

Grade 6 • Unit 9 • Assessment Guide

Putting It All Together

For the Parent or Teacher — What to look for

Unit 9 is a CAPSTONE — students apply multiple skills from across the year to open-ended problems. Look for: comfort with multi-step problems, willingness to make assumptions, justification of choices, and recognition of connections across topics.

Problem 1 — Heartbeats Fermi problem

- Reasonable answer: assume ~ 80 beats/min $\times 60$ min $\times 24$ hr $\times 365$ days $\times$ age in years. For a 12-year-old: about 500 million beats.
- Strong: clearly states assumptions, shows multi-step calculation, gives a reasonable order of magnitude.
- Weak: no assumptions; gets wildly off (off by orders of magnitude); answer in wrong units.
- ★ Order-of-magnitude reasoning is the goal — students should be comfortable with 'about 500 million'.

Problem 2 — Breaths per year + comparison

- Reasonable: 15 breaths/min $\times 60$ min $\times 24$ hr $\times 365$ days ≈ 8 million breaths/year.
- Strong: identifies that small differences in assumed rate compound across many multiplications.
- Weak: just states a number without recognizing the role of assumptions.

Problem 3 — Plurality vote

- (a) Zoo wins (12 votes).
- (b) NO majority. $12/30 = 40\%$, not more than half.
- (c) 40%.
- (d) Strong: notices 60% of the class did NOT want zoo; discusses whether plurality reflects the majority's preference; possible solutions like runoff voting.
- Weak: doesn't recognize the distinction between plurality and majority; thinks 12 votes = majority because it's the most.

Problem 4 — Rectangle area connections

- (a) Area = 60 sq cm.
- (b) Side of square with area 60 = $\sqrt{60} \approx 7.75$ cm. (Not a whole number — that's the point!)
- (c) Many options: 10×6 , 8×7.5 , 4×15 , etc.
- Strong: realizes the square root of 60 is irrational; lists multiple rectangle pairs.
- Weak: tries to fit a square side as 'half of $12+5 = 8.5$ ' (arithmetic mean instead of geometric).

Problem 5 — $7/8$ multiple forms

- Decimal: 0.875. Percent: 87.5%.
- Strong: real situation matches the fraction ('I read $7/8$ of my book — 87.5% done').
- Weak: decimal or percent wrong; situation doesn't connect to $7/8$.

Problem 6 — Lin's walking rate

- Rate per hour: $(3/4) \div (1/3) = (3/4)(3/1) = 9/4 = 2.25$ mi/hr.
- In 2.5 hours: $2.25 \times 2.5 = 5.625$ mi.

- Strong: connects unit rate (Unit 3) AND fraction division (Unit 4).
- Weak: finds rate but can't extend to 2.5 hours; or just multiplies $\frac{3}{4} \times 2.5$.

Problem 7 — Pool volume and drain time

- (a) Volume = $25 \times 12 \times 2 = 600 \text{ m}^3$.
- (b) $600 \text{ m}^3 \times 1000 \text{ L/m}^3 = 600,000 \text{ L}$. At 600 L/min, time = 1000 minutes ≈ 16.67 hours.
- Strong: handles unit conversion AND multi-step calculation; expresses answer in sensible units (hours, not minutes).
- Weak: forgets the m^3 -to-L conversion; reports answer in minutes without contextualizing.

Problem 8 — Temperature drop 5°C to -12°C

- Drop = $5 - (-12) = 17^\circ\text{C}$, OR distance from 5 to 0 (5) + distance from 0 to -12 (12) = 17.
- Strong: number-line strategy — counts from 5 down to 0 (5°), then from 0 down to -12 (12°), total 17° .
- Weak: computes $5 - 12 = -7$ or $|5 + 12|$ with the wrong sign reasoning.
- ★ Multi-step problem combining Unit 7 negatives + everyday reasoning.

Problem 9 — Reflection on biggest shift

- No right answer. Look for specificity and self-awareness.
- Strong: 'Dividing by a fraction larger than 1 makes the answer smaller — I didn't see that before, and now I always check the size before I divide.'
- Weak: 'I learned a lot of stuff' / 'Math was hard'.
- ★ The depth of reflection signals whether the year's ideas have become THE STUDENT'S OWN.

Problem 10 — Original multi-concept problem

- Strong: a coherent problem genuinely requiring TWO Grade 6 ideas (e.g., 'A store offers 25% off. After tax of 8%, the total is \$43.20. What was the original price?').
- Weak: 'problem' is just one operation; the two concepts aren't really integrated; no clear solution.
- ★ The capstone test of synthesis.

— end —