

Grade 7 Playlist: Area and Circumference of Circles

Aligns with [CCSS.MATH.CONTENT.7.G.B.4](#): Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Related Standards

- [8.G.C.9](#): Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
- [HSG.C.B.5](#): Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.



Objectives

In this playlist, you will learn and practice the following skills:

- Use formulas to find the circumference of a circle.
- Use a formula to find the area of a circle.
- Find the area of a circle when given the circumference or find the circumference of a circle when given the area.

Let's get started!

Key Terms

- The **area** is the amount of space inside of a two-dimensional shape.
- The **circumference** measures the length of the perimeter (outer edge) of a circle.
- The **radius** of a circle is the distance from the center to the edge of the circle.
- The **diameter** of a circle is the length of a segment that passes through the center and has endpoints on the circle. The diameter is always twice the length of the radius.



Welcome

In this lesson, you will learn how to find the area and circumference of a circle using formulas. You will also see how the area and circumference of circles are related by solving problems that involve both formulas! Here's an example of the type of problem you will need to solve: What is the area of a circle with a radius of 5 feet?

Watch!

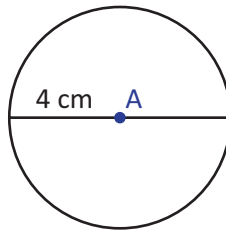
For a quick overview of area and circumference, watch this video:

- <https://www.opened.com/video/circles-circumference-and-area/5504352>

Focus: Switching Between Circumference and Radius

To find area and circumference of circles, it is useful to be able to transition between radius and diameter.

The **diameter** is twice the length of the **radius**. It is the same length as two radii added together.



What is the diameter of the circle above? We know that the radius is 4 cm, so we double it to find the diameter, which is 8 cm.

What if you know only the diameter of a circle? Let's say you have a circle with a diameter of 14 meters. To find the radius, divide the diameter in half. The radius of a circle with a diameter of 14 meters would be 7 meters.

Answers

To find the area of a circle with a radius of 5 feet, use the area formula for a circle: $A = \pi r^2$

$$A = \pi r^2$$

$$A = \pi 5^2$$

$$A = \pi \cdot 25$$

$$A = 25\pi \text{ square feet}$$

$$A \approx 78.54 \text{ square feet}$$



Watch!

For a quick overview of switching between circumference and radius, watch this video:

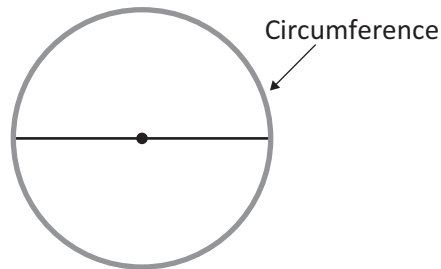
- <https://www.youtube.com/watch?v=oH7y5nfD7hs>

What is the radius of a circle with a diameter of 16 inches?



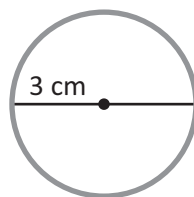
Explore

The **circumference** of a circle is the distance around the outer edge of a circle.



The circumference of a circle is found by using the formula $C = \pi d$, where C is the circumference, d is the diameter, and π is pi, the ratio between the circumference and diameter of a circle (often rounded to 3.14).

Because the radius is half the diameter, you can find the circumference of a circle using the formula $C = 2\pi r$, where r is the radius of the circle.



To find the circumference of the circle above, you can first find the diameter by doubling the radius. The diameter is 6 cm. Then you can substitute into the circumference formula:

$$C = \pi d$$

$$C = \pi \cdot 6$$

$$C = 6\pi$$

The circumference is 6π centimeters, which is equivalent to about 18.84 centimeters.

- Note that you also could have used the formula $C = 2\pi r$, since you are given the radius.

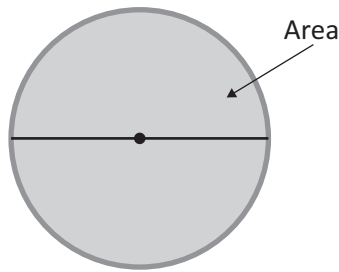
$$C = 2\pi r$$

$$C = 2\pi \cdot 3$$

$$C = 6\pi$$

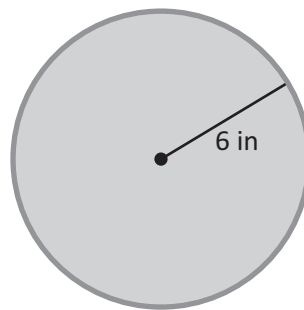


The **area** of a circle is the amount of two-dimensional space it takes up. You can think of this as the *inside* of the circle.



We find the area of a circle by using the formula $A = \pi r^2$, where A is the area, π is pi, and r is the radius.

Try finding the area of the figure below.



Use the formula $A = \pi r^2$ to find the area:

$$A = \pi r^2$$

$$A = \pi(6)^2$$

$$A = \pi(36)$$

$$A = 36\pi$$

The area of a circle with a radius of 6 inches is 36π square inches. Make a note that area is always expressed in square units, such as square feet, square inches, or square centimeters.

Sometimes you will need to find the area of a circle when the only information you have is the circumference. Watch how this works.

Find the area of a circle with a circumference of 8π inches.

$$C = \pi d \quad \text{Substitute } 8\pi \text{ in for the circumference.}$$

$$8\pi = \pi d \quad \text{Divide both sides by } \pi \text{ so it cancels out.}$$

$$8 = d \quad \text{You are left with the diameter}$$



To find the area, we need to know the radius. The radius is half the diameter, so the radius here must be 4.

$$A = \pi r^2 \quad \text{Substitute the radius into the formula}$$

$$A = \pi(4)^2 \quad \text{Square 4}$$

$$A = \pi(16) \quad \text{Switch the 16 and the } \pi \text{ so the 16 is the coefficient.}$$

$$A = 16\pi$$

The area of a circle with a circumference of 8π inches is 16π square inches.

Watch!

For a more information about area and circumference of circles, watch these videos:

- <http://www.youtube.com/embed/jyLRpr2POMQ>
- <https://www.youtube.com/watch?v=-uO7DYG0qhk>
- <https://www.youtube.com/watch?v=PUf4-VyffZE>

Practice!

You can practice finding the area and circumference of circles by completing these activities:

- https://www.khanacademy.org/math/geometry/basic-geometry/circum_area_circles/e/radius_diameter_and_circumference
- https://www.khanacademy.org/math/geometry/basic-geometry/circum_area_circles/e/area_of_a_circle

