Lesson 7 | Equivalent Fractions

Problem Solving: Interpreting a List of Data

Equivalent Fractions

Vocabulary
equivalent fractions

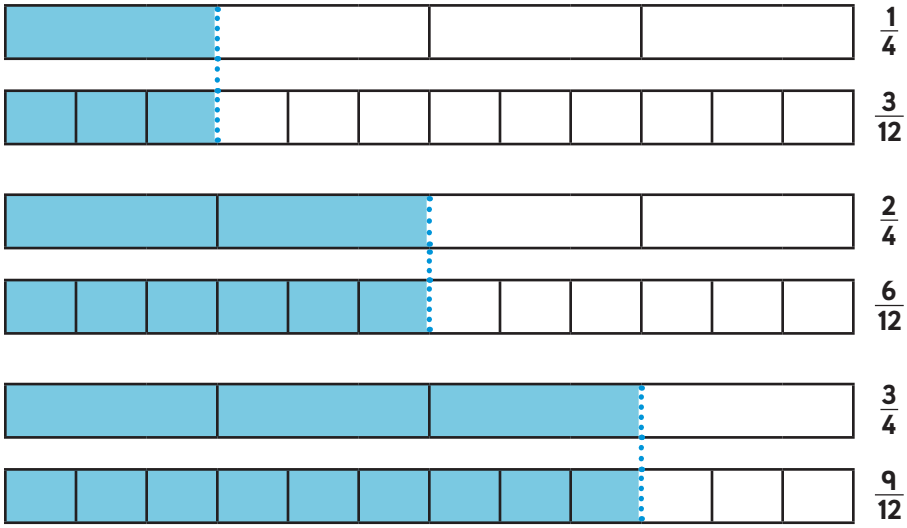
How do fraction bars show that two fractions are the same?

Look at the following fractions.

$\frac{4}{8}$ $\frac{3}{6}$ $\frac{5}{10}$ $\frac{2}{4}$ $\frac{1}{2}$ $\frac{50}{100}$

All the numbers in the numerator are exactly half of the numbers in the denominator. When we draw these fractions using shapes, we shade one-half of the whole shape.

Fraction bars can show that two different fractions are the same, or **equivalent fractions**. The following pairs of fraction bars are made up of different fair shares. But we can line them up and show that the fractions they represent are equivalent. The dotted lines show how these fraction bars line up.



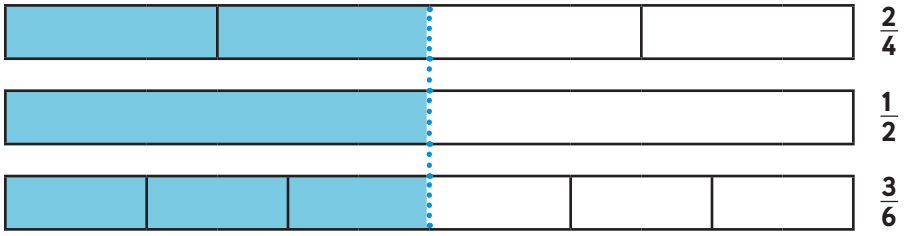
We see the fractions are equivalent because the same area in each fraction bar is shaded.

How do fraction bars show that three different fractions are the same?

We use fraction bars to show how three fractions are equivalent.

Example 1

Compare $\frac{2}{4}$, $\frac{1}{2}$, and $\frac{3}{6}$.



It is easy to see that $\frac{1}{2}$ the area of each fraction bar is shaded. All these fractions represent one-half. They have different numerators and different denominators, but they are all equal to each other. This means we can make the following statement about these three fractions:

$$\frac{2}{4} = \frac{1}{2} = \frac{3}{6}$$

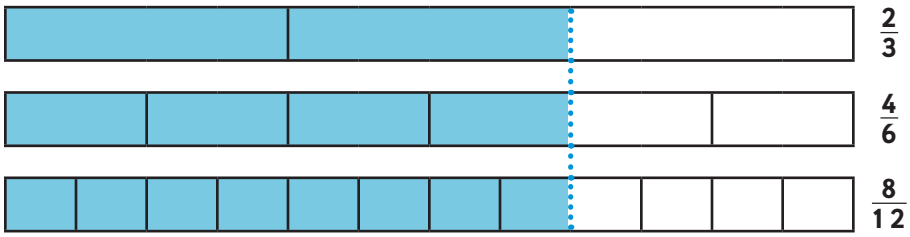
In each fraction, the numerator is half of the denominator. All these fractions represent one-half.

The three fractions are equivalent.

Let's look at another example of equivalent fractions.

Example 2

Compare $\frac{2}{3}$, $\frac{4}{6}$, and $\frac{8}{12}$.



The lengths of the three fraction bars are the same, and the same portion of each bar is shaded. The only difference is the number of total parts each of the bars is divided into.

- The fraction $\frac{2}{3}$ is divided into 3 total parts.
- The fraction $\frac{4}{6}$ is divided into 6 total parts.
- The fraction $\frac{8}{12}$ is divided into 12 total parts.

$$\frac{2}{3} = \frac{4}{6} = \frac{8}{12}$$

The three fractions are equivalent.

When comparing fractions using fraction bars, if the shaded area is the same, the fractions are equivalent fractions.

Apply Skills
Turn to ***Interactive Text***, page 19.

mBook Reinforce Understanding
Use the ***mBook Study Guide*** to review lesson concepts.

▶Problem Solving: Interpreting a List of Data

Vocabulary
stem-and-leaf plot **median**

What are stem-and-leaf plots?

When we try to interpret a list of data, it helps to organize it in a way that makes sense. Imagine a school election for class president. Seven students are on the ballot. The votes are counted by the principal, but they are not arranged in any order on his list.

Candidates	Votes
Sam	132
Joe	147
Sara	122
Rose	158
Paco	125
Paula	147
Jack	129

The list shows the names of the candidates and the number of votes they each received. Let's try to find out how many students received between 120 and 130 votes. It is hard to make sense of the list.

A good way to make sense of the data is to reorganize it. We can write the numbers in a **stem-and-leaf plot**. This way of showing data breaks numbers apart by tens and ones.

Steps for Making a Stem-and-Leaf Plot

STEP 1

Think about each number broken apart by tens and ones.

		Tens	Ones
132	→	13	2

We see that 132 is broken apart into 13 tens, or 130, and 2 ones. The next step is to organize the data from high to low.

STEP 2

Set up the data from high to low by tens and draw lines like the ones on the right.

Stem	Leaf
12	
13	
14	
15	

STEP 3

Fill in the data using just the ones. Be sure to use all the data, and write the data from the smallest to the largest number on each line.

Stem	Leaf
12	2 5 9
13	2
14	7 7
15	8

We see that 3 students received between 120 and 130 votes.

How do we find the median of a set of numbers?

The stem-and-leaf plot has another big advantage. It is easy to find the number in the middle, or the **median**. The *median* is the halfway point in the list of ordered numbers. We have seven numbers in the stem-and-leaf plot so just count down to the middle number. The number 132 is halfway between 158 and 122, so the median number of votes is 132.

Stem	Leaf
12	2 5 9
13	2
14	7 7
15	8

median

If we have an even list of numbers, finding the median takes an extra step. Look at the list and stem-and-leaf plot below. The numbers are already organized from high to low.

27
22
22
20
16
15
14
9

Stem	Leaf
0	9
1	4 5 6
2	0 2 2 7

The median is the halfway point on the list. However, there is not a middle because there are 8 numbers. We make the median for this list by taking the average of the two numbers nearest the middle. If we add 20 + 16, we get 36. Then divide 36 by 2, and we get 18.

The number 18 is the median for this list of even numbers.

Problem-Solving Activity
Turn to ***Interactive Text***, page 20.

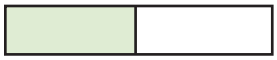
Reinforce Understanding
Use the ***mBook Study Guide*** to review lesson concepts.

Homework

Activity 1

Look at the pictures and estimate the fraction represented by the shaded portion.

1. 

2. 

3. 

4. 

Activity 2

Draw fraction bars to show each of the following equivalences.

1. $\frac{1}{2} = \frac{2}{4}$
2. $\frac{1}{3} = \frac{2}{6}$
3. $\frac{1}{4} = \frac{2}{8}$
4. $\frac{1}{5} = \frac{2}{10}$

Activity 3

Find the median of the following data set.

25, 36, 38, 42, 45, 52, 62, 63, 69

Activity 4 • Distributed Practice

Solve.

1. $576 + 298$
2. $1{,}500 - 700$
3. 43×68
4. 678×2
5. $7\overline{)548}$