

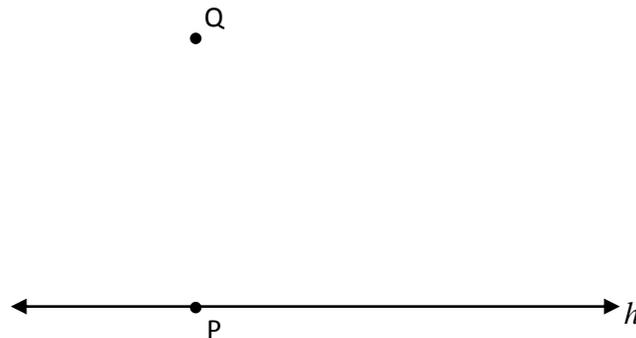
Geometry Unit 3 Day 7 Transformations of Lines

Coordinate Plane Tools

- Slope: $m = \frac{\Delta y}{\Delta x}$
- Slope-Intercept: $y = mx + b$
- Point-Slope: $y - y_1 = m(x - x_1)$

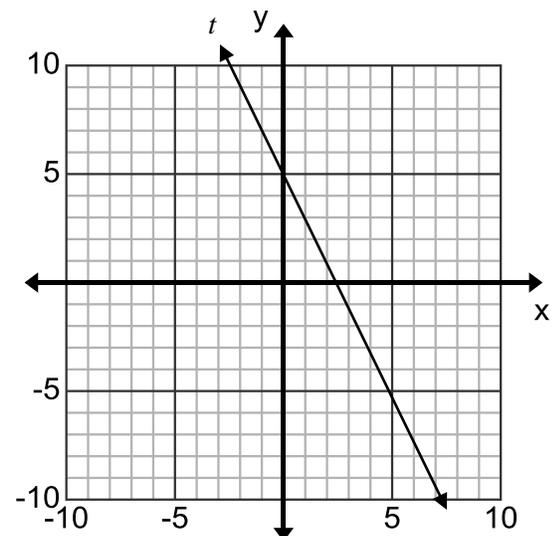
RIGID MOTION TRANSFORMATIONS THROUGH CONSTRUCTIONS

- 1) Rotate line h 90° around point P using a formal geometric construction.
 - a. How does line h' relate to line h ? _____
- 2) Rotate line h' 90° around point Q using a formal geometric construction.
 - a. How does line h'' relate to line h' ? _____
 - b. How does line h'' relate to the original line h ? _____
- 3) Rotating a line 180° can create a line that is _____ and could equate the rigid motion
 - a. _____. Draw the line of reflection that maps line h to line h'' .
 - b. _____. Draw the translation vector that maps line h to line h'' .



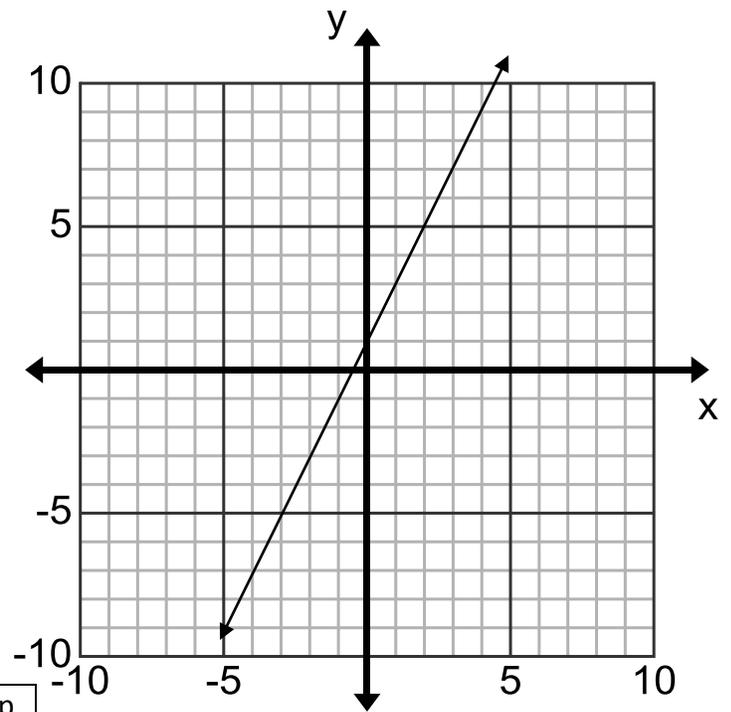
TRANSLATIONS IN THE COORDINATE PLANE

- 1) Given line $t: y = -2x + 5$. Perform the following transformation on the graph: $T_{-3,1}(\text{Line } t) \rightarrow \text{Line } t'$.
- 2) What is the relationship between line t and its image? _____
Will this always be the relationship between the pre-image and image lines under a translation? Explain:
- 3) Write the equation of the image line t' .



REFLECTIONS IN THE COORDINATE PLANE

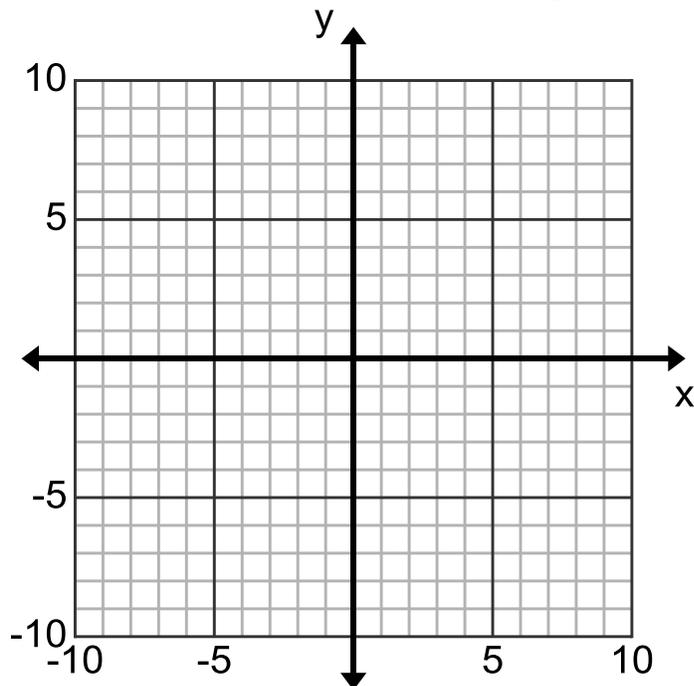
Example: Given \overline{MN} with M(0,1) and N(1,3).
 Perform each of the following rigid motion transformations and compare the relationships between each image and the pre-image in the table below.



Line	Points	Slope	Equation	Relationship to \overline{MN}
\overline{MN}	M(0,1) N(1,3)			
$r_{x-axis}(\overline{MN})$				
$r_{y-axis}(\overline{MN})$				
$r_{y=x}(\overline{MN})$				

ROTATIONS IN THE COORDINATE PLANE

Given the equation for \overline{PQ} is $(y-4) = \frac{2}{3}(x-3)$, perform each of the following rigid motion transformations and compare the relationships between each image and the pre-image in the table below.



Line	Point Coordinates	Slope	Point-Slope Equation	Slope-Intercept Equation	Relationship to \overline{PQ}
\overline{PQ}	P () Q ()				
$R_{90^\circ}(\overline{PQ})$	P' () Q' ()				
$R_{180^\circ}(\overline{PQ})$ $r_{Origin}(\overline{PQ})$	P'' () Q'' ()				

ON YOUR OWN: Graph each rotation image line and compare each image line to the original pre-image.

Rotation	Image Points	Point-Slope Equation	Relationship to \overline{PQ}
$R_{270^\circ}(\overline{PQ})$	P''' (4,-3) Q'''(6,-6)	$y+3 = -\frac{3}{2}(x-4)$	
$R_{360^\circ}(\overline{PQ})$	P'''' (3,4) Q''''(6,6)	$y-4 = \frac{2}{3}(x-3)$	

- Summarize the relationships you see overall (make a conjecture about the relationships among lines undergoing rotations):

ON YOUR OWN

Given: $y = -\frac{5}{2}x + 3$, graph and label it. Perform each of the following rigid motion transformations and graph, label, and write the equation of each image.

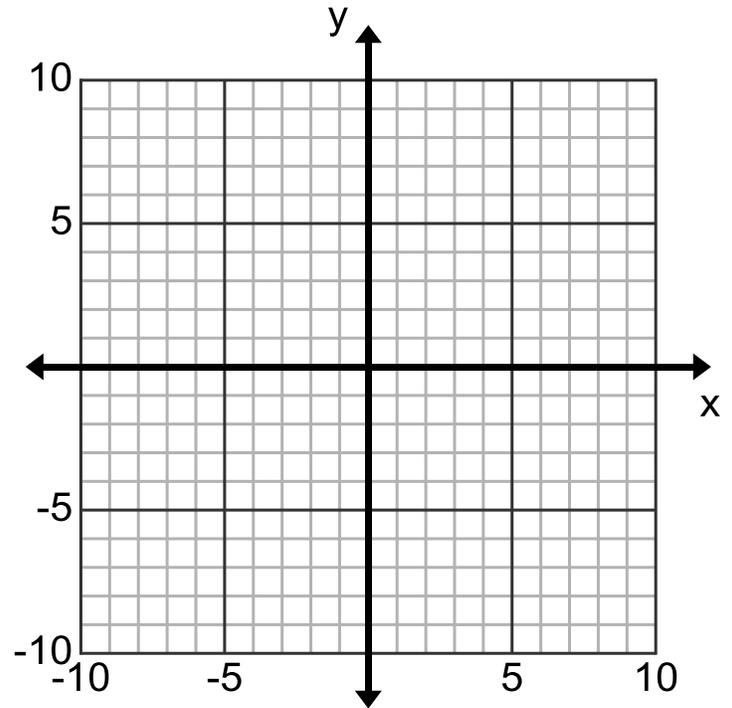
$T_{4, -5}$

r_{y-axis}

$r_{y=x}$

R_{90°

R_{180° or r_{origin}



- Which transformation will always create an image parallel to the pre-image?
- How will you decide if a rigid motion creates an image that is parallel/coincident/intersecting/perpendicular to the pre-image?

Extra Credit:

Describe a sequence/composition of rigid motion transformations that will map the image from $r_{y=x}$ line back onto itself such that the pre-image and image are coincident. (You can't just reverse the first rigid motion).