Accelerated 6 · Unit 1 · Assessment Guide

Areas

For the Parent or Teacher — What to look for

Unit 1 is about reasoning, not formulas. The accelerated cohort should produce GENERALIZATIONS, not just numerical answers. Watch for evidence that the student understands WHY formulas work, not just HOW to apply them.

Part A — Quick Computations

- These should be near-instant for accelerated students.
- ½ · 12 · 8 = 48 (triangle formula).
- 6 · 4.5 = 27 (parallelogram practice).
- 8^2 = 64.
- 2 · (5+3) = 16. Watch for order-of-operations slips.

Problem 1 — Two parallelograms, same area

- Both have area 54 cm² (9·6 = 12·4.5).
- Strong: predicts equal areas because 9·6 = 12·4.5 = 54 before computing — sees the product structure.
- Strong notice: "One is taller-and-narrower, one is shorter-and-wider, but the product is the same." This is multiplicative thinking, a Unit 1 target.
- Weak: just computes both and reports they happen to be equal — doesn't connect to dimensions.

Problem 2 — Triangle area two ways

- ★ THE diagnostic question for understanding 'base and height are a PAIR.'
- Way 1: ½ · 6 · 8 = 24.
- Way 2: ½ · 10 · h = 24, so h = 4.8.
- Strong: realizes BOTH ways must yield 24, then USES that to back out the altitude to the hypotenuse (4.8). This is the deep idea.
- Weak: gets 24 from legs, then gets stuck because they don't know the altitude — doesn't see that the two answers MUST match.
- If they actually compute h=4.8, that's college-prep level reasoning.

Problem 3 — Trapezoid two ways

- Area = ½(5+11)·4 = 32 cm².
- Decomposition: 5×4 rectangle (20) + two triangles totaling 12 = 32. OR ½·6·4 + 5·4 + ½·6·4 if symmetric.
- Strong: gets matching answers and recognizes the formula AS a generalization of what decomposition does.
- Weak: gets two different answers and doesn't reconcile; doesn't see the decomposition IS the formula.

Problem 4 — Diego's triangulation conjecture

- Diego's claim (n−2 triangles for n sides) is TRUE — this is a real theorem.
- Pentagon → 3 triangles. Hexagon → 4. Heptagon → 5.
- Strong: tests, confirms the pattern, articulates the general rule.
- Strong+: notices the connection to interior angle sum = (n−2)·180°.

- Weak: triangulates correctly but doesn't connect to the count, or makes wrong triangulations (overlapping).

Problem 5 — Rectangular prism + scaling

- SA = 2(12 + 15 + 20) = 94 cm².
- Doubling edges: new SA = 376 = 4× original (NOT 2×). This is the BIG idea: surface area scales by k^2, not k.
- Strong: predicts SA doesn't simply double, reasons about areas vs. lengths.
- Weak: predicts SA doubles. This is exactly the misconception this question targets. Note it.
- Acceptable: computes new SA = 376 and notices it's 4× — even without predicting correctly first.

Problem 6 — Triangular prism surface area

- Two triangles: 2 · ½ · 6 · 4 = 24 cm².
- Three rectangles: 6·10 + 4·10 + 7.2·10 = 60 + 40 + 72 = 172 cm².
- Total: 196 cm².
- Strong: correctly identifies that the three rectangles use the three SIDES of the triangle as widths (not just any number).
- Weak: uses only two rectangle faces, or confuses which dimensions go together.

Problem 7 — Lin vs. Diego (slanted parallelograms)

- ★ Core conceptual question. Lin is correct.
- Strong: explains via Cavalieri-style reasoning — "if you slide each horizontal strip, you get a rectangle of the same area" — OR via the shearing argument.
- Strong+: connects to the formula: area depends only on base × height, not on the slant.
- Weak: 'Lin is right because the formula says so' — restates without explaining WHY the formula works.
- Common error: agrees with Diego because the slanted one 'looks smaller.'

Problem 8 — Net of 6 squares in a row

- A 1×6 strip canNOT fold into a cube (two squares would overlap on the bottom).
- Strong: reasons that a cube has 3 pairs of opposite faces, and a straight strip puts too many in a line.
- Strong sketch: the classic 'cross' (+ shape) or 'T' net.
- Weak: just says no without reasoning, or sketches an invalid net.

Problem 9 — Add vs. subtract a triangle

- Both shapes differ from the 10×10 square by EXACTLY one triangle (area 20).
- The 'house' = 100 + 20 = 120.
- The cut-out = 100 − 20 = 80.
- Difference = 40, which equals 2 × triangle area.
- Strong: realizes the difference is twice the triangle (since one adds, one subtracts).
- Weak: computes both numerically without noticing the elegant '2 triangles' difference.

Problem 10 — Design a polygon with area 24

- Open-ended; many correct answers (trapezoid, L-shape, pentagon, etc.).
- Look for: correct labeling and a clear area justification.
- Strong: a non-trivial shape (NOT just two rectangles slapped together, or a triangle-with-rectangle stacked simply).
- Strong+: a shape requiring decomposition AND uses formulas they generalized in this unit.

● Weak: a 6×4 rectangle minus dimensions; an unlabeled scribble; an obviously wrong area.

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