Unit 1
Lesson 2

Reflections

Lesson 2 – Reflections

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 itself.
- Other points map to the opposite side of the reflection line so that the reflection line is the bisector of the segment joining a preimage and image point.
- Preimage and image points are **equidistant** from the line of reflection.
- Notation for reflections is $R_{Line\ of\ Reflection}$. Example: R_{x-axis} means reflection in or across the $x-axis$.

equal distance

$x^{\#}$

Superscript

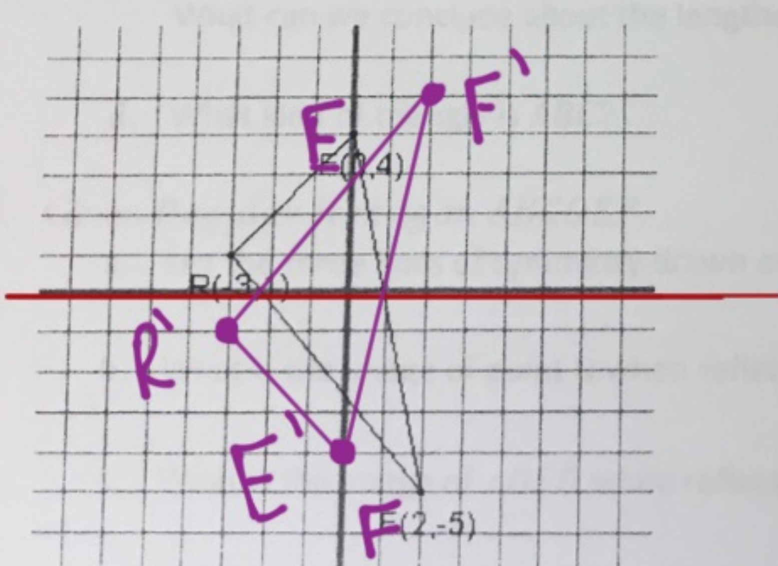
$R_{y\text{-}axis}$

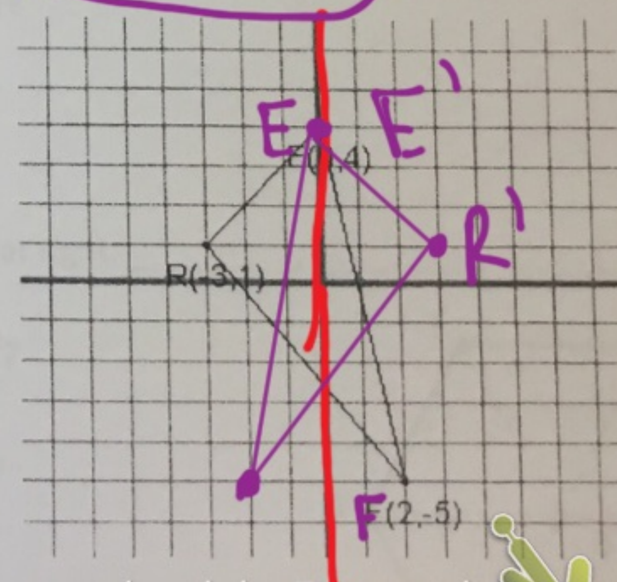
subscript

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: $R_{x\text{-axis}}$
   Record the new coordinates: $R'($ -3 , -1 $)$, $E'($ 0 , -4 $)$, $F'($ 2 , 5 $)$

2) On the second grid, draw the reflection of ΔREF in the $y-axis$. Notation: $R_{y\text{-axis}}$
   Record the new coordinates: $R'($ 3 , 1 $)$, $E'($ 0 , 4 $)$, $F'($ -2 , -5 $)$

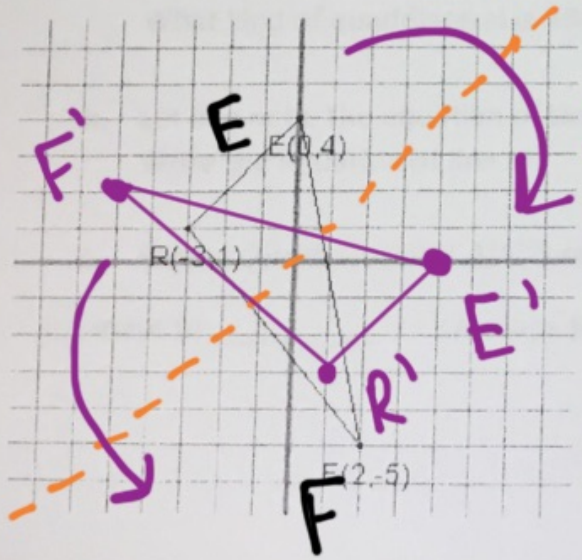




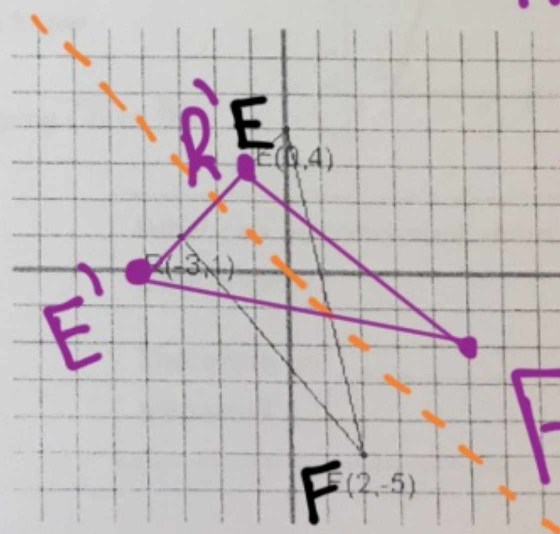
-3 1

3) Graph the line $y = x$ on the third coordinate grid. Reflect the triangle in the line $y = x$.
Record the new coordinates: R'(1 , -3), E'(4 , 0), F'(-5 , 2) Notation: $R_{y=x}$

4) Graph the line $y = -x$ on the fourth coordinate grid paper. Reflect the triangle in the line $y = -x$.
Record the new coordinates: R'(-1 , 3), E'(-4 , 0), F'(5 , -2) Notation: $R_{y=-x}$



x	y
-1	-1
0	0
1	1



x	y
-1	1
0	0
1	-1

6

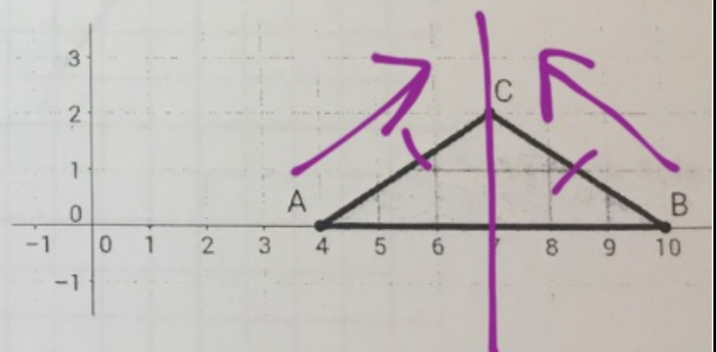
Look at the patterns and complete the rule. Then write the rule using proper notation.

1. Reflection in the $x - axis$ maps $(x, y) \rightarrow ($ x , -y $)$ Notation: Rx-axis
2. Reflection in the $y - axis$ maps $(x, y) \rightarrow ($ -x , y $)$ Notation: Ry-axis
3. Reflection in the line $y = x$ maps $(x, y) \rightarrow ($ y , x $)$ Notation: Ry=x
4. Reflection in the line $y = -x$ maps $(x, y) \rightarrow ($ -y , -x $)$ Notation: Ry=-x

Reflections with Polygons

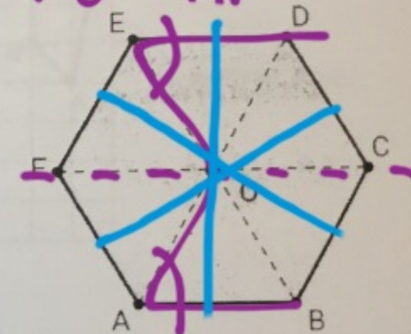
y=horizontal
x=vertical

Reflection Symmetry

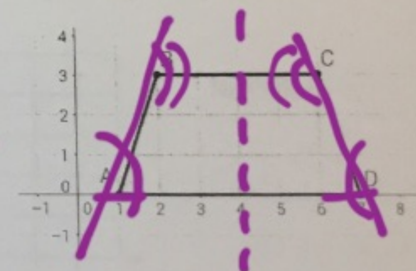


1. Given $Triangle\ ABC$.
   a. What is the equation of the line of reflection that maps angle A onto angle B? x=7
   b. If we reflect $Triangle\ ABC$ over the line of reflection found in part a, $\overline{AC}$ maps to $\overline{BC}$.
   c. What can we conclude about the **measures** of $\angle A$ and $\angle B$? ≅
      What can we conclude about the **lengths** of $\overline{AC}$ and $\overline{BC}$? ≅
   d. What kind of triangle is ABC? Isosceles

2. Given *Regular Hexagon ABCDEF*.
   a. List the three lines of symmetry drawn on the diagram at right: $\overline{EB}$, $\overline{FC}$, $\overline{AD}$
   b. What is the image of point D when reflected across $\overleftrightarrow{BE}$? F
   c. What is the image of $\angle OED$ when reflected across $\overleftrightarrow{FC}$? $\angle OAB$
   d. What conclusions can you make about these angles? $\cong$
   e. 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 1 pair of ∥ segments
   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? $\cong$

Therefore an isosceles trapezoid

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