line. Draw an arc.  **Step 2: Use the compasses to draw a second arc, intersecting the first arc.** Keeping the compasses, the same, draw another arc from the other end of the line.  **Step 3: Join the two points where the arcs intersect.** Using a ruler, join up the two points where the arcs intersect each other. The new line is the perpendicular bisector of the original line segment *AB*.	

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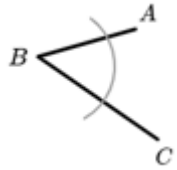
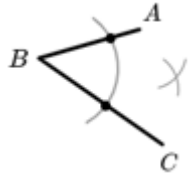
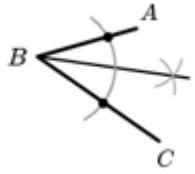
				 **Step 4: Check.** You can check that the new line goes through the midpoint of the line segment *AB* by using a ruler to measure. The line *AB* should have been cut into two equal halves. You can also check if the lines meet at a right angle. **Steps to Success- Constructing angle bisectors** **Step 1: Use compasses to draw an arc.** Set your compasses to a length that is less than the shortest line. Putting the point of the compasses on *B*, draw one arc going through both *AB* and *BC*.  **Step 2: Use the compasses to draw two more arcs.** Put the point of the compasses on the point where the first arc crossed *AB* and draw an arc. Keep the compass on the same setting. Repeat by putting the point of the compasses on the point where the first arc crossed *BC* and draw an arc. These two arcs need to intersect.  **Step 3: Join the vertex with the point where the arcs intersect.** Using a ruler, join up the point where the arcs intersect each other with the vertex *B*. The new straight line is the angle bisector of the original angle *ABC* and splits it into two equal parts. 	

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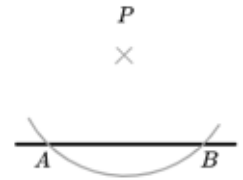
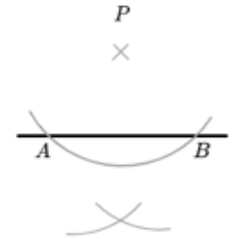
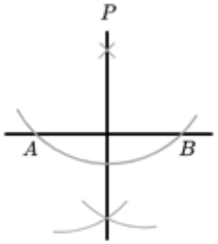
				Step 4: Check. You can check that the new straight line bisects the angle *ABC* by using a protractor. **Steps to Success- Constructing a perpendicular line to a point** **Step 1: Draw two arcs crossing the line segment.** Put the point of the compasses on the original point *P*. Draw an arc that crosses the original line in two places. These are labelled *A* and *B*.  **Step 2: Make two more arcs which intersect.** Put the point of the compasses on point *A* where an arc crosses the line and draw another arc. Keep the compasses on the same setting. Repeat with point *B*, drawing another arc to intersect the arc just drawn.  **Step 3: Join the point where the arcs intersect to the original point.** Using a ruler, join up the point where the arcs intersect each other and the original point *P*. The new line is perpendicular to the original line segment. The new line will have also bisected the length *AB* – this may not be true for all questions.  **Step 4: Measure the line.** You may be asked to measure the shortest distance from the point to the line. To do this measure the line you have constructed.	

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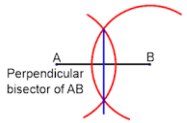
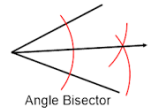
To learn how to construct loci.	• Students will know how to construct a region bounded by a circle. • Students will know how to construct a region bounded by two circles. • Students will know how to construct a region bounded by a circle and an intersecting line. • Students will know how to construct a given distance from a point. • Students will know how to construct a given distance from a line. • Students will know how to construct equal distances from two points. • Students will know how to construct equal distances from two-line segments. • Students will know how to construct regions defined by 'less than', 'nearer to' or 'greater than'. **Opportunity for challenge:** • Students will know how to use constructions to solve loci problems.	**Locus (Loci is the plural) –** the set of all points (usually forming a curve or surface) satisfying some condition **Equidistant –** an equal distance	• Students need to know how to draw circles using a known radius. • Students need to know how to draw line and angle bisectors.	**Loci – Key points:** • When 1 point is involved draw a circle/arc e.g. more than 4cm away from C  • When 2 points are involved draw a perpendicular bisector e.g. closer to A than B  • When 2 sides are involved draw an angle bisector e.g. closer to AB than BC  • When 1 side is involved draw a straight line e.g. more than 3cm away from AC 	
Exam Preparation 5					