

# Solving Real-World Problems with Rational Numbers

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 17

This is where math meets real life! Real-world problems with rational numbers usually need more than one step and more than one operation, so the first job is to read carefully, choose the right operations, and keep track of what positive and negative values mean in the story. A smart habit: estimate *before* you solve so you can tell right away if your exact answer makes sense. Show each step clearly, interpret your final answer in context, and you will see how powerful these skills really are.

## Key Concepts & Quick Review

**Order of operations (PEMDAS):** Parentheses → Exponents → Multiplication/Division (left to right) → Addition/Subtraction (left to right)

**Problem-solving steps:** 1. Read and identify the quantities and operations. 2. Write an expression. 3. Evaluate using PEMDAS. 4. Check the sign and units; estimate to verify reasonableness.

## Examples

① Evaluate  $\frac{3}{4} \times (-8) + 1\frac{1}{2} \div \frac{3}{4}$ .

**Think It Through:** Follow the order of operations. Do the multiplication and division first, moving from left to right. First,  $\frac{3}{4} \times (-8) = -6$ . Next,  $1\frac{1}{2} \div \frac{3}{4} = \frac{3}{2} \times \frac{4}{3} = 2$ . Now add the two results:  $-6 + 2 = -4$ . Writing the intermediate answers separately keeps the problem organized and prevents sign mistakes.

**Answer:**  $-4$

② Kenji has \$45.60 in his account. He spends  $\frac{3}{8}$  of it on Monday and earns \$12.75 on Tuesday. Write a multi-step expression and find his balance after Tuesday.

**Think It Through:** Start with the amount Kenji spends on Monday:  $45.60 \times \frac{3}{8} = 17.10$ . Subtract that from his original balance to get  $45.60 - 17.10 = 28.50$ . Then add the money he earns on Tuesday:  $28.50 + 12.75 = 41.25$ . So his balance after Tuesday is \$41.25. The full expression is  $45.60 - 45.60 \times \frac{3}{8} + 12.75$ . This is a good example of why multiplication must be done before subtraction.

**Answer:** \$41.25

## Practice Problems

Evaluate each multi-step expression using the correct order of operations.

1.  $\frac{3}{4} \times (-8) + \frac{1}{2} =$  \_\_\_\_\_

4.  $(-3) \times \frac{2}{9} + 1\frac{1}{3} =$  \_\_\_\_\_

2.  $\left(-\frac{5}{6}\right) \div \frac{1}{3} - \frac{1}{2} =$  \_\_\_\_\_

5.  $\frac{5}{6} - \frac{1}{3} \div \frac{2}{3} =$  \_\_\_\_\_

3.  $2.5 + (-0.75) \times 4 =$  \_\_\_\_\_

6.  $(-1.5)^2 \div 0.75 =$  \_\_\_\_\_



7.  $-\frac{3}{4} \times \left(-\frac{8}{9}\right) \div \frac{2}{3} =$  \_\_\_\_\_

8.  $(-2.5) \times \left(-\frac{4}{5}\right) + (-1.5) =$  \_\_\_\_\_

9.  $\frac{7}{8} - \frac{3}{4} \div \left(-\frac{3}{2}\right) =$  \_\_\_\_\_

10.  $(-4) \times 0.25 + (-3) \div \frac{3}{4} =$  \_\_\_\_\_

11.  $\frac{3}{5} \div \frac{9}{10} - \frac{1}{3} =$  \_\_\_\_\_




12.  $-2\frac{3}{4} + 1\frac{1}{2} \times \left(-\frac{2}{3}\right) =$  \_\_\_\_\_

13.  $3.6 \div (-0.9) + (-2) \times 1.5 =$  \_\_\_\_\_

14.  $\left(-\frac{1}{2}\right)^2 \times 8 - \frac{3}{4} =$  \_\_\_\_\_

15.  $-1\frac{2}{3} \div \frac{5}{9} + (-0.2) =$  \_\_\_\_\_

**Study Tips**

-  Underline key words: “per” signals division or multiplication; “change” often signals subtraction; “total” or “combined” often signals addition.
-  Work one operation at a time and write down each intermediate result — never try to hold two computations in your head at once.
-  After solving, read the answer back into the problem to check that the size and sign make real-world sense.

**Word Problems**

16. A small business tracks weekly profit and loss. In week 1 the business earns \$420.50. In week 2 it loses  $\frac{2}{5}$  of week 1's earnings. In week 3 it earns  $1\frac{1}{2}$  times what it made in week 1. Write a single expression for the total profit over the three weeks, evaluate it step by step, and state whether the overall result is a profit or loss.

\_\_\_\_\_

17. A scientist monitors a chemical reaction. The temperature starts at  $-3.5^\circ\text{C}$ . Every  $\frac{1}{4}$  min it changes by  $-\frac{3}{8}^\circ\text{C}$ . After 2 min, how many quarter-minute intervals have passed? Write a multiplication expression for the total temperature change and evaluate it. What is the final temperature? If the reaction must stay above  $-8^\circ\text{C}$ , is the reaction still within bounds?

\_\_\_\_\_



## Answer Keys

- 1)  $-\frac{11}{2}$
- 2) -3
- 3)  $-\frac{1}{2}$
- 4)  $\frac{2}{3}$
- 5)  $\frac{3}{3}$
- 6) 3
- 7) 1
- 8)  $\frac{1}{2}$
- 9)  $\frac{11}{8}$
- 10) -5

- 11)  $\frac{1}{3}$
- 12)  $-\frac{15}{4}$
- 13) -7
- 14)  $\frac{5}{4}$
- 15)  $-\frac{16}{5}$
- 16) Week 2 loss:  $-\$168.20$ ; week 3:  $\$630.75$ ; total:  $\$883.05$ ; overall profit.
- 17) Final temperature  $-6.5^{\circ}\text{C}$ ; yes, still above  $-8^{\circ}\text{C}$

### Step-by-Step Explanations

*Tutoring notes not found for this topic.*



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