**Math 2** Name: Key

**Unit 1 Day 3 Notes – Reflections** Date:

**Warm-Up**:
Using the points A(0, 0), B(4, 0), C(4, 4), and D (0, 4)

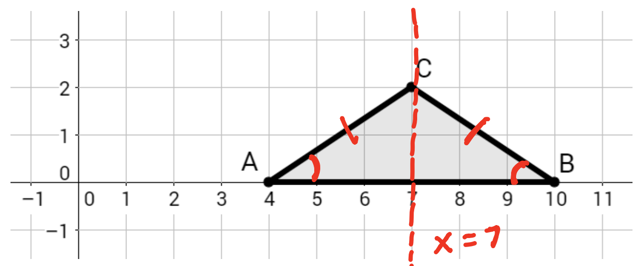
1) Graph the points on graph paper. Connect the points to make a convex polygon ABCD.
2) Draw all the lines of symmetry.
3) Write the equations of the lines of symmetry.

Challenge:
Using the points E(4, 0), F(7, 4), G(3, 7), and H(0, 3)

4) Graph the points on graph paper. Connect the points to make a convex polygon EFGH.
5) Draw all the lines of symmetry.
6) Write the equations of the lines of symmetry.

Part 3 – Reflection Symmetry

1. Given triangle ABC.
   a. What is the equation of the line of reflection that maps angle A onto angle B? $x = 7$



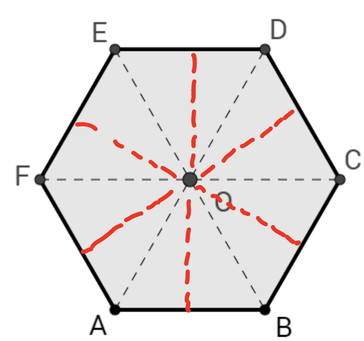

   b. If we reflect triangle ABC over the line of reflection found in part a, $\overline{AC}$ maps to $\overline{BC}$.

   c. What can we conclude about the measure of angle A and B?
   $\angle A$ + $\angle B$ are congruent ($\angle A \cong \angle B$)

   d. What can we conclude about the lengths of $\overline{AC}$ and $\overline{BC}$?
   $AC = BC$

   e. What kind of triangle is ABC?
   Isocceles $\triangle$

2. Given regular hexagon ABCDEF,
   a. List the three lines of symmetry drawn on the diagram at right:
   $\overline{EB}$, $\overline{DA}$, $\overline{FC}$
   $\overline{BE}$ $\overline{AD}$ $\overline{CF}$

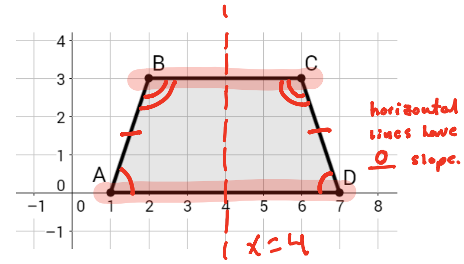



   b. What is the image of point D when reflected across $\overleftrightarrow{BE}$?
   Point F

   c. What is the image of $\angle OED$ when reflected across $\overleftrightarrow{FC}$? What conclusions can you make about these angles?
   $\angle OAB \cong \angle OED$

   d. Draw the other 3 lines of symmetry not already shown on the diagram.

3. Given quadrilateral ABCD,




a. The slope of $\overleftrightarrow{BC}$ is __0__. The slope of $\overleftrightarrow{AD}$ is __0__.
What kind of quadrilateral is ABCD? Explain how you know.

Trapezoid

b. Let line ***m*** be the equation of the reflection line mapping $\overline{CD}$ to $\overline{BA}$. Write the equation of line ***m***.

$x = 4$

c. Reflect quadrilateral ABCD over line ***m***.

Angle A maps to __$\angle D$__

Angle B maps to __$\angle C$__

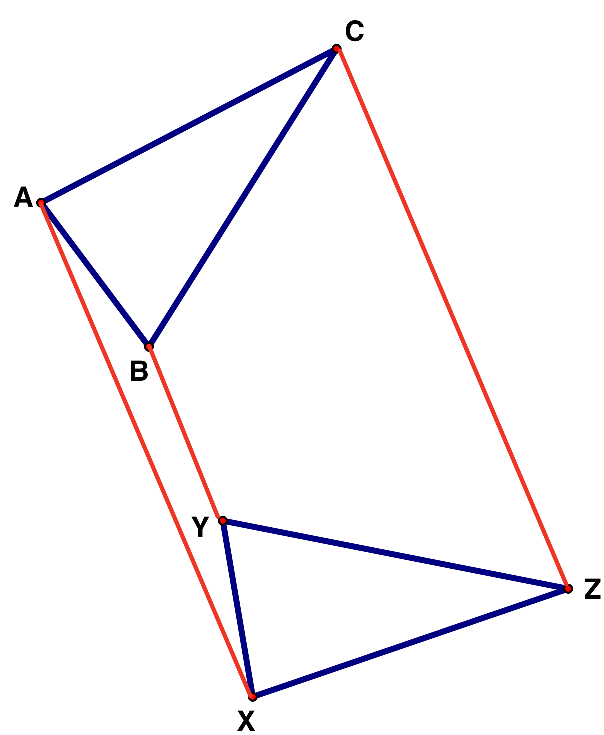
What can be concluded about both pairs of base angles? $\angle A \cong \angle D$

$\angle B \cong \angle C$

d. Look back at part a – was your description of the type of quadrilateral as specific as it should be (does it include details related to part c)? What is the more specific name of the quadrilateral? Explain how you know. Isoceles Trapezoid

**Reflection Exploration**

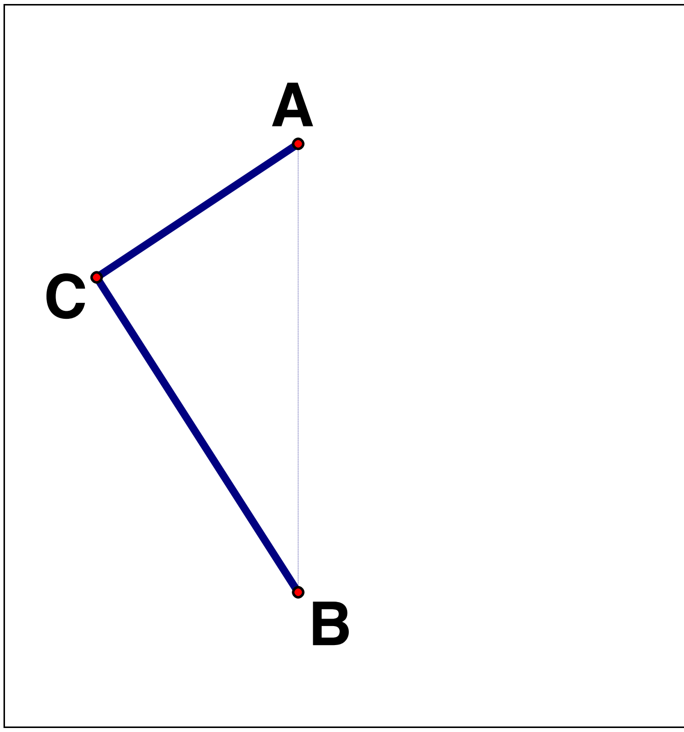
1) $\Delta ABC$ and $\Delta XYZ$ are reflections of each other. While holding the paper towards the light, fold the paper so that the triangles coincide (line up on top of each other). Crease the fold. Then open your paper back up and trace over this fold line using a straightedge to keep it neat.

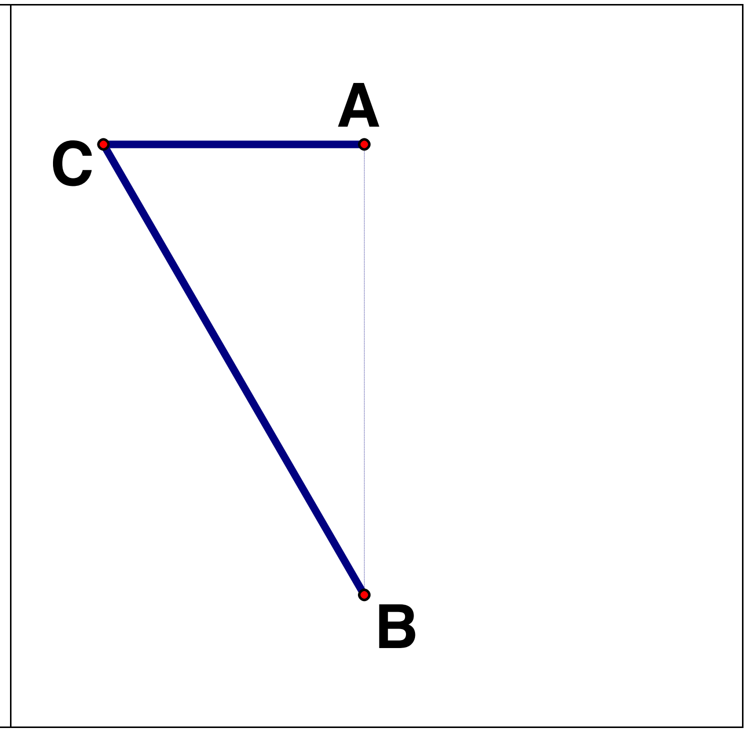



2) Using a straightedge, draw $\overline{AX}$, $\overline{BY}$, and $\overline{CZ}$. Look at each segment in relationship to the reflection line. What appears to be true about the reflection line? Discuss lengths of segments and angles created in relationship to the reflection line.

Patty Paper Reflections

Use patty paper to reflect each figure across the dashed line. Transfer the image from the patty paper onto the paper below. Label the image points with proper notation.




3) Points A and B are on the line of reflection. How are A' and B' related to the reflection line?

4) Using a straightedge, draw CC '. How is the reflection line related to CC '?

**Checkpoint: Reflections:**

- A reflection is a transformation in which the image is a mirror image of the preimage.
- A point on the line of reflection maps to same point.
- Other points map to the other side of the reflection line so that the reflection line is the middle of the segment joining a preimage and image point.
- Preimage and image points are equidistant from the reflection line.
- Notation for reflections is $R_{\text{line of reflection}}$. Example: $R_{\text{x-axis}}$ means reflection across the x-axis.

**Activity: Reflections in the coordinate plane.** Given ΔREF: R(-3, 1), E(0, 4), F(2, -5)

1) On the first grid, draw the reflection of ΔREF in the x-axis. Notation: $R_{x\text{-axis}}$ Rule: (x,y) → (x, -y)

Record the new coordinates: R'( -3 , -1 ), E'( 0 , -4 ), F'( 2 , 5 )

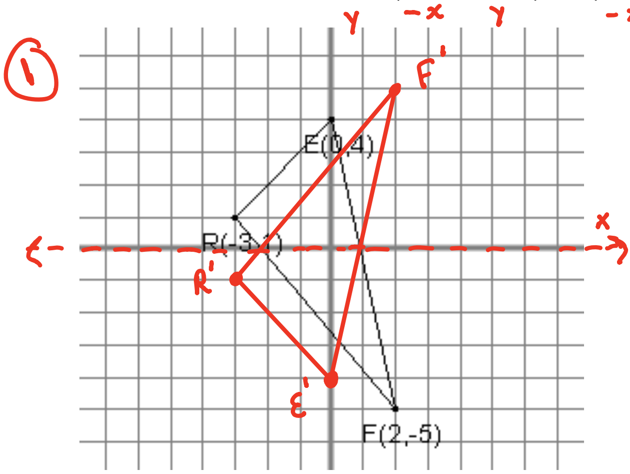
x -y x -y x -y

2) On the second grid, draw the reflection of ΔREF in the y-axis. Notation: $R_{y\text{-axis}}$ Rule: (x,y) → (-x, y)

Record the new coordinates: R'( 3 , 1 ), E'( 0 , 4 ), F'( -2 , -5 )

-x y -x y -x y

1

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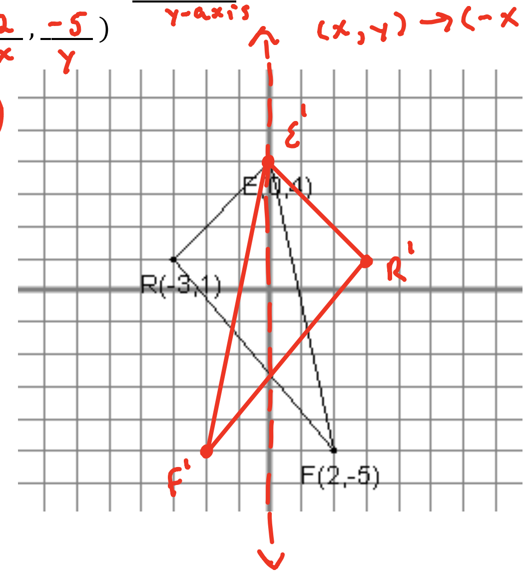


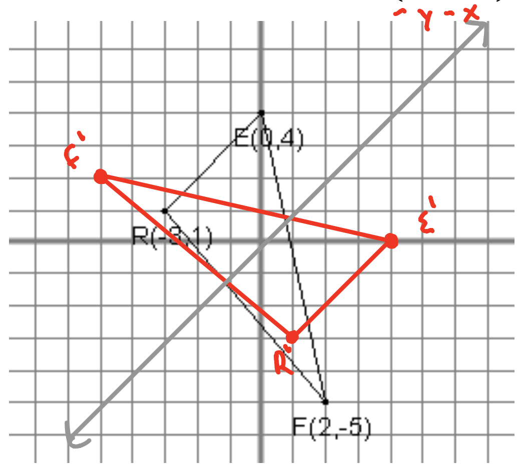

3) Graph the line y = x on the third coordinate grid. Trace ΔREF, both axes, and the line y = x on patty paper. Then flip the patty paper over and line it up again to see where the triangle's image would be if you reflected it in the line y = x. Record the new coordinates: R'( 1 , -3 ), E'( 4 , 0 ), F'( -5 , 2 ) $R_{y=x}$ (x, y) → (y, x)

y x y x y x

4) Graph the line y = -x on the fourth coordinate grid. Trace ΔREF, both axes, and the line y = -x on patty paper. Then flip the patty paper over and line it up again to see where the triangle's image would be if you reflected it in the line y = -x. Record the new coordinates: R'( -1 , 3 ), E'( -4 , 0 ), F'( 5 , -2 ) $R_{y=-x}$ (x,y) → (-y, -x)

-y -x -y -x -y -x

3

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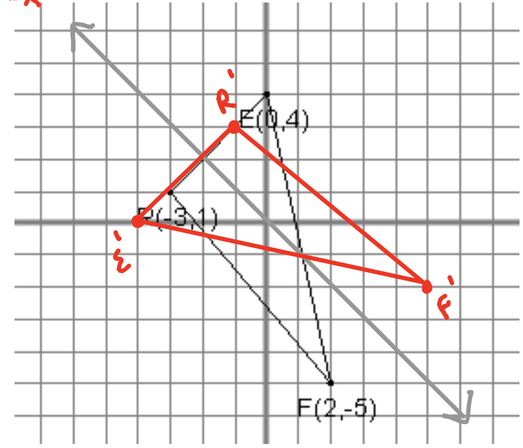


**Checkpoint: Look at the patterns and complete the rule. Then write the rule using proper notation.**

1. Reflection in the x-axis maps (x, y) → ( x , -y ) Notation: x-axis
2. Reflection in the y-axis maps (x, y) → ( -x , y ) Notation: $R_{y\text{-axis}}$
3. Reflection in the line y = x maps (x, y) → ( y , x ) Notation: $R_{y=x}$
4. Reflection in the line y = -x maps (x, y) → ( -y , -x ) Notation: $R_{y=-x}$