

Circles: Circumference and Area Made Clear

Grade 7 math · Lesson · Standards: 7.G.B.4

Quick answer: The circumference of a circle is the distance around it, found with $C = \pi d$ or $C = 2\pi r$. The area is the space inside, found with $A = \pi r^2$. The radius runs from the center to the edge, and the diameter is twice the radius. The number π is about 3.14, the same for every circle.

Standards: 7.G.B.4 · **Level:** Grade 7

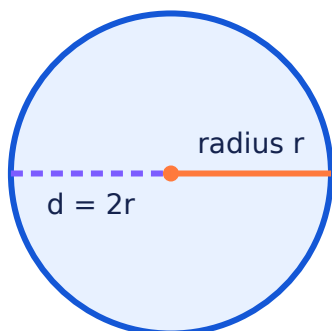
What are the parts of a circle?

Every point on a circle is the same distance from one fixed point, the center. The vocabulary is short but important.

Circle vocabulary

- **Radius** (r): the distance from the center to any point on the circle.
- **Diameter** (d): a segment through the center with both ends on the circle, so $d = 2r$.
- **Circumference** (C): the distance around the circle.
- **π (pi)**: the ratio $C \div d$, the same for every circle, about 3.14.

diameter passes through the center



$$C = \pi \times d$$

$$C = 2 \times \pi \times r$$

circumference C = the distance around

The parts of a circle and the two circumference formulas.

How do you find the circumference of a circle?

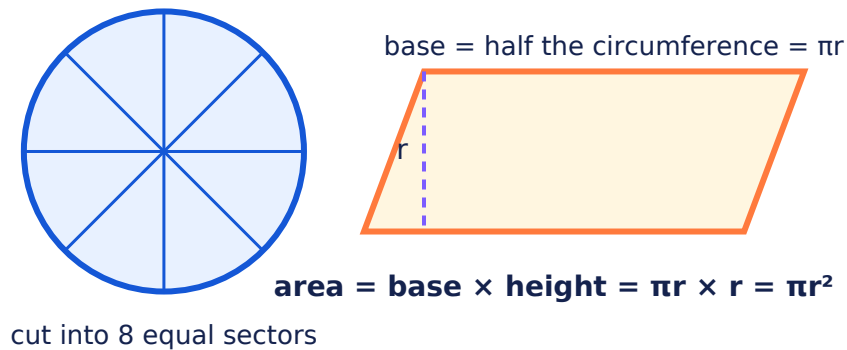
Because π is the ratio of circumference to diameter, multiplying the diameter by π gives the distance around.

Circumference formulas

$$C = \pi d \quad \text{or} \quad C = 2\pi r$$

How do you find the area of a circle?

Cut a circle into thin sectors and lay them side by side, alternating up and down. The result looks like a parallelogram. Its base is half the circumference, πr , and its height is the radius r . Multiplying gives the area.



Rearranged sectors form a shape close to a parallelogram.

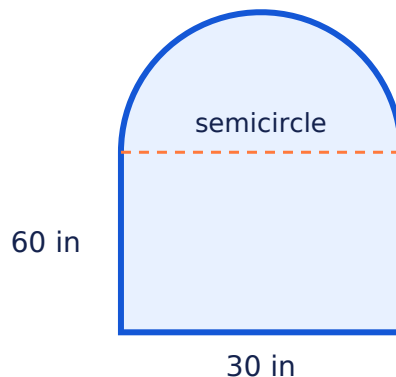
Area formula

$$A = \pi r^2$$

Square the radius first, then multiply by π . Area is measured in square units.

How do semicircles and quarter circles fit in?

A semicircle is half of a circle and a quarter circle is one fourth. Take the same fraction of the full area. For perimeter, take the same fraction of the circumference and then add the straight edges.



Rectangle 30 in by 60 in with a semicircle on top.

Common mistake

Using the diameter in $A = \pi r^2$. If a problem gives the diameter, halve it first.

What is the method for circle problems?

1. Decide whether the problem asks for distance around (circumference) or space inside (area).
2. Find the radius or diameter, converting if needed.
3. Substitute into the formula, using 3.14 or leaving π in the answer.
4. Write the units: linear for circumference, square for area.

Worked example

A fountain base has a diameter of 14 ft. Find its circumference and area using 3.14 for π .

Circumference: $C = 3.14 \times 14 = 43.96$ ft. Radius: $14 \div 2 = 7$ ft. Area: $A = 3.14 \times 7^2 = 3.14 \times 49 = 153.86$ ft².

Mathbot's tip

Doubling the radius doubles the circumference but quadruples the area. When the radius is more than 2, the area answer should be bigger than the circumference answer.

Key points to remember

- Diameter = $2 \times$ radius, and radius = diameter $\div 2$.
- Circumference: $C = \pi d = 2\pi r$, measured in linear units.
- Area: $A = \pi r^2$, measured in square units.
- A semicircle has half the area; a quarter circle has one fourth.
- Doubling the radius quadruples the area.

Circles: Circumference and Area Made Clear: frequently asked questions

What is the difference between circumference and area?

Circumference is the distance around the circle, like a fence, and is measured in units such as feet. Area is the space inside the circle, like grass, and is measured in square units such as square feet.

Should I use 3.14 or the π button?

Use whichever the problem asks for. With 3.14 you get an approximate decimal answer. Leaving π in the answer, such as 36π , gives the exact value.

Why is the area formula πr^2 and not πd^2 ?

The derivation uses the radius: the rearranged sectors have a base of πr and a height of r . If a

problem gives the diameter, divide it by 2 before squaring.

How do I find the radius if I know the circumference?

Divide the circumference by π to get the diameter, then divide by 2. For example, a circle with $C = 31.4$ in has $d = 10$ in and $r = 5$ in when π is 3.14.

How do I find the perimeter of a semicircle shape?

Find half of the circumference for the curved edge and add the straight diameter edge. A semicircle with a diameter of 10 cm has a perimeter of $5\pi + 10$ cm, about 25.7 cm.