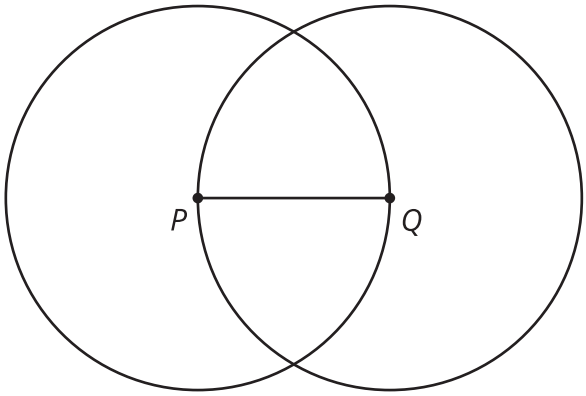
# Build It

Let's use tools to create shapes precisely.

## 1.1 The Right Tool

1. Copy this figure using only a pencil, and no other tools.

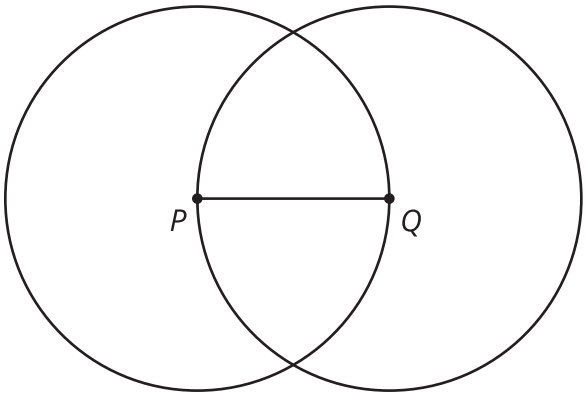



2. Familiarize yourself with your straightedge and compass by:
   a. drawing a few **circles** of different sizes.
   b. drawing a few **line segments** of different lengths.
   c. extending some of those line segments in both directions.

## 1.2 Illegal Construction Moves

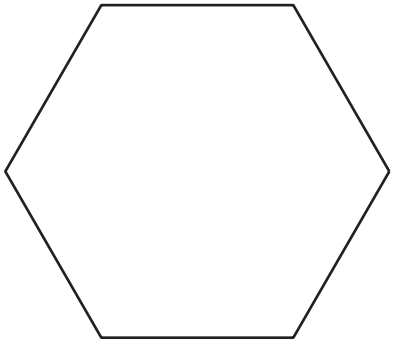
Complete these steps with a straightedge and compass:

1. Draw a point and label it $A$.
2. Draw a circle centered at point $A$ with a radius of length $PQ$.
3. Mark a point on the circle and label it $B$.
4. Draw another circle centered at point $B$ that goes through point $A$.
5. Draw a line segment between points $A$ and $B$.



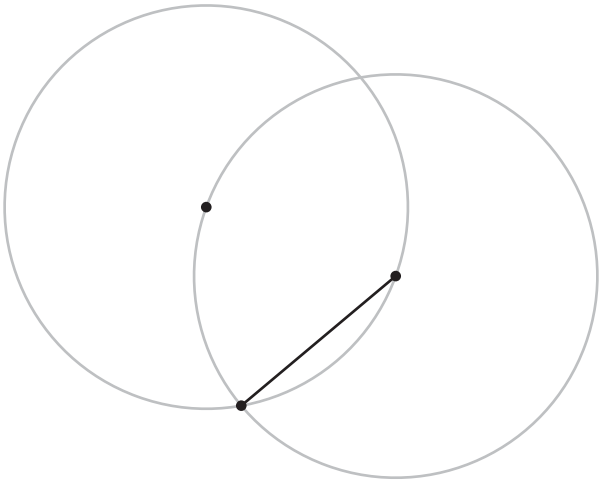

## 1.3 Can You Make a Perfect Copy?

Here is a hexagon with all congruent angles and all congruent sides (called a "*regular* hexagon").



1. Draw a copy of the regular hexagon using only your pencil and no other tools. Trace your copy onto tracing paper. Try to fold it in half. What happened?

2. Here is a figure that shows the first few steps to constructing the regular hexagon. Use straightedge and compass moves to finish constructing the regular hexagon. Trace it onto tracing paper and confirm that when you fold it in half, the edges line up.



3. How do you know each of the sides of the shape is the same length? Show or explain your reasoning.

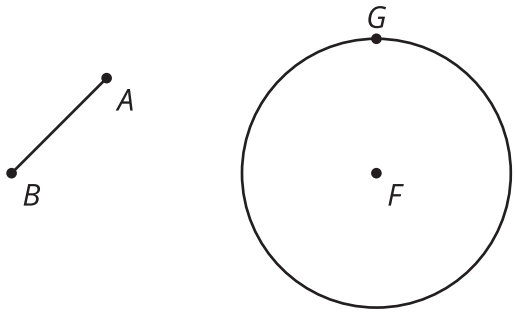
### Are you ready for more?

Why does the construction end up where it started? That is, how do we know the central angles go exactly 360 degrees around?

## Lesson 1 Summary

To construct geometric figures, we use a straightedge and a compass. These tools allow us to create precise drawings that someone else could copy exactly.

- We use a straightedge to draw a **line segment**, which is a set of points on a line with two endpoints.
- We name a segment by its endpoints. Here is segment $AB$, with endpoints $A$ and $B$.
- We use the compass to draw a **circle**, which is the set of all points the same distance (the radius of the circle) from the center.
- We describe a circle by naming its center and radius. Here is the circle centered at $F$ with radius $FG$.




Early mathematicians noticed that certain properties of shapes were true regardless of how large or small they were. Constructions were used as a way to investigate what has to be true in geometry without referring to numbers or direct measurements.