Understand Equivalent Fractions

LESSON 17

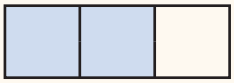
Dear Family,

This week your child is exploring equivalent fractions.

You can show the **equivalent fractions** $\frac{2}{3}$, $\frac{4}{6}$, and $\frac{8}{12}$ with models.

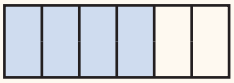
The model at the right is divided into 3 equal parts. The shaded section shows the fraction $\frac{2}{3}$.

$\frac{2}{3}$



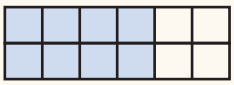
The same model can be divided into 6 equal parts. It has 2 times as many parts shaded and 2 times as many equal parts. The shaded section shows the fraction $\frac{4}{6}$.

$\frac{4}{6}$



The same model can be divided again into 12 equal parts. Now it has 4 times as many parts shaded and 4 times as many equal parts. The shaded section shows the fraction $\frac{8}{12}$.

$\frac{8}{12}$

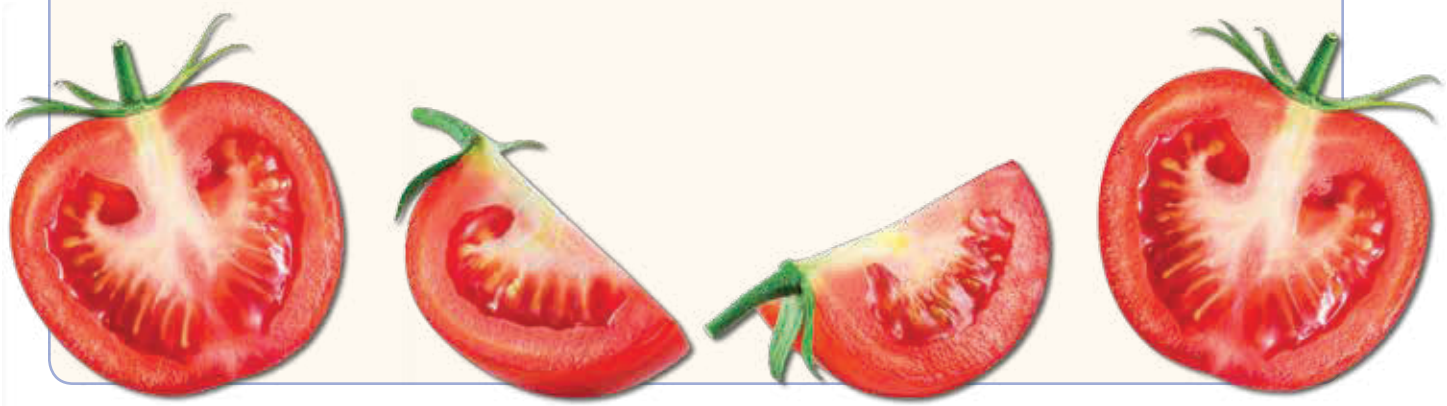


Another way to find equivalent fractions is to multiply both the **numerator** and **denominator** of a fraction by the same number. This is the same as multiplying by 1 because $\frac{2}{2} = 1$ and $\frac{4}{4} = 1$.

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

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

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



ACTIVITY EQUIVALENT FRACTIONS

Do this activity with your child to explore equivalent fractions.

Materials $\frac{1}{8}$-cup measuring cup, soup pot, ingredients shown in the recipe (all optional)

Look at the recipe below for bean soup. Then follow the steps below to find equivalent fractions.

- Suppose the only measuring cup available is a $\frac{1}{8}$-cup measuring cup. Rewrite the recipe so all the ingredients can be measured using only the $\frac{1}{8}$-cup measuring cup. (This means that you will find equivalent fractions with 8 as the denominator.)
- Discuss how the numerator relates to using the $\frac{1}{8}$-cup measuring cup to measure each ingredient. (The numerator is the number of times the measuring cup is filled.)
- Make the recipe for your family to enjoy.

Bean Soup

Ingredients

$\frac{4}{4}$ cup stewed tomatoes
$\frac{3}{4}$ cup canned black beans with liquid
$\frac{1}{2}$ cup cooked rice
$\frac{1}{4}$ cup salsa

Directions

Mix all the ingredients together in a soup pot. Stir.
Heat and serve. Enjoy!

Explore Equivalent Fractions

What is really going on when fractions are equivalent?

Learning Target

- Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

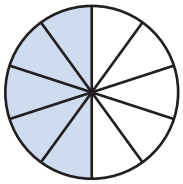
SMP 1, 2, 3, 4, 5, 6, 7

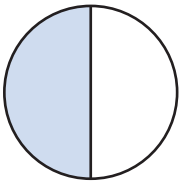
MODEL IT

Complete the problems and models below.

1 Look at the area models below.

a. Write the fraction of each model that is shaded.





....

b. How are the models of the fractions the same? How are they different? Explain.

2 Equivalent fractions name the same part of a whole. Shade the models to show fractions equivalent to $\frac{1}{2}$. Then name the fractions.

$\frac{1}{2}$

a.  .....

b.  .....

DISCUSS IT

- What is the same about the models for the equivalent fractions in problem 2? What is different about the models?
- I think equivalent fractions show the same amount in different ways because . . .

MODEL IT

Complete the models and answer the questions below.

3 Shade each model to represent the fraction shown.

$\frac{1}{3}$

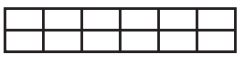
a. Is the size of the area you shaded in each model the same? .....

b. How do you know that $\frac{1}{3}$, $\frac{2}{6}$, and $\frac{4}{12}$ are equivalent fractions?

$\frac{2}{6}$

c. Compare the models. How many times as many equal parts and shaded parts does each model have than the model above it?

$\frac{4}{12}$



4 You can also multiply the numerator and denominator of a fraction by the same number to get an equivalent fraction.

a. Write the missing numbers to complete the equation.

$$\frac{1 \times \square}{3 \times \square} = \frac{2}{6}$$

b. How many times as many is the numerator and denominator in $\frac{2}{6}$ as in $\frac{1}{3}$?

c. Write the missing numbers to show a different equivalent fraction for $\frac{1}{3}$.

$$\frac{1 \times 4}{3 \times \square} = \frac{\square}{\square}$$

DISCUSS IT

- How could you and your partner use multiplication to find another equivalent fraction for $\frac{1}{3}$?
- I think models and equations can help you understand equivalent fractions because . . .

5 REFLECT

Explain how you can divide a rectangle into equal parts to show equivalent fractions.

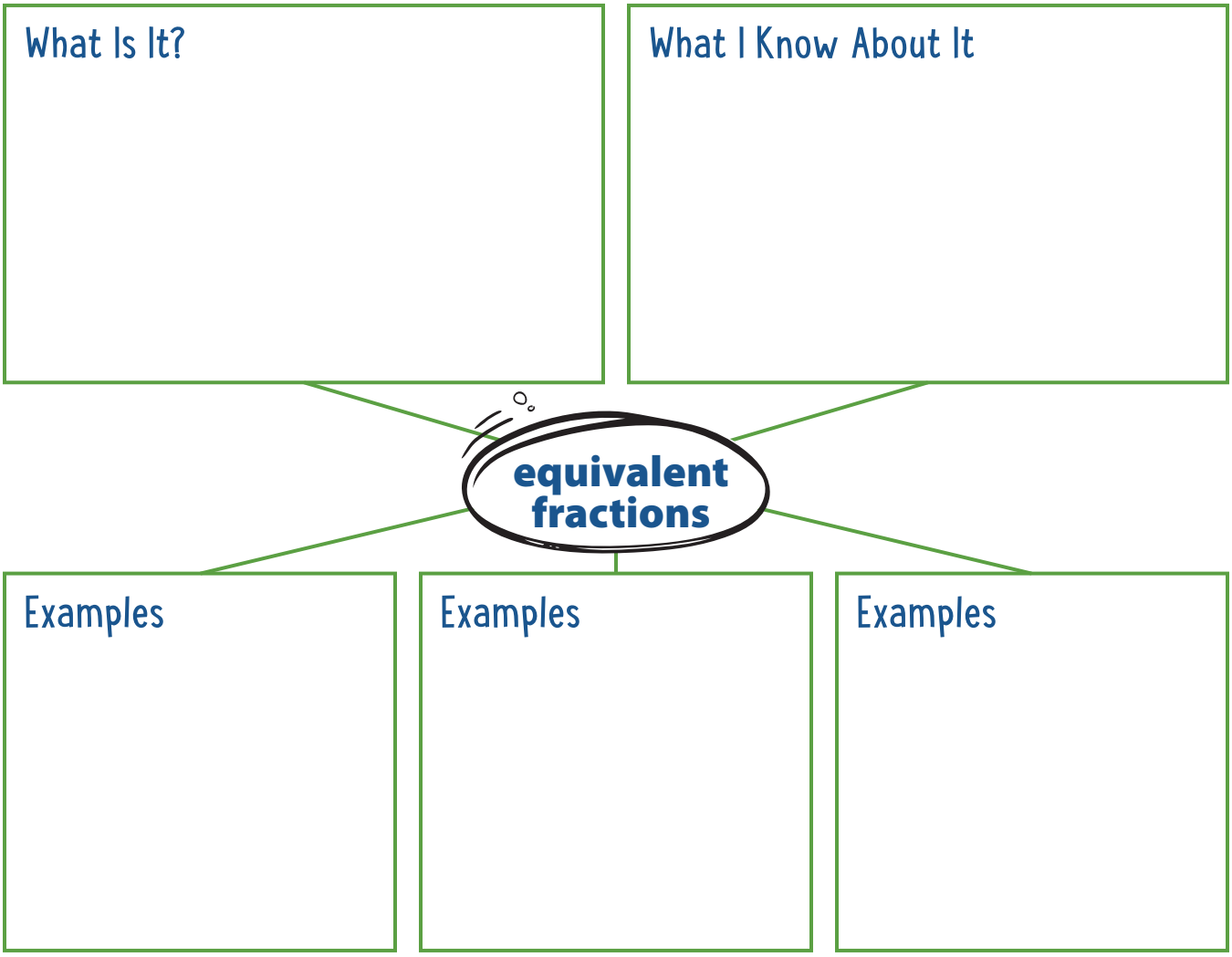
.....

.....

.....

Prepare for Equivalent Fractions

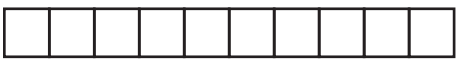
1 Think about what you know about equivalent fractions. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.



2 Shade the models to show fractions equivalent to $\frac{1}{2}$. Then name the fractions.

$\frac{1}{2}$

.....



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Solve.

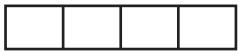
3 Shade each model to represent the fraction shown.

a. Is the size of the area you shaded in each model the same?

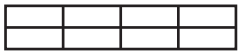
b. How do you know that $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{4}{8}$ are equivalent fractions?

$\frac{1}{2}$

$\frac{2}{4}$



$\frac{4}{8}$



c. Compare the models. How many times as many equal parts and shaded parts does each model have than the model above it?

4 You can also multiply the numerator and denominator of a fraction by the same number to get an equivalent fraction.

a. Write the missing numbers to complete the equation.

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

b. How many times as many is the numerator and denominator in $\frac{2}{4}$ as in $\frac{1}{2}$?

c. Write the missing numbers to show a different equivalent fraction for $\frac{1}{2}$.

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

Develop Understanding of Equivalent Fractions

MODEL IT: AREA MODELS

Try these two problems.

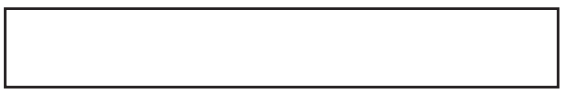
1 Use the model at the right.

a. Shade the model to show the unit fraction $\frac{1}{4}$.

b. Show 8 equal parts in the model and write the equivalent fraction.

c. How do the number and size of the parts compare in the equivalent fractions?

2 Use the model at the right to show $\frac{2}{5}$. Then divide the model into a different number of parts to show an equivalent fraction.



a. What equivalent fraction is shown?

b. How many times as many shaded parts and equal parts are in the equivalent fraction as are in $\frac{2}{5}$?

DISCUSS IT

- Compare your model in problem 2 to your partner's model. How are the models the same? How are the models different?
- I think area models help me understand equivalent fractions because . . .

MODEL IT: EQUATIONS

Use equations to help you think about equivalent fractions.

3 Write the missing numbers to find a fraction equivalent to $\frac{5}{6}$ using multiplication.

$$\frac{5 \times 2}{6 \times \square} = \frac{10}{\square}$$

4 **a.** Write the missing numbers to find a fraction equivalent to $\frac{4}{6}$ using multiplication.

$$\frac{4 \times \square}{6 \times \square} = \frac{8}{\square}$$

b. What happens if you divide both the numerator and denominator in $\frac{4}{6}$ by 2?

5 To find a fraction equivalent to $\frac{6}{8}$, Beth divided by 2 to get 4 in the denominator. What should Beth do to find the numerator? What are the equivalent fractions?

DISCUSS IT

- Look at problems 4a and 5. How did you know what number to multiply or divide by?
- I think using multiplication or division equations can help me find equivalent fractions because . . .

CONNECT IT

Complete the problems below.

6 How can you use area models and equations to make equivalent fractions?

7 Choose any model to find two fractions equivalent to $\frac{2}{6}$.

Practice with Equivalent Fractions

Study how the Example shows one way to model equivalent fractions. Then solve problems 1–8.

EXAMPLE

A model can show equivalent fractions.

The model has 5 equal parts. It shows $\frac{3}{5}$.

Divide the model into 10 equal parts to show an equivalent fraction.

The model shows $\frac{6}{10}$.

$\frac{3}{5} = \frac{6}{10}$

1 Divide the model below to show $\frac{1}{2} = \frac{5}{10}$.

2 Draw a model to show $\frac{1}{6}$. Then divide the model into twice as many parts to find an equivalent fraction.

$\frac{1}{6} =$ .....

3 Multiply the numerator and denominator of $\frac{1}{6}$ by 2. $\frac{1 \times 2}{6 \times 2} =$ .....

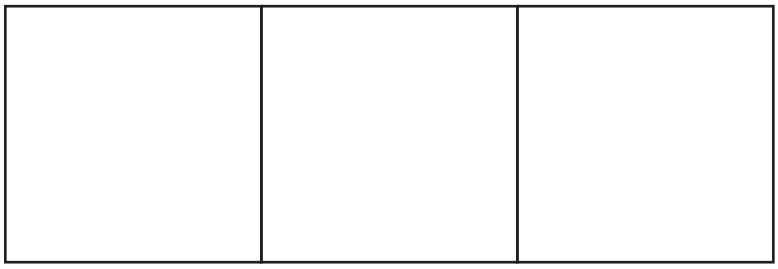
4 Why does it make sense that the fraction you wrote in problems 2 and 3 is the same?

5 Write the missing numbers to find two equivalent fractions to $\frac{4}{5}$.

$\frac{4 \times \square}{5 \times 2} = \frac{\square}{10}$ $\frac{4 \times 20}{5 \times 20} = \frac{\square}{100}$

6 Shade the model below to show $\frac{1}{5}$. Then show 10 equal parts and write an equivalent fraction.

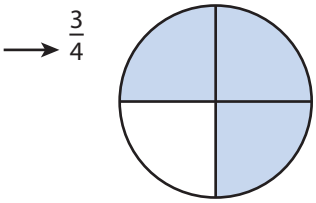
7 Shade the model below to show $\frac{2}{3}$. Then show 12 equal parts and write an equivalent fraction.



8 Chris said that a fraction equivalent to $\frac{9}{12}$ is $\frac{3}{6}$. Is Chris correct? Explain.

Vocabulary

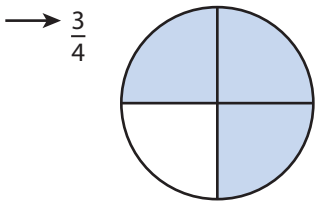
denominator the number below the line in a fraction that tells the number of equal parts in the whole.



4 equal parts

equivalent fractions two or more different fractions that name the same part of a whole or the same point on a number line.

numerator the number above the line in a fraction that tells the number of equal parts that are being described.



3 parts described

Refine Ideas About Equivalent Fractions

APPLY IT

Complete these problems on your own.

1 COMPARE

Use different methods to find two fractions that are equivalent to $\frac{3}{3}$.

2 ILLUSTRATE

Explain why you can multiply both the numerator and denominator by the same number to make an equivalent fraction. Draw a model to show an example.

3 CHOOSE

Fia needs $\frac{3}{4}$ of a cup of brown sugar. She only has a $\frac{1}{3}$-cup measuring cup and a $\frac{1}{8}$-cup measuring cup. Which should she use and why?

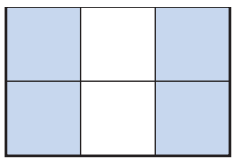
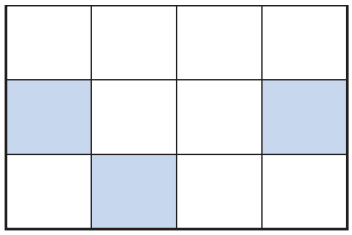
PAIR/SHARE

Discuss your solutions for these three problems with a partner.

APPLY IT

Use what you have learned to complete problem 4.

4 **Part A** The shaded part of each rectangle models a fraction. Draw lines to match the fraction model on the left with an equivalent fraction on the right.

Fraction Models	Fractions
a. 	$\frac{1}{3}$
	$\frac{2}{3}$
b. 	$\frac{10}{12}$
c. 	$\frac{3}{6}$
d. 	$\frac{1}{4}$
	$\frac{6}{10}$

Part B Choose one of the fraction models in Part A. Explain how to use multiplication or division to check the equivalent fraction. Why does this work?

5 MATH JOURNAL

Explain why $\frac{3}{4}$ is equivalent to $\frac{9}{12}$.