

Grade 6 • Unit 1 • Assessment Guide

Area and Surface Area

For the Parent or Teacher — What to look for

This guide accompanies the worksheet. For each problem, look for evidence of underlying understanding — not just numerical correctness. A student can be right for the wrong reason and wrong for the right reason; both matter.

Problem 1 — Comparing parallelogram areas

- Areas: $12 \times 7 = 84$ sq cm; $14 \times 6 = 84$ sq cm. They ARE equal.
- Strong: notices that two different base-height pairs can yield the same area; talks about multiplication of base $\times$ height.
- Weak: computes one wrong (often uses a slant length instead of the perpendicular height).
- ★ This is the FIRST test of whether the student understands that area depends on base $\times$ perpendicular height.

Problem 2 — Triangle formula reasoning

- Area: $(1/2)(9)(8) = 36$ sq in.
- The number is easy. The WHY is the test.
- Strong: explains that two copies of a triangle form a parallelogram, so the triangle is HALF a parallelogram with the same base and height.
- Weak: 'because the formula says so' / 'half of 9 times 8' with no geometric reasoning.
- ★ Conceptual understanding of where the $1/2$ comes from is the Unit 1 target.

Problem 3 — L-shaped room in TWO ways

- Either: $12 \times 8 + 5 \times 6 = 96 + 30 = 126$ sq ft, OR a larger $17 \times 8 = 136$ rectangle minus a $5 \times 2 = 10$ piece (or similar valid decomposition depending on how the student visualizes it).
- Strong: BOTH methods produce the same answer AND student articulates a preference with mathematical reason ('subtracting is faster because the bounding rectangle was easy').
- Weak: one method works, the other is muddled; or both work but the answers don't match (didn't notice the inconsistency).
- ★ The flexibility to use both additive and subtractive decomposition is a key Unit 1 outcome.

Problem 4 — Find height given area ($8h/2 = 36$)

- Equation: $(1/2)(8)(h) = 36$, so $4h = 36$, so $h = 9$ cm.
- Strong: writes a clear equation and reverses the formula.
- Weak: divides 36 by 8 (gets 4.5) — they're forgetting the $1/2$ factor.
- Watch for: students who say 'I just divided $36 \div 8 = 4.5$ ' and never relate to the triangle formula at all.

Problem 5 — Box: net, surface area, volume, units

- Surface area: $2(4 \times 5 + 4 \times 3 + 5 \times 3) = 2(20 + 12 + 15) = 94$ sq in.
- Volume: $4 \times 5 \times 3 = 60$ cubic in.
- (d) Surface area in SQUARE units; volume in CUBIC units. This distinction is a common Grade 6 confusion.
- Strong net: 6 rectangles correctly arranged, each labeled, and dimensions visible. Should connect adjacent rectangles by matching edges.

- Weak: forgets the bottom face (only 5 rectangles); uses linear units for both; mixes up sq in and cubic in.

Problem 6 — Cube with exponents

- (a) 6×5^2 ; (b) $6 \times 25 = 150$ sq cm
- (c) 5^3 ; (d) 125 cubic cm
- Strong: USES the exponent notation (not $6 \times 5 \times 5$ written out).
- Weak: writes 5×3 instead of 5^3 — interpreting the exponent as multiplication by the exponent.
- ★ The exponent-vs-multiplication error ($5^2 = 10$) is the most common Unit 1 mistake.

Problem 7 — Andre's slant-side error

- Andre is WRONG. The 12 cm is a slant side, not the height. The height must be perpendicular to the base.
- Without the actual height, we cannot compute the area.
- Strong: identifies that 12 cm is not perpendicular and that the formula needs the PERPENDICULAR height.
- Weak: 'looks right to me' / 'the answer is 60' / agrees with Andre.
- ★ Distinguishing slant side from perpendicular height is a critical Unit 1 misconception to catch.

Problem 8 — Same area, different base/height pair

- Area is fixed: $10 \times 6 = 60$. So $12h = 60$, $h = 5$.
- Strong: realizes the parallelogram has a fixed area, then sets up the equation $12h = 60$.
- Weak: thinks the area changes when the base changes.

Problem 9 — Reverse-engineer cube from surface area

- $SA = 6s^2 = 96$, so $s^2 = 16$, so $s = 4$ inches.
- Volume = $4^3 = 64$ cubic inches.
- Strong: uses square root reasoning (what number squared is 16?) and applies exponent again for volume.
- Weak: divides 96 by 6 and then says $s = 16$; doesn't square-root.

Problem 10 — Tent fabric (multi-face surface area)

- Two triangles: $2 \times (1/2)(6)(4) = 24$ sq ft.
- Two long sides: $6 \times 8 + 5 \times 8 = 48 + 40 = 88$ sq ft.
- Floor excluded.
- Total fabric $\approx 24 + 88 = 112$ sq ft.
- Strong: identifies WHICH faces to include and excludes the floor as instructed.
- Weak: includes the floor (doesn't read carefully); doubles the wrong face; treats every face as a rectangle.

Problem 11 — Reflection on formula vs decomposition

- No right answer; honest reasoning is the goal.
- Strong: gives a concrete situation for each ('A pentagon — decompose because no formula' vs 'A rectangle — formula is easier').
- Weak: 'I like formulas' with no reasoning, or just restates the question.
- ★ Indicates whether the student has developed a sense of strategic problem-solving.