Construction 11

Given a triangle, inscribe a circle in the triangle.
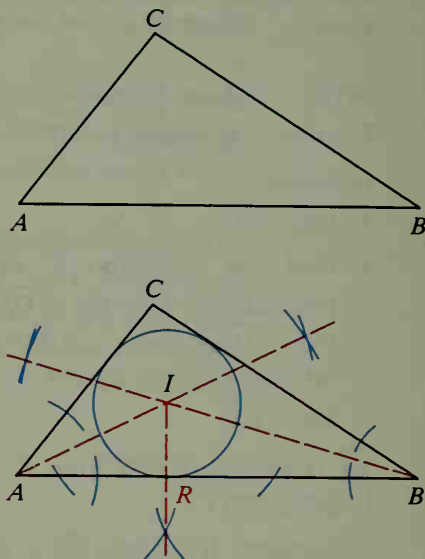
Given: $\triangle ABC$

Construct: A circle tangent to $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$

Procedure:

1. Construct the bisectors of $\angle A$ and $\angle B$. Label the point of intersection I.

2. Construct a perpendicular from I to $\overline{AB}$, intersecting $\overline{AB}$ at a point R.

3. Using I as center and IR as radius, draw a circle.

Circle I is tangent to $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$.

Justification: See Theorem 10-1 on page 386.

Classroom Exercises

1. Explain how to find the midpoint of $\overset{\frown}{AB}$.

2. Explain how to construct the center of the circle containing points A, B, and C.

3. Explain how to find the line described.
   a. Parallel to $\overline{RS}$ and passing through P
   b. Parallel to $\overline{RS}$ and tangent to $\odot P$

4. Here you see a common method for using just one compass setting for drawing a circle and dividing the circle into six congruent arcs. Explain how the method works.

5. Suppose a circle is given. Explain how you can use the method of Exercise 4 to inscribe an equilateral triangle in the circle.

6. Suppose the construction of Exercise 4 has been carried out. Explain how you can then inscribe a regular twelve-sided polygon in the circle.