

# Answer Key: Fractions and Decimals in Everyday Problems

**Grade:** 5 **Subject:** Mathematics **For teacher use only** Math

## How to use this key

Answers are grouped by section and question number, with full worked steps. Accept any correct method that reaches the right value — alternate strategies (a larger common denominator, a picture, or a decimal check) are noted where they apply. Watch-for notes flag common misconceptions. A basic calculator is allowed, so grade the **reasoning and steps**, not just the arithmetic. Estimated grading time: ~4–6 min per packet.

## Start Warm-Up ~1 min

1 Compare 0.7 and 0.68.

**0.7 > 0.68.** Line up by place value: write 0.7 as 0.70, then compare tenths first — 7 tenths > 6 tenths, so  $0.70 > 0.68$ . Full credit for the correct symbol **and** a place-value reason. *Watch-for:* students who say 0.68 is bigger "because it has more digits" have the length-vs-place-value misconception.

2 Name the shaded fraction of the bar.

**3/5.** The bar has 5 equal parts and 3 are shaded. Accept an equivalent that is clearly justified, but 3/5 is the intended reading. *Alternate:* a student who writes 0.6 has also correctly connected 3/5 to its decimal — give full credit if the fraction reasoning is shown.

## Build Study the Math ~1 min

3 Add  $1/2 + 1/4$ .

**Common denominator:** 4 (since 2 divides into 4). Rename  $1/2 = 2/4$ . Then  $2/4 + 1/4 = 3/4$ . *Alternate:* using  $2 \times 4 = 8$  gives  $4/8 + 2/8 = 6/8$ , which simplifies to  $3/4$  — accept either the 4ths or the 8ths form. As a decimal,  $3/4 = 0.75$ .

## Apply Use What You Know ~2–3 min

4 Recipe:  $1/2$  cup raisins +  $1/3$  cup almonds.

**Common denominator:** 6. Rename  $1/2 = 3/6$  and  $1/3 = 2/6$ . Add the tops:  $3/6 + 2/6 = 5/6$  **cup** in all. *Alternate:* any common multiple of 2 and 3 (such as 12:  $6/12 + 4/12 = 10/12 = 5/6$ ) is fine. This mirrors the worked example, so many students can reuse those steps.

5 Money: notebook \$3.45, pen \$1.60, pays with \$10.00.

**5a.**  $\$3.45 + \$1.60 = \$5.05$  (line up the decimal points: 45 hundredths + 60 hundredths = 105 hundredths = \$1.05, carry the dollar).

**5b.**  $\$10.00 - \$5.05 = \$4.95$  change.

*Watch-for:* a student who writes  $\$3.45 + \$1.6$  and lines up the last digits (getting  $\$3.51$  or similar) has lined up by digits, not place value. Remind them  $\$1.60 = \$1.60$ .

6 Error analysis:  $1/4 + 1/2 = 2/6$  (student added tops and bottoms).

**The mistake:** The student **added the denominators** ( $4 + 2 = 6$ ). You cannot add the bottoms — the bottom tells the **size** of the parts, and you must make the parts the same size first with a common denominator.

**Correct work:** Common denominator 4. Rename  $1/2 = 2/4$ . Then  $1/4 + 2/4 = 3/4$ .

*Sanity check:*  $1/2$  alone is already  $2/4$ , so the sum must be more than  $1/2$  — but the student's  $2/6 (= 1/3)$  is *less* than  $1/2$ , which shows the answer cannot be right. Full credit requires (1) naming the "added the denominators" error and (2) the correct  $3/4$ .

7 Which operation:  $3/4$  L +  $1/2$  L drunk from a 2 L bottle.

**7a.** "In all" → **add**. Common denominator 4. Rename  $1/2 = 2/4$ . Then  $3/4 + 2/4 = 5/4 = 1 \frac{1}{4}$  **liters** (one and one-quarter liters). Accept the improper form  $5/4$  or the mixed number  $1 \frac{1}{4}$ .

**7b.** The phrase "**in all**" (combining both amounts) tells you to add. Accept any answer that points to "in all" or the idea of joining the two amounts.

*Note:* The 2-liter capacity is extra information; some students may check that  $1 \frac{1}{4}$  L is less than 2 L, which is good reasoning.

## Explain Justify Your Thinking (Q8) ~1–2 min

8 Why you cannot add tops and bottoms ( $1/4 + 1/2$ ).

**Model answer.** Answer: the correct sum is  $3/4$ . Numbers I used: common denominator 4;  $1/2$  renamed as  $2/4$ ;  $1/4 + 2/4 = 3/4$ . Why: The denominator names the **size** of each part. Fourths and halves are different sizes, so you cannot combine them until you rename them as the same-size parts (fourths). Adding the bottoms would change the size of the parts, which is why  $2/6$  is wrong. Full credit requires the correct sum ( $3/4$ ) and a reason that fractions must have the same-size parts (a common denominator) before adding.

### Justification scoring rubric (3 points)

| Score | Answer                              | Numbers used                                            | Why (reasoning)                                                                        |
|-------|-------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------|
| 3     | Correct sum $3/4$ .                 | Shows common denominator 4 and the rename $1/2 = 2/4$ . | Clearly explains that parts must be the same size, so you cannot add the denominators. |
| 2     | Correct sum $3/4$ .                 | Some renaming shown, or a minor slip.                   | Reasoning present but incomplete (e.g., says "make bottoms match" without saying why). |
| 1     | Answer attempted, may be incorrect. | Little or no work shown.                                | Weak or missing reasoning.                                                             |
| 0     | No/incorrect answer.                | No work.                                                | No reasoning.                                                                          |

## Close ACE ~1 min

ACE Articulate / Connect / Extend.

**Articulate:** Accept any plain-language version of: "a common denominator is a shared bottom number so the parts are the same size; you need it so the fractions can be combined."

**Connect:** Valid items where a common denominator was found include Q3, Q4, Q6, or Q7a. Any correctly named item earns credit.

**Extend:** Any correct fraction–decimal pair not in the packet — e.g.,  $1/5 = 2/10 = 0.2$ ,  $1/4 = 25/100 = 0.25$ ,  $3/10 = 0.3$ ,  $1/10 = 0.1$ . More than one answer is defensible; check the pair is truly equal.

## Challenge Early Finisher (optional)

EF Draw a model for  $\frac{1}{3} + \frac{1}{6}$ .

**Common denominator:** 6. Rename  $\frac{1}{3} = \frac{2}{6}$ ;  $\frac{1}{6}$  stays  $\frac{1}{6}$ . Then  $\frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$ . A correct area model shows a bar in sixths with 3 of 6 parts shaded, or a number line from 0 to 1 in sixths with a jump ending at  $\frac{3}{6}$ . As a decimal,  $\frac{1}{2} = 0.5$ . Full credit for a labeled model that matches  $\frac{3}{6}$  (or the simplified  $\frac{1}{2}$ ). Accept the unsimplified  $\frac{3}{6}$ .

## Watch Common misconceptions

- **Adding the denominators.** The Q6 error:  $\frac{1}{4} + \frac{1}{2} = \frac{2}{6}$ . Students add both tops and both bottoms. Reinforce that only the tops are added, and only after the bottoms match (same-size parts). A quick sanity check helps: the sum must be bigger than  $\frac{1}{2}$ , but  $\frac{2}{6}$  is smaller.
- **Lining up decimals by digits, not place value.** In Q5, \$1.60 must line up as 1.60, not "1.6" pushed to the right. Comparing 0.7 and 0.68 (Q1) trips students who think "more digits = larger." Rewrite with matching decimal places (0.70 vs 0.68).
- **$\frac{1}{2}$  vs 0.2.** Students may write  $\frac{1}{2} = 0.2$ . Model that  $\frac{1}{2} = \frac{5}{10} = 0.5$  (one half of ten tenths is five tenths). 0.2 is  $\frac{2}{10} = \frac{1}{5}$ .
- **Forgetting to rename before adding.** Some find a common denominator but forget to change the numerators too (e.g., leaving  $\frac{1}{2}$  as  $\frac{1}{6}$  instead of  $\frac{2}{6}$ ). Both top and bottom multiply by the same number.
- **Choosing the wrong operation.** In Q7, "in all" signals addition; watch for students who subtract. Anchor the key words ("in all," "left," "how much more").

## Teacher follow-up based on likely errors

If many students miss Q6, do a quick 5-minute picture of  $\frac{1}{4} + \frac{1}{2}$  with an area model so they see the parts must match before adding. If Q1 or Q5 show digit-lining, practice writing decimals with equal places (0.70, 1.60) and comparing tenths first. If Q3/Q4 show a missing rename, model multiplying top *and* bottom by the same number. The Q8 justifications reveal who understands *why* a common denominator is needed — a good discussion starter next class. The separate student packet has all methods printed; this key is for the teacher only.