

Name \_\_\_\_\_

## Add and Subtract Parts of a Whole

Justin has  $\frac{3}{8}$  pound of cheddar cheese and  $\frac{2}{8}$  pound of brick cheese.  
How much cheese does he have in all?

**Step 1** Use fraction strips to model the problem. Use three  $\frac{1}{8}$ -strips to represent  $\frac{3}{8}$  pound of cheddar cheese.

**Step 2** Join two more  $\frac{1}{8}$ -strips to represent the amount of brick cheese.

**Step 3** Count the number of  $\frac{1}{8}$ -strips. There are five  $\frac{1}{8}$ -strips. Write the amount as a fraction. Justin has  $\frac{5}{8}$  pound of cheese.

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

**Step 4** Use the model to write an equation.

Suppose Justin eats  $\frac{1}{8}$  pound of cheese. How much cheese is left?

**Step 1** Use five  $\frac{1}{8}$ -strips to represent the  $\frac{5}{8}$  pound of cheese.

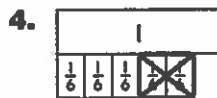
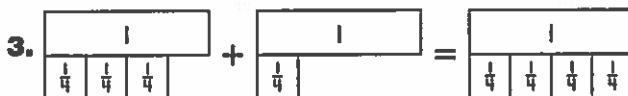
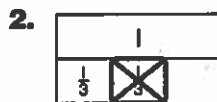
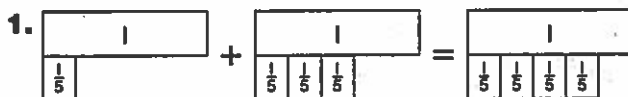
**Step 2** Remove one  $\frac{1}{8}$ -strip to show the amount eaten.

**Step 3** Count the number of  $\frac{1}{8}$ -strips left. There are four  $\frac{1}{8}$  fraction strips. There is  $\frac{4}{8}$  pound left.

$$\frac{5}{8} - \frac{1}{8} = \frac{4}{8}$$

**Step 4** Write an equation for the model.

Use the model to write an equation.





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## Write Fractions as Sums

A **unit fraction** tells the part of the whole that 1 piece represents.

A unit fraction always has a numerator of 1.

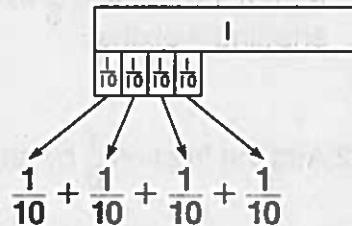
Bryan has  $\frac{4}{10}$  pound of clay for making clay figures. He wants to use  $\frac{1}{10}$  pound of clay for each figure. How many clay figures can he make?

Use fraction strips to write  $\frac{4}{10}$  as a sum of unit fractions.

**Step 1** Represent  $\frac{4}{10}$  with fraction strips.

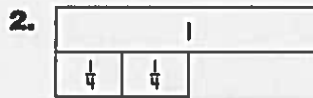
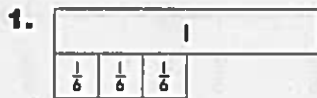
**Step 2** Each  $\frac{1}{10}$  is a unit fraction. Write a  $\frac{1}{10}$  addend for each  $\frac{1}{10}$ -strip you used to show  $\frac{4}{10}$ .

**Step 3** Count the number of addends. The number of addends represents the number of clay figures Bryan can make.



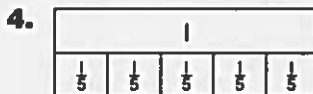
So, Bryan can make 4 clay figures.

Write the fraction as the sum of unit fractions.



$$\frac{3}{6} = \underline{\quad} + \underline{\quad} + \underline{\quad}$$

$$\frac{2}{4} = \underline{\quad} + \underline{\quad}$$



$$\frac{4}{8} = \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad}$$

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

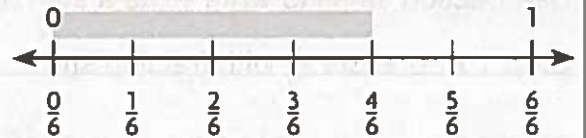
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## Add Fractions Using Models

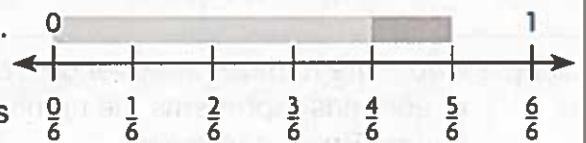
Fractions with like denominators have the same denominator. You can add fractions with like denominators using a number line.

**Model**  $\frac{4}{6} + \frac{1}{6}$ .

**Step 1** Draw a number line labeled with sixths. Model the fraction  $\frac{4}{6}$  by starting at 0 and shading 4 sixths.



**Step 2** Add the fraction  $\frac{1}{6}$  by shading 1 more sixth.

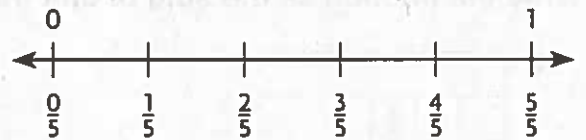


**Step 3** How many sixths are there in all? 5 sixths  
Write the number of sixths as a fraction.

$$5 \text{ sixths} = \frac{5}{6} \quad \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$$

1. Model  $\frac{1}{5} + \frac{4}{5}$ .

$$\frac{1}{5} + \frac{4}{5} = \underline{\hspace{2cm}}$$



Find the sum. Use a model to help.

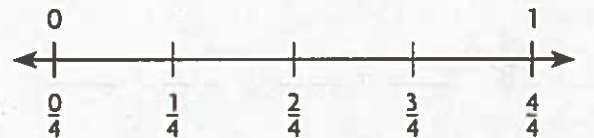
2.  $\frac{2}{10} + \frac{4}{10}$

\_\_\_\_\_



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

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# Subtract Fractions Using Models

You can subtract fractions with like denominators using fraction strips.

**Model**  $\frac{5}{8} - \frac{2}{8}$ .

**Step 1** Shade the eighths you start with.  
Shade 5 eighths.



**Step 2** Subtract  $\frac{2}{8}$ .

**Think:** How many eighths are taken away?  
Cross out 2 of the shaded eighths.

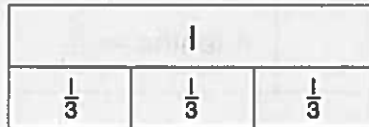


**Step 3** Count the shaded eighths that remain.  
There are 3 eighths remaining.

**Step 4** Write the number of eighths that remain as a fraction.

3 eighths =  $\frac{3}{8}$        $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$

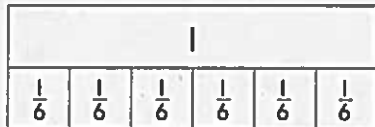
1. Model  $\frac{3}{3} - \frac{2}{3}$ .



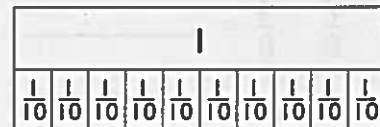
$\frac{3}{3} - \frac{2}{3} =$  \_\_\_\_\_

**Subtract. Use fraction strips to help.**

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



3.  $\frac{6}{10} - \frac{3}{10}$



$\frac{5}{6} - \frac{1}{6} =$  \_\_\_\_\_

$\frac{6}{10} - \frac{3}{10} =$  \_\_\_\_\_

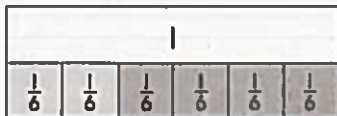
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## Add and Subtract Fractions

You can find and record the sums and the differences of fractions.

**Add.**  $\frac{2}{6} + \frac{4}{6}$

**Step 1** Model it.



**Step 2** Think: How many sixths are there in all?

There are 6 sixths.

$$6 \text{ sixths} = \frac{6}{6}$$

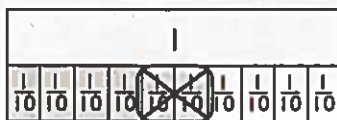
**Step 3** Record it.

Write the sum as an addition equation.

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

**Subtract.**  $\frac{6}{10} - \frac{2}{10}$

**Step 1** Model it.



**Step 2** Think: There are 6 tenths. I take away 2 tenths. How many tenths are left?

There are 4 tenths left.

$$4 \text{ tenths} = \frac{4}{10}$$

**Step 3** Record it.

Write the difference as a subtraction equation.

$$\frac{6}{10} - \frac{2}{10} = \frac{4}{10}$$

**Find the sum or difference.**

1. 7 eighth-size parts – 4 eighth-size parts = \_\_\_\_\_

$$\frac{7}{8} - \frac{4}{8} = \underline{\hspace{2cm}}$$

2.  $\frac{11}{12} - \frac{4}{12} = \underline{\hspace{2cm}}$

3.  $\frac{2}{10} + \frac{2}{10} = \underline{\hspace{2cm}}$

4.  $\frac{6}{8} - \frac{4}{8} = \underline{\hspace{2cm}}$

5.  $\frac{2}{4} + \frac{2}{4} = \underline{\hspace{2cm}}$

6.  $\frac{4}{5} - \frac{3}{5} = \underline{\hspace{2cm}}$

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

## Rename Fractions and Mixed Numbers

A **mixed number** is made up of a whole number and a fraction. You can use multiplication and addition to rename a mixed number as a fraction greater than 1.

**Rename  $2\frac{5}{6}$  as a fraction.**

First, multiply the denominator, or the number of parts in the whole, by the whole number.

$$6 \times 2 = 12$$

Then, add the numerator to your product.

$$12 + 5 = 17$$

$$\text{So, } 2\frac{5}{6} = \frac{17}{6}.$$

$$2\frac{5}{6} = \frac{17}{6}$$

total number of parts  
number of parts in the whole

You can use division to write a fraction greater than 1 as a mixed number.

**Rename  $\frac{16}{3}$  as a mixed number.**

To rename  $\frac{16}{3}$  as a mixed number, divide the numerator by the denominator.

Use the quotient and remainder to write a mixed number.

$$\text{So, } \frac{16}{3} = 5\frac{1}{3}.$$

$$\begin{array}{r} 5 \\ 3 \overline{)16} \\ \underline{-15} \\ 1 \end{array}$$

**Write the mixed number as a fraction.**

1.  $3\frac{2}{3} =$  \_\_\_\_\_

2.  $4\frac{3}{5} =$  \_\_\_\_\_

3.  $4\frac{3}{8} =$  \_\_\_\_\_

4.  $2\frac{1}{6} =$  \_\_\_\_\_

**Write the fraction as a mixed number.**

5.  $\frac{32}{5} =$  \_\_\_\_\_

6.  $\frac{19}{3} =$  \_\_\_\_\_

7.  $\frac{15}{4} =$  \_\_\_\_\_

8.  $\frac{51}{10} =$  \_\_\_\_\_

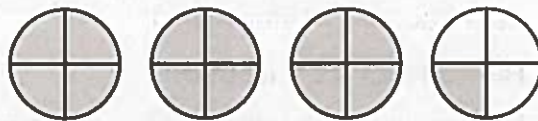
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## Add and Subtract Mixed Numbers

Find the sum.  $3\frac{1}{4} + 2\frac{1}{4}$

Add the whole number and fraction parts.

- Add the whole numbers:  $3 + 2 = 5$
- Add the fractions:  $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$



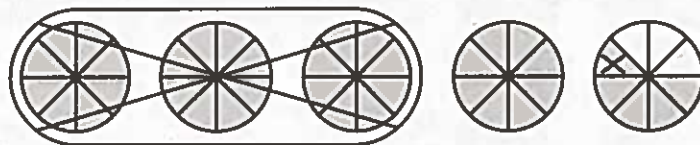
Write the sum as a mixed number, so the fractional part is less than 1.  $3\frac{1}{4} + 2\frac{1}{4} = 5\frac{2}{4}$



Find the difference.  $4\frac{5}{8} - 3\frac{1}{8}$

Subtract the fraction and the whole number parts.

- Subtract the fractions:  $\frac{5}{8} - \frac{1}{8} = \frac{4}{8}$
- Subtract the whole numbers:  $4 - 3 = 1$



$$4\frac{5}{8} - 3\frac{1}{8} = 1\frac{4}{8}$$

Find the sum or difference.

$$\begin{array}{r} 1. \quad 3\frac{4}{5} \\ + 4\frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 7\frac{2}{3} \\ - 3\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 4\frac{7}{12} \\ + 6\frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 12\frac{3}{4} \\ - 6\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 2\frac{3}{8} \\ + 8\frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 11\frac{9}{10} \\ - 3\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 7\frac{3}{5} \\ + 4\frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 8\frac{3}{6} \\ - 3\frac{1}{6} \\ \hline \end{array}$$



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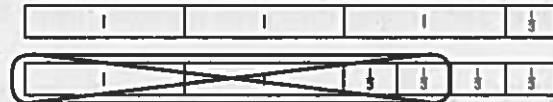
## Subtraction with Renaming

Fraction strips can help you subtract mixed numbers or subtract a mixed number from a whole number.

Find the difference.  $3\frac{1}{3} - 2\frac{2}{3}$

**Step 1** Model the number you are subtracting from,  $3\frac{1}{3}$ .

**Step 2** Because you cannot subtract  $\frac{2}{3}$  from  $\frac{1}{3}$  without renaming, change one of the 1 strips to three  $\frac{1}{3}$  strips. Then subtract by crossing out two wholes and two  $\frac{1}{3}$  strips.

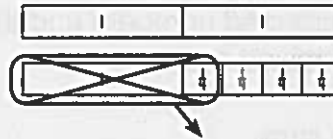


$$\text{So, } 3\frac{1}{3} - 2\frac{2}{3} = \frac{2}{3}.$$

Find the difference.  $2 - 1\frac{1}{4}$

**Step 1** Model the number you are subtracting from, 2.

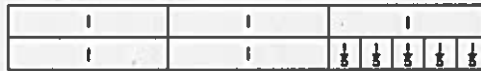
**Step 2** Because you cannot subtract  $\frac{1}{4}$  from 1 without renaming, change one of the 1 strips to four  $\frac{1}{4}$  strips. Then subtract by crossing out one whole and one  $\frac{1}{4}$  strip.



$$\text{So, } 2 - 1\frac{1}{4} = \frac{3}{4}.$$

Find the difference.

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



2.  $2\frac{1}{4} - 1\frac{3}{4} =$  \_\_\_\_\_



3. 
$$\begin{array}{r} 3\frac{3}{5} \\ - 2\frac{4}{5} \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 3\frac{1}{12} \\ - 2\frac{11}{12} \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 4\frac{5}{8} \\ - 2\frac{7}{8} \\ \hline \end{array}$$

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## Fractions and Properties of Addition

Properties of addition can help you group and order addends so you can use mental math to find sums.

The **Commutative Property of Addition** states that when the order of two addends is changed, the sum is the same.

$$6 + 3 = 3 + 6$$

The **Associative Property of Addition** states that when the grouping of addends is changed, the sum is the same.

$$(3 + 6) + 4 = 3 + (6 + 4)$$

Use the properties and mental math to add  $10\frac{3}{8} + 4\frac{7}{8} + 6\frac{5}{8}$ .

**Step 1** Look for fractions that combine to make 1.  $10\left(\frac{3}{8}\right) + 4\frac{7}{8} + 6\left(\frac{5}{8}\right)$

**Step 2** Use the Commutative Property to order the addends so that the fractions with a sum of 1 are together.

$$10\frac{3}{8} + 4\frac{7}{8} + 6\frac{5}{8} = 10\frac{3}{8} + 6\frac{5}{8} + 4\frac{7}{8}$$

**Step 3** Use the Associative Property to group the addends that you can add mentally.

$$= \left(10\frac{3}{8} + 6\frac{5}{8}\right) + 4\frac{7}{8}$$

**Step 4** Add the grouped numbers and then add the other mixed number.

$$= (17) + 4\frac{7}{8}$$

**Step 5** Write the sum.

$$= 21\frac{7}{8}$$

Use the properties and mental math to find the sum.

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

2.  $\left(5\frac{7}{10} + 1\frac{4}{10}\right) + 6\frac{3}{10}$

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

4.  $\left(2\frac{5}{12} + 3\frac{11}{12}\right) + 1\frac{7}{12}$

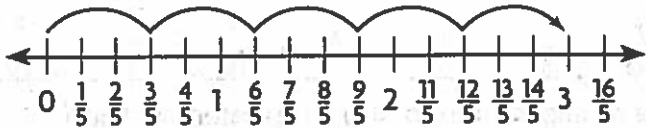
5.  $4\frac{7}{8} + \left(6\frac{3}{8} + \frac{1}{8}\right)$

6.  $9\frac{2}{6} + \left(4\frac{1}{6} + 7\frac{4}{6}\right)$

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## Problem Solving • Multistep Fraction Problems

Jeff runs  $\frac{3}{5}$  mile each day. He wants to know how many days he has to run before he has run a whole number of miles.

Read the Problem	Solve the Problem
<p><b>What do I need to find?</b></p> <p>I need to find <u>how many days Jeff needs to run <math>\frac{3}{5}</math> mile</u> until he has run a whole number of miles.</p>	<p><b>Describe how to act it out.</b> Use a number line.</p> 
<p><b>What information do I need to use?</b></p> <p>Jeff runs <u><math>\frac{3}{5}</math></u> mile a day. He wants the distance run to be a <u>whole number</u>.</p>	<p>Day 1: <math>\frac{3}{5}</math> mile</p> <p>Day 2: <math>\frac{6}{5}</math> mile <math>\frac{3}{5} + \frac{3}{5} = \frac{6}{5}</math> 1 whole mile and <math>\frac{1}{5}</math> mile more</p> <p>Day 3: <math>\frac{9}{5}</math> mile <math>\frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{9}{5}</math> 1 whole mile and <math>\frac{4}{5}</math> mile more</p>
<p><b>How will I use the information?</b></p> <p>I can use a number line and <u>patterns</u> to <u>act out</u> the problem.</p>	<p>Day 4: <math>\frac{12}{5}</math> mile <math>\frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{12}{5}</math> 2 whole miles and <math>\frac{2}{5}</math> mile more</p> <p>Day 5: <math>\frac{15}{5}</math> mile <math>\frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{15}{5}</math> 3 whole miles</p> <p>So, Jeff will run a total of <u>3</u> miles in <u>5</u> days.</p>

1. Lena runs  $\frac{2}{3}$  mile each day. She wants to know how many days she has to run before she has run a whole number of miles.

2. Mack is repackaging  $\frac{6}{8}$ -pound bags of birdseed into 1-pound bags of birdseed. What is the least number of  $\frac{6}{8}$ -pound bags of birdseed he needs in order to fill 1-pound bags without leftovers?

