

Reflections in Parallel and Intersecting Lines

Lesson Objective

INBAT use theorems about congruence transformations

Using Theorems about Congruence Transformations

Compositions of two reflections result in either a translation or a rotation.

A composition of two reflections in parallel lines results in a translation.

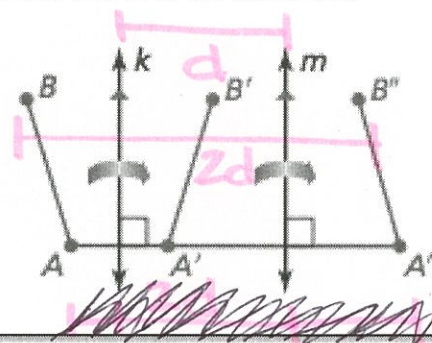
A composition of two reflections in intersecting lines results in a rotation.

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.

Also, If A'' is the IMAGE of A , then the following are true:

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



Example:

1. 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. Fill in the blank with the appropriate congruent segment.

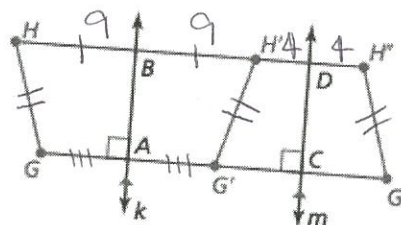
$$\overline{GH} \cong \underline{\overline{G'H'}} \cong \underline{\overline{G''H''}}$$

$$\overline{HB} \cong \underline{\overline{H'B}}$$

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

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

$$9 + 9 + 4 + 4 = \underline{26}$$



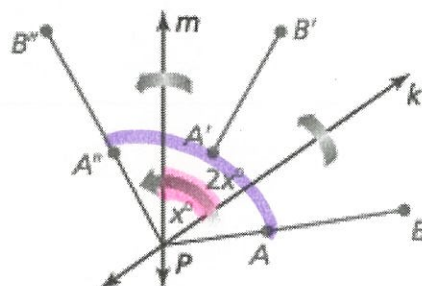
- c. What is the distance between k and m ?

$$\star \frac{1}{2} \text{ the dist. between } G \text{ and } G'' \quad \frac{26}{2} = \underline{13}$$

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 .

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

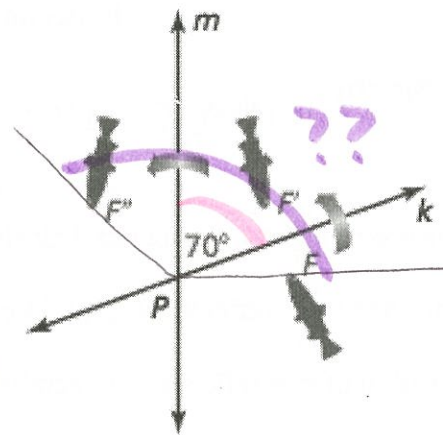


Examples

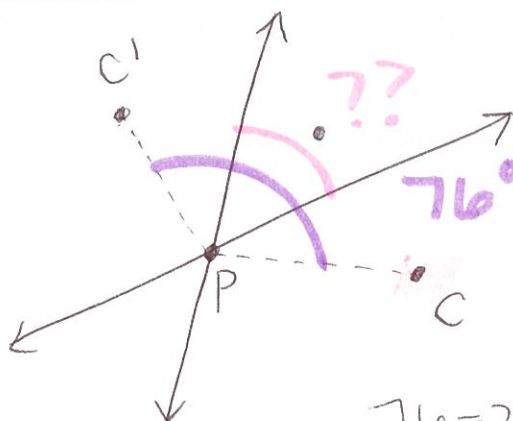
2. In the diagram, the figure is reflected in line k . The image is then reflected in line m . Describe a single transformation that maps F to F'' .

$$x = 70^\circ \Rightarrow 2x = 140^\circ$$

140° about point P



3. A rotation of 76° maps C to C' . To map C to C' using TWO reflections, what is the measure of the angle formed by the intersecting lines of reflection?



$$76 = 2x$$

$$38 = x$$

38°