Fractions Using Models

Mathematical Goals

- When 1 whole is represented by some enclosed region such as a circle, a rectangle, or other shape, the model is referred to as an area model.
- When more than one equal-sized section within an area model is shaded, the fraction that represents that part of the whole is not a unit fraction. That is, the fraction will not have a numerator of 1.

Misconceptions Addressed -



- Writes a fraction or a probability as whole-to-part not part-to-whole
- Does not understand how fractions are represented in diagrams/models
- When interpreting a fraction model, thinks the fraction is part-to-part or whole-to-part
- Does not understand that fractions are numbers as well as portions of a whole

Materials Needed

- Student pages and markers
- Response boards
- Show Me Cards FD5-1 through FD5-5
- ✓ Large paper to draw sample lengths large enough for students to see (11" × 17" recommended)

Focus on Language -

Model the use of this term and encourage students to use it throughout the lesson. Consider displaying the term so students can see it as they work.

• area model

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RESPONSE BOARDS

Begin the lesson by using Show Me Cards **FD5-1** through **FD5-5**. During today's show me, students will find what fractions are shown by arrows on the number line. Have students answer the following questions on their response boards.

• Write the fraction that is shown by this arrow ...



To finish, have students complete the show me problem in the student pages.



Student page 17

> setting the direction

Introduce today's lesson by telling students that they are going to focus on showing 1 whole using an area model

Tell students that some ways we can represent an area model are to draw 1 whole as a circle, a rectangle, or a square.

What do you think is required for a drawing to represent an area model?

Answer: It just has to be a closed shape that has area inside of it. For example, a circle is a closed shape that contains area inside.



english language learners

Make sure you show what you are saying so that students can follow along. It would be helpful to show students an area model and point out what you mean by *closed figure*.

Tell students that the fractions they will find as answers today will not be unit fractions, but that determining the fraction value of each equal-sized piece within each area shape will be helpful.



work time

Presenting the Task

Read problem 1 aloud to students.

Tell students that problems 2 through 4 are very similar to problem 1 and that they will read those problems with their partners as they work on problems 1 through 4 using partner work.

Have students work problems 1 through 4 using partner work.

⊃ work time
1. a. How many equal pieces is this circle divided into? 6
b. What is the size of each piece? $\frac{1}{6}$
c. How many pieces are shaded? 2
d. Write the fraction that tells what part of the circle is shaded. $\frac{2}{6}$
2. a. How many equal pieces is this square divided into? 8
b. What is the size of each piece? $\frac{1}{8}$
c. How many pieces are shaded? 3
d. Write the fraction that tells what part of the square is shaded. $\frac{3}{8}$
3. a. How many equal pieces is this rectangle divided into? 8
b. What is the size of each piece? $\frac{1}{8}$
c. How many pieces are shaded? 3
d. Write the fraction that tells what part of the rectangle is shaded. $\frac{3}{8}$
4. a. How many equal pieces is this triangle divided into? 3
b. What is the size of each piece? $\frac{1}{3}$
c. How many pieces are shaded? 2
d. Write the fraction that tells what part of the triangle is shaded. $\frac{2}{3}$

Student pages 17–18

After 14 minutes of partner work, instruct students that they are going to switch to solo work to answer problem 5.

Read problem 5 aloud to students.

Have students work problem 5 using solo work.

(5.) a. Compare your answers to problems 2 and 3. What is the same? The number of pieces in the whole and
number of shaded pieces are the same.
The fraction that is shaded in both figures is $\frac{3}{8}$.
b. What is different?
The shapes of the figures.
The ways they are divided.
The sizes of the pieces.
Student page 19



Look for students who write their fractions as part-to-part rather than part-to-whole.



probing for understanding

Ask different partner pairs to share their answers to problems 1 through 4.

As students provide answers, ask the rest of the group if they agree. If there is any disagreement, have a couple of students explain their reasoning until all students agree on the correct answers.

Then, ask several students to read aloud their answers to problem 5a. As students read their answers, be sure to listen for ways they compared items such as the number of total pieces and the number of shaded pieces.

Answers will vary: Students might say are that the number of pieces in the whole and the number of

shaded pieces are the same. They may also say that the fraction that is shaded in both figures is $\frac{3}{2}$.

Next, ask several students to read aloud their answers to problem 5b. As students read their answers, be sure to listen for ways they compared items such as the shapes of the figures or the way they are divided.

Answers will vary: Students may say the shapes of the figures are different, the ways they are divided are different, or the sizes of the pieces are different.

Finally, close the lesson by asking students if they can describe a third way that they could represent $\frac{3}{8}$ using an area model.

Answers will vary: One description a student may say is that you could draw a circle to represent 1 whole and then divide the circle into 8 equal pieces. Then, shade in 3 of the pieces to represent $\frac{3}{2}$

Students are asked to explain in problems 5a and 5b how the area models in problems 2 and 3 are alike and how they are different. Answers may vary greatly, but be sure that students are explaining their own reasoning as well as making sense of others' reasoning. For example, as they listen to others' explanations of similarities and differences, you can ask students if they had similar explanations. Students can say how their explanations were like other students' explanations and by doing so, they will demonstrate that they not only listened to others' reasoning, but made sense of it. Students will also improve their own abilities to reason as they compare their answers to others' answers.

reflection

Writing the Reflection

Have students respond to the reflection prompt.

\supset	reflection
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I can draw an area model of $\frac{5}{8}$ like this...

Student page 19

Fractions Using Area Models





> work time

- **1.** a. How many equal pieces is this circle divided into?
 - b. What is the size of each piece?
 - c. How many pieces are shaded?



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- 2. a. How many equal pieces is this square divided into?
 - b. What is the size of each piece?
 - c. How many pieces are shaded?
 - d. Write the fraction that tells what part of the square is shaded.
- **3.** a. How many equal pieces is this rectangle divided into?
 - b. What is the size of each piece?
 - c. How many pieces are shaded?
 - d. Write the fraction that tells what part of the rectangle is shaded.
- **4.** a. How many equal pieces is this triangle divided into?
 - b. What is the size of each piece?
 - c. How many pieces are shaded?
 - d. Write the fraction that tells what part of the triangle is shaded.

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5. a. Compare your answers to problems 2 and 3. What is the same?

b. What is different?

C reflection

I can draw an area model of $\frac{5}{8}$ like this...

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	8 8	Correct Answer Instructional Strategies	Write the fraction that is shown by this arrow.
Fold Here	SHOW ME CARD FD 5-1		FRACTIONS AND DECIMALS

parts are shown?

How many equal parts are hopped? How many total

Show me the fraction.





Show me the fraction.

 • How many equal parts are hopped? How many total parts are shown?

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Show me the fraction.

parts are shown? • How many equal parts are hopped? How many total

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	9	Correct Answer	
Fold Here	SHOW ME CARD FD 5-4		FRACTIONS AND DECIMALS

Instructional Strategies

Pow many equal parts are hopped? How many total

8

Write the fraction that is shown by this arrow.

Show me the fraction.





• How many equal parts are hopped? How many total

parts are shown?

Show me the fraction.

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