

Chapter 4

Transformations



4.1 - Translations

4.2 - Reflections

4.3 - Rotations

4.4 - Congruence and Transformations

4.5 - Dilations

4.6 - Similarity and Transformations

4.4 - Congruence and Transformations

Vocabulary

Congruent Figures

Two geometric figures are congruent figures if and only if there is a rigid motion (**isometry**) or a composition of rigid motions (**isometries**) that maps one of the figures onto the other.

Congruent



same size and shape

Not congruent



different sizes or shapes

4.4 - Congruence and Transformations

Vocabulary

Congruence Transformation

a rigid motion or a combination of rigid motions in which the pre-image and image are congruent figures

“Congruence transformation”, “isometry”, and “rigid motion” all mean the same thing.

Congruent



same size and shape

Not congruent

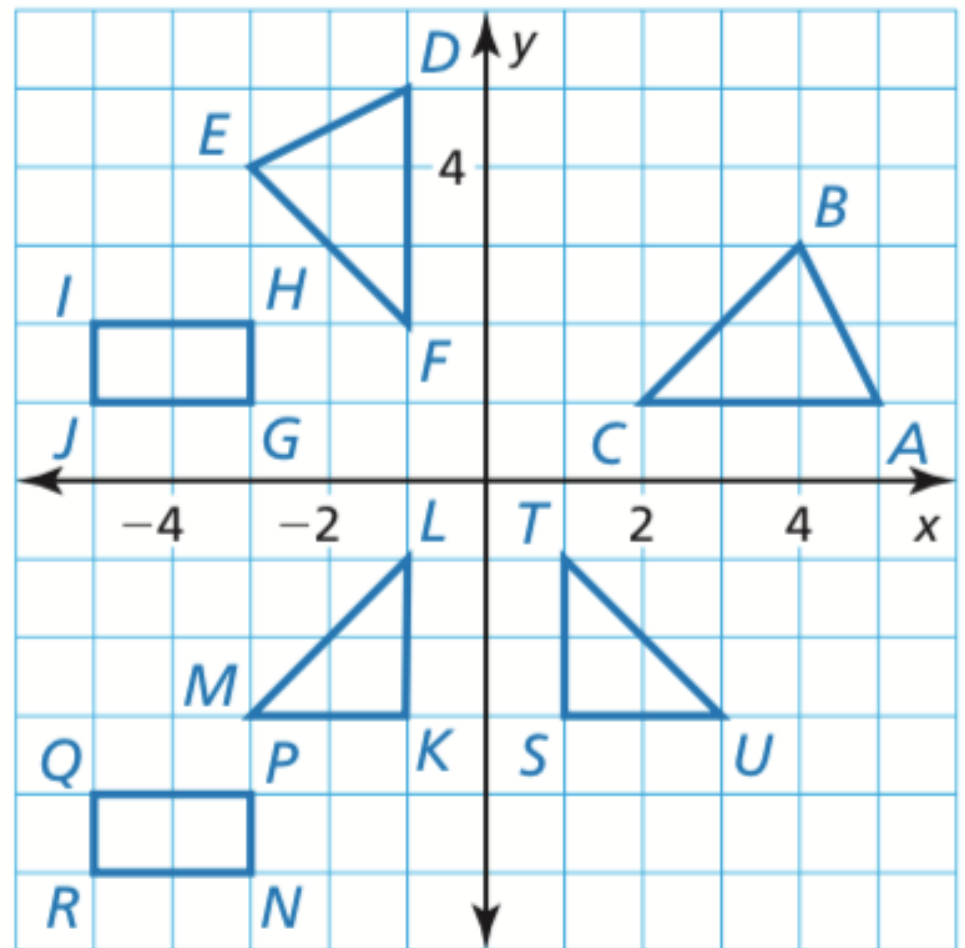


different sizes or shapes

4.4 - Congruence and Transformations

Solve:

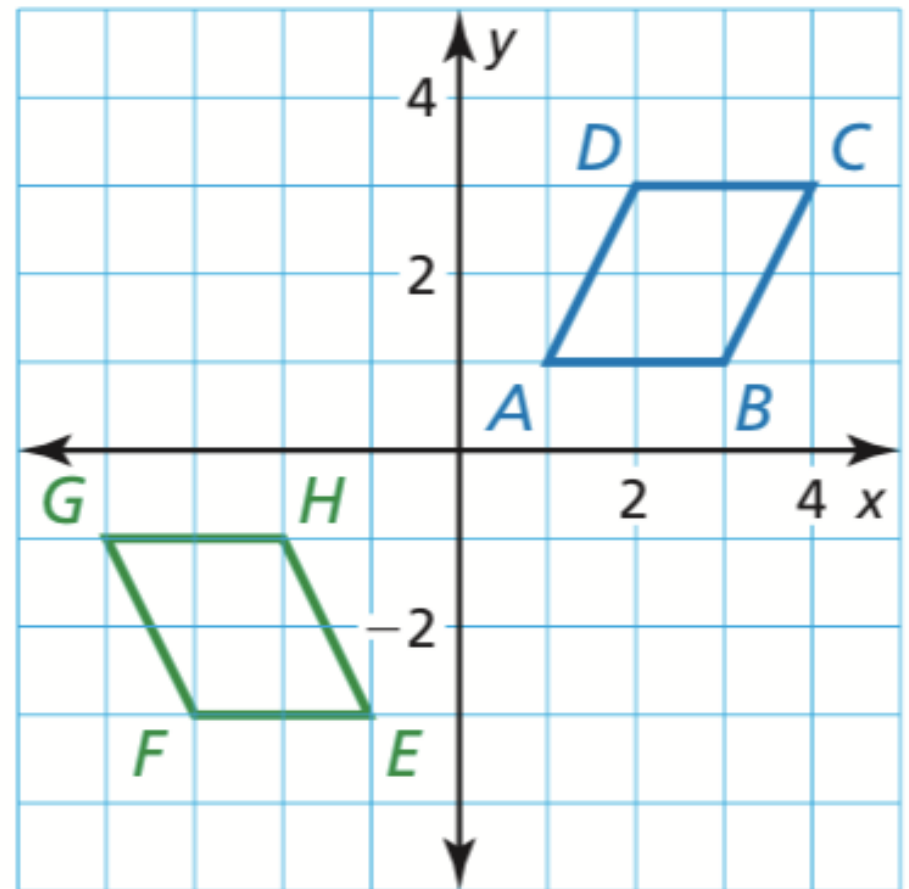
Identify congruent figures in the diagram, and determine the rigid motions (isometries) that were used.



4.4 - Congruence and Transformations

Solve:

Describe a congruence transformation that maps $\square ABCD$ to $\square EFGH$.



4.4 - Congruence and Transformations

Theorem

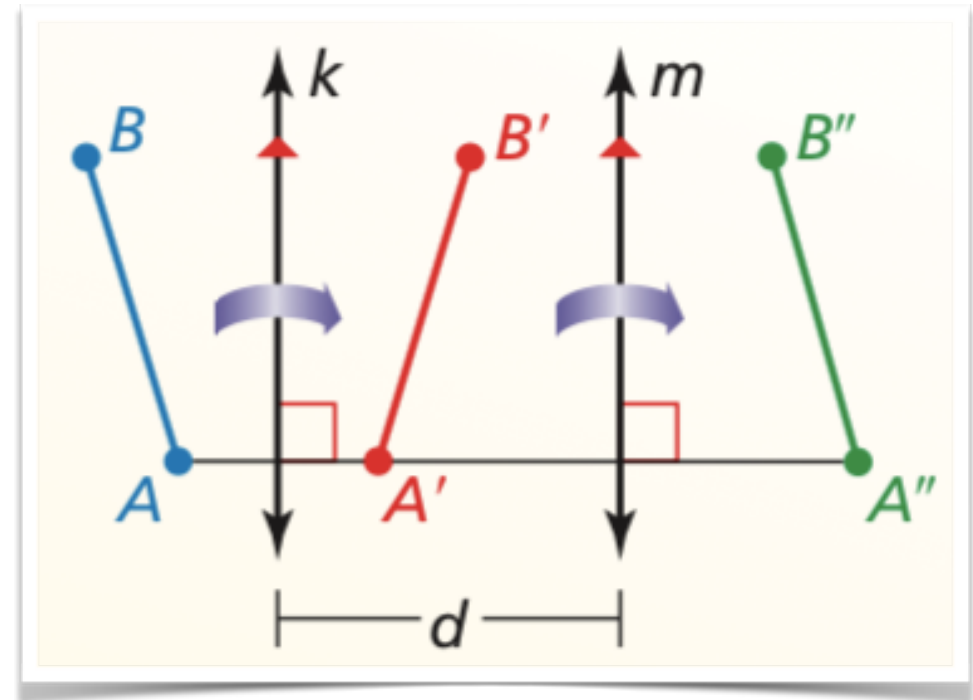
Reflections in Intersecting Lines Theorem

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.

Definition:

If A'' is the image of A , then

1. AA'' is perpendicular to lines k and m , and
2. $AA'' = 2d$, where d is the distance between lines k and m .

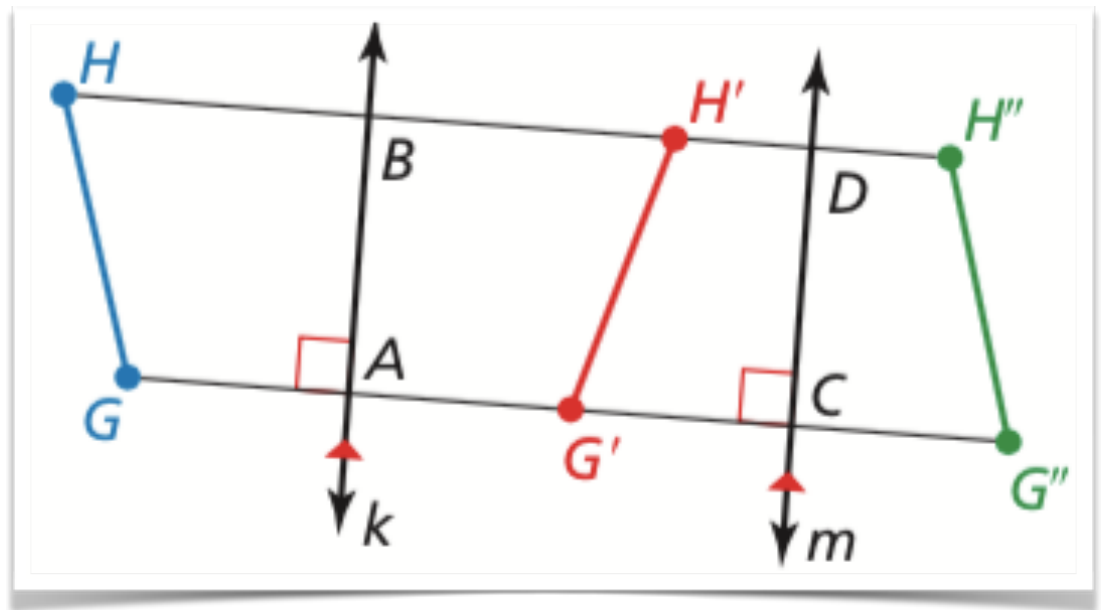


4.4 - Congruence and Transformations

Solve:

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

- Name any segments congruent to: GH , HB , and GA .
- Does $AC = BD$?
- What is the length of GG'' ?



4.4 - Congruence and Transformations

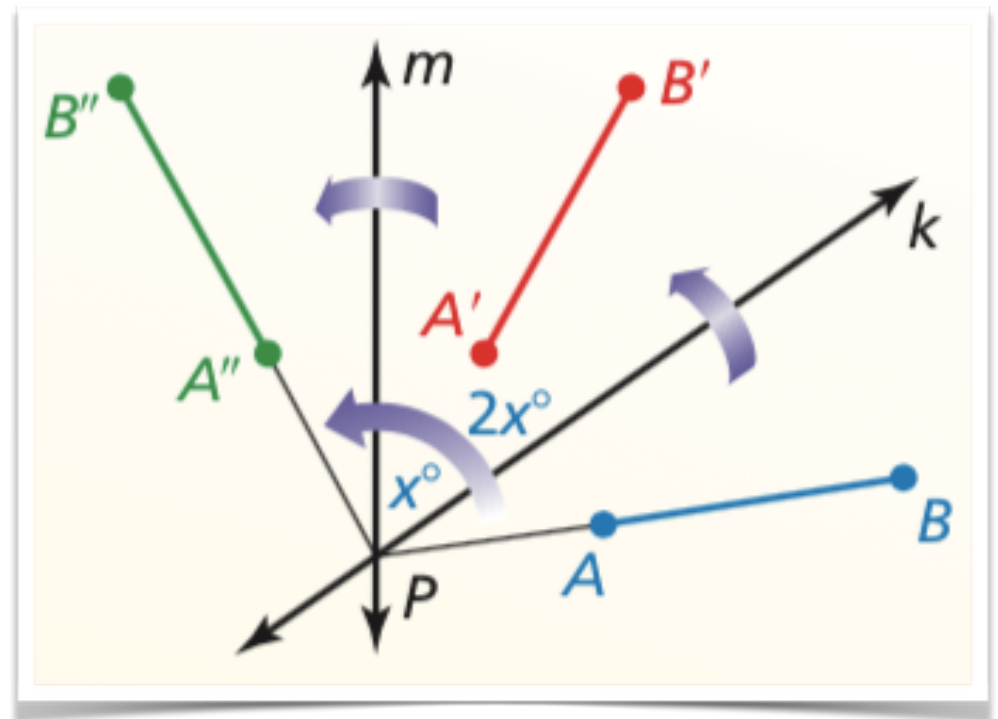
Theorem

Reflections in Parallel 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 .

Definition:

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



4.4 - Congruence and Transformations

Solve:

In the diagram, the pre-image is reflected in line k , then in line m . Describe a single transformation that maps the blue figure onto the green figure.

