

Circumference of Circles

Name: _____

Date: _____

Score: _____ / 17

The **circumference** is the distance all the way around a circle, and here is the amazing part: no matter what circle you measure, the ratio of circumference to diameter is always the same number— π ! That gives you two handy formulas: $C = \pi d$ and $C = 2\pi r$. Learning when to use radius versus diameter, and whether to leave your answer in terms of π or as a decimal, will make every circle problem feel manageable.



Key Concepts & Quick Review

$C = \pi d$ or $C = 2\pi r$ where $d = \text{diameter}$, $r = \text{radius}$, $d = 2r$.

Find d or r from C : $d = \frac{C}{\pi}$; $r = \frac{C}{2\pi}$. Use $\pi \approx 3.14$ unless told to use $\frac{22}{7}$ or leave exact (π).

Examples

① Find the circumference of a circle with: (a) radius 7 cm (b) diameter 15 m . Give exact and approximate answers.

Think It Through: Use the version of the formula that matches the measurement you are given. For part (a), the radius is known, so use $C = 2\pi r = 2\pi(7) = 14\pi$. For part (b), the diameter is given directly, so use $C = \pi d = \pi(15) = 15\pi$. Leave the exact answer with π , then use $\pi \approx 3.14$ for the decimal approximation.

Answer: (a) $14\pi \approx 44.0\text{ cm}$; (b) $15\pi \approx 47.1\text{ m}$

② A bicycle wheel has circumference 188.4 cm . Find its diameter and radius. How many full rotations does it make in 1 km ?

Think It Through: Work backward from circumference to diameter using $d = \frac{C}{\pi}$. That gives $d = \frac{188.4}{3.14} = 60\text{ cm}$, so the radius is half of that: 30 cm . For the number of wheel rotations in 1 km , change 1 km to $100,000\text{ cm}$ so the units match. Then divide total distance by distance per rotation: $100,000 \div 188.4 \approx 531$ rotations.

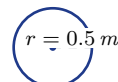
Answer: $d = 60\text{ cm}$, $r = 30\text{ cm}$; $\approx 531\text{ rotations/km}$



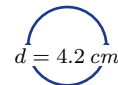
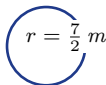
Practice Problems

Find the circumference (use $\pi \approx 3.14$ unless indicated). Leave some exact (π).

- 1. Find the circumference of a circle with radius 5 cm .
- 2. Find the circumference of a circle with radius 9 m .
- 3. Find the circumference of a circle with diameter 14 cm .
- 4. Find the circumference of a circle with diameter 20 m .
- 5. Find the exact circumference of a circle with radius 3.5 cm .
- 6. Find the exact circumference of a circle with diameter 11 cm .
- 8. Find the circumference of a circle with diameter 6 cm .
- 9. A circle has circumference 62.8 . Find its diameter.
- 10. A circle has circumference 31.4 . Find its radius.
- 11. Find the exact circumference of a circle with radius 12 cm .
- 12. Find the circumference of a circle with diameter 25 m .
- 13. A circle has circumference $\pi \times 8$. Find its diameter.
- 14. Find the circumference of a circle with radius 0.5 m .



- 7. Find the circumference of a circle with radius $\frac{7}{2}\text{ m}$.
- 15. Find the circumference of a circle with diameter 4.2 cm .



Study Tips

- Diameter or radius?** Read the problem carefully — $C = \pi d$ uses diameter; $C = 2\pi r$ uses radius. Using the wrong one doubles or halves your answer.
- For an **exact answer**, keep π as a symbol: write $10\pi\text{ cm}$, not 31.4 cm .
- Semicircle perimeter** = half circumference + diameter = $\pi r + 2r$.

Word Problems

- 16. A circular running track has a radius of 40 m . Find the circumference. An athlete wants to run 5 km . How many complete laps must she run? If she runs at 8 km/h , how many minutes will the run take? _____
- 17. A pizza has a diameter of 36 cm . A baker wants to press a decorative crust border around the entire edge. Find the length of border needed. If the dough roll that makes the border is 2 cm wide, what area does the border cover? (Hint: border area $\approx C \times 2$.) _____



Answer Keys

- | | |
|---|---|
| <p>1) 31.4 <i>cm</i></p> <p>2) 56.52 <i>m</i></p> <p>3) 43.96 <i>cm</i></p> <p>4) 62.8 <i>m</i></p> <p>5) 7π <i>cm</i></p> <p>6) 11π <i>cm</i></p> <p>7) 21.98 <i>m</i></p> <p>8) 18.84 <i>cm</i></p> <p>9) 20</p> <p>10) 5</p> | <p>11) 24π <i>cm</i></p> <p>12) 78.5 <i>m</i></p> <p>13) 8</p> <p>14) 3.14 <i>m</i></p> <p>15) 13.19 <i>cm</i></p> <p>16) Circumference about 251.3 <i>m</i>; 20 laps; 37.5 <i>min</i></p> <p>17) Circumference about 113.1 <i>cm</i>; border area about 226.2 <i>cm</i>²</p> |
|---|---|

Step-by-Step Explanations

Strategy: For Triangle Angle-Sum Theorem, add the three interior angles to 180° and keep the unknown angle in that same equation. Once the triangle sum is written, the missing angle is usually one clean subtraction.

Practice 1: A triangle has two angles measuring 40° and 75° . Find the third angle and classify the triangle.

Answer: 65°

At the beginning of the practice, use the fact that the three interior angles of a triangle add to 180 degrees.

Practice 15: An equilateral triangle has three equal angles. Find the measure of each angle. **Answer:** 60°

For the second model problem, use the fact that the three interior angles of a triangle add to 180 degrees.

Word-problem notes:

16. Answer: $2n + 8 + 3n - 12 + 90 = 180 \Rightarrow 5n = 94 \Rightarrow n = 18.8$; angles: 45.6° , 44.4° , 90° — valid right triangle.

A right triangle still follows the same angle-sum rule: the three angles add to 180° . Write $(2n + 8) + (3n - 12) + 90 = 180$. Simplifying gives $5n + 86 = 180$, so $5n = 94$ and $n = 18.8$. Substituting back gives the other two angles as 45.6° and 44.4° . Both are acute, and together with the 90° angle they make a valid right triangle.

17. Answer: $(4k - 5) + (2k + 15) + (k + 10) = 180 \Rightarrow 7k = 160 \Rightarrow k \approx 22.9$; angles: 86.4° , 60.7° , 32.9° ; acute; sharpest turn at peak (32.9°).

Add the three angle expressions and set the sum equal to 180° : $(4k - 5) + (2k + 15) + (k + 10) = 180$. This simplifies to $7k + 20 = 180$, so $7k = 160$ and $k \approx 22.9$. Substituting back gives approximate angles of 86.4° , 60.7° , and 32.9° . Since all three are less than 90° , the route forms an acute triangle. The sharpest turn is the smallest angle, which is at the peak.



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