

# 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. $7 \times \left(-\frac{4}{7}\right) =$    | _____ | 10. $(-12) \times \frac{5}{6} =$               | _____ |
| 6. $(-8) \times \frac{3}{4} =$               | _____ | 11. $(-3) \times 1\frac{2}{3} =$               | _____ |
| 7. $(-4) \times \left(-\frac{7}{8}\right) =$ | _____ | 12. $4 \times \left(-2\frac{1}{4}\right) =$    | _____ |
| 8. $6 \times \left(-\frac{5}{12}\right) =$   | _____ | 13. $(-5) \times \left(-1\frac{3}{5}\right) =$ | _____ |
| 9. $(-9) \times \frac{4}{9} =$               | _____ | 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)  $-\frac{6}{2}$
- 2)  $-\frac{6}{2}$
- 3)  $-\frac{6}{2}$
- 4)  $-\frac{6}{2}$
- 5)  $-4$
- 6)  $-6$
- 7)  $-\frac{7}{2}$
- 8)  $-\frac{5}{2}$
- 9)  $-4$

- 10)  $-10$
- 11)  $-5$
- 12)  $-9$
- 13)  $8$
- 14)  $-13$
- 15)  $-11$
- 16)  $-\$90$  per day;  $-\$450$  after 5 days
- 17) (a)  $-14$  ft; (b)  $-21$  ft; time to  $-63$  ft:  $36$  s.

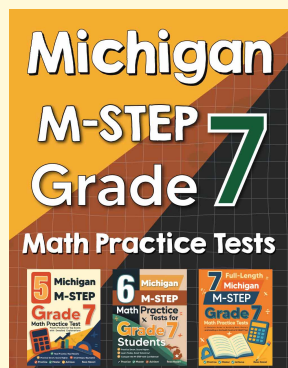
### Step-by-Step Explanations

*Tutoring notes not found for this topic.*



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