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 $\Rightarrow -$; $\frac{\cancel{4}^{1}}{1} \times \frac{3}{\cancel{8}^{2}} = \frac{3}{2}$; 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: $9 \times \left(-\frac{2}{3}\right)$. 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. $(-3) \times \frac{2}{5} =$ _____

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

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

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

Scan Me

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) $-\frac{6}{5}$
2) $-\frac{3}{2}$
3) $\frac{5}{3}$
4) $-\frac{3}{2}$
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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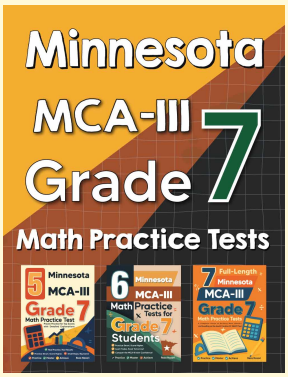

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