# Basic Constructions

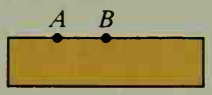
## Objectives

1. Perform seven basic constructions.
2. Use these basic constructions in original construction exercises.
3. State and apply theorems involving concurrent lines.

## 10-1 *What Construction Means*

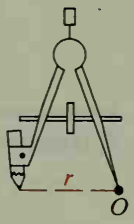
In Chapters 1–9 we have used rulers and protractors to draw segments with certain lengths and angles with certain measures. In this chapter we will *construct* geometric figures using only two instruments, a *straightedge* and a *compass*. (You may use a ruler as a straightedge as long as you do not use the marks on the ruler.)

*Using a Straightedge in Constructions*




Given two points $A$ and $B$, we know from Postulate 6 that there is exactly one line through $A$ and $B$. We agree that we can use a straightedge to draw $\overleftrightarrow{AB}$ or parts of the line, such as $\overline{AB}$ and $\overrightarrow{AB}$.

*Using a Compass in Constructions*




Given a point $O$ and a length $r$, we know from the definition of a circle that there is exactly one circle with center $O$ and radius $r$. We agree that we can use a compass to draw this circle or arcs of the circle.

### Construction 1

**Given a segment, construct a segment congruent to the given segment.**

Given: $\overline{AB}$

Construct: A segment congruent to $\overline{AB}$


Procedure:

1. Use a straightedge to draw a line. Call it $l$.
2. Choose any point on $l$ and label it $X$.
3. Set your compass for radius $AB$. Using $X$ as center, draw an arc intersecting line $l$. Label the point of intersection $Y$.


$\overline{XY}$ is congruent to $\overline{AB}$.

Justification: Since you used $AB$ for the radius of $\odot X$, $\overline{XY} \cong \overline{AB}$.