Grade 4 · Unit 1 · Assessment Guide

Factors and Multiples

For the Parent or Teacher — What to look for

Unit 1 builds the core concepts of FACTORS, MULTIPLES, PRIME, and COMPOSITE through area-of-rectangle reasoning. Watch whether the student understands these as STRUCTURAL ideas (a factor pair = sides of a rectangle whose area is the number) rather than memorized vocabulary.

Part A — Multiplication facts

- Answers: 56, 54, 8, 9, 36, 56, 7, 8.
- Watch HOW: instant recall vs. derived from a near fact ("7×8 = 7×7+7 = 56"). Both are fine; counting on fingers is a yellow flag.
- Division facts (48÷6, 72÷9) are the diagnostic — Grade 3 work that students must own by Grade 4.

Problem 1 — All factor pairs of 24

- Correct: 1×24, 2×12, 3×8, 4×6 (four pairs).
- Strong: finds all four AND draws/labels rectangles. Recognizes that 6×4 is the SAME pair as 4×6 (commutative).
- Weak: misses 3×8 or 2×12. Doesn't see the rectangle connection.
- ★ A student who lists 1, 2, 3, 4, 6, 8, 12, 24 individually but doesn't pair them up is still in 'list of factors' mode, not 'factor pair' mode.

Problem 2 — Is 23 prime?

- Yes. Diego is correct.
- Strong: explains in their own words — "23 can only make a 1×23 rectangle, no other whole-number sides work."
- Weak: just agrees without reasoning, or rejects because 'it sounds wrong.'

Problem 3 — Prime vs. composite

- 11 prime; 15 composite (3×5); 29 prime; 36 composite (4×9, 6×6, 2×18, 3×12); 49 composite (7×7).
- ★ 49 is the diagnostic — many students think 49 is prime because they can't quickly think of factors other than 1 and 49.
- Strong: catches all five correctly with a valid factor pair for each composite.

Problem 4 — Multiples of 6

- 6, 12, 18, 24, 30, 36.
- Ones digits pattern: 6, 2, 8, 4, 0 then repeats. Strong reasoning: "They're all EVEN because 6 is even." or "The ones digits cycle through 6,2,8,4,0."
- Weak: writes the multiples but can't say anything beyond "they go up by 6."

Problem 5 — Is 48 a multiple of 4? Two ways

- Yes. Way 1: 4 × 12 = 48 (multiplication). Way 2: 48 ÷ 4 = 12 with no remainder. Or count by 4s: 4, 8, 12, ..., 48.
- ★ Strong: genuinely different methods. Weak: "4 × 12 = 48" and "12 × 4 = 48" (same fact, swapped).

Problem 6 — Mai vs. Lin (49 prime?)

- Lin is correct. 49 = 7 × 7, so 49 is composite.
- ★ Does the student catch the false premise — 'odd numbers are prime'? Counterexamples: 9, 15, 21, 25, 27 — all odd, all composite.
- Strong: "Mai's rule is wrong — 9 is odd but 9 = 3 × 3."

Problem 7 — Numbers with exactly 3 factors

- Examples: 4 (1, 2, 4), 9 (1, 3, 9), 25 (1, 5, 25), 49 (1, 7, 49) — squares of primes.
- ★ Strong: notices these are p^2 where p is prime, even without that language.
- Weak: gives any number (e.g., 6, which has 4 factors).

Problem 8 — Han's factor pairs of 36

- Han is MISSING 6×6 (a square). All pairs: 1×36, 2×18, 3×12, 4×9, 6×6.
- ★ Diagnostic: do students catch that perfect-square numbers have a 'middle' factor pair where the number pairs with itself?
- Strong: spots 6×6 and explains.
- Weak: says 'he got them all' (didn't check).

Problem 9 — Locker Problem (10 lockers)

- Open at end: lockers 1, 4, 9 (perfect squares).
- Strong: tracks each locker, then notices the pattern.
- ★ Deeper: "Lockers with an ODD number of factors stay open — only PERFECT SQUARES have an odd number of factors, because one factor pairs with itself."
- Weak: cannot track through; or doesn't notice the squares pattern.

Problem 10 — Write your own factor/multiple problem

- Looking for a coherent contextual story (e.g., 'I have 24 chairs. How many ways can I arrange them in equal rows?' — uses factor pairs).
- Strong: problem clearly uses the concept; answer is correct.
- Weak: problem doesn't actually require finding factors/multiples.

Problem 11 — Pick a composite 50-100

- E.g., 72: 1×72, 2×36, 3×24, 4×18, 6×12, 8×9.
- Strong: explains the stopping rule — "I only need to check up to about √n, because beyond that the partner factor is already smaller."
- Weak: tries to list factors arbitrarily; can't say when they're done.
- ★ This is a self-aware reasoning question — completeness as a meta-skill.

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