

# Multiplying Integers and Rational Numbers

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

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

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

Multiplying integers with fractions or decimals is really a two-step job, and you already know both steps! First, use the sign rules from Chapter 1—same signs give a positive product, different signs give a negative one. Then multiply the absolute values using the fraction or decimal methods you have been practicing. A handy trick: write the integer as a fraction over 1 so you can cross-cancel and keep the numbers small before you multiply across.

## Key Concepts & Quick Review

**Step 1 — Sign:** same signs  $\Rightarrow +$ ; different signs  $\Rightarrow -$

**Step 2 — Multiply absolute values:**  $n \times \frac{a}{b} = \frac{n}{1} \times \frac{a}{b} = \frac{n \cdot a}{b}$  **Cross-cancel** when possible before multiplying.

**Example:**  $(-4) \times \frac{3}{8}$ : different signs  $\Rightarrow -$ ;  $\frac{4^1}{1} \times \frac{3}{8^2} = \frac{3}{2}$ ; result:  $-\frac{3}{2}$

## Examples

① Find  $(-4) \times \frac{5}{6}$ .

**Think It Through:** Separate the sign from the fraction work. A negative times a positive is negative, so the answer will be negative. Now write 4 as  $\frac{4}{1}$  and multiply the absolute values. Cross-cancel the 4 and 6 by 2, then multiply to get  $\frac{10}{3} = 3\frac{1}{3}$ . Put the negative sign back at the end, so the final answer is  $-3\frac{1}{3}$ . Treating the sign as its own step helps avoid mistakes.

**Answer:**  $-3\frac{1}{3}$

② An athlete loses  $\frac{2}{3}$  pound each week on a new training plan. What is the total weight change after 9 weeks? What does the sign of the answer mean?

**Think It Through:** Multiply the weekly change by the number of weeks:  $9 \times (-\frac{2}{3})$ . Because the signs are different, the result must be negative. Now compute the size of the answer by writing 9 as  $\frac{9}{1}$  and cancelling with the 3. That leaves  $3 \times 2 = 6$ , so the total change is  $-6$  pounds. The negative sign tells us this is a loss, not a gain.

**Answer:**  $-6$  pounds (lost)

## Practice Problems

Multiply. Determine the sign first, then compute the absolute value. Simplify.

1.  $(-3) \times \frac{2}{5} =$  \_\_\_\_\_

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

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

4.  $(-5) \times \frac{3}{10} =$  \_\_\_\_\_



5.  $7 \times \left(-\frac{4}{7}\right) =$  \_\_\_\_\_

6.  $(-8) \times \frac{3}{4} =$  \_\_\_\_\_

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

8.  $6 \times \left(-\frac{5}{12}\right) =$  \_\_\_\_\_

9.  $(-9) \times \frac{4}{9} =$  \_\_\_\_\_

10.  $(-12) \times \frac{5}{6} =$  \_\_\_\_\_

11.  $(-3) \times 1\frac{2}{3} =$  \_\_\_\_\_




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

13.  $(-5) \times \left(-1\frac{3}{5}\right) =$  \_\_\_\_\_

14.  $(-6) \times 2\frac{1}{6} =$  \_\_\_\_\_

15.  $8 \times \left(-1\frac{3}{8}\right) =$  \_\_\_\_\_

**Study Tips**

-  Decide the sign in **one separate step** before doing any arithmetic with the numbers.
-  Write the integer as  $\frac{n}{1}$  so you can use cross-cancelling and avoid large numbers.
-  For three-factor products, count negative signs: an **odd** number of negatives  $\Rightarrow$  negative product; **even**  $\Rightarrow$  positive.

**Word Problems**

16. A stock loses  $\frac{3}{8}$  of a dollar per share each day. An investor owns 240 shares. Write a multiplication expression to find the total dollar change in the investor's portfolio per day, and evaluate it. After 5 trading days, what is the total change? Is the investor gaining or losing money? \_\_\_\_\_

17. A submarine descends at a rate of  $-1\frac{3}{4}$  feet per second. Write and evaluate expressions to find the depth change after (a) 8 s and (b) 12 s. Then find how many seconds it takes the submarine to reach a depth of  $-63$  feet from the surface. \_\_\_\_\_



## Answer Keys

- |                   |   |
|-------------------|---|
| 1) $-\frac{6}{2}$ | 10) -10   |
| 2) $-\frac{3}{2}$ | 11) -5  |
| 3) $-\frac{3}{2}$ | 12) -9  |
| 4) $-\frac{3}{2}$ | 13) 8   |
| 5) -4             | 14) -13   |
| 6) -6             | 15) -11   |
| 7) $-\frac{7}{2}$ | 16) $-\$90$ per day; $-\$450$ after 5 days  |
| 8) $-\frac{5}{2}$ | 17) (a) $-14\text{ ft}$ ; (b) $-21\text{ ft}$ ; time to $-63\text{ ft}$ : $36\text{ s}$ . |
| 9) -4             |   |

### Step-by-Step Explanations

*Tutoring notes not found for this topic.*



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