

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Topic: \_\_\_\_\_

Class: \_\_\_\_\_

**Main Ideas/Questions**

**TRANSFORMATIONS**

**Notes/Examples**

- A transformation is an operation that maps an original figure called the pre-image onto a new figure called the image.
- On the graph to the left,  $\triangle ABC$  is the pre-image and  $\triangle A'B'C'$  is the image. (' is read as "prime")
- A transformation can change the position, orientation or size of a figure.

**RIGID MOTION**

When a transformation preserves the size and shape of a figure. All corresponding sides + angles of the pre-image + image are congruent.

Examples of rigid motions: translations, reflections, rotations

**TRANSLATION**

To vertically and/or horizontally SLIDE a figure

Coordinate Notation:  $(x, y) \rightarrow (x+h, y+k)$

h represents the horizontal shift

k represents the vertical shift

Graph and label each figure and its image under the given translation. Identify the coordinates of the image.

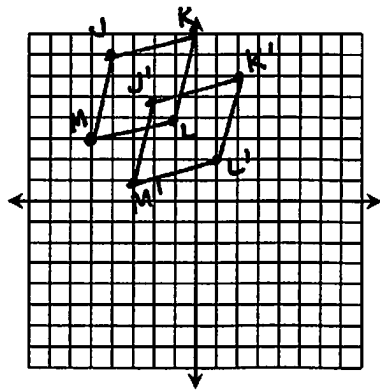
1. Rectangle  $QRST$  with vertices  $Q(-6, -1)$ ,  $R(-3, 1)$ ,  $S(1, -5)$ , and  $T(-2, -7)$ :  $(x, y) \rightarrow (x+5, y+7)$

2. Triangle  $CDE$  with vertices  $C(2, -1)$ ,  $D(7, -4)$ , and  $E(4, -6)$ :  $(x, y) \rightarrow (x-3, y+8)$

$Q': (-1, 6)$        $R': (2, 8)$   
 $S': (6, 2)$        $T': (-3, 0)$

$C': (-1, 7)$        $D': (4, 4)$   
 $E': (1, 2)$

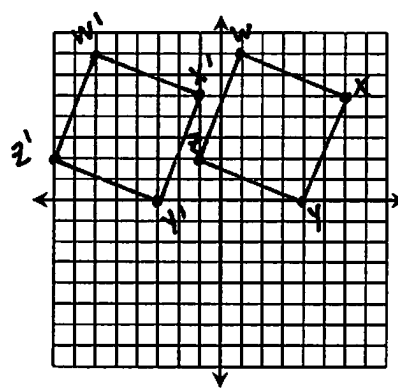
3. Rhombus  $JKLM$  with vertices  $J(-4, 7)$ ,  $K(0, 8)$ ,  $L(-1, 4)$ , and  $M(-5, 3)$ :  $(x, y) \rightarrow (x + 2, y - 2)$



$J'$ :  $(-2, 5)$

$L'$ :  $(1, 2)$

4. Square  $WXYZ$  with vertices  $W(1, 7)$ ,  $X(6, 5)$ ,  $Y(4, 0)$ , and  $Z(-1, 2)$ :  $(x, y) \rightarrow (x - 7, y)$



$W'$ :  $(-6, 7)$

$Y'$ :  $(-3, 0)$

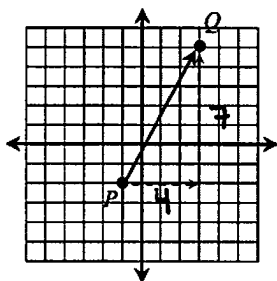
$K'$ :  $(2, 6)$

$M'$ :  $(-3, 1)$

$X'$ :  $(-1, 5)$

$Z'$ :  $(-8, 2)$

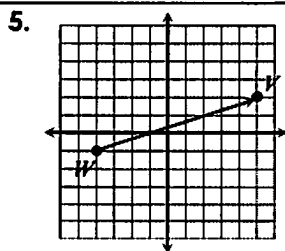
## VECTORS



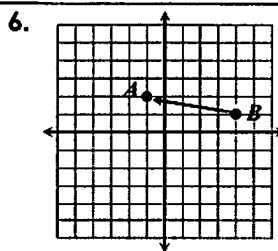
A quantity with both direction and magnitude, or size.

- A vector is represented in the coordinate plane by an arrow drawn from an initial point,  $P$ , to terminal point,  $Q$ .
- The vector is denoted as  $\vec{PQ}$  and read as "vector  $PQ$ ."
- The **component form** of a vector is written as  $\vec{PQ} = \langle a, b \rangle$  where  $a$  is the **horizontal component** and  $b$  is the **vertical component**.
- The component form of the vector to the right is  $\vec{PQ} = \langle 4, 7 \rangle$ .

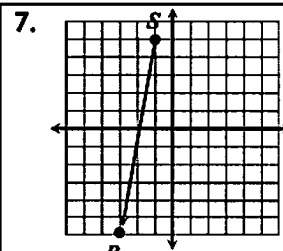
Name each vector, then write the vector in component form.



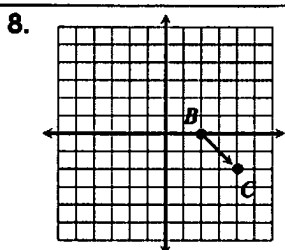
$$\vec{WU} = \langle 9, 3 \rangle$$



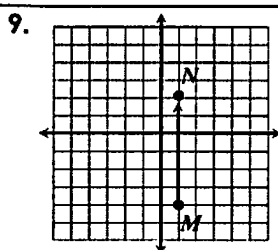
$$\vec{AB} = \langle -5, 1 \rangle$$



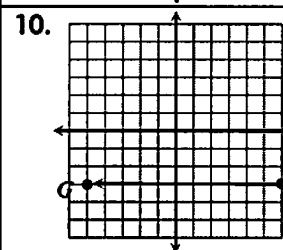
$$\vec{SR} = \langle -2, -11 \rangle$$



$$\vec{BC} = \langle 2, -2 \rangle$$



$$\vec{MN} = \langle 0, 6 \rangle$$



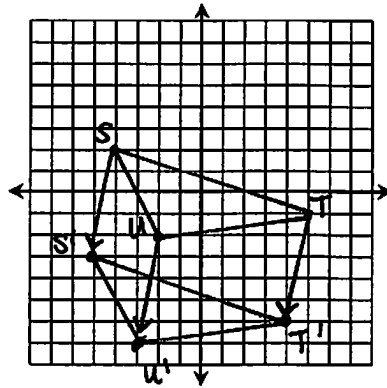
$$\vec{HG} = \langle -11, 0 \rangle$$

# TRANSLATING with Vectors

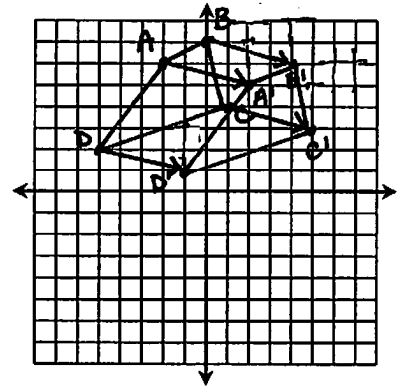
\*Notice that the vectors drawn from the preimage to the image are always parallel!

Graph and label each figure and its image under the translation along the given vector. Identify the coordinates of the image.

11. Triangle  $STU$  with vertices  $S(-4, 2)$ ,  $T(5, -1)$ , and  $U(-2, -2)$ :  $\langle -1, -5 \rangle$



12. Trapezoid  $ABCD$  with vertices  $A(-3, 6)$ ,  $B(0, 7)$ ,  $C(1, 4)$ , and  $D(-5, 2)$ :  $\langle 4, -1 \rangle$



$S'$ :  $(-5, -3)$

$U'$ :  $(-3, -7)$

$A'$ :  $(1, 5)$

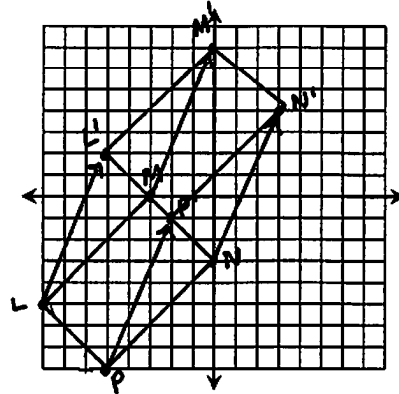
$C'$ :  $(5, 3)$

$T'$ :  $(4, -6)$

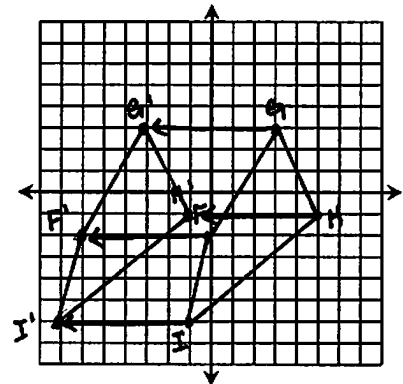
$B'$ :  $(4, 6)$

$D'$ :  $(-1, 1)$

13. Rectangle  $LMNP$  with vertices  $L(-8, -5)$ ,  $M(-3, 0)$ ,  $N(0, -3)$ , and  $P(-5, -8)$ :  $\langle 3, 7 \rangle$



14. Quadrilateral  $FGHI$  with vertices  $F(0, -2)$ ,  $G(3, 3)$ ,  $H(5, -1)$ , and  $I(-1, -6)$ :  $\langle -6, 0 \rangle$



$L'$ :  $(-5, 2)$

$N'$ :  $(3, 4)$

$F'$ :  $(-6, -2)$

$H'$ :  $(-1, -1)$

$M'$ :  $(0, 7)$

$P'$ :  $(-2, -1)$

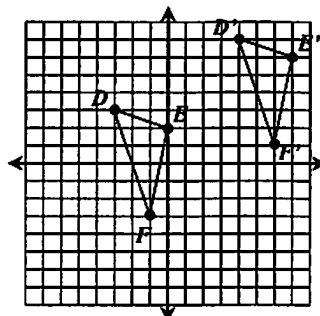
$G'$ :  $(-3, 3)$

$I'$ :  $(-7, -6)$

# IDENTIFYING & Writing Rules

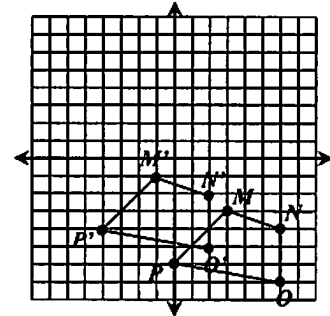
Describe the translation that maps each preimage to its image in (a) coordinate notation and (b) as a vector in component form.

15.



a)  $(x, y) \rightarrow (x+7, y+4)$   
b)  $\langle 7, 4 \rangle$

16.



a)  $(x, y) \rightarrow (x-4, y+2)$   
b)  $\langle -4, 2 \rangle$