

Accelerated 6 • Unit 4 • Assessment Guide

Equations and Expressions

For the Parent or Teacher — What to look for

Unit 4 is the bridge to algebra. Watch for whether students are MANIPULATING SYMBOLS WITH MEANING — or just doing rote moves. The 'equivalent vs. equal' distinction is the conceptual heart of the unit.

Part A — Quick Computations

- $3 \cdot (5+2) = 21$. $2^3 + 1 = 9$. $5x$ at $x=4 = 20$. $x+y = 10$.
- Watch order of operations: 2^3+1 should be 9, not 16 (mistakes 2^3 for $2 \cdot 3$ or for $(2+1)^3$).
- Strong: fluent substitution into algebraic expressions.

Problem 1 — Equal vs equivalent vs never

- ★ THE conceptual question of the unit.
- (a) Equivalent (distributive property).
- (b) Equal only when $x = 0$.
- (c) Equivalent (commutativity).
- (d) NEVER equal (parallel lines, never intersect).
- Strong: tests at multiple x -values, recognizes when the equation gives one solution vs. an identity vs. no solution.
- Weak: calls them all 'equivalent' or all 'equal' — has not distinguished the concepts.
- ★ This skill is the prerequisite for all of algebra. If shaky, more practice is needed.

Problem 2 — Mai's x^2 vs $2x$ mistake

- Table: $x=0 \rightarrow$ both 0; $x=1 \rightarrow 1$ vs 2; $x=2 \rightarrow 4$ vs 4 (TIE — interesting!); $x=3 \rightarrow 9$ vs 6.
- Mai is WRONG. Equal only at $x=0$ and $x=2$.
- Strong: notices the EQUAL CASES ($x=0$, $x=2$) — sophisticated observation.
- Strong+: starts to see this is a quadratic vs. linear comparison (foreshadows Algebra 1).
- Weak: declares Mai wrong but doesn't notice the meeting points, OR claims they're 'always different.'

Problem 3 — Sequence of equivalent equations

- (a) $x = 18$. (b) $x = 9$. (c) $x = 48$. (d) $3x = 18$; $x = 6$.
- ★ Look at WORK STRUCTURE: each line should be an equivalent equation, not a side-calculation.
- Strong: clean = signs aligned, one operation per step, with a note like 'subtract 7 from both sides.'
- Weak: writes a single line (' $18 \div 3 = 6$ ') without showing the equation transforming.

Problem 4 — Set up and solve word problems

- (a) $4x = 32 \rightarrow x = \8 .
- (b) $3n + 7 = 28 \rightarrow n = 7$.
- (c) $2(L + 9) = 50 \rightarrow L = 16$ cm.
- ★ Strong: writes the equation BEFORE solving. Equation captures the meaning of the situation.
- Weak: solves arithmetically without ever writing an equation — getting the right number without the algebra skill being demonstrated.

Problem 5 — Exponent practice

- (a) $2^5 = 32$. (b) 125. (c) 49. (d) 25.
- Watch for: confusing $2^2 \cdot 2^3$ with $2^2 + 2^3$, or writing 2^6 (multiplying exponents instead of adding).
- Strong: shows in (a) that $2^2 \cdot 2^3 = (2 \cdot 2) \cdot (2 \cdot 2 \cdot 2) = 2^5$ — understands WHY exponents add.

Problem 6 — Diego's $(a+b)^2 = a^2+b^2$ claim

- ★ Diego is WRONG. $(3+4)^2 = 49$, but $3^2+4^2 = 25$.
- Strong: states the rule clearly — 'you cannot distribute exponents over addition.'
- Strong+: anticipates $(a+b)^2 = a^2 + 2ab + b^2$ (preview of Algebra 1).
- Weak: notes Diego is wrong but doesn't see the structural reason.

Problem 7 — Taxi equation

- $F = 2m + 3$.
- (b) $F = \$23$. (c) $m = 8$ miles. (d) Linear graph, y-intercept 3, slope 2.
- Strong: graph is straight, slope visible, y-intercept marked at (0, 3).
- ★ Strong+: identifies the y-intercept and slope as the pickup fee and rate-per-mile — connecting to Unit 5 (proportional & nonproportional relationships).
- Weak: graph is wavy, or origin is wrong, or no scale.

Problem 8 — Order of inverse operations

- Both orders give $x = 6$. But Han's order (subtract first, then divide) avoids fractions.
- Other order: divide first $\rightarrow x + 7/3 = 25/3 \rightarrow x = 18/3 = 6$. Works, but uglier.
- Strong: actually executes both, shows they both work, then explains.
- ★ Strong: 'doing inverse operations in REVERSE order is like un-wrapping a package — outermost first.'
- Weak: just solves one way and asserts 'mine is better' without showing why.

Problem 9 — $x^2 = 9$ has two solutions

- BOTH Sara and Diego are right. $x = \pm 3$.
- ★ Strong: marks 'Both,' explains that $(-3)^2 = 9$ also.
- ★ Strong+: anticipates 'all even-degree equations can have negative solutions' (foreshadows Algebra 1).
- Weak: picks only Sara — forgets that $(-3)^2 = 9$.

Problem 10 — Story for $4x + 10 = 50$

- Strong examples: 'I had \$10. I save \$4/week. How many weeks until I have \$50?' OR 'A taxi costs \$10 booking + \$4 per mile. How far for \$50?'
- ★ Strong: every number has a clear physical meaning, and $4x$ represents a rate $\times$ quantity.
- Weak: numbers are forced (e.g., 'I have 4 apples and 10 oranges and...'), or doesn't actually require the algebra to solve.

— end —