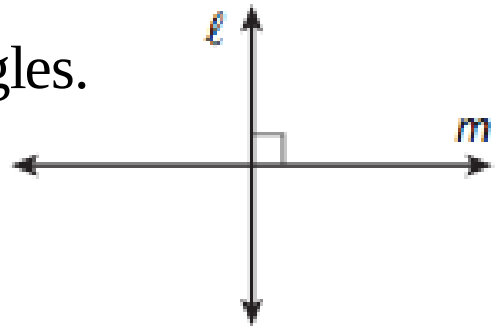
All of these describe the same thing:

- Translate along the vector $\langle -5, -2 \rangle$
- Translate using coordinate notation $(x, y) \rightarrow (x - 5, y - 2)$
- Translate left 5 units and down 2 unit

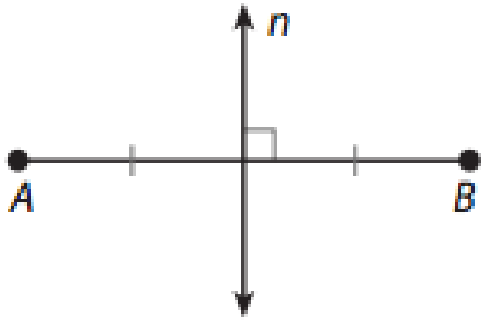
2.2 Reflections

Two lines are perpendicular if they cross to form right angles.

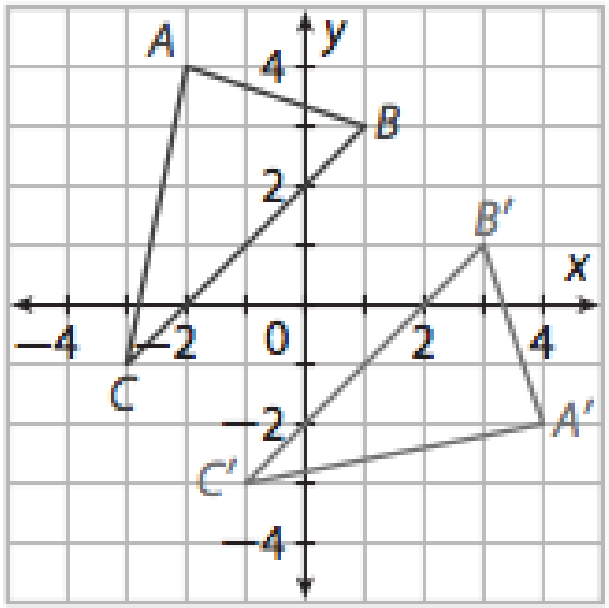


$$\ell \perp m$$

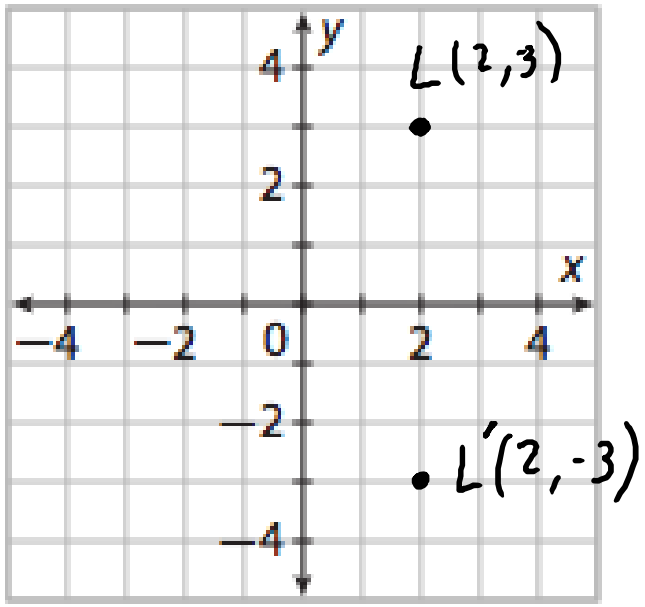
The perpendicular bisector of a segment is a line that is perpendicular to the segment and bisects the segment.



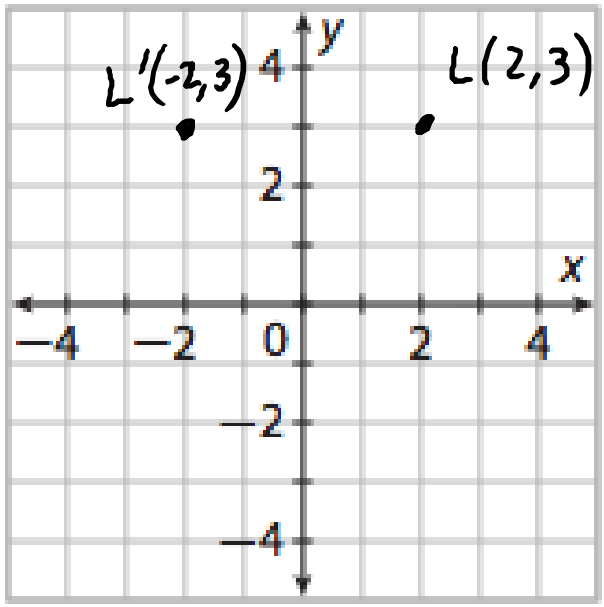
A reflection is another type of transformation that makes the mirror image of a figure.



Ex. Draw the reflection of $L(2,3)$ over the x-axis.



Ex. Draw the reflection of $L(2,3)$ over the y-axis.



For some reflections, we can write the coordinate notation:

Rules for Reflections on a Coordinate Plane	
Reflection across the x-axis	$(x, y) \rightarrow (x, -y)$
Reflection across the y-axis	$(x, y) \rightarrow (-x, y)$
Reflection across the line $y = x$	$(x, y) \rightarrow (y, x)$
Reflection across the line $y = -x$	$(x, y) \rightarrow (-y, -x)$

Ex. Consider the points $D(2,0)$, $E(2,2)$, and $F(5,1)$.

a) Find the image coordinates after reflecting over the x-axis.

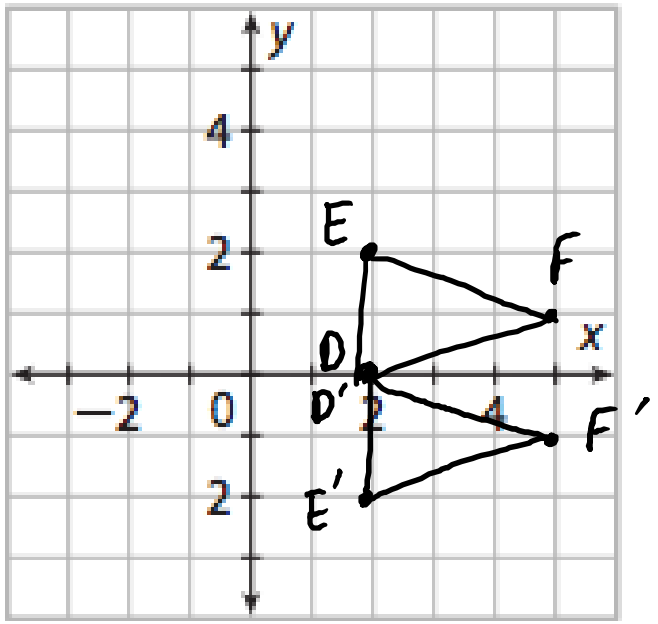
b) Graph the pre-image and image coordinates.

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

$D(2,0) \rightarrow D'(2,0)$

$E(2,2) \rightarrow E'(2,-2)$

$F(5,1) \rightarrow F'(5,-1)$



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Ex. Consider the points $S(3,4)$, $T(-2,4)$, and $U(-2,1)$.

a) Find the image coordinates after reflecting over the line $y = x$.

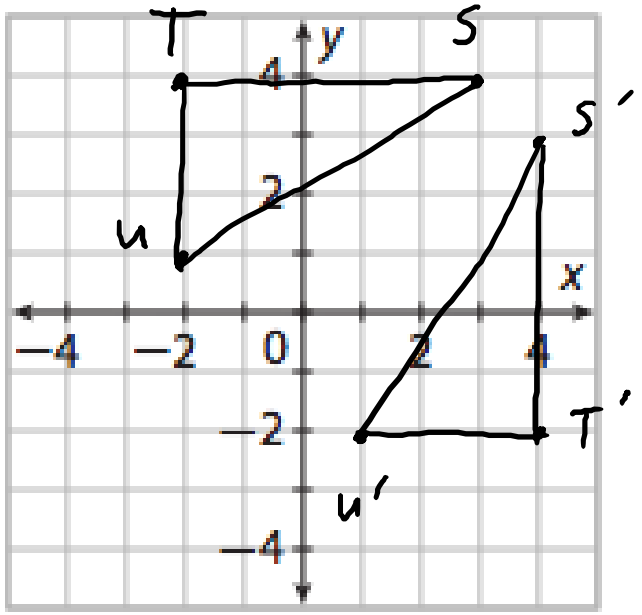
b) Graph the pre-image and image coordinates.

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

$S(3,4) \rightarrow S'(4,3)$

$T(-2,4) \rightarrow T'(4,-2)$

$U(-2,1) \rightarrow U'(1,-2)$



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Ex. Consider the points $A(-4,-2)$, $B(-1,-1)$, and $C(-1,-4)$.

a) Find the image coordinates after reflecting over the y-axis.

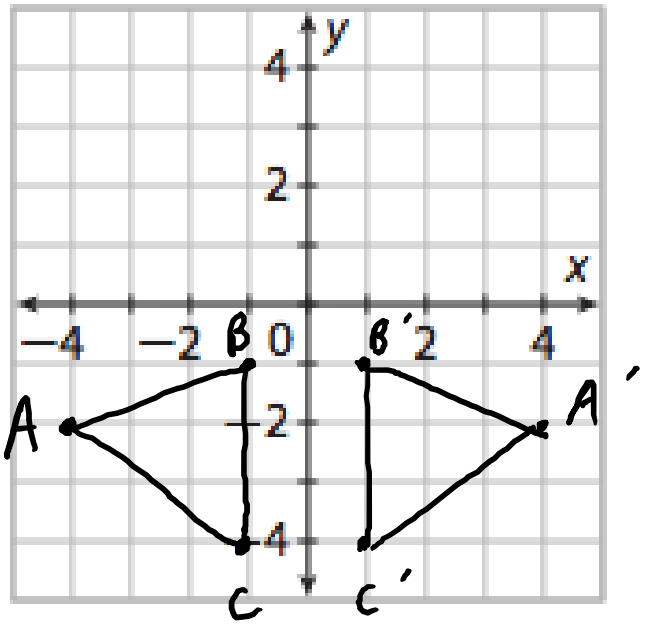
b) Graph the pre-image and image coordinates.

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

$A(-4,-2)$ $\quad A'(4,-2)$

$B(-1,-1)$ $\quad B'(1,-1)$

$C(-1,-4)$ $\quad C'(1,-4)$



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Reflection across the line $y = x$	$(x, y) \rightarrow (y, x)$
Reflection across the line $y = -x$	$(x, y) \rightarrow (-y, -x)$

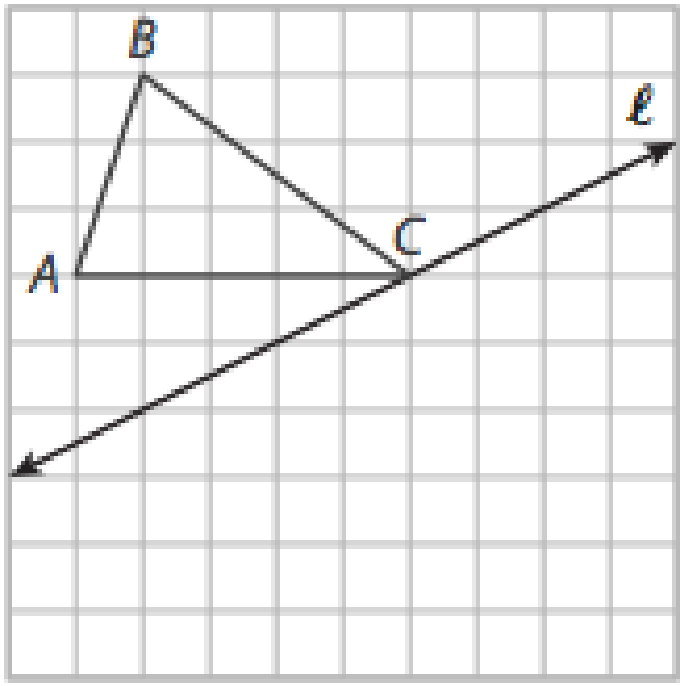
Ex. Draw the reflection of ΔABC across line ℓ.

1) **Find slope of line of mirror**

2) **Find the opposite reciprocal of that slope (ex: 3/4 → -4/3)**

3) **From each point in the pre-image, draw a line with the slope from step 2.**

4) **Find a point on each line that is the same distance from the mirror as the pre-image point. These are your image points.**



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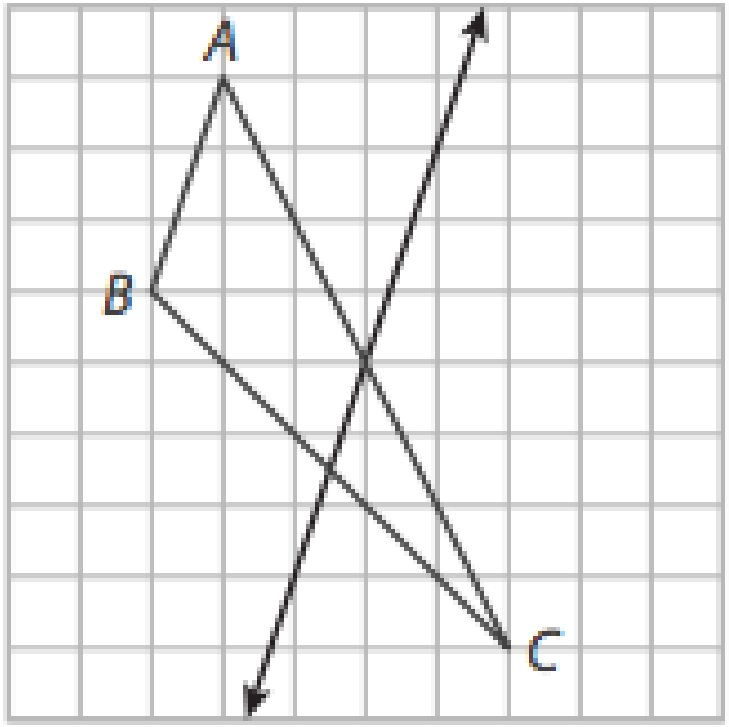

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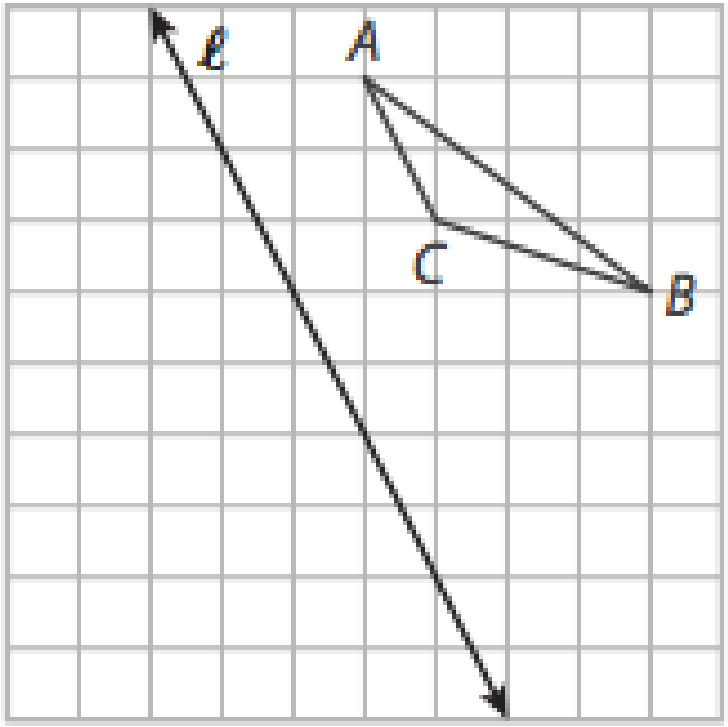
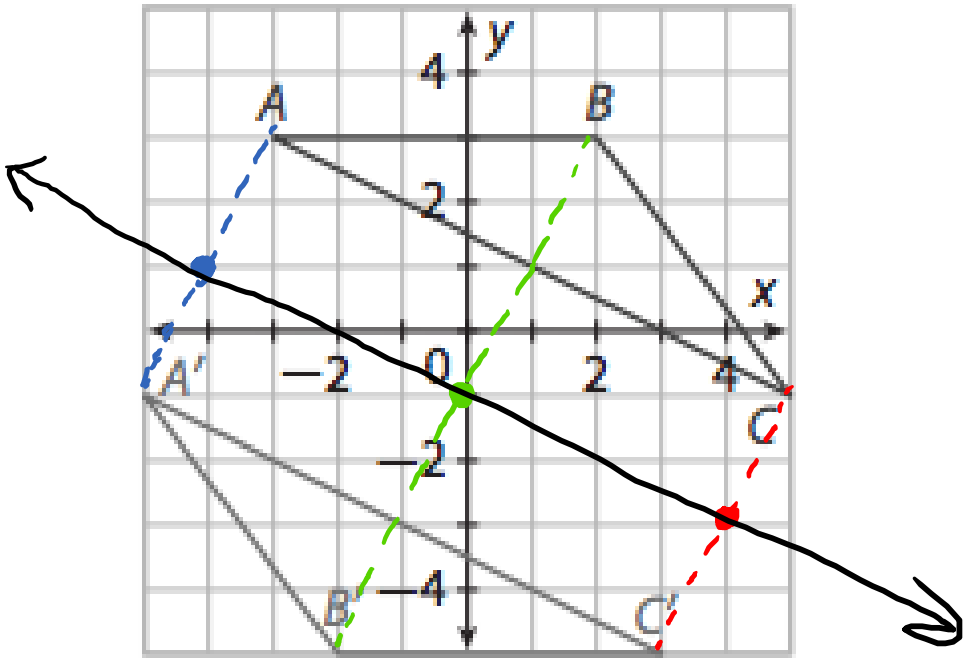


Ex. Draw the line of reflection.



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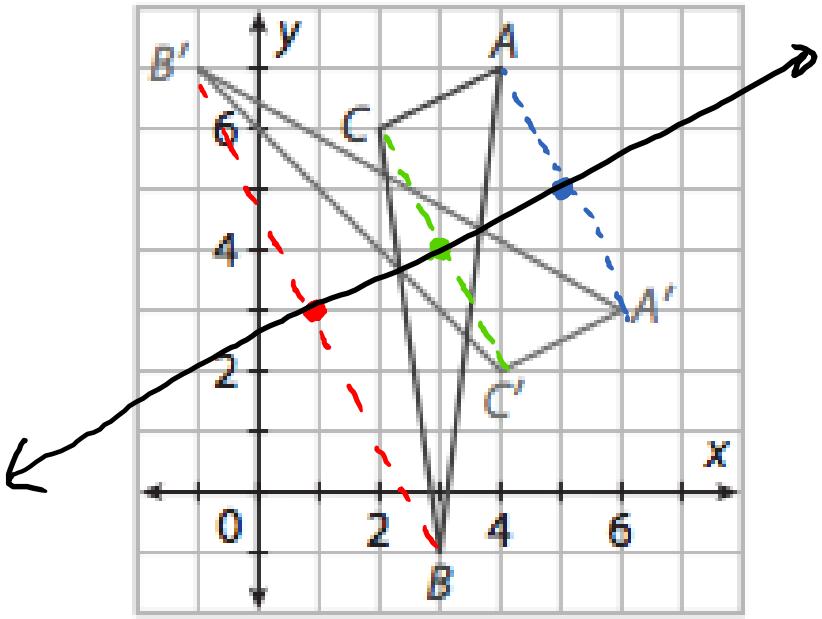

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