Cornell Notes	Name:_____ Date: _____
Main Ideas/Questions	9-2 Title of Notes: **Reflection**

Reflection:

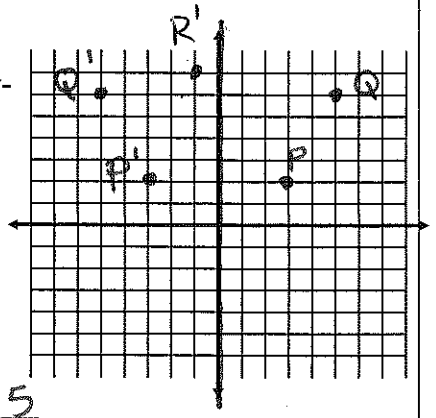
(Isometry)

- Involves ***flipping*** a figure over a line on the plane
- Relates to the idea of ***line symmetry***
- For our study only, we will reflect in the x-axis and y-axis
- **In the y-axis, (x,y) → (-x,y) fixed points on the y-axis**
- **In the x-axis, f(x,y) → (x,-y) fixed points on the x-axis**

EX 1

Plot the point P (3, 2).

Use patty paper to trace the point and the y-axis. Label both



Flip the patty paper over so that y-axis overlays the y-axis

What are the coordinates of P' (-3,2)

Repeat the process for Q(5,6) Q' (-5,6)

What is the distance from Q to the y-axis? 5

What is the distance from Q' to the y-axis? 5

Connect points Q and Q'. What do you observe? Forms a line

Q and Q' are both 5 units away from the y-axis

Using the same transformation. If R'(-1,7) what must the coordinate of R be? (1,7)

For each mapping what is the line of symmetry? y-axis (x = 0)

Under a Reflection:

Same size

Same shape

1. **Size is preserved - every segment is mapped into a segment congruent to the original segment.**
2. **Shape is preserved - every angle is mapped into an angle congruent to the original angle.**
3. **Image figure is congruent to pre-image figure.**

Is a reflection a rigid transformation? yes

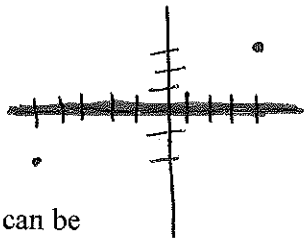
Are there any fixed points? yes If so, where? If the coordinate is on the line of symmetry

Is it possible to reflect in a line other than the x or y axes? yes

If so, how might it be done? P p and p' must form a right angle

Cornell Notes Main Ideas/Questions	Name: _____ Date: _____ Title of Notes: **Cont'd**

A reflection of the plane in the x-axis is the transformation described by $(x,y) \rightarrow (x,-y)$. Points on the x-axis are fixed points



State the image, under a reflection in the x-axis, of:

(a) (4,3) → (4, -3) (b) (-5,-2) → (-5, 2)

Instead of using the function notation, the reflection can be described using equations.
The transformation $f(x,y) = (x, -y)$ can be written as $x' = x$ and $y' = -y$. Use this transformation to find the image points of the following:

(a) (4,3) → _____ (b) (-5,-2) → _____

Same

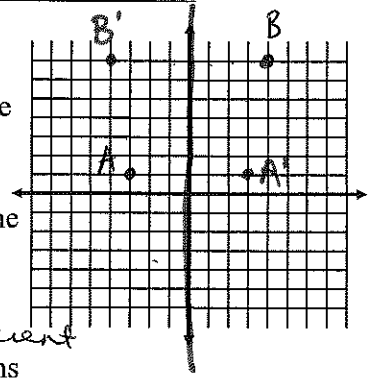
Practice

Reflection on y-axis is $(x,y) \rightarrow (-x,y)$
Reflection on $y = x$ is $(x,y) \rightarrow (y,x)$

The mapping for a particular reflection of the plane are

$(x,y) \rightarrow (x,-y)$

1. Is the transformation a reflection in the x-axis or is it a reflection in the y-axis?
2. The image of (5,2) is (5, -2).
3. The image of (7,0) is (7, 0).
4. Since the image of any point on the x-axis is the point itself, every point on the x-axis is called a fixed point.
5. The preimage of (3,-7) is (3, 7).
6. Graph the points A(-3, 1) and B(4,7) and graph their images after a reflection in the y-axis.



7. Find the slope of $\overline{AB}$ 6/7. Find the slope of $\overline{A'B'}$ -6/7. How are these slopes related? The signs are different
8. Write the equation of the line that contains AB and write the equation of the line that contain A' and B'. What do you notice about the y-intercepts? Would this also happen if the reflection had been in the x-axis?

AB
(-3,1); (4,7)
$m = \frac{7-1}{4+3} = \frac{6}{7}$
$y - 7 = \frac{6}{7}(x-4)$
OR
$y - 1 = \frac{6}{7}(x+3)$

A'B'
(3,1); (-4,7)
$m = \frac{7-1}{-4-3} = \frac{6}{-7}$
$y - 7 = -\frac{6}{7}(x+4)$
OR
$y - 1 = -\frac{6}{7}(x-3)$