Essential Question

What conjectures can you make about a figure reflected in two lines?

Identifying Congruent Figures

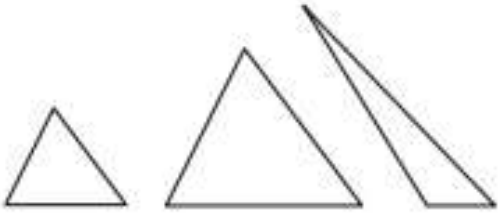
Defition

Two geometric figures are **congruent figures** if and only if there is a rigid motion or a composition of rigid motions that maps one of the figures onto the other. Congruent figures have the same size and shape.

Congruent

same size and shape

Not congruent



different sizes or shapes

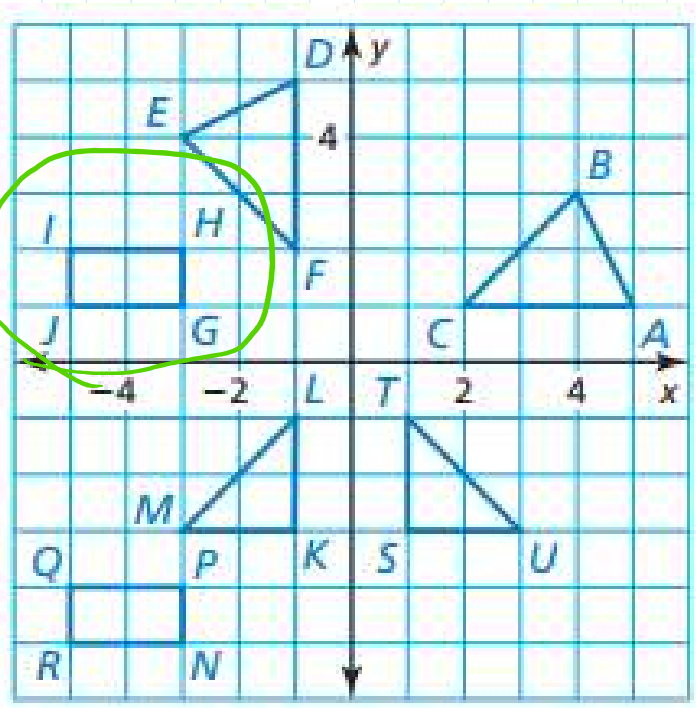
Identify the Congruent shapes:

$\triangle DEF \cong \triangle CBA$

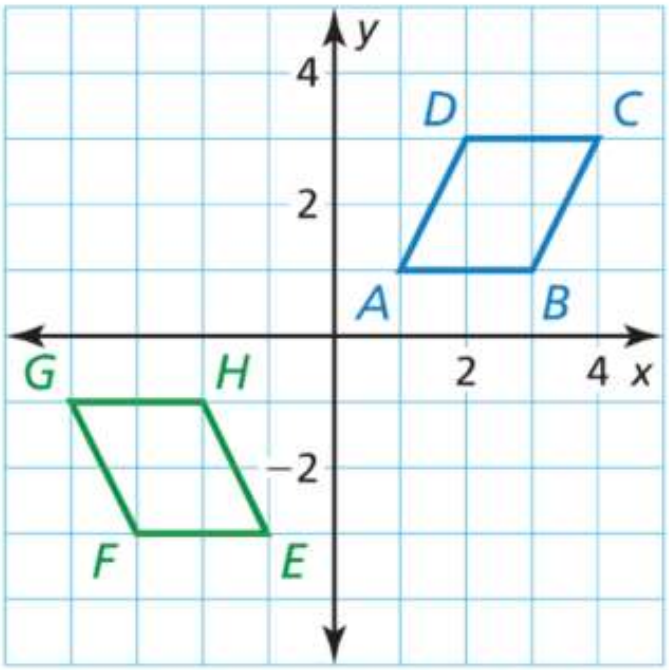
$\triangle DEF \cong \triangle ADC$

$\square GHIJ \cong \square NPQR$

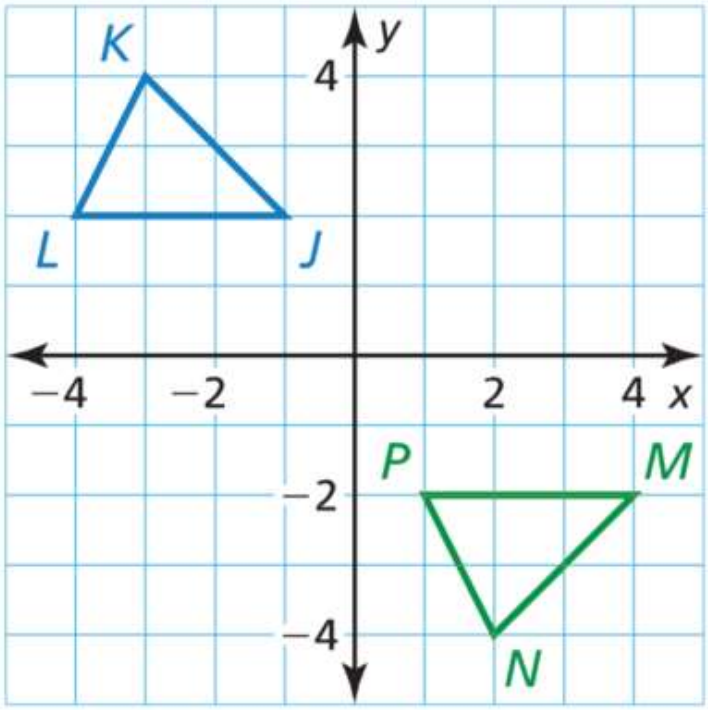
$\square GHIJ \cong \square QRNP$



Describe the congruence transformation from $\square ABCD \rightarrow \square EFGH$



Describe the congruence transformation from $\triangle JKL \rightarrow \triangle MNP$



There are 2 possibilities, can you find both?

Theorem

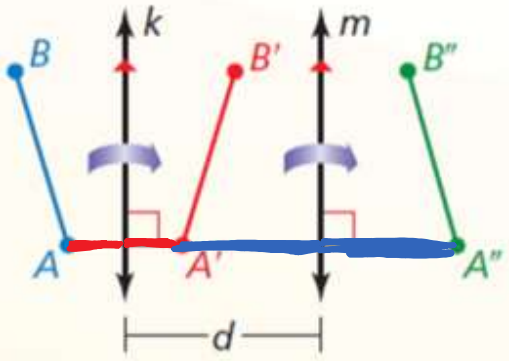
Theorem 4.2 Reflections in Parallel Lines Theorem

If lines k and m are parallel, then a reflection in line k followed by a reflection in line m is the same as a translation.

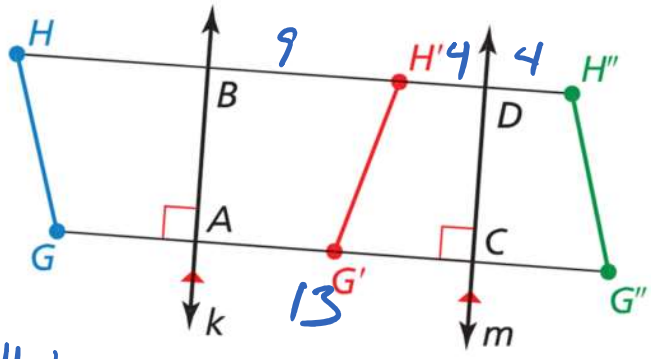
If A'' is the image of A, then

1. $\overline{AA''}$ is perpendicular to k and m, and
2. $AA'' = 2d$, where d is the distance between k and m.

Proof Ex. 31, p. 206



In the diagram, a reflection in line k maps $\overline{GH}$ to $\overline{G'H'}$. A reflection in line m maps $\overline{G'H'}$ to $\overline{G''H''}$. Also, $HB = 9$ and $DH'' = 4$.



a. Name any segments congruent to each segment: $\overline{GH}$, $\overline{HB}$, and $\overline{GA}$.

$\overline{GH} \cong \overline{G'H'} \cong \overline{G''H''}$

$\overline{HB} \cong \overline{BH'}$

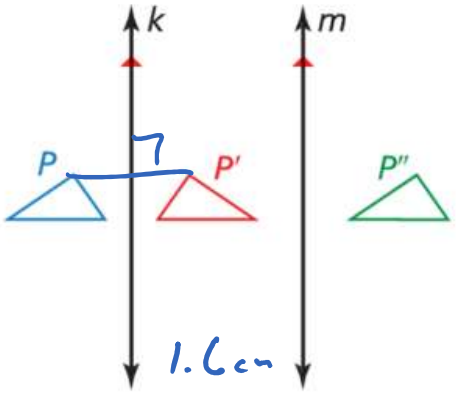
$\overline{GA} \cong \overline{AG'}$

b. Does $AC = BD$? Explain. yes, def. of $\parallel$ lines

c. What is the length of $\overline{GG''}$?

$2(AC) = 26$

Use the figure. The distance between line k and line m is 1.6 centimeters.



4. The preimage is reflected in line k, then in line m. Describe a single transformation that maps the blue figure to the green figure.

translation $\langle 3.2, 0 \rangle$

5. What is the relationship between $\overline{PP'}$ and line k? Explain.

$\perp$, because it is a reflection in k

6. What is the distance between P and P''?

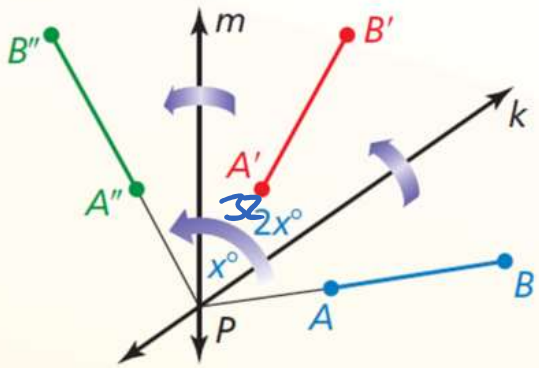
3.2cm

Theorem

Theorem 4.3 Reflections in Intersecting Lines Theorem

If lines k and m intersect at point P, then a reflection in line k followed by a reflection in line m is the same as a rotation about point P.

The angle of rotation is $2x°$, where $x°$ is the measure of the acute or right angle formed by lines k and m.

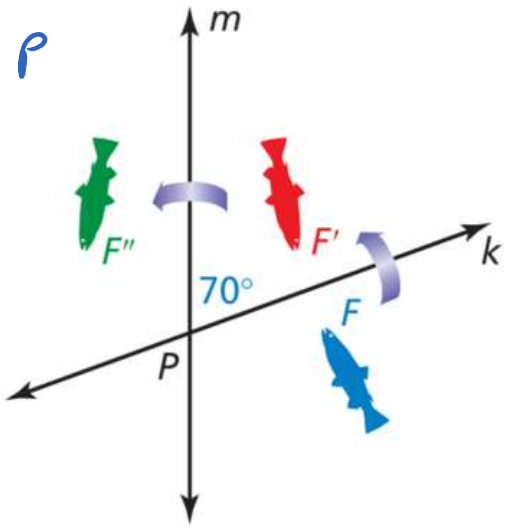


$m\angle BPB'' = 2x°$

Proof Ex. 31, p. 250

In the diagram, the figure is reflected in line k. The image is then reflected in line m. Describe a single transformation that maps F to F''.

140° rotation about P



Practice sec 4.4; Pg. 204:
1, 3-21EO