

Chapter 3

Fractions and Mixed Numbers

Practice 1 Adding Unlike Fractions

Find two equivalent fractions for each fraction.

Example

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9}$$

1. $\frac{3}{4} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

2. $\frac{2}{5} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

3. $\frac{5}{6} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

4. $\frac{1}{7} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Express each fraction in simplest form.

5. $\frac{6}{8} = \underline{\hspace{2cm}}$

6. $\frac{8}{20} = \underline{\hspace{2cm}}$

7. $\frac{10}{15} = \underline{\hspace{2cm}}$

8. $\frac{9}{21} = \underline{\hspace{2cm}}$

Rewrite each pair of unlike fractions as like fractions.

Example

$$\frac{1}{2} = \frac{2}{4} \quad \frac{1}{4} = \frac{1}{4}$$

9. $\frac{1}{4} =$ _____ $\frac{5}{12} =$ _____

10. $\frac{1}{10} =$ _____ $\frac{2}{5} =$ _____

11. $\frac{5}{9} =$ _____ $\frac{2}{3} =$ _____

12. $\frac{3}{8} =$ _____ $\frac{9}{16} =$ _____

Write equivalent fractions for each fraction. Then find the least common denominator of the fractions.

Example

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$$

$$\frac{2}{3} = \frac{4}{6}$$

The least common denominator
is 6.

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

$$\frac{3}{4} =$$

The least common denominator
is _____.

14. $\frac{1}{4} =$

$$\frac{5}{6} =$$

The least common denominator
is _____.

15. $\frac{5}{6} =$

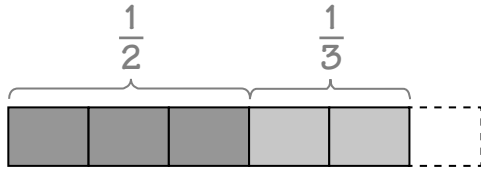
$$\frac{3}{8} =$$

The least common denominator
is _____.

Shade and label each model to show the fractions. Then complete the addition sentence.

Example

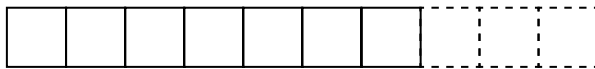
$$\frac{1}{2}, \frac{1}{3}$$



Find the multiples of 2 and 3.
 Choose the least common multiple.
 Use it to rewrite $\frac{1}{2}$ and $\frac{1}{3}$ as like fractions.

$$\begin{aligned} \frac{1}{2} + \frac{1}{3} &= \frac{3}{6} + \frac{2}{6} \\ &= \frac{5}{6} \end{aligned}$$

16. $\frac{1}{5}, \frac{1}{2}$



$$\begin{aligned} \frac{1}{5} + \frac{1}{2} &= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

Shade and label each model to show the fractions. Then complete the addition sentence.

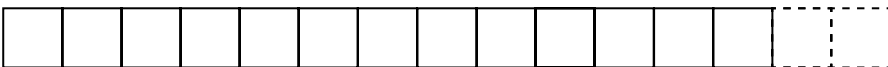
17. $\frac{1}{6}, \frac{1}{4}$



$$\frac{1}{6} + \frac{1}{4} = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

18. $\frac{1}{5}, \frac{2}{3}$



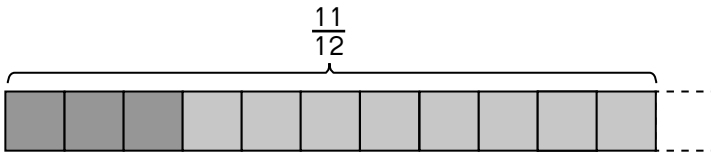
$$\frac{1}{5} + \frac{2}{3} = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

Name: _____

Date: _____

Look at the model. Write two addition sentences.



19. Addition sentence 1:

$$\frac{\square}{12} + \frac{\square}{12} = \frac{\square}{12}$$

20. Addition sentence 2 (fractions in simplest form):

$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Add. Express each sum in simplest form.

21. $\frac{1}{3} + \frac{1}{9} =$

22. $\frac{5}{8} + \frac{2}{4} =$

23. $\frac{1}{2} + \frac{6}{7} =$

24. $\frac{4}{8} + \frac{1}{5} =$

Use benchmarks to estimate each sum.

Example

$$\frac{1}{3} + \frac{4}{7}$$

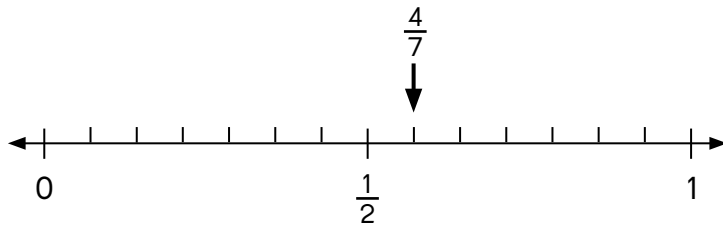
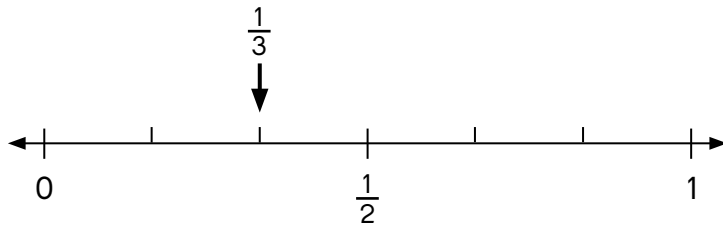
$\frac{1}{3}$ is about $\frac{1}{2}$.

$\frac{4}{7}$ is about $\frac{1}{2}$.

$$\frac{1}{3} + \frac{4}{7}$$

$$\rightarrow \frac{1}{2} + \frac{1}{2} = 1$$

$\frac{1}{3} + \frac{4}{7}$ is about 1.



25. $\frac{2}{3} + \frac{2}{9}$

26. $\frac{7}{9} + \frac{1}{7} + \frac{3}{5}$

Practice 2 Subtracting Unlike Fractions

Rewrite the fractions as like fractions and complete the subtraction sentence.

Example

$$\begin{array}{ccc} \nearrow \textcircled{\times 3} & & \nearrow \textcircled{\times 2} \\ \frac{1}{2} = \frac{\boxed{3}}{\boxed{6}} & & \frac{1}{3} = \frac{\boxed{2}}{\boxed{6}} \\ \searrow \textcircled{\times 3} & & \searrow \textcircled{\times 2} \end{array}$$

What is the least common multiple of 2 and 3?



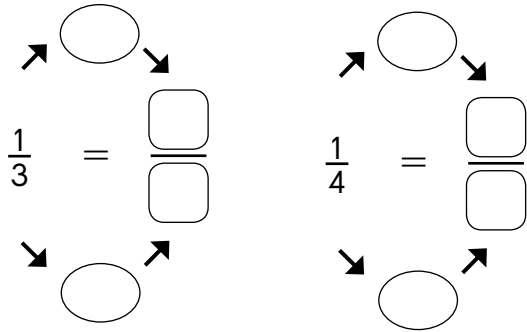
$$\frac{1}{2} = \frac{\boxed{3}}{\boxed{6}}$$

$$\frac{1}{3} = \frac{\boxed{2}}{\boxed{6}}$$

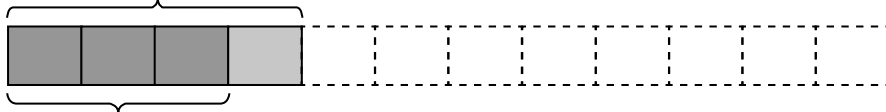
$$\begin{aligned} \frac{1}{2} - \frac{1}{3} &= \frac{\boxed{3}}{\boxed{6}} - \frac{\boxed{2}}{\boxed{6}} \\ &= \frac{\boxed{1}}{\boxed{6}} \end{aligned}$$

Rewrite the fractions as like fractions and complete the subtraction sentence.

1.



$$\frac{1}{3} = \frac{\quad}{\quad}$$



$$\frac{1}{4} = \frac{\quad}{\quad}$$

$$\frac{1}{3} - \frac{1}{4} = \underline{\quad\quad} - \underline{\quad\quad}$$

$$= \underline{\quad\quad}$$

Subtract. Express each difference in simplest form.

2. $\frac{7}{12} - \frac{2}{4} =$

3. $\frac{4}{5} - \frac{1}{3} =$

4. $1 - \frac{5}{6} - \frac{1}{12} =$

5. $\frac{7}{9} - \frac{1}{6} =$

Use benchmarks to estimate each difference.*Example*

$$\frac{4}{5} - \frac{3}{8}$$

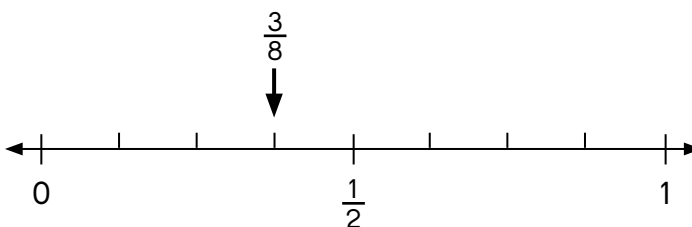
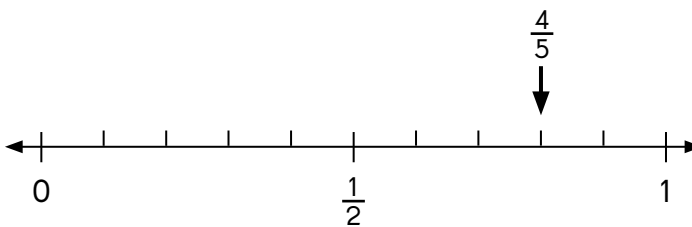
$\frac{4}{5}$ is about 1.

$\frac{3}{8}$ is about $\frac{1}{2}$.

$$\frac{4}{5} - \frac{3}{8}$$

$$\rightarrow 1 - \frac{1}{2} = \frac{1}{2}$$

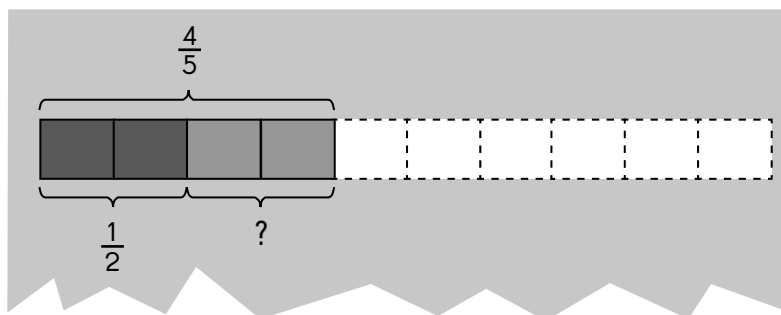
$\frac{4}{5} - \frac{3}{8}$ is about $\frac{1}{2}$.



6. $\frac{9}{10} - \frac{1}{6}$

7. $\frac{5}{12} - \frac{1}{9}$

Darren drew a model to find $\frac{4}{5} - \frac{1}{2}$. His model is drawn incorrectly. Explain his mistakes. Then draw the correct model and find the difference.



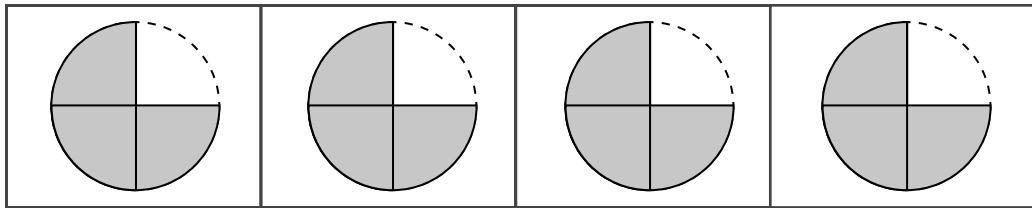
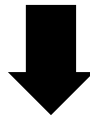
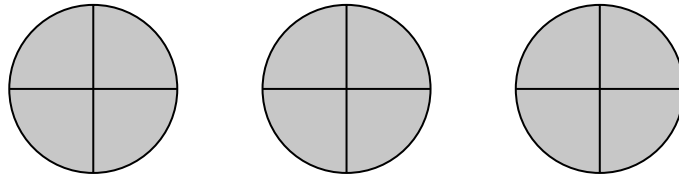
Darren's model is wrong because:

The correct model is:

Practice 3 Fractions, Mixed Numbers, and Division Expressions

Look at the diagram. Complete.

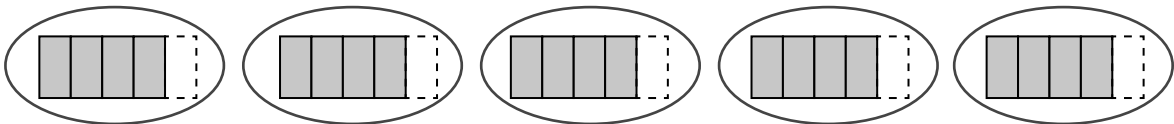
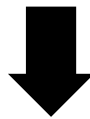
Example



$$\underline{\quad 3 \quad} \div \underline{\quad 4 \quad} = \frac{\boxed{3}}{\boxed{4}}$$

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1.



$$\underline{\quad \quad} \div \underline{\quad \quad} = \frac{\boxed{\quad}}{\boxed{\quad}}$$

Write each division expression as a fraction.

2. $5 \div 7 = \frac{\boxed{}}{\boxed{}}$

3. $3 \div 10 = \frac{\boxed{}}{\boxed{}}$

4. $4 \div 9 = \frac{\boxed{}}{\boxed{}}$

5. $2 \div 11 = \frac{\boxed{}}{\boxed{}}$

Write each fraction as a division expression.

Example

$$\frac{7}{8} = \underline{7} \div \underline{8}$$

6. $\frac{5}{12} = \underline{} \div \underline{}$

7. $\frac{1}{10} = \underline{} \div \underline{}$

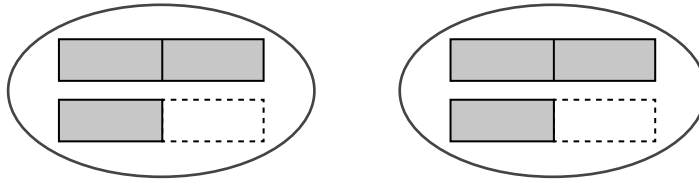
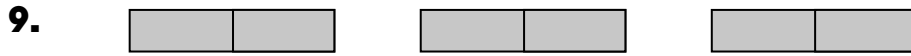
8. $\frac{6}{7} = \underline{} \div \underline{}$

Look at the diagram. Complete.

Example

$\underline{4} \div \underline{3} = \frac{\boxed{4}}{\boxed{3}} = \boxed{1} \frac{\boxed{1}}{\boxed{3}}$

Look at the diagram. Complete.



$$\underline{\quad} \div \underline{\quad} = \frac{\square}{\square} = \square \frac{\square}{\square}$$

Complete.

10. $7 \div 4 = \frac{\square}{\square}$

$$= \frac{\square}{\square} + \frac{\square}{\square}$$

$$= 1 + \frac{\square}{\square}$$

$$= \square \frac{\square}{\square}$$

11. $35 \div 11 = \frac{\square}{\square}$

$$= \frac{\square}{\square} + \frac{\square}{\square}$$

$$= 3 + \frac{\square}{\square}$$

$$= \square \frac{\square}{\square}$$

Divide. Express each quotient as a mixed number.

Example

$$5 \div 3 = 1 \frac{\boxed{2}}{\boxed{3}} \quad \begin{array}{r} 3 \overline{) 5} \\ \underline{3} \\ 2 \end{array}$$

12.

$$7 \div 2 = 3 \frac{\boxed{}}{\boxed{}}$$

13.

$$9 \div 4 = 2 \frac{\boxed{}}{\boxed{}}$$

14.

$$18 \div 5 = 3 \frac{\boxed{}}{\boxed{}}$$

Write each fraction in simplest form. Then divide to express each quotient as a mixed number.

15.

$$\begin{aligned} 18 \div 4 &= \frac{\boxed{}}{\boxed{}} \\ &= \frac{\boxed{}}{\boxed{}} \\ &= \boxed{} \frac{\boxed{}}{\boxed{}} \end{aligned}$$

16.

$$\begin{aligned} 22 \div 6 &= \frac{\boxed{}}{\boxed{}} \\ &= \frac{\boxed{}}{\boxed{}} \\ &= \boxed{} \frac{\boxed{}}{\boxed{}} \end{aligned}$$

Practice 4 Expressing Fractions, Division Expressions and Mixed Numbers as Decimals

Write each fraction as a decimal.

Example

$$\frac{3}{5} = \frac{6}{10}$$

$$= 0.6$$

1. $\frac{13}{20} =$ _____

= _____

2. $\frac{19}{25} =$ _____

= _____

3. $\frac{47}{50} =$ _____

= _____

Express each division expression as a mixed number in simplest form and as a decimal.

Division expression	Express division expression as	
	a mixed number	a decimal
4. $7 \div 2$		
5. $9 \div 4$		
6. $21 \div 5$		
7. $101 \div 25$		

Express each improper fraction as a decimal.

Example

$$\begin{aligned}\frac{3}{2} &= \frac{2}{2} + \frac{1}{2} \\ &= 1 + \frac{1}{2} \\ &= 1 + 0.5 \\ &= 1.5\end{aligned}$$

8. $\frac{22}{5}$

9. $\frac{47}{20}$

10. $\frac{32}{25}$

Solve. Show your work.

- 11.** A coil of rope 603 feet long is cut into 25 equal pieces. What is the length of each piece? Express your answer as a mixed number and as a decimal.

Practice 5 Adding Mixed Numbers

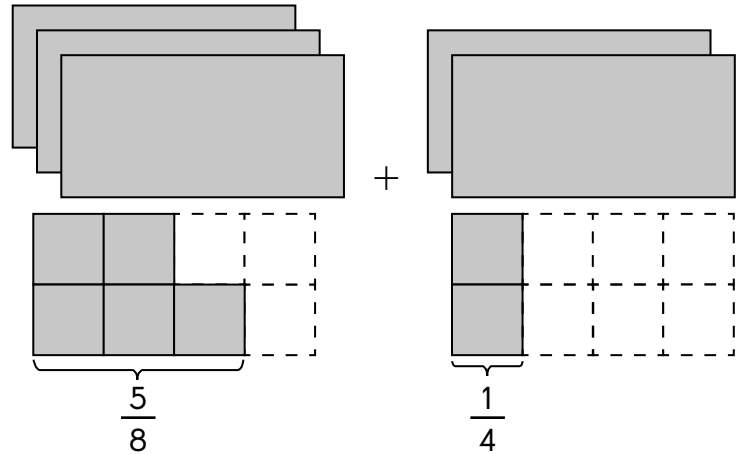
Add. Express each sum in simplest form.

Example

$$3\frac{5}{8} + 2\frac{1}{4}$$

$$= 3\frac{5}{8} + 2\frac{2}{8}$$

$$= 5\frac{7}{8}$$

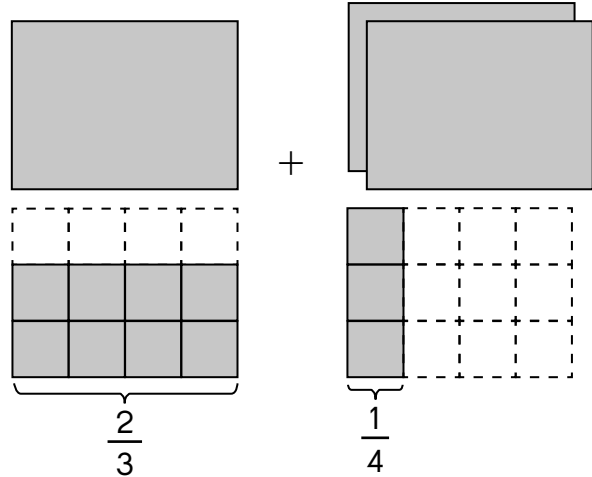


1.

$$1\frac{2}{3} + 2\frac{1}{4}$$

$$= 1\frac{\quad}{\quad} + 2\frac{\quad}{\quad}$$

$$= 3\frac{\quad}{\quad}$$

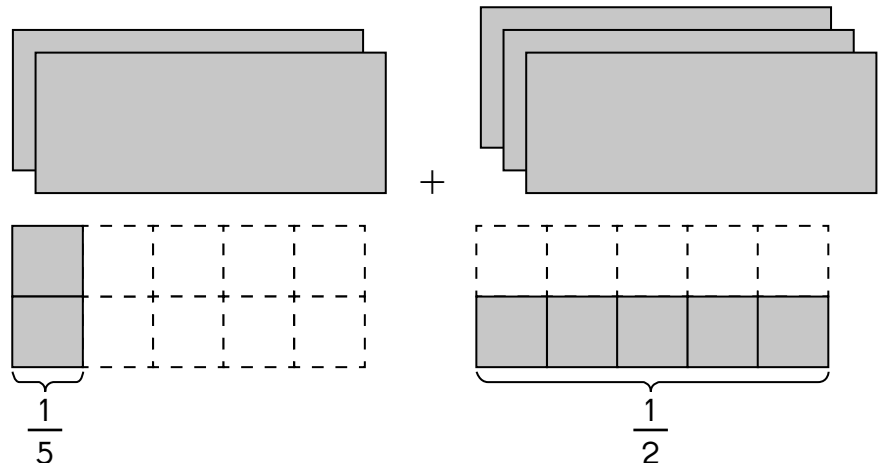


2.

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

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

$$= 5\frac{\quad}{\quad}$$



Add. Express each sum in simplest form.

3. $3\frac{2}{7} + 2\frac{5}{14}$

4. $5\frac{7}{12} + 3\frac{1}{4}$

5. $4\frac{1}{15} + 1\frac{3}{10}$

6. $12\frac{1}{9} + 9\frac{5}{6}$

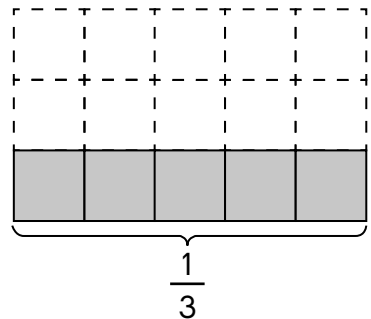
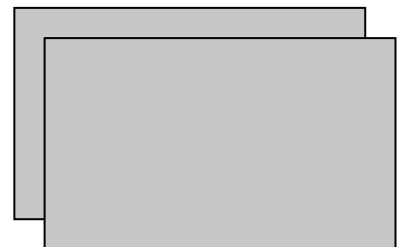
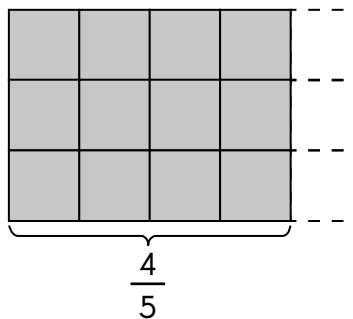
Add. Express each sum in simplest form.

7. $1\frac{4}{5} + 2\frac{1}{3}$

$= 1\frac{\boxed{}}{\boxed{}} + 2\frac{\boxed{}}{\boxed{}}$

$= 3\frac{\boxed{}}{\boxed{}}$

$= 4\frac{\boxed{}}{\boxed{}}$



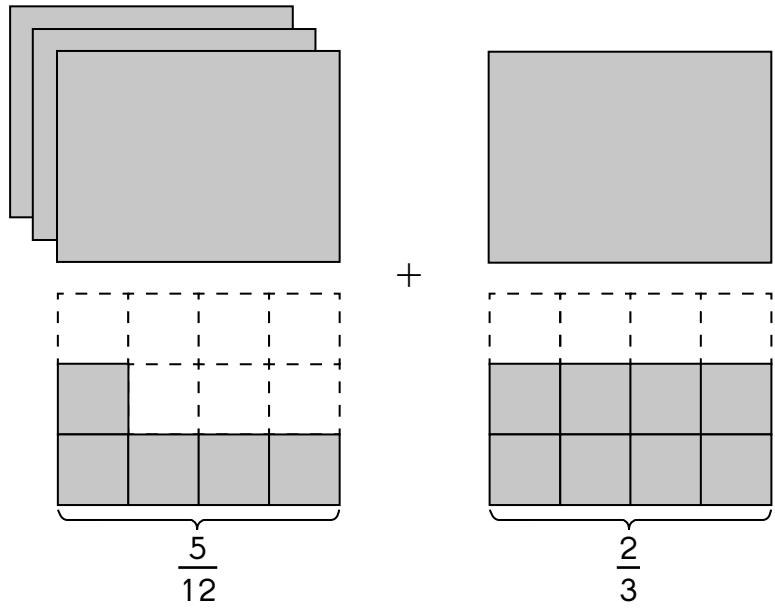
Add. Express each sum in simplest form.

8. $3\frac{5}{12} + 1\frac{2}{3}$

$= 3\frac{\square}{\square} + 1\frac{\square}{\square}$

$= 4\frac{\square}{\square}$

$= 5\frac{\square}{\square}$



9. $2\frac{3}{4} + 3\frac{2}{5}$

10. $2\frac{5}{9} + 1\frac{5}{6}$

11. $7\frac{8}{9} + 9\frac{5}{12}$

12. $5\frac{7}{12} + 1\frac{3}{4}$

Use benchmarks to estimate each sum.

Example

$$6\frac{3}{5} + 4\frac{5}{6}$$

$\frac{3}{5}$ is about $\frac{1}{2}$.

So, $6\frac{3}{5}$ is about $6\frac{1}{2}$.

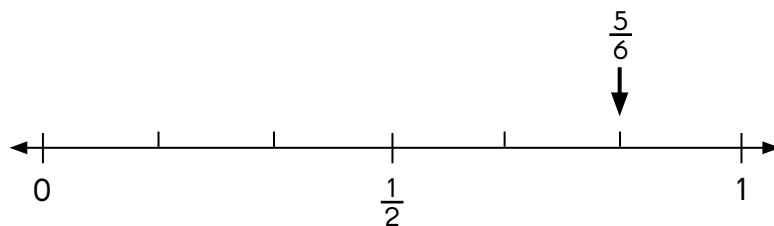
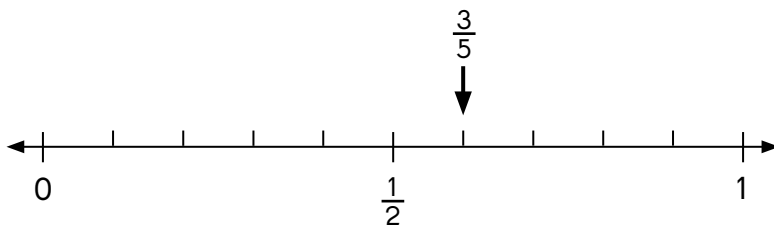
$\frac{5}{6}$ is about 1.

So, $4\frac{5}{6}$ is about 5.

$$6\frac{3}{5} + 4\frac{5}{6}$$

$$\rightarrow 6\frac{1}{2} + 5 = 11\frac{1}{2}$$

$6\frac{3}{5} + 4\frac{5}{6}$ is about $11\frac{1}{2}$.



13. $9\frac{6}{7} + 7\frac{5}{12}$

14. $4\frac{7}{12} + 10\frac{1}{9}$

Practice 6 Subtracting Mixed Numbers

Subtract. Express each difference in simplest form.

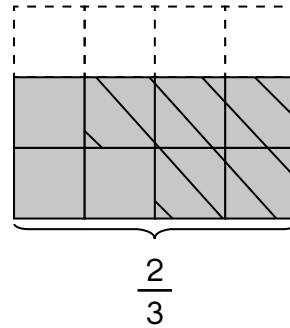
Example

$$3\frac{2}{3} - \frac{5}{12}$$

$$= 3\frac{\boxed{8}}{12} - \frac{5}{12}$$

$$= 3\frac{\boxed{3}}{12}$$

$$= 3\frac{\boxed{1}}{\boxed{4}}$$

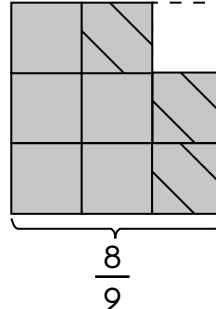
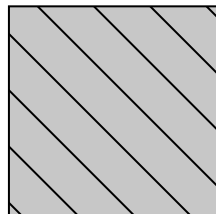
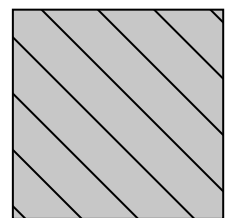
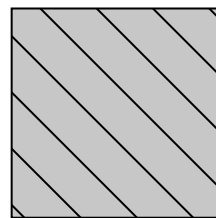


1.

$$4\frac{8}{9} - 3\frac{1}{3}$$

$$= 4\frac{8}{9} - 3\frac{\boxed{}}{\boxed{}}$$

$$= 1\frac{\boxed{}}{\boxed{}}$$

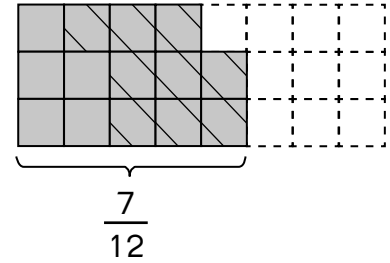
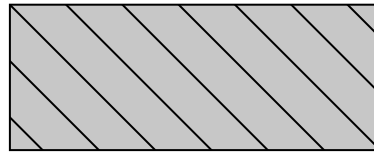
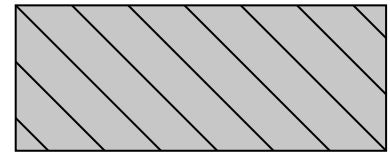


Subtract. Express each difference in simplest form.

2. $3\frac{7}{12} - 2\frac{3}{8}$

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

$$= 1\frac{\square}{\square}$$



3. $3\frac{5}{9} - 1\frac{1}{2}$

4. $7\frac{5}{6} - 2\frac{1}{4}$

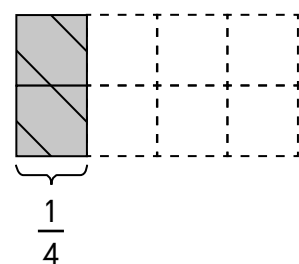
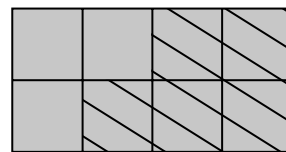
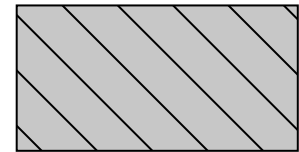
Subtract. Express each difference as a mixed number.

5. $3\frac{1}{4} - 1\frac{7}{8}$

$$= 3\frac{\square}{\square} - 1\frac{7}{8}$$

$$= \square\frac{\square}{\square} - \square\frac{\square}{\square}$$

$$= \square\frac{\square}{\square}$$

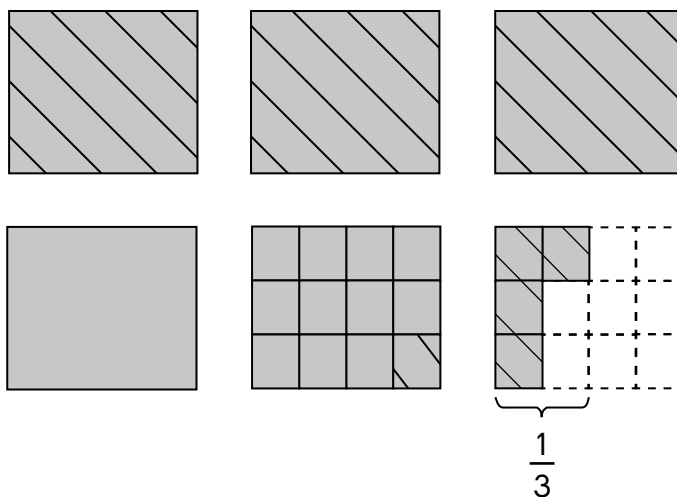


Subtract. Express each difference as a mixed number.

6. $5\frac{1}{3} - 3\frac{5}{12}$
 $= 5\frac{\square}{\square} - 3\frac{5}{12}$

$= \square\frac{\square}{\square} - \square\frac{\square}{\square}$

$= \square\frac{\square}{\square}$



7. $4\frac{1}{5} - 1\frac{1}{3}$

8. $6\frac{3}{8} - 3\frac{5}{6}$

9. $7\frac{1}{4} - 5\frac{11}{12}$

10. $8\frac{1}{3} - 4\frac{3}{4}$

Use benchmarks to estimate each difference.

Example

$$7\frac{2}{9} - 6\frac{5}{12}$$

$\frac{2}{9}$ is about 0.

So, $7\frac{2}{9}$ is about 7.

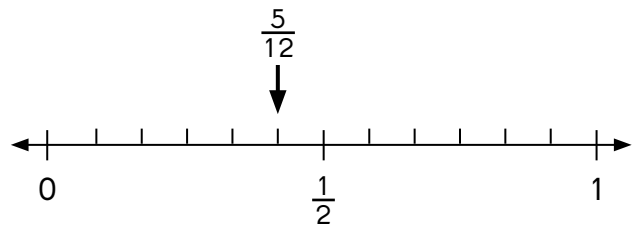
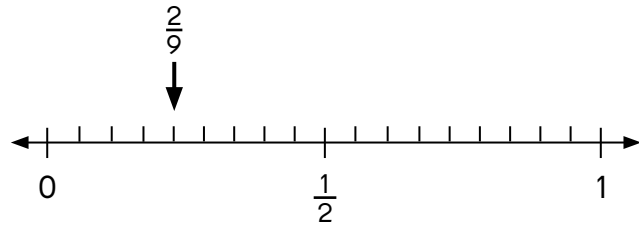
$\frac{5}{12}$ is about $\frac{1}{2}$.

so, $6\frac{5}{12}$ is about $6\frac{1}{2}$.

$$7\frac{2}{9} - 6\frac{5}{12}$$

$$\rightarrow 7 - 6\frac{1}{2} = \frac{1}{2}$$

$7\frac{2}{9} - 6\frac{5}{12}$ is about $\frac{1}{2}$.



11. $12\frac{2}{5} - 8\frac{7}{12}$

12. $20\frac{1}{8} - 5\frac{3}{9}$

Practice 7 Real-World Problems: Fractions and Mixed Numbers

Solve. Show your work.

1. Elena has 12 pieces of banana bread. She gives an equal amount of banana bread to 5 friends. How many pieces of banana bread does she give each friend?
2. A utility bill shows that a household used 2,001 gallons of water in a 5-day period. What was the average amount of water used by the household each day?
3. A ball of string is 50 yards long. A shipper uses 5 yards of string to tie packages. The remaining string is then cut into 7 equal pieces. What is the length of each of the 7 pieces of string?

Solve. Show your work.

- 4.** Steve picks 55 pounds of pears. He packs an equal amount of pears into 6 bags. He then has 4 pounds of pears left. What is the weight of pears in each bag?

- 5.** Jeremy puts an empty container under a leaking faucet. In the first hour, $\frac{3}{8}$ quart of water collects. In the second hour, $\frac{1}{6}$ quart of water collects. How much water collects in the container in the two hours?

Solve. Show your work.

6. Arnold buys $\frac{8}{9}$ pound of ground turkey. He uses $\frac{3}{4}$ pound of the ground turkey to make meatballs. How many pounds of ground turkey are left?

7. A snail is at the bottom of a well. In the first 10 minutes, the snail climbs $23\frac{7}{12}$ inches. In the next 10 minutes, it climbs $19\frac{5}{6}$ inches. How far is the snail from the bottom of the well after 20 minutes?

Solve. Show your work.

- 8.** Johnny is jogging along a track. He has already jogged $1\frac{2}{3}$ miles. He plans to jog a total of $3\frac{1}{4}$ miles. How many miles does he have left to jog?

Practice 8 Real-World Problems: Fractions and Mixed Numbers

Solve. Show your work.

1. Susanne and Barry each buy 4 equal-sized bagels. They divide the bagels equally among themselves and 3 other friends. How many bagels does each person get?

2. Maya has 5 sheets of paper. She cuts each sheet into 3 equal-sized rectangles. The rectangles are shared equally among 6 students. How many rectangles does each student get?

Solve. Show your work.

- 3.** Mrs. Quirk buys 1 quart of milk. Michael drinks $\frac{2}{7}$ quart of it.
Joel drinks $\frac{1}{3}$ quart of it. How many quarts of milk are left?

Name: _____

Date: _____

Solve. Show your work.

- 4.** An organic farmer buys a piece of land. She plants tomatoes on $\frac{5}{9}$ of the land and green beans on $\frac{1}{12}$ of the land. She plants potatoes on the remaining piece of land. What fraction of the land does she plant with potatoes?

Solve. Show your work.

- 5.** A package contains three types of bagels, plain, wheat and sesame. The weight of the plain bagels is $1\frac{2}{3}$ pounds. The weight of the wheat bagels is $2\frac{5}{6}$ pounds. The total weight of the three types of bagels is 5 pounds. What is the weight of the sesame bagels?

Name: _____

Date: _____

Solve. Show your work.

6. Reggie and Jay go for a walk every morning. Reggie walks $2\frac{1}{4}$ miles. Jay walks $1\frac{3}{8}$ miles less than Reggie. What is the total distance they walk every morning?

Solve. Show your work.

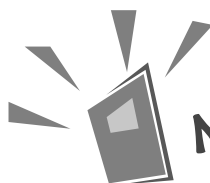
- 7.** Alicia uses $\frac{3}{4}$ gallon of paint to paint her room. Becca uses $\frac{4}{5}$ gallon more than Alicia to paint her room. How many gallons of paint do they use altogether?

Name: _____

Date: _____

Solve. Show your work.

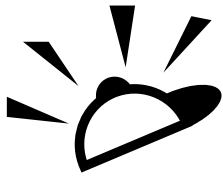
8. A monkey climbs $3\frac{3}{5}$ feet up a coconut tree that has a height of 10 feet. It rests for a while and continues to climb another $4\frac{2}{3}$ feet up the tree. How many more feet must the monkey climb to reach the top of the tree?



Math Journal

$$\frac{1}{8} + \frac{2}{3} = ?$$

Draw a model, and explain the steps you can use to add $\frac{2}{3}$ to $\frac{1}{8}$.



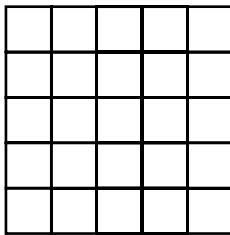
Put On Your Thinking Cap!

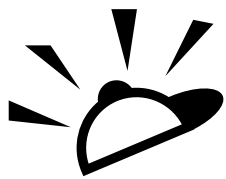


Challenging Practice

Solve. Show your work.

Tina, Troy and Nate had a total of 25 equal-sized square tiles to place over a square grid. Tina used $\frac{8}{25}$ of the square tiles. Troy used $\frac{1}{5}$ of the square tiles. Shade the square grid below to show how Tina and Troy could have placed the square tiles. What fraction of the square grid must Nate place the tiles on so that $\frac{1}{5}$ of the square grid is **not** covered?





Put On Your Thinking Cap!



Problem Solving

Solve. Use a model to help you.

Paul mixes cement with sand. He uses $3\frac{3}{4}$ kilograms of cement and $\frac{1}{2}$ kilogram more sand than cement. He needs 10 kilograms of the mixture. Does he have enough mixture? If yes, how much more does he have and if no, how much more does he need?