Geometry 9.1 (4, 7)

Draw reflections

Draw reflections in the coordinate plane

line of symmetry (line of reflection)

$y = 1x + 0$

x-axis

y-axis

A' image : after

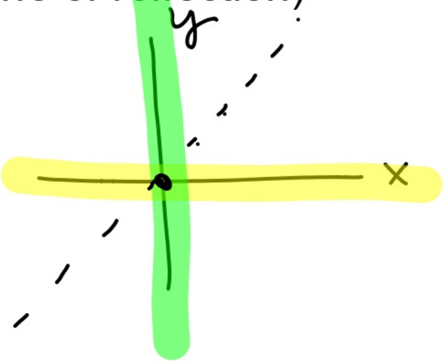
A preimage : before

isometry

invariant point

activity: letters

mira in the zoo



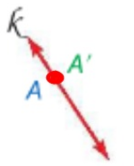
Reflection activity
The animals have escaped from the zoo.
Use a mira and symmetry to put each animal back into its own cage.

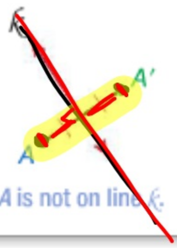
Line of Symm.

KeyConcept **Reflection in a Line**

A reflection in a line is a function that maps a point to its image such that

- if the point is on the line, then the image and preimage are the same point, or
- if the point is not on the line, the line is the perpendicular bisector of the segment joining the two points.



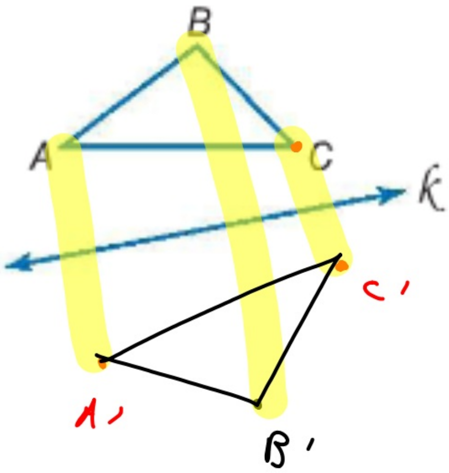


A′, *A″*, *A‴*, and so on, name corresponding points for one or more transformations.

Example 1 Reflect a Figure in a Line

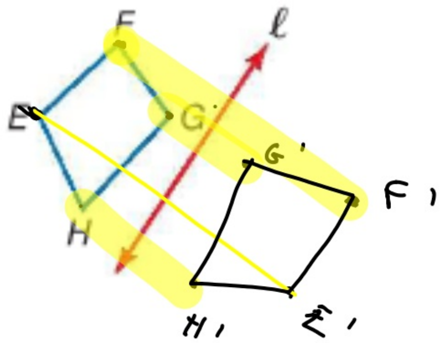
Copy the figure and the given line of reflection. Then draw the reflected image in this line using a ruler.

The line of symmetry is a
perpendicular bisector connecting A with A'

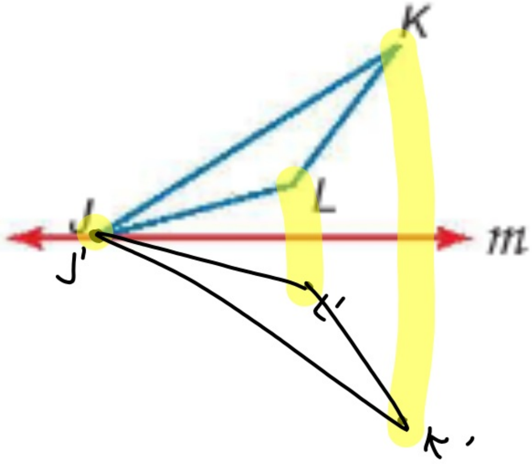


GuidedPractice

1A.



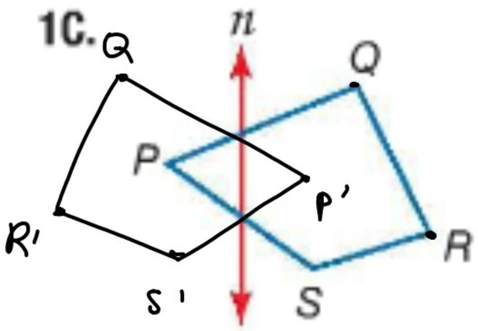
1B.



9.1 p627
11-45 odd
54-59
(19, 21, 23
graph opt.)

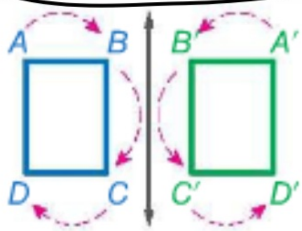
invariant point

1C.



StudyTip

Characteristics of a Reflection Reflections, like all isometries, preserve distance, angle measure, betweenness of points, and collinearity. The orientation of a preimage and its image, however, are reversed.



Example 3 Reflect a Figure in a Horizontal or Vertical Line

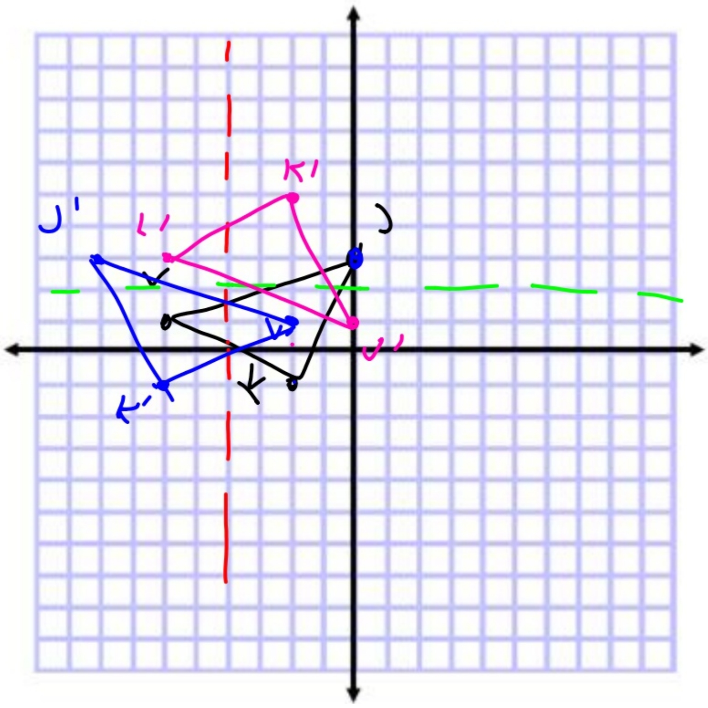
Triangle JKL has vertices $J(0, 3)$, $K(-2, -1)$, and $L(-6, 1)$. Graph $\triangle JKL$ and its image in the given line.

a. $x = -4$

b. $y = 2$

y = horiz.

x = vertical



reminder y= lines are horizontal
x= lines are vertical

GuidedPractice

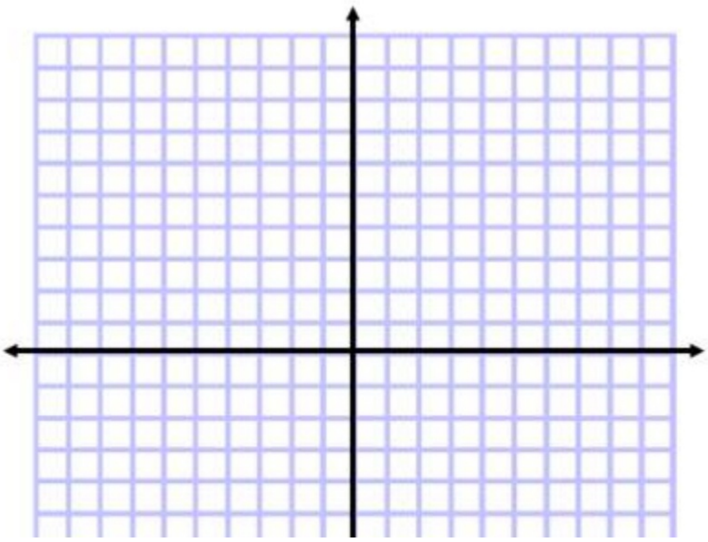
Trapezoid *RSTV* has vertices $R(-1, 1)$, $S(4, 1)$, $T(4, -1)$, and $V(-1, -3)$. Graph trapezoid *RSTV* and its image in the given line.

3A. $y = -3$

horiz

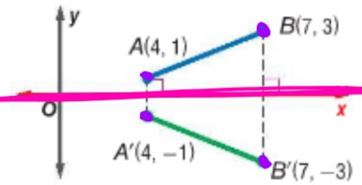
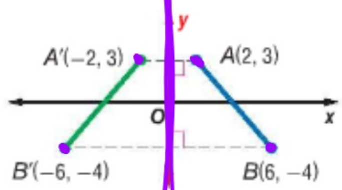
3B. $x = 2$

vert



x-axis $(a,b) \to (a,-b)$

KeyConcept Reflection in the *x*- or *y*-axis

	Reflection in the *x*-axis		Reflection in the *y*-axis
Words	To reflect a point in the *x*-axis, multiply its *y*-coordinate by -1.	Words	To reflect a point in the *y*-axis, multiply its *x*-coordinate by -1.
Symbols	$(x, y) \to (x, -y)$	Symbols	$(x, y) \to (-x, y)$
Example		Example	

ReadingMath

Coordinate Function Notation

The expression $P(a, b) \to P'(a, -b)$ can be read as *point P with coordinates a and b is mapped to new location P prime with coordinates a and negative b.*

y-axis
(a,b) $(-a,b)$

Example 4 Reflect a Figure in the *x*- or *y*-axis

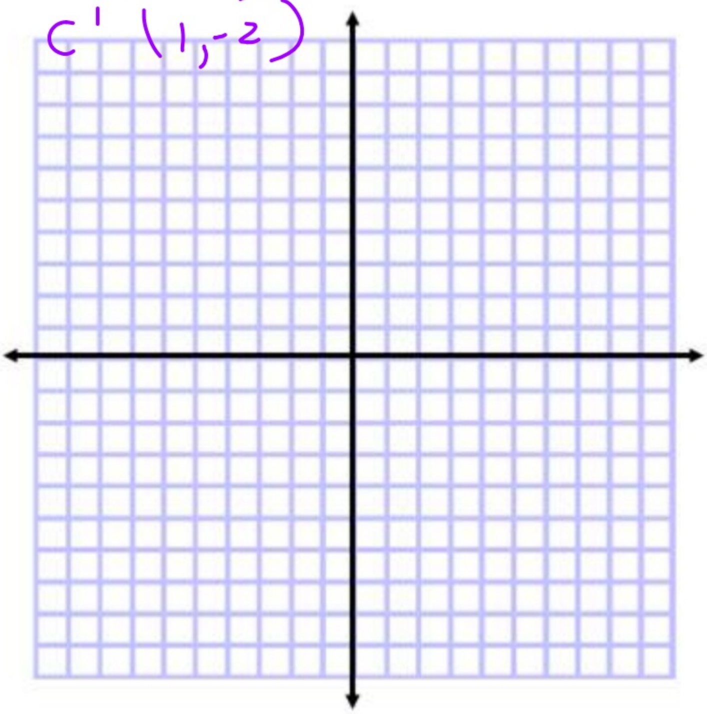
~~Graph each figure and its image~~ Find the image under the given reflection.

a. $\triangle ABC$ with vertices $A(-5, 3)$, $B(2, 0)$, and $C(1, 2)$ in the *x*-axis

$A'(-5,-3)$

$B'(2,0)$

$C'(1,-2)$



Invariant point:
- lies on the line of symmetry
- maps onto itself

Study Tip

Invariant Points In Example 4a, point B is called an *invariant point* because it maps onto itself. Only points that lie on the line of reflection are invariant under a reflection.