

Name: _____

Date: _____

UNIT 2





LESSON 8

AIM: WHAT IS REFLECTIONAL, ROTATIONAL AND POINT SYMMETRY?

Do Now: Take an educated guess on how many degrees each figure must be rotated to map onto itself. Follow along with the geometers sketch pad to see what the answers should be!


A regular polygon means that all sides and angles are equal

1. **EDUCATED GUESS:** How many degrees do you think it will take before an **equilateral triangle** maps onto itself? _____
ACTUAL ANSWER: _____
2. **EDUCATED GUESS:** How many degrees do you think it will take before a **square** maps onto itself? _____
ACTUAL ANSWER: _____
3. **EDUCATED GUESS:** How many degrees do you think it will take before a **regular pentagon** maps onto itself? _____
ACTUAL ANSWER: _____
4. **EDUCATED GUESS:** How many degrees do you think it will take before a **regular hexagon** maps onto itself? _____
ACTUAL ANSWER: _____

	Equilateral Triangle	Square	Regular Pentagon	Regular Hexagon
				
# of sides				
Angles of Rotation				

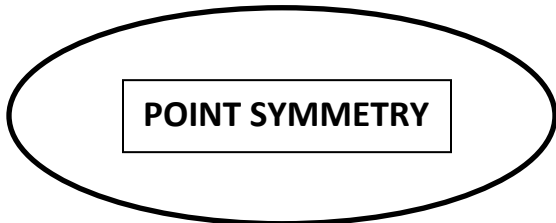
FORMULA TO FIND ANGLE OF ROTATION FOR REGULAR POLYGONS



DEFINITION	
EXAMPLE	NON-EXAMPLE

DISCOVERY ACTIVITY:

1. Watch the video and see if you can identify what determines if something has point symmetry!
2. Each group has several cards from a deck, sort these by what you believe has point symmetry and what does not have point symmetry.

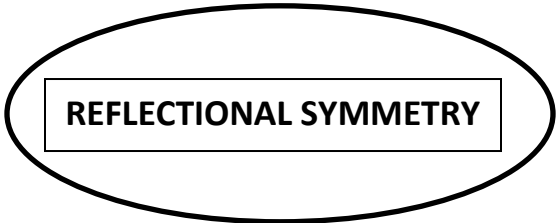
DEFINITION	
EXAMPLE	NON-EXAMPLE

GROUP ACTIVITY!

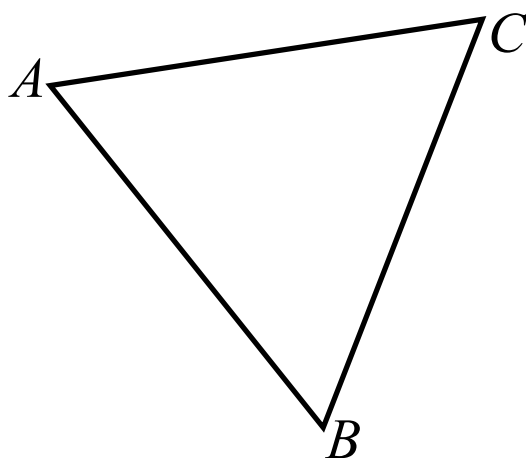
Here are the letters of the alphabet. Classify them into the given categories.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

One Line of Symmetry	Two Lines of Symmetry	Rotational Symmetry
Point Symmetry	No Symmetry	

DEFINITION	
EXAMPLE	NON-EXAMPLE

Using a compass and a straightedge, construct the lines of symmetry of the equilateral triangle below.

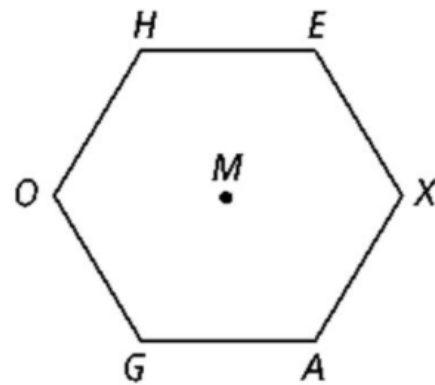


CONCLUSION: _____

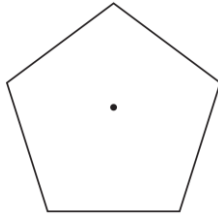
EXAMPLE PROBLEMS:

1. Point M is the center of rotation of the given regular hexagon to the right.

- a) How many sides does a hexagon have? _____
- b) What is the total # of lines of symmetry? _____
- c) What is the total # of rotational symmetry? _____
- d) What is the minimum number of degrees of each turn? _____
- e) What is the angle measurement of the counterclockwise rotation that maps H to X? _____
- f) What is the angle measurement of the counterclockwise rotation that maps E to G? _____
- g) What is the angle measurement of the counterclockwise rotation that maps O to G? _____



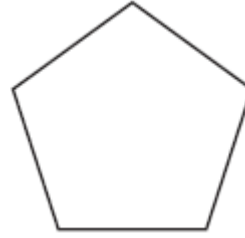
2. A regular pentagon is shown in the diagram below.



If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is

- 1) 54°
- 2) 72°
- 3) 108°
- 4) 360°

3. The regular polygon below is rotated about its center.



Which angle of rotation will carry the figure onto itself?

- 1) 60°
- 2) 108°
- 3) 216°
- 4) 540°

4. Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?

- 1) octagon
- 2) decagon
- 3) hexagon
- 4) pentagon

5. Which rotation about its center will carry a regular decagon onto itself?

- 1) 54°
- 2) 162°
- 3) 198°
- 4) 252°

6. A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be

- 1) 10°
- 2) 150°
- 3) 225°
- 4) 252°

7. Which transformation would *not* carry a square onto itself?

- 1) a reflection over one of its diagonals
- 2) a 90° rotation clockwise about its center
- 3) a 180° rotation about one of its vertices
- 4) a reflection over the perpendicular bisector of one side

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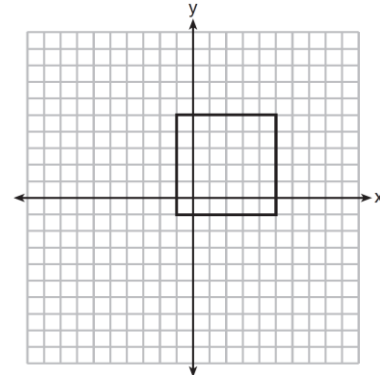
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LESSON 8 HOMEWORK

1. Which figure always has exactly four lines of reflection that map the figure onto itself?

- 1) square
- 2) rectangle
- 3) regular octagon
- 4) equilateral triangle

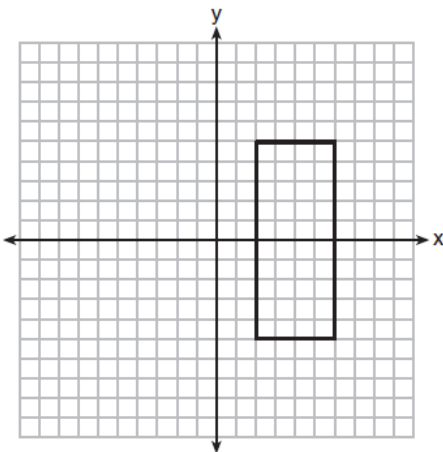
2. In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?

- 1) $x = 5$
- 2) $y = 2$
- 3) $y = x$
- 4) $x + y = 4$

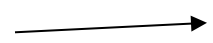
3. As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

- 1) a reflection over the x-axis
- 2) a reflection over the line $x = 4$
- 3) a rotation of 180° about the origin
- 4) a rotation of 180° about the point $(4, 0)$

4. A regular hexagon is rotated in a counterclockwise direction about its center. Determine and state the minimum number of degrees in the rotation such that the hexagon will coincide with itself.

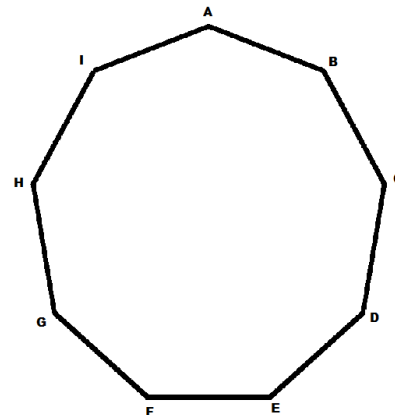


5. Which of the following capital letters has at least one line of reflection symmetry?

- [A] F [B] R [C] O [D] L

6. In the regular nonagon shown below, is a rotated n degrees about its center T carrying the nonagon onto itself.

- a. How many sides does a nonagon have? _____
b. What is the total # of lines of symmetry? _____
c. What is the total # of rotational symmetry? _____
d. What is the minimum number of degrees of each turn? _____
e. Identify each of the values that n could be.



- f. What is the angle measurement of the counterclockwise rotation that maps A to D? _____
g. What is the angle measurement of the counterclockwise rotation that maps D to H? _____
h. What is the angle measurement of the counterclockwise rotation that maps I to E? _____

7. What kind of symmetry does the figure on the right have?

- (1) Reflection symmetry
(2) Rotation symmetry
(3) Both reflection and rotation symmetry
(4) No symmetry

