The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Prime – Similarity, Congruency and Transformations

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to calculate missing lengths in similar shapes.	• 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 in similar triangles, where 1 triangle is sitting on top of another. • Students will know how to use the length scale factor to find missing lengths in similar triangles, where a matching pair of angles are vertically opposite at a point and the opposite sides forming a pair of parallel sides. **Opportunity for challenge:** • Students will know how to solve problems involving the lengths of similar shapes.	**Similar** - having a resemblance in appearance, character, or quantity, without being identical. **Similar Shapes –** two shapes are similar when one is an enlargement of the other. When a shape is enlarged, the image is similar to the original shape. It is the same shape but a different size. **Scale factor –** how much the shape has been enlarged, the scale factor tells us what the corresponding measures have been multiplied by	• Students will need to be able to recognise similar and congruent shapes • Students will be able to find sf	**Steps to success – Finding missing lengths of similar shapes** **Step one:** Check that your two shapes are similar. **Step two:** Find the pair of corresponding sides of the two shapes. **Step three:** Divide the larger length by the smaller length in order to find the scale factor. **Step four:** Find the pair of corresponding sides you need in order to find your answer. **Step five:** Multiply or divide your known corresponding length by your scale factor.	
To learn how to calculate similar areas and volumes.	• Students will know the effect of enlargement on an area and volume. • Students will know how to find the area scale factor • Students will know how to find the volume scale factor • Students will know how to find the area or volume of an enlarged shape given two corresponding lengths and the area or volume of one of the shapes. **Opportunity for challenge:** • Students will know how to solve problems involving similar areas and volumes		• Students need to know how to use a scale factor to find similar lengths.	**Steps to Success – Similar Shapes Area** **Step 1** - Find the scale factor (divide the lengths of the same sides on similar shapes) **Step 2** - Square the scale factor **Step 3** - If you are finding the larger area multiply the smaller area by the scale factor, if you are finding the smaller divide the larger area by the scale factor **Steps to Success – Similar Shapes Volume** **Step 1** - Find the scale factor (divide the lengths of the same sides on similar shapes) **Step 2** – Cube the scale factor. **Step 3** - If you are finding the larger volume multiply the smaller volume by the scale factor, if you are finding the smaller volume divide the larger volume by the scale factor.	
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) **Opportunity for challenge:** • Students will know how to solve problems involving congruent shapes.	**Congruent** – the same **Parallel –** parallel lines are 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 **Co-interior Angles –** angles that lie between two lines and on the same side of a transversal	• Students will need to know how to identify simple congruent shapes.		

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To learn how to represent 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 the opposite direction. • Students will know how to combine column vectors by adding or subtracting them and draw resulting vectors • Students will know how to multiply column vectors by a scalar. • Students will know how to solve substitution problems and equations involving column vectors	**Vector –** A vector describes a movement from one point to another. A vector quantity has both direction and magnitude. **Magnitude –** size	• Students will need to know how to use Pythagoras' theorem to calculate the hypotenuse of a right-angled triangle	**Steps to Success – Calculations with Column Vectors** Step 1: Complete the calculation with the x direction values, whether this be addition, subtraction or multiplication Step 2: Complete the calculation with the y direction values, it should obviously be the same operation as the x direction value. Note – You must not write the vector as fractions.	
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 –** in maths, a transformation is a process that manipulates a polygon or other two-dimensional object on a plane or coordinate system **Translation –** the process of moving something from one place to another.	• Students should know how to interpret a column vector as a movement.	**Steps to Success – Translating a Shape** **Step 1:** Interpret the column vector. The top number means left (-) or right (+), the bottom number means up (+) or down (-). **Step 2:** Pick one **vertex** of the original shape and translate 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. **Steps to Success – Describing a translation** **Step 1:** Write down that the shape has been translated **Step 2:** Chose one vertex on the original shape and work out how many spaces that vertex has been moved left/right and up/down to arrive at its new position. Remember to ensure you work this out for the corresponding vertex on the transformed shape. **Step 3:** Write this movement as a column 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 = a, y = x, y = -x. • Students will know how to describe a reflection fully.	**Reflection –** In maths, a 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 - the line of reflection **Symmetry –** the quality of being made up of exactly similar parts facing each other or around an axis.	• Students need to know how to identify the equation of a straight line that is parallel to either the x- or y-axis.	**Steps to Success – Reflecting a Shape** **Step 1:** Draw the mirror line stated in the question **Step 2:** Reflect each vertex in the mirror line **Step 3:** Join them up using a ruler and pencil **Step 4:** Check that the shape you are giving as your answer is the same size as the original shape **Steps to Success – Describe Reflections.** **Step 1** – State that the transformation is a reflection. **Step 2** - Identify the mirror line and state the shape has been reflected in the mirror line.	
To learn how to rotate shapes and describe rotations.	• Students will know how to rotate a shape about a centre. • Students will know how to describe a rotation fully.	**Rotate** – turn **Clockwise** – in the same direction as the hands move around a clock (to the right)	• Students need to know how to plot and write coordinates.	**Steps to Success – Rotating a Shape** **Step 1:** Place your tracing paper over the shape you are rotating and trace over it. **Step 2:** Place your pencil on top of the tracing paper over the coordinate that is the centre of the rotation.	

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		Anti-clockwise – in the opposite direction as the hands move around a clock (to the left) **Origin** – The origin is located at the intersection of the vertical and horizontal axes at the coordinates (0, 0)		**Step 3:** Rotate the tracing paper the appropriate degrees and in the correct direction (clockwise or anti-clockwise). **Step 4:** Remove the tracing paper and draw the shape in its new position. **Steps to Success – Describing Rotations** **Step1** – Identify that it is a rotation and state this. **Step 2** – Trace your shape and rotate the tracing paper until it lands on top of the image. If you had to turn your tracing paper once it is a 90-degree rotation. If you turned your paper twice it is a 180-degree rotation, three turns is 270 degree rotation. **Step 3** – State if you turned your paper clockwise or anticlockwise. **Step 4** – State the **centre of rotation**. This is where you held your pencil on the tracing paper before rotating.	
To learn how to enlarge shapes and describe enlargements.	• Students will know how to enlarge a shape by a positive scale factor from a given centre of enlargement. • Students will know how to enlarge a shape by a fractional scale factor from a given centre of enlargement. • Students will know how to describe positive enlargements fully. • Students will know how to describe an enlarge of a shape involving a fractional scale factor. **Opportunity for challenge:** • Students will know how to enlarge a shape by a negative scale factor given a centre of enlargement. **Note: If students finish please use the opportunity for them to practise a mixture of the different transformations**	**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 –** how much the shape has been enlarged, the scale factor tells us what the corresponding measures have been multiplied by	• Students need to know how to use a scale factor to find similar lengths. • Students need to know how to enlarge a 2D shape by a give scale factor but without a centre of enlargement.	**Steps to Success – Enlarging a Shape with a Positive Scale Factor** **Step 1:** Identify the centre of enlargement **Step 2:** Choose one of the vertices 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 this for all other vertices **Step 6:** Join up all of 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 for the original shape by the scale factor and checking that the corresponding side on the new shape is that length. Do this for all lengths to be sure. **Steps to Success – Enlarging a Shape with a Negative Scale Factor** **Step 1:** Identify the centre of enlargement **Step 2:** Label each vertex on the shape using letters. Choose one of the vertices on the shape you are enlarging and count how many spaces you need to move left/right and up/down to get from the centre of enlargement to each vertex. Write this down. Step 3: Work out the new movement you are going to have to make by multiplying the distance currently travelled by the scale factor and swap the direction you will travel so that it's opposite to the original (this is the result of the scale factor being negative) **Step 4:** Go back to the centre of enlargement and move horizontally and vertically the scaled up movements you worked out in step 3 for each of the vertices and mark the points of the new vertices **Step 4:** Join up all of the points you have marked using a ruler and a pencil	

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				Step 5: Check that your new shape is the correct size by multiplying each of the lengths for the original shape by the scale factor and checking that the corresponding side on the new shape is that length. Do this for all lengths to be sure. **Steps to Success – Describing an enlargement** **Step 1:** Is the new shape bigger or smaller than the original? If so then it is an enlargement. **Step 2:** Write down the word enlargement. **Step 3:** State the scale factor by comparing 2 matching sides in each shape. What has the original shapes sides been multiplied by to get to the sides of the new shape? **Step 4:** Find the centre of enlargement by using a ruler to line up matching corners in both shapes. Draw a line connecting these straight across the whole graph. Repeat this for all the corners. The point that each line crosses 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.***	
Mini-Assessment 8					