Lesson 05: Evaluating — One Variable

Unit: Algebra 1 • Unit 1: Expressions | **Grade:** 9 | **Duration:** ⏱50 min **Standards:** MN 9.3.5.5, 9.3.5.7, 9.3.5.8 | **Key Vocabulary:** evaluate, substitute, expression, variable, value **Materials:** Whiteboards & markers, tiered worksheets (T1/T2/T3), exit tickets, Prime Time Speed Lane cards, timer

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1 PHASE 1: ACTIVATE & EXPLORE (⏱16 MIN)

🔹 Bell Ringer | ⏱4 min

Instruction: Display `U1L05 EvalOneVar BellRinger.md`. Students solve independently on whiteboards. Hold up answers on signal. **Purpose:** Reactivate order of operations and integer arithmetic without variable context to isolate the substitution step later.

🔹 Direct Instruction | ⏱6 min

Objective: Define *evaluate* and model precise substitution syntax using parentheses.

1. **Define:** To **evaluate** an expression means to determine its numerical value when specific values are assigned to the variables. The process requires **substitution**: replacing each variable with its given value, enclosed in parentheses to preserve sign integrity.
2. **Model (Board):** Evaluate `3x + 4` when `x = −2`.

• Step 1: Write expression ⟶ `3x + 4` • Step 2: Substitute ⟶ `3(−2) + 4` *(Emphasize parentheses)* • Step 3: Apply order of operations ⟶ `−6 + 4 = −2`

3. 🟫 **GEMDAS Reminder:** Substitution does not change operation priority. Always resolve Exponents before Multiplication/Division, then Addition/Subtraction. Parentheses from substitution are resolved via multiplication immediately after.

🔹 Culture & Career Spotlight | ⏱6 min

Context: Mall of America — Bloomington | Retail Ops Coordinator | BS | $ 102,950 **Script:** "Retail Operations Coordinators at large-scale destinations like the Mall of America use one-variable expressions to forecast inventory turnover, schedule staffing, and model promotional impact. For example, if a seasonal discount day reduces baseline sales by a fixed amount per store, they might track adjusted revenue using `R(d) = 14,500 − 250d`, where `d` represents the number of participating stores running the promotion. Evaluating this expression accurately ensures accurate payroll allocation and supply chain orders. A Bachelor's degree in Business Analytics or Supply Chain Management typically supports this role, which averages $ 102,950 annually. Precision in evaluation directly impacts operational efficiency and profit margins." **Culture Slide (Slot B, position 4):** Ethiopian-Minnesotan,

Cedar-Riverside injera baking: teff flour cups and berbere teaspoons as variables. **Math Connection:** Expression: teff cups = cups per batch × batches

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2 PHASE 2: PRACTICE & APPLY (⏱26 MIN)

🔹 Guided Practice | ⏱8 min

Structure: Three scaffolded examples. Students solve on whiteboards; teacher models thinking aloud with 🧱 GEMDAS checkpoints.

Example	Expression / Value	Solution Path	🧱 GEMDAS Checkpoint
1	$5m + 9$, when $m = 4$	$5(4) + 9 \rightarrow 20 + 9 = 29$	Multiply first, then add.
2	$2a^2 - 7$, when $a = 3$	$2(3)^2 - 7 \rightarrow 2(9) - 7 \rightarrow 18 - 7 = 11$	Exponents before multiplication; substitute with parentheses.
3	$10 - 3y$, when $y = -2$	$10 - 3(-2) \rightarrow 10 + 6 = 16$	Multiplication of negatives yields positive; subtraction becomes addition.

Teacher Prompt: “Where does the exponent apply? Only to the base inside the parentheses, not the coefficient.”

🔹 Independent Worksheet + Circulate & Support | ⏱18 min (9+9)

Worksheet Tiers: • **T1 (Foundational):** Evaluate linear expressions with positive integer substitutions. (e.g., $4x - 3$ when $x = 5$) • **T2 (Intermediate):** Evaluate expressions containing exponents and negative values. Requires strict GEMDAS sequencing. • **T3 (Contextual):** Real-world scenarios requiring expression setup & evaluation (e.g., parking fee models, print shop costs). **Execution:** • ⏱9 min: Silent independent work. Students record each substitution step explicitly. • ⏱9 min: Teacher circulates with a diagnostic checklist. Target errors: missing parentheses, exponent scope confusion, sign mishandling during multiplication. Provide immediate corrective feedback using redirect questions (see below).

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3 PHASE 3: ASSESS & REFLECT (⏱8 MIN)

🔹 Game: Prime Time Speed Lane | ⏱5 min

Format: Zero-device fluency drill. Students form two parallel lines facing each other. Teacher calls a composite number (e.g., “12”, “15”, “20”). Pairs must rapidly state the prime factorization or product pair that clears the lane first. First team to clear 6 numbers wins. Reinforces multiplicative reasoning critical for efficient evaluation without calculators.

🔹 Exit Ticket | ⏱2 min

Prompt: Evaluate `4k − 5` when `k = 3`. Show substitution step explicitly. **Success Criteria:** Correct parentheses usage, accurate GEMDAS execution, final value of 7.

🔷 Today & Tomorrow | ⏱️1 min

"Today we evaluated one-variable expressions with precision. Tomorrow (L6), we extend this skill to two-variable expressions and explore how changing multiple inputs affects output values."

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4 📌 MISCONCEPTIONS & REDIRECT QUESTIONS

Misconception	Redirect Question	Corrective Action
Skipping parentheses during substitution (e.g., writing `3–2` instead of `3(–2)`)	"How does omitting parentheses change how we read the operation?"	Require explicit bracket notation on all future work.
Applying exponent to coefficient (e.g., `(2x)²` vs `2x²`)	"Does the exponent touch the 2, or only what's directly attached?"	Use color-coding: base in blue, exponent applies only to blue region.
Subtracting a negative incorrectly (`10 − (−4) = 6`)	"What operation is actually happening after you distribute the negative sign?"	Model number line visualization; emphasize `−(−)` becomes `+`.

5 ♿ SPED & ELL CROSS-REFERENCE

• **SPED:** Provide substitution scaffold mat with pre-printed parentheses slots. Allow calculator use for arithmetic only (not operation sequencing). Chunk worksheet into 3 sections with self-check answer keys. • **ELL:** Supply bilingual vocabulary anchor (`evaluate = determine numerical value`, `substitute = replace`). Use sentence frames: "When , I substitute to get ." Pair with strategic peer during Speed Lane game for language modeling.

6 📦 MATERIALS CHECKLIST

[ ] Whiteboards & dry-erase markers (1 per student) [ ] Tiered Worksheet Packets (T1/T2/T3) [ ] Exit Tickets (pre-printed or half-sheet) [ ] Prime Time Speed Lane number cards (laminated, 20–30 composites) [ ] Timer/ Projector for phase transitions [ ] Teacher diagnostic circulation checklist MERIT EDUCATION GROUP™
