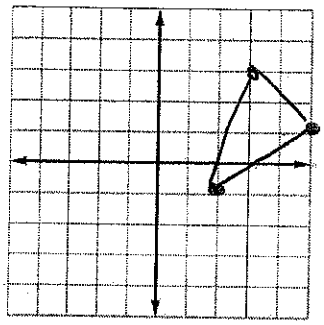
February 26, 2014

9.5 Warm-Up

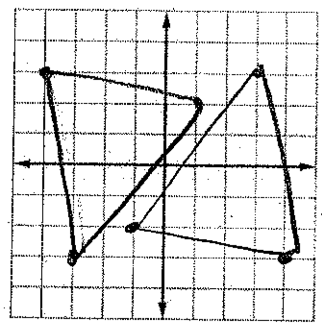
Graph each figure and its image after the specified rotation about the origin.

1. $\triangle STU$ has vertices $S(2, -1)$, $T(5, 1)$ and $U(3, 3)$; 90°

S( )
T( )
U( )



2. $\triangle DEF$ has vertices $D(-4, 3)$, $E(1, 2)$, and $F(-3, -3)$; 180°



D (4, -3)
E (-1, -2)
F (3, 3)

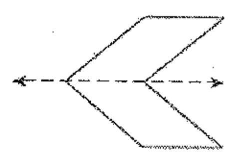
9.5 Symmetry

Target: Use the properties of figures to find symmetry and rotational

Symmetry- When an object can be transformed on itself.

KeyConcept Line Symmetry

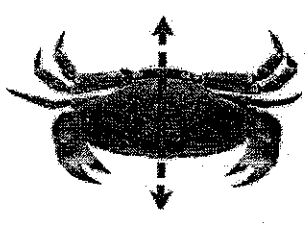
A figure in the plane has **line symmetry** (or *reflection symmetry*) if the figure can be mapped onto itself by a reflection in a line, called a **line of symmetry** (or *axis of symmetry*).



Real-World Example 1 Identify Line Symmetry

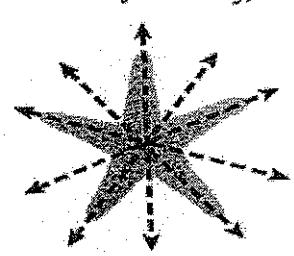
BEACHES State whether the object appears to have line symmetry. Write *yes* or *no*. If so, copy the figure, draw all lines of symmetry, and state their number.

a.



Yes; the crab has one line of symmetry.

b.



Yes; the starfish has five lines of symmetry.

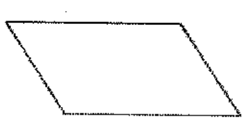
c.

No; there is no line in which the oyster shell can be reflected so that it maps onto itself.

GuidedPractice

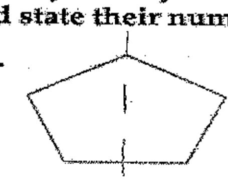
State whether the figure has line symmetry. Write *yes* or *no*. If so, copy the figure, draw all lines of symmetry, and state their number.

1A.

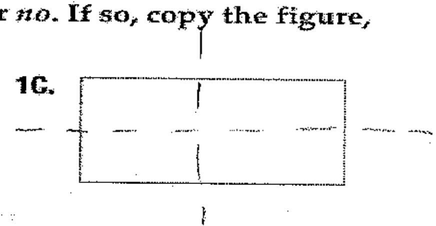


no

1B.



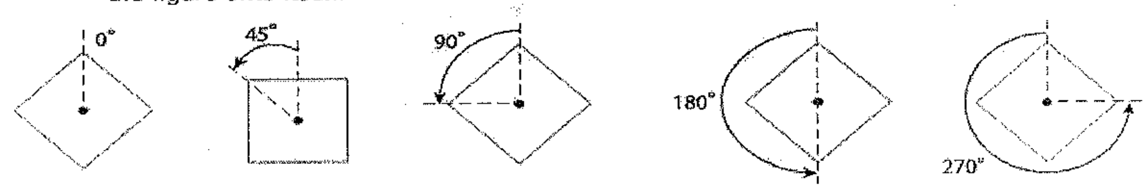
1C.



KeyConcept Rotational Symmetry

A figure in the plane has **rotational symmetry** (or *radial symmetry*) if the figure can be mapped onto itself by a rotation between 0° and 360° about the center of the figure, called the **center of symmetry** (or *point of symmetry*).

Examples The figure below has rotational symmetry because a rotation of 90°, 180°, or 270° maps the figure onto itself.



The number of times a figure maps onto itself as it rotates from 0° to 360° is called the **order of symmetry**. The **magnitude of symmetry** (or angle of rotation) is the smallest angle through which a figure can be rotated so that it maps onto itself. The order and magnitude of a rotation are related by the following equation.

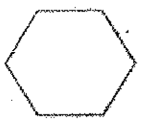
$\frac{360}{\text{order of symmetry}}$

Example 2 Identify Rotational Symmetry

State whether the figure has rotational symmetry. Write *yes* or *no*. If so, copy the figure, locate the center of symmetry, and state the order and magnitude of symmetry.

a.

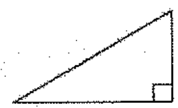
order = 6



$\frac{360}{6}$

angle of rotation → 60°

b.



None

c.

order = 2

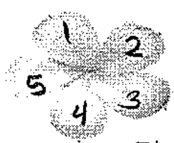
$\frac{360}{2}$

180°

GuidedPractice

FLOWERS State whether the flower appears to have rotational symmetry. Write *yes* or *no*. If so, copy the flower, locate the center of symmetry, and state the order and magnitude of symmetry.

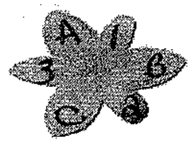
2A.



order = 5 $\frac{360}{5}$

72°

2B.



order = 3

120°

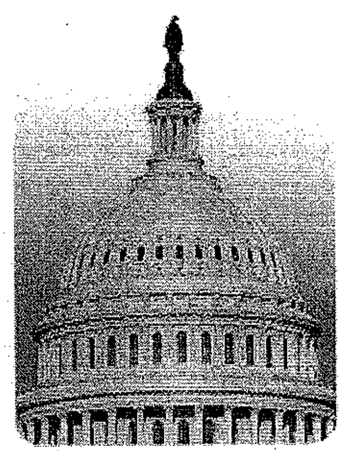
2C.

none

Why is this important?

- History

U.S. CAPITOL Completed in 1863, the dome is one of the most recent additions to the United States Capitol. It is supported by 36 iron ribs and has 108 windows, divided equally among three levels.



~~**a.**~~ Excluding the spire of the dome, how many horizontal and vertical planes of symmetry does the dome appear to have?

b. Does the dome have axis symmetry? If so, state the order and magnitude of symmetry.

order = 36 $\frac{360}{36} = 10°$