Basic Compass and Ruler Constructions 1

When doing compass and ruler constructions, we are using two tools:

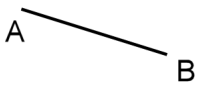
- a compass, and
- a straightedge (ruler).

With a *compass*, you draw circles. That means you can find **all the points that are at a specified distance from some point** (the circle's center point). Study carefully the following constructions, and pay attention how the compass is used!

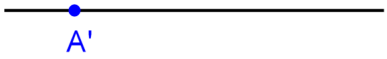
A straightedge is a ruler without measurement units (such as cm or in) on it. It is simply used to draw straight lines. You can use your normal ruler as long as you don't pay attention to the measurement units on it. In the exercises of this lesson, use only a compass and a straightedge.

Copy a Line Segment

The task is to draw a copy of the line segment $\overline{AB}$, or in other words to draw another line segment of the same length. The copy of the line segment can reside anywhere.



Start out by drawing a long line somewhere, and drawing one point on it (A'). Now, how can you use a compass to find where the other end point B' should be, so that $\overline{A'B'}$ is congruent to $\overline{AB}$?



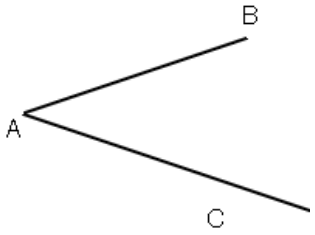
1. Copy the line segment.

2. Draw a line segment that is as long as these two line segments together.

An Isosceles Triangle

This is an easy construction, too.

Complete the drawing so you get an isosceles triangle ABC. In other words, find where the point C should go so that $\overline{AB}$ and $\overline{AC}$ are congruent (of the same length).

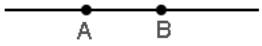


3. Draw any isosceles triangle.

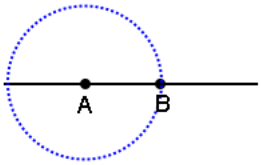
4. Draw an isosceles triangle with two sides this long:

An Equilateral Triangle

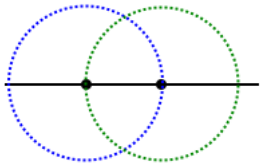
An equilateral triangle has three congruent sides. In other words, its vertices are at the same distance from each other. A compass can help us find points that are at the same distance from each other!



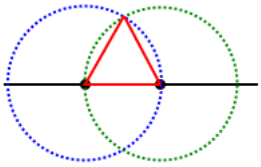
These two points mark one of the sides of the triangle.



Draw a circle using one of the points (A) as a center point and the other (B) indicating the radius. The third vertex of the triangle MUST lie on this circle... because its distance to B is equal to $\overline{AB}$.



Can you see what was done in this picture?



The triangle is ready!

Make sure you understand why this construction works! Many others are based on this one.

5. Draw an equilateral triangle using this line segment as the base.

6. Draw any equilateral triangle. This means you can choose how long the sides are.