

Introducing Circles



A circle is the set of all points in a plane the same distance from a given point. In this activity you'll construct circles and investigate the meaning of this definition and other circle definitions.

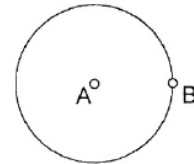
SKETCH AND INVESTIGATE



Click an object to show or hide its label. Drag the label to move it. Double-click the label to change it.

In most books, a circle is named after its center point. The circle shown at right would be called circle A . However, it's often convenient to name a Sketchpad circle after both points that define it, so you could call the circle at right circle AB .

1. Use the **Compass** tool to construct a circle. Two points define your circle.

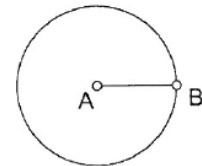


2. Choose the **Selection Arrow** tool and drag each point to see how it affects the circle.

Q1 Describe how each point affects the circle.

3. Choose the **Text** tool. Show the point labels and change them, if necessary, to match the diagram.

4. Choose the **Segment** tool and construct segment AB . This segment is called a *radius*.



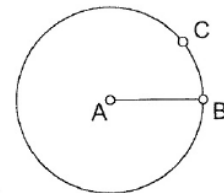
5. Choose the **Selection Arrow** tool. Select the segment and, in the Measure menu, choose **Length**. This length is also called the *radius* of the circle.

6. Select the circle and, in the Measure menu, choose **Radius**.

7. Drag point A or point B and observe these measures.

8. Use the **Point** tool to construct point C on the circle.

9. Choose the **Selection Arrow** tool. Click in blank space to deselect all objects. Select point A and point C . In the Measure menu, choose **Distance**.

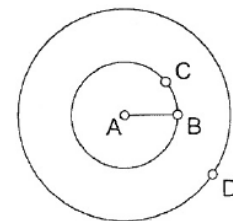


10. Drag point C around the circle and observe the distance AC .

Q2 True or false: The radius of a circle is the distance from the center to *any* point on the circle. _____

11. Construct a circle centered at point A with control point D , as shown here.

12. Drag point D so that circle AD moves inside and outside circle AB .



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continued



Select \overline{AB} and point E ; then, in the Construct menu, choose **Circle by Center+Radius**

Sketchpad will call the circle something like "circle c1" instead of "circle E."

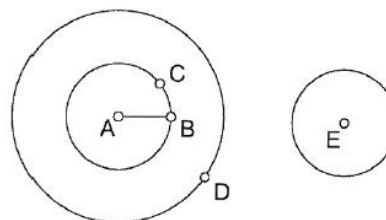
- Q3** If two or more coplanar circles share the same center, they are *concentric* circles. How many circles can share the same center? (Why might it be convenient to name circles after two points?)

13. Construct a point E anywhere in your sketch.

14. Construct a circle with center E and radius AB .

15. Drag point B to see how it affects circle E .

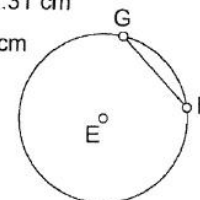
16. Measure the radius of circle E .



- Q4** Circle E and circle AB are *congruent* circles. Write a definition of *congruent circles*.

17. Construct \overline{FG} , where points F and G are points on circle E . This segment is called a *chord* of the circle.

Radius $c_1 = 1.31$ cm
 $m \overline{FG} = 1.48$ cm



18. Measure the length of \overline{FG} .

19. Drag point F around the circle and observe the length measure.

- Q5** Make the length of \overline{FG} as great as you can. When a chord in a circle is as long as it can possibly be, it is called a *diameter*. Describe a diameter.

- Q6** The length of a diameter segment is also called the *diameter* of the circle. How does the diameter of a circle compare to the radius?

EXPLORE MORE

20. In the activity you constructed a chord that you could make into a diameter by dragging one of its endpoints. But this chord won't stay a diameter if you change the circle. Figure out a way to construct a circle and a diameter that will always stay a diameter when you drag. (*Hint*: There are many ways to do this. One way uses a ray.) Describe your method.