

Grade 6 • Unit 6 • Assessment Guide

Expressions and Equations

For the Parent or Teacher — What to look for

Unit 6 introduces algebra: variables, equations, equivalent expressions, exponents, and the relationship between tables, graphs, and equations. The key shift is from arithmetic (compute) to algebraic thinking (represent, generalize).

Problem 1 — Solve 4 equations and check

- (a) $x = 15$. (b) $y = 13$. (c) $m = 27$. (d) $n = 7.2$.
- Strong: shows operation used (subtract 12, divide by 5, multiply by $\frac{3}{2}$, add 4.7) AND substitutes back.
- Weak: works the equation backwards but never checks; or gets numbers right without showing how.
- ★ The substitution check is a critical habit — it's how students self-verify their reasoning.

Problem 2 — Is $x = 6$ a solution?

- (a) $3(6)+2 = 20$. YES.
- (b) $30/6 = 5$. YES.
- (c) $6^2 = 36$, not 12. NO.
- Strong: substitutes ALL THREE; doesn't guess.
- Weak: guesses without checking; or only checks one.

Problem 3 — Sticker pack equation

- $7s = 84$, so $s = 12$.
- Strong: writes the equation FIRST with a clearly named variable.
- Weak: divides 84 by 7 and writes only the answer without an equation.

Problem 4 — Translate phrases

- (a) $n + 5$. (b) $2n - 7$. (c) $4.50x$. (d) $60h + 15$.
- Watch for: 'twice a number, minus 7' written as $2(n-7)$ instead of $2n-7$ — order of operations.
- Watch for: (d) — confuses 'minutes per hour' with 'hours per minute'.

Problem 5 — Equivalent to $6(x+4)$

- Equivalent: (b) $6x+24$, (c) $6 \cdot x + 6 \cdot 4$, (e) $2(3x+12)$.
- NOT equivalent: (a) $6x+4$ (forgot to distribute), (d) $10x$ (added the inside and multiplied — invalid).
- Strong: circles exactly the three correct AND explains the error in (a) ('forgot to distribute the 6 to the 4').
- Weak: only circles (b) — doesn't recognize (c) is just the distribution written out; circles (a) — combined like terms incorrectly.

Problem 6 — Distributive property practice

- (a) $8y + 24$.
- (b) $4(a + 3)$.
- (c) $10x - 5$.
- Strong: factoring (b) is the harder direction — student finds the GCF (4) and factors.
- Weak: distributes only the second operation; or struggles to factor.

Problem 7 — Order of operations with exponents

- (a) 25. (b) 8. (c) $9 + 16 = 25$. (d) $5^2 = 25$. (e) $2 + 9 = 11$.
- Critical: (d) vs (e) shows whether students respect grouping symbols and order of operations.
- (c) vs (d): same arithmetic if done correctly, both equal 25.
- Weak: (b) $2 \cdot 3 = 6$ (multiplied base by exponent); (e) $5^2 = 25$ (added before squaring).

Problem 8 — Is $4^2 + 4^2 = 4^4$?

- DIFFERENT. $4^2 + 4^2 = 16 + 16 = 32$. $4^4 = 256$.
- Strong: computes both and shows they differ; possibly notes $4^2 + 4^2 = 2 \cdot 4^2 = 2(16) = 32$.
- Weak: agrees that they're the same because both have 4s and 2s and exponents.
- ★ A great diagnostic for whether the student really understands exponents.

Problem 9 — Storage company $c = 25m + 40$

- Table: $m=1 \rightarrow \$65$; $m=3 \rightarrow \$115$; $m=6 \rightarrow \$190$; $m=12 \rightarrow \$340$.
- Independent: m (months we choose). Dependent: c (cost depends on m).
- Strong: writes a CORRECT linear equation with the fixed fee AND identifies independent/dependent correctly.
- Weak: forgets the \$40 set-up fee; writes $c = 25m$; or confuses independent/dependent.

Problem 10 — Tyler's equivalence claim

- $4x+3 = 3+4x$. YES, equivalent (commutative property).
- $4x+3 \neq 7x$. Try $x=1$: $4+3=7$ (coincidence!), test $x=0$: $0+3=3$ vs $7 \cdot 0=0$. DIFFERENT.
- ★ Choosing TWO test values catches the coincidence at $x=1$.
- Strong: tests multiple x values to prove non-equivalence.
- Weak: tests only $x=1$ and falsely concludes they're equivalent.

Problem 11 — Word problem for $3x + 5 = 26$

- $x = 7$.
- Strong: realistic story (e.g., '3 packs of pencils plus 5 extra = 26 total. How many in each pack?'); solves.
- Weak: story doesn't match the equation structure; or no solution shown.

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