

April 19, 2018

**UNIT 7: SIMILARITY AND
TRANSFORMATIONS**

**7.6: ROTATIONS AND
ROTATIONAL
SYMMETRY**

**K. Sears
MATH 9**



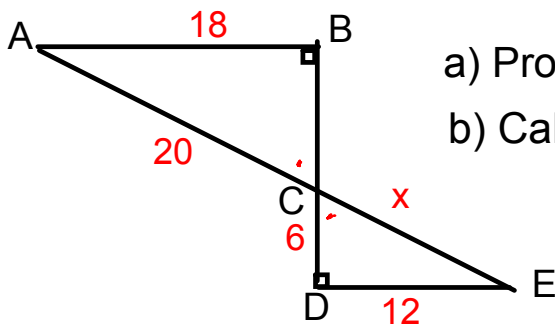
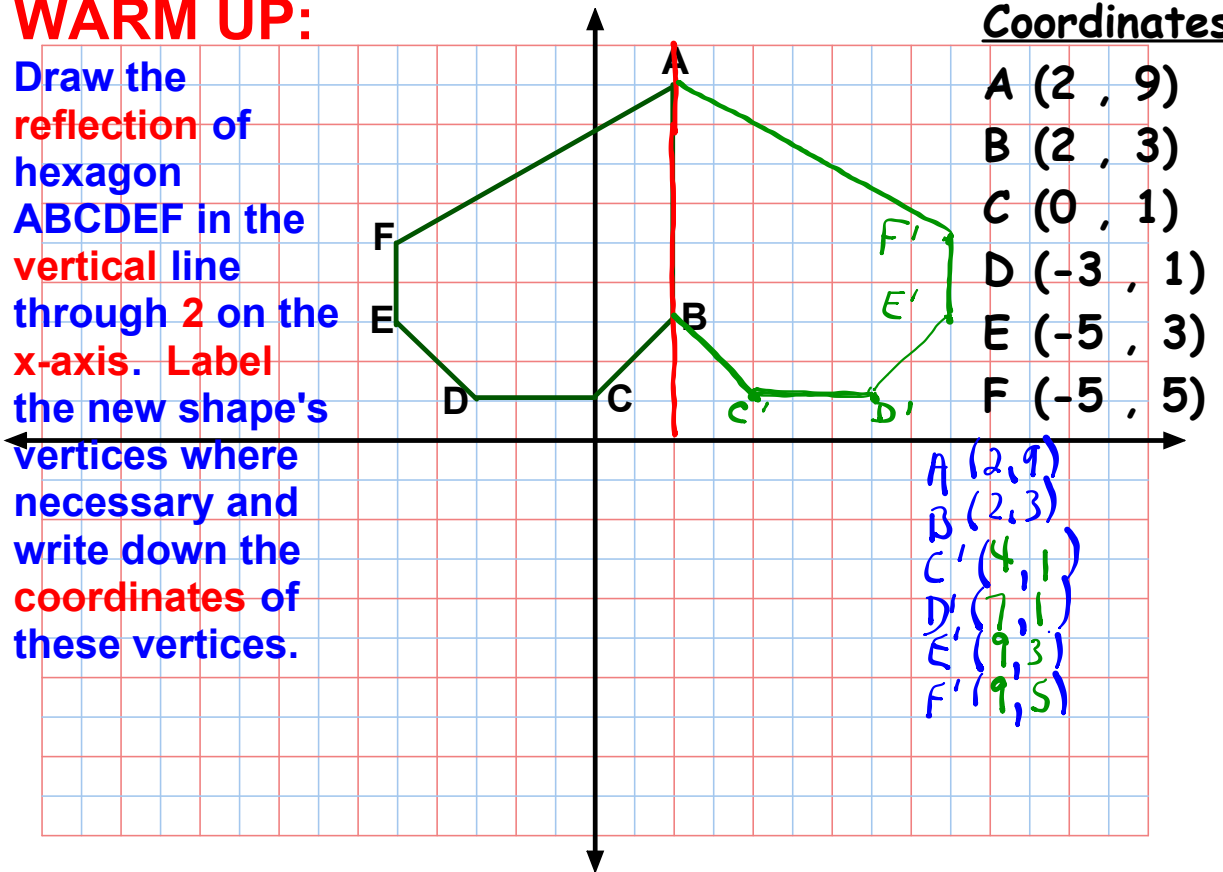
WHAT'S THE POINT OF TODAY'S LESSON?

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."

WARM UP:

Draw the reflection of hexagon ABCDEF in the vertical line through 2 on the x-axis. Label the new shape's vertices where necessary and write down the coordinates of these vertices.



- a) Prove the two triangles are similar
- b) Calculate the length of the missing side

a) $\angle B = \angle D$ (Given)
 $\angle BCA = \angle ECD$ (OAT)
 $\angle A = \angle E$ (SATT)

$\therefore \triangle ABC \sim \triangle EDC$ (AAA)

b)
$$\frac{x}{20} = \frac{12}{18}$$

$$x = \frac{12(20)}{18}$$

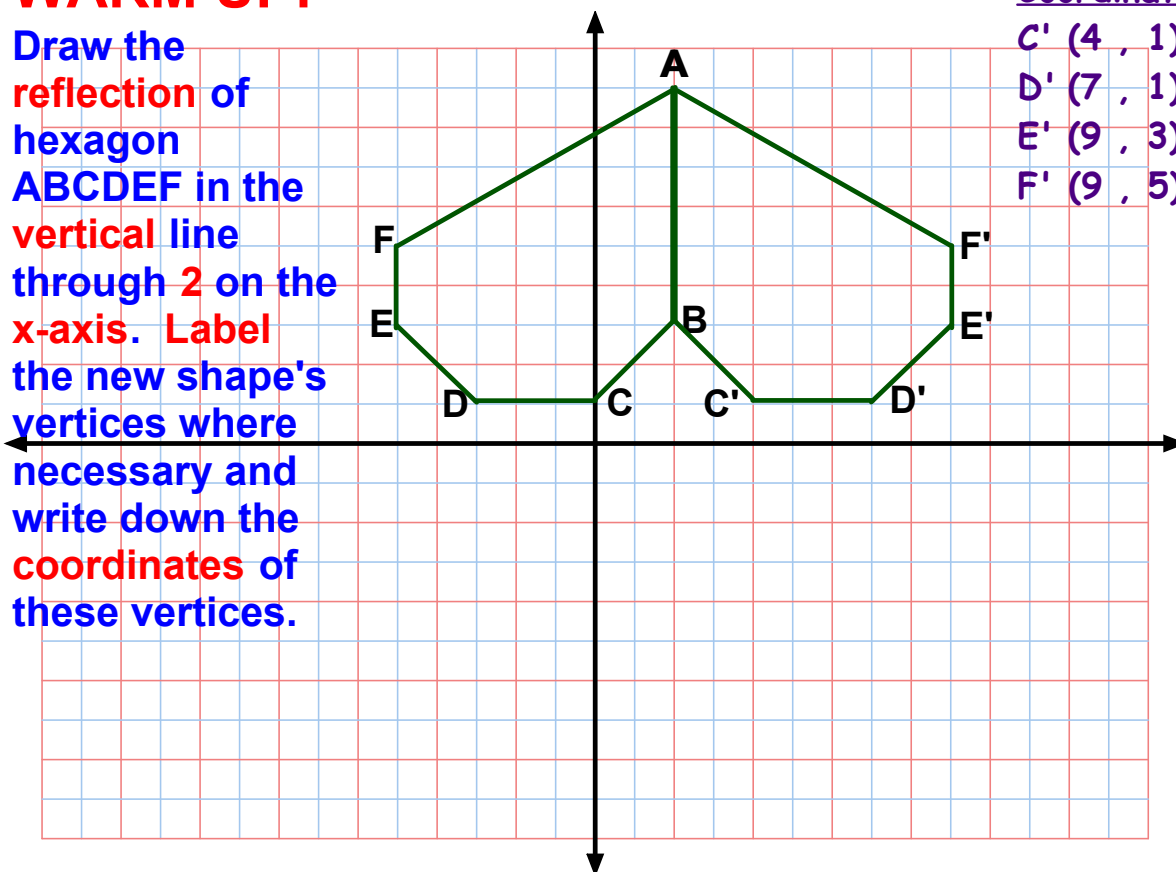
$$= 13.\bar{3}$$

WARM UP:

Draw the reflection of hexagon ABCDEF in the vertical line through 2 on the x-axis. Label the new shape's vertices where necessary and write down the coordinates of these vertices.

Coordinates:

- C' (4 , 1)
- D' (7 , 1)
- E' (9 , 3)
- F' (9 , 5)



HOMEWORK QUESTIONS?

(pages 357-359 3, 5, 8-10)

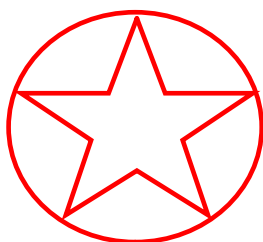
ROTATIONS:



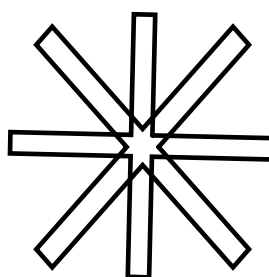
1. Rotations (like reflections) are transformations
2. Rotations can be performed either **CLOCKWISE** or **COUNTERCLOCKWISE**
3. A shape has **ROTATIONAL SYMMETRY** when it coincides with itself after a rotation of less than 360° about its centre.
4. **ORDER OF ROTATION** the number of times a shape 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 symmetry.

1.



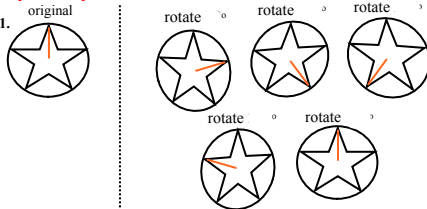
2.



3.

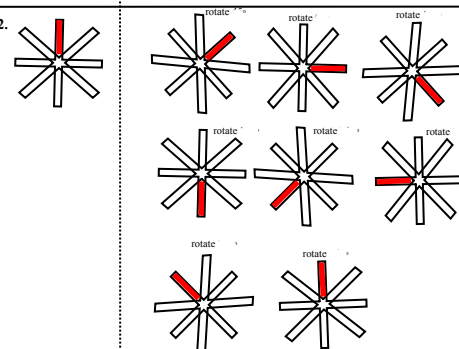


Determine if the following shapes have rotational symmetry. If so, state their order of rotation and their angle of rotation symmetry.

1. 



Rotational symmetry of order 5.

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

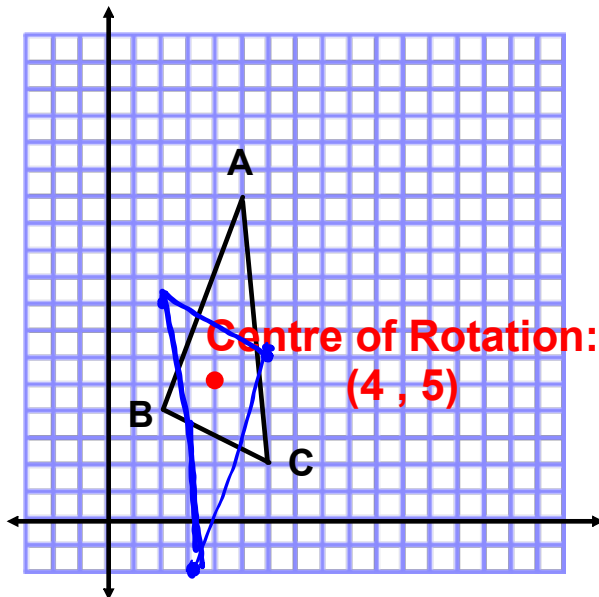
2. 

Rotational symmetry of order 8.

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

3.   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)

A' (3, -2)

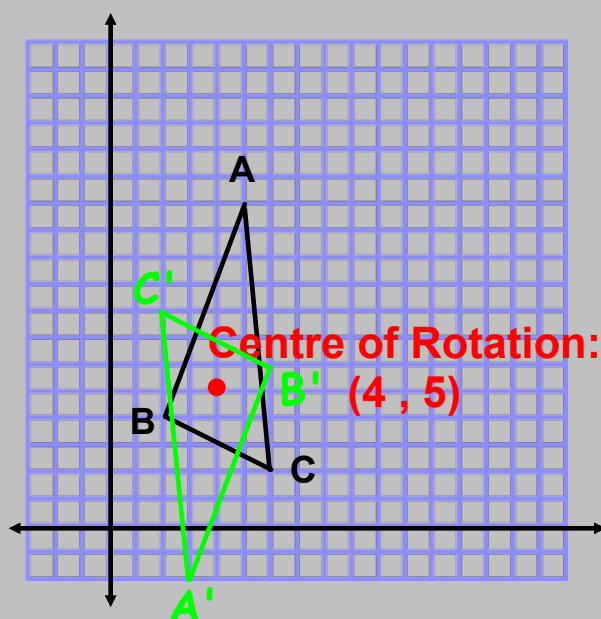
B' (2, 8)

C' (6, 6)

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).

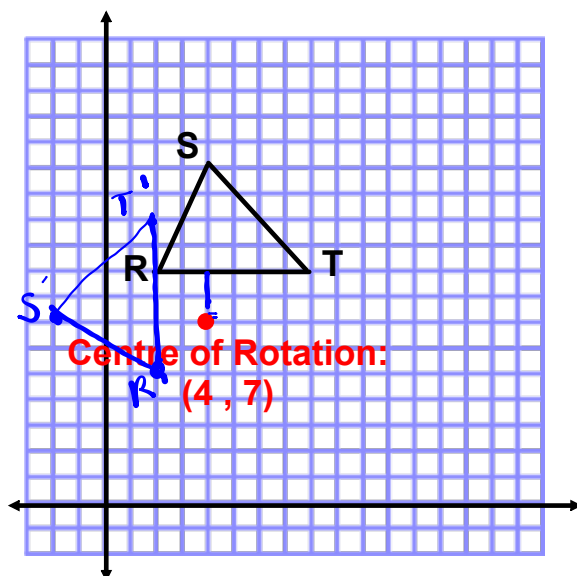
**Coordinates:**

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)

$S'(-2, 7)$

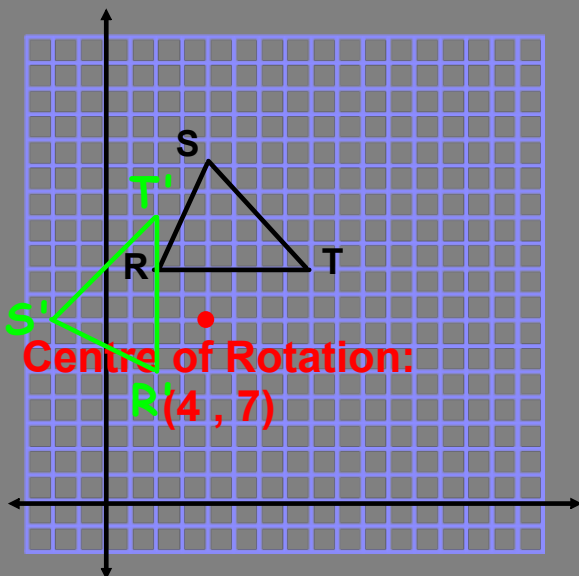
$R'(-2, 5)$

$T'(2, 11)$

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:

$R' (2, 5)$

$S' (-2, 7)$

$T' (2, 11)$

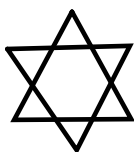
Centre of Rotation:

$R(4, 7)$

WARM UP:

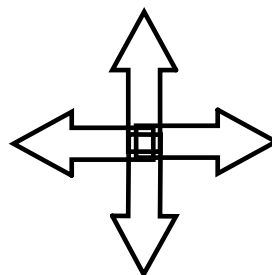
Determine if the following shapes have rotational symmetry. If so, state their **order of rotation** and their **angle of rotation symmetry**.

1.



Order = 6
 $\angle = \frac{360}{6}$
 $= 60^\circ$

2.



Order = 4
 $\angle = \frac{360}{4}$
 $= 90^\circ$

CONCEPT REINFORCEMENT:

MMS9:

PAGE 365: #4, #5 & #6

PAGE 366: #8, #9 & #12

PAGE 367: #14 & #15