The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Intermediate – Geometry 4

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to calculate missing lengths in similar shapes.	• Students will know that two triangles are similar if all of the angles are the same size or if the corresponding sides are in the same ratio. They will know that either of these conditions will prove two triangles are similar. • Students will know how to calculate the length scale factor for a shape that has been enlarged. • Students will know how to use the length scale factor to find missing lengths in similar shapes. • Students will know how to use the length scale factor to find missing lengths with similar triangles when one triangle is overlapping the other. • Students will know how to use the length scale factor to find missing lengths with similar triangles when corresponding angles are vertically opposite to each other. **Opportunity for challenge:** • Students will know how to prove that two shape are similar to each other.	**Similar** - having a resemblance in appearance, without being identical. **Similar Shapes –** two shapes are similar when one is an enlargement of the other **Similar triangles –** two triangles are similar if all of the angles are the same size or if the corresponding sides are in the same ratio. Either of these conditions will prove two triangles are similar. **Scale factor –** how much the shape has been enlarged, the scale factor tells us what the corresponding lengths have been multiplied by	• Students need to be able to recognise similar and congruent shapes.	**Steps to success – Finding missing lengths of similar shapes** **Step 1:** Check that your two shapes are mathematically similar. **Step 2:** Find a pair of corresponding sides of the two shapes. **Step 3:** Divide the larger length by the smaller length in order to find the scale factor. **Step 4:** Find the pair of corresponding sides you need in order to find your answer. **Step 5:** Multiply or divide your known corresponding length by your scale factor.	Is it worth adding in area and volume?
To learn how to identify congruent shapes and prove congruence.	• Students will know the criteria for congruent triangles. (SSS, SAS, ASA and RHS). • Students will know how to prove that two triangles are congruent by proving that one of the criteria for congruence is met. (SSS, SAS, ASA and RHS).	**Congruent** – the same **Hypotenuse** – the longest side in a right-angled triangle. It can always be found opposite the right angle **Parallel –** two lines that are side by side and have the same distance continuously between them **Isosceles Triangle –** a triangle with two equal sides and two equal angles **Corresponding –** matching	• Students need to know how to use Pythagoras' theorem. • Students need to know how to find the missing angles in triangles.	**Steps to Success – Proving congruence** **Step 1:** Highlight a matching side or angle in each diagram. Write the criteria down for the matching side or angle. **Step 2:** Repeat step 1 until three criteria have been found. **Step 3:** Write a conclusion for your proof. E.g. Therefore congruent.	

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To learn how to draw, write and interpret column vectors.	• Students will know how to represent a column vector on a coordinate grid. • Students will know how to write a column vector given one drawn on a coordinate grid. • Students will know that a negative vector has the same magnitude but travels in the opposite direction. • Students will know how to combine column vectors by adding or subtracting them and draw resultant vectors. • Students will know how to multiply column vectors by a scalar and drawing resultant vectors. • Students will know how to use substitution involving column vectors. • Students will know how to simple solve problems involving column vectors. **Opportunity for challenge:** • Students will know how to simple solve problems involving column vectors and the use of Pythagoras' theorem.	**Vector –** a way to describe movement from one point to another. A vector quantity has both direction and magnitude. **Magnitude –** size **Cultural capital**	• Students need to know how to interpret a column vector. E.g. $\binom{4}{3}$ means 4 to the right and 3 up.		
To learn how to translate shapes and describe translations.	• Students will know how to translate a shape by a given column vector. • Students will know how to describe a translation using a column vector.	**Transform –** change **Transformation –**a process that manipulates a polygon on a coordinate system **Translation –** the process of moving something from one place to another. **Cultural capital**	• Students need to know how to interpret a column vector. E.g. $\binom{4}{3}$ means 4 to the right and 3 up.	**Steps to Success – Translations** **Step 1:** Interpret the column vector. The top number means right (+) or left (-), the bottom number means up (+) or down (-). **Step 2:** Pick one **vertex** of the original shape and move this coordinate the given number of spaces to the left/right and up/down. **Step 3:** Repeat for all other **vertices** of the shape and then join them up using a ruler and pencil. **Step 4:** Check that the new shape is congruent to the original. **Steps to Success – Describing translations** **Step 1:** Identify that the transformation is a translation. Is the shape congruent but in a different position? Write down the word translation. **Step 2:** Highlight a corresponding vertex of each shape. **Step 3:** Count across from one vertex to the other. Make sure you are starting from the correct shape. Write this number down on the top of the vector with a (+) if going right or a (-) if going left. **Step 4:** Count up or down from one vertex to the other. Make sure you are starting from the correct shape. Write this number down on the bottom of the vector with a (+) if going up or a (-) if going down. *** Check that you have all the information needed – translation and vector. ***	
To learn how to reflect shapes and describe reflections.	• Students will know how to reflect a shape in the x-axis or y-axis. • Students will know how to reflect a shape in a line in the form x = a, y = b, y = x, y = -x • Students will know how to describe a reflection.	**Reflection –** is a type of transformation where each point in a shape appears at an equal distance on the opposite side of a given line of reflection **Symmetry –** a balanced arrangement of parts on either side of a dividing line **Cultural capital**	• Students need to know how to draw straight lines in the form x=a, y=b and y=x.	**Steps to Success – Reflections** **Step 1:** Draw the mirror line stated in the question **Step 2:** Highlight a vertex on the shape. Step 3: Count from this vertex into the line of reflection. Step 4: Count out the same amount in the opposite direction from the line of reflection. Step 5: Continue steps 3 and 4 until all vertices are reflected. **Step 6:** Join them up all the vertices using a ruler and pencil. **Step 7:** Check that the new shape is congruent to the original but reflected. **Steps to Success – Describing Reflections.** **Step 1:** Identify that the transformation is a reflection. Is the shape congruent but flipped over? Write down the word reflection. **Step 2:** Identify the mirror line by using your ruler to find the half way line between your reflected shapes.	

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				Step 3: State the equation of the line of reflection. *** Check that you have all the information needed – reflection and a line of reflection. ***	
To learn how to rotate shapes and describe rotations.	• Students will know how to rotate a shape about the origin. • Students will know how to rotate a shape about any point. • Students will know how to describe a rotation.	**Rotate** – turn **Centre of rotation** – the point which a shape is rotated about **Clockwise** – in the same direction as the hands move around a clock (to the right) **Anti-clockwise** – in the opposite direction as the hands move around a clock (to the left) **Origin** –is the point with coordinates (0, 0)	• Students need to know how to plot and write coordinates.	**Steps to Success – Rotations** **Step 1:** Draw the centre of rotation on your graph with a cross (x). **Step 2:** Place your tracing paper over the shape and centre of rotation and trace them. **Step 3:** Decide which direction your tracing paper is going to move. Drawing an arrow pointing upwards (↑) helps you make sure the direction is correct. Your arrow will end up facing: • (→) 90° clockwise • (←) 90° anticlockwise • (↓) 180° clockwise or anticlockwise **Step 4:** Place your pencil on top of the centre of rotation and press down. **Step 5:** Move the tracing paper in the direct you want to the appropriate number of degrees. **Step 6:** Remove the tracing paper and draw the vertices in their new position. **Step 7:** Connect the vertices with a pencil and ruler. **Step 8:** Check that the shape is congruent but has rotated round. **Steps to Success – Describing Rotations** **Step 1:** Identify that the transformation is a rotation. Is the shape congruent but turned around or even looks upside down? Write down the word rotation. **Step 2:** Use tracing paper to trace the original shape. Rotate this round using different points until the traced shape lands on the new shape. Try the points between the shapes first and adjust if needed. **Step 3:** State if you turned your paper clockwise or anticlockwise. Drawing an arrow pointing upwards (↑) helps you make sure the direction is correct. Your arrow will end up facing: • (→) 90° clockwise • (←) 90° anticlockwise • (↓) 180° clockwise or anticlockwise **Step 4:** State the degrees in which the shape has moved. **Step 5:** State the **centre of rotation**. This is where you held your pencil on the tracing paper before rotating. *** Check that you have all the information needed – rotation, degrees, direction and a centre of rotation. ***	
To learn how to enlarge shapes.	• Students will know how to enlarge a shape by a positive integer scale factor. • Students will know how to enlarge a shape by a positive scale integer factor from a given centre of enlargement. • Students will know how to enlarge a shape by a positive scale fractional factor from a given centre of enlargement.	**Enlarge –** change the size **Enlargement –** a type of transformation where we change the size of the original shape to make it bigger or smaller by multiplying it by a scale factor **Scale factor –**the number that corresponding	• Students need to enlarge a shape without a centre of enlargement.	**Steps to Success – Enlarging a shape with a positive scale factor** **Step 1:** Draw the centre of enlargement on your graph with a cross (x). **Step 2:** Highlight a vertex on the shape you are enlarging and count how many spaces you need to move horizontally and vertically to get from the centre of enlargement to that vertex. Jot this down if it helps you. **Step 3:** Multiply the horizontal and vertical distances by the scale factor of the enlargement, write this down if it helps. **Step 4:** Go back to the centre of enlargement and move horizontally and vertically the scaled-up movements you worked out in step 3 and mark this point as the new location of that vertex. **Step 5:** Repeat steps 3 and 4 for all other vertices. **Step 6:** Join up all the points you have marked using a ruler and a pencil. **Step 7:** Check that your new shape is the correct size by multiplying each of the lengths	

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		measures have been multiplied by to enlarge a shape		for the original shape by the scale factor and checking that the corresponding side on the new shape is that length. The shapes will be mathematically similar to each other.	
To learn how to describe enlargements .	• Students will know how to describe an enlargement with a positive integer scale factor. • Students will know how to describe an enlargement with a positive fractional scale factor. **Note: If students finish, please use the opportunity for them to practise a mixture of the different transformations.**		• Students need to know how to identify the length scale factor for similar shapes.	**Steps to Success – Describing an enlargement** **Step 1:** Identify that the transformation is a enlargement. Is the new shape bigger or smaller than the original shape? Write down the word enlargement. **Step 2:** State the scale factor by comparing 2 corresponding sides in each shape. What has the original shapes sides been multiplied by to get to the sides of the new shape? **Step 3:** Find the centre of enlargement by using a ruler to line up corresponding vertices in both shapes. Draw a line connecting these straight across the whole graph. **Step 4:** Repeat step 3 for all the vertices. **Step 5:** The point that each line intersects is the centre of enlargement. Write down these coordinates. *** Check that you have all the information needed – enlargement, a scale factor and a centre of enlargement. ***	
Exam Preparation 15					