

Grade 6 • Unit 4 • Assessment Guide

Dividing Fractions

For the Parent or Teacher — What to look for

Unit 4 develops fraction division through MEANING — not just the algorithm. Look for students who can model with diagrams AND apply the algorithm AND choose between them strategically.

Problem 1 — Two stories for $12 \div 4$

- Story 1 (measurement / 'how many groups of 4'): 'I have 12 cookies. I put 4 in each bag. How many bags?' Answer: 3.
- Story 2 (partitive / 'how much per group'): 'I have 12 cookies to share among 4 people. How much each?' Answer: 3.
- Strong: TWO genuinely different stories — different actions, both yield 3.
- Weak: both stories use the same structure; one is missing or doesn't make sense.
- ★ Distinguishing the two meanings is a unit foundation.

Problem 2 — Predict quotient size

- (a) $5 \div (1/3) > 1$ (many $1/3$ s fit in 5; in fact 15).
- (b) $(1/4) \div 8 < 1$ (splitting $1/4$ into 8 makes a tiny piece, $1/32$).
- (c) $(3/4) \div (1/4) > 1$ ($3/4$ contains three $1/4$ s).
- Strong: explains using the meaning of division ('dividing by a smaller-than-1 number makes the answer bigger').
- Weak: guesses; says all answers are 'less than 1' because the question 'feels small'.
- ★ Counterintuitive: dividing by less than 1 INCREASES — students need to develop this intuition.

Problem 3 — $5 \div (1/3)$ servings

- Answer: 15 servings.
- Equations: $(1/3) \times 15 = 5$ AND $5 \div (1/3) = 15$.
- Strong: tape diagram shows 5 wholes each split into thirds, totaling 15 thirds.
- Weak: divides 5 by 3 (gets $5/3$); confuses multiplication and division.

Problem 4 — $6 \div (3/4)$

- Answer: 8 pieces. $6 \div (3/4) = 6 \times (4/3) = 24/3 = 8$.
- Strong: tape diagram or clear equation.
- Weak: divides 6 by 4 and 3 separately; gives a fraction answer like $18/4$.

Problem 5 — Algorithm practice (4 quotients)

- (a) $(3/4) \div (2/3) = (3/4) \times (3/2) = 9/8 = 1 \frac{1}{8}$.
- (b) $(5/6) \div (1/2) = (5/6) \times (2/1) = 10/6 = 5/3 = 1 \frac{2}{3}$.
- (c) $4 \div (2/5) = 4 \times (5/2) = 20/2 = 10$.
- (d) $(7/8) \div 2 = (7/8) \times (1/2) = 7/16$.
- Watch for: students who 'flip' the wrong fraction (the first one instead of the divisor).

Problem 6 — Show $(2/3) \div (4/5) = (2/3) \times (5/4)$

- Strong: explains that dividing by $\frac{4}{5}$ is the same as multiplying by its reciprocal $\frac{5}{4}$ because $(\frac{4}{5})(\frac{5}{4})=1$.
- Weak: just states the rule without justification.
- ★ The relational understanding 'why does invert-and-multiply work' is the deepest Unit 4 goal.

Problem 7 — Rectangle: area= $\frac{5}{8}$, width= $\frac{1}{4}$, length?

- Length $\times (\frac{1}{4}) = \frac{5}{8}$, so length = $(\frac{5}{8}) \div (\frac{1}{4}) = (\frac{5}{8})(\frac{4}{1}) = \frac{20}{8} = \frac{5}{2} = 2.5$ m.
- Strong: writes the equation FIRST, then divides.
- Weak: multiplies instead of dividing; or gets confused on which is the divisor.

Problem 8 — Prism: volume=3.5, l=2, w=1.25, h=?

- $3.5 = 2 \times 1.25 \times h$, so $3.5 = 2.5h$, so $h = 1.4$ ft (or $\frac{7}{5}$ ft).
- Or: $h = (\frac{7}{2}) \div (2 \times \frac{5}{4}) = (\frac{7}{2}) \div (\frac{5}{2}) = (\frac{7}{2})(\frac{2}{5}) = \frac{14}{10} = \frac{7}{5}$.
- Strong: handles mixed numbers; equation-based solution.
- Weak: can't combine the operations; tries to divide volume by each dimension separately and adds them.

Problem 9 — Han's error: $(\frac{1}{2}) \div (\frac{1}{4}) \neq \frac{1}{8}$

- Correct: $(\frac{1}{2}) \div (\frac{1}{4}) = (\frac{1}{2})(\frac{4}{1}) = 2$. There are TWO $\frac{1}{4}$ -cups in $\frac{1}{2}$ a cup.
- Han computed $(\frac{1}{2}) \times (\frac{1}{4})$ (multiplication, not division).
- Strong: distinguishes 'half OF a fourth' (multiplication) from 'how many fourths fit in a half' (division).
- Weak: confused about the difference; can't fix the error.
- ★ The conflation of multiplication and division of fractions is the most common Grade 6 error.

Problem 10 — Two ways: $(\frac{3}{4}) \div (\frac{1}{8})$

- Answer: 6.
- Way 1 (model): $\frac{3}{4} = \frac{6}{8}$, so six $\frac{1}{8}$ s fit in $\frac{3}{4}$.
- Way 2 (algorithm): $(\frac{3}{4}) \times (\frac{8}{1}) = \frac{24}{4} = 6$.
- Strong: both methods AND a clear preference with reason ('the algorithm was faster, but the diagram made it easier to SEE why').
- Weak: same approach twice; or model didn't actually answer the question.

Problem 11 — Original word problem for $(\frac{2}{3}) \div (\frac{1}{6})$

- Answer: 4.
- Strong: realistic scenario ('I have $\frac{2}{3}$ of a pizza. Each slice is $\frac{1}{6}$. How many slices?'), correctly written, with solution.
- Weak: numbers don't fit the operation; story is about multiplication not division; no solution shown.

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