# Grade 6 · Unit 5 · Assessment Guide

*Arithmetic in Base Ten*

*For the Parent or Teacher — What to look for*

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*Unit 5 extends place-value thinking to decimal operations. The deepest understanding shows up in WHERE THE DECIMAL POINT GOES — and why.*

### Problem 1 — Adding/subtracting decimals

- (a) 4.27 + 13.6 = 17.87.
- (b) 12.5 − 8.347 = 4.153 (requires regrouping across decimal places).
- (c) 0.4 + 0.06 + 0.009 = 0.469.
- Watch for: students who right-justify instead of aligning by decimal point (gives 4.27 + 13.6 = 5.63 if they treat 13.6 as 136 hundredths).

### Problem 2 — Why 0.4 + 0.06 ≠ 0.10

- Correct: 0.4 + 0.06 = 0.46.
- Confusion source: students add the 4 and the 6 in their respective places (4 tenths + 6 hundredths) and erroneously combine.
- Strong: explains that 0.4 is FOUR tenths (40 hundredths) so 40 + 6 = 46 hundredths.
- Weak: doesn't see why 0.10 is wrong; can't articulate place value.

### Problem 3 — 2.3 × 1.4 two ways

- Area: 2×1 + 2×0.4 + 0.3×1 + 0.3×0.4 = 2 + 0.8 + 0.3 + 0.12 = 3.22.
- Whole number: 23 × 14 = 322. Place decimal: 2 decimal places total in factors → 3.22.
- Strong: both methods give the same answer AND student explains the decimal placement.
- Weak: the area model misses the 0.12 partial product; or whole-number method gets 322 but the decimal point is misplaced.

### Problem 4 — Estimating products

- (a) 0.8 × 7.4 ≈ 6 (close to 1 × 7); actual 5.92.
- (b) 12.5 × 0.04 ≈ 0.5 (close to 12 × 0.04); actual 0.500.
- Multiplying by less than 1 PRODUCES a smaller result — this is the central insight.
- Strong: estimates BEFORE computing AND articulates that <1 multipliers shrink the product.
- Weak: expects multiplication to always make numbers bigger.

### Problem 5 — 147 ÷ 6 long division

- Answer: 24.5 (or 24 R 3 if treated as whole-number division).
- Strong: clear setup; brings down digits; handles the remainder by adding a decimal place.
- Weak: gets 24 R 3 and stops without converting to 24.5; or arithmetic errors at each step.

### Problem 6 — 12.6 ÷ 0.4

- Multiply both by 10: 126 ÷ 4 = 31.5. So 12.6 ÷ 0.4 = 31.5.
- Strong: scales both numbers up to make a whole-number division.
- Weak: divides 12.6 by 4 (gets 3.15) — forgot to also scale the dividend; or shifts decimal incorrectly.

### Problem 7 — 4.32 ÷ 8

- 0.54.
- Strong: long division setup with decimal in correct place.
- Weak: gets 5.4 (decimal misplaced) or 54 (no decimal at all).

### Problem 8 — Diego's 2.4 × 0.5 = 12 error

- Correct: 1.2.
- Diego forgot to place the decimal point (or placed it incorrectly). 24 × 5 = 120, but 2.4 × 0.5 has TWO decimal places in the factors, so 1.20.
- Strong: explains decimal place counting rule.
- Weak: can't fix the answer; just says 'looks wrong'.

### Problem 9 — Mai's 0.6 ÷ 0.2 = 0.3 error

- Correct: 3 (NOT 0.3).
- Mai treated 'how many 0.2s in 0.6?' as a multiplication or computed 0.6 × 0.5 by accident.
- Strong: realizes the answer should be the number of 0.2s in 0.6 (3 of them) and that the answer should be GREATER than 1 because divisor < dividend.
- Weak: agrees with Mai or can't articulate why 0.3 is wrong.
- ★ Counterintuitive sign of division: dividing by a number less than 1 produces a LARGER quotient.

### Problem 10 — Sami's lunch ($20, $3.85/day, 5 days)

- 5 × $3.85 = $19.25. YES, Sami can afford 5 lunches with $0.75 left over.
- Strong: multiplies correctly AND interprets the result in context.
- Weak: arithmetic error; or computes but doesn't answer the yes/no question.

### Problem 11 — Original problem with answer in (0.1, 1)

- Examples: 0.4 × 0.8 = 0.32. Or 0.5 × 1.2 = 0.6. Any product in (0.1, 1).
- Strong: the answer IS in (0.1, 1); the problem is well-posed.
- Weak: answer outside range; or product chosen randomly without checking.

*— end —*