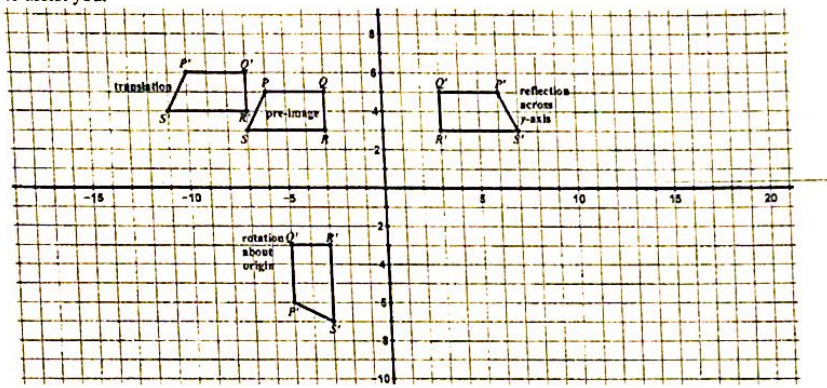
Name:_____ Date:_____ Per._____

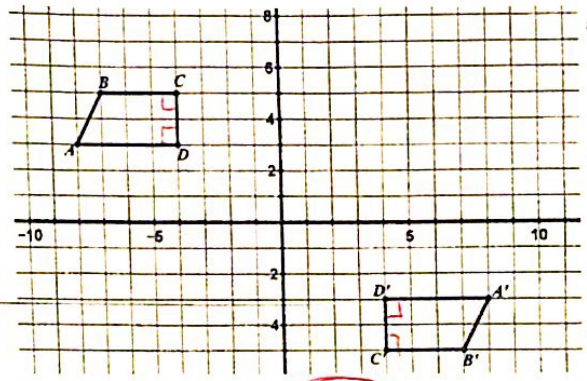
U10 CWK #6 *Congruence*

The following phrases and words are properties or descriptions of one or more of the transformations we have studied so far: translation, reflection, and rotation. Determine which type of transformation(s) the statements describe and write your answer(s) on the line. An example of each type of transformation has been provided below to assist you.



Property/Description	Type of Transformation(s)
Flip	Reflection
Slide	Translation
Turn	Rotation
Image has the same orientation as pre-image.	Translation
Specified by a figure, a center of rotation, and an angle of rotation.	Rotation
Specified by a figure and a line of reflection.	Reflection
Specified by a figure, a distance, and a direction.	Translation
Segments connecting corresponding vertices of image and pre-image are the same length.	Trans / Rot / Reflection
Corresponding image and pre-image vertices lie on the same circle.	Rotation
Segments connecting corresponding vertices of image and pre-image are parallel to each other.	Translation
Line of reflection is the perpendicular bisector of all segments connecting corresponding vertices of the image and pre-image.	Reflection
Concentric circles	Rotation
Orientation of the figure does not change.	Translation
The slopes of corresponding segments may change.	Reflection / Rotation
Corresponding segments in the image and pre-image are the same length.	Trans / Rot / Reflection
Corresponding angles in the image and pre-image have the same measure.	Trans / Rot / Reflection
Parallel lines in the pre-image remain parallel lines in the image.	Trans / Rot / Reflection

1. Observe the two figures below.



a. Describe the ways in which the figures are the same and the ways in which they are different.

* lengths of sides are congruent
* ∠s corresponding are congruent
* orientation different

The two figures above are said to be **congruent**. In 7th grade, you learned that two figures are congruent if they have the **same shape** and are the **same size**. In 8th grade, we define congruence in terms of transformations. A two-dimensional figure is congruent to another if the second can be obtained from the first by a rigid motion (rotation, reflection, or translation) or a sequence of rigid motions. If you can move one of the figures using one of these transformations or a series of these transformations so that it fits exactly on the other one, the two figures are congruent.

Congruent = same shape & size

b. In this case, there are several different transformations that will carry one figure onto the other. Describe one transformation that will carry *ABCD* onto *A'B'C'D'*.

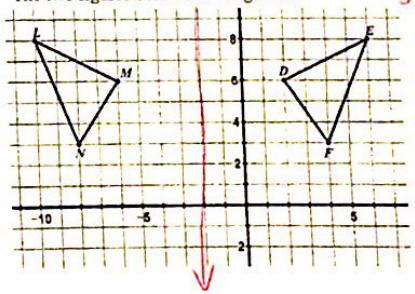
rotation OR 2 reflections

c. A translation, reflection, and rotation are described as rigid motions. Describe in your own words what this means.

keeping same size & shape

Rigid => translation, reflection, rotation

2. The two figures below are congruent.



a. Describe the transformation that will carry ΔLMN onto ΔEDF.

reflection across x = -2

Congruent figures have corresponding parts – their matching sides and angles. For example, in the figure above, $\overline{LM}$ corresponds to $\overline{ED}$ and $\angle D$ corresponds to $\angle M$. List the other corresponding parts below.

$\overline{LN}$ corresponds to $\overline{EF}$ $\overline{LN} \cong \overline{EF}$ $\angle E$ corresponds to $\angle L$ $\angle E \cong \angle L$

$\overline{MN}$ corresponds to $\overline{DF}$ $MN \cong \overline{DF}$ $\angle F$ corresponds to $\angle N$ $\angle F \cong \angle N$

We can write a congruence statement for the two triangles. You can denote that two figures are congruent by using the symbol $\cong$ and listing their vertices in corresponding order.

In the example above, we would write this symbolically as $\Delta LMN \cong \Delta EDF$. The order the vertices is written tells us which segments and angles are corresponding in the figures.

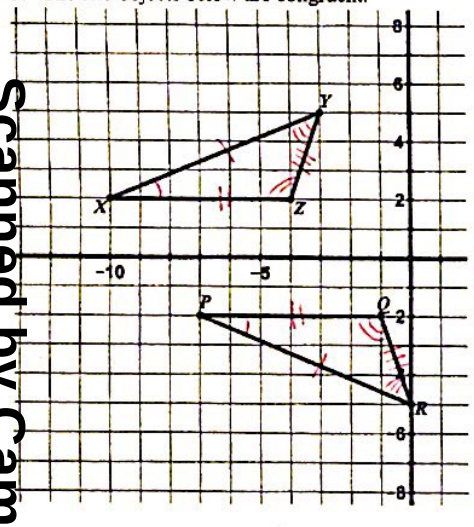
$\Delta LMN \cong \Delta EDF$

Corresponding parts of congruent figures are congruent (corresponding segments have the same length and corresponding angles have the same measure). We can show this symbolically in the following way:

$\overline{LM} \cong \overline{ED}$ $\angle D \cong \angle M$
$\overline{LN} \cong \overline{EF}$ $\angle E \cong \angle L$
$\overline{MN} \cong \overline{DF}$ $\angle F \cong \angle N$

We can also annotate the diagram to show which parts are congruent. Do this on the diagram above.

3. The two objects below are congruent.



a. Describe the transformation that will carry ΔXYZ onto ΔPRQ.

reflects across x-axis
translates right 3

b. List the congruent corresponding parts.

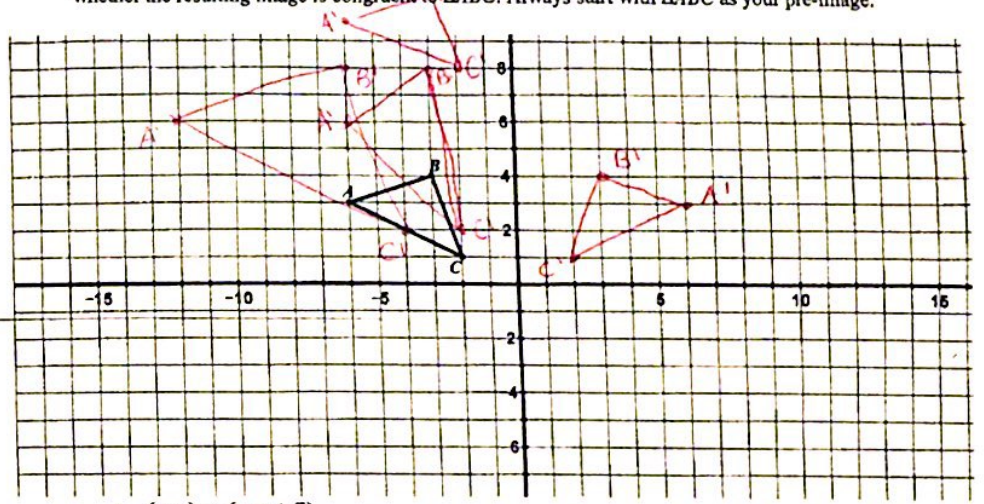
$\overline{XY} \cong \overline{PR}$ $\angle X \cong \angle P$
$\overline{YZ} \cong \overline{RQ}$ $\angle Y \cong \angle R$
$\overline{XZ} \cong \overline{PQ}$ $\angle Z \cong \angle Q$

c. Write a congruence statement for the triangles.

$\Delta XYZ \cong \Delta PRQ$

d. Annotate the diagram to show which parts are congruent.

4. Using ΔABC in the diagram below as the pre-image, apply the following rules to ΔABC and determine whether the resulting image is congruent to ΔABC. Always start with ΔABC as your pre-image.



a. $(x, y) \rightarrow (x, y + 7)$
Is the resulting image congruent to ΔABC? Why or why not? yes = translation

b. $(x, y) \rightarrow (-x, y)$
Is the resulting image congruent to ΔABC? Why or why not? yes = reflection

c. $(x, y) \rightarrow (x, 2y)$
Is the resulting image congruent to ΔABC? Why or why not? NO = dif shape/size

d. $(x, y) \rightarrow (2x, 2y)$
Is the resulting image congruent to ΔABC? Why or why not? NO = dif size

e. Write your own coordinate rule that is different than the ones above that would result in an image that **is congruent** to ΔABC. How do you know that the resulting image is congruent to ΔABC?

f. Write your own coordinate rule that is different than the ones above that would result in an image that **is <u>not</u> congruent** to ΔABC. How do you know that the resulting image is not congruent to ΔABC?