4.4 Congruence and Transformations

Identifying Congruent Figures:

Spiral review:

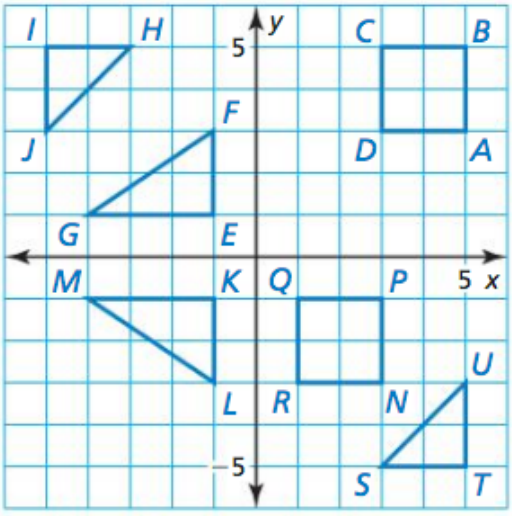
What is a rigid motion?

Key Concepts

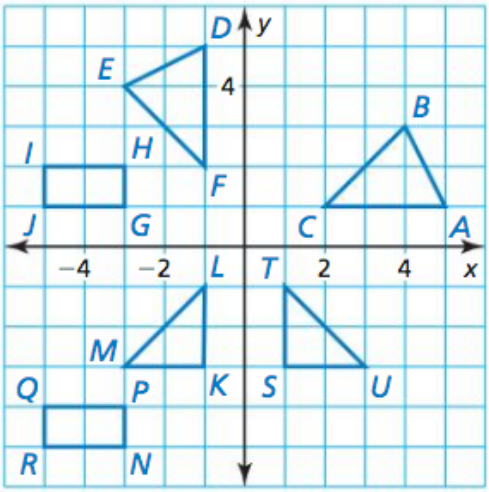
Two geometric figures are ***congruent figures*** if and only if there is a rigid motion or a composition of rigid motions that maps one of the figures onto the other.

Example 1:

Identify any congruent figures in the coordinate plane.
Explain your answers using proper terminology.



Try on your own:

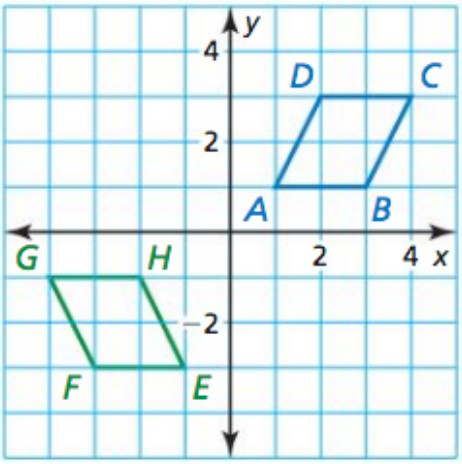


Congruence Transformations:

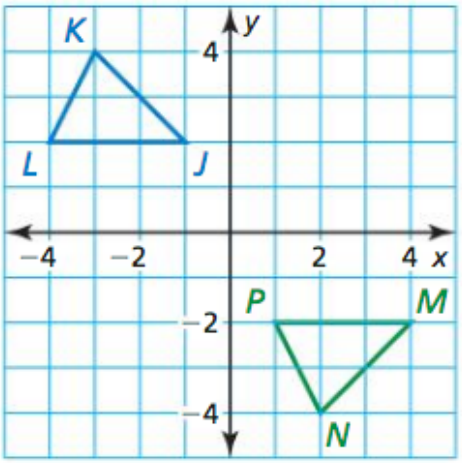
Another name for a rigid motion or a combination of rigid motions
Is a ***congruence transformation***. This is due to the figure (preimage)
And the image being congruent.

Example 2:

Describe a congruence transformation that maps *quad. ABCD* to *quad. EFGH*



Try on your own.



Reflections in Parallel Lines Theorem

Theorem

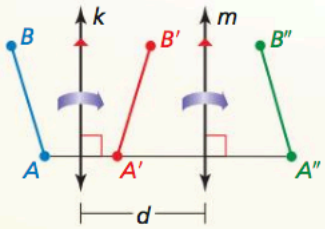
Theorem 4.2 Reflections in Parallel Lines Theorem

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



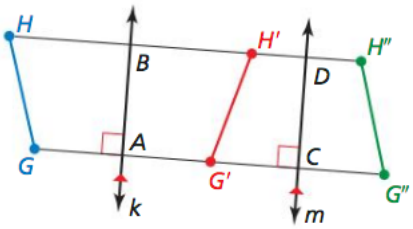
Example 3:

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 $\overline{GA}$.

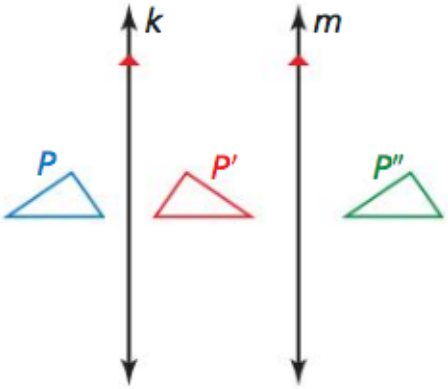
b. Does $AC = BD$? Explain.

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



Try on your own:

The distance between line K and line M is 1.6cm. Determine the length of segment PP"



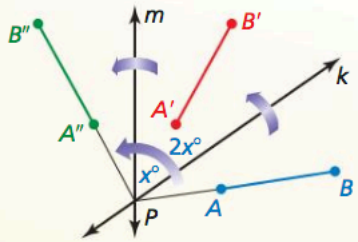
Reflections in Intersecting Lines Theorem

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.

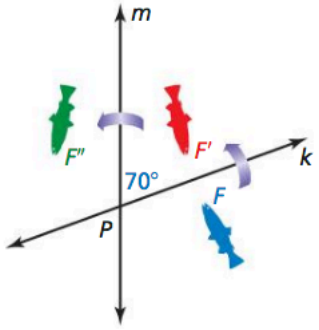


$m\angle BPB'' = 2x°$

Proof Ex. 31, p. 250

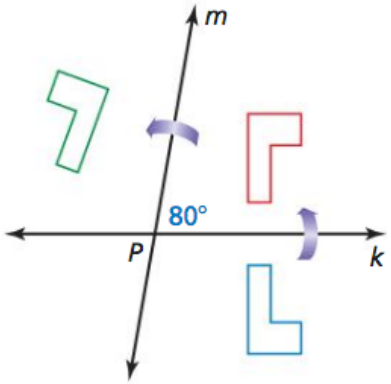
Example 4:

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''.



Try on your own:

Describe a single transformation that maps the blue figure onto the green figure.



Classwork/Homework:

3, 5, 7, 9, 11-15, 18, 30