

MAY 3, 2016

**UNIT 7: SIMILARITY AND
TRANSFORMATIONS**

**7.6: ROTATIONS AND
ROTATIONAL
SYMMETRY**

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*MATH 9***



WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 5" OR "SS5" which states:

"Demonstrate an understanding of line and rotation symmetry."



What does THAT mean???

SCO SS5 means that we will:

- * **classify a given set of 2-D shapes or designs according to the number of lines of symmetry**
- * **complete a 2-D shape or design given one half of the shape or design and a line of symmetry**
- * **determine if a 2-D shape or design has rotational symmetry about the point at the centre of the shape or design and, if it does, state the order and angle of rotation**
- * **rotate a given 2-D shape about a vertex and draw the resulting image**
- * **identify a line of symmetry or the order and angle of rotation symmetry in a given tessellation**
- * **identify the type of symmetry that arises from a given transformation on the Cartesian plane**
- * **complete, concretely or pictorially, a given transformation of a 2-D shape on a Cartesian plane, record the coordinates and describe the type of symmetry that results**
- * **identify and describe the types of symmetry created in a given piece of artwork**
- * **determine whether or not two given 2-D shapes on the Cartesian plane are related by either rotational or line symmetry**
- * **draw, on a Cartesian plane, the translation image of a given shape using a given translation rule, such as R_2 , U_3 , label each vertex and its corresponding ordered pair and describe why the translation does not result in line or rotational symmetry**





What does THAT mean???

In today's lesson, we will work on the following achievement indicators for SCO SS5:

- * determine if a 2-D shape or design has rotational symmetry about the point at the centre of the shape or design and, if it does, state the order and angle of rotation
- * rotate a given 2-D shape about a vertex and draw the resulting image
- * identify a line of symmetry or the order and angle of rotation symmetry in a given tessellation



HOMEWORK QUESTIONS?

(pages 357/8/9, #3, #5, #8, #9 & #10)

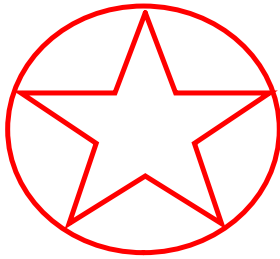
ROTATIONS:



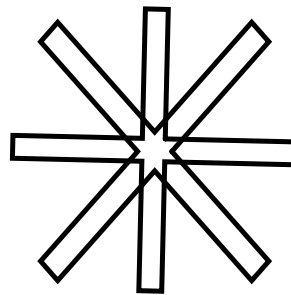
1. Rotations (like reflections) are transformations
2. Rotations can be performed either **CLOCKWISE** or **COUNTERCLOCKWISE**
3. A shape has **ROTATIONAL SYMMETRY** when it coincides with itself after a rotation of less than 360° about its centre.
4. **ORDER OF ROTATION** is the number of times a shape coincides with itself during a 360° rotation. It is stated like this:
"This shape has rotational symmetry of order ____."
5. Angle of Rotation Symmetry = $\frac{360^\circ}{\text{the order of rotation}}$

Determine if the following shapes have rotational symmetry. If so, state their order of rotation and their angle of rotation.

1.



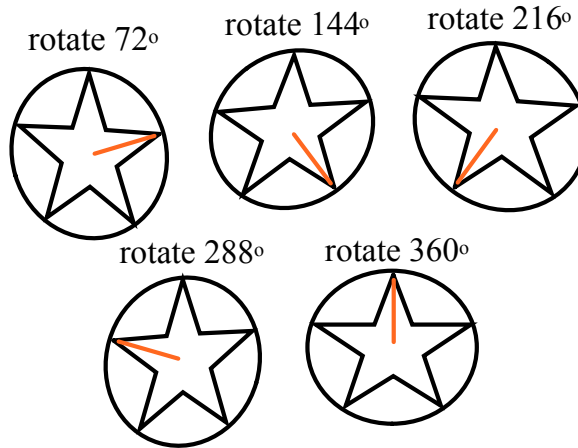
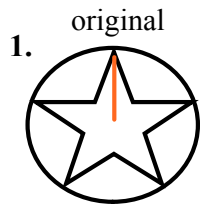
2.



3.

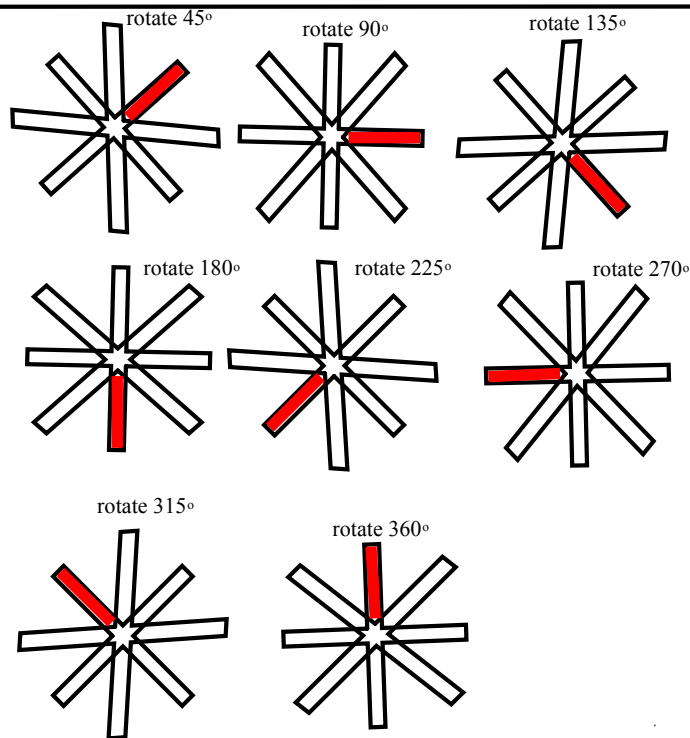
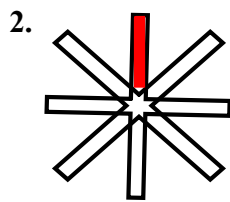


Determine if the following shapes have rotational symmetry. If so, state their order of rotation and their angle of rotation symmetry.



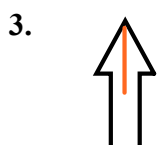
Rotational symmetry of order 5.

Angle of rotation: $\frac{360^\circ}{5} = 72^\circ$



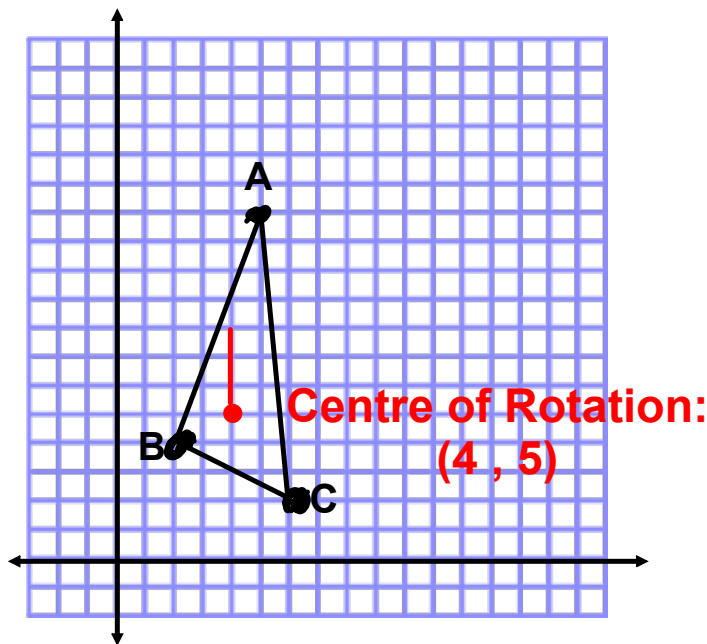
Rotational symmetry of order 8.

Angle of rotation: $\frac{360^\circ}{8} = 45^\circ$



This shape is rotated one complete turn before it coincides with itself. It does **NOT** have rotational symmetry.

Draw and label the rotation image of triangle ABC below after a 180° clockwise rotation about $(4, 5)$.



Coordinates:

A (5 , 12)

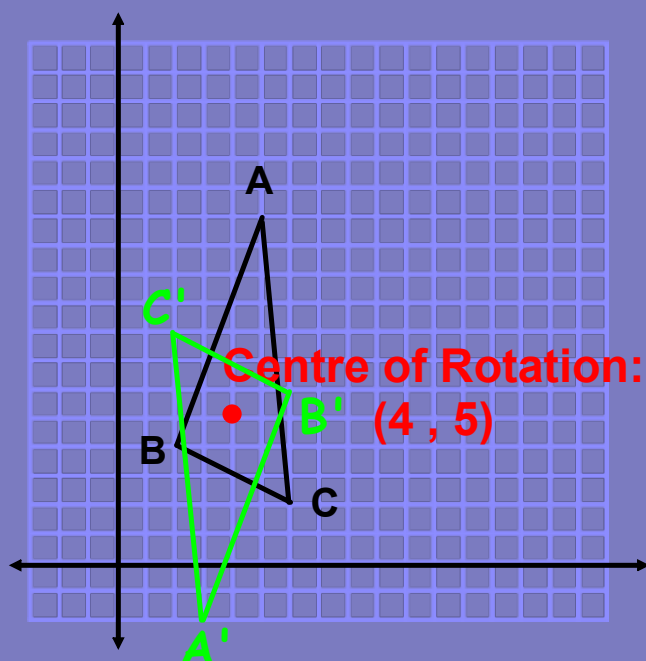
B (2 , 4)

C (6 , 2)

DIRECTIONS:

1. Draw triangle ABC on graph paper - the coordinates of its vertices are: A (5 , 12) ; B (2 , 4) ; C (6 , 2)
2. Trace the shape on the white tissue paper you have been given. Be sure to include the point that is to be used for the centre of rotation (4 , 5).
3. Draw a vertical line segment on your tissue paper from the centre of rotation (4 , 5) up to (4 , 8) to help identify where angles are located as you rotate the tissue paper.
4. Rotate triangle ABC 180° ($90^\circ + 90^\circ$) clockwise while placing and holding the tip of your pencil on the centre of rotation (4 , 5).
5. Make note of the vertices for the rotated image on your tissue paper.
6. Draw the rotated image of triangle ABC on your graph - you may want to use a different colour to be able to distinguish the rotated image from the original.

Draw and label the rotation image of triangle ABC below after a 180° clockwise rotation about $(4, 5)$.



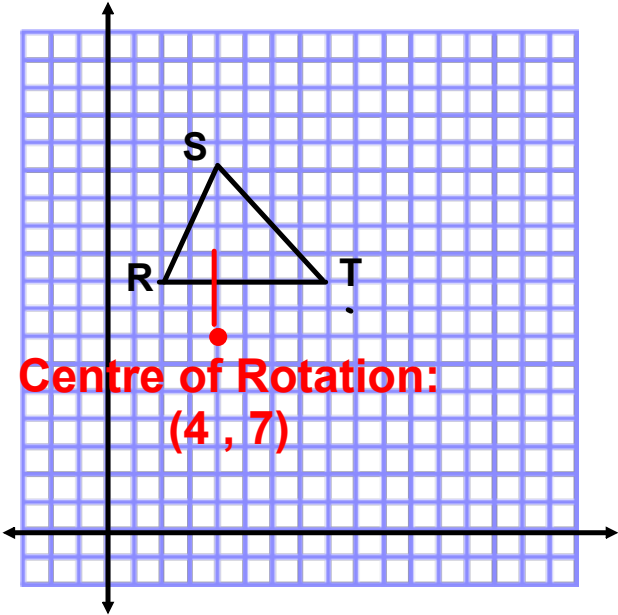
Coordinates:

A' (3 , -2)

B' (6 , 6)

C' (2 , 8)

Draw and label the rotation image of triangle RST below after a 90° counterclockwise rotation about $(4, 7)$.



Coordinates:

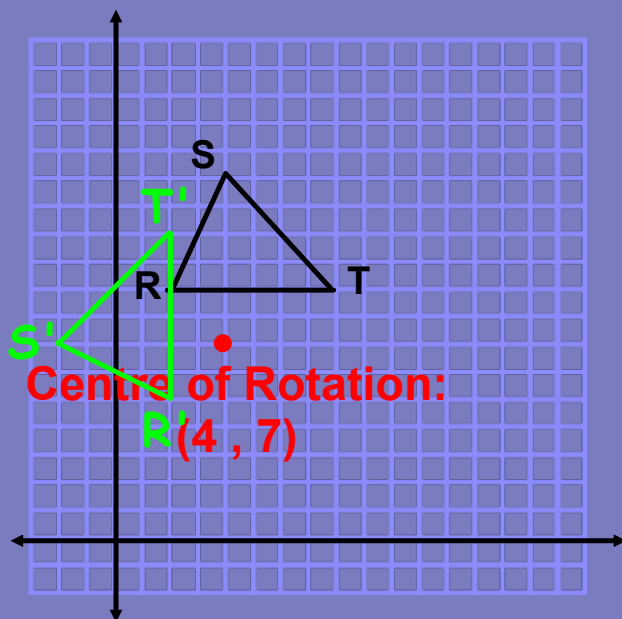
- R (2 , 9)
- S (4 , 13)
- T (8 , 9)

Centre of Rotation:
 $(4, 7)$

DIRECTIONS:

1. Draw triangle RST on graph paper - the coordinates of its vertices are: R (2 , 9) ; S (4 , 13) ; T (8 , 9)
2. Trace the shape on the white tissue paper you have been given. Be sure to include the point that is to be used for the centre of rotation (4 , 7).
3. Draw a vertical line segment on your tissue paper from the centre of rotation (4 , 7) up to (4 , 10) to help identify where angles are located as you rotate the tissue paper.
4. Rotate triangle RST 90° counterclockwise while placing and holding the tip of your pencil on the centre of rotation (4 , 7).
5. Make note of the vertices for the rotated image on your tissue paper.
6. Draw the rotated image of triangle RST on your graph - you may want to use a different colour to be able to distinguish the rotated image from the original.

Draw and label the rotation image of triangle RST below after a 90° counterclockwise rotation about $(4, 7)$.



Coordinates:

R' (2 , 5)

S' (-2 , 7)

T' (2 , 11)

CONCEPT REINFORCEMENT:

MMS9:

PAGE 365: #4, #5 & #6

PAGE 366: #8, #9 & #12

PAGE 367: #14 & #15