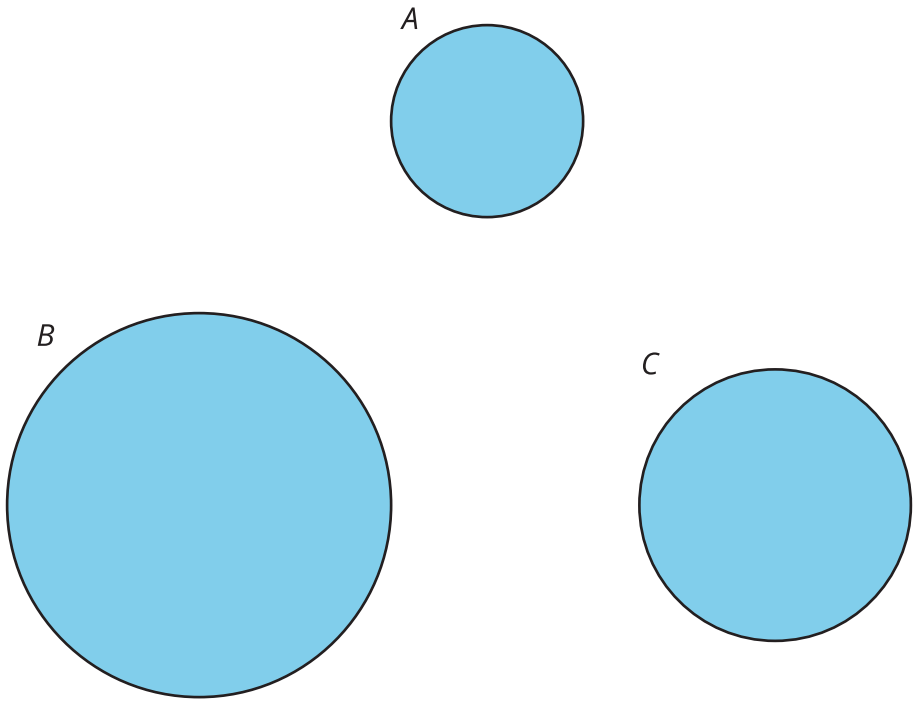
Unit 3, Lesson 16

Drawing Proportional Circles

Let's draw a map of data.

16.1 A Circle Twice as Big

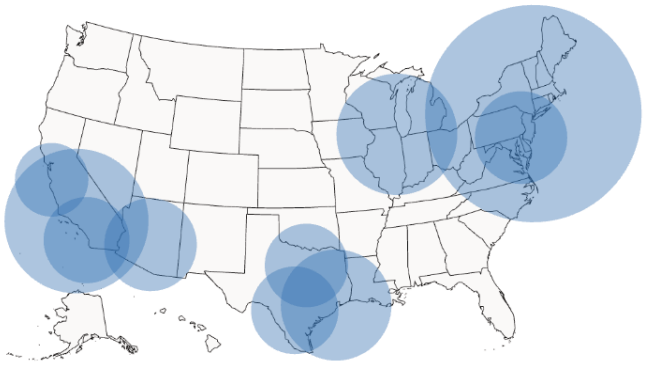
Circle A has a radius of 1 unit and an area of π square units. Which other circle would you say is twice as big?



16.2 Population Circles

The map shows the population of the 10 most populous cities in the United States according to the 2020 census. 1 square unit of area is equivalent to 1 million people.

city	population	area	radius
New York, NY	8,804,190		
Los Angeles, CA	3,898,747		
Chicago, IL	2,746,388		
Houston, TX	2,304,580		
Phoenix, AZ	1,608,139		
Philadelphia, PA	1,603,797		
San Antonio, TX	1,434,625		
San Diego, CA	1,386,932		
Dallas, TX	1,304,379		
San Jose, CA	1,013,240		



1. Complete the table to show the area and radius of each circle on the map. (Round each value to the nearest thousandth.)
2. Write a function that takes a population as an input and gives the value in the area column as its output.

3. Write a function that takes a population as an input and gives the value in the radius column as its output.

16.3 Map Your Own Data

With your partner, decide on some data you would like to represent on a map. Your data set should include at least 10 locations.

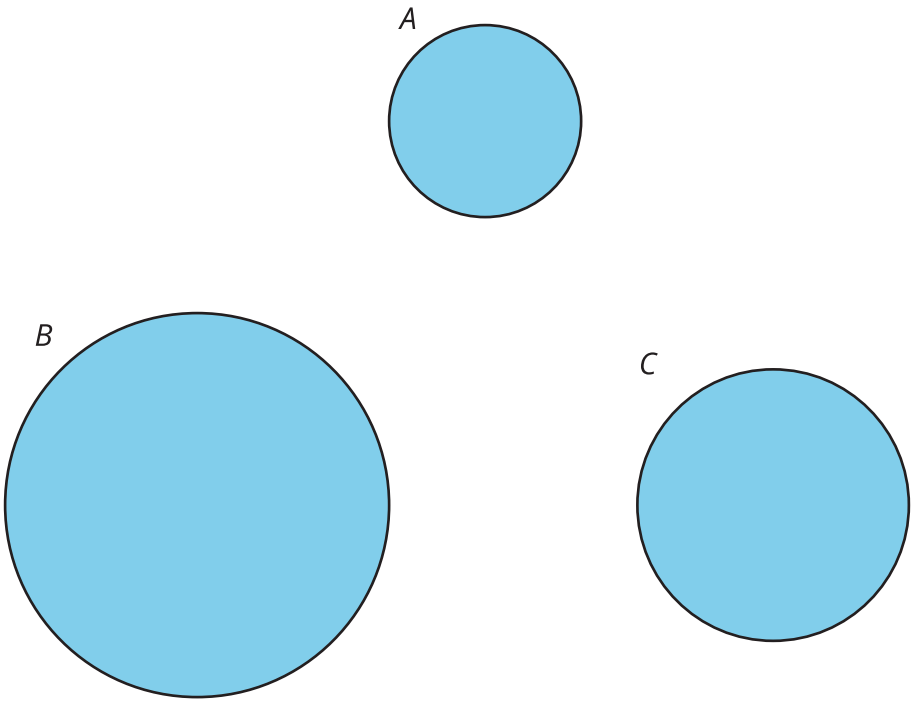
location	data	area	radius

1. Decide on a reasonable size for the circles you will draw on your map. Make sure that the largest circle is not too large and the smallest circle is not too small. Write the scale you will use (for example, 1 million people is equivalent to 1 square centimeter). Fill in the area column so that the data will be represented by circles with area proportional to the data.
2. Fill in the radius column so that a circle with that radius has the correct area.
3. Write an equation that takes the data as an input and outputs the radius.

4. Use a ruler and compass to draw the circles on your map.

Lesson 16 Summary

The size of a circle could refer to its area or its radius. Because scaling all distances by a factor of k scales the area by a factor of k^2, how circles are used to represent data is important. Usually it is easier for people to compare the proportional size of circles when considering the area. For example, in this image, circle B has a radius twice as large as circle A's radius and circle C has an area twice as large as circle A's area.



Whether you are using a compass or technology to draw a circle, it is usually important to know the radius of the circle. If you know the area of a circle, finding the radius requires using a square root.