Accelerated 7 · Unit 3 · Assessment Guide

Equations and Inequalities

For the Parent or Teacher — What to look for

Unit 3 builds the algebraic foundation: from situations to equations to solutions. The key step from grade 6 is the structural understanding that p(x+q) = r and px+q = r can be solved by either distributing or by working with the parentheses as a unit. Watch for flexibility, error analysis skill, and contextual reasoning.

Problem 1 — Situations to equations

- (a) 2x + 3 = 19, x = 8 miles.
- (b) 3x + 4 = 25, x = 7.
- (c) 3(x - 5) = 48, x = 21 (cost per item).
- Watch for the form chosen: situation (c) is naturally p(x+q)=r because the $5 is taken off FIRST, then tripled. Students who model it as 3x - 5 = 48 missed the structure.
- Critical that x is defined precisely — "the cost" or "the number" is vague.

Problem 2 — Two ways to solve 4(x+7) = 32

- Way 1: divide both sides by 4 -> x + 7 = 8 -> x = 1.
- Way 2: distribute -> 4x + 28 = 32 -> 4x = 4 -> x = 1.
- The preference matters: dividing first is faster IF coefficient divides cleanly. Distributing is the safer fallback when fractions appear.
- Strong: articulates this trade-off.

Problem 3 — Step-by-step solving

- (a) 5x - 12 = 23 -> 5x = 35 -> x = 7.
- (b) -2(x - 5) = 18 -> x - 5 = -9 -> x = -4 (OR distribute: -2x + 10 = 18, x = -4).
- (c) (x + 9)/4 = 7 -> x + 9 = 28 -> x = 19.
- Watch for sign errors in (b) — common to forget dividing by -2 affects both sides.

Problem 4 — Diego's error

- Error: didn't distribute the 3. He treated 3(x - 4) as 3x - 4, but it's 3x - 12.
- Correct: 3(x - 4) = 21 -> 3x - 12 = 21 -> 3x = 33 -> x = 11. (OR divide first: x - 4 = 7, x = 11.)
- The strong response names the error specifically ("forgot to distribute") rather than just showing the right work.

Problem 5 — Solving inequalities

- (a) 3x ≥ 9, x ≥ 3.
- (b) -2x > -6, x < 3 (FLIP sign because divided by negative).
- (c) 4x - 8 ≤ 12, 4x ≤ 20, x ≤ 5.
- THE diagnostic: does the student flip the inequality in (b)? This is the #1 algebra error at this level.

Problem 6 — Why flip the inequality?

- Strong: shows with numbers. E.g., 2 < 4. Multiply both by -1: -2 > -4 (the inequality flips). Therefore the rule preserves the truth of the relationship.
- Weak: just restates the rule.

- Looking for: an explicit numerical demonstration. Bonus if they connect to the number line: multiplying by -1 reflects across 0, reversing order.

Problem 7 — Rectangle perimeter

- Let w = width. Then length = w + 8. Perimeter: 2w + 2(w + 8) = 64 -> 4w + 16 = 64 -> w = 12. Length = 20.
- Watch the SETUP: does the student define a variable clearly? Many leap to equations without saying what x means.
- Verify: 2(12) + 2(20) = 24 + 40 = 64.

Problem 8 — Phone plan inequality

- Set up: 25 + 0.10t > 40 (when is plan A MORE than plan B?). Solve: 0.10t > 15, t > 150. So unlimited is cheaper when you send MORE than 150 texts.
- Strong response carefully chooses inequality direction based on the question.
- Weak: gets the algebra right but flips the direction of the answer.

Problem 9 — Three equations with solution x = -5

- Many possibilities. E.g., x + 5 = 0, 2x = -10, 3(x + 2) = -9.
- Strong: makes equations with VARIED structure (one with parentheses, one with coefficient ≠ 1, one with constant on both sides).
- Weak: writes x + 5 = 0, x + 6 = 1, x + 7 = 2 — same structure three times.

Problem 10 — Equivalent inequalities

- Yes, equivalent. Both simplify to x < 4.
- B: -2x - 3 > -11 -> -2x > -8 -> x < 4 (flip sign when dividing by -2).
- A: 2x + 3 < 11 -> 2x < 8 -> x < 4.
- Strong: notes that B is just A multiplied through by -1 (and the inequality flipped accordingly).

Problem 11 — Real-world inequality

- Many possibilities. E.g., "I have $30 to spend. I want to buy two of the same item plus a $5 gift bag for each. How much can each item cost?" 2(x + 5) ≤ 30.
- Solution: x ≤ 10.
- Context constraint: x ≥ 0 (can't pay negative dollars).
- Diagnostic: does the student connect the math to the real-world MEANING (especially the implicit constraint x ≥ 0)? This shows model-aware thinking, key for Algebra 1.

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