

Grade 7 · Circumference and Area of Circles · Lesson

Common Core 7.G.B.4 · mathovore.fr

The circumference of a circle is $C = \pi d = 2\pi r$, the distance around it, and its area is $A = \pi r^2$, the space inside. Here r is the radius, $d = 2r$ is the diameter, and π is about 3.14. Use circumference for length and area for square units.

Grade 7 Common Core: 7.G.B.4

Key facts:

- Diameter is twice the radius: $d = 2r$.
- Circumference: $C = \pi d = 2\pi r$, measured in linear units.
- Area: $A = \pi r^2$, measured in square units.
- π is about 3.14; leave answers in terms of π when asked.
- A semicircle is half a circle; its perimeter includes the diameter.

What are the radius, diameter, and circumference of a circle?

A **circle** is the set of all points in a plane that are the same distance from a point called the **center**. The **radius** r runs from the center to the circle. The **diameter** d runs across the circle through the center, so it is twice as long. The distance around the circle is the **circumference** C .

Radius and diameter

$$d = 2r \text{ and } r = \frac{d}{2}$$

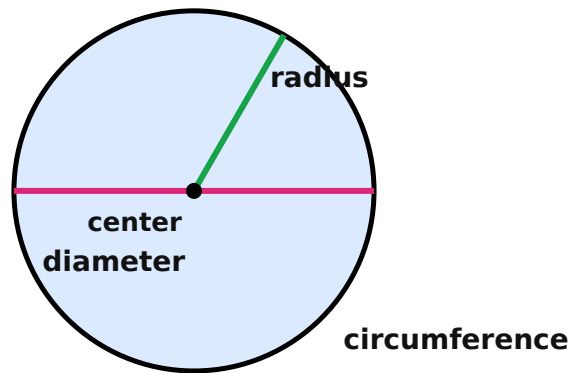


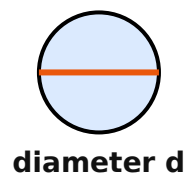
Figure 1. The diameter is twice the radius.

How do you find the circumference of a circle?

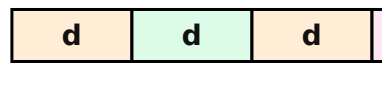
Measure any circle around and across. The distance around is always a little more than three diameters. That ratio is the number π , about 3.14. In this chapter, every problem tells you whether to use 3.14 for π or to leave the answer in terms of π .

Circumference formulas

$$C = \pi d \text{ and } C = 2\pi r$$



diameter d



$$\text{rcumference} = 3 \text{ diameters} + 0.14 d$$

Figure 2. Circumference is about 3.14 times the diameter.

How do you find the area of a circle?

Cut a circle into equal sectors and fit them together, point up and point down. The pieces form a shape close to a parallelogram. Its base is half the circumference, πr , and its height is r . So the area is $\pi r \times r$.

Area of a circle

$A = \pi r^2$. Square only the radius, then multiply by π . Area is measured in square units.

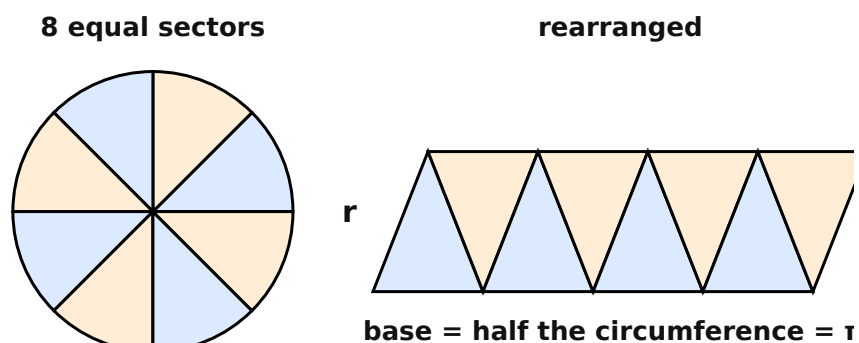


Figure 3. Area is about base times height = πr times $r = \pi r^2$.

How do you work with semicircles and quarter circles?

A semicircle is half of a circle, and a quarter circle is one fourth. Find the full circle first, then take half or one fourth. For perimeter, add the straight edges, because the diameter or radii are part of the boundary.

1. Write down the radius. If you are given the diameter, divide by 2.
2. Choose the formula: $C = 2\pi r$ for distance, $A = \pi r^2$ for space.
3. Substitute r and $\pi = 3.14$, then compute.
4. Take the fraction of the circle that is shown, and add straight edges for a perimeter.
5. Write the unit: inches, or square inches for area.

Worked example. The semicircle in Figure 4 has diameter 8 ft, so $r = 4$. The full circle has area $3.14 \times 4^2 = 50.24$, and half is 25.12 ft^2 . Its perimeter is half the circumference plus the diameter: $\frac{1}{2} \times 3.14 \times 8 + 8 = 12.56 + 8 = 20.56 \text{ ft}$.

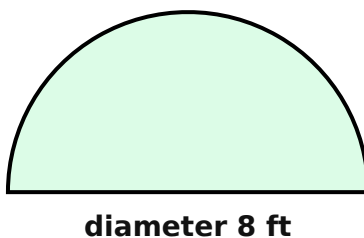


Figure 4. A semicircle with diameter 8 ft and radius 4 ft.

Circumference and Area of Circles: frequently asked questions

What is the difference between circumference and area?

Circumference is the distance around a circle, like the length of a fence. Area is the amount of surface inside, like the grass in a pen. Circumference uses units such as feet, and area uses square units such as square feet.

Why is the area formula πr^2 and not $2\pi r$?

Area measures square units, so the radius is used twice: $r \times r$. The expression $2\pi r$ is the circumference. Mixing the two is one of the most common mistakes.

What if a problem gives the diameter?

Divide the diameter by 2 to get the radius before using $A = \pi r^2$. For circumference you can use $C = \pi d$ directly with the diameter.

When do I leave an answer in terms of π ?

Leave π in the answer when the problem says so. For a circle with radius 5 cm, the area is $25\pi \text{ cm}^2$. Otherwise, multiply by 3.14 and round as directed.

How do you find the perimeter of a semicircle?

Take half of the circumference, then add the diameter. For $d = 10 \text{ ft}$, half the circumference is 15.7 ft, so the perimeter is 25.7 ft.