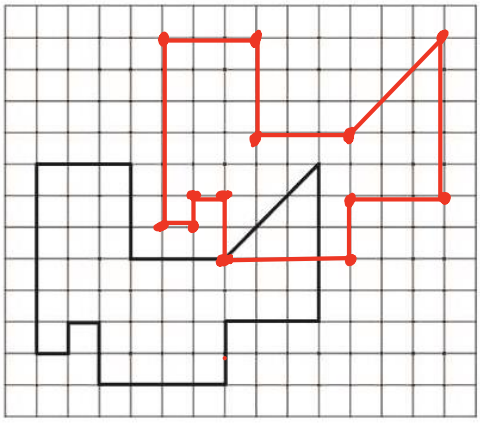
Math 2
Unit 1 Day 1 Notes – Transformations & Translations
Warm-Up:

Name: Key
Date: _____

1. Transformations: Translations

A **translation**, or a slide, is the movement of a figure from one position to another without turning. To the right are examples of a horizontal slide and a vertical slide.

Look at the figure below. Slide the figure 4 units to the right and 4 units up. Draw the image on the graph.



Prerequisite Skill:
Solving Systems of Equations

Solve for x and y.

2. $x = 8 + 3y$
   $2x - 5y = 8$

3. $5x - y = 20$
   $3x + y = 12$

4. $x + 3y = 7$
   $x + 2y = 4$

5. $19 = 5x + 2y$
   $1 = 3x - 4y$

Congruent figures Corresponding sides, angles, faces, etc. are congruent.

When two figures are congruent, you can move one so that it can be moved on to the other figure with transformations.

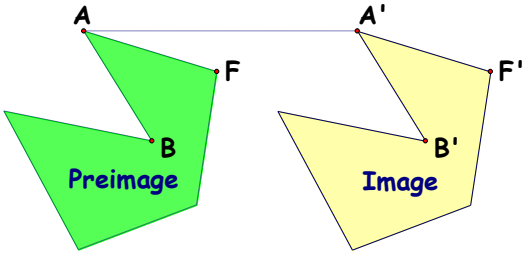
Transformation of a geometric figure: change in its position, size, or shape.

Preimage – original figure

Notation: A

Image – new or original figure

Notation: A'



Isometry – transformation in which preimage and image are the side lengths and angles (also called: rigid transformation)

Examples:

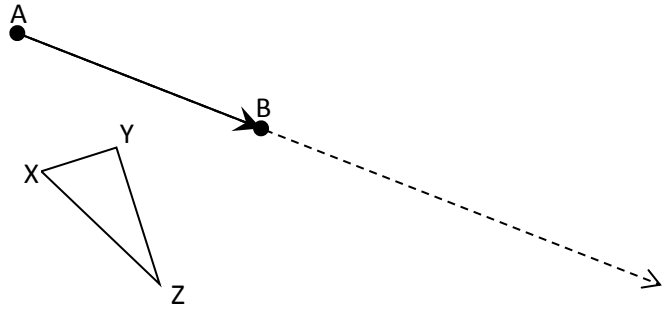
_____, _____, and _____

Translation – an isometry that maps all points the x - values and the y - values.

Activity 1: Patty Paper Translation

The translation T is defined by T(A) = B … meaning that it slides the figure the distance AB in the direction that $\overrightarrow{AB}$ goes.

1) Place the patty paper over this page. Trace the triangle and points A and B.
2) Slide the patty paper along $\overrightarrow{AB}$ so that the A on the patty paper is on top of B on this sheet and B on the patty paper is still on $\overrightarrow{AB}$ on this sheet.
3) The position of the triangle on your patty paper now corresponds to the image of ΔXYZ under the translation, T. If you press down hard with a sharp pencil, the image of the triangle can be seen on this page when you remove the patty paper.



Translation Vector – an arrow that indicates the **distance** and **direction** to translate a figure in a plane.

$\overrightarrow{AB}$ in the activity above is an example of a translation vector.

The notation for a vector is: $< -a, b >$ for a translation *a* units to the left and *b* units up.

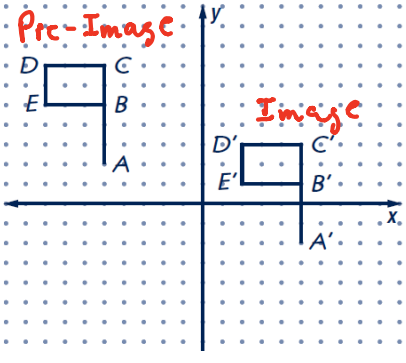
Three ways to describe a transformation (using example shown r

Always **be specific when completing **any** type of description

1) **Words:** Translation to the right 10 units and down 4 units

2) **Algebraic rule** (motion rule): T: (x, y) -> (x + 10, y – 4)

3) **Vector:** $< 10, -4 >$



Activity 2: Dot Paper Translations

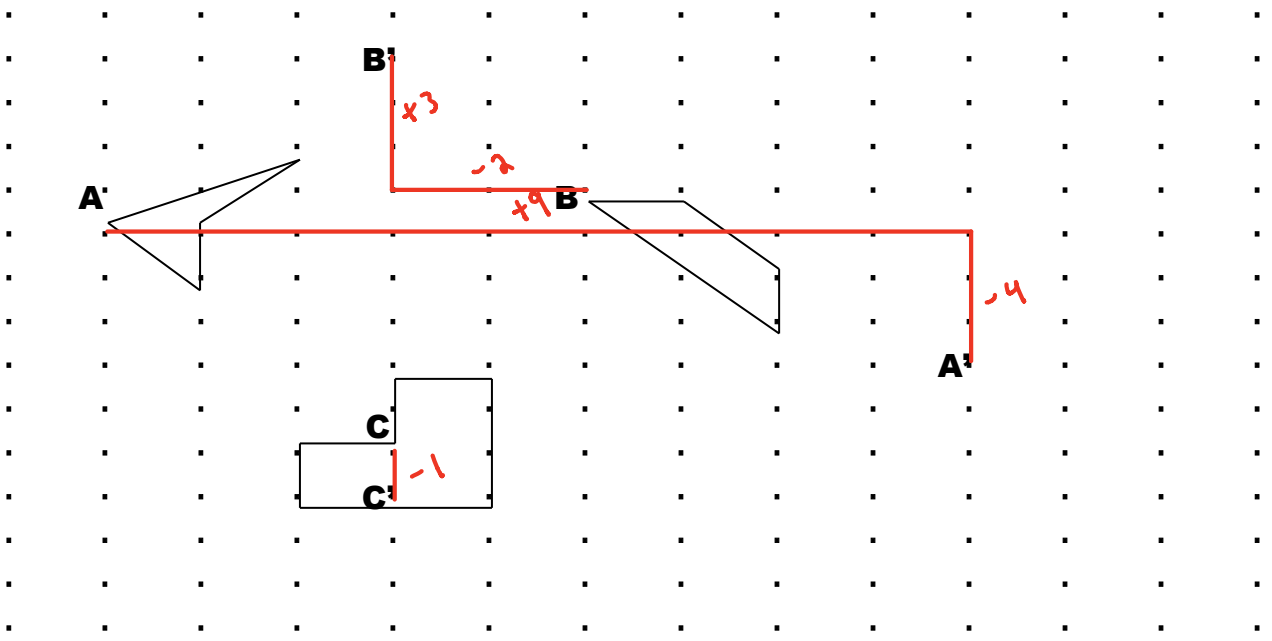
1) Use the dots to help you draw the image of the first figure so that A maps to A'.
2) Use the dots to help you draw the image of the second figure so that B maps to B'.
3) Use the dots to help you draw the image of the third figure so that C maps to C'.
4) Complete each of the following translation rules using your mappings from 1 – 3 above.

a) For A, the translation rule is: T:(x, y) → (x+9 , y-4) or <9, -4>

b) For B, the translation rule is: T:(x, y) → (x-2 , y+3) or <-2, 3>

c) For C, the translation rule is: T:(x, y) → (x+0 , y-1) or <0, -1>

Left: x-# | down: y-#
right: x+# | up: y+#



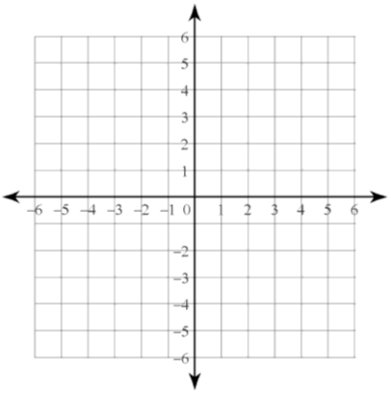
Checkpoint: ΔGEO has coordinates G(-2, 5), E(-4, 1) O(0, -2). A translation maps G to G' (3, 1).

1. Find the coordinates of: a) E' (1 , -3) b) O' (5 , -6)
2. The translation rule is T: (x, y) → (x+5 , y-4)
3. The vector is <5, -4>
4. Specifically describe the transformation: 5 right 4 down

Unit 1 Day 1 HW

1. Graph and label ΔLIP with vertices: L(-3, -1), I(-1, 4), and P(2, 2). Graph and label the image of ΔLIP under the translation $(x, y) \rightarrow (x + 2, y - 4)$.

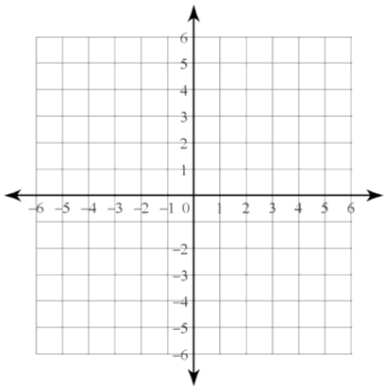
L' _____
I' _____
P' _____



Write the rule in vector notation: _____
Write the shift using words:

2. Graph and label quadrilateral DUCK with vertices D(2,2), U(4, 1), C(3, -2), and K(0,-1) Graph and label the image of Quadrilateral DUCK when the Quadrilateral is shifted left 4 and up 3.

D' _____
U' _____
C' _____
K' _____

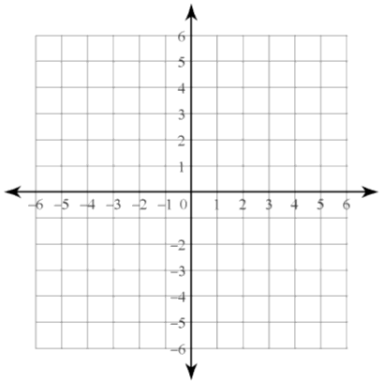


Write the rule in vector notation: _____

Write the rule in algebraic notation: _____

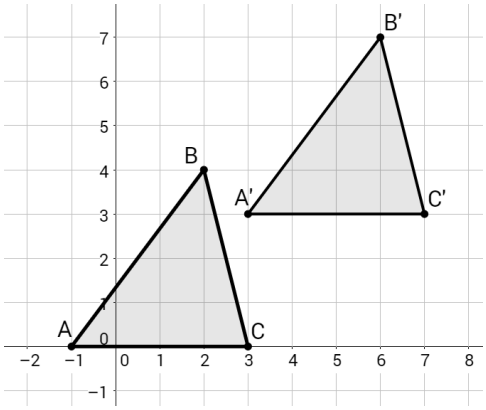
3. Graph and label quadrilateral MATH with vertices M(4, 1), A(2, 4), T(0,6), and H(1,2). Graph and label the image of Quadrilateral MATH when the Quadrilateral is shifted according to the vector <-3, -4>

M' _____
A' _____
T' _____
H' _____



Write the rule in algebraic notation: _____
Describe in words the shift:

4. Write the rule mapping the pre-image to the image.



Write the rule in vector notation: _____
Write the rule in algebraic notation: _____

Describe in words the shift:

5. Gerald is rearranging the furniture in his living room. He has to leave before he is finished, so he draws the diagram at right for his wife to place the end table. Draw the new position of the end table. Include the answers to the following questions in your explanation. Use complete sentences!

What method did you use?

Is there only one possible answer?

What does the arrow tell you?

What do you call this motion?

What could you call the table before it moved? After?