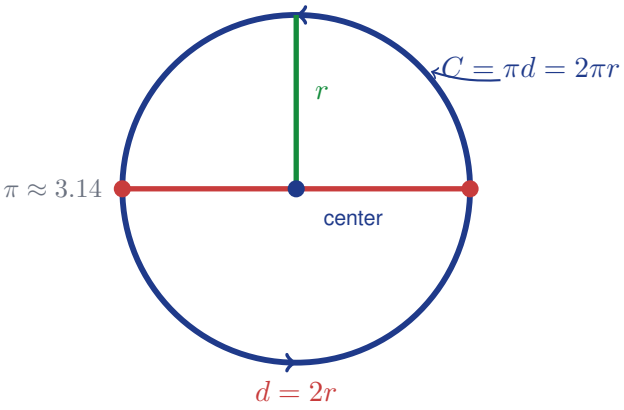
Circumference of Circles

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 = diameter, r = 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)* $14\pi \approx 44.0\ cm$; *(b)* $15\pi \approx 47.1\ m$

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 $d = \frac{188.4}{3.14} = 60\ cm$, so the radius is half of that: $30\ cm$. For the number of wheel rotations in $1\ km$, change $1\ km$ to $100{,}000\ cm$ so the units match. Then divide total distance by distance per rotation: $100{,}000 \div 188.4 \approx 531$ rotations.

Answer: $d = 60\ cm$, $r = 30\ cm$; ≈ 531 *rotations/km*

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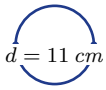
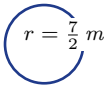
Practice Problems

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

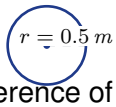
1. Find the circumference of a circle with radius $5\ cm$. _____
2. Find the circumference of a circle with radius $9\ m$. _____
3. Find the circumference of a circle with diameter $14\ cm$. _____
4. Find the circumference of a circle with diameter $20\ m$. _____
5. Find the exact circumference of a circle with radius $3.5\ cm$. _____
6. Find the exact circumference of a circle with diameter $11\ cm$. _____



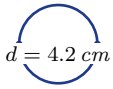
7. Find the circumference of a circle with radius $\frac{7}{2}\ m$. _____



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 $0.5\ m$. _____



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 $10\pi\ cm$, 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

1) $31.4\ cm$
2) $56.52\ m$
3) $43.96\ cm$
4) $62.8\ m$
5) $7\pi\ cm$
6) $11\pi\ cm$
7) $21.98\ m$
8) $18.84\ cm$
9) 20
10) 5
11) $24\pi\ cm$
12) $78.5\ m$
13) 8
14) $3.14\ m$
15) $13.19\ cm$
16) Circumference about $251.3\ m$; 20 laps; $37.5\ min$
17) Circumference about $113.1\ cm$; border area about $226.2\ cm^2$

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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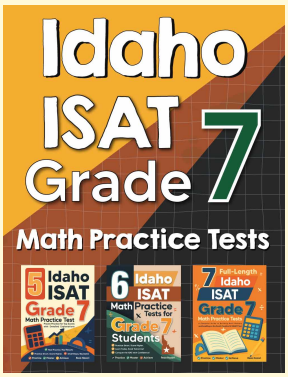

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