

Module 3: Representing Fractions

Mathematics Routines

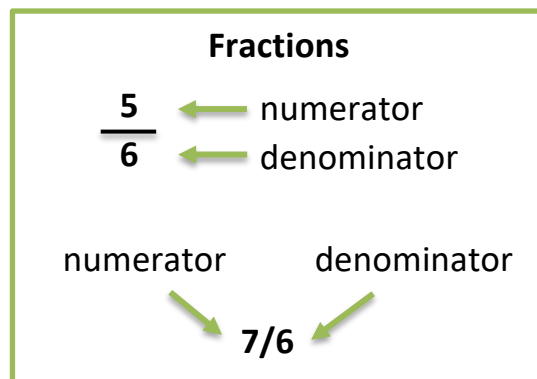
A. Important Vocabulary with Definitions

Term	Definition
denominator	The term in a fraction that tells the number of equal parts in a whole.
equal sign	The symbol that tells you that two sides of an equation are the same, balanced, or equal.
equivalent	Two numbers that have the same value.
fraction	A number representing part of a whole or set.
improper fraction	Any fraction in which the numerator is greater than or equal to the denominator.
mixed number	A whole number and a fraction combined.
numerator	The term in a fraction that tells how many parts of a fraction.
proper fraction	A fraction where the numerator is less than the denominator.

B. Background Information

In this module, we focus on representing fractions. We use three models of fractions: (1) length model, (2) area model, and (3) set model.

When referring to fractions, be sure to use proper vocabulary. Also, present fractions in different ways.



C. Routines and Examples

(1) Length Model

Routine

Materials:

- Module 3 Problem Sets
- Module 3 Vocabulary Cards
 - If necessary, review Vocabulary Cards before teaching
- A hands-on tool or manipulative like fraction tiles, Cuisenaire rods, or number lines

ROUTINE WITH FRACTION TILES



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 2 is a number or 13 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these fraction tiles first.
(Show manipulatives.)
- Teacher** When we show fractions with the fraction tiles, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** I'll place the whole in the middle of my workspace.
(Show whole.)
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to divide this whole into ____ (denominator) equal parts.
How many equal parts?

- Students ____.
- Teacher **So, how could we divide this whole into ____ (denominator) equal parts?**
- Students Divide the whole into ____ equal parts with ____ fraction tiles.
(Show whole divided into equal parts. Place equal parts over the whole or above the whole.)
- Teacher **We showed the whole divided into ____ equal parts. Now, what's the numerator of the fraction?**
- Students ____.
- Teacher **That means we want to show ____ (numerator) of the equal parts in order to show the fraction _____. How many equal parts do we want to show?**
- Students ____.
- Teacher **Let's show ____ of the ____ equal parts.**
(Show the equal parts of the numerator. Leave equal parts over the whole or above the whole.)
- Teacher **What fraction did we show?**
- Students ____.
- Teacher **We showed the fraction _____. First, we divided the whole into ____ equal parts. Then, we showed the ____ equal parts of the fraction. How did we show this fraction?**
- Students We divided the whole into equal parts. Then, we showed the number of equal parts of the fraction.
- Teacher **Now, let's think about this fraction. We should interpret the left side of the whole tile as zero – like zero on a number line. What number?**
- Students Zero.
- Teacher **And if we have only one whole, we should interpret the right side of the whole tile as one – like one on a number line. What number?**
- Students One.
- Teacher **Remember to think about the whole as a number line from 0 to 1 (then 1 to 2, then 2 to 3...). That helps us learn the value of the fraction _____. Where would the fraction $\frac{1}{2}$ be on this whole?**
- Students In the middle between 0 and 1.
- Teacher **Think about $\frac{1}{2}$. What do you notice about ____ (fraction) compared to $\frac{1}{2}$?**
- Students ____ is greater/less than $\frac{1}{2}$.
- Teacher **Yes, I see ____ is greater/less than $\frac{1}{2}$. What else do you notice about ____ (fraction)?**
- Students ____ is greater/less than ____ (benchmark fraction).
- Teacher **Great work! Using these fraction tiles helps you understand the value of different fractions. Let's review. What's a denominator?**
- Students The equal parts in the whole.
- Teacher **What's a numerator?**
- Students How many equal parts we show for a specific fraction.
- Teacher **How can you use the fraction tiles to show a fraction?**

Students

First, you show the whole. Then, you look at the denominator and divide the whole into equal parts. Then, you show the numerator of the fraction by showing the equal parts in the numerator.

ROUTINE WITH CUISENAIRE RODS



Teacher

Let's show different fractions. What's a fraction?

Students

A fraction is a number with a numerator and denominator.

Teacher

A fraction is a number – just like 4 is a number or 65 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?

Students

A numerator and denominator.

Teacher

The denominator tells us about the equal parts in the whole. What does the denominator tell us?

Students

The equal parts in the whole.

Teacher

And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?

Students

How many equal parts we show for a specific fraction.

Teacher

So, let's show different fractions. We'll use Cuisenaire rods.
(Show manipulatives.)

Teacher

When we show fractions with the Cuisenaire rods, let's first start by thinking about the whole. What should we focus on?

Students

The whole.

Teacher

Let's show this fraction.
(Show fraction.)

Teacher

What fraction?

Students

___.

Teacher

What's the denominator of the fraction?

Students

___.

Teacher

That means we want to show a whole with ___ (denominator) equal parts. How many equal parts?

Students

___.

Teacher

So, how could we show a whole with ___ (denominator) equal parts?

Students

Show ___ (denominator) equal parts. Then, find a Cuisenaire rod with a whole that's the same length as the ___ equal parts.

Teacher

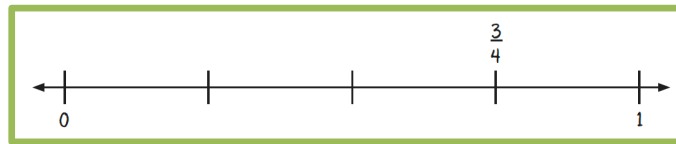
Let's first find ___ (denominator) equal parts. We'll line those up and find a whole that's the same length as the ___ (denominator) equal parts.
(Show whole divided into equal parts. Place equal parts over the whole or above the whole.)

Teacher

So, this rod (say color) shows the denominator. What does this rod show?

- Students The denominator.
- Teacher **Now, what's the numerator of the fraction?**
- Students ____.
- Teacher **That means we want to show ____ (numerator) of the equal parts in order to show the fraction ____.** How many equal parts do we want to show?
- Students ____.
- Teacher **Let's show ____ of the ____ equal parts.**
(Show the equal parts of the numerator. Leave equal parts over the whole or above the whole.)
- Teacher **What fraction did we show?**
- Students ____.
- Teacher **We showed the fraction ____.** First, we divided the whole into ____ equal parts. Then, we showed the ____ equal parts of the fraction. How did we show this fraction?
- Students We divided the whole into equal parts. Then, we showed the equal parts of the fraction.
- Teacher **Now, let's think about this fraction. We should interpret the left side of the whole as zero – like zero on a number line. What number?**
- Students Zero.
- Teacher **And if we have only one whole, we should interpret the right side of the whole as one – like one of a number line. What number?**
- Students One.
- Teacher **Remember to think about the whole as a number line from 0 to 1 (then 1 to 2, then 2 to 3...). That helps us learn the value of the fraction ____.** Where would the fraction $\frac{1}{2}$ be on this whole?
- Students In the middle between 0 and 1.
- Teacher **Think about $\frac{1}{2}$.** What do you notice about ____ (fraction) compared to $\frac{1}{2}$?
- Students ____ is greater/less than $\frac{1}{2}$.
- Teacher **Yes, I see ____ is greater/less than $\frac{1}{2}$.** What else do you notice about ____ (fraction)?
- Students ____ is greater/less than ____ (benchmark fraction).
- Teacher **Great work! Using these Cuisenaire rods helps you understand the value of different fractions. Let's review. What's a denominator?**
- Students The equal parts in the whole.
- Teacher **What's a numerator?**
- Students How many equal parts we show for a specific fraction.
- Teacher **How can you use the Cuisenaire rods to show a fraction?**
- Students First, you determine the equal parts of the whole and find a whole of the same length. Then, you look at the denominator and divide the whole into equal parts. Then, you show the numerator of the fraction by showing the number of equal parts by the numerator.

ROUTINE WITH NUMBER LINE



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 5 is a number or 17 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. Today, let's draw fractions with a number line.
- (Draw a number line.)
- Teacher** When we show fractions with a number line, let's draw a 0 and 1 on the number line.
- (Draw 0 and 1.)
- Teacher** Now, let's start by thinking about the whole. What should we focus on?
- Students** The whole.
- Teacher** Let's show this fraction.
- (Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to show a whole with ____ (denominator) equal parts. How many equal parts?
- Students** ____.
- Teacher** So, how could we show a whole with ____ (denominator) equal parts?
- Students** Draw ____ (denominator) equal parts.
- Teacher** Let's divide this number line into ____ (denominator) equal parts.
- (Divide number line into equal parts by drawing tick marks.)
- Teacher** So, our number line shows ____ equal parts or the denominator. What does the number line show?
- Students** The denominator.
- Teacher** Now, what's the numerator of the fraction?
- Students** ____.

- Teacher** That means we want to show ___ (numerator) of the equal parts in order to show the fraction ___. How many equal parts do we want to show?
- Students** ___.
- Teacher** Let's draw where the fraction ___ is on the number line. I count ___ equal parts. (Draw the fraction on the number line.)
- Teacher** What fraction did we show?
- Students** ___.
- Teacher** We showed the fraction ___. First, we drew a number line. Then, we divided the whole into ___ equal parts. Then, we showed the fraction. How did we show this fraction?
- Students** We divided the number line into equal parts. Then, we determine the numerator – or the number of equal parts – and drew the fraction on the number line.
- Teacher** Let's think about this fraction on a number line from 0 to 1 (then 1 to 2, then 2 to 3...). That helps us learn the value of the fraction ___. Where would the fraction $\frac{1}{2}$ be on this whole?
- Students** In the middle between 0 and 1.
- Teacher** Think about $\frac{1}{2}$. What do you notice about ___ (fraction) compared to $\frac{1}{2}$?
- Students** ___ is greater/less than $\frac{1}{2}$.
- Teacher** Yes, I see ___ is greater/less than $\frac{1}{2}$. What else do you notice about ___ (fraction)?
- Students** ___ is greater/less than ___ (benchmark fraction).
- Teacher** Great work! Using the number line helps you understand the value of different fractions. Let's review. What's a denominator?
- Students** The equal parts in the whole.
- Teacher** What's a numerator?
- Students** How many equal parts we show for a specific fraction.
- Teacher** How can you use the number line to show a fraction?
- Students** First, draw the equal parts of the whole. Then, draw the fraction on the number line.

Example

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

EXAMPLE WITH FRACTION TILES



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number, except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these fraction tiles first.
(Show manipulatives.)
- Teacher** When we show fractions with the fraction tiles, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** I'll place the whole in the middle of my workspace.
(Show whole.)
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** $\frac{3}{4}$.
- Teacher** What's the denominator of the fraction?
- Students** 4.
- Teacher** That means we want to divide this whole into 4 equal parts. How many equal parts?
- Students** 4.
- Teacher** So, how could we divide this whole into 4 equal parts?
- Students** Divide the whole into 4 equal parts with 4 one-fourth fraction tiles.
(Show whole divided into equal parts. Place equal parts over the whole or above the whole.)
- Teacher** We showed the whole divided into 4 equal parts. Each equal part is one-fourth of the whole. Now, what's the numerator of the fraction?
- Students** 3.

- Teacher** That means we want to show 3 of the equal parts in order to show the fraction $\frac{3}{4}$. How many equal parts do we want to show?
- Students** 3.
- Teacher** Let's show 3 of the 4 equal one-fourth parts.
(Show the equal parts of the numerator. Leave equal parts over the whole or above the whole.)
- Teacher** What fraction did we show?
- Students** $\frac{3}{4}$.
- Teacher** We showed the fraction $\frac{3}{4}$. First, we divided the whole into 4 equal parts. Then, we showed the 3 equal parts of the fraction. How did we show this fraction?
- Students** We divided the whole into 4 equal parts. Then, we showed the 3 equal parts of the fraction.
- Teacher** Now, let's think about this fraction. We should interpret the left side of the whole tile as zero – like zero on a number line. What number?
- Students** Zero.
- Teacher** And if we have only one whole, we should interpret the right side of the whole tile as one – like one on a number line. What number?
- Students** One.
- Teacher** Remember to think about the whole as a number line from 0 to 1. That helps us learn the value of the fraction $\frac{3}{4}$. Where would the fraction $\frac{1}{2}$ be on this whole?
- Students** In the middle between 0 and 1.
- Teacher** Think about $\frac{1}{2}$. What do you notice about $\frac{3}{4}$ compared to $\frac{1}{2}$?
- Students** $\frac{3}{4}$ is greater than $\frac{1}{2}$.
- Teacher** Yes, I see $\frac{3}{4}$ is greater than $\frac{1}{2}$. What else do you notice about $\frac{3}{4}$?
- Students** $\frac{3}{4}$ is less than 1.
- Teacher** Excellent! Using these fraction tiles helps you understand the value of different fractions. Let's review. What's a denominator?
- Students** The equal parts in the whole.
- Teacher** What's a numerator?
- Students** How many equal parts we show for a specific fraction.
- Teacher** How can you use the fraction tiles to show a fraction?
- Students** First, you show the whole. Then, you look at the denominator and divide the whole into equal parts. Then, you show the numerator of the fraction by showing the equal parts in the numerator.

(2) Area Model

Routine

Materials:

- Module 3 Problem Sets
- Module 3 Vocabulary Cards
 - If necessary, review Vocabulary Cards before teaching
- A hands-on tool or manipulative like fraction circles, geoboards, or pattern blocks

ROUTINE WITH FRACTION CIRCLES



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 2 is a number or 13 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these fraction circles.
(Show manipulatives.)
- Teacher** These fraction circles can help us see fractions by area. Any area – a circle, triangle, rectangle, or any other area – can also be used to show fractions. What's an area that could be used to show fractions?
- Students** Rectangle or triangle.
- Teacher** When we show fractions with the fraction circles, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** I'll place the whole in the middle of my workspace.
(Show whole.)
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?

Students ____.

Teacher **What's the denominator of the fraction?**

Students ____.

Teacher **That means we want to divide this whole into ____ (denominator) equal parts. How many equal parts?**

Students ____.

Teacher **So, how could we divide this whole into ____ (denominator) equal parts?**

Students Divide the whole into ____ equal parts with ____ fraction tiles.
(Show whole divided into equal parts. Place equal parts over the whole.)

Teacher **We showed the whole divided into ____ equal parts. Now, what's the numerator of the fraction?**

Students ____.

Teacher **That means we want to show ____ (numerator) of the equal parts in order to show the fraction ____.** How many equal parts do we want to show?

Students ____.

Teacher **Let's show ____ of the ____ equal parts.**
(Show the equal parts of the numerator. Leave equal parts over the whole.)

Teacher **What fraction did we show?**

Students ____.

Teacher **We showed the fraction ____.** First, we divided the whole into ____ equal parts. Then, we showed the ____ equal parts of the fraction. How did we show this fraction?

Students We divided the whole into equal parts. Then, we showed the equal parts of the fraction.

Teacher **Now, let's think about this fraction. We're looking at a fraction by area. What would be $\frac{1}{2}$ of this area**

Students Half of the circle.

Teacher **What do you notice about ____ (fraction) compared to $\frac{1}{2}$?**

Students ____ is greater/less than $\frac{1}{2}$.

Teacher **Yes, I see ____ is greater/less than $\frac{1}{2}$.** What else do you notice about ____?

Students ____ is greater/less than 1.

Teacher **Great work! Using these fraction circles helps you understand the area of different fractions. Let's review. What's a denominator?**

Students The equal parts in the whole.

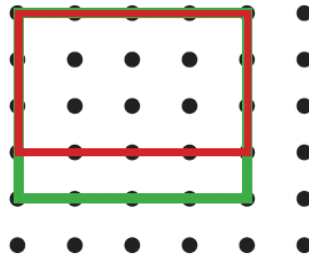
Teacher **What's a numerator?**

Students How many equal parts we show for a specific fraction.

Teacher **How can you use the fraction tiles to show a fraction?**

Students First, you show the whole area. Then, you look at the denominator and divide the whole into equal parts. Then, you show the numerator of the fraction by placing the equal parts of the numerator on the whole.

ROUTINE WITH GEOBOARDS



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 5 is a number or 25 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use this geoboard.
(Show manipulatives.)
- Teacher** This geoboard can help us see fractions by area. Any area – a circle, triangle, rectangle, or any other area – can also be used to show fractions. What's an area that could be used to show fractions?
- Students** Rectangle or triangle or circle or trapezoid.
- Teacher** When we show fractions with the geoboard, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to make an area that can be divided into ____ (denominator) equal parts. How many equal parts?
- Students** ____.
- Teacher** So, how could we make an area divided into ____ (denominator) equal parts?
- Students** Ring the rubber band around ____ equal parts.
(Use rubber band to ring whole divided into equal parts.)
- Teacher** We showed an area or whole divided into ____ equal parts. Now, what's the numerator of the fraction?

Students

Teacher

___.

That means we want to show ___ (numerator) of the equal parts in order to show the fraction ___. How many equal parts do we want to show?

Students

Teacher

___.

Let's show ___ of the ___ equal parts using a different colored rubber band. (Use rubber band to ring equal parts of the numerator.)

Teacher

What fraction did we show?

Students

Teacher

___.

We showed the fraction ___. First, we showed an area divided into ___ equal parts. Then, we showed the ___ equal parts of the fraction. How did we show this fraction?

Students

We showed the area of the whole. Then, we showed the equal parts of the fraction.

Teacher

Now, let's think about this fraction. What's the area of this fraction? What would be $\frac{1}{2}$ of this area?

Students

Half of this shape.

Teacher

What do you notice about ___ (fraction) compared to $\frac{1}{2}$?

Students

___ is greater/less than $\frac{1}{2}$.

Teacher

Yes, I see ___ is greater/less than $\frac{1}{2}$. What else do you notice about ___?

Students

___ is greater/less than 1.

Teacher

Awesome! Using a geoboard helps you understand the area of different fractions. Let's review. What's a denominator?

Students

The equal parts in the whole.

Teacher

What's a numerator?

Students

How many equal parts we show for a specific fraction.

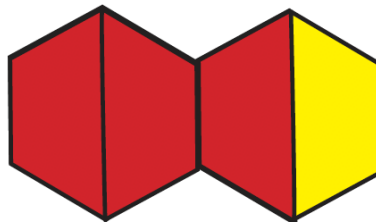
Teacher

How can you use the geoboard to show a fraction?

Students

First, you show the whole. Then, you use a rubber band to show the denominator by dividing the whole into equal parts. Then, you use a second rubber band of a different color to show the fraction.

ROUTINE WITH PATTERN BLOCKS



Teacher

Let's show different fractions. What's a fraction?

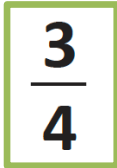
Students

A fraction is a number with a numerator and denominator.

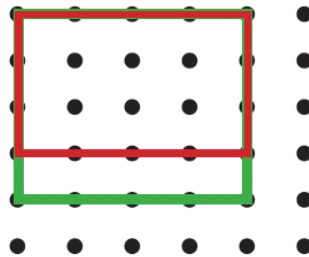
- Teacher** A fraction is a number – just like 14 is a number or 8 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these pattern blocks.
(Show manipulatives.)
- Teacher** These pattern blocks can help us see fractions by area. Any area – a circle, triangle, rectangle, or any other area – can also be used to show fractions. What's an area that could be used to show fractions?
- Students** Octagon or pentagon or triangle.
- Teacher** When we show fractions with the pattern blocks, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to make an area that can be divided into ____ (denominator) equal parts. How many equal parts?
- Students** ____.
- Teacher** So, how could we make an area divided into ____ (denominator) equal parts?
- Students** Use ____ shape.
- Teacher** With pattern blocks, you could use one shape to make the whole. Or you could combine shapes to make a whole.
(Show whole.)
- Teacher** We showed an area or whole divided into ____ equal parts. Now, what's the numerator of the fraction?
- Students** ____.
- Teacher** That means we want to show ____ (numerator) of the equal parts in order to show the fraction _____. How many equal parts do we want to show?
- Students** ____.
- Teacher** Let's show ____ of the ____ equal parts by placing the numerator shapes over the whole.
(Place shapes over the whole.)
- Teacher** What fraction did we show?
- Students** _____.

- Teacher** We showed the fraction _____. First, we showed an area divided into _____ equal parts. Then, we showed the _____ equal parts of the fraction. How did we show this fraction?
- Students** We showed the area of the whole. Then, we showed the equal parts of the fraction.
- Teacher** Now, let's think about this fraction. What's the area of this fraction? What would be $\frac{1}{2}$ of this area?
- Students** Half of the shape.
- Teacher** What do you notice about _____ (fraction) compared to $\frac{1}{2}$?
- Students** _____ is greater/less than $\frac{1}{2}$.
- Teacher** Yes, I see _____ is greater/less than $\frac{1}{2}$. What else do you notice about _____?
- Students** _____ is greater/less than 1.
- Teacher** Great work! Using pattern blocks helps you understand the area of different fractions. Let's review. What's a denominator?
- Students** The equal parts in the whole.
- Teacher** What's a numerator?
- Students** How many equal parts we show for a specific fraction.
- Teacher** How can you use the pattern blocks to show a fraction?
- Students** First, you show the whole with a shape or shapes. Then, you show the numerator of the fraction by placing shapes on top of the whole area.

Example



EXAMPLE WITH GEOBOARDS



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number but the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.

- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use this geoboard.
(Show manipulatives.)
- Teacher** When we show fractions with the geoboard, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** $\frac{3}{4}$.
- Teacher** What's the denominator of the fraction?
- Students** 4.
- Teacher** That means we want to make an area that can be divided into 4 equal parts. How many equal parts?
- Students** 4.
- Teacher** So, how could we make an area divided into 4 equal parts?
- Students** Ring the rubber band around 4 equal parts.
(Use rubber band to ring whole divided into equal parts.)
- Teacher** We showed an area or whole divided into 4 equal parts. Now, what's the numerator of the fraction?
- Students** 3.
- Teacher** That means we want to show 3 of the equal parts in order to show the fraction $\frac{3}{4}$. How many equal parts do we want to show?
- Students** 3.
- Teacher** Let's show 3 of the 4 equal parts using a different colored rubber band.
(Use rubber band to ring equal parts of the numerator.)
- Teacher** What fraction did we show?
- Students** $\frac{3}{4}$.
- Teacher** We showed the fraction $\frac{3}{4}$. First, we showed an area divided into 4 equal parts. Then, we showed the 3 equal parts of the fraction. How did we show this fraction?
- Students** We showed the area of the whole. Then, we showed the equal parts of the fraction.
- Teacher** Now, let's think about this fraction. What would be $\frac{1}{2}$ of this area?
- Students** Half of the shape.
- Teacher** What do you notice about $\frac{3}{4}$ compared to $\frac{1}{2}$?

Students $\frac{3}{4}$ is greater than $\frac{1}{2}$.

Teacher **Yes, I see $\frac{3}{4}$ is greater than $\frac{1}{2}$. What else do you notice about $\frac{3}{4}$?**

Students $\frac{3}{4}$ is less than 1.

Teacher **Awesome! Using a geoboard helps you understand the area of different fractions. Let's review. What's a denominator?**

Students The equal parts in the whole.

Teacher **What's a numerator?**

Students How many equal parts we show for a specific fraction.

Teacher **How can you use the geoboard to show a fraction?**

Students First, you show the whole by ringing a rubber band around an area. Then, you show the numerator of the fraction by ringing the area of the numerator.

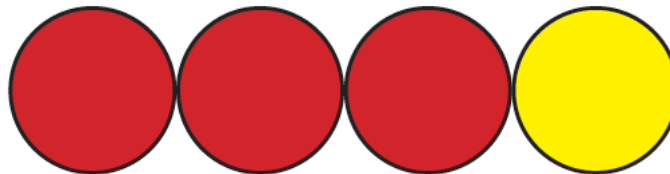
(3) Set Model

Routine

Materials:

- Module 3 Problem Sets
- Module 3 Vocabulary Cards
 - If necessary, review Vocabulary Cards before teaching
- A hands-on tool or manipulative like two-color counters or colored cubes

ROUTINE WITH TWO-COLOR COUNTERS



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 3 is a number or 300 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these two-color counters. (Show manipulatives.)
- Teacher** When we show fractions with the two-color counters, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction. (Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to show ____ (denominator) equal parts. How many equal parts?
- Students** ____.

Teacher So, how could we show a set with ___ (denominator) equal parts?
Students Use ___ counters.
Teacher With two-color counters, we can create a set of ___ (denominator) counters. We'll use the yellow side to show the denominator.
 (Show yellow counters in a set. Place the counters so they are touching one another.)
Teacher We showed a set divided into ___ equal parts. Now, what's the numerator of the fraction?
Students _____.
Teacher That means we want to show ___ (numerator) of the equal parts in order to show the fraction _____. How many equal parts do we want to show?
Students _____.
Teacher We can show the numerator by turning over the counter to the red side.
 (Turn counters to red side.)
Teacher What fraction did we show?
Students _____.
Teacher We showed the fraction _____. First, we showed a set divided into ___ equal parts. Then, we showed the ___ equal parts of the fraction. How did we show this fraction?
Students We showed a set of yellow counters for the denominator, then we turned over counters to the red side to show the numerator.
Teacher Now, let's think about this fraction. What would be $\frac{1}{2}$ of this set?
Students Half of the counters.
Teacher What do you notice about ___ (fraction) compared to $\frac{1}{2}$?
Students ___ is greater/less than $\frac{1}{2}$.
Teacher Yes, I see ___ is greater/less than $\frac{1}{2}$. What else do you notice about ___?
Students ___ is greater/less than 1.
Teacher Great work! Using the two-color counters helps you understand how sets can be used to show different fractions. Let's review. What's a denominator?
Students The equal parts in the whole.
Teacher What's a numerator?
Students How many equal parts we show for a specific fraction.
Teacher How can you use the two-color counters to show a fraction?
Students We showed a set of yellow counters to show the denominator, then we turned over the counters to the red side to show the numerator or fraction.

ROUTINE WITH COLORED CUBES



- Teacher** Let's show different fractions. What's a fraction?
- Students** A fraction is a number with a numerator and denominator.
- Teacher** A fraction is a number – just like 150 is a number or 15 is a number. Except with a fraction, the number has a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these colored cubes.
(Show manipulatives.)
- Teacher** When we show fractions with the cubes, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** ____.
- Teacher** What's the denominator of the fraction?
- Students** ____.
- Teacher** That means we want to show ____ (denominator) equal parts. How many equal parts?
- Students** ____.
- Teacher** So, how could we show a set with ____ (denominator) equal parts?
- Students** Use ____ cubes.
- Teacher** With the cubes, let's use one color to show the denominator. Let's place ____ (denominator) ____ (color) cubes in a set.
(Show cubes in a set. Place the cubes so they are close to one another – to show a set of objects.)
- Teacher** We showed a set divided into ____ equal parts. Now, what's the numerator of the fraction?
- Students** ____.
- Teacher** That means we want to show ____ (numerator) of the equal parts in order to show the fraction _____. How many equal parts do we want to show?
- Students** ____.

Teacher

With the cubes, let's use another color to show the numerator. We'll replace ___ (denominator) cubes with ___ (new color) cubes.
(Show numerator cubes in a different color by replacing the denominator cubes.)

Teacher

What fraction did we show?

Students

___.

Teacher

We showed the fraction ___. First, we showed a set of cubes divided into ___ equal parts. Then, we showed the ___ equal parts of the fraction. How did we show this fraction?

Students

We showed a set of cubes for the denominator, then we used different colored cubes to show the numerator.

Teacher

Now, let's think about this fraction. What would be $\frac{1}{2}$ of this set?

Students

Half of the cubes.

Teacher

What do you notice about ___ (fraction) compared to $\frac{1}{2}$?

Students

___ is greater/less than $\frac{1}{2}$.

Teacher

Yes, I see ___ is greater/less than $\frac{1}{2}$. What else do you notice about ___?

Students

___ is greater/less than 1.

Teacher

Super! Using the colored cubes helps you understand how sets can be used to show different fractions. Let's review. What's a denominator?

Students

The equal parts in the whole.

Teacher

What's a numerator?

Students

How many equal parts we show for a specific fraction.

Teacher

How can you use the colored cubes to show a fraction?

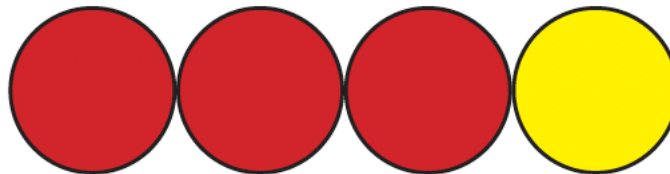
Students

First, you show a set of the whole with cubes. Then, you use a different colored cube to show the numerator within that set.

Example

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

EXAMPLE WITH TWO-COLOR COUNTERS



Teacher

Let's show different fractions. What's a fraction?

Students

A fraction is a number with a numerator and denominator.

- Teacher** A fraction is a number with a numerator and denominator. What does a fraction have?
- Students** A numerator and denominator.
- Teacher** The denominator tells us about the equal parts in the whole. What does the denominator tell us?
- Students** The equal parts in the whole.
- Teacher** And the numerator tells us how many equal parts should be shown in a specific fraction. What does the numerator tell us?
- Students** How many equal parts we show for a specific fraction.
- Teacher** So, let's show different fractions. We'll use these two-color counters.
(Show manipulatives.)
- Teacher** When we show fractions with the two-color counters, let's first start by showing the whole. What should we show?
- Students** The whole.
- Teacher** Let's show this fraction.
(Show fraction.)
- Teacher** What fraction?
- Students** $\frac{3}{4}$.
- Teacher** What's the denominator of the fraction?
- Students** 4.
- Teacher** That means we want to show 4 equal parts. How many equal parts?
- Students** 4.
- Teacher** So, how could we show a set with 4 equal parts?
- Students** Use 4 counters.
- Teacher** With two-color counters, we can create a set of 4 counters. We'll use the yellow side to show the denominator.
(Show 4 yellow counters in a set. Place the counters so they are touching one another.)
- Teacher** We showed a set divided into 4 equal parts. Now, what's the numerator of the fraction?
- Students** 3.
- Teacher** That means we want to show 3 of the equal parts in order to show the fraction $\frac{3}{4}$. How many equal parts do we want to show?
- Students** 3.
- Teacher** We can show the numerator by turning over 3 counters to the red side.
(Turn 3 counters to red side.)
- Teacher** What fraction did we show?
- Students** $\frac{3}{4}$.
- Teacher** We showed the fraction $\frac{3}{4}$. First, we showed a set divided into 4 equal parts. Then, we showed the 3 equal parts of the fraction. How did we show this fraction?

- Students We showed a set of 4 yellow counters for the denominator, then we turned over 3 counters to the red side to show the numerator.
- Teacher **Now, let's think about this fraction. What would be $\frac{1}{2}$ of this set?**
- Students Half of the counters – or 2 counters.
- Teacher **What do you notice about $\frac{3}{4}$ compared to $\frac{1}{2}$?**
- Students $\frac{3}{4}$ is greater than $\frac{1}{2}$.
- Teacher **Yes, I see $\frac{3}{4}$ is greater than $\frac{1}{2}$. What else do you notice about $\frac{3}{4}$?**
- Students $\frac{3}{4}$ is less than 1.
- Teacher **Great work! Using the two-color counters helps you understand how sets can be used to show different fractions. Let's review. What's a denominator?**
- Students The equal parts in the whole.
- Teacher **What's a numerator?**
- Students How many equal parts we show for a specific fraction.
- Teacher **How can you use the two-color counters to show a fraction?**
- Students First, you show a set of the whole by showing a set with yellow counters. Then, you turn over counters to the red side for the numerator.

D. Problems for Use During Instruction

See Module 3 Problem Sets.

E. Vocabulary Cards for Use During Instruction

See Module 3 Vocabulary Cards.

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