Transformational Geometry Review

Student Activity

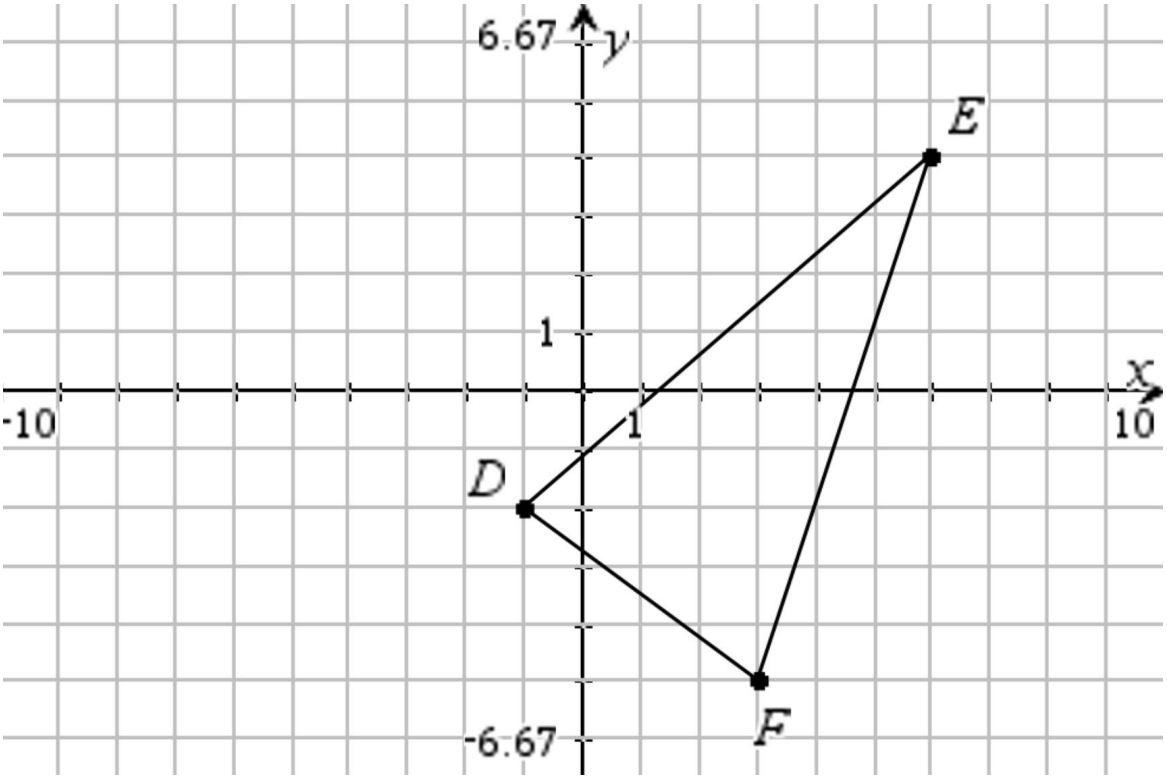
Name _____

Class _____

In this lesson, you will be given the opportunity to summarize, review, explore and extend ideas about each of the four transformations: reflections, translations, rotations, dilations.

Use a straightedge to make sketches in the grid supplied.

1. Reflect ΔDEF about the y-axis. Then fill in the blanks with appropriate responses.



a. If $m\angle F = 70^o$, then $m\angle$_____ = _____^{o}

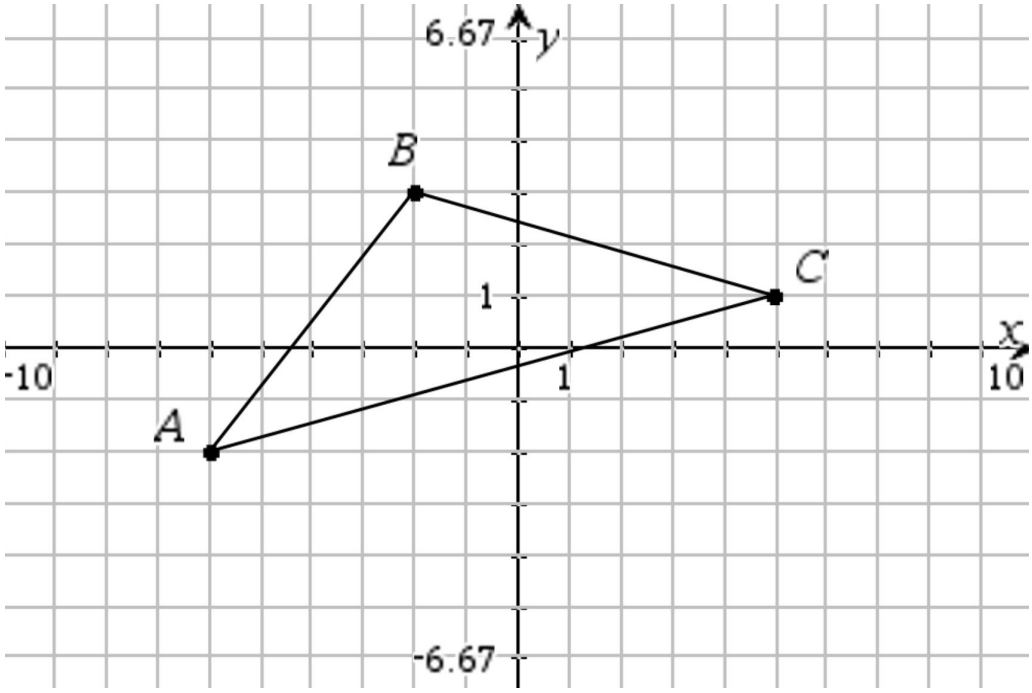
b. if the slope of $\overline{DE} = \frac{6}{7}$, then the slope of _____ = _____

c. If the coordinates of E are (6, 4), then the coordinates of _____ are _____

d. If the area of ΔDEF is 24 sq cm, then the area of _____ is _____

e. If the coordinates of a point H on ΔDEF are (x, y), then the coordinates of H' are _____

2. Reflect ΔABC about the x-axis. Then fill in the blanks with appropriate responses.



a. If $m\angle A = 35^o$, then $m\angle$ _____ = _____^{o}

b. If BC = 8 cm, then _____ = _____ cm.

c. If the slope of $\overline{BC} = -\frac{2}{7}$, then the slope of _____ = _____.

d. If the perimeter of ΔABC = 17 in, then the perimeter of _____ = _____

e. If the coordinates of a point G on ΔABC are (x, y), then the coordinates of G' are _____

f. If the coordinates of a point H' on $\Delta A'B'C'$ are (p, q),

then the coordinates of H are _____

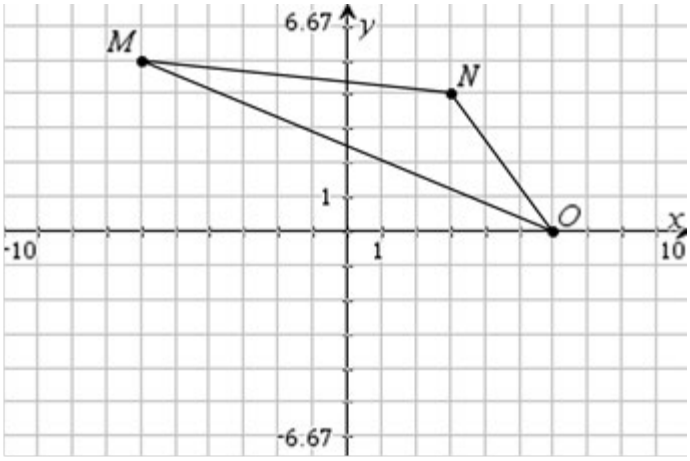
3. Reflect ΔMNO about the line y = 3.

List the coordinates of each of the vertices:

M: _____ M': _____

N: _____ N': _____

O: _____ O': _____



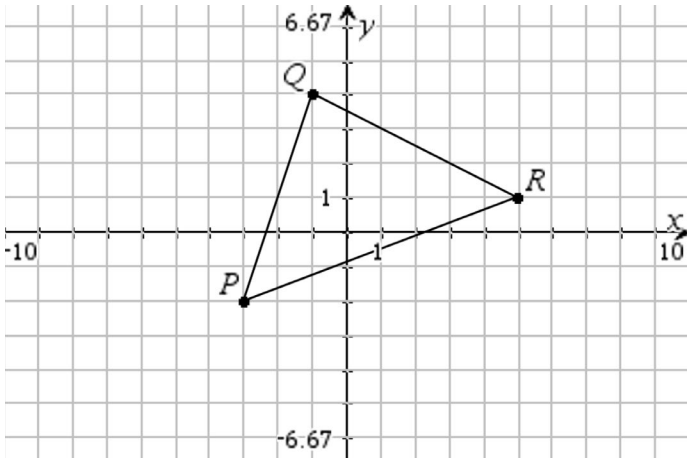
4. Reflect ΔPQR about the line x = – 2.

List the coordinates of each of the vertices:

P: _____ P': _____

Q: _____ Q': _____

R: _____ R': _____



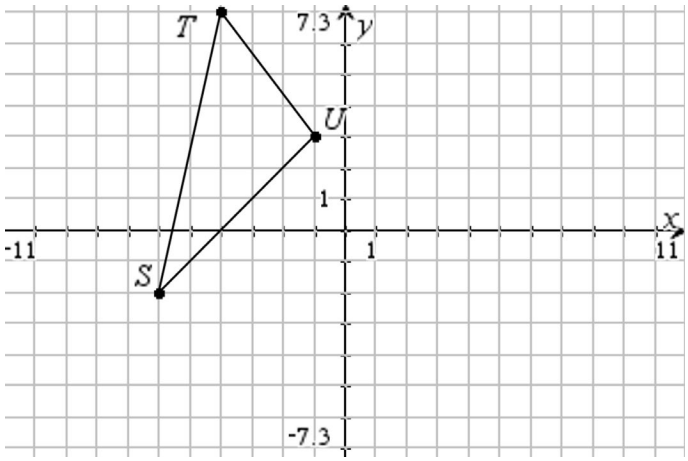
5. Reflect ΔSTU about the line y = 2x.

List the coordinates of each of the vertices:

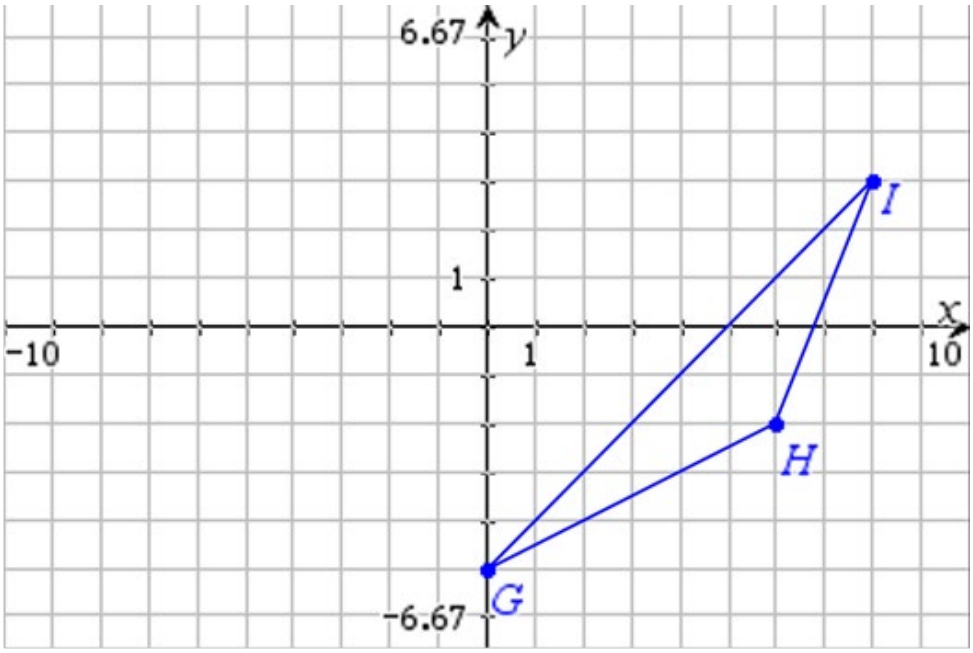
S: _____ S': _____

T: _____ T': _____

U: _____ U': _____



6. Translate ΔGHI up 3 units and to the left 6 units. Then fill in the blanks with appropriate responses.



a. If GH = 9 in, then _____ = _____ in

b. If the perimeter of ΔGHI is 36 cm, then the perimeter of _____ is _____.

c. If the slope of $\overline{HI} = \frac{5}{2}$, then the slope of _____ = _____

d. If the coordinates of H are (6, – 2), then the coordinates of _____ are _____

e. If point A is on ΔGHI and its coordinates are $(3, -2)$, the coordinates of A' are _____

f. If point Z' is on $\Delta G'H'I'$ and its coordinates are $(-2,\ 2)$, the coordinates of Z: _____

g. If the coordinates of a point P on ΔGHI are (x, y), then the coordinates of P' are _____

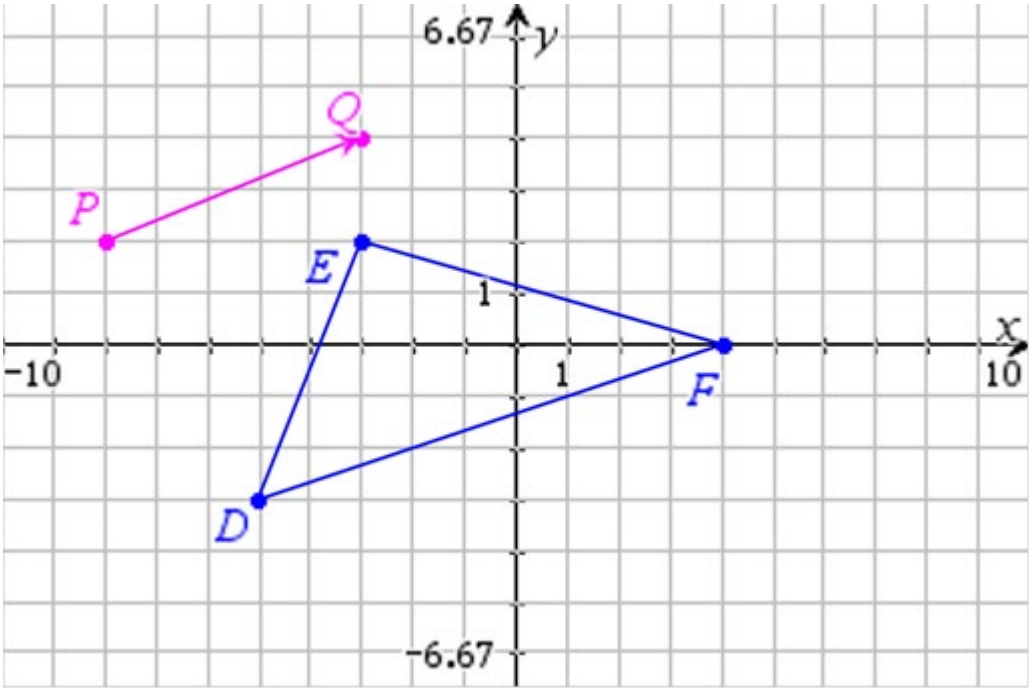
h. Name three sets of parallel segments and list the slope of each:

_____ slope is _____

_____ slope is _____

_____ slope is _____

7. Translate ΔDEF by vector $\overrightarrow{PQ}$.



a. What are the coordinates of D': _____ E': _____ F': _____

b. If point A' is on $\Delta D'E'F'$ and has coordinates $(6, 1)$, the coordinates of A? _____

c. What segments are parallel to vector $\overrightarrow{PQ}$? _____

What is the slope of each of those segments? _____

d. Name three other pairs of segments that are also parallel and state their slopes:

_____ slope is _____

_____ slope is _____

_____ slope is _____

8. Given: ΔDEF is translated to the left 7 units and up 5 units.

a. If D has coordinates (5, 7), what are the coordinates for D'? _____

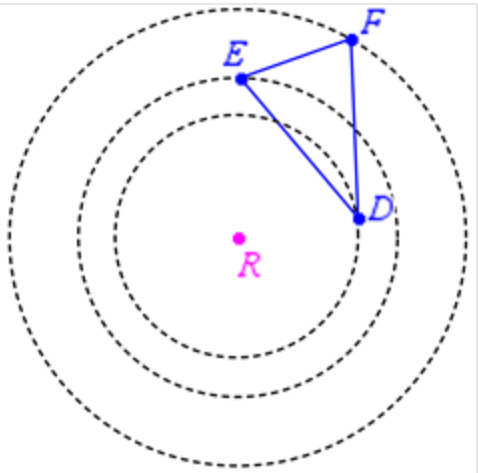
b. If E has coordinate (– 3, – 7), what are the coordinates of E'? _____

c. If F' has coordinates (1, 6), what are the coordinates of F? _____

d. If D has coordinates (x, y), what are the coordinates for D'? _____

e. If E' has coordinates (p, q), what are the coordinates for E? _____

9. Label the vertices of the images appropriately.



a. Rotate ΔDEF 90° about point R. ($\Delta D'E'F'$)

b. Rotate ΔDEF 180° about point R. ($\Delta D''E''F''$)

c. Rotate ΔDEF 270° about point R. ($\Delta D'''E'''F'''$)

d. Rotate ΔDEF 360° about point R. ($\Delta D^{(4)}E^{(4)}F^{(4)}$)

e. If $m\angle D = 35^o$, then $m\angle D' =$ _____.

f. If EF = 4.5 in, then E''F'' = _____.

g. If the slope of $\overline{ED}$ = – 2, then the slope of $\overline{E'D'}$ = _____.

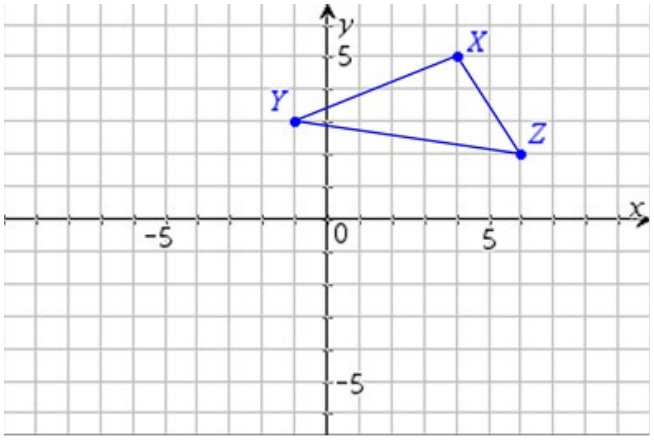
h. If the slope of $\overline{EF}$ = $\frac{2}{3}$, then the slope of $\overline{E''F''}$ = _____.

i. If the perimeter of ΔDEF is 8 in, then the perimeter of $\Delta D''E''F''$ is _____.

j. If the coordinates of point D are (3, 2), what are the coordinates of:

D': _____ D'': _____ D''': _____ $D^{(4)}$: _____

10. Label the vertices of the images appropriately.



a. Rotate ΔXYZ 90° about the origin.

$m(\overline{XY}) =$ _____ $m(\overline{X'Y'}) =$ _____

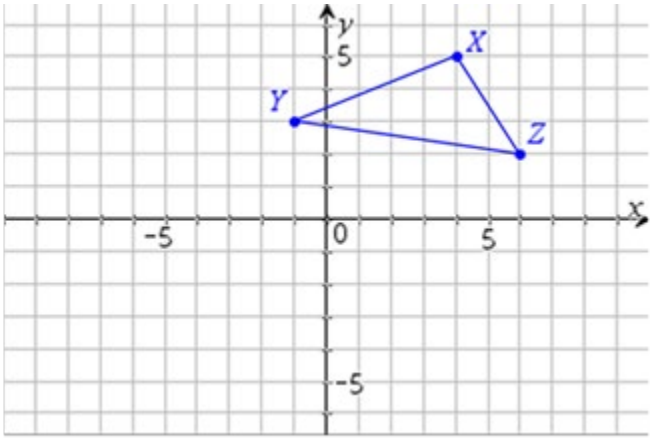
$m(\overline{YZ}) =$ _____ $m(\overline{Y'Z'}) =$ _____

$m(\overline{XZ}) =$ _____ $m(\overline{X'Z'}) =$ _____

Fill in the blanks with either $\parallel$ ('is parallel to') or $\perp$ (' is perpendicular to'):

$\overleftrightarrow{XY}$ _____ $\overleftrightarrow{X'Y'}$ $\overleftrightarrow{YZ}$ _____ $\overleftrightarrow{Y'Z'}$ $\overleftrightarrow{XZ}$ _____ $\overleftrightarrow{X'Z'}$

11. Label the vertices of the images appropriately.



b. Rotate ΔXYZ 180° about the origin.

$m(\overline{XY}) =$ _____ $m(\overline{X''Y''}) =$ _____

$m(\overline{YZ}) =$ _____ $m(\overline{Y''Z''}) =$ _____

$m(\overline{XZ}) =$ _____ $m(\overline{X''Z''}) =$ _____

Fill in the blanks with either $\parallel$ ('is parallel to') or $\perp$ (' is perpendicular to'):

$\overleftrightarrow{XY}$ _____ $\overleftrightarrow{X''Y''}$ $\overleftrightarrow{YZ}$ _____ $\overleftrightarrow{Y''Z''}$ $\overleftrightarrow{XZ}$ _____ $\overleftrightarrow{X''Z''}$

12.a. The corresponding sides of rotated triangles are _____.

b. The corresponding angles of rotated triangles are _____.

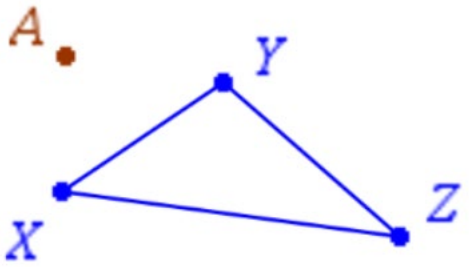
13. If a triangle is rotated about a point through x^{o}, the corresponding angles and the corresponding sides of the pre-image and image triangles are congruent and the triangles are _____.

Therefore, a rotation is a _____, or an _____.

We also say that a rotation is a _____

and an _____ transformation.

14. **All of the questions in this exercise refer to the dilation that you will do below.**
Dilate ΔXYZ about point A with a scale factor of 3.



a. If $m\angle X = 20^o$, then $m\angle X' =$ _____

b. If $YZ =$ 8 cm, then $Y'Z' =$ _____

c. If $X'Z' =$ 30 in, then $XZ =$ _____

d. If the perimeter of ΔXYZ is 60 cm, then the perimeter of $\Delta X'Y'Z' =$ _____

e. Calculate the following ratios. Write your answers as fractions.

1. $\frac{perimeter(\Delta X'Y'Z')}{perimeter(\Delta XYZ)} =$ _____

2. $\frac{area(\Delta X'Y'Z')}{area(\Delta XYZ)} =$ _____

3. $\frac{perimeter(\Delta XYZ)}{perimeter(\Delta X'Y'Z')} =$ _____

f. If the area of ΔXYZ = 72 in^2, then the area of $\Delta X'Y'Z' =$ _____

g. What is true about the segments $\overline{XZ}$ *and* $\overline{X'Z'}$? _____

h. The slope of $\overline{XY}$ is $-\frac{3}{4}$. List another segment and its slope. _____

i. If $AX = 10cm$, then $AX' =$ _____ *and* $XX' =$ _____

j – o. Calculate the ratios. Write your answers as fractions.

j. $\frac{AX'}{AX} =$ _____

k. $\frac{AY}{AY'} =$ _____

l. $\frac{XZ}{X'Z'} =$ _____

m. $\frac{area(\Delta XYZ)}{area(\Delta X'Y'Z')} =$ _____

n. $\frac{m\angle X}{m\angle X'} =$ _____

o. $\frac{m\angle Z'}{m\angle Z} =$ _____

p. If point A is at the origin, answer the following questions.

1. If the coordinates of X are $(6,-12)$, then the coordinates of X' are _____

2. If the coordinates of Z' are $(6,-12)$, then the coordinates of Z are _____

3. If the coordinates of Y are $(-7,11)$, then the coordinates of Y' are _____

4. If the coordinates of X' are $(-18,24)$, then the coordinates of X are _____

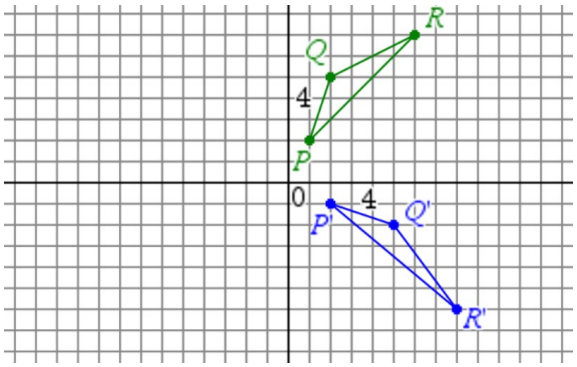
q. If point A were to coincide with point X:

1. Which pairs of sides will overlap? _____

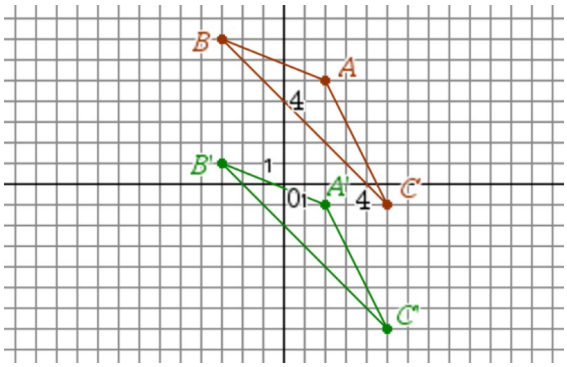
2. What is the other pair of sides and what is true about these sides? _____

15. In each of the following grids, a triangle was transformed.
State which transformation was done: dilation, reflection, rotation, translation.
And describe what was done: how many units, which direction, about what angle, …

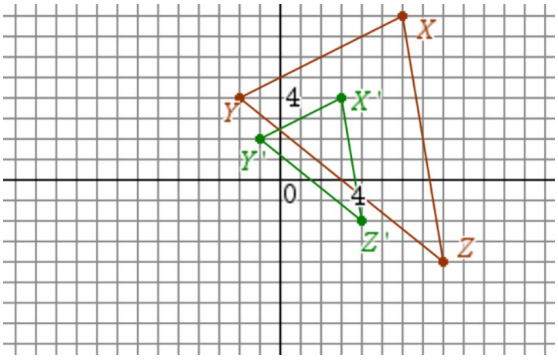
a. pre-image ΔPQR; image $\Delta P'Q'R'$



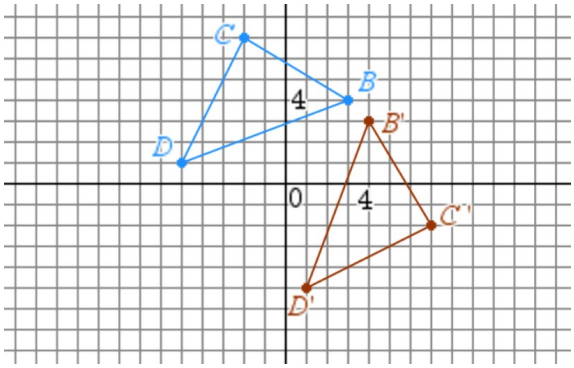
b. pre-image ΔABC; image $\Delta A'B'C'$



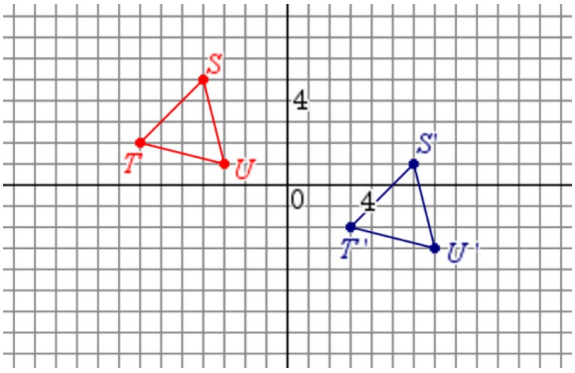
c. pre-image ΔXYZ ; image $\Delta X'Y'Z'$



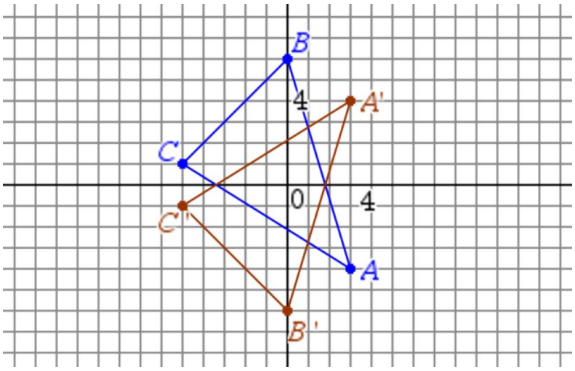
d. pre-image ΔBCD ; image $\Delta B'C'D'$



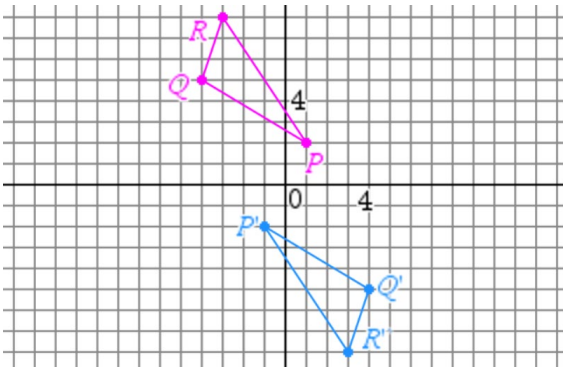
e. pre-image ΔSTU ; image $\Delta S'T'U'$



f. pre-image ΔABC ; image $\Delta A'B'C'$



g. pre-image ΔPQR ; image $\Delta P'Q'R'$



h. pre-image ΔCDE ; image $\Delta C'D'E'$