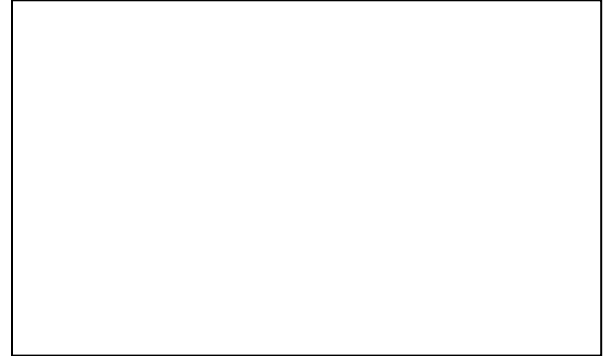
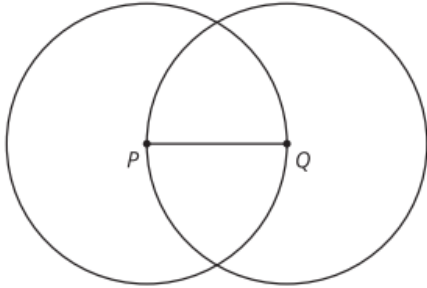


Lesson 2.6 – Intro to drawing by hand & Geometry Proofs

I. Constructions

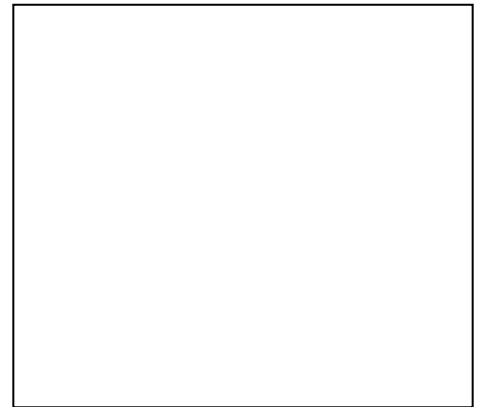
A **circle** is a round shape with no corners or edges, where all points are a fixed distance from the center.

1. Try drawing a circle on your own. Then try copying this figure using your pencil.



2. Let's see what you can draw if instead I described the shape with only words. Complete the following steps by drawing to the right:

- a. Draw a point and label it **A**.
- b. Draw a circle centered at point **A** with a radius of length **PQ**.
- c. Mark a point on the circle you just drew and label the point **B**.
- d. Draw another circle centered at point **B** that goes through point **A**.
- e. Draw a line segment between points **A** and **B**.



3. Let's up the stakes.

- a. Create a circle centered at **A** with radius **AB**.
- b. Estimate the midpoint of segment **AB** and label it **C**.
- c. Create a circle centered at **B** with radius **BC**. This creates 2 intersection points. Label the one toward the top of the page as **D** and the one toward the bottom as **E**.
- d. Draw straight lines to connect points **A**, **D**, and **E** to make triangle **ADE** and lightly shade it in with your pencil.



4. Draw the following



Regular Triangle



Regular Square

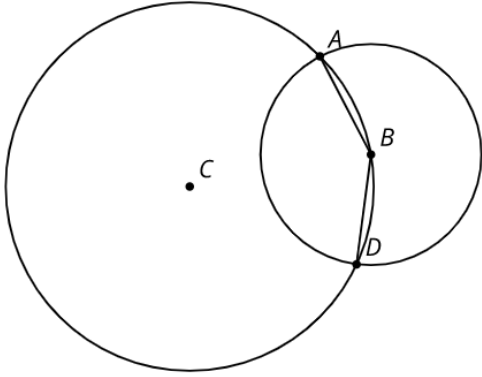


Regular Pentagon

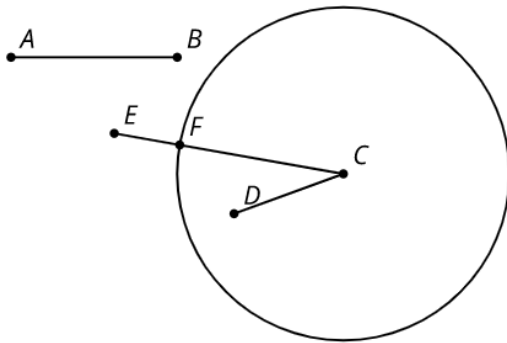


Regular Hexagon

5. In this diagram, **C** is the center of one circle, and **B** is the center of the other. Explain why the length of segment **BD** is the same as the length of segment **AB**.

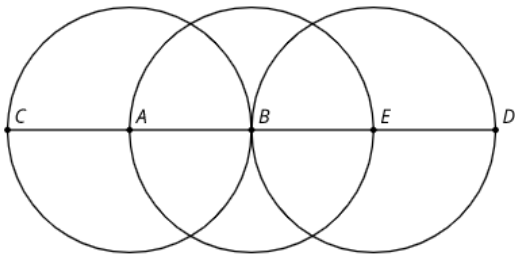


6. The circle below with center **C** has a radius of the same length as segment **AB**. Which of the following statements are true?

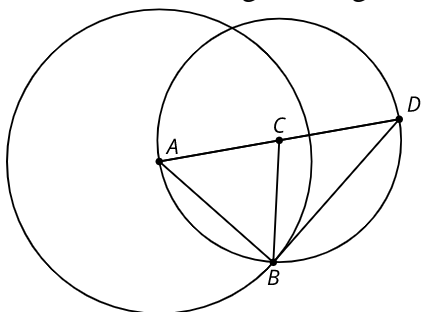


- (a) $AB > CD$
- (b) $AB = CD$
- (c) $AB > CE$
- (d) $AB = CE$

7. The diagram was constructed with straightedge and compass tools. Points **A**, **B**, **C**, **D**, and **E** are all on line segment **CD**. Name a line segment that is half the length of **CD**. Explain how you know.



8. In this diagram, **A** is the center of one circle, and **C** is the center of the other.
- (a) The 2 circles intersect at point **B**. Label the other intersection point **E**.
 - (b) How does the length of segment **CE** compare to the length of segment **AD**?



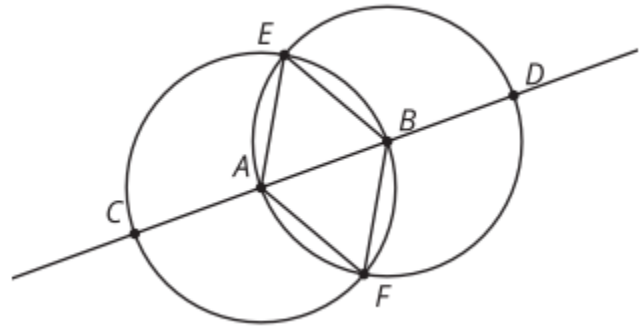
II. Proving Conjectures

A **conjecture** is a statement we want to test or prove to be true, based on postulate and other given statements we know to be true.

9. To the right are two circles with centers **A** and **B**.

Based on the diagram, explain how you know each of the following statements are true.

a. Conjecture: The length of segment **EA** is equal to the length of segment **EB**.

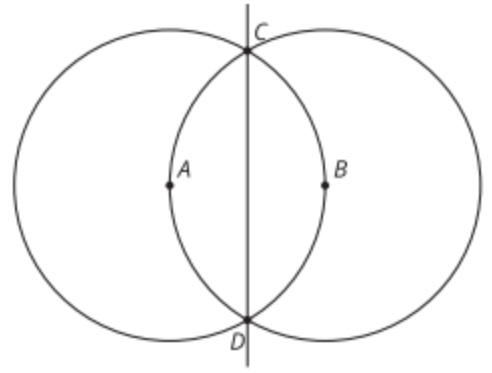


b. Conjecture: Triangle **ABF** is equilateral.

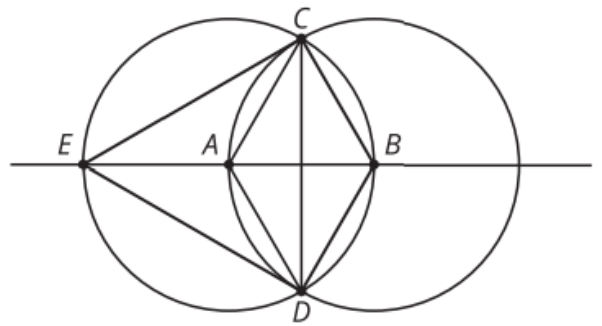
c. Conjecture: $AB = \frac{1}{3}CD$

d. Conjecture: $CB = DA$

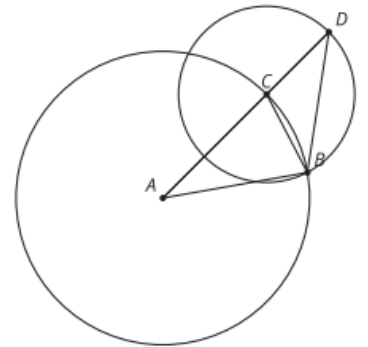
10. Using words, describe a series of steps to draw the following figure.



11. In this diagram, **A** is the center of one circle, and **B** is the center of the other. Identify all segments that have the same length as segment **AB**.

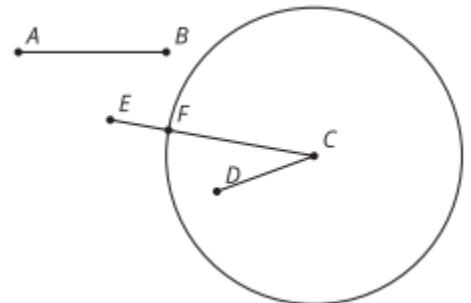


12. In this diagram, **A** is the center of one circle, and **C** is the center of the other. List all line segments that *must* have the same length as segment **AB**.



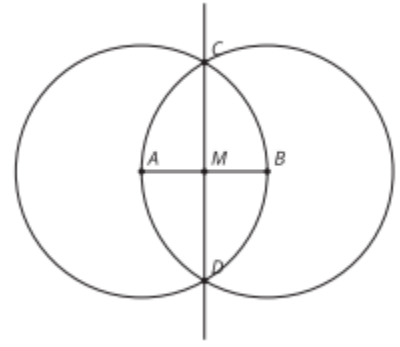
13. The circle **C** has a radius with the same length as segment **AB**. Which statement must be true?

- a. **AB = CD**
- b. **AB = CE**
- c. **AB = CF**
- d. **AB = EF**



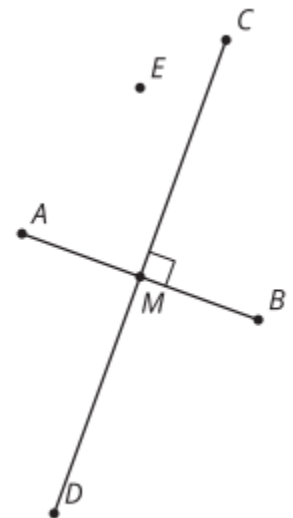
III. Practice

14. In the diagram to the right, **A** is the center of one circle, and **B** is the center of the other. Determine which of the following statements are true.

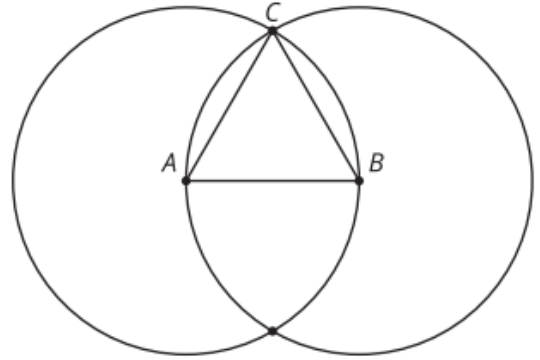


- a. Line **CD** is perpendicular to segment **AB**.
- b. Point **M** is the midpoint of segment **AB**.
- c. The length **AB** is equal to the length **CD**.
- d. Segment **AM** is perpendicular to segment **BM**.
- e. $CB + BD > CD$

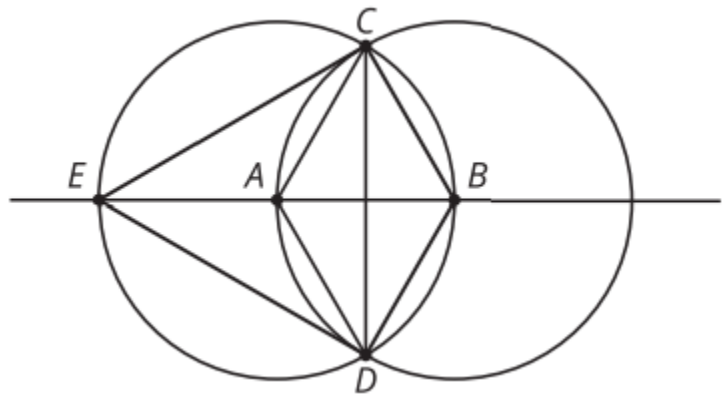
15. In the diagram to the right, line segment **CD** is the perpendicular bisector of line segment **AB**. Assume the conjecture that the set of point equidistant from **A** and **B** is the perpendicular bisector of **AB** is true. Is point **E** closer to point **A**, closer to point **B**, or the same distance between the points? Explain how you know.



16. Starting with 2 marked points, **A** and **B**, precisely describe the straightedge and compass moves required to construct the triangle **ABC** in this diagram.



17. This diagram was created by starting with points **C** and **D** and using only straightedge and compass to construct the rest. Describe the straightedge and compass moves required to construct this diagram.



18. **A** is the center of one circle, and **C** is the center of the other. Select all true statements.

- $AB = BC$
- $AB = BD$
- $AD = 2AC$
- $BC = CD$
- $BD = CD$

