Grade 7 · Unit 2 · Assessment Guide

Introducing Proportional Relationships

For the Parent or Teacher — What to look for

Unit 2 builds the formal definition of a proportional relationship. Key signals: (1) is the ratio y/x constant across rows? (2) does the equation have the form y = kx (no added constant)? (3) does the graph go through the origin in a straight line? The most diagnostic problems are those that look proportional but aren't (like Tyler's ages), and those that ask students to translate between table/equation/graph.

Problem 1 — Table A proportional?

- Yes. k = 3 (each y is 3 times the x).
- Strong: divides y/x and notices it's constant.

Problem 2 — Table B not proportional

- Not proportional. y = 2x + 1 (linear but with intercept).
- ★ The diagnostic: do they NOTICE that 3/1 = 3 but 5/2 = 2.5 — ratios aren't constant?
- Weak: "it's increasing so it must be proportional."

Problem 3 — Constant speed

- (a) 55 mph. (b) distance = 55 × time. (c) 55, 165, 275, 55t. (d) 8 hours.
- Strong: notices the table structure and can extract k from the given (3, 165).
- ★ Common mistake: filling in additively ("+165 every 3 hours").

Problem 4 — Two equations from a ratio

- F = 1.5 S (or F = 3S/2) and S = (2/3) F.
- The two constants (1.5 and 2/3) are RECIPROCALS.
- ★ This is THE Lesson 5 idea — students should notice reciprocal relationship.
- Weak: only writes one equation; doesn't see that 'flour proportional to sugar' and 'sugar proportional to flour' are both true with different k.

Problem 5 — Graph through origin and (4, 10)

- (a) Yes. (b) k = 10/4 = 2.5. (c) y = 2.5x.
- (d) When x = 6, y = 15. When y = 35, x = 14.
- ★ Strong: uses k to compute both directions confidently. Weak: re-derives from scratch each time.

Problem 6 — Which graphs aren't proportional

- Should circle (b) and (c).
- (a) is proportional (straight line through origin).
- (b) is linear but DOESN'T go through origin (intercept 5).
- (c) is a curve — not even linear.
- (d) IS proportional — through origin, slope 3.
- ★ The diagnostic: do they require BOTH straight line AND through origin? Many students forget the origin condition.

Problem 7 — Two smoothie shops

- Shop A: $0.75 per oz at all sizes — proportional.

- Shop B: $0.75, $0.67, $0.625 per oz — NOT proportional (price doesn't scale evenly).
- ★ The diagnostic: do they actually compute price-per-ounce, or just eyeball? Strong analysis notices Shop B charges proportionally LESS for bigger sizes (bulk discount = not proportional).

Problem 8 — Tyler's age argument

- Tyler is WRONG. 7/4 ≠ 12/9.
- ★ THE classic 'additive vs multiplicative' fallacy.
- Even though both increase by the same amount each year, the RATIO changes. Proportional requires constant RATIO, not constant difference.
- Strong: shows the ratios drift toward 1 over time. Weak: agrees with Tyler.
- This is THE essential distinction of Unit 2.

Problem 9 — Four representations

- Equation: p = 12m.
- Words: '12 pages per minute' or '1 minute prints 12 pages.'
- Table: 12, 36, 5 (for 60 pages), 120.
- Graph: line through origin and (1, 12); slope 12.
- ★ Each rep should match. Weak: graph misses origin or uses wrong axes; table doesn't match equation.

Problem 10 — Jada vs Han

- BOTH are correct, just describing DIFFERENT relationships.
- If y is proportional to x (y = 4x), then k_y = 4.
- If x is proportional to y (x = (1/4)y), then k_x = 1/4.
- The two constants are reciprocals.
- ★ Strong: explains that proportional relationships go both ways and the constants are reciprocals. Weak: picks one as 'the' answer.

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