Using a School Compass

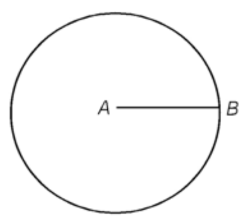
Why is using a school compass different from using a modern compass? To understand the difference, you need only think about how a school compass is actually used. When a class ends, each student must return his or her compass to the teacher. For many students, the final step before giving it to the teacher is to bend it just a bit—not enough to be noticed, but enough to give the next student who uses it a problem. After this procedure is followed by several students, the compass becomes very loose. It can still be used to draw circles, but lifting it from the page without changing the distance between the compass point and the pencil is impossible. The once useful school compass has become a **collapsible compass.** It correctly draws any circle you choose, but it can't be used to transfer distance.

Although schools as we know them didn't exist in 300 B.C., Euclid had experience working with students. When he wrote *Elements,* **Euclid assumed the use of a collapsible compass** and a straightedge.

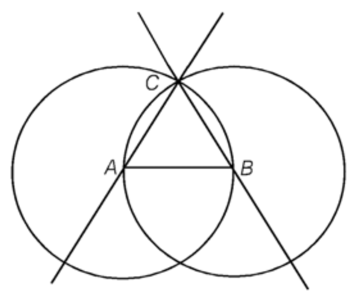
What does this mean for the solutions to construction problems in the previous section? All of those solutions are valid, but only for a modern compass that is working properly. If you want to find solutions that Euclid would accept, you have to solve the previous construction problems using a collapsible compass. Is solving the problems using a collapsible compass a big deal? Let's find out.

Here's the previous solution to the first construction problem in *Elements.*

Problem C1: Given line segment $\overline{AB}$, construct an equilateral triangle that has $\overline{AB}$ as one of its sides.



Step 1: Draw a circle whose center is point *A* and whose radius is equal to the length of $\overline{AB}$.



Step 2: Draw a second circle whose center is point *B*, whose radius is equal to the length of $\overline{AB}$. Label one intersection of the two circles as point *C.*

Step 3: Draw lines $\overleftrightarrow{AC}$ and $\overleftrightarrow{BC}$.

Step 4: Then $\triangle ABC$ is equilateral because $\overline{AC} \cong \overline{AB}$ and $\overline{AB} \cong \overline{BC}$, therefore $\overline{AC} \cong \overline{BC}$.