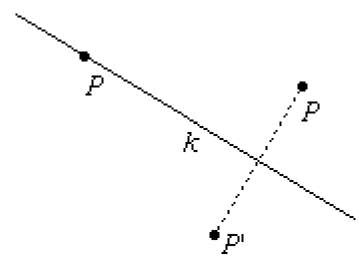
6-2: Line Reflections

Definition: A **transformation** is a one-to-one correspondence between two sets of points, *S* and *S'*, such that every point in set *S* corresponds to one and only one point in set *S'*, called its **image**, and every point in *S'* is the image of one and only one point in *S*, called its **preimage**.

Definition: A **reflection in line *k*** is a transformation in the plane such that:



1. If a point *P* is not on *k*, then the image of *P* is *P'* where *k* is the perpendicular bisector of $\overline{PP'}$.
2. If point *P* is on *k*, the image of *P* is *P*.

- Under a line reflection, the size and shape of the image is the same size and shape of the preimage:

Theorem and Corollaries: Under a line reflection distance, angle measure, collinearity, and midpoint are preserved.

- The proof is left to the reader.

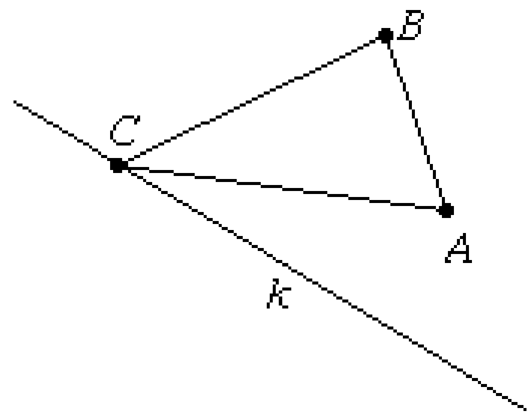
- **Notation:**
  - $r_k(A) = B$ *means*

    "The image of *A* under a reflection in the line *k* is *B*."
  - $r_k(\Delta ABC) = \Delta A'B'C'$ *means*

    "The image of ΔABC under a reflection in line *k* is $\Delta A'B'C'$."

Example:

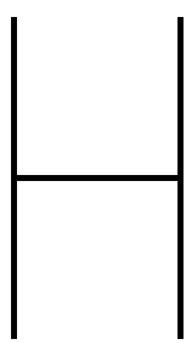
If $r_k(\Delta ABC) = \Delta A'B'C'$, construct $\Delta A'B'C'$.



Note: $\Delta ABC \cong \Delta A'B'C'$ by the theorem and corollaries above.

Definition: A figure has line symmetry when the figure is its own image under a line reflection.

Example: How many lines of symmetry does the letter H have?



Homework: