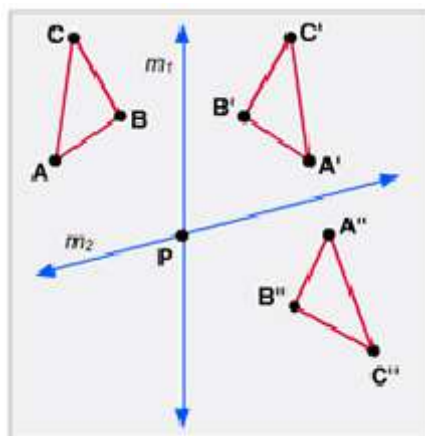


Rigid transformations

Student Activity Sheet 3; use with *Exploring* “Reflections and rotations”

1. In the diagram, $\triangle A''B''C''$ is a composition of two reflections across lines m_1 and m_2 . Compare how $\triangle ABC$ and $\triangle A''B''C''$ are oriented with respect to the intersecting lines. How can you tell from the images that $\triangle A''B''C''$ is not a translation of $\triangle ABC$? [EX2, page 2]



In a translation, each point in a figure moves the same distance in the same direction. So, the line segments connecting corresponding points would have to be the same length and parallel. In this case, the line segments connecting the corresponding vertices of $\triangle ABC$ and $\triangle A''B''C''$ are not parallel or congruent. So, this transformation cannot be a translation.

2. Fill in the blanks to complete the following statements. [EX2, page 4]

A rotation of a point about a fixed point is a composite of two reflections of the point across intersecting lines. The point of intersection of the lines is the center of rotation.

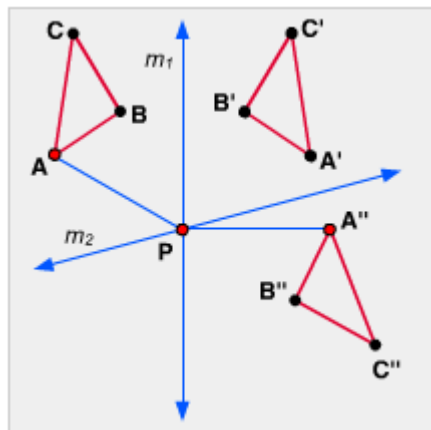
3. Compare the orientation of $\triangle ABC$ and $\triangle A''B''C''$. Do you think your observation is true for all rotations? [EX2, page 4]

On both triangles, the vertices go in a counterclockwise direction, from **A** to **B** to **C**. Therefore, they have the same orientation. In general, rotations preserve orientation.

Rigid transformations

Student Activity Sheet 3; use with *Exploring* “Reflections and rotations”

4. Use the diagram to write another definition for rotation. [EX2, page 6]



A rotation about a point P maps A to A'' so that $\angle APA''$ is the angle of rotation and $PA = PA''$.

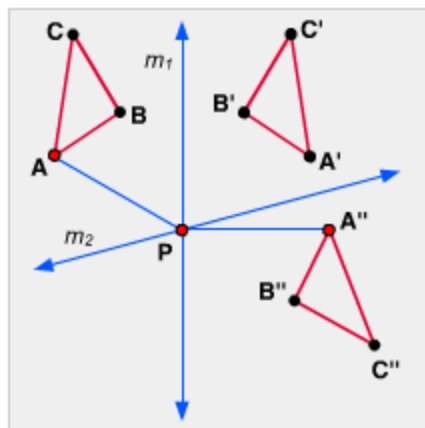
Use the terms provided to fill in the blanks in the statements below. [EX2, page 7]

bisector	$4x$	rotation	transformation
perpendicular bisector	reflection	translation	x

- A rigid transformation preserves distance, angle measure, and area.
- Point P' is a reflection of P across line m if and only if m is the perpendicular bisector of $\overline{PP'}$.
- A translation is a composition of two reflections over two parallel lines. If the distance between the lines is $2x$, then the distance between the image and the pre-image is $4x$.
- A rotation is a composition of two reflections over two intersecting lines. If the measure of the angle of rotation is $2x$, then the measure of the acute angle of the intersecting lines is x .

Rigid transformations

Student Activity Sheet 3; use with *Exploring* “Reflections and rotations”



9. **REINFORCE** In the diagram, assume the measure of the acute angle between m_1 and m_2 is 80° , and $m\angle APA'' = (5x - 30)^\circ$. Solve for x .

$m\angle APA''$ is twice the measure of the acute angle formed by lines m_1 and m_2 .

$$5x - 30 = 2(80)$$

$$5x - 30 = 160$$

$$5x = 190$$

$$x = 38$$

10. **REINFORCE** In the diagram, assume $PA = (6x + 4)$ inches and $PA'' = (7x + 1)$ inches. Solve for x .

Since A'' is a rotation of A about P , $PA = PA''$.

$$6x + 4 = 7x + 1$$

$$3 = x$$