CHAPTER ~~14~~: (9 online)
TRANSFORMATIONS

SECTION 14.2:
REFLECTIONS

Standards:

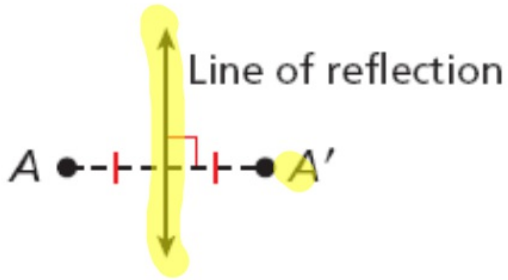
22.0 - Students know the effect of rigid motions on figures in the coordinate plane and space, including rotations, translations, and reflections.

Recall that a reflection is a transformation that moves a figure (the preimage) by flipping it across a line. The reflected figure is called the image. A reflection is an isometry, so the image is always congruent to the preimage.

An isometry is a transformation that does not change the shape or size of a figure. Reflections, translations, and rotations are all isometries. Isometries are also called congruence transformations or rigid motions.

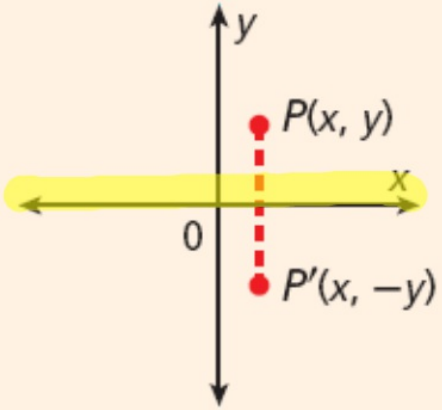
Reflections

A reflection is a transformation across a line, called the line of reflection, so that the line of reflection is the perpendicular bisector of each segment joining each point and its image.



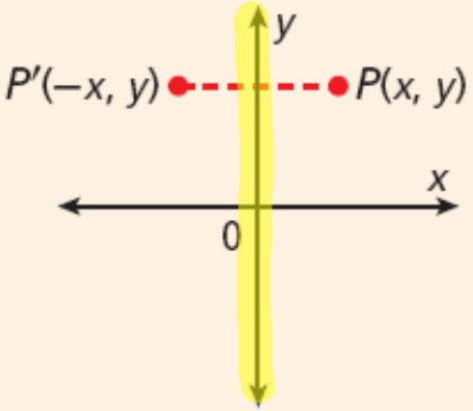
Reflections in the Coordinate Plane

ACROSS THE *x*-AXIS



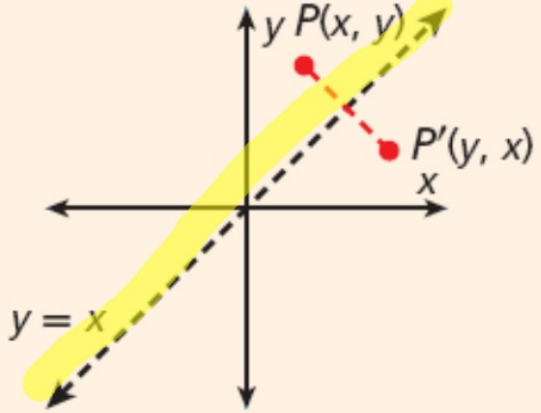
$(x, y) \rightarrow (x, -y)$

ACROSS THE *y*-AXIS



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

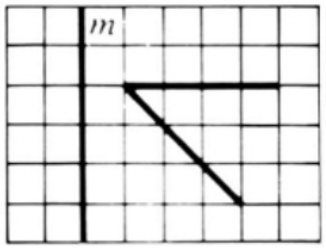
ACROSS THE LINE $y = x$

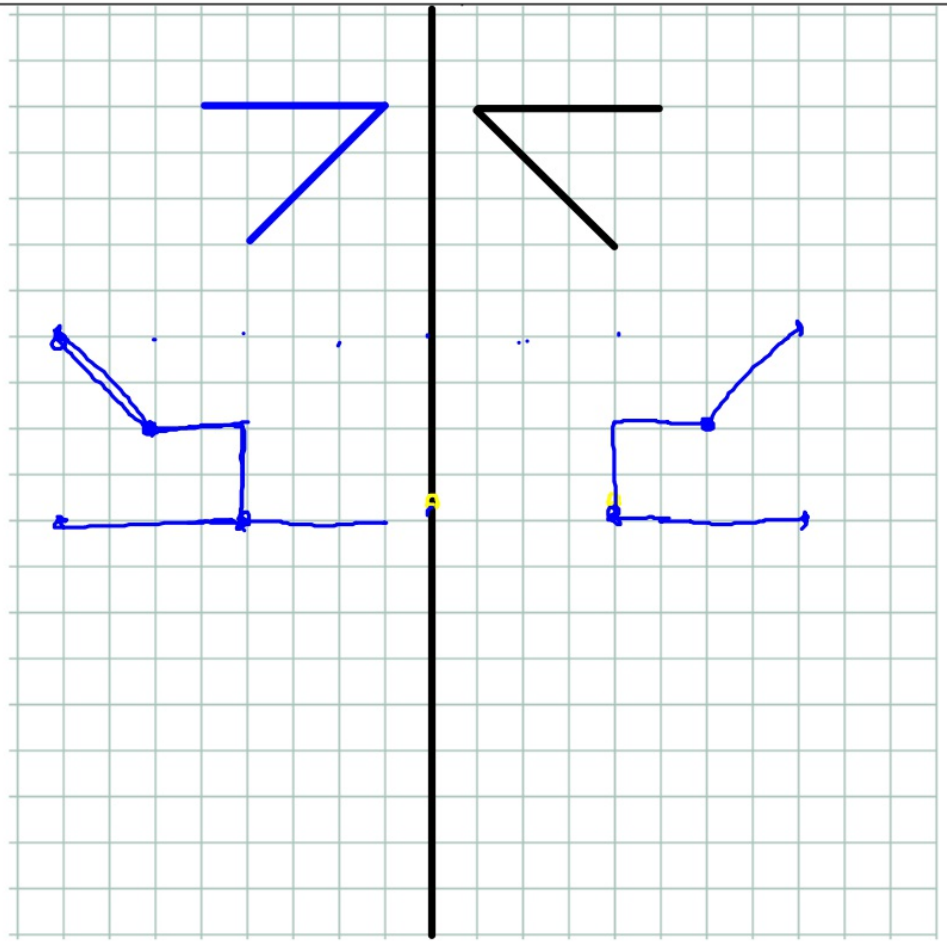


$(x, y) \rightarrow (y, x)$

1-6: Copy each figure on graph paper. Then draw the image by reflection in line *m*.

1)





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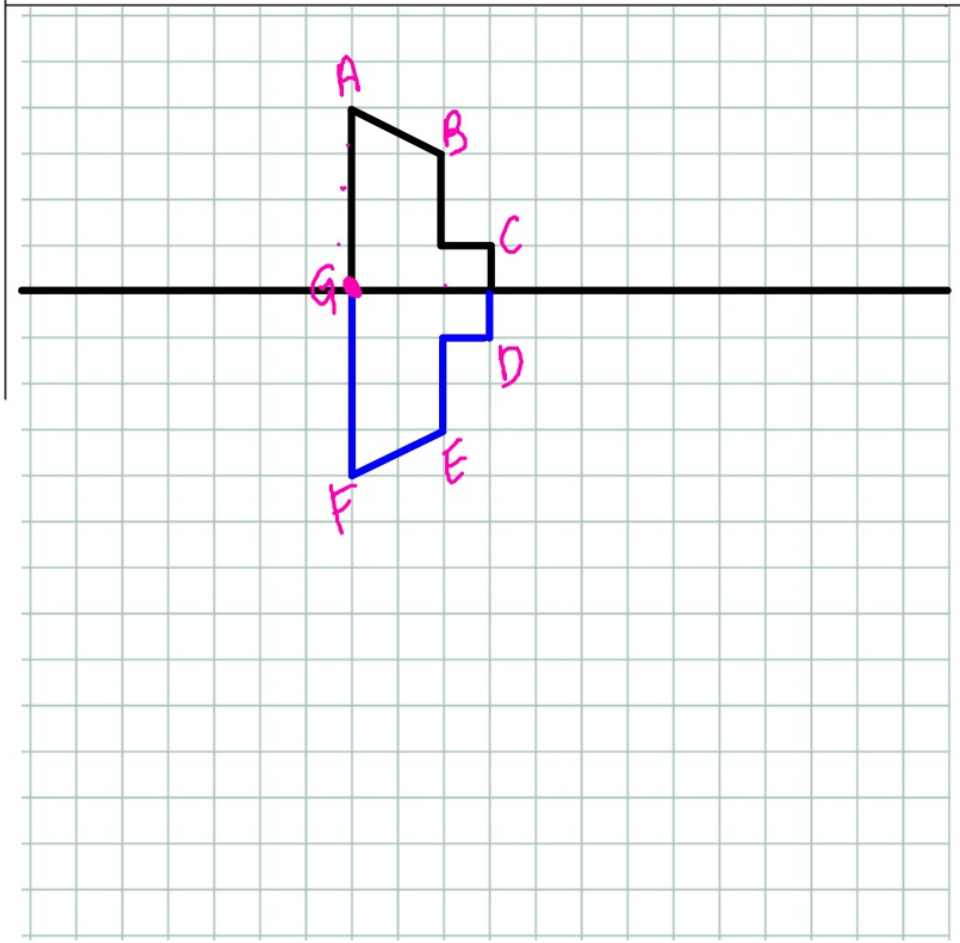
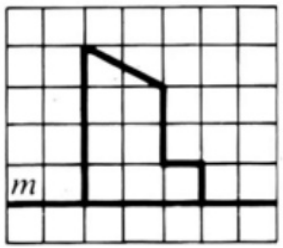


2)

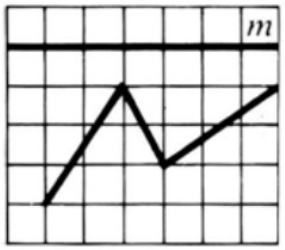


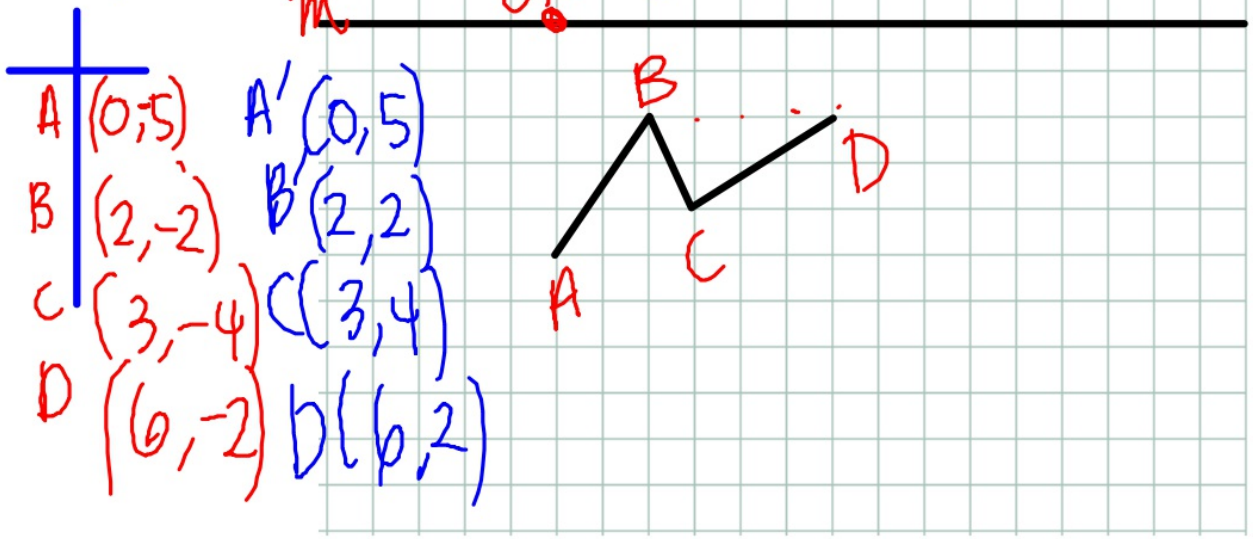
G	0,0
A	0,4
B	2,3
C	3,1

G.(0,0)
F (0,4)
E (2,3)
D (3,1)

1-6: Copy each figure on graph paper. Then draw the image by reflection in line *m*.

3)





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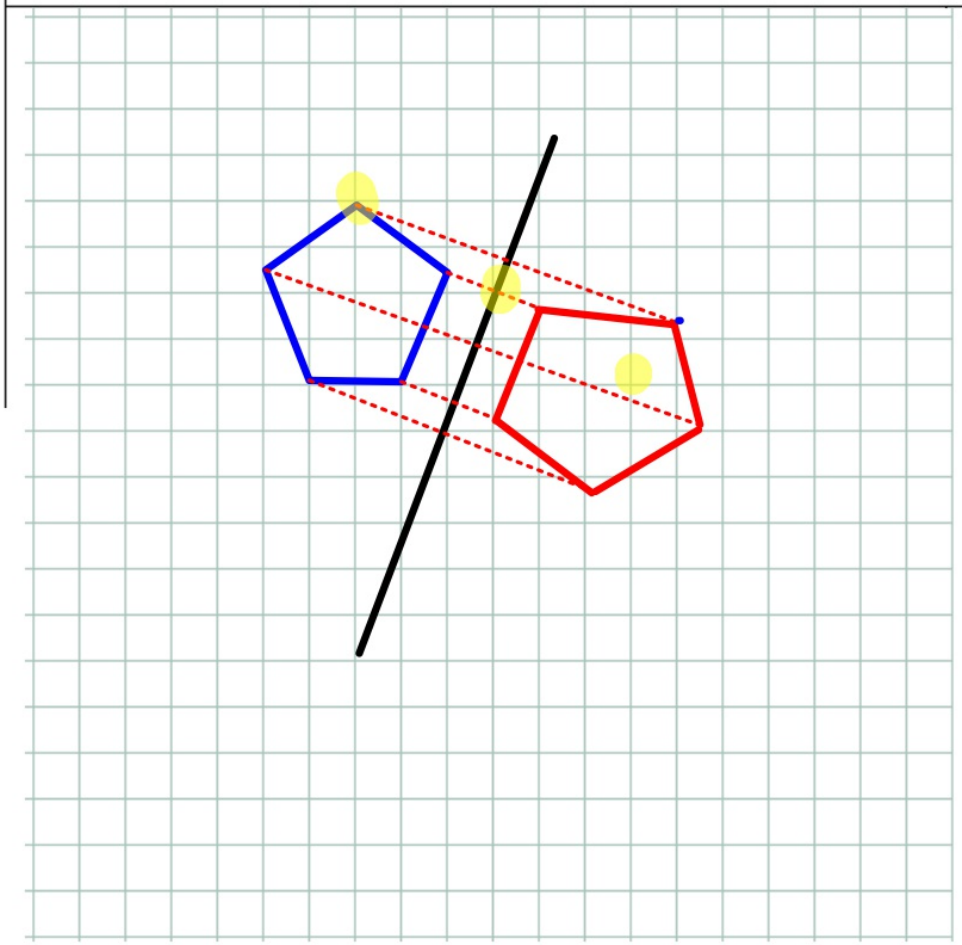
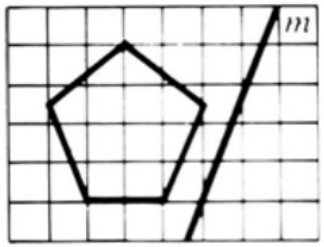
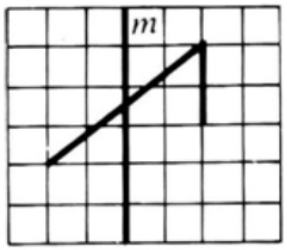


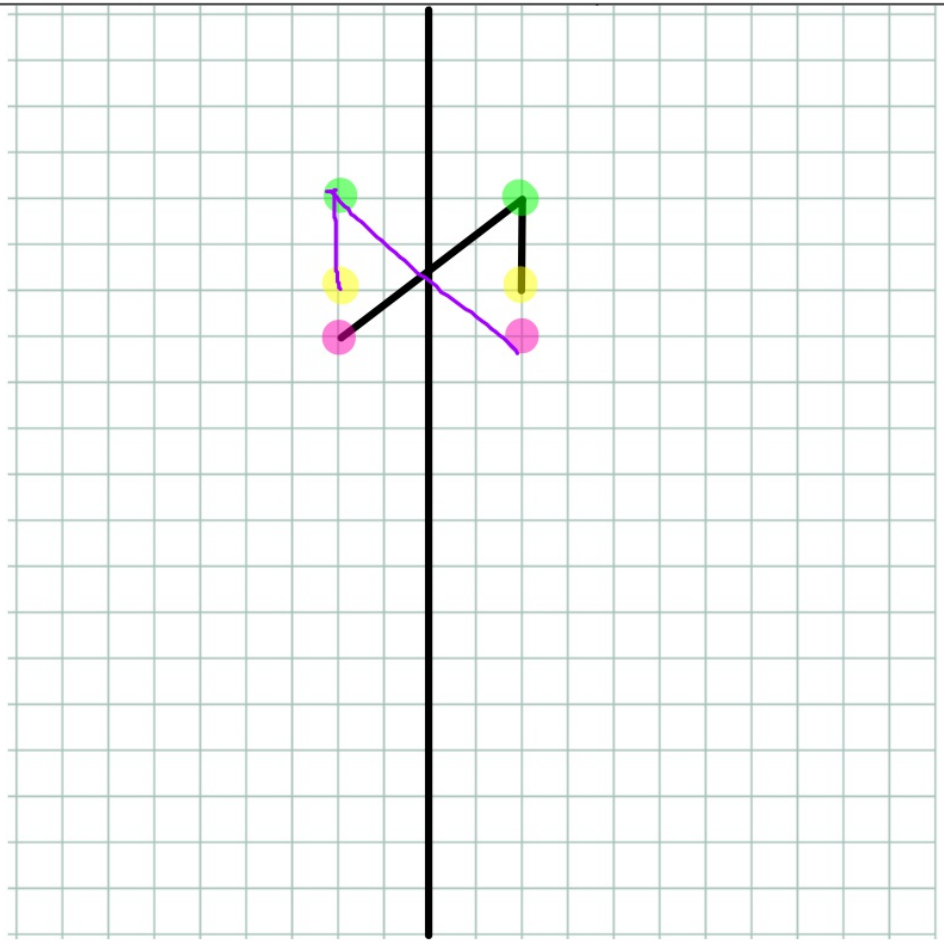
4)



1-6: Copy each figure on graph paper. Then draw the image by reflection in line *m*.

5)





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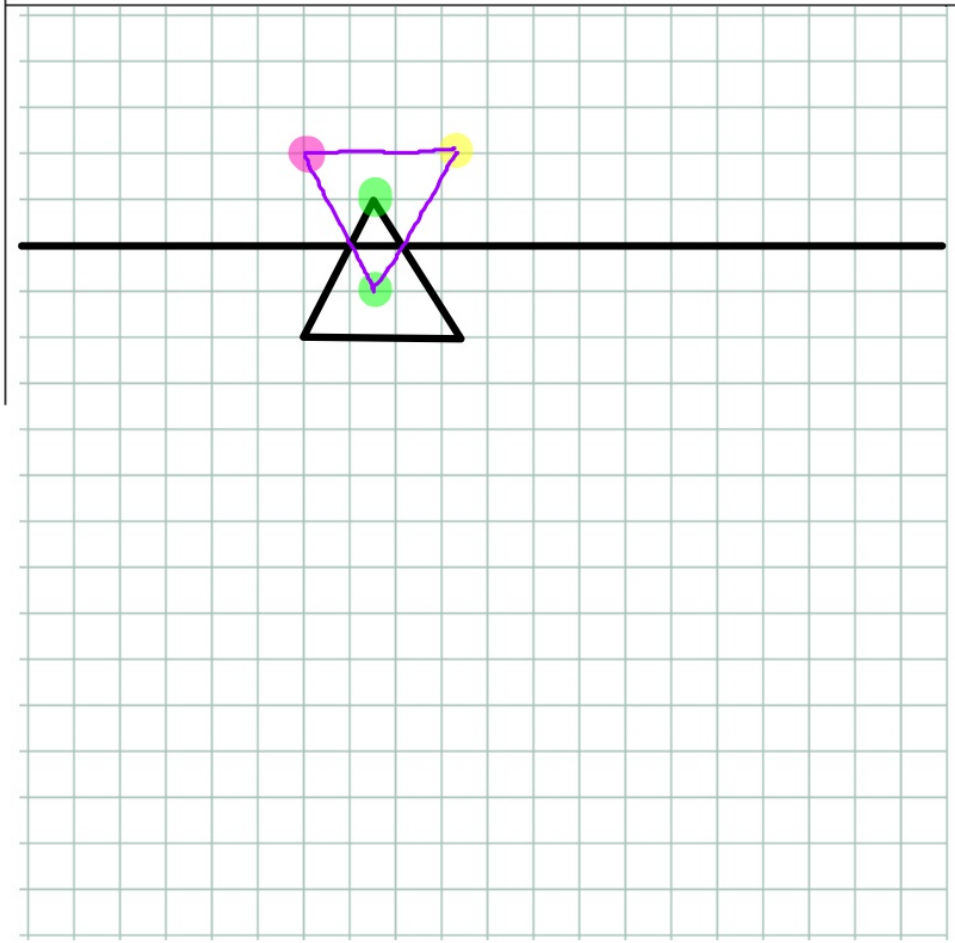
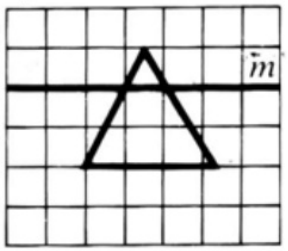
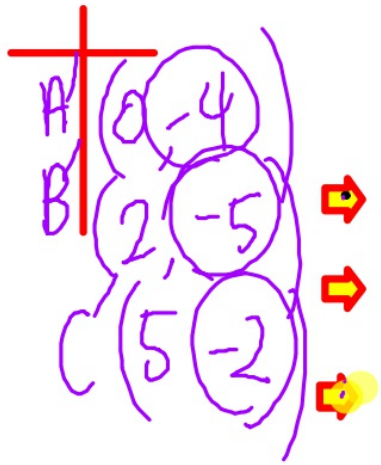


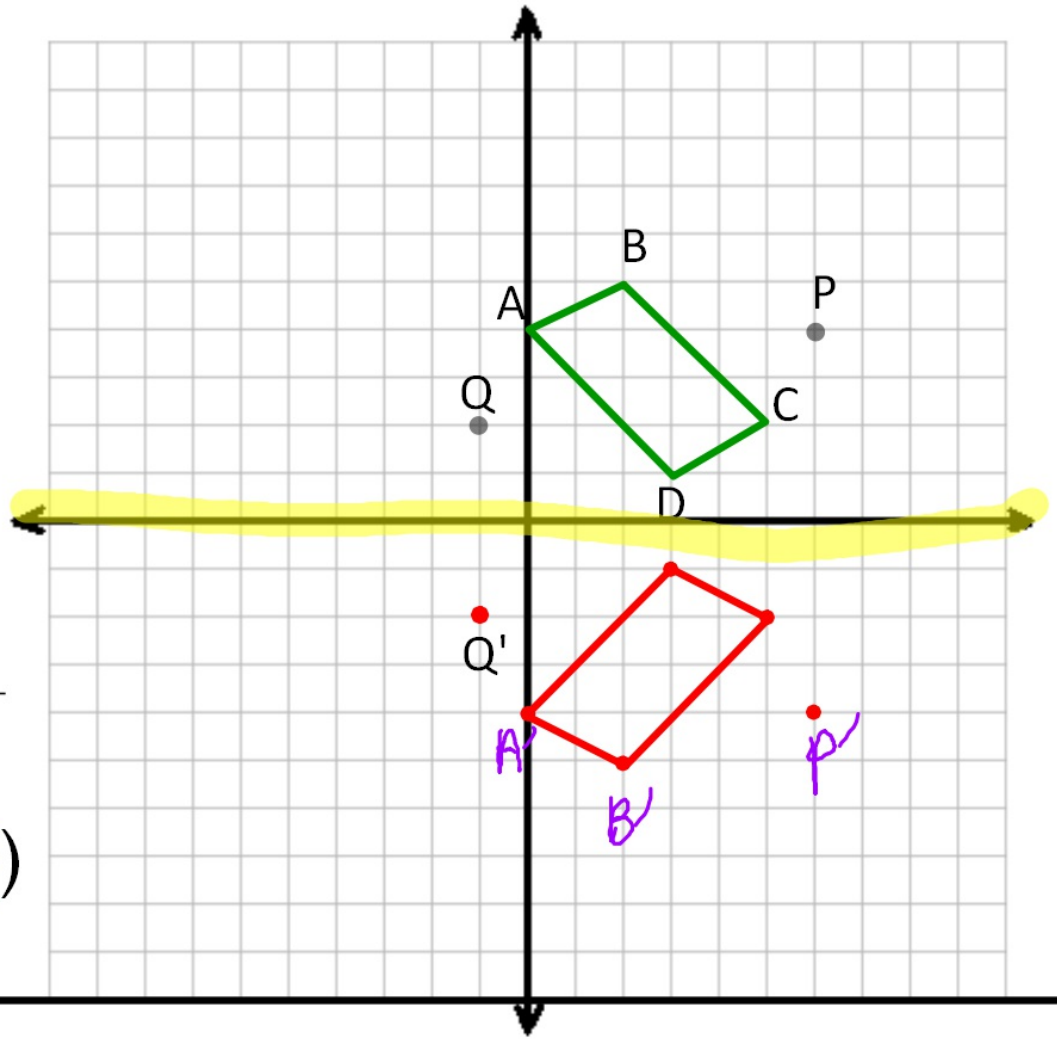
6)



7-9: Find the image of $P(6,4)$, $Q(-1,2)$, and $\square ABCD$ with $A(0,4)$, $B(2,5)$, $C(5,2)$, and $D(3,1)$ under each reflection.

7) The line of reflection is the x-axis.





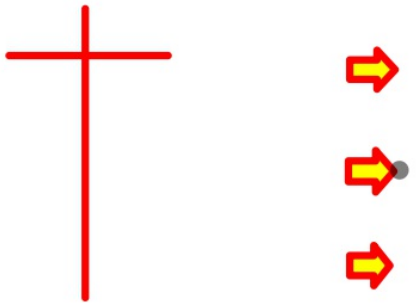
P(6, 4) --> (6 , -4)

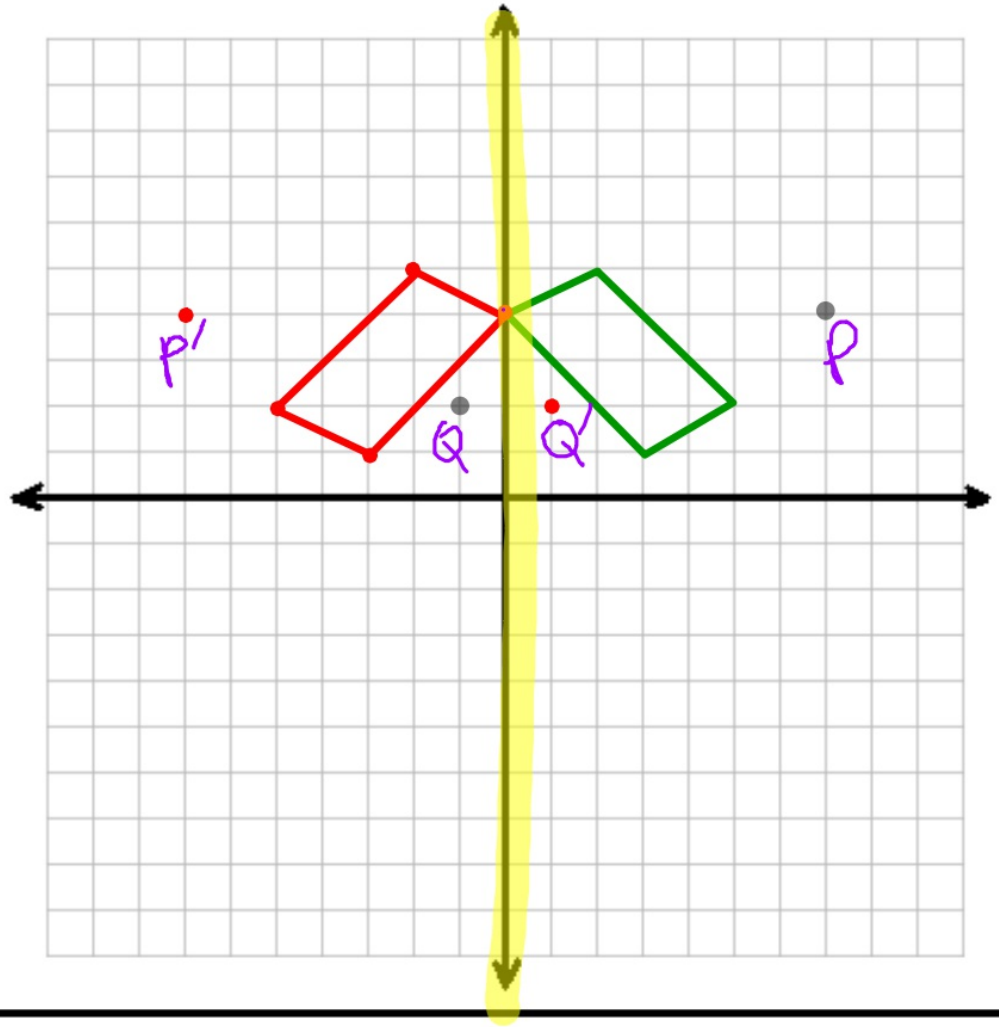
Q(-1, 2) --> (-1 , -2)

A reflection in the x-axis maps (x, y) to (x, -y)

7-9: Find the image of $P(6,4)$, $Q(-1,2)$, and $\square ABCD$ with $A(0,4)$, $B(2,5)$, $C(5,2)$, and $D(3,1)$ under each reflection.

8) The line of reflection is the y-axis.





P(6, 4) --> (-6, 4)

Q(-1, 2) --> (-1, 2)

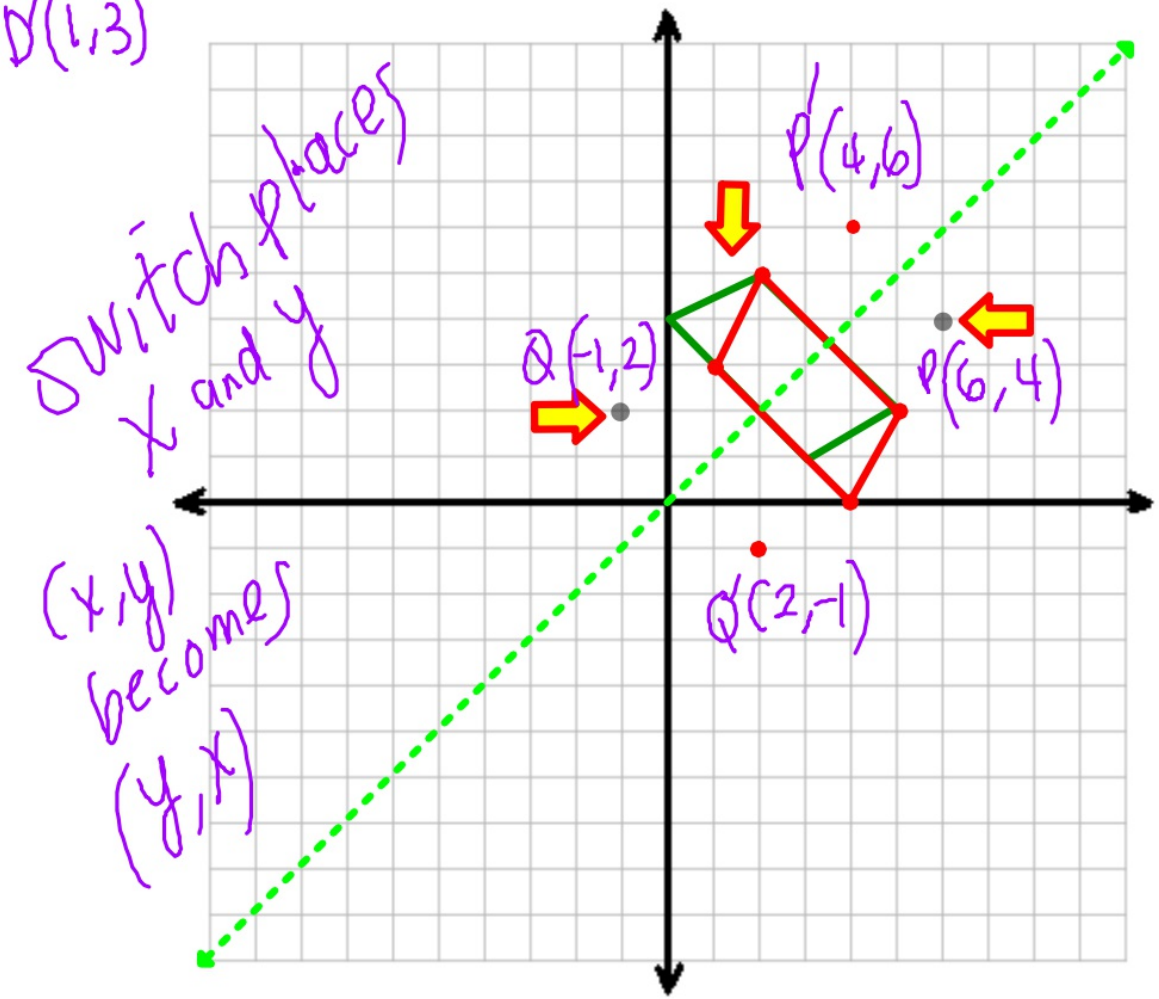
A reflection in the y-axis maps (x, y) to (-x, y)

7-9: Find the image of $P(6,4)$, $Q(-1,2)$, and $\square ABCD$ with $A(0,4)$, $B(2,5)$, $C(5,2)$, and $D(3,1)$ under each reflection.

A'4,0 B'(5,2) C'(2,5)

D(1,3)

9) The line of reflection is the line $y = x$.



P(6, 4) --> (4 ,6)

Q(-1, 2) --> (2,-1)

A reflection in the line y = x maps (x, y) to (y, x)

Reflect the figure with the given vertices across the given line.

***X*(2, –1), *Y*(–4, –3), *Z*(3, 2); *x*-axis**

The reflection of (x, y) is $(x, -y)$.

$X(2,-1) \rightarrow$ (2, 1)

$Y(-4,-3) \rightarrow$ (-4, 3)

$Z(3, 2) \rightarrow$ (3, -2)

R*(–2, 2), *S*(5, 0), *T*(3, –1); *y* = *x

The reflection of (x, y) is (y, x).

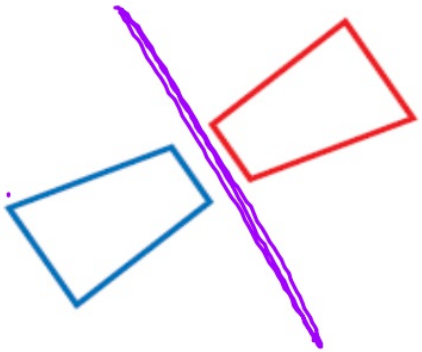
$R(-2, 2) \rightarrow$ (2, -2)

$S(5, 0) \rightarrow$ (0, 5)

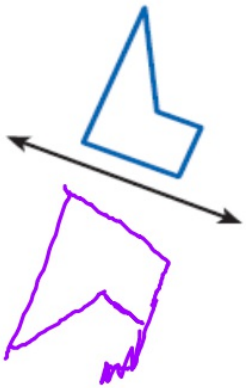
$T(3, -1) \rightarrow$ (-1, 3)

Lesson Quiz: Part I

1. Tell whether the transformation appears to be a reflection. If so, draw the line of reflection.



2. Copy the figure and the line of reflection. Draw the reflection of the figure across the line.



Lesson Quiz: Part II

Reflect the figure with the given vertices across the given line.

3. $A(2, 3)$, $B(-1, 5)$, $C(4,-1)$; $y = x$

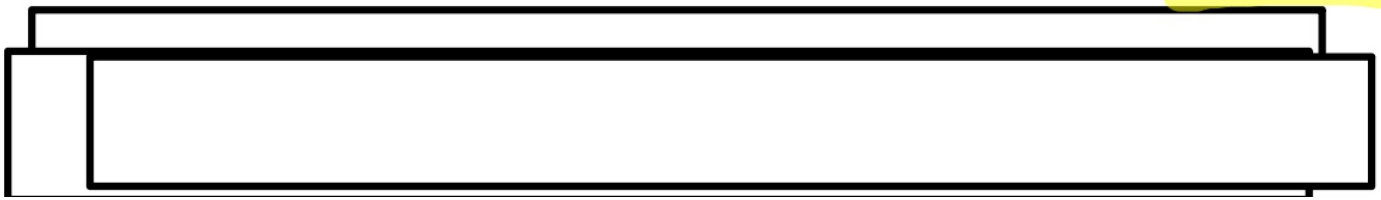
$A'(3, 2)$, $B'(5,-1)$, $C'(-1, 4)$

4. $U(-8, 2)$, $V(-3, -1)$, $W(3, 3)$; y-axis

$U'(8, 2)$, $V'(3, -1)$, $W'(-3, 3)$

5. $E(-3, -2)$, $F(6, -4)$, $G(-2, 1)$; x-axis

$E'(-3, 2)$, $F'(6, 4)$, $G'(-2, -1)$



HW 9.1

online

p607-608 #1-26

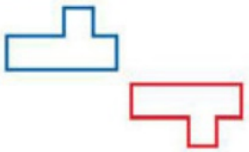
1. **Vocabulary** If a transformation is an *isometry*, how would you describe the relationship between the preimage and the image?

Tell whether each transformation appears to be a reflection.

2. 

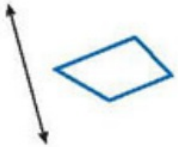
3. 

4. 

5. 

Multi-Step Copy each figure and the line of reflection. Draw the reflection of the figure across the line.

6. 

7. 

8. **City Planning** The towns of San Pablo and Tanner are located on the same side of Highway 105. Two access roads are planned that connect the towns to a point P on the highway. Draw a diagram that shows where point P should be located in order to make the total length of the access roads as short as possible.

Reflect the figure with the given vertices across the given line.

9. $A(-2, 1), B(2, 3), C(5, 2)$; x-axis
10. $R(0, -1), S(2, 2), T(3, 0)$; y-axis
11. $M(2, 1), N(3, 1), P(2, -1), Q(1, -1)$; $y = x$
12. $A(-2, 2), B(-1, 3), C(1, 2), D(-2, -2)$; $y = x$

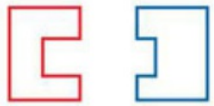
PRACTICE AND PROBLEM SOLVING

Tell whether each transformation appears to be a reflection.

13. 

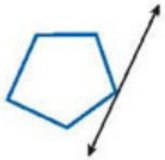
14. 

15. 

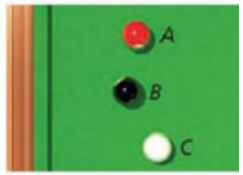
16. 

Multi-Step Copy each figure and the line of reflection. Draw the reflection of the figure across the line.

17. 

18. 

19. **Recreation** Cara is playing pool. She wants to hit the ball at point A without hitting the ball at point B. She has to bounce the cue ball, located at point C, off the side rail and into her ball. Draw a diagram that shows the exact point along the rail that Cara should aim for.



Reflect the figure with the given vertices across the given line.

20. $A(-3, 2), B(0, 2), C(-2, 0)$; y-axis
21. $M(-4, -1), N(-1, -1), P(-2, -2)$; $y = x$
22. $J(1, 2), K(-2, -1), L(3, -1)$; x-axis
23. $S(-1, 1), T(1, 4), U(3, 2), V(1, -3)$; $y = x$

Copy each figure. Then complete the figure by drawing the reflection image across the line.

24. 

25. 

26.