Multiplying and Dividing Fractions and Mixed Numbers

Practice 1  Multiplying Proper Fractions

Complete.

1.

\( \frac{3}{4} \) \[ \text{of} \] \( \frac{1}{2} \) = \[ \text{Fraction} \times \text{Fraction} \]  

Multiply. Express the product in simplest form.

2. \( \frac{3}{8} \times \frac{1}{2} = \)  

3. \( \frac{5}{12} \times \frac{7}{8} = \)
Multiply. Express the product in simplest form.

4. \( \frac{2}{11} \times \frac{7}{12} = \)

5. \( \frac{3}{8} \times \frac{4}{9} = \)

Complete. Express the product in simplest form.

6. \( \frac{1}{3} \text{ of } \frac{5}{8} = \)

7. \( \frac{2}{7} \text{ of } \frac{9}{11} = \)

8. \( \frac{2}{5} \text{ of } \frac{7}{10} = \)

9. \( \frac{3}{4} \text{ of } \frac{8}{9} = \)

Practice 2  Real-World Problems: Multiplying with Proper Fractions

Solve. Draw models to help you.

1. Lena has some eggs in the refrigerator. She takes out \( \frac{3}{5} \) of the eggs to make waffles and scrambled eggs. She uses \( \frac{2}{3} \) of the eggs she took out to make waffles. What fraction of the total number of eggs does Lena use to make waffles?

2. Dawn has \( \frac{5}{6} \) yard of lace. She uses \( \frac{4}{5} \) of it for a dress and the rest for a jewel box. How much lace does she use for the jewel box?
Solve. Show your work.

3. Tasha finished a job in $\frac{3}{4}$ hour. Megan finished it in $\frac{4}{5}$ of the time Tasha took. How long did Megan take to finish the job?

4. Lily has a bottle containing $\frac{7}{8}$ quart of milk. She pours $\frac{4}{5}$ of it into a bowl. What amount of milk does she pour into the bowl?

5. Raoul ran $\frac{3}{4}$ mile in a race. Eduardo ran $\frac{2}{7}$ of the distance that Raoul ran. What distance did Eduardo run?
Solve. Draw models to help you.

6. Jenny spends $\frac{1}{6}$ of her paycheck and saves $\frac{2}{5}$ of the remaining amount. What fraction of her total paycheck is saved?
Solve. Draw models to help you.

7. In Rod’s family, $\frac{3}{4}$ of the members wear glasses. Of those who do not wear glasses, $\frac{1}{3}$ are male. What fraction of the family are males who do not wear glasses?
Solve. Draw models to help you.

8. Ned folded a set of origami figures. Of this set, $\frac{5}{8}$ are cranes and $\frac{1}{6}$ of the remainder are frogs. The rest are grasshoppers. What fraction of the origami figures are grasshoppers?
10. Karen collects local and foreign coins. Of the coins in her collection, \( \frac{1}{4} \) are foreign coins. Of the foreign coins, \( \frac{2}{5} \) are from Mexico. What fraction of the collection are foreign coins that are not from Mexico?
Practice 3  Multiplying Improper Fractions by Fractions

Complete.

1. \[
\frac{3}{2} \times \frac{1}{2} = \]

2. \[
\frac{8}{3} \times \frac{1}{4} = \]

Find the product.

3. \[
\frac{11}{2} \times \frac{1}{3} = \]
Multiply. Express the product in simplest form.

**Example**

\[
\frac{4}{5} \times \frac{7}{6}
\]

**Method 1**

\[
\frac{4}{5} \times \frac{7}{6} = \frac{4 \div 2}{5} \times \frac{7}{6 \div 2}
\]

\[
= \frac{2}{5} \times \frac{7}{3}
\]

\[
= \frac{2 \times 7}{5 \times 3}
\]

\[
= \frac{14}{15}
\]

**Method 2**

\[
\frac{4}{5} \times \frac{7}{6} = \frac{4 \times 7}{5 \times 6}
\]

\[
= \frac{28}{30}
\]

\[
= \frac{28 \div 2}{30 \div 2}
\]

\[
= \frac{14}{15}
\]

4. \( \frac{7}{4} \times \frac{1}{3} = \)  

5. \( \frac{9}{8} \times \frac{2}{7} = \)  

6. \( \frac{8}{3} \times \frac{3}{10} = \)  

7. \( \frac{15}{9} \times \frac{3}{20} = \)
Multiply. Express the product as a whole number or a mixed number in simplest form.

Example

\[
\frac{2}{5} \times \frac{15}{4}
\]

Method 1

\[
\frac{2}{5} \times \frac{15}{4} = \frac{2 \div 2}{5} \times \frac{15 \div 2}{4}
\]

\[
= \frac{1}{5 \div 5} \times \frac{15 \div 5}{2}
\]

\[
= \frac{1 \times 3}{1 \times 2}
\]

\[
= \frac{3}{2}
\]

\[
= 1 \frac{1}{2}
\]

Method 2

\[
\frac{2}{5} \times \frac{15}{4} = \frac{2 \times 15}{5 \times 4}
\]

\[
= \frac{30}{20}
\]

\[
= \frac{3}{2}
\]

\[
= 1 \frac{1}{2}
\]

8. \( \frac{3}{4} \times \frac{8}{5} = \)

9. \( \frac{16}{7} \times \frac{21}{2} = \)

10. \( \frac{15}{12} \times \frac{8}{5} = \)

11. \( \frac{32}{9} \times \frac{36}{8} = \)
Multiply. Express the product as a whole number or a mixed number in simplest form.

12. \( \frac{7}{8} \times \frac{6}{5} = \)

13. \( \frac{11}{12} \times \frac{28}{3} = \)

14. \( \frac{21}{5} \times \frac{15}{6} = \)

15. \( \frac{25}{4} \times \frac{18}{10} = \)

16. \( \frac{30}{9} \times \frac{7}{2} = \)

17. \( \frac{14}{8} \times \frac{5}{3} = \)
Practice 4  Multiplying Mixed Numbers and Whole Numbers

Complete.

1. \(1\frac{1}{2} \times 2\)

\[\begin{array}{c}
1\frac{1}{2} \times 2 = \begin{array}{c}
\\\n\end{array} \times \begin{array}{c}
\end{array} \\
= \begin{array}{c}
\end{array}
\end{array}\]

2. \(2\frac{1}{3} \times 6\)

\[\begin{array}{c}
2\frac{1}{3} \times 6 = \begin{array}{c}
\\\n\end{array} \times \begin{array}{c}
\end{array} \\
= \begin{array}{c}
\end{array}
\end{array}\]
Multiply. Express the product as a whole number or a mixed number in simplest form.

**Example**

\[ 9 \times 2 \frac{1}{3} \]

\[ 9 \times 2 \frac{1}{3} = 9 \times \frac{7}{3} \]

\[ = \frac{9 \times 7}{3} \]

\[ = \frac{63}{3} \]

\[ = 21 \]

3. \[ 4\frac{1}{5} \times 15 = \]

4. \[ 2\frac{3}{7} \times 28 = \]

5. \[ 24 \times 1\frac{5}{6} = \]

6. \[ 4\frac{1}{2} \times 18 = \]
Multiply. Express the product as a whole number or a mixed number in simplest form.

7. $2\frac{3}{4} \times 16 = \quad 8. \quad 32 \times 3\frac{1}{8} =$

Example

$6 \times 2\frac{1}{5}$

$6 \times 2\frac{1}{5} = 6 \times \frac{11}{5}$

$= \frac{66}{5}$

$= \frac{65}{5} + \frac{1}{5}$

$= 13 + \frac{1}{5}$

$= 13\frac{1}{5}$

9. $4 \times 2\frac{7}{9} = \quad 10. \quad 5 \times 2\frac{3}{7} =$
Multiply. Express the product as a whole number or a mixed number in simplest form.

11. \[ 2\frac{1}{4} \times 7 = \]

12. \[ 1\frac{4}{5} \times 12 = \]

13. \[ 12 \times 2\frac{3}{8} = \]

14. \[ 26 \times 1\frac{1}{6} = \]

Answer each question.

15. Is the product of 6 and 10 greater than or less than each of its factors? Explain your reasoning.

16. Is the product of \( \frac{2}{5} \) and 5 greater than or less than \( \frac{2}{5} \)? Is it greater than or less than 5? Explain your reasoning.
Lesson 4.5  Real-World Problems: Multiplying Mixed Numbers

Practice 5  Real-World Problems: Multiplying Mixed Numbers

Solve. Show your work.

1. At a party, there are 8 guests. Each guest eats $2\frac{1}{4}$ oranges.
   How many oranges do the 8 guests eat?
   1 guest $\rightarrow 2\frac{1}{4}$ oranges
   
   8 guests $\rightarrow \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$ oranges
   
   $= \underline{\hspace{1cm}}$
   
   The 8 guests eat a total of _______ oranges.

2. One pound of chicken costs $3. Jim buys $8\frac{2}{3}$ pounds of chicken.
   How much does Jim pay for the chicken?

3. Nolan practices the piano for $1\frac{2}{5}$ hours every Saturday and Sunday.
   How long does he practice each weekend? Express your answer in hours and minutes.
Solve. Show your work.

4. Sue buys 5 pieces of fabric. Each piece of fabric is $1\frac{7}{10}$ yards long.
   a. What is the total length of the fabric she buys?
   
   b. One yard of the fabric costs $5. How much does she pay for all 5 pieces of fabric?

5. Angela works $1\frac{1}{2}$ hours a day and is paid $7 per hour. She works 5 days a week. How much does Angela earn in 7 weeks?
Practice 6  Dividing Fractions and Whole Numbers

Shade parts of the model to show the division expression. Then complete.

Example

\[ \frac{1}{3} \div 2 \]

\[ \frac{1}{3} \]

\[ \frac{1}{6} \]

is shaded.

\[ \frac{1}{3} \div 2 = \frac{1}{6} \]

1. \[ \frac{1}{6} \div 3 \]

\[ \frac{1}{6} \]

is shaded.

\[ \frac{1}{6} \]

is shaded.

\[ \frac{1}{6} \div 3 = \]
Divide. Draw models to help you.

2. \( \frac{4}{5} \div 2 = \)

3. \( \frac{6}{7} \div 3 = \)

4. \( \frac{3}{4} \div 2 = \)

5. \( \frac{2}{5} \div 3 = \)

Divide. Express each quotient in simplest form.

6. \( \frac{4}{5} \div 7 = \)

7. \( \frac{5}{8} \div 9 = \)

8. \( \frac{8}{9} \div 4 = \)

9. \( \frac{10}{11} \div 5 = \)
Divide. Draw models to help you.

Example

\[3 \div \frac{1}{5}\]

\[\frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5} \quad \frac{1}{5}\]

So, \[3 \div \frac{1}{5} = 3 \times 5 = 15\]

10. \[1 \div \frac{1}{4} = \quad \]  
11. \[3 \div \frac{1}{3} = \quad \]

12. \[5 \div \frac{1}{8} = \quad \]

13. \[9 \div \frac{1}{6} = \quad \]
Solve. Show your work.

14. Mr. Chagall’s garden covers $\frac{2}{5}$ of an acre of land. He divides the land into 4 equal sections. What fraction of an acre is each section of the garden?

15. Gordon pours $\frac{4}{9}$ quart of milk from a pitcher equally into 4 mugs.
   a. Find the amount of milk in each mug.
   b. Find the amount of milk in 3 mugs.
16. Calvin buys \( \frac{3}{5} \) pound of ground beef. He divides the beef into 6 equal portions.
   a. Find the weight of 1 portion of beef.
   b. Find the weight of 4 portions of beef.

17. Devon buys a plot of land with an area of \( \frac{5}{6} \) square kilometer. He divides the land equally into 4 smaller plots. What is the total area of 3 of the smaller plots of land?
Solve. Show your work.

18. Sandra has a 5-foot length of canvas. She cuts the canvas into pieces that are \( \frac{1}{4} \) feet long. How many pieces will she have?

19. Aidan uses \( \frac{1}{4} \) of the water in a bucket to water 1 potted plant. How many potted plants can Aidan water with 3 full buckets of water?

20. Mrs. Carter needs \( \frac{1}{2} \) meter of cloth to make a pillowcase. How many pillowcases can she make with 5 meters of cloth?
Practice 7  Real-World Problems: Multiplying and Dividing with Fractions

Solve. Draw models to help you.

1. Evan typed 72 pages of notes one day. He typed \( \frac{1}{2} \) of the pages in the morning and \( \frac{1}{3} \) of the pages in the afternoon. He typed the rest of the pages in the evening. How many pages of notes did he type in the morning and afternoon?

2. Last Saturday, Jay spent 6 hours playing games, studying and talking with his friends. He spent \( \frac{2}{5} \) of the time playing games and \( \frac{1}{2} \) of the time studying. How many minutes did he spend talking with his friends?
Solve. Draw models to help you.

3. Joanne earns $720 a week. She spends \( \frac{1}{3} \) of her money on groceries and household goods and \( \frac{3}{4} \) of the remaining money on rent. How much money does she spend on rent, groceries and household goods?
Solve. Draw models to help you.

4. During a triathlon, Sharon swims $\frac{1}{4}$ of the total route and cycles $\frac{3}{5}$ of the remaining route. She runs the rest of the route. If she runs 3,600 meters, find the total distance of the triathlon route.
Solve. Show your work.

5. Victoria has a 2-pound package of flour. She uses $\frac{2}{5}$ of the flour to make a pizza. She then uses $\frac{3}{10}$ of the remaining flour to make bread. Find the weight of the package of flour that she has left. Express your answer as a decimal.
Solve. Show your work.

6. Karen collects $\frac{6}{7}$ quart of rainwater. She uses $\frac{1}{2}$ of the water to clean her bicycle and uses the remaining water equally for 3 houseplants. What volume of water does she use for each houseplant?

7. Ricardo spends $\frac{8}{9}$ hour reading the newspaper. He spends $\frac{1}{4}$ of the time reading the world news and splits the remaining time equally between the sports news and the comics. How much time does he spend reading the comics?
Solve. Show your work.

8. A square foot of wall space needs $\frac{1}{8}$ quart of paint. Terrence has 7 quarts of paint, but uses 2 quarts to paint a pipe. How many square feet of wall can he paint with the rest of the paint?

9. Mary spends $\frac{1}{5}$ hour to make a friendship bracelet. She spends 3 hours before lunch and 2 hours after lunch making the bracelets. How many bracelets does she make in all?

10. Clayton wants to be a musician. After school one afternoon, he spends half his time practicing his drums and $\frac{3}{4}$ of the remaining time on homework and dinner. He spends the remaining $\frac{3}{4}$ hour talking with and texting his friends. How long did he practice the drums?
11. Julia spends $\frac{5}{9}$ of her vacation at summer camp. She spends $\frac{3}{4}$ of the remaining time at her grandparent’s home. The remaining 7 days she spends at the seashore with her family. How many days of summer vacation does she get each summer.
Math Journal

Rachel drew a model to solve this problem:

Earl pours \( \frac{1}{3} \) of a bottle of juice into his glass. Roberto pours \( \frac{1}{3} \) of the remainder into his glass. What fraction of the bottle of juice is left?

\[
1 - \frac{1}{3} - \frac{1}{3} = \frac{1}{3}
\]

\( \frac{1}{3} \) of the bottle of juice is left.

Did Rachel solve the problem correctly? Explain.
Put On Your Thinking Cap!

Challenging Practice

An art teacher has a box of markers. She keeps half of the markers in the box and gives $\frac{1}{3}$ of the other half to group A. The remaining markers were shared equally among the 8 students in group B. What fraction of the whole box does each of the students in group B get?
Put On Your Thinking Cap!

**Problem Solving**

Mimi’s Market sold 24 heads of lettuce one morning. That afternoon \(\frac{2}{7}\) of the remaining heads of lettuce were sold. The number of heads left was now \(\frac{1}{2}\) of the number the market had at the beginning of the day. How many heads of lettuce were there at the beginning of the day?