

Multiplying Fractions and Mixed Numbers

Warm Up

What is $\frac{1}{2}$ of each of the following?

1. 24 12

2. 16 8

3. 30 15

4. 28 14



Multiplying Fractions and Mixed Numbers

Essential Question:

How do you multiply fractions and mixed numbers?

Standard:

MCC7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

Multiplying Fractions and Mixed Numbers

To multiply fractions, multiply the numerators to find the product's numerator. Then multiply the denominators to find the product's denominator.

In other words: Multiply straight across



Review Video

Multiplying Fractions and Mixed Numbers

Additional Example 1A: Multiplying Fractions

Multiply. Write the answer in simplest form.

$$-12 \cdot \frac{3}{4}$$

$$-12 \cdot \frac{3}{4} = -\frac{12}{1} \cdot \frac{3}{4} \quad \text{Write } -12 \text{ as a fraction.}$$

$$= -\frac{\overset{3}{\cancel{12}} \cdot 3}{1 \cdot \cancel{4}_1} \quad \text{Simplify.}$$

$$= -\frac{9}{1} = -9 \quad \begin{array}{l} \text{Multiply numerators.} \\ \text{Multiply denominators.} \end{array}$$

Helpful Hint

The product of two positive proper fractions is less than either fraction.

Multiplying Fractions and Mixed Numbers

Additional Example 1B: Multiplying Fractions

Multiply. Write the answer in simplest form.

$$\frac{1}{3} \cdot \frac{3}{8}$$

$$\frac{1}{3} \cdot \frac{3}{8} = \frac{1 \cdot \cancel{3}^1}{\cancel{3}_1 \cdot 8}$$

Simplify.

$$= \frac{1}{8}$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Additional Example 1C: Multiplying Fractions

Multiply. Write the answer in simplest form.

$$\frac{3}{5} \cdot \left(-\frac{1}{4}\right)$$

Integer Rules
still apply!!!!

$$\frac{3}{5} \cdot \left(-\frac{1}{4}\right) = -\frac{3 \cdot 1}{5 \cdot 4}$$

The signs are different, so the answer will be negative.

$$= -\frac{3}{20}$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Check It Out: Example 1A

Multiply. Write the answer in simplest form.

$$-16 \cdot \frac{1}{4}$$

$$-16 \cdot \frac{1}{4} = -\frac{16}{1} \cdot \frac{1}{4} \quad \text{Write } -16 \text{ as a fraction.}$$

$$= -\frac{\overset{4}{\cancel{16}} \cdot 1}{1 \cdot \cancel{4}_1} \quad \text{Simplify.}$$

$$= -\frac{4}{1} = -4 \quad \begin{array}{l} \text{Multiply numerators.} \\ \text{Multiply denominators.} \end{array}$$

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Check It Out: Example 1B

Multiply. Write the answer in simplest form.

$$\frac{1}{6} \cdot \frac{6}{9}$$

$$\frac{1}{6} \cdot \frac{6}{9} = \frac{1 \cdot \cancel{6}^1}{\cancel{6}_1 \cdot 9}$$

Simplify.

$$= \frac{1}{9}$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Check It Out: Example 1C

Multiply. Write the answer in simplest form.

$$\left(-\frac{3}{7}\right) \cdot \frac{1}{8}$$

$$\left(-\frac{3}{7}\right) \cdot \frac{1}{8} = -\frac{3 \cdot 1}{7 \cdot 8}$$

$$= -\frac{3}{56}$$

The signs are different, so the answer will be negative.

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Additional Example 2A: Multiplying Mixed Numbers

Multiply. Write the answer in simplest form.

$$\frac{2}{5} \cdot 1\frac{2}{3}$$

$$\frac{2}{5} \cdot 1\frac{2}{3} = \frac{2}{5} \cdot \frac{5}{3}$$

Write the mixed number as an improper fraction.

$$= \frac{2}{\cancel{5}^1} \cdot \frac{\cancel{5}_1}{3}$$

Simplify.

$$= \frac{2}{3}$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Additional Example 2B: Multiplying Mixed Numbers

Multiply. Write the answer in simplest form.

$$-4\frac{1}{5} \cdot -2\frac{1}{7}$$

$$-4\frac{1}{5} \cdot -2\frac{1}{7} = \frac{-21}{5} \cdot \frac{-15}{7}$$

Write the mixed numbers as improper fractions.

$$= \frac{\overset{3}{\cancel{21}}}{\underset{1}{\cancel{5}}} \cdot \frac{\overset{3}{\cancel{15}}}{\underset{1}{\cancel{7}}}$$

Simplify.

$$= \frac{9}{1} \text{ or } 9$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Additional Example 2C: Multiplying Mixed Numbers

Multiply. Write the answer in simplest form.

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

$$6\frac{2}{3} \cdot -4\frac{2}{5} = \frac{20}{3} \cdot \frac{-22}{5}$$

$$= \frac{\overset{4}{\cancel{20}}}{3} \cdot \frac{-22}{\cancel{5}_1}$$

$$= \frac{-88}{3} \text{ or } -29\frac{1}{3}$$

Write the mixed numbers as improper fractions.

Simplify.

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Check It Out: Example 2A

Multiply. Write the answer in simplest form.

$$\frac{3}{5} \cdot 2\frac{1}{3}$$

$$\frac{3}{5} \cdot 2\frac{1}{3} = \frac{3}{5} \cdot \frac{7}{3}$$

Write the mixed number as an improper fraction.

$$= \overset{1}{\cancel{3}} \cdot \frac{7}{\cancel{3}^1}$$

Simplify.

$$= \frac{7}{5} \text{ or } 1\frac{2}{5}$$

*Multiply numerators.
Multiply denominators.*

Multiplying Fractions and Mixed Numbers

Reciprocals can help you divide by fractions.
Two numbers are reciprocals or multiplicative inverses if their product is 1. The reciprocal of $\frac{1}{3}$ is 3 because

$$\frac{1}{3} \cdot 3 = \frac{1}{3} \cdot \frac{3}{1} = \frac{3}{3} = 1.$$

Dividing by a number is the same as multiplying by its reciprocal.

$$2 \div \frac{1}{3} = 2 \cdot 3 = 6$$

[Review Video](#)

Multiplying Fractions and Mixed Numbers

Additional Example 1: Dividing Fractions

Divide. Write each answer in simplest form.

$$\begin{aligned} \underline{A.} \quad \frac{3}{7} \div \frac{2}{5} &= \frac{3}{7} \cdot \frac{5}{2} \\ &= \frac{3 \cdot 5}{7 \cdot 2} \\ &= \frac{15}{14} \text{ or } 1 \frac{1}{14} \end{aligned}$$

Multiply by the reciprocal of $\frac{2}{5}$.

$$\begin{aligned} \underline{B.} \quad \frac{3}{8} \div 12 &= \frac{3}{8} \cdot \frac{1}{12} \\ &= \frac{\cancel{3}^1 \cdot 1}{8 \cdot \cancel{12}_4} \\ &= \frac{1}{32} \end{aligned}$$

Multiply by the reciprocal of 12.

Simplify.

Multiplying Fractions and Mixed Numbers

Check It Out: Example 1

Divide. Write each answer in simplest form.

$$\begin{aligned} \underline{A.} \quad & \frac{-3}{5} \div \frac{1}{2} \\ & \frac{-3}{5} \div \frac{1}{2} = \frac{-3}{5} \cdot \frac{2}{1} \\ & = \frac{-3 \cdot 2}{5 \cdot 1} \\ & = \frac{-6}{5} \text{ or } -1\frac{1}{5} \end{aligned}$$

Integer Rules
still apply!

Multiply by the reciprocal of $\frac{1}{2}$.

$$\begin{aligned} \underline{B.} \quad & \frac{-3}{4} \div -3 \\ & \frac{-3}{4} \div -3 = \frac{-3}{4} \cdot \frac{1}{-3} \\ & = \frac{\cancel{-3} \cdot 1}{4 \cdot \cancel{-3}} \underline{1} \\ & = \frac{1}{4} \end{aligned}$$

Multiply by the reciprocal of 3.

Simplify.

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Additional Example 2: Dividing Mixed Numbers

Divide. Write each answer in simplest form.

A. $5\frac{2}{3} \div 1\frac{1}{4}$

$$\begin{aligned} 5\frac{2}{3} \div 1\frac{1}{4} &= \frac{17}{3} \div \frac{5}{4} \\ &= \frac{17}{3} \cdot \frac{4}{5} \\ &= \frac{68}{15} \text{ or } 4\frac{8}{15} \end{aligned}$$

Write mixed numbers as improper fractions.

Multiply by the reciprocal of $\frac{5}{4}$.

B. $\frac{-3}{4} \div 2\frac{1}{2}$

$$\begin{aligned} \frac{-3}{4} \div 2\frac{1}{2} &= \frac{-3}{4} \div \frac{5}{2} \\ &= \frac{-3}{4} \cdot \frac{2}{5} \\ &= \frac{-3}{4} \cdot \frac{2}{5} \cdot \frac{1}{1} \\ &= \frac{-3}{2} \cdot \frac{1}{5} \\ &= \frac{-3}{10} \end{aligned}$$

Write $2\frac{1}{2}$ as an improper fraction.

Multiply by the reciprocal of $\frac{5}{2}$.

Simplify.

Multiply. Write each answer in simplest form.

1. $5 \cdot \frac{1}{2}$

2. $9 \cdot \frac{3}{4}$

3. $6 \cdot -\frac{2}{5}$

4. $\frac{9}{15} \cdot \frac{5}{7}$

5. $\frac{9}{14} \cdot -\frac{7}{9}$

6. $\frac{7}{12} \cdot \frac{6}{14}$

7. $-12 \cdot \frac{3}{7}$

8. $15 \cdot \frac{5}{6}$

9. $21 \cdot \frac{3}{8}$

10. $2\frac{1}{3} \cdot \frac{3}{5}$

11. $3\frac{2}{5} \cdot \frac{1}{2}$

12. $4\frac{5}{6} \cdot \frac{2}{5}$

13. $2\frac{2}{5} \cdot \frac{2}{3}$

14. $3\frac{3}{4} \cdot \frac{2}{5}$

15. $8\frac{1}{6} \cdot \frac{3}{7}$

16. $2\frac{1}{3} \cdot 3\frac{3}{8}$

17. $1\frac{3}{5} \cdot 6\frac{2}{3}$

18. $2\frac{2}{5} \cdot 4\frac{5}{6}$

19. Rolf spent 15 hours last week practicing his saxophone. If $\frac{3}{10}$ of the time was spent practicing warm-up routines, how much time did he spend practicing warm-up routines?
- _____

20. A muffin recipe calls for $\frac{2}{5}$ tablespoon of vanilla extract for 6

*Pg. 73
Do odd
only*

Workbook
Pg. 78

PRACTICE

Find each quotient.

1. $-\frac{1}{4} \div \left(-\frac{3}{16}\right) =$ _____

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

3. $1\frac{1}{4} \div 2\frac{1}{4} =$ _____

4. $\frac{\frac{2}{5}}{\frac{4}{5}} =$ _____

5. $\frac{-\frac{1}{8}}{\frac{2}{3}} =$ _____

6. $\frac{-\frac{3}{4}}{-\frac{1}{6}} =$ _____

Write two equivalent expressions for each quotient by changing the placement of negative signs.

7. $\frac{-1}{3},$ _____, _____

8. $-\frac{7}{12},$ _____, _____

9. $\frac{-5}{-16},$ _____, _____