

Introduction to Transformations

Transformations

Transformation- changes the position, shape, or size of a figure on a coordinate plane.

Types of transformations: translations, reflections, rotations, and dilations.

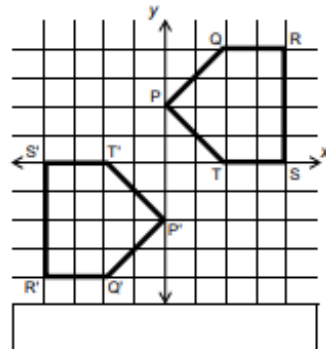
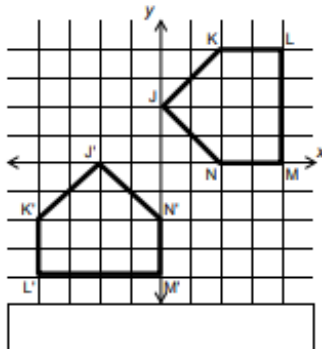
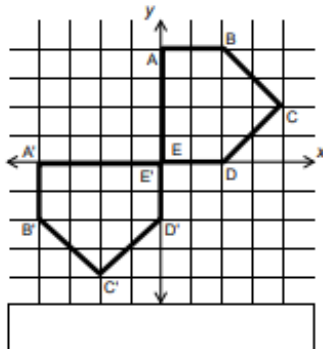
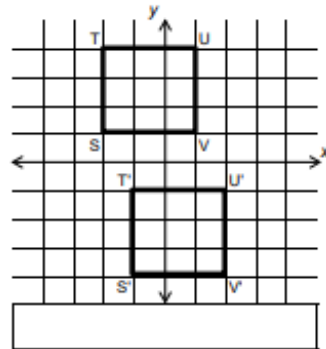
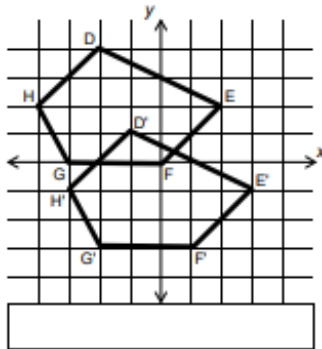
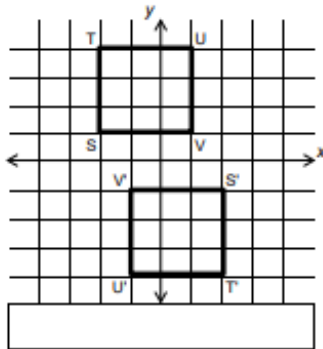
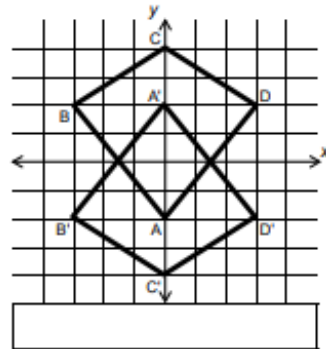
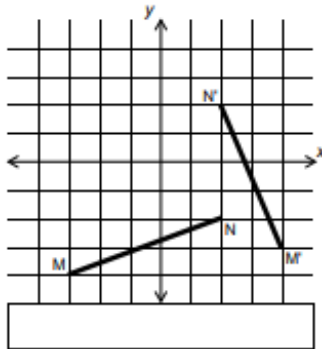
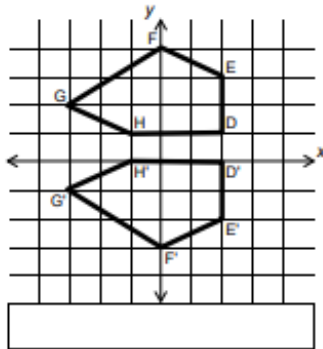
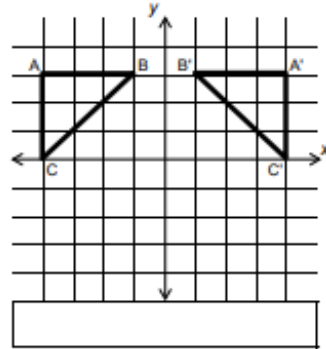
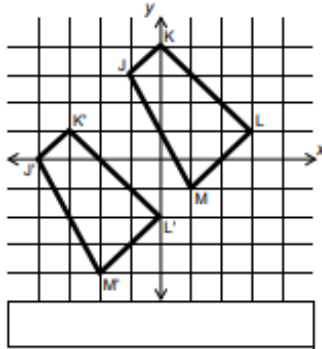
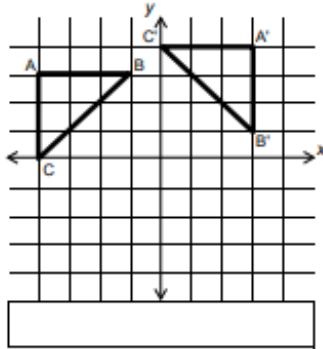
Preimage- the original figure

Image- the resulting figure.

Isometric- transformations that are congruent; rotations, reflections, and translations are isometric.

Congruent- same size, shape, and angle measure.

Write translation, reflection, or rotation for each transformation below.



Translations

- A transformation in which each point of a figure moves the same _____ in the same _____.
- In a translation, the pre-image & image are _____.
- The corresponding angles have the _____ measurement.
- The corresponding sides have the _____ measurement

Rule: $T_{h,k}(x, y) \rightarrow (x + h, y + k)$

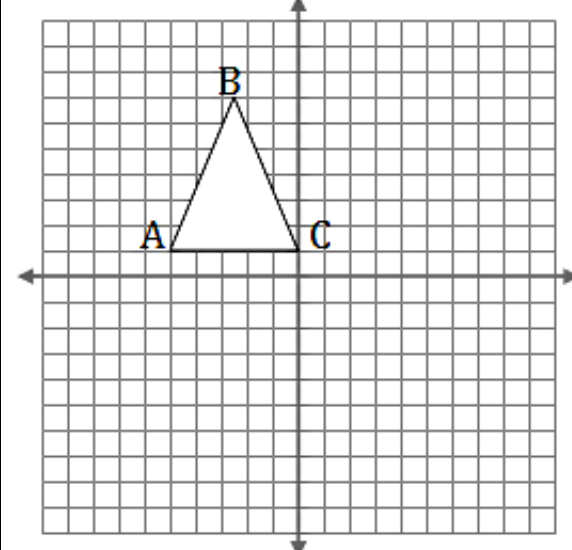
Ex.1 Translating Points.

Pre-Image	A(8,8)	B(8,3)	C(4,3)
Image (x + 5, y + 2)	A'(____,____)	B'(____,____)	C'(____,____)
In word, describe the translation.			

Ex.2 Finding the Pre-image.

Pre-Image	Q(____,____)	R(____,____)	S(____,____)
Image (x + 4, y + 3)	Q'(3,2)	R'(3,1)	S'(2,1)

Ex.3 Translating in the Coordinate Plane.



Translate the figure down 2 right 7.

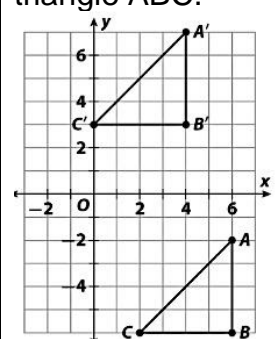
Pre-Image	A(____,____)	B(____,____)	C(____,____)
Image	A'(____,____)	B'(____,____)	C'(____,____)

Write a rule for the transformation:

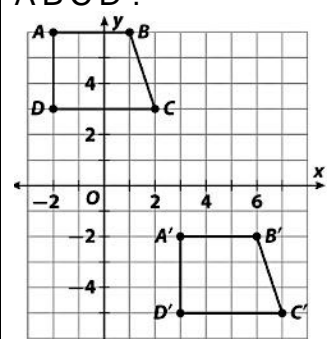
Graph the new image.

Ex.4 Translating points onto themselves.

Determine how to translate triangle A'B'C' to triangle ABC.



How is trapezoid ABCD translated to trapezoid A'B'C'D'?



Reflections

- A transformation in which each point of a figure is reflected in a line, called the line of reflection.
- In a reflection, the pre-image & image are _____.
- The corresponding angles have the _____ measurement.
- The corresponding sides have the _____ measurement.

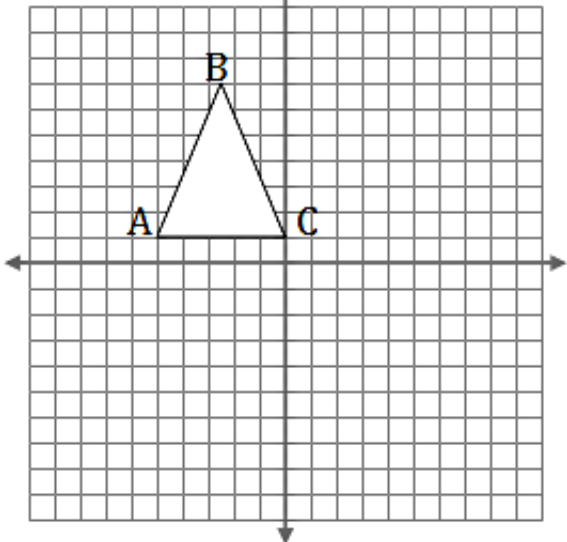
Ex.1 Reflecting across the x-axis. **Rule:** $r_{x-axis}(x, y) \rightarrow (x, -y)$,

Pre-Image	A(-1, -3)	B(-4,0)	C(-1,5)
Image	A'(___,___)	B'(___,___)	C'(___,___)

Ex.2 Reflecting across the y-axis. **Rule:** $r_{y-axis}(x, y) \rightarrow (-x, y)$

Pre-Image	A(4,-6)	B(2,1)	C(4,0)
Image	A'(___,___)	B'(___,___)	C'(___,___)

Ex.3 Reflecting across $y = x$.



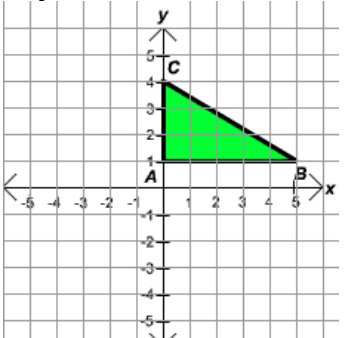
Pre-Image	A(___,___)	B(___,___)	C(___,___)
Image	A'(___,___)	B'(___,___)	C'(___,___)

Rule: $r_{y=x}(x, y) \rightarrow$ (___, ___)

Graph the new image.

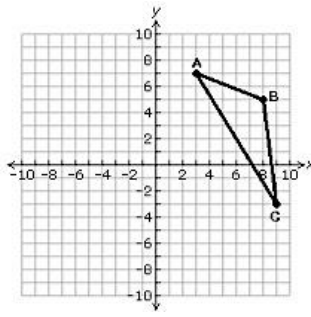
Ex.4 Reflecting in the Coordinate Plane.

Reflect across $y = 1$



Pre-Image	A(___,___)	B(___,___)	C(___,___)
Image	A'(___,___)	B'(___,___)	C'(___,___)

Reflect across $x = 2$

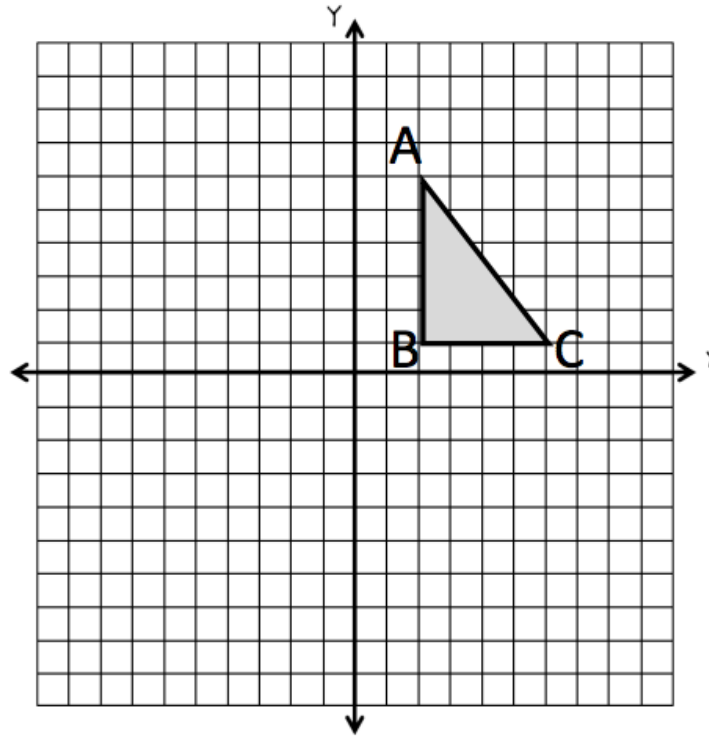


Pre-Image	A(___,___)	B(___,___)	C(___,___)
Image	A'(___,___)	B'(___,___)	C'(___,___)

Rotations

- A transformation in which the figure is turned through a given angle, called the angle of rotation, and in a given direction about a fixed point, called the point of rotation.
- In a rotation, the pre-image & image are _____.
- The corresponding angles have the _____ measurement.
- The corresponding sides have the _____ measurement.

Ex.1 Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.



Pre-Image	A(____,____)	B(____,____)	C(____,____)
90° Counter Clockwise	A'(____,____)	B'(____,____)	C'(____,____)
180° Counter Clockwise	A''(____,____)	B''(____,____)	C''(____,____)
270° Counter Clockwise	A'''(____,____)	B'''(____,____)	C'''(____,____)
360° Counter Clockwise	A''''(____,____)	B''''(____,____)	C''''(____,____)

Counterclockwise Rotation Rules

$$R_{90^\circ}(x, y) \rightarrow (_, _) \quad R_{180^\circ}(x, y) \rightarrow (_, _) \quad R_{270^\circ}(x, y) \rightarrow (_, _) \quad R_{360^\circ}(x, y) \rightarrow (_, _)$$

Clockwise Rotation Rules

$$R_{90^\circ}(x, y) \rightarrow (_, _) \quad R_{180^\circ}(x, y) \rightarrow (_, _) \quad R_{270^\circ}(x, y) \rightarrow (_, _) \quad R_{360^\circ}(x, y) \rightarrow (_, _)$$

Dilations

- In a dilation, we are enlarging and reducing the pre-image
- Dilations are not isometric.
- In a dilation, the pre-image & image are _____.
- The corresponding angles have the _____ measurement.
- The corresponding sides are _____.
- The scale factor, represented by k , is what we multiply our points by.

Rule: *Dilation* $k(x, y) \rightarrow (k \cdot x, k \cdot y)$

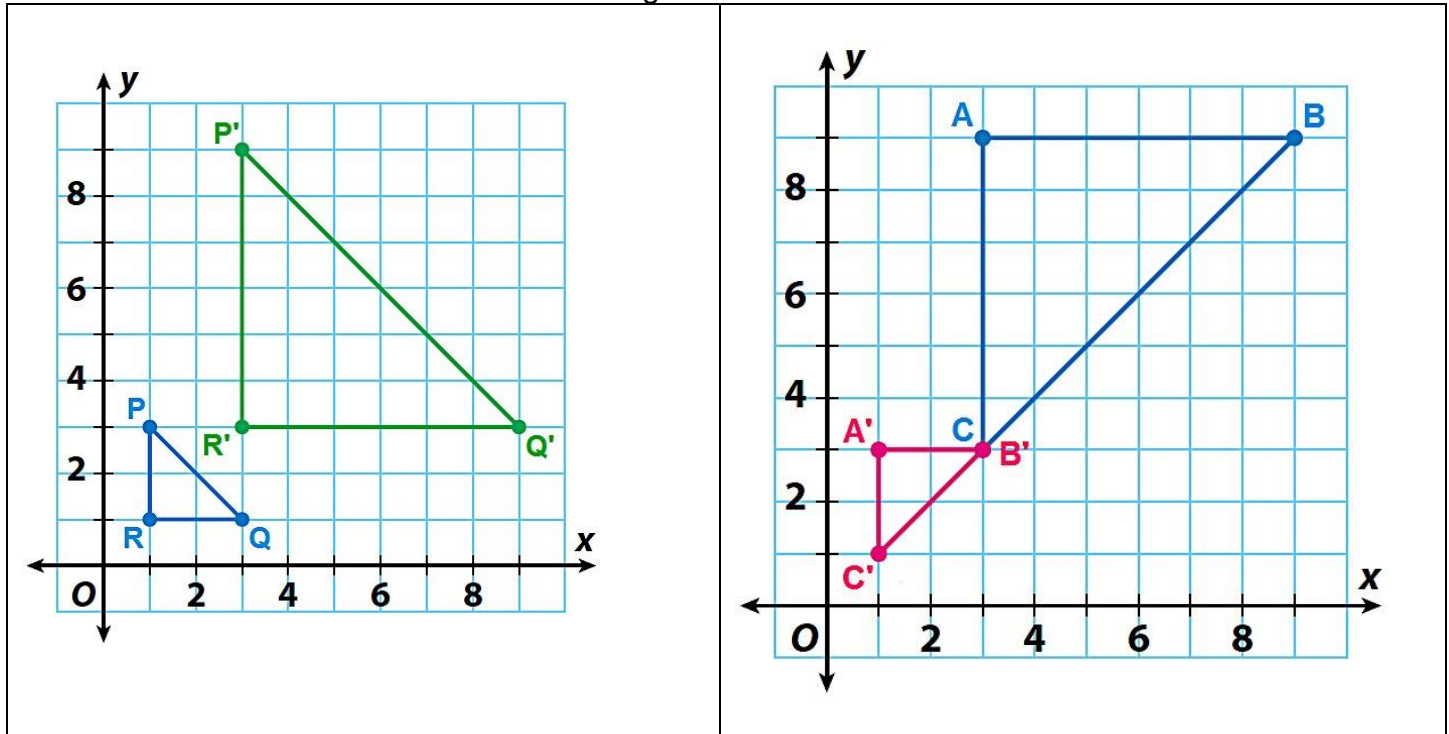
Ex.1 Dilating Points.

Pre-Image	A(-2,4)	B(-3,2)	C(0,0)
Image K=5	A'(___,___)	B'(___,___)	C'(___,___)
Is the dilation a reduction, enlargement, or the same? Why?			

Ex.2 Dilating Points.

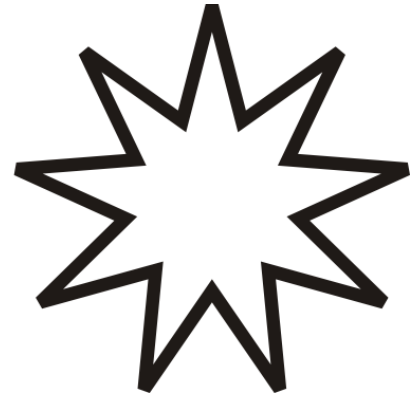
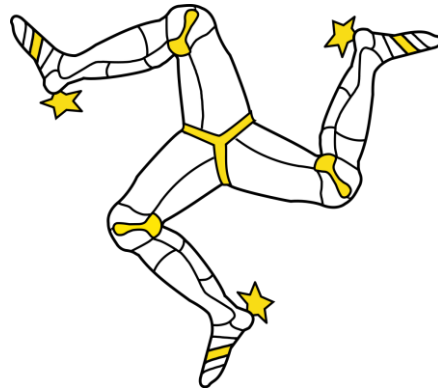
Pre-Image	Q(1,-2)	R(-2,-4)	S(4,-3)
Image K= 1/2	Q'(___,___)	R'(___,___)	S'(___,___)
Is the dilation a reduction, enlargement, or the same? Why?			

Ex.3 Determine the scale factor used in the figures below.



Symmetry

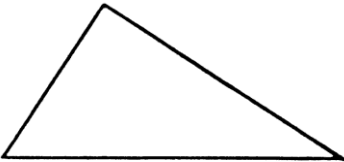
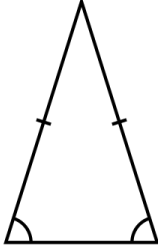
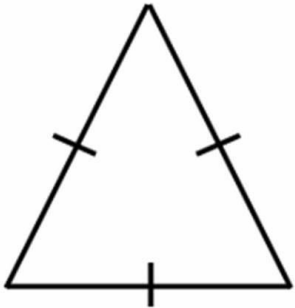
Rotational Symmetry - a shape has Rotational Symmetry when it still looks the same after some rotation (of less than one full turn).



Line Symmetry – is a line separating a figure into two halves that are mirror images.

Triangles

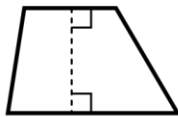
- Folding Test: when the folded part sits perfectly on top, then the fold line is a line of symmetry

<p>Scalene – All of the sides are different lengths.</p> 	<p>Isosceles – two of the sides are equal.</p> 	<p>Equilateral – all sides are equal</p> 
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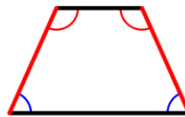
Quadrilaterals - a shape with 4 sides



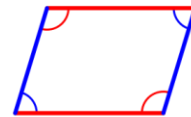
Trapezium
(Amer. Eng.)



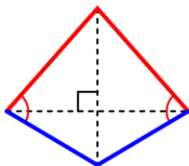
Trapezoid (Amer. Eng.)
Trapezium (Brit. Eng.)



Isosceles trapezoid (Am.)
Isosceles trapezium (Br.)



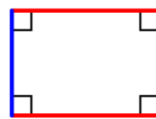
Parallelogram



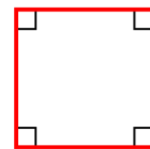
Kite



Rhombus

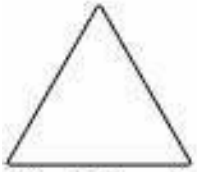


Rectangle

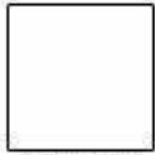


Square

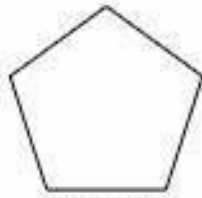
Regular Polygons - have all sides equal and all angles equal



Equilateral
Triangle



Square



Regular
Pentagon



Regular
Hexagon



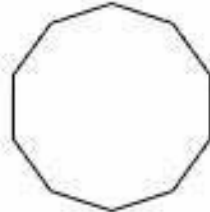
Regular
Heptagon



Regular
Octagon



Regular
Nonagon



Regular
Decagon

Onto
Sequences

