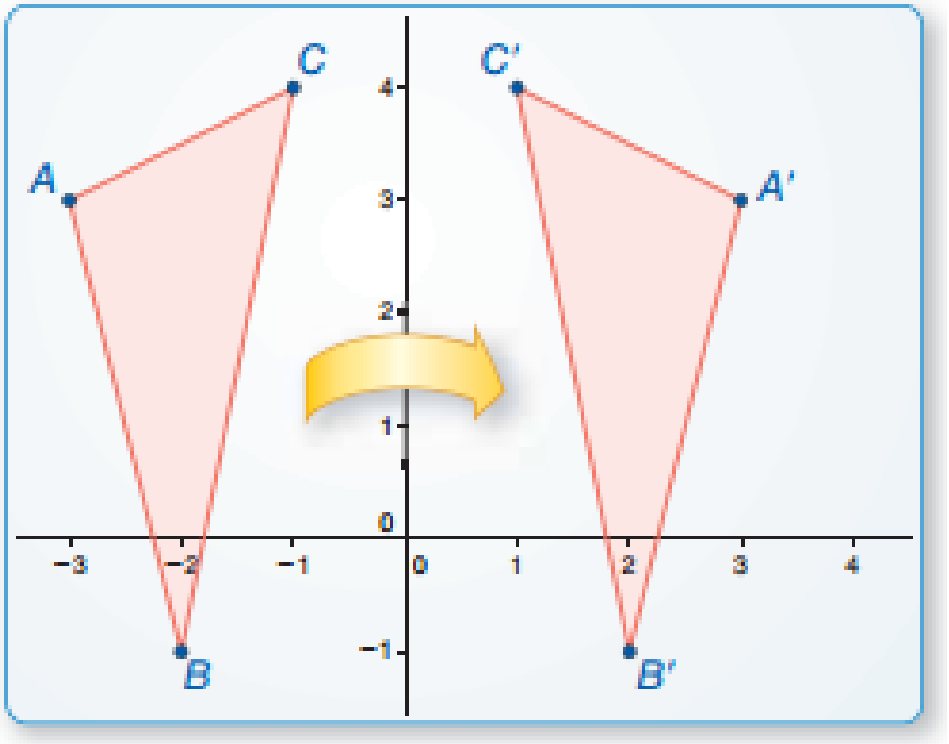
4.2 Reflections



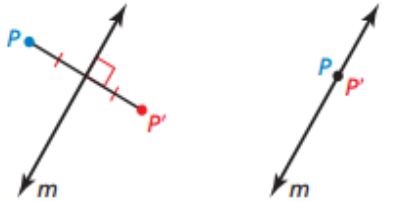
Flip or

mirror image

A reflection is a transformation that uses a line like a mirror to reflect a figure. The mirror line is called the line of reflection.

A reflection in a line m maps every point P in the plane to a point P', so that for each point one of the following properties is true.

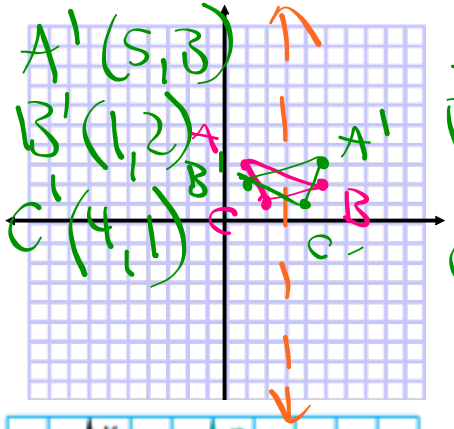
- If P is not on m, then m is the perpendicular bisector of $\overline{PP'}$, or
- If P is on m, then $P = P'$.



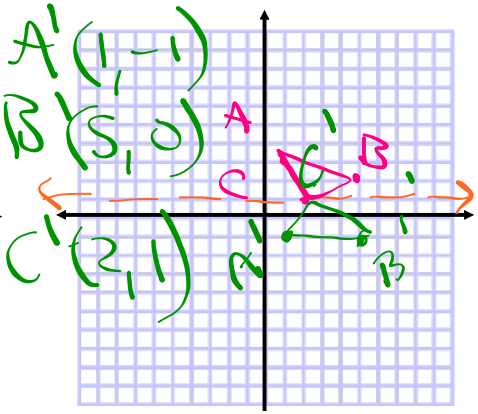
Examples: Reflecting over Horizontal & Vertical Lines

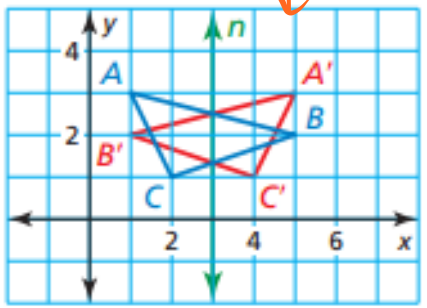
Graph ΔABC with vertices A(1, 3), B(5, 2), and C(2, 1) and its image after the reflections described.

1. over the line : x = 3

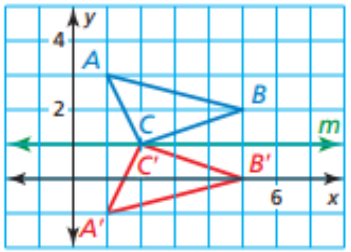


2. Over the line: y = 1





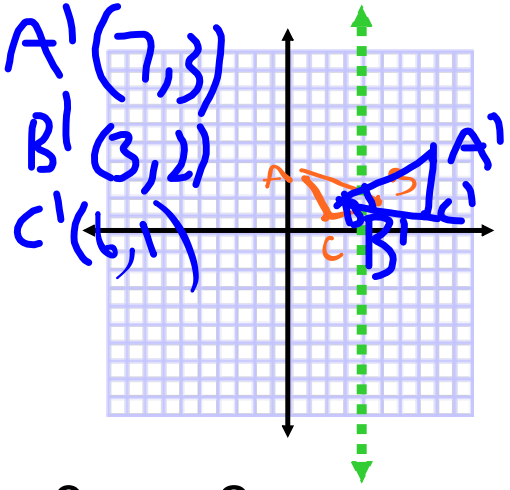
Pull Pull



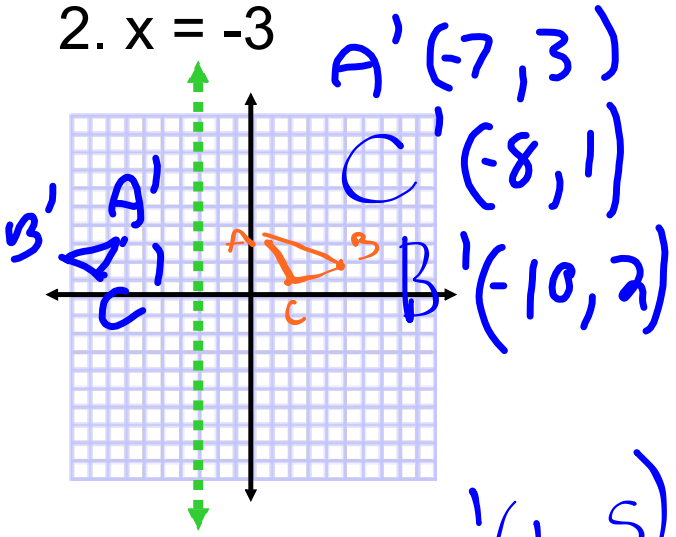
Practice:

Graph ΔABC with vertices A(1, 3), B(5, 2), and C(2, 1) and its image after the reflections described.

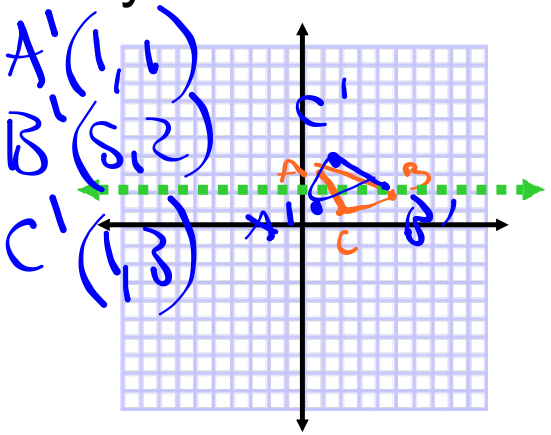
1. x = 4



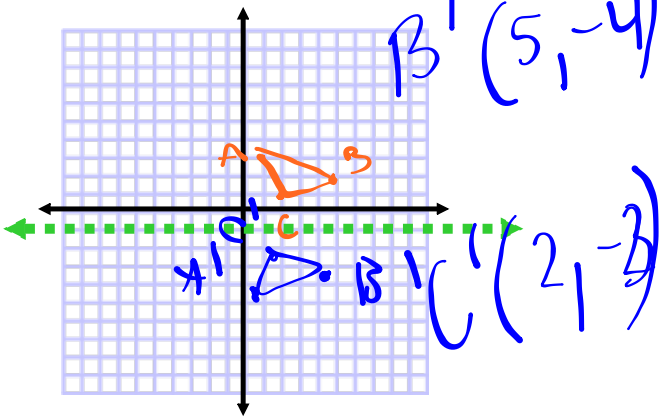
2. x = -3



3. y = 2



4. y = -1



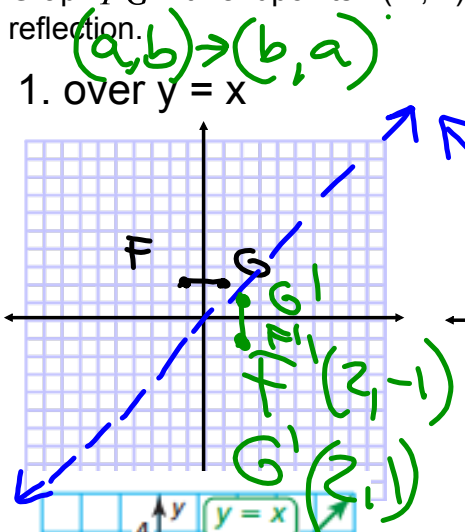
Coordinate Rules for Reflections

- If (a, b) is reflected in the x-axis, then its image is the point $(a, -b)$.
- If (a, b) is reflected in the y-axis, then its image is the point $(-a, b)$.
- If (a, b) is reflected in the line $y = x$, then its image is the point (b, a).
- If (a, b) is reflected in the line $y = -x$, then its image is the point $(-b, -a)$.

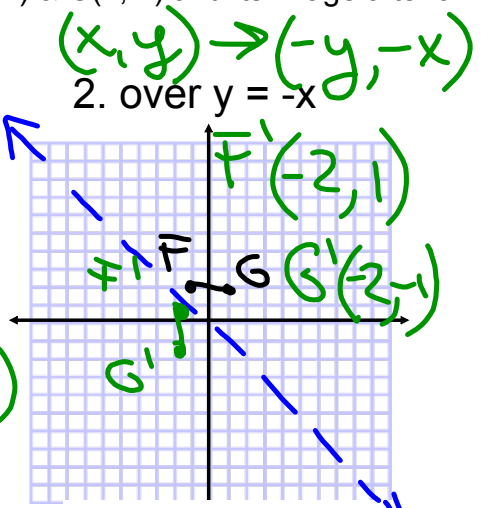
Example: Reflecting over an Axis or Diagonal Line

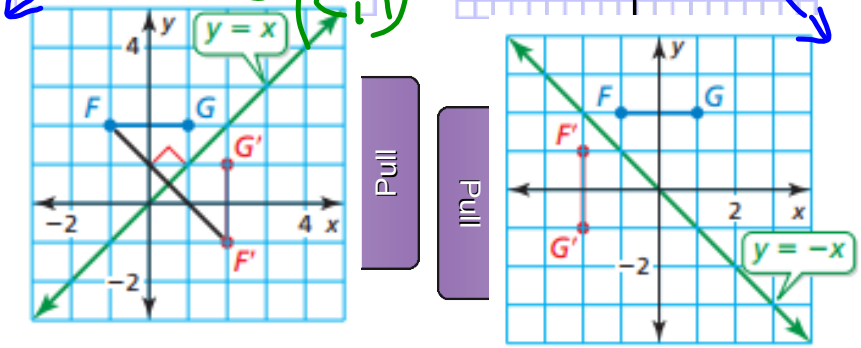
Graph $\overline{FG}$ with endpoints F(-1, 2) & G(1, 2) and its image after a reflection.

1. over y = x



2. over y = -x





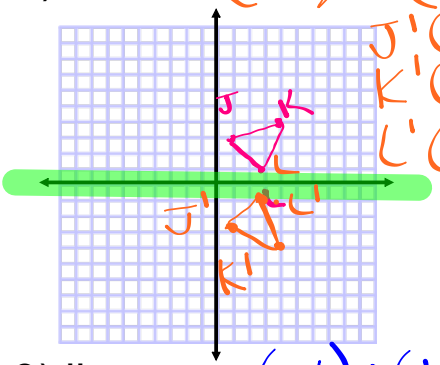
Practice:

The vertices of ΔJKL are J(1, 3), K(4, 4), and L(3, 1).

Graph the new image with reflections over the ...

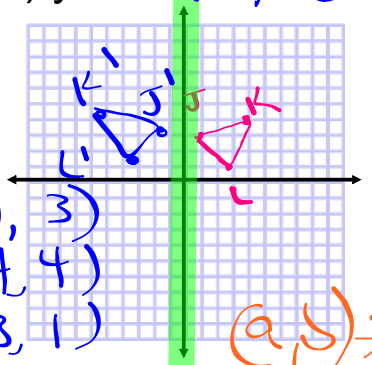
1) x-axis $(a,b) \rightarrow (a,-b)$

J'(1, -3)
K'(4, -4)
L'(3, -1)



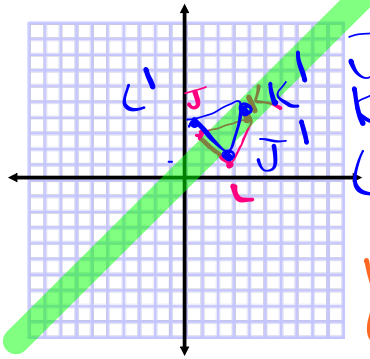
2) y-axis $(a,b) \rightarrow (-a,b)$

J'(-1, 3)
K'(-4, 4)
L'(-3, 1)



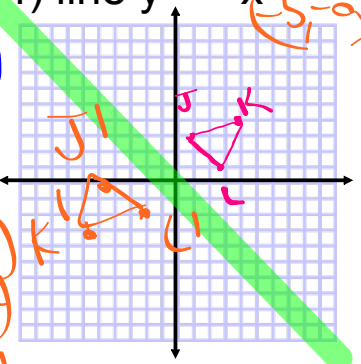
3) line y = x $(a,b) \rightarrow (b,a)$

J'(3, 1)
K'(4, 4)
L'(1, 3)



4) line y = - x $(a,b) \rightarrow (-b,-a)$

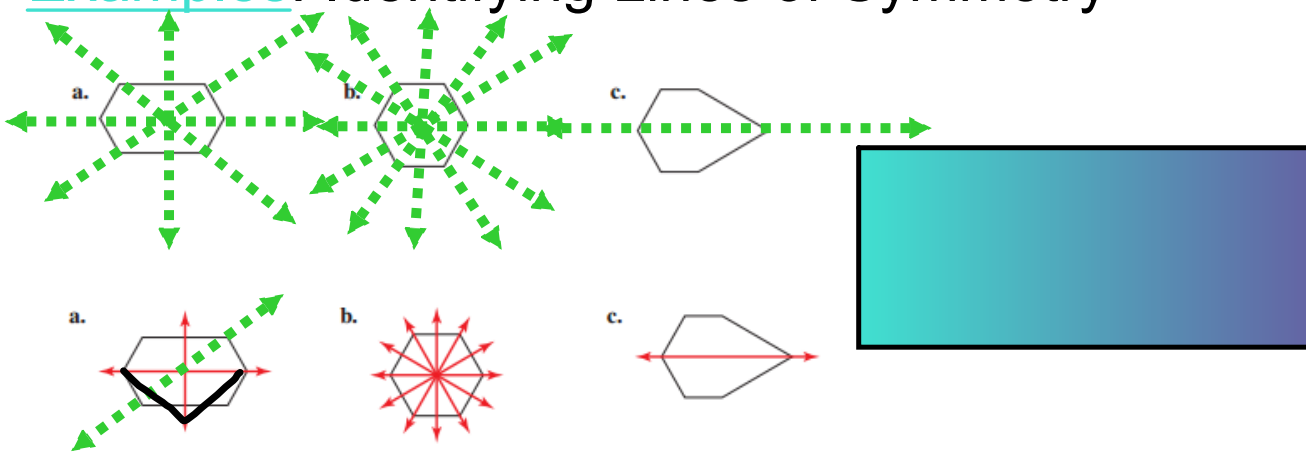
J'(-3, -1)
K'(-4, -4)
L'(-1, -3)



Identifying Lines of Symmetry

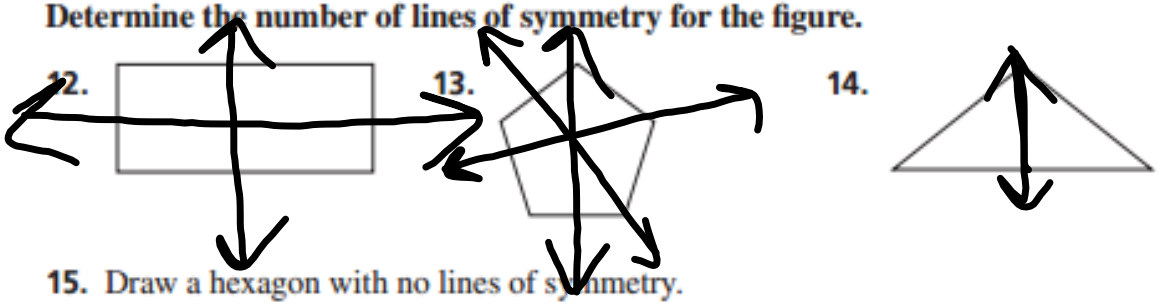
A figure in the plane has line symmetry when the figure can be mapped onto itself by a reflection in a line. This line of reflection is a line of symmetry, such as a line *m* below. A figure can have more than one line of symmetry.

Examples: Identifying Lines of Symmetry

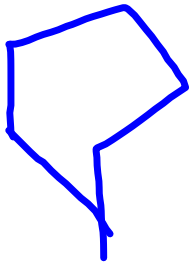


Practice:

Determine the number of lines of symmetry for the figure.



15. Draw a hexagon with no lines of symmetry.



ACT Practice:

What is $\frac{1}{9}$ of 63% of \$6,000?

A. \$34,020

B. \$4,200

C. \$3,402

D. \$420

E. \$42

$\frac{1}{9}(.63)(6000)$

$6000(.63) = 3780$

$\frac{1}{9}(3780)$

HW. pg. 186: 3 - 25 (o), 40 - 49

4.2 WS Directions:

Graph the pre-image and image.

Write the final image coordinates down correctly.