Accelerated 6 · Unit 5 · Assessment Guide

Proportional Relationships

For the Parent or Teacher — What to look for

Unit 5 is foundational for Algebra 1. The signature ideas: (1) a proportional relationship has CONSTANT RATIO, (2) its graph is a LINE THROUGH THE ORIGIN, (3) its equation has the form y = kx (no constant term). Many tests will probe whether students confuse 'linear' with 'proportional.'

Part A — Quick Computations

- 12·7 = 84. 84÷6 = 14. π·5 ≈ 15.7. Area, r=2: π·4 ≈ 12.56.
- Strong: should be near-instant for accelerated cohort.

Problem 1 — Proportional or not?

- (a) YES, y = 0.6x. (b) NO (base fee makes it nonproportional). (c) NO, $y = x^2$ (the rate changes). (d) INVERSE proportion, y = (pizza)/n — not direct proportional.
- ★ Strong: gives correct decisions AND identifies (b) as having a 'starting amount,' (c) as nonlinear, (d) as inverse.
- Weak: any 'rate per something' situation is called proportional — doesn't check zero point.
- ★ The diagnostic for accelerated work: catching (b) and (d). Most G6 students miss the inverse case.

Problem 2 — Table check (5, 10, 15, 25)

- Proportional, k = 5/2 = 2.5. (10/4 = 2.5; 15/6 = 2.5; 25/10 = 2.5.)
- Strong: tests EVERY row, not just the first two.
- Weak: says proportional after checking only one row.

Problem 3 — Table check (5, 8, 11, 14)

- NOT proportional. Differences are constant (3), but ratios are not.
- ★ Strong: explicitly says 'the differences are 3 each time, so it's linear with slope 3, but it's NOT proportional because (1, 5) doesn't have ratio 3.'
- ★ Strong+: finds the equation y = 3x + 2.
- Weak: declares proportional because there's a pattern; doesn't distinguish arithmetic from multiplicative pattern.
- Common error: divides only the first row's y by first row's x and concludes k = 5.

Problem 4 — Three graphs

- (a) and (b) pass through origin → proportional.
- (c) y = x + 1 is linear but NOT proportional (y-intercept 1).
- ★ Strong: identifies the two proportional ones VISUALLY by 'passes through origin,' not by computing.
- Weak: confuses linear with proportional.

Problem 5 — Circle with d = 10

- C = π·10 ≈ 31.4 cm.
- $A = \pi \cdot 5^2 = 25\pi \approx 78.5$ cm².
- Double the diameter: C doubles (linear). A quadruples (the SQUARE of the scale factor).
- ★ Strong: connects this to Unit 1's discovery (surface area scales as k^2).

- Weak: claims A also doubles — exactly the misconception this question probes.

Problem 6 — C/d = π is proportional

- C/d ratio: ≈ 3.14 every row. C for d=5: ≈ 15.7. C for d=10: ≈ 31.4.
- ★ This is the foundation: π IS the constant of proportionality between d and C.
- Strong: articulates that π is the CONSTANT in C = π·d.
- Strong+: notices this means C and d ARE proportional, but C and r have constant 2π (also proportional). And C and A are NOT proportional.

Problem 7 — Is x and y^2 also proportional?

- ★ NO. If y = 3x, then $y^2 = 9x^2$. So x and y^2 are NOT proportional — that's a quadratic relationship.
- Table check: x=1, y=3, y^2=9. x=2, y=6, y^2=36. y^2/x = 9, 18 → not constant.
- Strong: catches the squaring breaks proportionality and shows it.
- Weak: agrees with Mai because 'squaring a constant gives k^2.' Missing the (squaring x) effect.
- ★ THE most subtle problem on this worksheet.

Problem 8 — Two circles, radii 3 and 6

- Circumference ratio: 2:1 (linear).
- Area ratio: 4:1 (quadratic).
- Generalization: double radius → C doubles, A quadruples.
- Strong: states the rule clearly.
- ★ Strong+: generalizes to 'multiply by k → C multiplies by k, A multiplies by k^2.'

Problem 9 — Proportional vs. linear (lines through origin)

- y = 0.5x: YES proportional.
- y = 0.5x + 0: YES (same as the first).
- y = 0.5x − 3: NO (linear but not proportional).
- ★ The ONE thing: must pass through the origin (or: equation has no constant term).
- Strong: clearly articulates that the y-intercept must be 0.
- Weak: marks all three as proportional because 'they have the same slope.'

Problem 10 — Design a proportional relationship

- Open-ended.
- Strong: equation IS of form y = kx (no constant), graph passes through origin, table shows constant ratio.
- Strong+: chosen context makes sense for 'starts at zero' (e.g., distance at constant speed from a starting position).
- Weak: provides a linear-but-not-proportional setup (e.g., 'baseline $10 plus...'), missing the unit's core distinction.

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