Accelerated 6 · Unit 2 · Assessment Guide

Ratios, Rates, and Percentages

For the Parent or Teacher — What to look for

Unit 2 is about flexible reasoning with multiplicative relationships. Watch whether the student can move fluidly between ratios, rates, and percentages — or whether they have a brittle 'one method per problem type' approach.

Part A — Percent fluency

- 20% of 80 = 16. 25% of 64 = 16. 150% of 40 = 60. 1% of 350 = 3.5.
- Notice if they reach for procedures ("move the decimal") or use fluent benchmarks ("20% is one fifth").
- Accelerated students should be benchmark-fluent — instant, with reasoning available.

Problem 1 — Recipe ratios both directions

- Han: 12 cups flour → 8 cups sugar.
- Diego: 10 cups sugar → 15 cups flour.
- (c) is the diagnostic: both should taste the same because both maintain the 3:2 ratio.
- Strong: explicitly says "the ratio is preserved, so the taste is the same."
- Weak: 'yes because they both have flour and sugar' — misses the proportionality.

Problem 2 — Mixture comparison (4:6 vs 6:9)

- Both reduce to 2:3 → SAME shade.
- Strong: explicit comparison of simplified ratios, OR notes that 4·9 = 6·6 = 36 (cross-product reasoning).
- Weak: assumes more blue = darker without ratio reasoning.
- Watch for the misconception that adding the same amount to both sides preserves a ratio (it doesn't — multiplication does).

Problem 3 — Equivalent ratios table + unit rates

- If 45 miles per 1 hour: row 1 → (45, 1). Row 2 → (45, 1). Row 3 → (135, 3). Row 4 → (180, 4). Row 5 → (1, 1/45).
- Both unit rates: 45 mph (miles per hour) AND 1/45 hours per mile.
- Strong: articulates that 1/45 of an hour ≈ 1.33 min/mile and explains why both unit rates are useful in different contexts.
- Weak: only finds the 'miles per hour' rate; doesn't see the inverse rate as equally valid.

Problem 4 — Compare runners two ways

- Lin: 5/25 = 0.2 km/min (or 5 min/km).
- Sara: 8/36 ≈ 0.222 km/min (or 4.5 min/km).
- Sara is faster.
- Method 1: unit rates as above.
- Method 2: scaling — e.g., "In 5 minutes, Lin runs 1 km; Sara runs 8·5/36 ≈ 1.11 km." Or "To run 40 km, Lin takes 200 min, Sara takes 180 min."
- Strong: BOTH methods executed with different scaling, not the same method twice.

Problem 5 — Multi-step percent (sale + tax)

- $80 · 0.70 = $56 (sale price). $56 · 1.07 = $59.92.
- Mai's claim: YES, $80 · 0.70 · 1.07 = $59.92.
- ★ Strong: recognizes that successive percent changes compose multiplicatively (a key idea for Unit 6).
- Weak: gets the arithmetic right but says Mai is wrong because she 'skipped a step' — misses the multiplicative meaning.

Problem 6 — Survey percentages + ratio question

- Math: 54. Reading: 20% · 120 = 24.
- (c) New reading: 24 + 12 = 36 out of 132. 36/132 ≈ 27.3%.
- ★ Strong: realizes the DENOMINATOR changed and recomputes correctly.
- Weak: just does 24/120 + 10% or some additive guess — doesn't update the whole.

Problem 7 — Inches/centimeters area conversion

- (a) 60.96 cm × 91.44 cm.
- (b) Area = 864 in^2 = 864 · $(2.54)^2$ cm^2 ≈ 5574 cm^2.
- ★ The KEY diagnostic: 1 in^2 = 6.4516 cm^2, not 2.54.
- Strong: explains that area scales as the SQUARE of the linear conversion factor.
- Strong+: connects this to Unit 1's discovery that doubling edges quadruples surface area — same principle.
- Weak: multiplies area by 2.54 — exactly the misconception this question targets.

Problem 8 — Diego's wrong ratio comparison

- Diego is WRONG.
- 6:9 = 2:3 ≈ 0.667. 4:6 = 2:3 ≈ 0.667. They're EQUAL.
- Strong: simplifies both to 2:3, sees equality. Explains that with ratios you must compare RELATIVE size, not absolute size of components.
- Weak: agrees with Diego (most common misconception); or simplifies but doesn't articulate why component-wise comparison fails.

Problem 9 — +20% then −20% is NOT back to original

- $100 → $120 → $96. So FINAL is 96% of original (4% LESS).
- General: (1.2)(0.8) = 0.96, not 1.
- Strong: articulates that the 20% decrease is taken off a LARGER number, so the dollar amount of the decrease exceeds the increase.
- Strong+: generalizes (1+p)(1−p) = 1 − p^2, always less than 1 — foreshadows Unit 6 (percent change) and even Algebra 1 (difference of squares).
- Weak: agrees with Han, OR computes 96 but can't say why.

Problem 10 — Write your own combined problem

- Open-ended. Strong examples: "Gas costs $3.50/gallon, my car gets 28 mpg. A trip is 420 miles. If gas goes up 15%, how much MORE will the trip cost?"
- Look for: BOTH a unit rate AND a percent — many students will write a percent-only or rate-only problem.
- Strong: the two concepts genuinely interact (not just two separate parts).
- Weak: rate and percent both appear but the problem could be solved without one of them.

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