Addition with Unlike Denominators

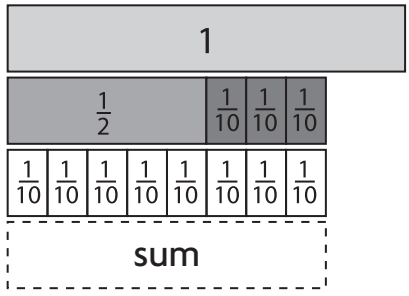
Karen is stringing a necklace with beads. She puts green beads on $\frac{1}{2}$ of the string and purple beads on $\frac{3}{10}$ of the string. How much of the string does Karen cover with beads?

You can use fraction strips to help you add fractions with unlike denominators. Trade fraction strips of fractions with unlike denominators for equivalent strips of fractions with like denominators.

Use fraction strips to find the sum. Write your answer in simplest form.

$\frac{1}{2} + \frac{3}{10}$

Step 1 Use a $\frac{1}{2}$ strip and three $\frac{1}{10}$ strips to model fractions with unlike denominators.



Step 2 Trade the $\frac{1}{2}$ strip for five $\frac{1}{10}$ strips.

$\frac{1}{2} + \frac{3}{10} = \frac{5}{10} + \frac{3}{10}$

Step 3 Add the fractions with like denominators.

$\frac{5}{10} + \frac{3}{10} = \frac{8}{10}$

Step 4 Write the answer in simplest form.

$\frac{8}{10} = \frac{4}{5}$

So, Karen covers $\frac{4}{5}$ of the string with beads.

Use fraction strips to find the sum. Write your answer in simplest form.

1. $\frac{3}{8} + \frac{3}{4}$

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

3. $\frac{5}{6} + \frac{7}{12}$

Name _____

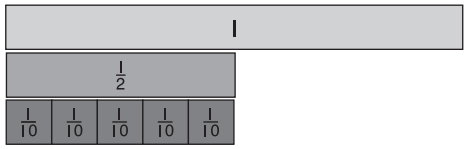
Subtraction with Unlike Denominators

You can use fraction strips to help you subtract fractions with unlike denominators. Trade fraction strips of fractions with unlike denominators for equivalent strips of fractions with like denominators.

Use fraction strips to find the difference. Write your answer in simplest form.

$\frac{1}{2} - \frac{1}{10}$

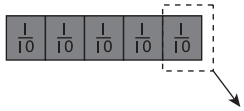
Step 1 Use a $\frac{1}{2}$ fraction strip to model the first fraction.



Step 2 Trade the $\frac{1}{2}$ strip for five $\frac{1}{10}$ strips.

$\frac{1}{2} - \frac{1}{10} = \frac{5}{10} - \frac{1}{10}$

Step 3 Subtract by taking away $\frac{1}{10}$.



$\frac{5}{10} - \frac{1}{10} = \frac{4}{10}$

So, $\frac{1}{2} - \frac{1}{10} = \frac{4}{10}$. Written in simplest form, $\frac{4}{10} = \frac{2}{5}$.

Use fraction strips to find the difference. Write your answer in simplest form.

1. $\frac{7}{8} - \frac{1}{2}$ _____

2. $\frac{2}{3} - \frac{1}{4}$ _____

3. $\frac{5}{6} - \frac{1}{3}$ _____

4. $\frac{1}{2} - \frac{1}{3}$ _____

5. $\frac{9}{10} - \frac{4}{5}$ _____

6. $\frac{2}{3} - \frac{5}{12}$ _____

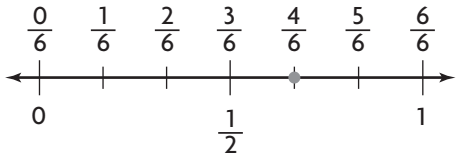
Name _____

Estimate Fraction Sums and Differences

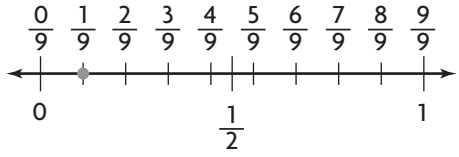
You can round fractions to 0, to $\frac{1}{2}$, or to 1 to estimate sums and differences.

Estimate the sum. $\frac{4}{6} + \frac{1}{9}$

Step 1 Find $\frac{4}{6}$ on the number line.
Is it closest to 0, $\frac{1}{2}$, or 1?
The fraction $\frac{4}{6}$ is closest to $\frac{1}{2}$.



Step 2 Find $\frac{1}{9}$ on the number line.
Is it closest to 0, $\frac{1}{2}$, or 1?
The fraction $\frac{1}{9}$ is closest to 0.

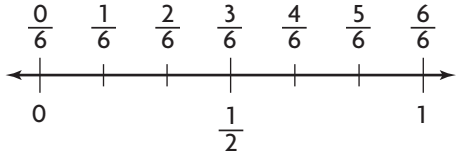


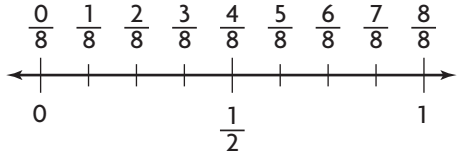
Step 3 To estimate the sum $\frac{4}{6} + \frac{1}{9}$, add the two rounded numbers.

$\frac{1}{2} + 0 = \frac{1}{2}$

So, $\frac{4}{6} + \frac{1}{9}$ is about $\frac{1}{2}$.

Estimate the sum or difference.





1. $\frac{4}{6} + \frac{1}{8}$ _____

2. $\frac{2}{6} + \frac{7}{8}$ _____

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

4. $\frac{4}{6} + \frac{3}{8}$ _____

5. $\frac{7}{8} - \frac{5}{6}$ _____

6. $\frac{1}{6} + \frac{7}{8}$ _____

Name _____

Common Denominators and Equivalent Fractions

You can find a common denominator of two fractions.

A **common denominator** of two fractions is a common multiple of their denominators.

Find a common denominator of $\frac{1}{6}$ and $\frac{7}{10}$. Rewrite the pair of fractions using a common denominator.

Step 1 Identify the denominators.
The denominators are 6 and 10.

Step 2 List the multiples of the greater denominator, 10.
Multiples of 10: 10, 20, 30, 40, 50, 60, ...

Step 3 Check if any of the multiples of the greater denominator are evenly divisible by the other denominator.

Both 30 and 60 are evenly divisible by 6.
Common denominators of $\frac{1}{6}$ and $\frac{7}{10}$ are 30 and 60.

Step 4 Rewrite the fractions with a denominator of 30.
Multiply the numerator and the denominator of each fraction by the same number so that the denominator results in 30.

$$\frac{1}{6} = \frac{1 \times 5}{6 \times 5} = \frac{5}{30} \quad \frac{7}{10} = \frac{7 \times 3}{10 \times 3} = \frac{21}{30}$$

Use a common denominator to write an equivalent fraction for each fraction.

1. $\frac{5}{12}, \frac{2}{9}$
common denominator: _____

_____

2. $\frac{3}{8}, \frac{5}{6}$
common denominator: _____

_____

3. $\frac{2}{9}, \frac{1}{6}$
common denominator: _____

_____

4. $\frac{3}{4}, \frac{9}{10}$
common denominator: _____

_____

Name _____

Add and Subtract Fractions

To add or subtract fractions with unlike denominators, you need to rename them as fractions with like denominators. You can do this by making a list of equivalent fractions.

Add. $\frac{5}{12} + \frac{1}{8}$

Step 1 Write equivalent fractions for $\frac{5}{12}$. $\frac{5}{12}, \mathbf{\frac{10}{24}}, \frac{15}{36}, \frac{20}{48}$

Step 2 Write equivalent fractions for $\frac{1}{8}$. $\frac{1}{8}, \frac{2}{16}, \mathbf{\frac{3}{24}}$

Step 3 Rewrite the problem using the equivalent fractions. Then add.

Stop when you find two fractions with the same denominator.

$\frac{5}{12} + \frac{1}{8}$ becomes $\frac{10}{24} + \frac{3}{24} = \frac{13}{24}$.

Subtract. $\frac{9}{10} - \frac{1}{2}$

Step 1 Write equivalent fractions for $\frac{9}{10}$. $\mathbf{\frac{9}{10}}, \frac{18}{20}, \frac{27}{30}, \frac{36}{40}$

Step 2 Write equivalent fractions for $\frac{1}{2}$. $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \mathbf{\frac{5}{10}}$

Step 3 Rewrite the problem using the equivalent fractions. Then subtract.

$\frac{9}{10} - \frac{1}{2}$ becomes $\frac{9}{10} - \frac{5}{10} = \frac{4}{10}$. Written in simplest form, $\frac{4}{10} = \frac{2}{5}$.

Find the sum or difference. Write your answer in simplest form.

1. $\frac{2}{9} + \frac{1}{3}$ _____

2. $\frac{1}{2} + \frac{2}{5}$ _____

3. $\frac{1}{4} + \frac{1}{6}$ _____

4. $\frac{1}{5} + \frac{3}{4}$ _____

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

6. $\frac{3}{4} - \frac{2}{3}$ _____

7. $\frac{9}{10} - \frac{4}{5}$ _____

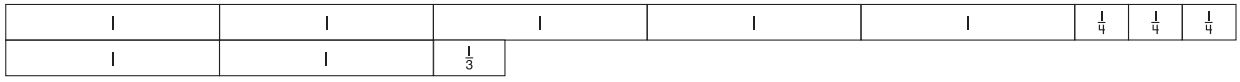
8. $\frac{8}{9} - \frac{5}{6}$ _____

Add and Subtract Mixed Numbers

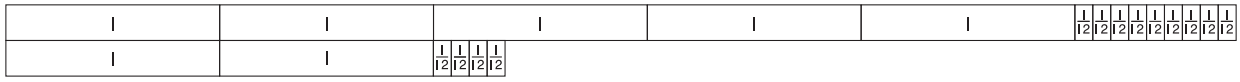
When you add or subtract mixed numbers, you may need to rename the fractions as fractions with a common denominator.

Find the sum. Write the answer in simplest form. $5\frac{3}{4} + 2\frac{1}{3}$

Step 1 Model $5\frac{3}{4}$ and $2\frac{1}{3}$.



Step 2 A common denominator for $\frac{3}{4}$ and $\frac{1}{3}$ is 12, so rename $5\frac{3}{4}$ as $5\frac{9}{12}$ and $2\frac{1}{3}$ as $2\frac{4}{12}$.



Step 3 Add the fractions.

$$\frac{9}{12} + \frac{4}{12} = \frac{13}{12}$$

Step 4 Add the whole numbers

$5 + 2 = 7$

Add the sums. Write the answer in simplest form.

$\frac{13}{12} + 7 = 7\frac{13}{12}$, or $8\frac{1}{12}$

So, $5\frac{3}{4} + 2\frac{1}{3} = 8\frac{1}{12}$.

Find the sum or difference. Write your answer in simplest form.

1. $2\frac{2}{9} + 4\frac{1}{6}$

2. $10\frac{5}{6} + 5\frac{3}{4}$

3. $11\frac{7}{8} - 9\frac{5}{6}$

4. $18\frac{3}{5} - 14\frac{1}{2}$

_____ _____ _____ _____

Subtraction with Renaming

You can use a common denominator to find the difference of two mixed numbers.

Estimate. $9\frac{1}{6} - 2\frac{3}{4}$

Step 1 Estimate by using 0, $\frac{1}{2}$, and 1 as benchmarks.

$9\frac{1}{6} - 2\frac{3}{4} \rightarrow 9 - 3 = 6$

So, the difference should be close to 6.

Step 2 Identify a common denominator.

$9\frac{1}{6} - 2\frac{3}{4}$ A common denominator of 6 and 4 is 12.

Step 3 Write equivalent fractions using the common denominator.

$9\frac{1}{6} = 9 + \frac{1 \times 2}{6 \times 2} = 9\frac{2}{12}$

$2\frac{3}{4} = 2 + \frac{3 \times 3}{4 \times 3} = 2\frac{9}{12}$

Step 4 Rename if needed. Then subtract.

Since $\frac{2}{12} < \frac{9}{12}$, rename $9\frac{2}{12}$ as $8\frac{14}{12}$.

Subtract. $8\frac{14}{12} - 2\frac{9}{12} = 6\frac{5}{12}$

So, $9\frac{1}{6} - 2\frac{3}{4} = 6\frac{5}{12}$.

Since the difference of $6\frac{5}{12}$ is close to 6, the answer is reasonable.

Estimate. Then find the difference and write it in simplest form.

1. Estimate: _____

$5\frac{1}{3} - 3\frac{5}{6}$ _____

2. Estimate: _____

$7\frac{1}{4} - 2\frac{5}{12}$ _____

3. Estimate: _____

$8\frac{2}{3} - 2\frac{7}{9}$ _____

4. Estimate: _____

$9\frac{2}{5} - 3\frac{3}{4}$ _____

5. Estimate: _____

$7\frac{3}{16} - 1\frac{5}{8}$ _____

6. Estimate: _____

$2\frac{4}{9} - 1\frac{11}{18}$ _____

Name _____

Algebra • Patterns with Fractions

You can find an unknown term in a sequence by finding a rule for the sequence.

Find the unknown term in the sequence.

$1\frac{2}{5}, 1\frac{7}{10}, 2, \_\_\_\_, 2\frac{3}{5}$

Step 1 Find equivalent fractions with a common denominator for all of the terms.

The denominators are 5 and 10. A common denominator is 10.

$1\frac{2}{5} = 1\frac{4}{10}$ and $2\frac{3}{5} = 2\frac{6}{10}$

Step 2 Write the terms in the sequence using the common denominator.

$1\frac{4}{10}, 1\frac{7}{10}, 2, \_\_\_\_, 2\frac{6}{10}$

Step 3 Write a rule that describes the pattern.

The sequence increases. To find the difference between terms, subtract at least two pairs of consecutive terms.

$1\frac{7}{10} - 1\frac{4}{10} = \frac{3}{10}$ $\quad 2 - 1\frac{7}{10} = \frac{3}{10}$

So, a rule is to add $\frac{3}{10}$.

Step 4 Use the rule to find the unknown term.

Add $\frac{3}{10}$ to the third term to find the unknown term.

$2 + \frac{3}{10} = 2\frac{3}{10}$

Write a rule for the sequence. Then, find the unknown term.

1. $2\frac{2}{3}, 3\frac{1}{2}, \_\_\_\_, 5\frac{1}{6}, 6$

Rule: _____

2. $4\frac{1}{2}, 3\frac{7}{8}, 3\frac{1}{4}, \_\_\_\_, 2$

Rule: _____

Name _____

Problem Solving • Practice Addition and Subtraction

Makayla walks for exercise. She wants to walk a total of 6 miles. On Monday, she walked $2\frac{5}{6}$ miles. On Tuesday, she walked $1\frac{1}{3}$ miles. How many more miles does Makayla need to walk to reach her goal?

Read the Problem	Solve the Problem
What do I need to find? I need to find the distance that Makayla needs to walk.	• Start with the equation. $6 = 2\frac{5}{6} + 1\frac{1}{3} + x$ Subtraction is the inverse operation of addition.
What information do I need to use? I need to use the distance she wants to walk and the distance she has already walked.	• Use subtraction to work backward and rewrite the equation. $6 - 2\frac{5}{6} - 1\frac{1}{3} = x$
How will I use the information? First I can write an equation $6 = 2\frac{5}{6} + 1\frac{1}{3} + x$. Then I can work backward to solve the problem.	• Subtract to find the value of x. $6 = 5\frac{6}{6}$ → $3\frac{1}{6} = 2\frac{7}{6}$ $-2\frac{5}{6} = -2\frac{5}{6}$ → $-1\frac{1}{3} = -1\frac{2}{6}$ $3\frac{1}{6}$ → $1\frac{5}{6}$ Estimate to show that your answer is reasonable. $3 + 1 + 2 = 6$ So, Makayla has to walk $1\frac{5}{6}$ more miles to reach her goal.

1. Ben has $5\frac{3}{4}$ cups of sugar. He uses $\frac{2}{3}$ cup of sugar to make cookies. Then he uses $2\frac{1}{2}$ cups of sugar to make fresh lemonade. How many cups of sugar does Ben have left?

2. Cheryl has 5 ft of ribbon. She cuts a $3\frac{3}{4}$-ft strip to make a hair bow. Then she cuts a $\frac{5}{6}$-ft strip for a border on a scrapbook page. Is there enough ribbon for Cheryl to cut two $\frac{1}{3}$-ft pieces to put on a picture frame? **Explain**.

Name _____

Algebra • Use Properties of Addition

You can use the properties of addition to help you add fractions with unlike denominators.

Use the Commutative Property and the Associative Property.

Add. $\left(3\frac{2}{5} + 1\frac{7}{15}\right) + 2\frac{1}{5}$

$\left(3\frac{2}{5} + 1\frac{7}{15}\right) + 2\frac{1}{5} = \left(1\frac{7}{15} + 3\frac{2}{5}\right) + 2\frac{1}{5}$ ← Use the Commutative Property to order fractions with like denominators.

$= 1\frac{7}{15} + \left(3\frac{2}{5} + 2\frac{1}{5}\right)$ ← Use the Associative Property to group fractions with like denominators.

$= 1\frac{7}{15} + 5\frac{3}{5}$ ← Use mental math to add the fractions with like denominators.

$= 1\frac{7}{15} + 5\frac{9}{15}$ ← Write equivalent fractions with like denominators. Then add.

$= 6\frac{16}{15} = 7\frac{1}{15}$ ← Rename and simplify.

Use the properties and mental math to solve. Write your answer in simplest form.

1. $\left(\frac{5}{7} + \frac{3}{14}\right) + \frac{4}{7}$ _____

2. $\left(\frac{2}{5} + \frac{5}{9}\right) + \frac{7}{9}$ _____

3. $\left(3\frac{7}{10} + 5\frac{3}{4}\right) + \frac{3}{4}$ _____

4. $2\frac{5}{12} + \left(4\frac{2}{3} + 3\frac{7}{12}\right)$ _____

5. $3\frac{3}{8} + \left(2\frac{1}{5} + 5\frac{1}{8}\right)$ _____

6. $\left(4\frac{3}{7} + 2\frac{1}{6}\right) + 3\frac{5}{7}$ _____