Use What You Know

Now that you can add and subtract fractions with different denominators, you can use this skill to solve word problems. Take a look at this problem.

Aleena has a 1-gallon watering can that is full of water. She uses \( \frac{3}{8} \) gallon to water her roses and \( \frac{1}{3} \) gallon to water her geraniums. How much water did Aleena use to water both the roses and geraniums?

- **a.** Does Aleena use more than \( \frac{1}{2} \) gallon or less than \( \frac{1}{2} \) gallon of water? ____________

- **b.** How do you know? ___________________________________________

- **c.** Estimate how much water Aleena used. ________________________

- **d.** Write an equation with equivalent fractions to find the amount of water Aleena used. ____________________________________________

- **e.** Is this answer reasonable based on your estimate? Explain. ____________________________
Find Out More

The number line below shows the location of benchmark fractions between 0 and 2. You can use these fractions to estimate sums and differences.

\[
\begin{array}{cccccccc}
& 0 & \frac{1}{4} & \frac{1}{2} & \frac{3}{4} & 1 & 1\frac{1}{4} & 1\frac{1}{2} & 1\frac{3}{4} & 2 \\
\end{array}
\]

There are different ways to estimate the sums or differences of fractions. The examples below show two ways to think about fractions to find estimates for the amount of water Aleena used to water her flowers.

\[
\frac{3}{8} + \frac{1}{3} = ?
\]

**Student A**

\[
\frac{3}{8} \text{ and } \frac{1}{3} \text{ are both less than } \frac{1}{2}, \text{ or } \frac{4}{8}.
\]

So the sum must be less than 1.

**Student B**

\[
\frac{3}{8} \text{ is a little greater than } \frac{1}{4}. \frac{1}{3} \text{ is a little greater than } \frac{1}{4}.
\]

I know \( \frac{1}{4} + \frac{1}{4} = \frac{2}{4}, \text{ or } \frac{1}{2}. \)

So, I estimate the sum is greater than \( \frac{1}{2}. \)

**Reflect**

1. Both estimates above model correct thinking. Which estimate makes more sense to you? Why?
Read the problem below. Then explore different ways to estimate and solve problems with fractions.

Frankie purchases a $3\ \frac{1}{2}$-pound bag of chicken. He uses $1\ \frac{1}{3}$ pounds of chicken for fajitas. How many pounds of chicken are left?

**Picture It** You can picture the problem using a fraction strip.

The fraction strip below represents $3\ \frac{1}{2}$ pounds of chicken. It is separated into sections representing the $1\ \frac{1}{3}$ pounds used for fajitas and the unused amount.

The model shows the difference $3\ \frac{1}{2} - 1\ \frac{1}{3}$.

**Model It** You can model the problem with a number line.

Since $2 \times 3 = 6$, the fractions in the problem, $3\ \frac{1}{2}$ and $1\ \frac{1}{3}$, can be rewritten using a common denominator of 6. $3\ \frac{1}{2} = \frac{3}{2} \cdot \frac{3}{3} = \frac{9}{6}$ and $1\ \frac{1}{3} = \frac{1}{3} \cdot \frac{2}{2} = \frac{2}{6}$.

The number line below is divided into sixths. It shows starting with a total of $3\ \frac{1}{2}$ pounds, with two jumps to the left representing the $1\ \frac{1}{3}$ pounds of chicken used.

You can rewrite the difference $3\ \frac{1}{2} - 1\ \frac{1}{3}$ as $\frac{9}{6} - \frac{2}{6}$.
Connect It Now you will estimate and then solve the problem from the previous page using benchmark fractions and an equation.

2 Identify the closest half on either side of $1 \frac{1}{3}$.
   $1 \frac{1}{3}$ is greater than _________ and less than _________.

3 Why are halves a good choice for benchmark fractions for $1 \frac{1}{3}$?

4 The difference $3 \frac{1}{2} - 1 \frac{1}{3}$ must be between _________ and _________.
   Estimate $3 \frac{1}{2} - 1 \frac{1}{3}$ and explain your estimate.

5 Find the actual difference. ________________________________
   There are _________ pounds of chicken remaining.

6 Is this a reasonable answer based on your estimate? Explain. ________________________________

7 Explain how you can check if a fraction sum or difference is reasonable.

Try It Use what you just learned about estimating with benchmark fractions to solve this problem. Show your work on a separate sheet of paper.

8 Tim’s bean sprout grew $3 \frac{3}{8}$ inches. Teegan’s bean sprout grew $2 \frac{3}{4}$ inches. How many more inches did Tim’s bean sprout grow than Teegan’s? First, estimate the difference and explain your reasoning. Then find the actual difference.
Study the example below. Then solve problems 9–11.

Example

The blue field of stars on a flag has an area of $1 \frac{3}{5}$ square yards. The red stripes have a combined area of $2 \frac{3}{10}$ square yards. What is the difference between the area of the blue field of stars and the area of the red stripes?

Look at how you could show your work using fraction strips.

\[
\begin{align*}
\text{red} & \quad \begin{array}{c}
\frame{1} & \frame{1} & \frame{3} \frac{10}{10} \\
\end{array} \\
\text{blue} & \quad \begin{array}{c}
\frame{1} & \frame{6} \frac{10}{10} \\
\end{array}
\end{align*}
\]

\[
\text{difference} = \frac{7}{10}
\]

Solution $\frac{7}{10}$ square yard

9 Parker mixes $3 \frac{1}{2}$ ounces of blue paint with $1 \frac{2}{5}$ ounces of yellow paint to create green paint to use for the leaves of a tree. How many ounces of green paint did Parker create?

Estimate, and then compute. Explain how you know your result is reasonable.

Show your work.

Solution

\[
\begin{align*}
\text{Parker mixes} & \quad 3 \frac{1}{2} \text{ ounces of blue paint with} \quad 1 \frac{2}{5} \text{ ounces of yellow paint to create green paint to use for the leaves of a tree. How many ounces of green paint did Parker create?}
\end{align*}
\]

Will there be a little more than $4 \frac{1}{2}$ ounces or a little less than $4 \frac{1}{2}$ ounces of green paint?

Pair/Share

Was your estimate more than or less than the actual answer? By how much?
10 Jose’s football weighs \( \frac{7}{8} \) pound. His football helmet weighs \( 5 \frac{1}{6} \) pounds. Estimate how much more the helmet weighs than the football. Explain your estimate.

**Solution**

11 Which is a reasonable estimate for the difference \( 5 \frac{1}{2} - 3 \frac{5}{9} \)? Circle the letter of the correct answer.

- A between \( \frac{1}{2} \) and 1
- B between 1 and \( 1 \frac{1}{2} \)
- C between \( 1 \frac{1}{2} \) and 2
- D between 2 and \( 2 \frac{1}{2} \)

Elise chose D as the correct answer. How did she get that answer?
Solve the problems.

1. William compares monthly rainfall amounts for the summer months using the table below.

<table>
<thead>
<tr>
<th>Month</th>
<th>Monthly Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>$3\frac{3}{10}$ inches</td>
</tr>
<tr>
<td>July</td>
<td>$3\frac{3}{4}$ inches</td>
</tr>
<tr>
<td>August</td>
<td>$3\frac{1}{2}$ inches</td>
</tr>
</tbody>
</table>

About how much more rain fell in July than in June?

A. $\frac{1}{4}$ inch  
B. $\frac{1}{2}$ inch  
C. 1 inch  
D. $1\frac{1}{2}$ inches

2. Several expressions are shown. Decide if the value of each expression is less than $1\frac{1}{2}$, between $1\frac{1}{2}$ and 2, or greater than 2. Write each expression in the correct category in the chart.

\[
\begin{align*}
2\frac{1}{2} - 1\frac{1}{8} & \quad 1\frac{5}{11} + \frac{3}{4} & \quad 3\frac{4}{5} - 1\frac{1}{3} & \quad 3 \frac{3}{8} + \frac{9}{10}
\end{align*}
\]

<table>
<thead>
<tr>
<th>Less than $1\frac{1}{2}$</th>
<th>Between $1\frac{1}{2}$ and 2</th>
<th>Greater than 2</th>
</tr>
</thead>
</table>
The table below shows the thickness of coins.

<table>
<thead>
<tr>
<th>Coin</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>quarter</td>
<td>1(\frac{3}{4}) millimeters</td>
</tr>
<tr>
<td>dime</td>
<td>1(\frac{7}{20}) millimeters</td>
</tr>
<tr>
<td>nickel</td>
<td>1(\frac{19}{20}) millimeters</td>
</tr>
<tr>
<td>penny</td>
<td>1(\frac{1}{2}) millimeters</td>
</tr>
</tbody>
</table>

Hailey stacks a dime on top of a penny. She estimates the thickness of the two coins to be less than 3 millimeters.

Write a symbol (\(<\), \(>\), or \(=\)) in the box to make the statement true. Then use the statement to tell whether Hailey’s estimate is correct.

\[ 1\frac{1}{2} + 1\frac{7}{20} \quad \underline{\quad} \quad 1\frac{1}{2} + 1\frac{1}{2} \]

Is Hailey’s estimate correct? 

Jimmy says 3\(\frac{4}{9}\) \(-\) 2\(\frac{5}{6}\) is 1\(\frac{1}{3}\).

**Part A** Without finding the actual difference, explain why Jimmy’s difference is or is not reasonable.

**Part B** Find the actual difference.

Show your work.

Solution