

### 3-4 Compositions of Transformations

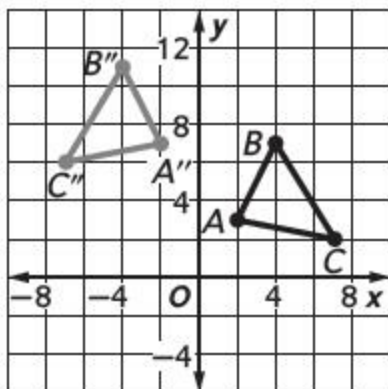
**Graph each figure with the given vertices and its image after the indicated glide reflection.**

12.  $\triangle ABC$ :  $A(2, 3)$ ,  $B(4, 7)$ ,  $C(7, 2)$

Translation: along  $\langle 0, 4 \rangle$

Reflection: in  $y$ -axis

**ANSWER:**

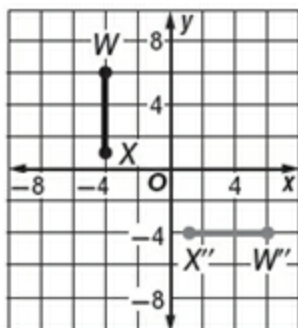


**SENSE-MAKING** Graph each figure with the given vertices and its image after the indicated composition of transformations.

13.  $\overline{WX}$ :  $W(-4, 6)$  and  $X(-4, 1)$

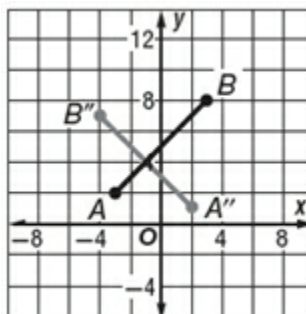
Reflection: in  $x$ -axis Rotation:  $90^\circ$  about origin

**ANSWER:**



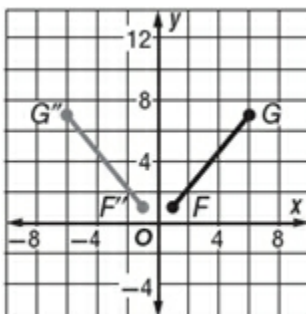
14.  $\overline{AB}$ :  $A(-3, 2)$  and  $B(3, 8)$  Rotation:  $90^\circ$  about origin  
Translation: along  $\langle 4, 4 \rangle$

**ANSWER:**



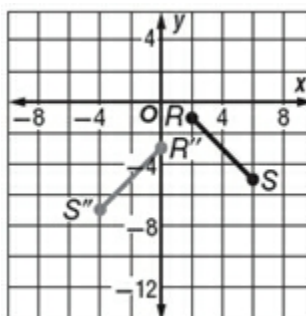
15.  $\overline{FG}$ :  $F(1, 1)$  and  $G(6, 7)$  Reflection: in  $x$ -axis  
Rotation:  $180^\circ$  about origin

**ANSWER:**



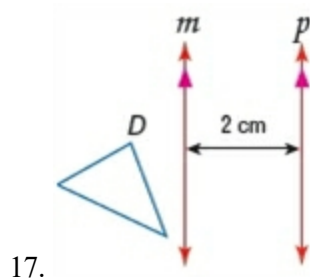
16.  $\overline{RS}$ :  $R(2, -1)$  and  $S(6, -5)$  Translation: along  $\langle -2, -2 \rangle$   
Reflection: in  $y$ -axis

**ANSWER:**

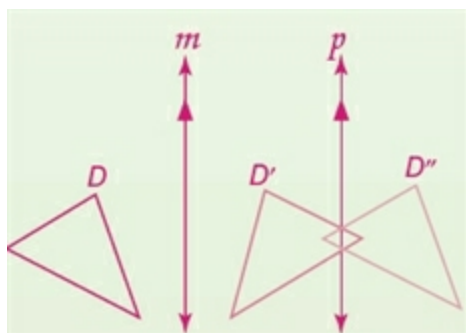


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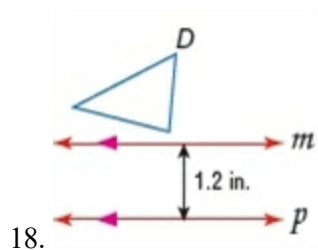
Copy and reflect figure  $D$  in line  $m$  and then line  $p$ . Then describe a single transformation that maps  $D$  onto  $D''$ .



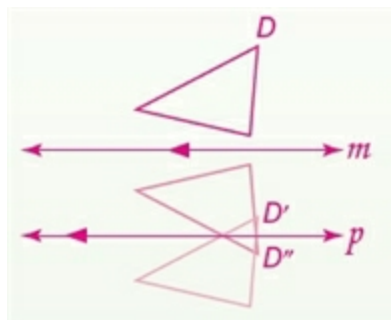
ANSWER:



horizontal translation 4 cm to the right

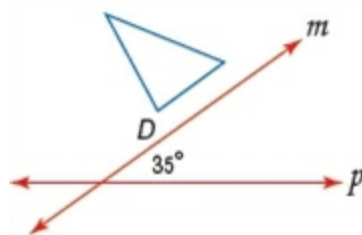


ANSWER:

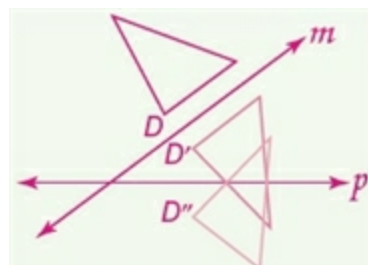


vertical translation 2.4 in. down

19.

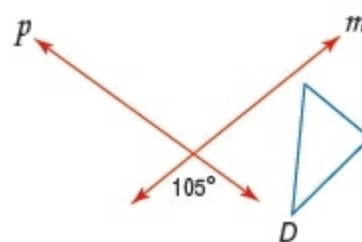


ANSWER:

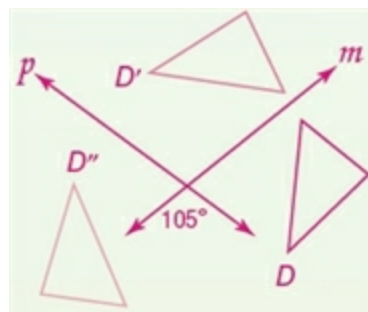


$70^\circ$  rotation about the point where lines  $m$  and  $p$  intersect

20.



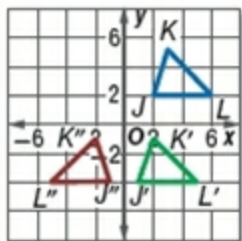
ANSWER:



$210^\circ$  rotation about the point where lines  $m$  and  $p$  intersect

### 3-4 Compositions of Transformations

Identify the sequence of transformations that will carry the preimage to the final image.



32.

**ANSWER:**

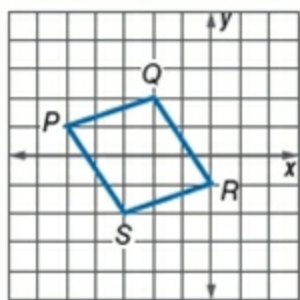
translation along  $\langle -1, -6 \rangle$  and reflection in the  $y$ -axis

37. **WRITING IN MATH** Do any points remain invariant under glide reflections? Under compositions of transformations? Explain.

**ANSWER:**

Sample answer: No; there are no invariant points in a glide reflection because all of the points are translated along a vector. Perhaps for compositions of transformations, there may be invariant points when a figure is rotated and reflected, rotated twice, or reflected twice.

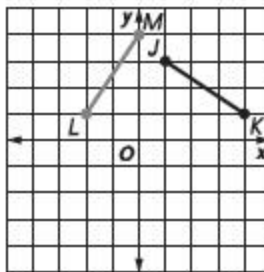
38. **CHALLENGE** If  $PQRS$  is translated along  $\langle 3, -2 \rangle$ , reflected in  $y = -1$ , and rotated  $90^\circ$  about the origin, what are the coordinates of  $P'''Q'''R'''S'''$ ?



**ANSWER:**

$P'''(1, -2)$ ,  $Q'''(2, 1)$ ,  $R'''(-1, 3)$ ,  $S'''(-2, 0)$

43. Which composition of transformations maps  $JK$  to  $\overline{LM}$ ?



- A rotation  $90^\circ$  about the origin and translation along  $\langle 0, -1 \rangle$
- B reflection in  $y$ -axis and translation along  $\langle -1, -2 \rangle$
- C translation along  $\langle 0, -1 \rangle$  and rotation  $90^\circ$  about the origin
- D translation along  $\langle -1, 1 \rangle$  and reflection in  $y$ -axis

**ANSWER:**

C