

12

Career Focus
Education & Training

Elementary teacher
High school teacher
Corporate trainer

Vocabulary

equivalent fractions

fractions that have the same value

numerator

the number of parts being considered
(the top number in a fraction)

denominator

the number of parts into which the whole is divided
(the bottom number in a fraction)

sum

the answer in an addition problem

common denominator

a common multiple for the denominators of two or more fractions

improper fraction

a fraction whose value is greater than one
(the numerator is larger than the denominator)

Sweets for the Sweet

Greet your tutee and have a friendly warm-up chat.

MATH PRE-FLIGHT

Today we're going to review equivalent fractions. Do you remember what equivalent fractions are?

Make a positive comment or review the definition with your tutee.

Equivalent fractions are fractions that have the same value.

One way to make equivalent fractions is to multiply or divide the numerator and denominator by the same number.

Show your tutee the Equivalent Fractions sheet in the Tutee Activity Book.

Here are two examples of how to make equivalent fractions for the fraction $\frac{6}{8}$. In the first example, the numerator and denominator are each divided by a common factor, 2, to equal $\frac{3}{4}$. So $\frac{6}{8}$ and $\frac{3}{4}$ are equivalent fractions.

say

Write the first example on the white board as you review it with your tutee.

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

$\frac{6}{8}$ and $\frac{3}{4}$ are equivalent fractions.

Let's look at the second example. The numerator and denominator in $\frac{6}{8}$ also can be multiplied by 3 to equal $\frac{18}{24}$. In this example $\frac{3}{4}$, $\frac{6}{8}$ and $\frac{18}{24}$ are equivalent fractions.

Write this example on the white board as you review it with your tutee.

$$\frac{6 \times 3}{8 \times 3} = \frac{18}{24}$$

$\frac{3}{4}$, $\frac{6}{8}$ and $\frac{18}{24}$ are equivalent fractions.

Let's practice finding some other equivalent fractions. On the activity sheet you'll see two columns of fractions. Draw lines connecting the fractions that are equivalent.

Using the white board, guide your tutee to match the equivalent fractions.

$$\frac{2 \times 3}{3 \times 3} = \frac{6}{9} \quad \frac{15 \div 3}{24 \div 3} = \frac{5}{8} \quad \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

say

Your tutee's finished columns should look like this:

$$\begin{array}{ccc}
 \frac{2}{3} & & \frac{3}{4} \\
 & \diagdown & / \\
 \frac{15}{24} & & \frac{5}{8} \\
 & / & \diagdown \\
 \frac{6}{8} & & \frac{6}{9}
 \end{array}$$

Make a positive comment, or review the work with your tutee.

Show your tutee the last list on the Equivalent Fractions sheet.

Now see if you can write three equivalent fractions for each fraction in this list. Remember, you can multiply or divide to make equivalent fractions. You can use the white board for your calculations if you want.

say

Help your tutee as needed. Some possible responses:

$$\frac{1}{5} \text{ is equivalent to } \frac{2}{10}, \frac{3}{15}, \frac{4}{20}, \frac{5}{25}$$

$$\frac{6}{12} \text{ is equivalent to } \frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{12}{24}$$

$$\frac{3}{8} \text{ is equivalent to } \frac{6}{16}, \frac{9}{24}, \frac{12}{32}$$

There are other possible answers. If your tutee has a different answer, ask him or her to show you the work on the white board. The equivalent fraction should be created by multiplying or dividing the numerator and denominator by the same number. If not, have your tutee create another equivalent fraction.

CAREER FOCUS

Do you have a favorite teacher? Have you ever thought you might like to work with students?

Accept any response. Model by sharing ideas of your own.

A career in education is an investment in the future. Teachers and administrators are always needed in preschools, elementary and high schools, universities and even as corporate trainers. Teaching responsibilities may include creating lessons, communicating with parents, determining grades, working with other teachers, and teaching a particular subject.

say

What would you want to teach if you became an educator? What do you think you might need to know to start a career in education?

Accept any responses. Model by sharing ideas of your own.

A college degree and a state teaching license are requirements for most teachers. Educational administrators lead the teaching team and manage the everyday activities of a school or university – for these jobs, you would need a college degree and an administrative license.

READ THE PROBLEM

Show your tutee the story, "Sweets for the Sweet," in the Tutee Activity Book.

Last time we read about hot dogs. Today we're going to read about candy! David and his teacher are brainstorming ideas for David to make extra money for a band trip. I'll read most of the story, but you can read David's part.

Show your tutee that David's lines are marked with a dot. Make positive comments as your tutee reads.

When you are finished,

Which kind of fudge would you buy? It sounds like a great way to make extra money, but let's do the math to see if David made a profit.

say

SOLVE THE PROBLEM

Get out the SOLVE cards. Turn the "S" card face up.

Let's start with "S" – study the problem. What are you trying to find? Can you highlight the problem in the story?

*Make a positive comment, or help your tutee reread to find and highlight the **two** problems in the text:*

How much of each kind of fudge was sold?

How much money did David earn for the band trip?

Make a positive comment. Remind your tutee to write the questions beside the "S" on the SOLVE sheet.

Turn the "O" card face up.

Next is "O" – organize the data. What information is included in this problem?

Help your tutee identify the information given in the problem:

Fudge is priced at \$6 per pound.

David spent \$60 on ingredients.

The chart lists how many pounds of fudge of each variety David sold each day.

say

Let's write the price per pound and the cost of the ingredients beside the "O" on the SOLVE sheet. That way you won't need to look back in the story later to remember those numbers. There's no need to list the pounds of fudge sold per day, because that information is easy to find in the chart.

Turn the "L" card face up.

"L" means "line up a plan." What steps could you take to find the answers?

*Make a positive comment, or help your tutee understand that the plan must have **three** steps:*

- 1) *Calculate how many pounds David sold of each kind of fudge.*
- 2) *Multiply the number of pounds sold by the price per pound (\$6) to calculate how much money David collected.*
- 3) *Subtract the cost of ingredients (\$60) to determine how much money David earned.*

Turn the "V" card face up.

Now you need to verify the plan. This is where you do the math. The first step is to find the total number of pounds of each kind of fudge David sold. Let's start with the chocolate fudge. Write out that addition problem next to the "V" on your SOLVE sheet.

say

Your tutee's problem should look like this:

$$\begin{array}{r}
 3\frac{7}{8} \\
 2\frac{3}{8} \\
 4\frac{1}{8} \\
 + 5\frac{5}{8} \\
 \hline
 \end{array}$$

Make a positive comment. If needed, use the white board to show your tutee the problem.

say

To add or subtract fractions, all of the fractions must have the same denominator. In this problem, do all of the fractions have the same denominator?

Yes, the denominator is 8.

This is called a *common denominator*. Find the sum in this problem by first adding the number of whole pounds. Then add the number of eighths by adding the numerators.

The answer is $14\frac{16}{8}$ pounds of chocolate fudge were sold.

$$\begin{array}{r}
 3\frac{7}{8} \\
 2\frac{3}{8} \\
 4\frac{1}{8} \\
 + 5\frac{5}{8} \\
 \hline
 14\frac{16}{8}
 \end{array}$$

Make a positive comment, or help your tutee add the whole pounds and then the eighths.

We haven't worked with a fraction like this before, where the value of the fraction is greater than one. This is called an *improper* fraction.

Remember, $\frac{8}{8}$ represents a whole, so $\frac{16}{8}$ would be two wholes.

If necessary, use the white board to show your tutee that $\frac{16}{8} = \frac{8}{8} + \frac{8}{8}$, or two wholes. Another way to calculate this is $16 \div 8 = 2$.

So if you add 14 pounds and 2 pounds, what is the total amount of chocolate fudge David sold?

David sold 16 pounds of chocolate fudge.

$$14 + 2 = 16 \text{ pounds}$$

Make a positive comment or review the work with your tutee.

Now let's calculate the total number of pounds of vanilla fudge David sold. Can you write that addition problem on your SOLVE sheet?

Make a positive comment, or help your tutee understand that he or she must add the amounts of vanilla fudge sold each day. Your tutee's problem should look like this:

$$\begin{array}{r} 1\frac{1}{2} \\ 3\frac{1}{4} \\ 2\frac{3}{4} \\ + 4 \\ \hline \end{array}$$

Remember, to add or subtract fractions, each of the fractions must have the same denominator. What denominators do the fractions have now?

The denominators are 2 and 4.

say

The denominators must be the same before you can add the fractions in this problem. The best common denominator is the least common multiple. Let's find the least common multiple for 2 and 4. What are the first four multiples of 2? Write them on the white board.

Make a positive comment, or help your tutee count by 2 to understand the first four multiples of 2 are: 2, 4, 6 and 8. If needed, review the Multiples sheet in Lesson 7.

say

What are the first four multiples of 4? Write them on the white board.

Make a positive comment, or help your tutee count by 4 to understand the first four multiples of 4 are: 4, 8, 12 and 16. If needed, review the Multiples sheet in Lesson 7.

What is the smallest number that appears on both lists?

The number 4 is the smallest number on both lists.

That's right, 4 is the least common multiple of 2 and 4, so we'll use that as our common denominator. Before we add, all the fractions need to have 4 as the common denominator. Which one will you need to change?

$$\frac{1}{2}$$

Make a positive comment, or show your tutee that the other fractions already have 4 as a denominator.

Create an equivalent fraction for $\frac{1}{2}$ that has 4 as a common denominator, and update your problem on the SOLVE sheet.

Multiply both the numerator and denominator by 2.

$$1 \frac{1 \times 2}{2 \times 2} = 1 \frac{2}{4}$$

Your tutee's problem should now look like this:

$$\begin{array}{r} 1 \frac{1}{2} = 1 \frac{2}{4} \\ 3 \frac{1}{4} = 3 \frac{1}{4} \\ 2 \frac{3}{4} = 2 \frac{3}{4} \\ + 4 = 4 \\ \hline \end{array}$$

You can find the sum now that your denominators are the same. Start by adding the number of whole pounds, and then add the number of fourths by adding the numerators.

say

The answer is $10\frac{6}{4}$.

$$\begin{array}{r} 1\frac{1}{2} = 1\frac{2}{4} \\ 3\frac{1}{4} = 3\frac{1}{4} \\ 2\frac{3}{4} = 2\frac{3}{4} \\ + 4 = 4 \\ \hline 10\frac{6}{4} \end{array}$$

You can't use $\frac{6}{4}$ in your answer because it is an improper fraction – it's larger than one. Let's find an equivalent fraction for $\frac{6}{4}$ by dividing the numerator and denominator by 2.

say

$$\frac{6}{4} = \frac{3}{2} \quad \frac{6 \div 2}{4 \div 2} = \frac{3}{2}$$

Now think about $\frac{3}{2}$. $\frac{2}{2}$ is a whole, so $\frac{3}{2}$ would be the same as a whole with $\frac{1}{2}$ left over.

Illustrate on the white board by drawing $\frac{3}{2}$. Draw a whole circle divided into two halves, and a half circle. Label the first circle $\frac{2}{2}$ and the half circle $\frac{1}{2}$.

Your drawing should look like this:

$$\begin{array}{c} \text{○} + \text{◐} \\ \frac{2}{2} + \frac{1}{2} \end{array} \quad \frac{3}{2} = \frac{2}{2} + \frac{1}{2} = 1\frac{1}{2}$$

So if $\frac{3}{2} = 1\frac{1}{2}$, how many pounds of vanilla fudge did David sell?

David sold $11\frac{1}{2}$ pounds of vanilla fudge.

$$10 + 1 + \frac{1}{2} = 11\frac{1}{2} \text{ pounds}$$

Let's repeat the process to find how many pounds of swirl fudge David sold. Write that addition problem on your SOLVE sheet.

say

Your tutee's problem should look like this:

$$\begin{array}{r} 3 \\ 2\frac{2}{3} \\ 2\frac{1}{3} \\ + 1\frac{1}{2} \\ \hline \end{array}$$

Once again, you'll need to start by writing the fractions with a common denominator. What might be a good common denominator?

Make a positive comment, or help your tutee understand 6 is the lowest common denominator.

If additional help is needed, list the first four multiples of 2 and the first four multiples of 3 on the white board. Point out that 6 is the least common multiple and should be used as the common denominator.

12 and 18 also are common denominators. If your tutee suggests 12 or 18, help him or her understand that although they would work, there is a smaller common denominator he or she can use.

In this problem, which fractions will need to be changed to have the new denominator of 6?

All three fractions will need to be changed. Make a positive comment or help tutee recognize that all three fractions have a denominator other than 6.

say

So, let's get started. How will you change $\frac{2}{3}$ to an equivalent fraction with the denominator of 6?

Multiply numerator and denominator by 2.

$$\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

Make a positive comment or show him or her the work on the white board.

Go ahead and change the next two fractions and I will check them for you when you finish.

$$\frac{1 \times 2}{3 \times 2} = \frac{2}{6} \quad \text{and} \quad \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$$

Make a positive comment or help your tutee by showing the work on the white board.

Rewrite the entire addition problem with the equivalent fraction.

Your tutee's problem should now look like this:

$$\begin{array}{r}
 3 \\
 2\frac{4}{6} \\
 2\frac{2}{6} \\
 + 1\frac{3}{6} \\
 \hline
 \end{array}$$

Add the whole number parts first, and then add the fraction parts. Finally, add the whole number and the fraction parts together.

say

The answer is $8\frac{9}{6}$ pounds of swirl fudge. Your tutee's problem should look like this:

$$\begin{array}{r}
 3 \\
 2\frac{4}{6} \\
 2\frac{2}{6} \\
 + 1\frac{3}{6} \\
 \hline
 8\frac{9}{6}
 \end{array}$$

The answer includes another improper fraction. Think about $\frac{9}{6}$, and write an equivalent fraction.

The answer is $8\frac{3}{2}$.

Make a positive comment, or help your tutee divide the numerator and denominator by 3.

$$\frac{9}{6} = \frac{3}{2}$$

say

We reduced $\frac{9}{6}$, but $\frac{3}{2}$ is still an improper fraction. Do you remember the circles I drew a few minutes ago? The drawing showed that $\frac{3}{2} = 1\frac{1}{2}$. If you find the sum of 8 and $1\frac{1}{2}$, you'll know how much swirl fudge David sold.

David sold $9\frac{1}{2}$ pounds of swirl fudge.

$$8 + 1 + \frac{1}{2} = 9\frac{1}{2} \text{ pounds}$$

Now you know how much of each kind of fudge was sold. The first question is answered, but you still need to find out how much money David earned for his band trip. Look back at the facts you wrote beside the "O."

David charged \$6 per pound and spent \$60 on ingredients.

How can you use those two facts to calculate how much profit David made?

say

Your tutee can solve this problem in two ways:

- 1) *Multiply the price of the fudge (\$6 a pound) by the total amount of each kind of fudge. After multiplying, the three totals should be added to calculate the total dollars.*
- 2) *Add to find the total pounds of all fudge sold, and then multiply by \$6.*

Either way your tutee will get the same answer.

Depending on your tutee's strategy, help your tutee follow the steps outlined in method 1 or 2. Make sure he or she records his work on the SOLVE sheet.

Remember, once your tutee has calculated the amount of money David made, he or she will still have to subtract the cost of ingredients.

Method 1

Multiply the number of pounds of each kind of fudge by \$6.

$$\text{Chocolate: } 16 \times 6 = \$96$$

$$\text{Vanilla: } 11\frac{1}{2} = 11 \times 6 + \frac{1}{2} \times 6 = 66 + 3 = \$69$$

11 whole pounds x \$6 + another \$3
for the half pound

$$\text{Swirl: } 9\frac{1}{2} = 9 \times 6 + \frac{1}{2} \times 6 = 54 + 3 = \$57$$

9 whole pounds x \$6 + another \$3
for the half pound

Help your tutee understand that $\frac{1}{2}$ a pound of fudge costs \$3 ($\frac{1}{2}$ of \$6 is \$3).

$$\text{Add up the three dollar amounts: } 96 + 69 + 57 = \$222$$

Method 2

Add up the pounds of fudge first, then multiply by \$6.

$$16 + 11\frac{1}{2} + 9\frac{1}{2} = 36\frac{2}{2} = 37$$

Multiply the total pounds of fudge by \$6:

$$37 \times 6 = \$222$$

Make a positive comment, or use the white board to help your tutee calculate the amount of fudge sold.

*Whichever method your tutee uses, the answer is the same:
David earned \$192 for his trip.*

$$222 - 60 = \$192$$

Make sure your tutor writes the answer in a complete sentence on the SOLVE sheet.

Turn over the "E" card.

That was a lot of work! We're almost done. Now you have to examine the results. Does your answer make sense? Did you answer both of the questions in the problem? Are both of your answers correctly labeled in pounds and dollars?

Make a positive comment. Make sure your tutee has answered both questions, and written both answers in complete sentences.

Nice job. This was a complicated problem. Are you clear about getting common denominators for fractions, or do we need to review any of the steps?

say

LESSON LOG

Show your tutee the Lesson Log in the Tutee Activity Book.

This problem had a lot of steps – I know sometimes it looked like we were never going to get finished! I discovered that it really helps to break down difficult problems into smaller steps. As you fill out your Lesson Log, think about whether you can use that strategy for your other coursework. I'll be right here, so let me know if you have any questions.

Sweets for the Sweet

Captain Powers has delivered a shipment to Sky Harbor International Airport in Tucson, Arizona. In one of the containers are packages of sugar, cocoa and butter for the Gourmet Cooking class at Oro Valley High School. One of the students, David Ramirez, is helping his teacher pick up the ingredients to start their new unit on candies and desserts. As they are loading the school van, David asks Ms. Gonzales for advice.

“Maybe you can help me with my problem. I play sax in the band and we are planning a trip. I need to raise some money to cover the cost. My parents offered to pay for half if I can earn the other half.”

“Why don’t you put your cooking talents to use? You’re one of my best students,” Ms. Gonzales said. “How about selling fudge after school? I bet the principal would give you permission.”

“Great idea! Everyone loves fudge. I could probably sell enough to cover the trip.”

After school, David stops by Ms. Gonzales’ office.

“Good news, Ms. Gonzales. The principal said I could sell fudge after school next week, Monday through Thursday. Will you help me find some awesome recipes?”

“Of course I will!”

Ms. Gonzales helped David look through cookbooks to pick his recipes and make a shopping list. David made three kinds of fudge: chocolate, vanilla and swirl. He sold the fudge for \$6 a pound. He spent \$60 on ingredients for the fudge.

Below is a chart showing the amount of fudge he sold each day. After the four-day sale, how many pounds of each kind of fudge did he sell? How much money did David earn to pay for his band trip?

Day	Chocolate (pounds)	Vanilla (pounds)	Swirl (pounds)
Monday	$3\frac{7}{8}$	$1\frac{1}{2}$	3
Tuesday	$2\frac{3}{8}$	$3\frac{1}{4}$	$2\frac{2}{3}$
Wednesday	$4\frac{1}{8}$	$2\frac{3}{4}$	$2\frac{1}{3}$
Thursday	$5\frac{5}{8}$	4	$1\frac{1}{2}$

FINDING EQUIVALENT FRACTIONS: $\frac{6}{8}$

- 1) The numerator and denominator in $\frac{6}{8}$ can each be divided by 2 (a common factor) to equal $\frac{3}{4}$.

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

Equivalent fractions: $\frac{6}{8}$ and $\frac{3}{4}$

- 2) The numerator and denominator in $\frac{6}{8}$ can each be multiplied by 3 to equal $\frac{18}{24}$.

$$\frac{6 \times 3}{8 \times 3} = \frac{18}{24}$$

Equivalent fractions: $\frac{3}{4}$, $\frac{6}{8}$ and $\frac{18}{24}$

PRACTICING WITH EQUIVALENT FRACTIONS

- 3) Draw lines connecting the fractions that are equivalent.

$$\frac{2}{3}$$

$$\frac{3}{4}$$

$$\frac{15}{24}$$

$$\frac{5}{8}$$

$$\frac{6}{8}$$

$$\frac{6}{9}$$

- 4) Write three equivalent fractions for each fraction in the list.

$$\frac{1}{5}$$

$$\frac{6}{12}$$

$$\frac{3}{8}$$

Name _____ Date _____

S	__
O	__
L	__
V	__
E	__

S

O

L

Name _____ Date _____

V

E Does my answer match the question? Yes No
Did I check my answer? Yes No

		Tutee used plan correctly	Tutee corrected him/herself	Tutor assistance provided
S	Studied the problem Identified the question to be solved			
O	Organized the facts			
L	Lined up a plan			
V	Verified the plan			
E	Examined the results			

Does my tutee understand common denominators? How do I know?

Are there any problems I need to bring up during debriefing?

Name _____ Date _____

Lesson Log

Name _____ Date _____

- 1) If you want to add $\frac{1}{2}$ and $\frac{3}{4}$ why can't you use 2 as the common denominator?
- 2) What would be a common denominator for 3 and 5?
For 3 and 4?
- 3) A possible common denominator for 4 and 6 is 24. Think of a smaller common denominator for 4 and 6.
- 4) Think of another way you can combine the swirl fudge fractions without finding a common denominator. What do you know about the first two fractions? Can you add those in your head?

$$\begin{array}{r} 3 \\ 2\frac{2}{3} \\ 2\frac{1}{3} \\ + 1\frac{1}{2} \\ \hline \end{array}$$

- 5) We broke a long problem into smaller, more manageable steps. What projects or assignments might be easier if you tried this?
- 6) Update your map and Mileage Log.

