Grade 7 · Unit 3 · Assessment Guide

Measuring Circles

For the Parent or Teacher — What to look for

Unit 3 builds intuition about circle measurements: C = πd = 2πr and A = πr². The classic misconceptions: confusing radius with diameter, mixing up circumference and area formulas, and thinking area scales linearly (it doesn't — it's quadratic in r). Watch for whether students KNOW WHICH FORMULA to use in context (problems 6, 7, 8).

Problem 1 — Parts of a circle

- Radius: distance from center to edge. Diameter = 2 × radius = 10 cm. Circumference = π × diameter ≈ 31.4 cm.
- Watch for: confusing radius and diameter (the most common error in this unit).

Problem 2 — Fill in the table

- Row 1: d = 6 cm, C ≈ 18.84 cm.
- Row 2: r = 5 in, C ≈ 31.4 in.
- Row 3: d = 31.4/π ≈ 10 cm, r ≈ 5 cm.
- Row 4: d = 14 m, C = 14π m.
- ★ Strong: handles both directions (C → d and d → C). Weak: only works one direction.
- Note 'in terms of π' — students should write 14π, not 43.96.

Problem 3 — Pizza diameter from C

- C = πd, so d = C/π = 50.24/3.14 = 16 inches.
- Watch for: students who divide by 2 (confusing with radius/diameter) or multiply instead of dividing.

Problem 4 — Area of circular table

- A = π × 4² = 16π sq ft (exact) ≈ 50.24 sq ft.
- ★ Watch for students who write 8π (using 2r instead of r²) — this is the classic confusion with circumference.
- Strong: confident with both 'in terms of π' and approximate forms.

Problem 5 — Better pizza deal

- 10-inch pizza (radius 5): area = 25π ≈ 78.5 sq in. Price per sq in: $9/78.5 ≈ $0.115/sq in.
- 14-inch pizza (radius 7): area = 49π ≈ 153.86 sq in. Price per sq in: $15/153.86 ≈ $0.098/sq in.
- ★ The 14-inch pizza is the better deal.
- ★ Watch for: students using DIAMETER (10 or 14) as radius in A = πr². Catastrophic but common.
- Strong: real-world reasoning about price/sq in. This is exactly the kind of multi-step problem that tests area understanding.

Problem 6 — Circumference or area?

- (a) Circumference (fence = perimeter).
- (b) Area (painting covers a surface).
- (c) Circumference (one rotation = circumference).
- (d) Area (frosting covers a surface).

- (e) Circumference (ribbon goes around).
- ★ The KEY question: am I measuring around the edge (1-D, length) or covering the surface (2-D, area)?
- Weak: random answers. Strong: explains the dimensionality.

Problem 7 — Track perimeter

- Two straights: 2 × 100 = 200 m.
- Two semicircles = 1 full circle. C = 2π × 30 ≈ 188.4 m.
- Total ≈ 388.4 m.
- ★ Watch for: students computing AREA when the question asks LENGTH. Or forgetting that 2 semicircles = 1 full circle.
- Strong: clear decomposition.

Problem 8 — Square minus inscribed circle

- Square area: 144 sq cm. Circle area: $\pi \times 6^2 = 36\pi$ sq cm.
- Outside area = $144 - 36\pi$ sq cm ≈ 144 − 113.1 = 30.9 sq cm.
- ★ Diagnostic: do they use radius = 6 (half the side), not 12? Many students plug in 12.
- ★ Also: 'outside the circle' means SUBTRACT circle from square.

Problem 9 — Tyler confused C and A

- Tyler used C = 2πr formula ($2 \times \pi \times 6 = 12\pi$) but called it area.
- Correct area: $A = \pi \times 6^2 = 36\pi$.
- ★ THE classic Unit 3 error.
- Strong: identifies that he used the circumference formula. Weak: 'he just multiplied wrong.'

Problem 10 — Doubling radius doubles area? (Mai)

- Mai is WRONG. Radius 3: $A = 9\pi$. Radius 6: $A = 36\pi$.
- Doubling radius multiplies area by 4 ($= 2^2$).
- ★ The CRITICAL idea: area scales by the SQUARE of the scale factor (also seen in Unit 1).
- Strong: connects to Unit 1's scale-factor-squared insight. Weak: 'it doubles' (the trap).
- This is the deepest conceptual question in the unit.

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