

Add and Subtract Fractions



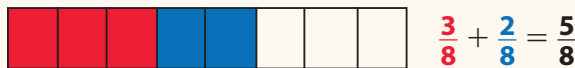
Dear Family,

This week your child is learning how to add and subtract fractions with like denominators.

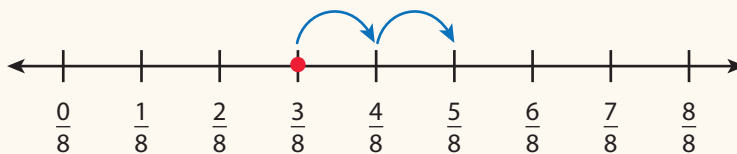
Fractions with the same number below the line have like denominators.

like denominators: $\frac{1}{4}$ and $\frac{3}{4}$ unlike denominators: $\frac{1}{2}$ and $\frac{3}{4}$

To find the sum of fractions with like denominators, understand that you are adding like units. Just as 3 apples plus 2 apples is 5 apples, 3 eighths plus 2 eighths is 5 eighths. Similarly, when you take away, or subtract, 2 eighths from 5 eighths, you have 3 eighths left.



You can also use a number line to understand adding and subtracting like fractions.



Remember that the denominator names units the same way that “apples” names units.

So, when you add two fractions with like denominators, the sum of the numerators tells how many of those units you have.

When you subtract two fractions with like denominators, the difference of the numerators tells how many of those units you have.

Invite your child to share what he or she knows about adding and subtracting fractions by doing the following activity together.

ACTIVITY ADDING AND SUBTRACTING FRACTIONS

Do this activity with your child to add and subtract fractions.

Materials bowl, measuring cup, ingredients shown in the recipe

Follow the recipe below to make a creamy cracker spread or veggie dip.

Creamy Spread

Ingredients

$\frac{5}{8}$ cup cream cheese

$\frac{2}{8}$ cup sour cream

herbs

crackers or veggies

Directions

Mix the cream cheese, sour cream, and herbs together in a medium bowl. Serve immediately with crackers or sliced fresh veggies. Enjoy!



After you have made the spread, ask your child questions such as these:

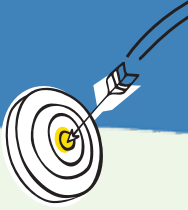
1. What fraction of a cup is the total amount of spread?
2. If you spread $\frac{1}{8}$ of a cup on crackers or veggies, how much spread is left?

Make up a simple recipe using fractions for someone else in the family to make!



Answers: 1. $\frac{7}{8}$ cup; 2. $\frac{6}{8}$ cup

Explore Adding and Subtracting Fractions



Previously, you learned that adding fractions is similar to adding whole numbers. Use what you know to try to solve the problem below.

Lynn, Paco, and Todd share a pack of 12 cards. Lynn gets 4 cards, Paco gets 3 cards, and Todd gets the rest of the cards. What fraction of the pack does Todd get?



Learning Targets



- Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model.
- Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

SMP 1, 2, 3, 4, 5, 6, 7

TRY IT



Math Toolkit

- counters
- fraction circles
- fraction tiles
- fraction bars
- number lines 
- fraction models 



DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner: At first, I thought . . .

CONNECT IT

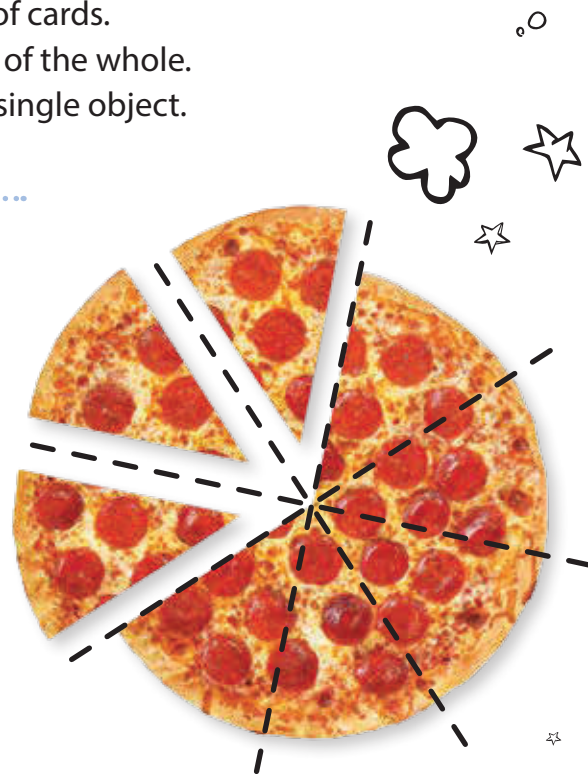
1 LOOK BACK

Explain how you can find the fraction of the pack that Todd gets.

2 LOOK AHEAD

In the problem on the previous page, the whole is the pack of cards. Since there are 12 cards in the pack, each card represents $\frac{1}{12}$ of the whole. Look at the whole shown here. The whole is the pizza. It is a single object.

- a. How many equal parts are shown in the pizza?
- b. What fraction can you use to describe each piece of pizza?
- c. What fraction can you use to describe the whole?
- d. What fraction can you use to describe the 3 pieces being taken away?



3 REFLECT

How does knowing about equal parts help you add and subtract fractions?

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Prepare for Adding and Subtracting Fractions

- 1 Think about what you know about fractions. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

What Is It?	What I Know About It	
 fraction		
Examples	Examples	Examples

- 2 Does the model below show eighths? Why or why not?

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
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3 Solve the problem. Show your work.

Maria, Jon, and Kara share a set of 10 animal stickers. Maria gets 2 stickers, Jon gets 4 stickers, and Kara gets the rest of the stickers. What fraction of the stickers does Kara get?



Solution

4 Check your answer. Show your work.

Develop Adding Fractions



Read and try to solve the problem below.

Josie and Margo are painting a fence green. Josie starts at one end and paints $\frac{3}{10}$ of the fence. Margo starts at the other end and paints $\frac{4}{10}$ of it. What fraction of the fence do they paint altogether?

TRY IT



Math Toolkit

- fraction circles
- fraction tiles
- fraction bars
- number lines 
- index cards
- fraction models 



DISCUSS IT

Ask your partner: How did you get started?

Tell your partner:
A model I used was ...
It helped me ...

Explore different ways to understand adding fractions.

Josie and Margo are painting a fence green. Josie starts at one end and paints $\frac{3}{10}$ of the fence. Margo starts at the other end and paints $\frac{4}{10}$ of it. What fraction of the fence do they paint altogether?

PICTURE IT

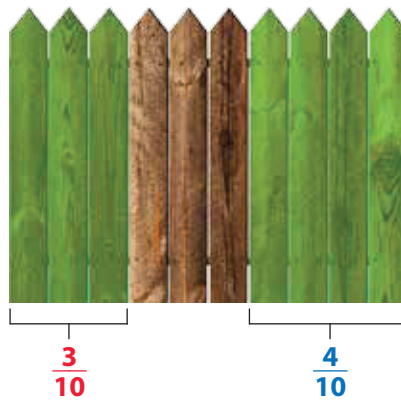
You can use a picture to help understand the problem.

Think what the fence might look like if it has 10 equal-sized parts.



Each part is $\frac{1}{10}$ of the whole.

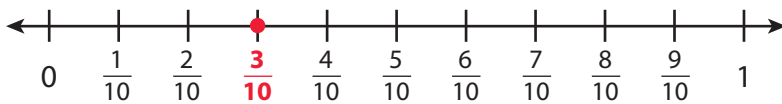
The girls paint 3 tenths and 4 tenths of the fence.



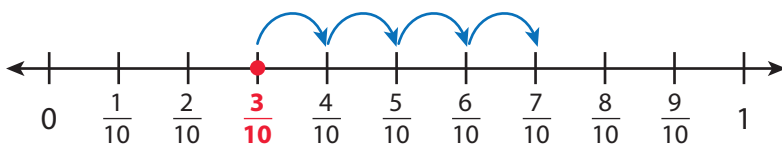
MODEL IT

You can also use a number line to help understand the problem.

The number line below is divided into tenths with a point at $\frac{3}{10}$.



Start at $\frac{3}{10}$ and count 4 tenths to the right to **add** $\frac{4}{10}$.



CONNECT IT

Now you will use the problem from the previous page to help you understand how to add any two fractions that have the same denominator.



1 Look at **Picture It**. How do you know that each section of fence is $\frac{1}{10}$ of the whole fence?

2 What do the numerators, 3 and 4, tell you?

3 How many tenths of the fence do Josie and Margo paint altogether?

4 Complete the equations to show what fraction of the fence Josie and Margo painted altogether.

Use words: **3 tenths** + **4 tenths** = tenths

Use fractions: $\frac{3}{10}$ + $\frac{4}{10}$ = $\frac{\square}{10}$

5 What would be the sum if the fractions were $\frac{3}{10}$ and $\frac{5}{10}$?

6 Explain how you add fractions that have the same denominator.

7 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for adding fractions? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 8 Lita and Otis help their mom clean the house. Lita cleans $\frac{1}{3}$ of the house. Otis cleans $\frac{1}{3}$ of the house. What fraction of the house do Lita and Otis clean altogether? Show your work.

Solution

- 9 Mark and Imani use string for a project. Mark's string is $\frac{1}{5}$ of a meter long. Imani's string is $\frac{3}{5}$ of a meter long. How long are the two strings combined? Show your work.

..... of a meter

- 10 Paola makes a fruit smoothie. She uses $\frac{2}{8}$ of a pound of strawberries and $\frac{4}{8}$ of a pound of blueberries. How many pounds of fruit does she use? Show your work.

Solution



Practice Adding Fractions

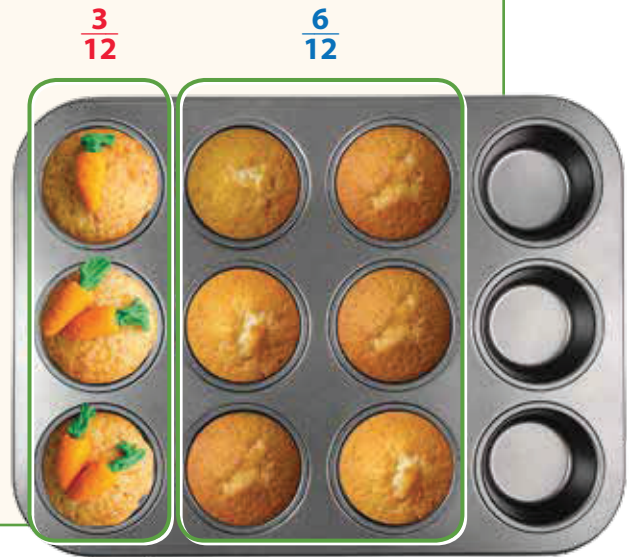
Study the Example showing one way to add fractions.
Then solve problems 1–9.

EXAMPLE

Shrina has a muffin pan that holds 12 muffins.
She fills $\frac{3}{12}$ of the pan with carrot muffin batter.
Then she fills $\frac{6}{12}$ with pumpkin muffin batter.
What fraction of the pan does she fill?

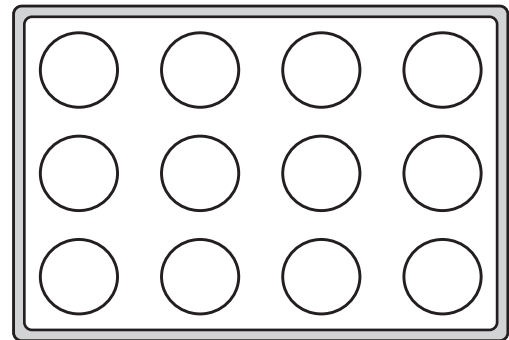
$$\frac{3}{12} + \frac{6}{12} = \frac{9}{12}$$

So, she fills $\frac{9}{12}$ of the muffin pan.



- 1 Sam fills $\frac{2}{12}$ of another pan with banana muffin batter.
Shade $\frac{2}{12}$ of the muffin pan diagram at the right.

- 2 Then Sam fills $\frac{6}{12}$ with lemon muffin batter.
Shade $\frac{6}{12}$ of the diagram to show this.

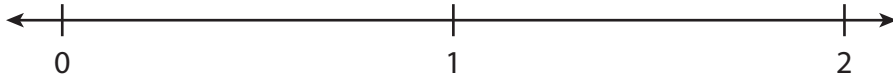


- 3 In problem 2, what fraction of the pan in all is filled now?
Write an equation for this problem that includes your answer.

Kay runs $\frac{6}{8}$ of a mile and rests. Then she runs another $\frac{6}{8}$ of a mile.



- 4 Divide the number line below to show eighths.



- 5 Label $\frac{6}{8}$ on the number line above.

- 6 Use arrows to show $\frac{6}{8} + \frac{6}{8}$ on the number line.

- 7 What is the total distance Kay runs?

- 8 Write an equation for this problem that includes your answer.

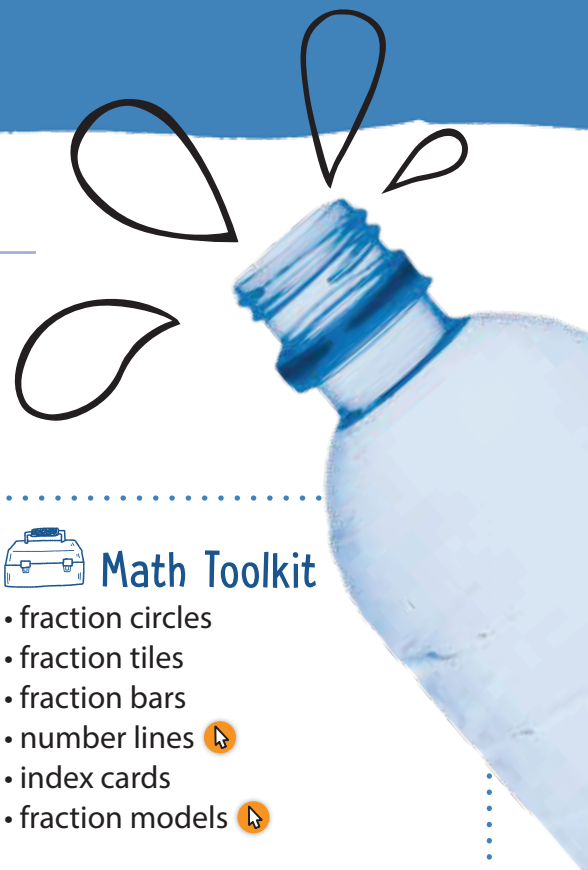
- 9 Jin cleans $\frac{1}{10}$ of the patio before lunch and $\frac{9}{10}$ of the patio after lunch. What fraction of the patio does Jin clean altogether? Show your work.

Solution

Develop Subtracting Fractions

Read and try to solve the problem below.



Alberto's water bottle has $\frac{5}{6}$ of a liter of water in it.
He drinks $\frac{4}{6}$ of a liter. What fraction of a liter of water
is left in the bottle?



TRY IT



Math Toolkit

- fraction circles
- fraction tiles
- fraction bars
- number lines 
- index cards
- fraction models 



DISCUSS IT

Ask your partner: Can you explain that again?

Tell your partner: I disagree with this part because . . .

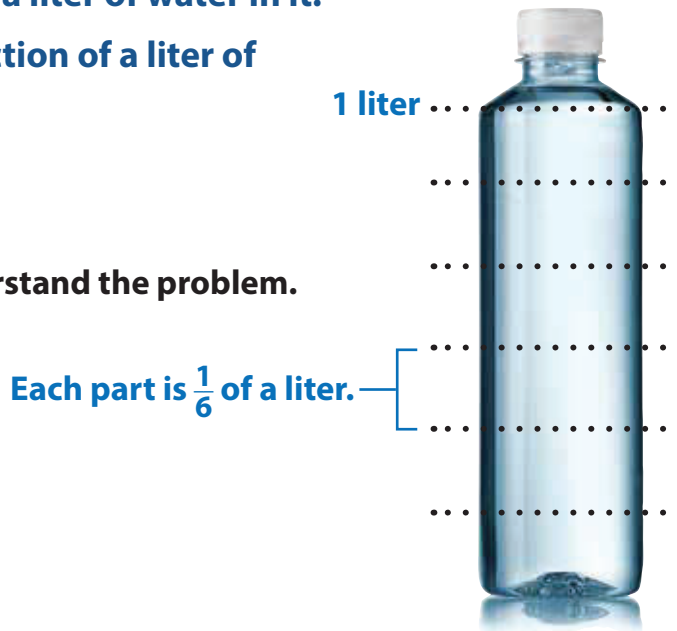
Explore different ways to understand subtracting fractions.

Alberto's water bottle has $\frac{5}{6}$ of a liter of water in it. He drinks $\frac{4}{6}$ of a liter. What fraction of a liter of water is left in the bottle?

PICTURE IT

You can use a picture to help understand the problem.

The picture shows the whole liter divided into 6 equal parts.



Five shaded parts show how much water is in the bottle. Alberto drinks 4 sixths of a liter, so take away 4 shaded parts. The 1 shaded part that is left shows the fraction of a liter that is left.



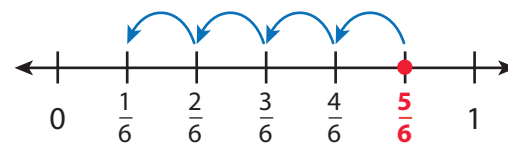
MODEL IT

You can also use a number line to help understand the problem.

The number line at the right is divided into sixths, with a point at $\frac{5}{6}$.



Start at $\frac{5}{6}$ and count back 4 sixths to subtract $\frac{4}{6}$.



CONNECT IT

Now you will use the problem from the previous page to help you understand how to subtract any two fractions that have the same denominator.

1 In **Picture It**, why does $\frac{1}{6}$ represent 1 of the equal parts of the liter?

2 What do the numerators, 5 and 4, tell you?

3 How many sixths of a liter are left in the bottle after Alberto drinks 4 sixths?

4 Complete the equations to show what fraction of a liter is left in the bottle.

Use words: **5 sixths** − **4 sixths** = sixth

Use fractions: **$\frac{5}{6}$** − **$\frac{4}{6}$** = $\frac{\square}{6}$

5 Explain how you subtract fractions with the same denominator.

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for subtracting fractions? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 7 Carmen has $\frac{8}{10}$ of the lawn left to mow. She mows $\frac{5}{10}$ of the lawn. Now what fraction of the lawn is left to mow? Show your work.



Solution

- 8 Mrs. Kirk has $\frac{3}{4}$ of a carton of eggs. She uses some for baking and has $\frac{2}{4}$ of the carton left. What fraction of the carton does she use? Show your work.

Solution

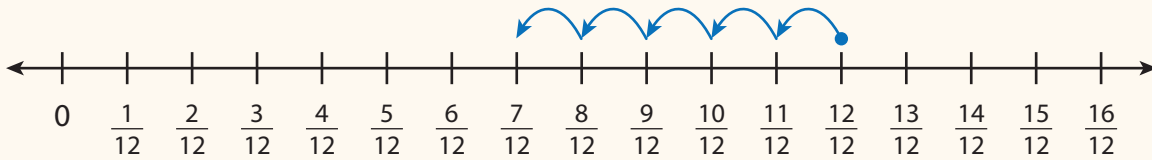
- 9 Badru reads $\frac{4}{8}$ of a book. How much of the book does he have left to read?
- (A) $\frac{1}{8}$
 - (B) $\frac{2}{8}$
 - (C) $\frac{4}{8}$
 - (D) $\frac{6}{8}$

Practice Subtracting Fractions

Study the Example showing one way to subtract fractions.
Then solve problems 1–7.

EXAMPLE

Ali buys a carton of eggs. He uses $\frac{3}{12}$ of the eggs to cook breakfast. He uses another $\frac{2}{12}$ to make a dessert for dinner. What fraction of the carton is left?



$$\frac{12}{12} - \frac{3}{12} = \frac{9}{12}$$

$$\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$$

So, $\frac{7}{12}$ of the carton is left.



Keisha is at her friend's house. Her friend's house is $\frac{8}{10}$ of a mile from Keisha's home. Keisha walks $\frac{3}{10}$ of a mile toward home. Then her mother drives her the rest of the way home.

- 1 Divide the number line below to show tenths. Then label each tick mark.



- 2 Use arrows to show the problem on the number line you labeled in problem 1.
- 3 How far does Keisha's mother drive her?
- 4 Write an equation for this problem that includes your answer.

- 5 Anna makes a quilt by sewing together green, white, and yellow fabric. When she finishes, $\frac{2}{6}$ of the quilt is green, and $\frac{3}{6}$ is yellow. The rest is white. What fraction of the quilt is white? Show your work.

Solution

- 6 Find $\frac{9}{8} - \frac{8}{8}$.
Use a number line or an area model to show your thinking.

Solution

- 7 Shanice has 1 whole pizza. She eats some of it and has $\frac{4}{6}$ of the pizza left. What fraction of the pizza does she eat? Show your work.

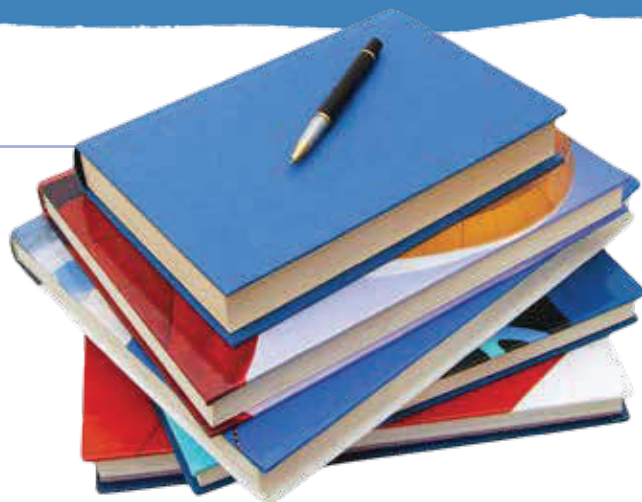
Solution



Develop Decomposing Fractions

Read and try to solve the problem below.



Dan has $\frac{5}{6}$ of his reading left to complete for the week. He plans to complete his reading on two or more days of the week from Monday to Friday. What are two different ways he could plan to complete his reading? Use a fraction to describe the part of his reading he does each day.



TRY IT



Math Toolkit

- counters
- fraction circles
- fraction tiles
- fraction bars
- number lines 
- fraction models 



DISCUSS IT

Ask your partner: Do you agree with me? Why or why not?

Tell your partner: I do not understand how ...

Explore different ways to understand decomposing fractions.

Dan has $\frac{5}{6}$ of his reading left to complete for the week. He plans to complete his reading on two or more days of the week from Monday to Friday. What are two different ways he could plan to complete his reading? Use a fraction to describe the part of his reading he does each day.

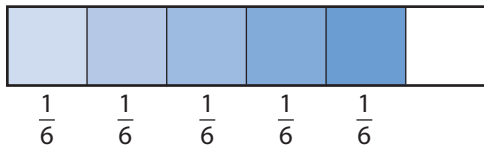
MODEL IT

You can use models to show how to decompose a fraction in different ways.

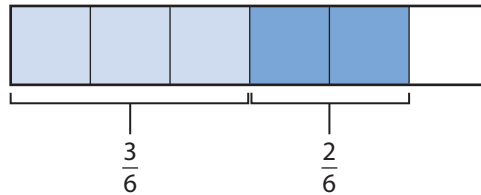
When you decompose a fraction, you break it into parts.

The models show two ways to decompose $\frac{5}{6}$.

One way:



Another way:



MODEL IT

You can also use equations to decompose a fraction in different ways.

You can list different ways to add fractions to make $\frac{5}{6}$.

$$\frac{5}{6} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$$

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

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

$$\frac{5}{6} = \frac{3}{6} + \frac{1}{6} + \frac{1}{6}$$

$$\frac{5}{6} = \frac{3}{6} + \frac{2}{6}$$

$$\frac{5}{6} = \frac{4}{6} + \frac{1}{6}$$

CONNECT IT

Now you will use the problem from the previous page to help you understand how to decompose a fraction in different ways.

- 1 Look at the first **Model It**. How many equal parts are in each model?
How many shaded parts are in each model?
- 2 Look at the equations in the second **Model It**. How can you tell if two or more fractions add to make $\frac{5}{6}$?
- 3 What is the greatest amount of his reading that Dan could do in one day?
- 4 What are two different ways that Dan could do his reading?
- 5 Explain how to find all the different ways to decompose a fraction.

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for decomposing a fraction? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 7 Find three ways to decompose $\frac{7}{8}$ into a sum of other fractions. Draw a model for each way to show how you know the way is correct. Show your work.

Solution

- 8 Complete the equations to show a way to decompose each fraction.

a. $+$ $\frac{1}{4}$ $+$ $\frac{3}{4}$ $=$ $\frac{5}{4}$

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

c. $\frac{9}{12} = \frac{3}{12} + \frac{3}{12} +$

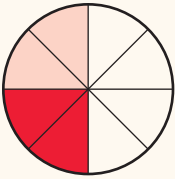
- 9 Draw a diagram to justify your answer to problem 8b.

Practice Decomposing Fractions

Study the Example showing how to decompose a fraction in different ways. Then solve problems 1–5.

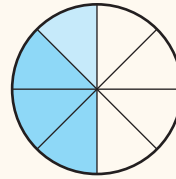
EXAMPLE

Sarah's family has $\frac{4}{8}$ of a cherry pie left over. Sarah and her sister share the leftover pie. What are two different ways that Sarah and her sister can each get some of the pie?



$$\frac{2}{8} + \frac{2}{8} = \frac{4}{8}$$

Sarah and her sister each get $\frac{2}{8}$ of the pie.



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

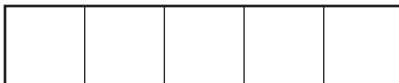
Sarah gets $\frac{1}{8}$ of the pie, and her sister gets $\frac{3}{8}$ of the pie.

- 1 Complete the equations to show how to decompose $\frac{3}{5}$ in two different ways.

a. $\frac{3}{5} = \frac{1}{5} + \dots$

b. $\frac{3}{5} = \frac{1}{5} + \dots + \frac{1}{5}$

- 2 Shade the area model below to show the equation in problem 1a.



3 Select all the equations that show a correct way to represent $\frac{7}{10}$.

Ⓐ $\frac{1}{10} + \frac{5}{10} = \frac{7}{10}$

Ⓑ $\frac{2}{10} + \frac{5}{10} = \frac{7}{10}$

Ⓒ $\frac{1}{10} + \frac{2}{10} + \frac{4}{10} = \frac{7}{10}$

Ⓓ $\frac{1}{10} + \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$

Ⓔ $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} = \frac{7}{10}$

4 Vijay has $\frac{6}{6}$ of a cup of raisins. He wants to put the raisins into three snack bags. What are two different ways he could put raisins into three snack bags? Use a model to show each way. Show your work.

Solution

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5 Is $\frac{7}{12} + \frac{1}{12}$ equivalent to $\frac{4}{12} + \frac{4}{12}$? Explain your answer.

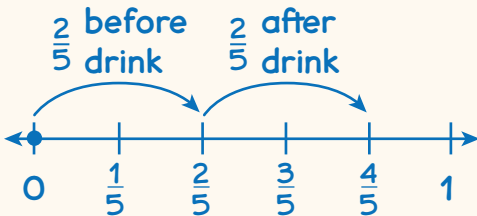
Refine Adding and Subtracting Fractions

Complete the Example below. Then solve problems 1–9.

EXAMPLE

Jessica hikes $\frac{2}{5}$ of a mile on a trail before she stops to get a drink of water. After her drink, Jessica hikes another $\frac{2}{5}$ of a mile. How far does Jessica hike in all?

Look at how you could show your work using a number line.



Solution

The student used labels and “jump” arrows to show each part of the hike on a number line. It is just like adding whole numbers!



PAIR/SHARE

How else could you solve this problem?

APPLY IT

- Ruth makes 1 fruit smoothie. She drinks $\frac{1}{3}$ of it. What fraction of the fruit smoothie is left? Show your work.

Solution

What fraction represents the whole fruit smoothie?

PAIR/SHARE

How did you and your partner decide what fraction to start with?

- 2 Mr. Chang has a bunch of balloons. $\frac{3}{10}$ of the bunch is red. $\frac{2}{10}$ of the bunch is blue. What fraction of the bunch is not red or blue? Show your work.

I think that there are at least two different steps to solve this problem.



Solution

- 3 Emily eats $\frac{1}{6}$ of a bag of carrots. Nick eats $\frac{2}{6}$ of the same bag of carrots. What fraction of the bag of carrots do Emily and Nick eat altogether?

- (A) $\frac{1}{6}$
- (B) $\frac{1}{3}$
- (C) $\frac{3}{6}$
- (D) $\frac{3}{12}$

Rob chose (D) as the correct answer. How did he get that answer?

PAIR/SHARE

What other problem in this lesson is similar to this one?

To find the fraction of the bag Emily and Nick ate together, should you add or subtract?

PAIR/SHARE

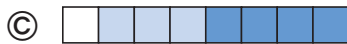
Does Rob's answer make sense?

- 4 Lin buys some cloth. He uses $\frac{5}{8}$ of a yard for a school project. He has $\frac{2}{8}$ of a yard left. How much cloth does Lin buy?
- (A) $\frac{3}{8}$ of a yard
(B) $\frac{7}{16}$ of a yard
(C) $\frac{7}{8}$ of a yard
(D) $\frac{8}{8}$ of a yard
- 5 Carmela cuts a cake into 12 equal-sized pieces. She eats $\frac{2}{12}$ of the cake, and her brother eats $\frac{3}{12}$ of the cake. What fraction of the cake is left?
- (A) $\frac{1}{12}$
(B) $\frac{5}{12}$
(C) $\frac{7}{12}$
(D) $\frac{12}{12}$
- 6 Lee makes muffins. She uses $\frac{2}{3}$ of a cup of milk and $\frac{1}{3}$ of a cup of oil. How much more milk than oil does she use? Show your work.



Solution

- 7 Lucy and Melody work together to paint $\frac{6}{8}$ of a room. Which models could be used to show how much of the room each girl paints?



(D) $\frac{6}{8} = \frac{3}{8} + \frac{3}{8}$

(E) $\frac{6}{8} = \frac{5}{8} + \frac{1}{8}$

- 8 Cole and Max pick $\frac{9}{10}$ of a bucket of blueberries in all. Cole picks $\frac{3}{10}$ of a bucket of blueberries. What fraction of a bucket of blueberries does Max pick? Show your work.

Solution

9 MATH JOURNAL

Ms. Jones cuts an apple into eighths. She eats $\frac{3}{8}$ of the apple and gives the rest to her son and daughter. Describe two different ways her son and daughter can share the rest of the apple if they each have some of the apple.



SELF CHECK Go back to the Unit 4 Opener and see what you can check off.