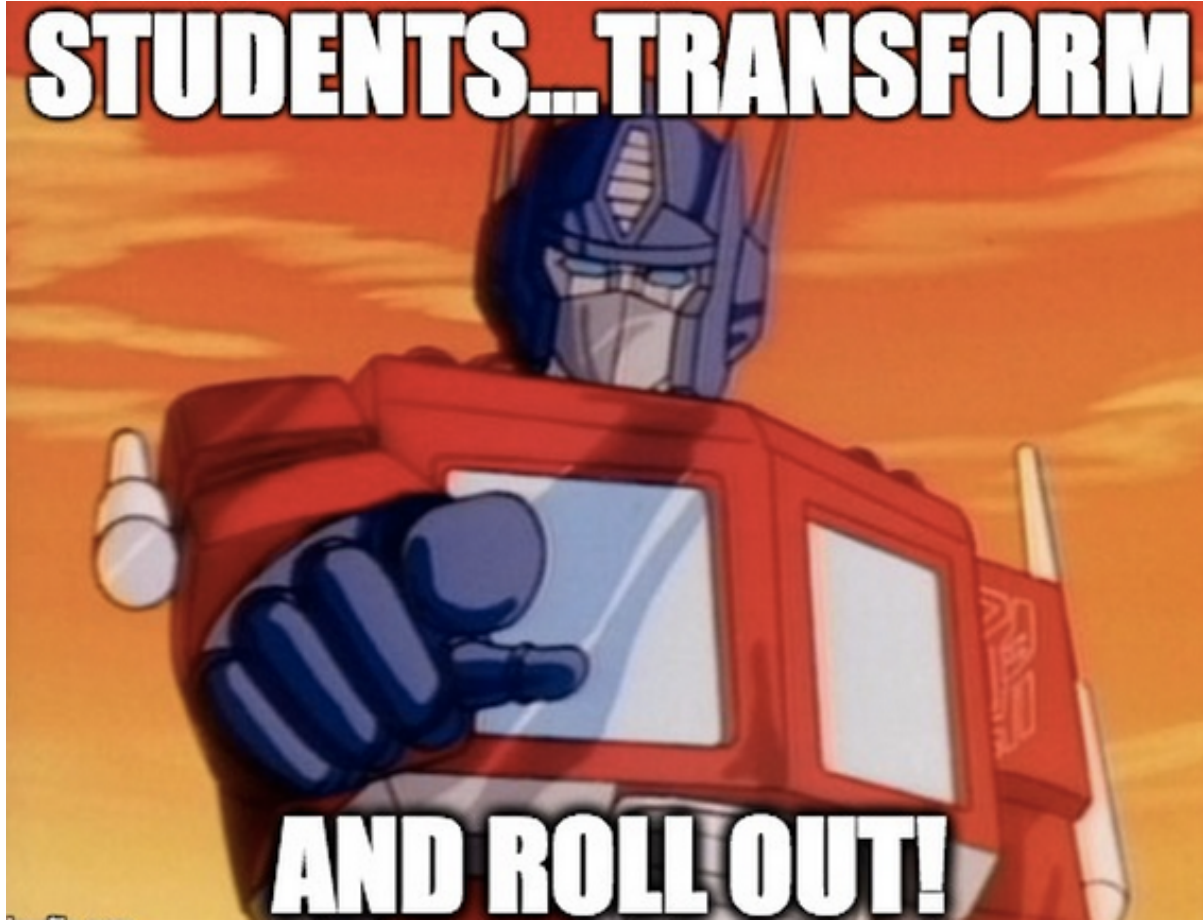# Unit 2 Transformations

**Target 2.1 – Identify and determine congruent parts given a rigid motion**

**Target 2.2 – Perform and identify rigid transformations of points, segments, and figures**
   **2.2a – Perform and identify reflections of points, segments, and figures**
   **2.2b – Perform and identify rotations of points, segments, and figures**
   **2.2c – Perform and identify reflections of points, segments, and figures**

**Target 2.3 – Perform multiple transformations to determine coordinates and location of the image**

2.1 – Transformations and Congruent Figures
Target 1 – Identify and determine congruent parts given a rigid motion

Vocabulary

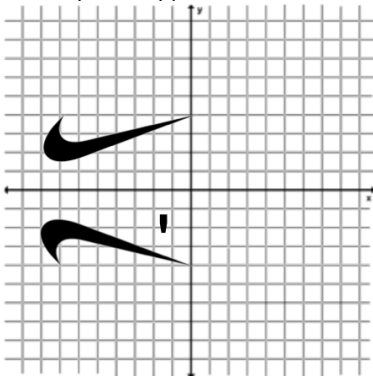**Transformation:** change of _____ or _____ of a figure.

Annotate Here
(location, size)
What's a "rigid motion?"

Type of Transformations

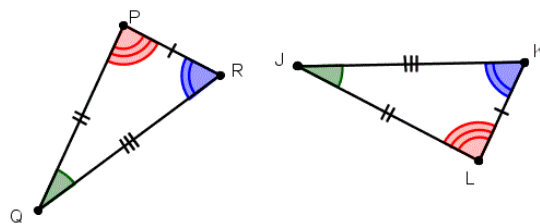|		

Example 1: Using rigid motions
Identify the type of transformation shown.
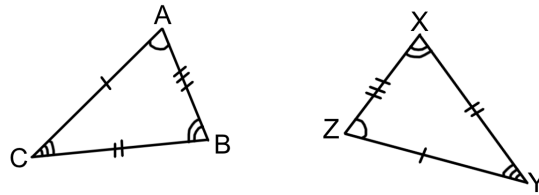
What symbol is used to mean "congruence?"

Example 2: Congruent Figures
The figures below are congruent. Identify the following: All pairs of congruent angles, congruent pairs of sides, and the congruent statement.
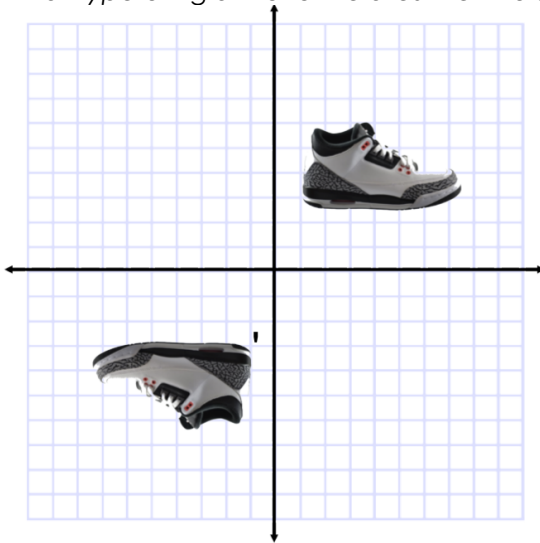
✎ YOU TRY NOW!

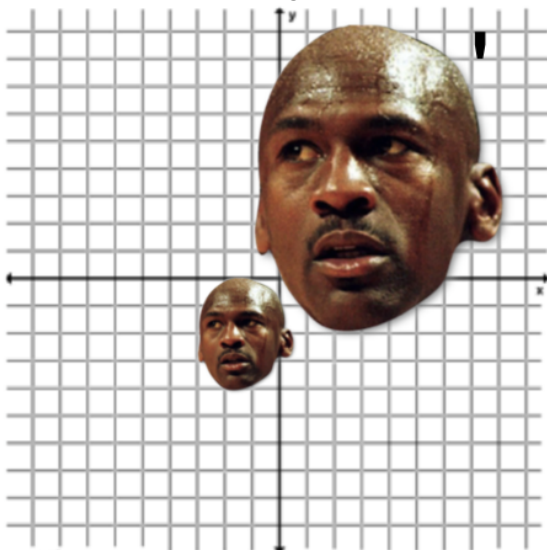**1.** *The triangles below are congruent. How would you describe the figures? Circle all that apply.*

A) $\triangle ABC \cong \triangle XZY$
B) $\angle BAC \cong \angle YZX$
C) $\overline{AB} \cong \overline{XY}$
D) $\triangle BCA \cong \triangle XYZ$
E) I don't know. Write down your question below.

---

2. *What type of rigid motion relates the two shoes?*

---

3. *Is this an example of a rigid motion? Explain below.*

Explanation:

VOCAB from the FUTURE
Dilation – a transformation that stretches or shrinks an image.

2.2a – Translations
Target 2 – Perform and identify rigid motions of points, segments, and figures

Vocabulary
**Image** – the _____ of a figure after a transformation.

Pre image – the position of a(n) _____ prior to a transformation.

Isometry – a _____ in which the pre image and its image are _____.

### Example 1: Translate a figure in the coordinate plane
Graph and label the quadrilateral *ABCD* with vertices A(-2, 6), B(2, 4), C(2,1), and D(-2, 3). Find the image of each vertex after the translation:
$(x, y) \rightarrow (x +3, y – 3)$. Then graph the image using prime notation.
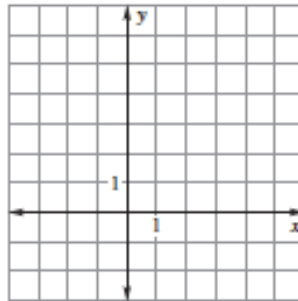
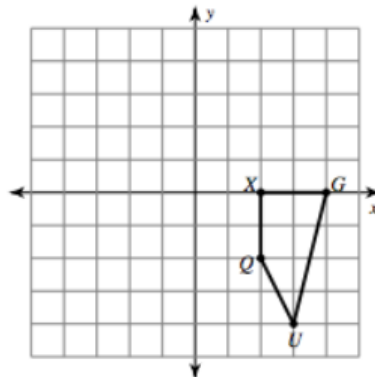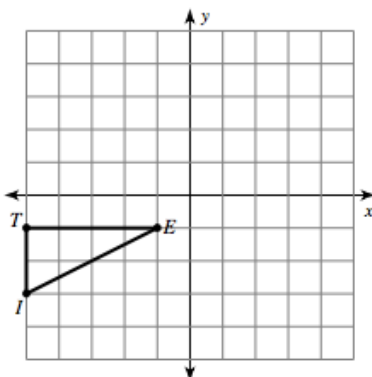### Example 2: Write a translation rule and verify congruence
Write a rule for the translation of ΔABC to $\Delta A'B'C'$. Then verify that the transformation is an isometry.
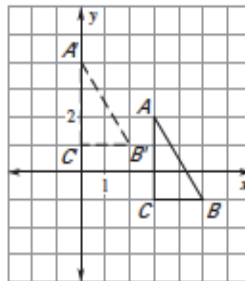
✎ YOU TRY NOW!
Graph and label image of the figure using the translation given
a)   1 unit right & 2 units down.   b)   4 units left & 3 units up

✎ YOU TRY NOW!

Graph and label image of the figure using the given translation rule

c) $(x, y) \rightarrow (x - 2, y + 3)$ | d) $(x, y) \rightarrow (x + 4, y - 4)$
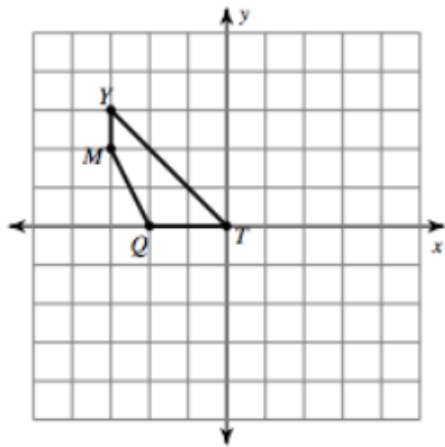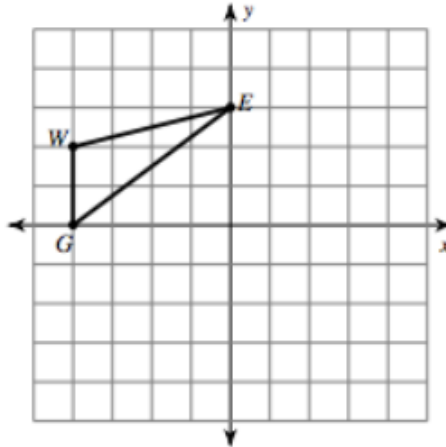
✎ YOU TRY NOW!

Write the rule in proper notation to describe each translation

Proper notation: $(x, y) \rightarrow (x \pm \underline{\quad}, y \pm \underline{\quad})$

e) pre-image on the right | f) pre-image on the left
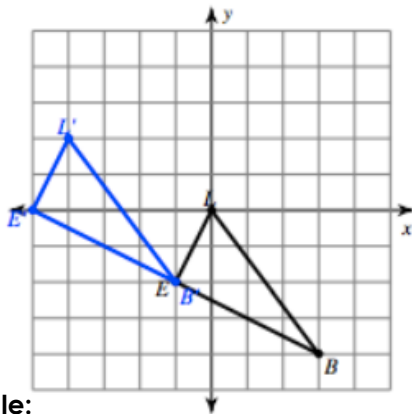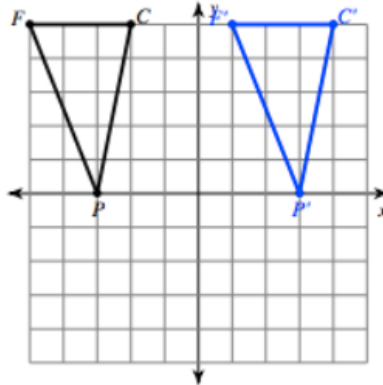
Rule: **Rule:**

✎ YOU TRY NOW!

Find the coordinates of the vertices of each figure after the given translation.

g) 3 units to the right and 6 unites down

Z (-4, -3), I(-2, -2), V(-2, -4)

QUESTIONS OR REFLECTION

Write down at most 2 questions that you can ask the next day. BE SPECIFIC.

Annotate Here

2.2b – Rotations
Target 2 – Perform and identify rigid motions of points, segments, and figures

Vocabulary
Rotation: a transformation that moves a figure along a _____
path about a _____ called the
_____.

Angle of rotation: can be both _____ and
_____. Angle of rotation is defined by two rays where one
goes from the _____to a starting point on the figure
and the other goes from the center of rotation to the corresponding final
point on the figure.

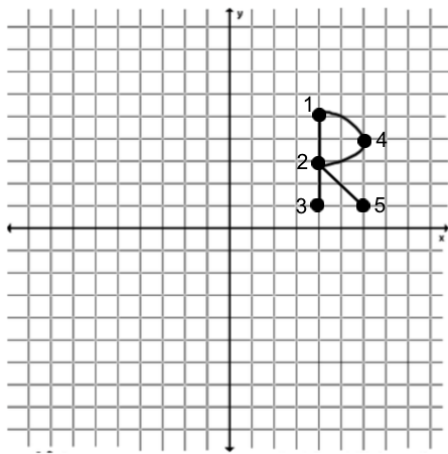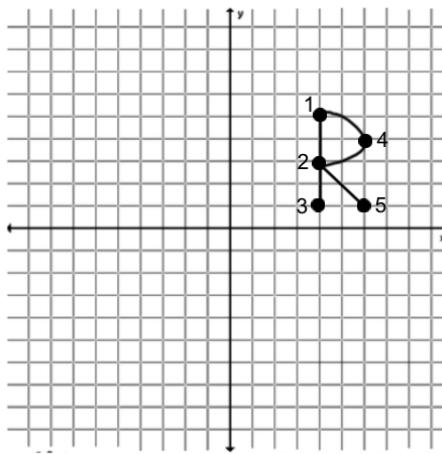### Example 1: Rotate the pre image 90 degrees about the origin
Write the coordinates of the pre-image and the image below.

Clockwise (CW)	Counterclockwise (CCW)

Pre-Image	Image	Pre-Image	Image
1 ( )	1' ( )	1 ( )	1' ( )
2 ( )	2' ( )	2 ( )	2' ( )
3 ( )	3' ( )	3 ( )	3' ( )
4 ( )	4' ( )	4 ( )	4' ( )
5 ( )	5' ( )	5 ( )	5' ( )

REFLECTION/ANALYSIS
What do you notice about the corresponding coordinates of the pre-
image and the image? Write your predictions below

Example 2: Rotate the pre image

Annotate Here

(circular, fixed point, center of rotation)

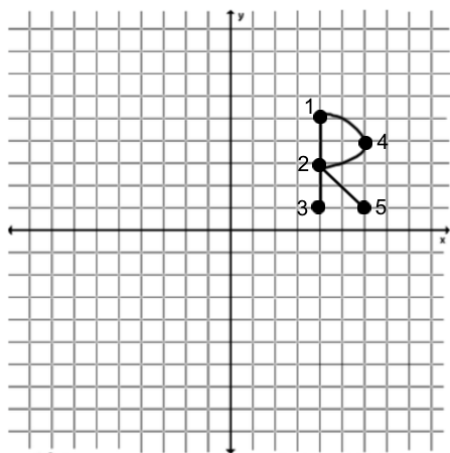*(clockwise, counterclockwise, center of rotation)*

SCAN FOR EXTRA SUPPORT

(Part two of the video)
https://www.youtube.com/watch?v=7vKxhfPMyAo

Having difficulty? Write a question below to ask the next day. REMEMBER to ask!

180 degrees about the origin.

Write the coordinates of the pre-image and the image below.

(CW)/(CCW)	**REFLECTION/ANALYSIS**

What do you notice about the corresponding coordinates of the pre-image and the image? Write your thoughts below.

Pre-Image   **Image**

1 (   )   1' (   )

2 (   )   2' (   )

3 (   )   3' (   )

4 (   )   4' (   )

5 (   )   5' (   )

Example 3: Rotate the pre image 270 degrees about the origin

Write the coordinates of the pre-image and the image below.

(CCW)	**REFLECTION/ANALYSIS**

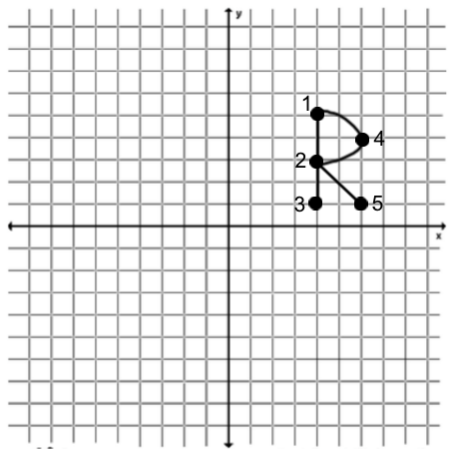What do you notice about the corresponding coordinates of the pre-image and the image? Write your thoughts below.

Coordinates
Pre-Image   **Image**

1 (   )   1' (   )

2 (   )   2' (   )

3 (   )   3' (   )

4 (   )   4' (   )

5 (   )   5' (   )

2.2c – Reflections
Target 2 – Perform and identify rigid motions of points, segments, and figures
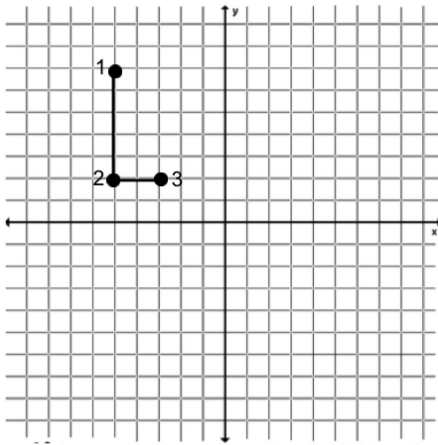
Vocabulary
Line of Reflection: also called the _____,
the axis that a figure is reflected about forming a congruent
image that is symmetricical to the its original

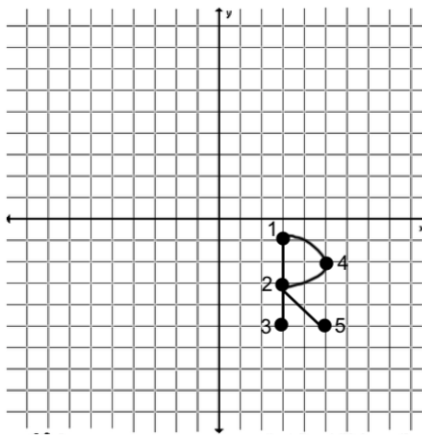### *Example 1: Reflect each image over the given line of reflection to find coordinates of the image.*
Write the coordinates of the pre-image and the image below.

(Over the x-axis)	**(Over the y-axis)**

Coordinates

Pre-Image	**Image**
1 ( )	1' ( )
2 ( )	2' ( )
3 ( )	3' ( )

Coordinates

Pre-Image	**Image**
1 ( )	1' ( )
2 ( )	2' ( )
3 ( )	3' ( )
4 ( )	4' ( )
5 ( )	5' ( )

REFLECTION/ANALYSIS
What is the line called that helps you visually see how a figure is being reflected?

What do you notice about the corresponding coordinates of the pre-image and the image? Write your thoughts below.
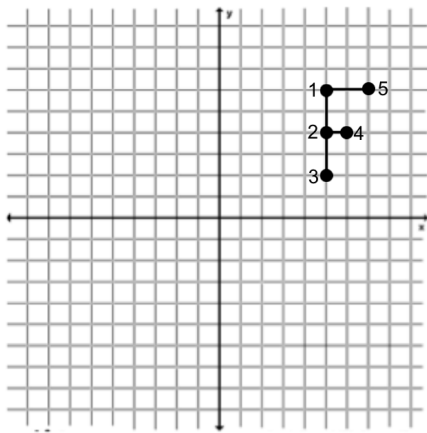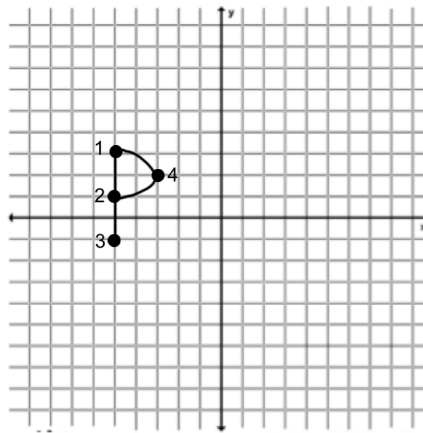

Example 2: Reflect each image over the given line of reflection to find coordinates of the image.

Write the coordinates of the pre-image and the image below

(Over the line of x = 3)   **(Over the line of y = -2)**

Coordinates

Pre-Image	Image
1 ( )	1' ( )
2 ( )	2' ( )
3 ( )	3' ( )
4 ( )	4' ( )
5 ( )	5' ( )

Coordinates

Pre-Image	Image
1 ( )	1' ( )
2 ( )	2' ( )
3 ( )	3' ( )
4 ( )	4' ( )
5 ( )	5' ( )

REFLECTION/ANALYSIS

What direction do "x = any number" equations go?

What direction do " y = any number" equations go?

What do you notice about the corresponding coordinates of the pre-image and the image? Write your thoughts below.

2.3 - Compositions
Target 3– Perform multiple transformations to determine coordinates and location of the image

Vocabulary

Glide Reflection: a transformation in the plane that is a combination of a
_____ and a _____through a line parallel to
that line of reflection

Composition of transformations: When two ore more transformations are
combined to form a new transformation.

Example 1: Find the image of a glide reflection

The vertices of ΔABC are A(2, 1), B(5, 3), and C(6, 2). Find the coordinates
image of ΔABC AFTER the glide
relfection.

FIRST: TRANSLATE: (x, y) →(x – 8, y)
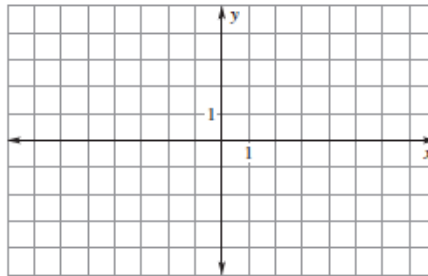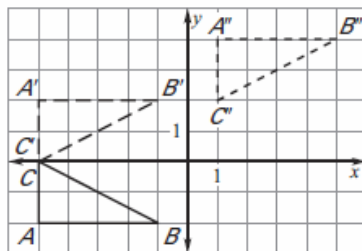
THEN REFLECT the **translated** figure in the x-axis

A' (   )
B' (   )
C' (   )

Coordinates of the GLIDE REFLECTION:

Example 2: Describing the composition of transformations

In the diagram, the coordinates of triangle ABC are given. Describe the
composition of transformations from *ABC* to *A'B'C'* to *A"B"C"*. Write each
rule for each transformation.

Rule for ABC to A'B'C'

Rule for A'B'C' to A"B"C"

🏴 *YOU TRY NOW!*

The vertices of ΔABC are A(-6, 2), B(4,-3), and C(4, 2). Find the coordinates image of ΔABC AFTER the glide relfection.

Transformation 1: Reflect in the y axis
Transformation 2: the **translated** figure in the x-axis

A' (   )
B' (   )
C' (   )

Annotate Here