Grade 3 · Unit 4 · Assessment Guide

Relating Multiplication to Division

For the Parent or Teacher — What to look for

Unit 4 makes the deep connection between multiplication and division. The diagnostic is whether the student sees division as an UNKNOWN-FACTOR problem (e.g., 24 ÷ 4 = ? is the same as 4 × ? = 24). Watch for fluency growing through reasoning about facts, not pure memorization.

Part A — Multiplication facts (8 facts)

- 6×4=24, 7×5=35, 8×3=24, 9×6=54, 4×8=32, 3×7=21, 5×9=45, 6×7=42.
- ★ HOW they get the answer matters: recall (instant — fluent), reasoning (e.g., 9×6 = 10×6 − 6 = 54 — good), counting/skip-counting (still developing).
- Notice 6×4 vs 4×8 and 7×5 vs 5×9 — accept commutative reasoning across pairs.
- Watch for hesitation on harder facts (7×6, 8×7, 9×6) — these are where most kids get stuck and where this unit's reasoning strategies pay off.

Problem 1 — Share 24 cookies among 4 people

- Each: 6 cookies. Equation: 24 ÷ 4 = 6 (or 6 × 4 = 24).
- ★ This is the 'how many in each group?' interpretation of division.
- Strong: writes both 6 × 4 = 24 (multiplication) and 24 ÷ 4 = 6 (division) and recognizes they're inverse.
- Weak: gets answer but writes 24 ÷ 6 = 4 (wrong direction).

Problem 2 — 20 students in groups of 5

- 4 groups. Division: 20 ÷ 5 = 4.
- ★ This is the 'how many groups?' interpretation — different from problem 1's 'how many in each group?'
- Same division operation, different MEANING in context. Diagnostic for whether the student can interpret division both ways.

Problem 3 — Two stories for 18 ÷ 6

- Problem A ('how many in each'): 'I have 18 markers and 6 cups. How many markers go in each cup?' → 3 per cup.
- Problem B ('how many groups'): 'I have 18 markers and I want 6 in each pack. How many packs?' → 3 packs.
- ★ Big diagnostic: do they write two DIFFERENT contexts, or do they confuse the two interpretations?
- Strong: clearly identifies that the 6 means different things in the two stories.

Problem 4 — Related equations from 7×8=56

- 56 ÷ 8 = 7. 56 ÷ 7 = 8.
- 9 × 5 = 45, so 45 ÷ 9 = 5.
- ★ The explanation is the key. Strong: 'Division asks what number times something gives the total. So if I know my multiplication facts, I know division facts automatically.'
- Weak: just fills in numbers without articulating the inverse relationship.

Problem 5 — Quotients using inverse multiplication

- 32 ÷ 4 = 8 (8 × 4 = 32). 63 ÷ 9 = 7 (7 × 9 = 63). 48 ÷ 6 = 8 (8 × 6 = 48).

- ★ The scaffold of 'because ___ × N = total' is intentional. Strong students would do this naturally even without the prompt.
- Watch: if they get the quotient but can't fill the multiplication, they may be skip-counting rather than using facts.

Problem 6 — 4 × 30 two ways

- Answer: 120.
- Strong: Way 1 = 4 × 3 tens = 12 tens = 120. Way 2 = repeated addition 30+30+30+30 OR (4 × 3) × 10.
- ★ Reveals understanding of the associative property: 4 × 30 = 4 × (3 × 10) = (4 × 3) × 10 = 12 × 10.
- Weak: just writes '120' twice with no actual second method.

Problem 7 — 5 × 16 by decomposing 16

- 5 × 10 = 50. 5 × 6 = 30. Total: 80.
- ★ This is the DISTRIBUTIVE PROPERTY in action: 5 × (10 + 6) = 5×10 + 5×6.
- Strong area diagram: rectangle with width 5 split horizontally into 10 and 6 — two sub-rectangles with areas 50 and 30.
- Weak: just writes 5 × 16 = 80 without the decomposition; OR adds parts but doesn't connect to area model.

Problem 8 — 7 × 23

- Answer: 161. Break: 7 × 20 = 140; 7 × 3 = 21; 140 + 21 = 161.
- ★ Same distributive idea as problem 7, but now with a tens-and-ones split.
- Watch for: 7 × 23 attempted as a standard algorithm (allowed but rarely correct at G3 without instruction); OR computing 7 × 20 = 140 but then forgetting to add 7 × 3.

Problem 9 — Maya's doubling strategy for 6×8

- Maya is RIGHT. 6×8 = 6×(4+4) = 6×4 + 6×4 = 24 + 24 = 48. Distributive property in action.
- ★ Strong: 'Yes — she split 8 into 4 + 4, then doubled 6 × 4. That's a smart strategy when you know one fact but not the other.'
- ★ This is exactly the kind of reasoning Unit 4 is trying to develop. Reveals whether the student values FLEXIBLE reasoning over rote memorization.
- Weak: 'no, you should just memorize' (misses the point of building fluency through reasoning).

Problem 10 — 36 markers, 4 per student

- 9 students. Multiplication: 9 × 4 = 36 (or 4 × 9 = 36). Division: 36 ÷ 4 = 9.
- ★ Demonstrates that the same situation supports both equations.
- Strong: both equations match. Weak: one or both equations have numbers in wrong positions.

Problem 11 — Sam: 24÷6=4 AND 6÷24=4?

- 24 ÷ 6 = 4 is correct. 6 ÷ 24 is NOT 4 (it would be 0.25 or 1/4, but G3 doesn't formally compute this).
- ★ Division is NOT commutative — order matters!
- Strong: 'No — for 24 ÷ 6 you're putting 24 things into groups of 6 (4 groups). For 6 ÷ 24 you'd be putting 6 things into 24 groups, which doesn't work out the same way.'
- Weak: 'both are right because multiplication and division are related' (misapplies commutativity to division).

Problem 12 — Story for (5×4) + 12 = 32

- Strong story: 'There are 5 boxes of 4 markers, plus 12 extra markers loose. How many markers in all?' (5×4=20, +12=32.)

- ★ Tests understanding of parentheses (do the multiplication FIRST, then add) — a Section D skill.
- Weak: ignores parentheses; or writes a story for just 5×4 = 32 (wrong arithmetic AND missing the 12).

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