

*Revised Edition*

# Performance

# Coach™



# Mathematics

5



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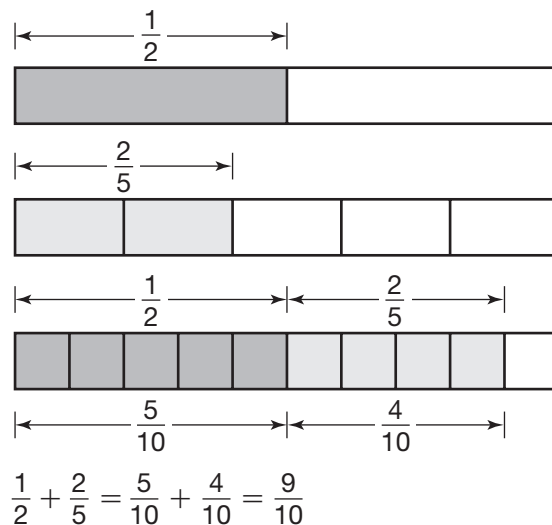
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# Solving Problems with Addition and Subtraction of Fractions

## 1 GETTING THE IDEA

You can write **equations** and use models to add and subtract fractions in word problems.

For example, the model below shows a snack made of  $\frac{1}{2}$  cup almonds and  $\frac{2}{5}$  cup cranberries.



### Example 1

Ben makes a sauce by combining  $\frac{2}{3}$  cup tomatoes with  $\frac{1}{4}$  cup lime juice. How much sauce does Ben make?

**Strategy** Determine the operation needed to solve the problem. Write an equation.

**Step 1** Write an equation.

You can add to find a total amount after combining ingredients.

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

**Step 2** Write equivalent fractions using a common denominator.

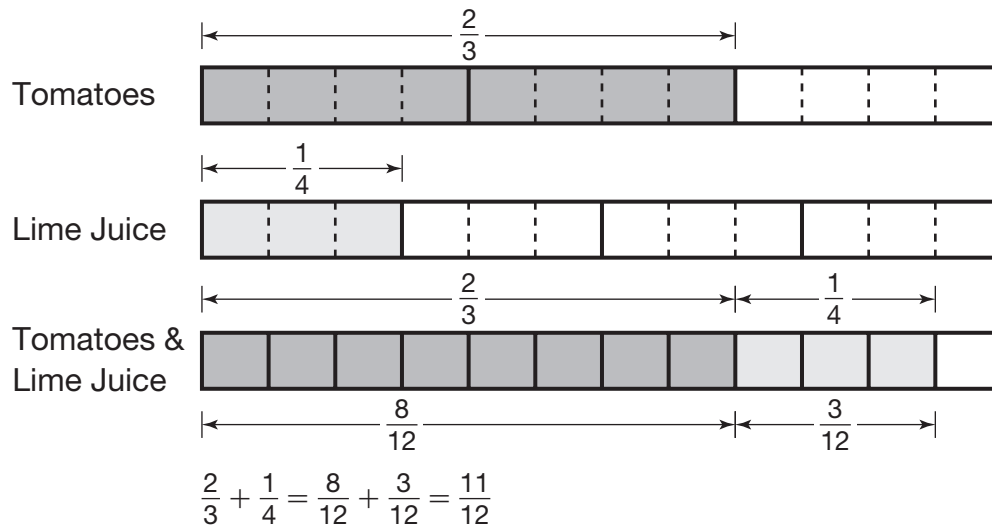
A common denominator of  $\frac{2}{3}$  and  $\frac{1}{4}$  is 12.

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12} \qquad \frac{1}{4} = \frac{1 \times 3}{4 \times 3} = \frac{3}{12}$$

**Step 3** Add the fractions with like denominators.

$$\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$$

**Step 4** Use a model to check your answer.



**Solution** Ben makes  $\frac{11}{12}$  cup of sauce.

## Example 2

Lela bought  $\frac{4}{5}$  yard of fabric to use on projects. She used  $\frac{1}{4}$  yard on her first project. How much fabric does Lela have left?

**Strategy** Determine the operation needed to solve the problem. Write an equation.

**Step 1** Write an equation.

You want to find out how much fabric is left after Lela uses some.

Subtract to find out how much remains after some is taken away.

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

**Step 2** Write equivalent fractions using a common denominator.

A common denominator of  $\frac{4}{5}$  and  $\frac{1}{4}$  is 20.

$$\frac{4}{5} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20} \quad \frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20}$$

**Step 3** Subtract the fractions with like denominators.

$$\frac{4}{5} - \frac{1}{4} = \frac{16}{20} - \frac{5}{20} = \frac{11}{20}$$

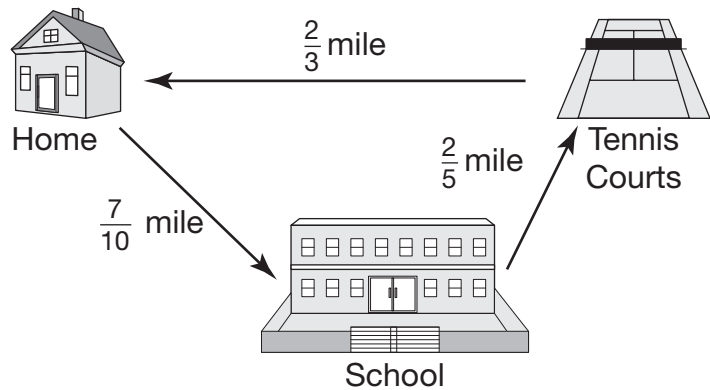
**Step 4** Use addition to check your answer.

$$\frac{11}{20} + \frac{5}{20} = \frac{16}{20} \text{ or } \frac{4}{5} \checkmark$$

**Solution** Lela has  $\frac{11}{20}$  yard of fabric left.

### Example 3

On Mondays, Regan walks the route shown on the map. How many miles in all does Regan walk on Mondays?



**Strategy** Determine the operation needed to solve the problem. Write an equation.

**Step 1**

Write an equation.

The three distances are shown on the map. Add to find the total.

$$\frac{7}{10} + \frac{2}{5} + \frac{2}{3} = \square$$

**Step 2**

Write equivalent fractions using a common denominator.

A common denominator of  $\frac{7}{10}$ ,  $\frac{2}{5}$ , and  $\frac{2}{3}$  is 30.

$$\frac{7}{10} = \frac{21}{30} \quad \frac{2}{5} = \frac{12}{30} \quad \frac{2}{3} = \frac{20}{30}$$

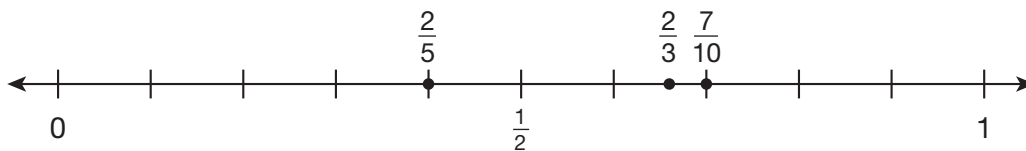
**Step 3**

Add the fractions with like denominators.

$$\frac{7}{10} + \frac{2}{5} + \frac{2}{3} = \frac{21}{30} + \frac{12}{30} + \frac{20}{30} = \frac{53}{30}, \text{ or } 1\frac{23}{30}$$

**Step 4**

Use benchmark fractions to determine if your answer is reasonable.



All three fractions are closer to  $\frac{1}{2}$  than to 0 or 1. Estimate the sum.

$$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}. \leftarrow \text{This is close to } 1\frac{23}{30}. \text{ The answer is reasonable.}$$

**Solution** Regan walks  $1\frac{23}{30}$  miles in all on Mondays.

## 2 COACHED EXAMPLE

Jake and Paco each ordered a small pizza. Jake ate  $\frac{7}{8}$  of his pizza. Paco ate  $\frac{2}{3}$  of his pizza. How much more pizza did Jake eat than Paco?

Write an equation.

To find how much more, which operation should you use? \_\_\_\_\_

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

Write equivalent fractions with a common denominator.

$$\frac{7}{8} = \frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$$

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

\_\_\_\_\_ the fractions with like denominators. Solve.

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

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

Use benchmark fractions to determine if your answer is reasonable.

Is each fraction closer to 0,  $\frac{1}{2}$ , or 1?

Estimate:  $\frac{7}{8}$  is closer to \_\_\_\_\_.

$\frac{2}{3}$  is closer to \_\_\_\_\_.

Estimate the answer. \_\_\_\_\_

Explain how you know your exact answer is reasonable.

\_\_\_\_\_

\_\_\_\_\_

Jake ate \_\_\_\_\_ more pizza than Paco.

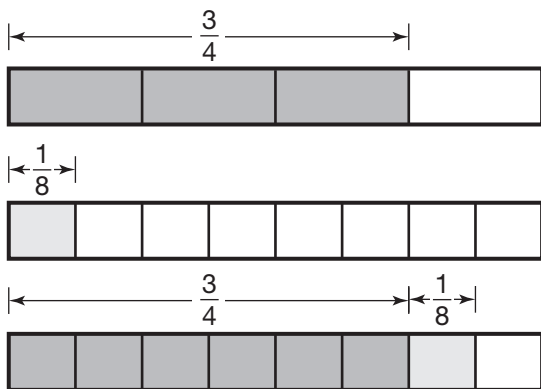


### 3 LESSON PRACTICE

- 1 Meg bought two pieces of ribbon to decorate a picture frame. One piece was  $\frac{3}{5}$  yard long. The other piece was  $\frac{1}{2}$  yard long. What is the total length of ribbon Meg bought?

- A.  $\frac{1}{10}$  yard
- B.  $\frac{4}{7}$  yard
- C.  $\frac{2}{3}$  yard
- D.  $1\frac{1}{10}$  yards

- 2 Sanjay made buttermilk using  $\frac{3}{4}$  cup whole milk and  $\frac{1}{8}$  cup lemon juice. Use the model shown below to find the total amount of buttermilk he made.



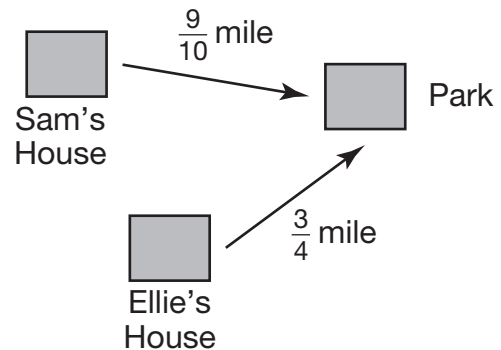
How much buttermilk does Sanjay make?

- A.  $\frac{4}{12}$  cup
- B.  $\frac{4}{8}$  cup
- C.  $\frac{7}{8}$  cup
- D. 1 cup

- 3 Atticus and Haley are both reading the same book. Atticus has read  $\frac{7}{9}$  of the book and Haley has read  $\frac{2}{3}$  of the book. How much more of the book has Atticus read than Haley?

- A.  $\frac{1}{9}$  of the book
- B.  $\frac{9}{12}$  of the book
- C.  $\frac{5}{6}$  of the book
- D.  $\frac{13}{9}$  of the book

- 4 Ellie and her friend Sam both walk to the park. The distances they each walk are shown on the map.



How much farther does Sam walk than Ellie?

- A.  $\frac{3}{20}$  mile
- B.  $\frac{6}{10}$  mile
- C. 1 mile
- D.  $1\frac{13}{20}$  mile



- 5 On Saturday, Ana worked  $\frac{1}{4}$  of a day washing cars for a fund-raiser. On Sunday, she worked  $\frac{1}{3}$  of a day babysitting. What part of a day did she work on Saturday and Sunday? Use the bars to help you.




Ana worked  $\frac{\square}{\square}$  of a day on Saturday and Sunday.

- 6 Nana wants to paint her bedroom walls light blue. She will mix white and blue paint to get the shade she wants. Which expression has the same value as a mixture of  $\frac{3}{8}$  gallon blue paint with  $\frac{1}{2}$  gallon white paint? Mark all that apply.

A.  $\frac{5}{8} + \frac{1}{4}$

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

C.  $\frac{1}{8} + \frac{5}{8}$

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

E.  $\frac{3}{8} + \frac{1}{2}$

F.  $\frac{3}{8} + \frac{4}{24}$

- 7 Kade makes  $\frac{5}{6}$  cup salad dressing. He uses  $\frac{2}{3}$  cup dressing on a salad. How much salad dressing is left?

cup(s)

- 8 The table shows the ingredients, in cups, that Rosa used in her smoothie recipe.

**Berry Delicious Smoothie**

Mixed Berries	Yogurt	Milk
$2\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{4}$

**Part A**

Write each mixed number as an improper fraction. Find a common denominator. Then write equivalent fractions for the improper fractions.

$$2\frac{1}{2} = \frac{\square}{\square} = \frac{\square}{\square}$$

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

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

**Part B**

Find the total number of cups of ingredients in Rosa's smoothie. Show your work.

- 9 Kate is planting a garden. She will plant  $\frac{3}{10}$  of her garden with herbs, and  $\frac{3}{5}$  of her garden will be vegetables. She will plant flowers in the rest of her garden.

Select the boxes in the table to show whether each statement is true or false.

Statement	True	False
$\frac{1}{5}$ of Kate's garden is flowers.	<input type="radio"/>	<input type="radio"/>
$\frac{9}{10}$ of Kate's garden is herbs and vegetables.	<input type="radio"/>	<input type="radio"/>
$\frac{7}{10}$ of Kate's garden is flowers and vegetables.	<input type="radio"/>	<input type="radio"/>
$\frac{3}{10}$ of Kate's garden is flowers and herbs.	<input type="radio"/>	<input type="radio"/>

- 10 Inez has  $\frac{3}{5}$  quart of orange juice. She drank  $\frac{1}{3}$  quart. How much orange juice does she now have? Explain how you know your answer is reasonable.

- 11 Yuri made a fruit salad with  $\frac{1}{3}$  cup blueberries,  $\frac{5}{8}$  cup strawberries, and  $\frac{5}{6}$  cup apples.

**Part A**

How much fruit salad did Yuri make? Show your work.

**Part B**

Use benchmark fractions to determine if your answer is reasonable. Show your work.

**Part C**

Explain how to determine if your estimate for  $\frac{1}{3} + \frac{5}{8} + \frac{5}{6}$  is greater than the actual sum.