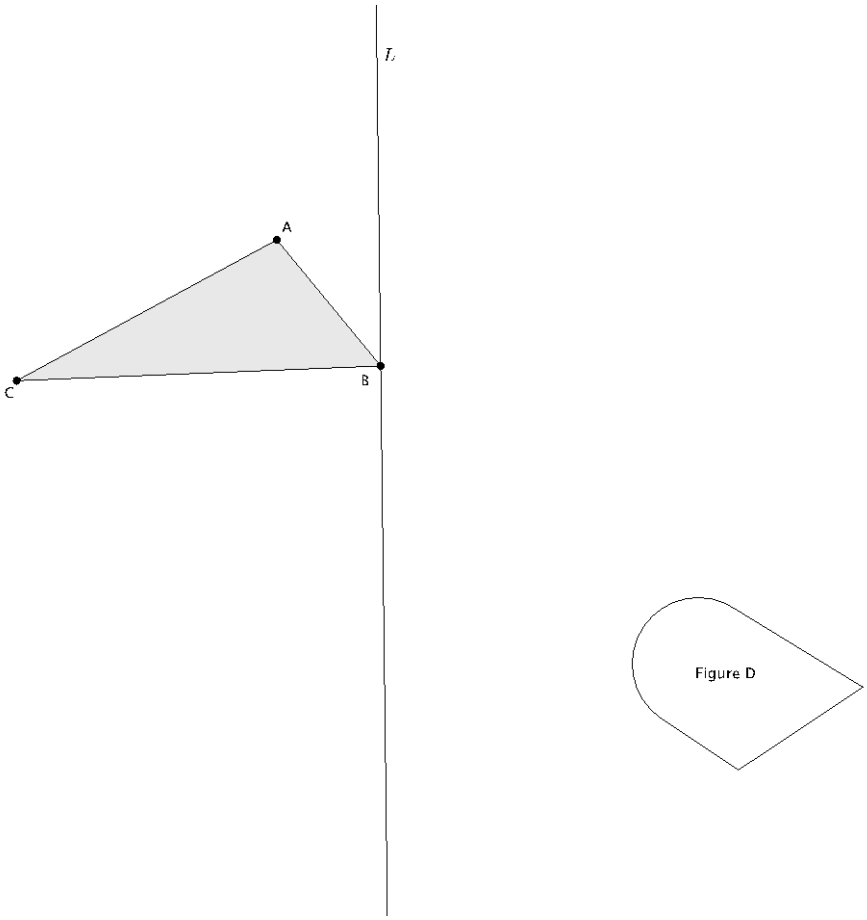
Lesson 4: Definition of Reflection and Basic Properties

Classwork

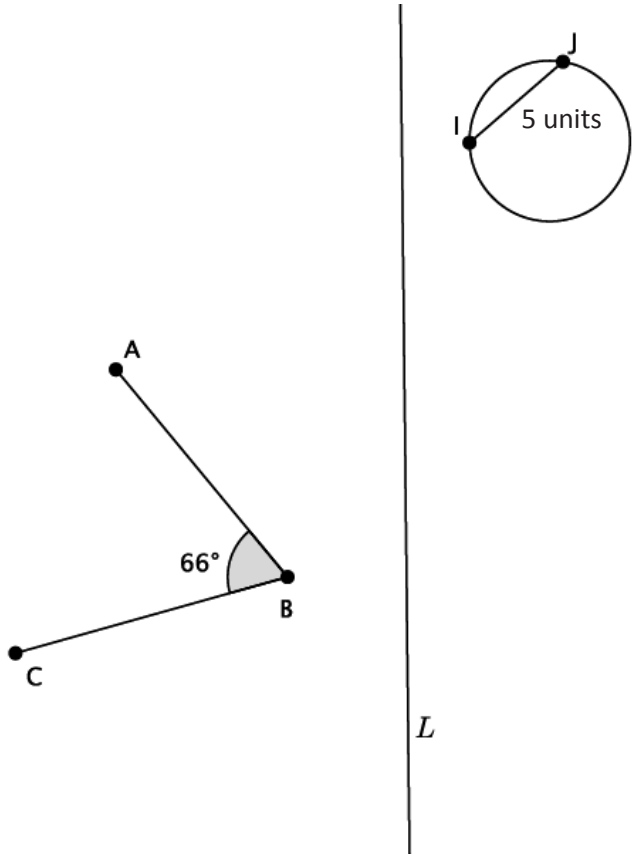
Exercises

1. Reflect $\triangle ABC$ and Figure D across line L. Label the reflected images.



2. Which figure(s) were not moved to a new location on the plane under this transformation?

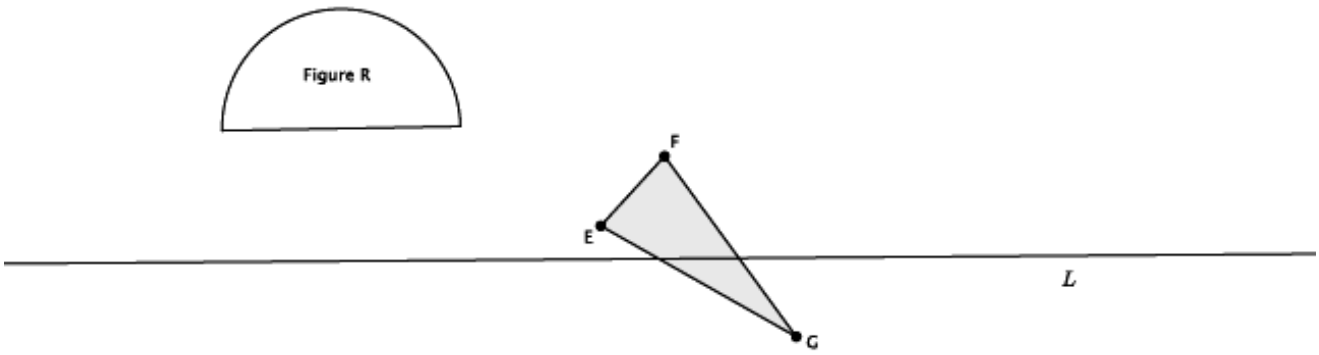
3. Reflect the images across line L. Label the reflected images.



4. Answer the questions about the image above.
   a. Use a protractor to measure the reflected $\angle ABC$. What do you notice?

   b. Use a ruler to measure the length of IJ and the length of the image of IJ after the reflection. What do you notice?

5. Reflect Figure R and $\triangle EFG$ across line L. Label the reflected images.



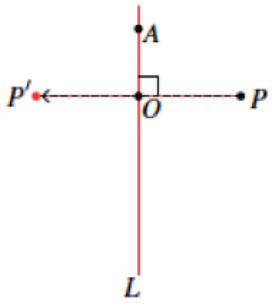
Basic Properties of Reflections:

(Reflection 1) A reflection maps a line to a line, a ray to a ray, a segment to a segment, and an angle to an angle.

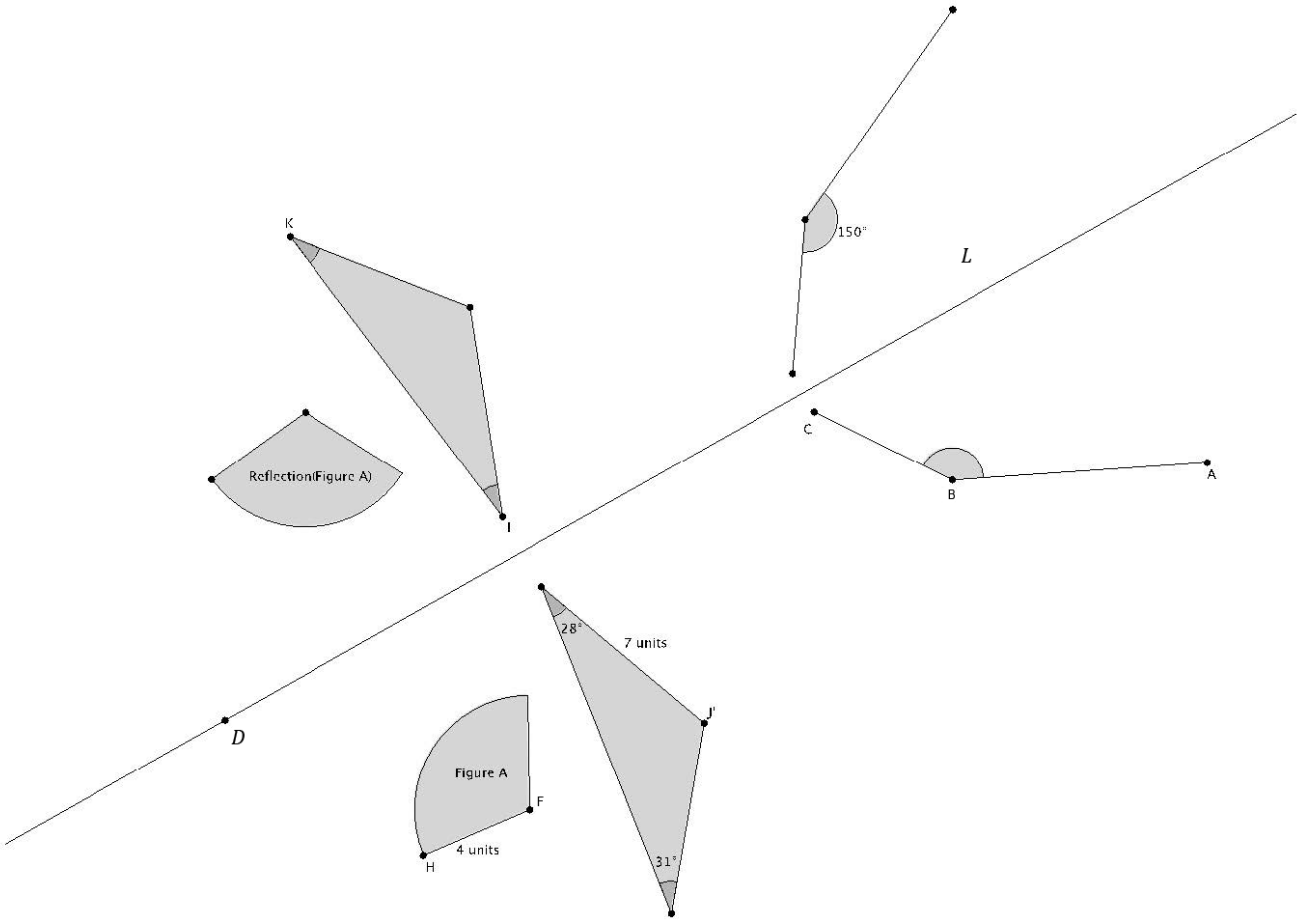
(Reflection 2) A reflection preserves lengths of segments.

(Reflection 3) A reflection preserves measures of angles.

If the reflection is across a line L and P is a point not on L, then L bisects and is perpendicular to the segment PP', joining P to its reflected image P'. That is, the lengths of OP and OP' are equal.



Use the picture below for Exercises 6–9.



6. Use the picture to label the unnamed points.

7. What is the measure of $\angle JKI$? $\angle KIJ$? $\angle ABC$? How do you know?

8. What is the length of segment $Reflection(FH)$? IJ? How do you know?

9. What is the location of $Reflection(D)$? Explain.

Lesson Summary

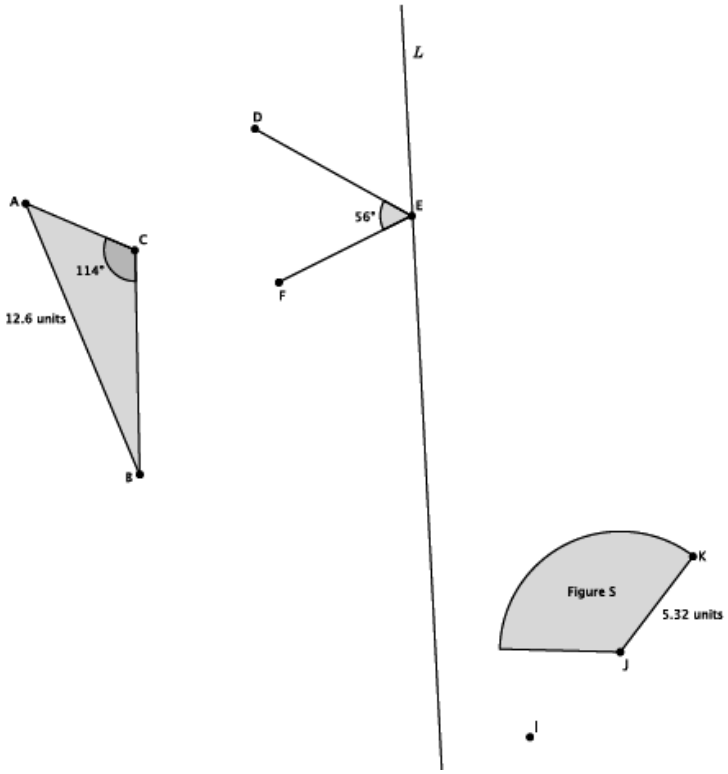
- A reflection is another type of basic rigid motion.
- A reflection across a line maps one half-plane to the other half-plane; that is, it maps points from one side of the line to the other side of the line. The reflection maps each point on the line to itself. The line being reflected across is called the *line of reflection*.
- When a point P is joined with its reflection P' to form the segment PP', the line of reflection bisects and is perpendicular to the segment PP'.

Terminology

REFLECTION (description): Given a line L in the plane, a *reflection across* L is the transformation of the plane that maps each point on the line L to itself, and maps each remaining point P of the plane to its image P' such that L is the perpendicular bisector of the segment PP'.

Problem Set

1. In the picture below, $\angle DEF = 56°$, $\angle ACB = 114°$, $AB = 12.6$ units, $JK = 5.32$ units, point E is on line L, and point I is off of line L. Let there be a reflection across line L. Reflect and label each of the figures, and answer the questions that follow.



2. What is the measure of $Reflection(\angle DEF)$? Explain.

3. What is the length of $Reflection(JK)$? Explain.

4. What is the measure of $Reflection(\angle ACB)$?

5. What is the length of $Reflection(AB)$?

6. Two figures in the picture were not moved under the reflection. Name the two figures, and explain why they were not moved.

7. Connect points I and I'. Name the point of intersection of the segment with the line of reflection point Q. What do you know about the lengths of segments IQ and QI'?