

Circumference to Area: Given the circumference of a circle, find the area of the circle.

Example 1: The circumference of a circular park is 450 feet. Find the area of the park. Round to the nearest hundredth.

Step 1: Find the radius of the park. Use the circumference formula.

$$C = 2\pi r \quad \text{Circumference formula.}$$

$$450 = 2 \cdot \pi \cdot r \quad \text{Substitute 450 for } C.$$

$$\frac{450}{2} = \frac{2 \cdot \pi \cdot r}{2} \quad \text{Divide both sides by 2.}$$

$$\frac{225}{\pi} = \frac{\pi \cdot r}{\pi} \quad \text{Divide both sides by } \pi.$$

$$r \approx 71.619 \quad \text{Divide.}$$

$$r \approx 71.62 \text{ feet} \quad \text{Round to the nearest hundredth.}$$

Step 2: Find the area of the park. Use the area of a circle formula.

$$A = \pi r^2 \quad \text{Area of a circle formula.}$$

$$A = \pi \cdot (71.62)^2 \quad \text{Substitute 71.62 in for } r.$$

$$A = \pi \cdot (5129.42) \quad \text{Multiply.}$$

$$A \approx 16,114.548 \quad \text{Multiply.}$$

$$A \approx 16,114.55 \text{ feet}^2 \quad \text{Multiply.}$$

The area of the park is about 16,114.55 feet².

Try This:

- a. The circumference of a round dining table is 16.4 feet. Find the area of the dining table to the nearest hundredth of a foot.

$$C = 16.4 \text{ ft}$$

$$\begin{aligned} \textcircled{1} C &= 2\pi r \\ \frac{16.4}{2} &= \frac{2\pi r}{2} \\ \frac{8.2}{\pi} &= \frac{\pi r}{\pi} \\ r &\approx 2.61 \text{ ft} \\ \boxed{r &\approx 2.61 \text{ ft}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \text{ Area} \\ A &= \pi r^2 \\ A &= \pi (2.61)^2 \\ A &= \pi (6.8121) \\ A &\approx 21.40 \text{ ft}^2 \\ \boxed{A &\approx 21.40 \text{ ft}^2} \end{aligned}$$

The area of the table is about 21.40 ft².

Area to Circumference: Given the area of a circle, find the circumference of the circle.

Example 2: The area of a round swimming pool is 1,230 square feet. Find the amount of fencing needed to enclose the pool. Round to the nearest hundredth.

circumference

Step 1: Find the radius of the pool. Use the area formula.

$$\begin{aligned} A &= \pi r^2 && \text{Area of a circle formula.} \\ 1230 &= \pi \cdot r^2 && \text{Substitute 1230 in for } A. \\ \frac{1230}{\pi} &= \frac{\pi \cdot r^2}{\pi} && \text{Divide both sides by } \pi. \\ 391.52116 &\approx r^2 && \text{Divide.} \\ \sqrt{391.52116} &\approx \sqrt{r^2} && \text{Find the square root of each side.} \\ 19.786 &\approx r && \text{Simplify} \\ 19.79 \text{ ft} &\approx r && \text{Round to the nearest hundredth for the radius.} \end{aligned}$$

Step 2: Find the circumference of the pool. Use the circumference of a circle formula.

$$\begin{aligned} C &= 2\pi r && \text{Circumference of a circle formula.} \\ C &= 2 \cdot \pi \cdot 19.79 && \text{Substitute 19.80 in for } r. \\ C &= 39.58 \cdot \pi && \text{Multiply.} \\ C &\approx 124.344 && \text{Multiply.} \\ C &\approx 124.34 \text{ ft} && \text{Round to the nearest hundredth.} \end{aligned}$$

You need about 124.34 feet of fencing.

Try This:

- b. The town square is putting in a circular fountain. The fountain will have an area of 110 square feet. Find the distance around the edge of the fountain to the nearest hundredth of a foot. ← Circumference

① Find radius

$$A = \pi r^2$$

$$\frac{110}{\pi} = \frac{\pi r^2}{\pi}$$

$$\sqrt{r^2} \approx \sqrt{35.01408748}$$

$$r \approx 5.917$$

$$r \approx 5.92 \text{ ft.}$$

② Circumference

$$C \approx 2\pi r$$

$$C \approx 2\pi(5.92)$$

$$C \approx 11.84\pi$$

$$C \approx 37.196$$

$$C \approx 37.20 \text{ ft.}$$

The distance around the edge of the fountain is about 37.20 feet.

