

Dividing by Fractions

Purpose

Students will explain how to divide positive fractions and perform the calculations.

Materials

For the teacher: overhead projector, overhead markers, set of transparent fraction bars

For each student: copies of Black Line Masters (BLMs) *Fraction Bars* and *Dividing Fractions*

Activity

A. Introduction

1. Tell students they are going to be learning about dividing by fractions.
2. Review with students what division is (separating a number of things into equal groups, i.e., $25 \div 5$ means separating 25 into 5 equal groups).
3. Place 2 whole fraction bars on the overhead. Place $\frac{1}{4}$ fraction pieces under the 1s strips. Ask: "How many $\frac{1}{4}$ strips can 2 wholes be divided into?" [8] Write: " $2 \div \frac{1}{4} = 8$."
4. Write: " $\frac{3}{4} \div \frac{2}{8}$ " on the overhead.
5. Using transparency pieces show $\frac{3}{4}$. Tell students you are going to divide $\frac{3}{4}$ by $\frac{2}{8}$.
6. Place $\frac{1}{8}$ pieces below the $\frac{3}{4}$ until you have an amount equal to three-fourths.
7. Ask: "How many groups of 2 one-eighth pieces were needed to equal 3 one-fourth pieces?" [3] Write: " $\frac{3}{4} \div \frac{2}{8} = 3$."

B. Teacher-Led Activity

1. Hand out BLM *Fraction Bars*. Have students cut out the bars.
2. Have students work in groups of three or four so that they will have more than one set of fraction bars.
3. Give students problems similar to the two problems in the introduction to work out with the fraction bars.
4. Write the problem and answer to each problem on the overhead. Encourage the students to look for patterns that could lead them to the algorithm for dividing by fractions.

(continued)



INCORPORATING TECHNOLOGY

Have students use online programs such as www.aaamath.com to practice dividing by fractions.



MEETING INDIVIDUAL NEEDS

For students having difficulty understanding dividing with fractions, try this example using money. Show students a dollar bill and ask what happens if you divide the dollar into quarters. Then show students the resulting four quarters. Have students write the mathematical expression for this process ($\$1.00 \div \frac{1}{4} = 4$). Repeat the example using $\frac{1}{10}$ and dimes.

Standards Link 6.2.2

Activity (continued)

C. Teaching the Algorithm

1. Ask students to verbalize the patterns they found from dividing fractions with fraction bars. Accept all responses. Prompt students for the correct response. Students should realize the solution can be obtained by changing the problem into a multiplication problem and switching the numerator and denominator of the divisor. Stress to students that this works through inverse or opposite operations.
2. Have the students re-do the examples in section B above using this new algorithm. (For an activity that introduces the concept of multiplying fractions, see the activity for Standard Indicator 6.2.4, "Multiplying Fractions".)
3. Introduce the term *reciprocal* (reciprocals are two fractions whose product is 1. Example: $\frac{1}{2}$ and $\frac{2}{1}$).
4. Ask students to name the reciprocals of each of the following:
 $\frac{3}{4}$ [$\frac{4}{3}$], $\frac{1}{5}$ [$\frac{5}{1}$], $\frac{3}{4}$ [$\frac{4}{3}$], $\frac{5}{2}$ [$\frac{2}{5}$].
5. Write $2 \div \frac{1}{4}$ on the board again. Tell students that a whole number should be written as an improper fraction when dividing. So the problem becomes $\frac{2}{1} \div \frac{1}{4}$.
6. Tell students the next step in dividing by a fraction is to replace the \div sign with a \times sign and replace the second fraction with its reciprocal. The problem then becomes: $\frac{2}{1} \times \frac{4}{1} = \frac{8}{1}$ or 8
7. Have students work along with you on the following problems:
 $\frac{6}{10} \div \frac{1}{5} =$ $5 \div \frac{1}{4} =$ $\frac{2}{5} \div \frac{2}{3} =$ $4 \div \frac{3}{4} =$
8. Have students work in their groups to generate similar problems and to check each other for understanding.


D. Homework


Have students complete the BLM *Dividing Fractions* individually.


Classroom Assessment

Basic Concepts and Processes

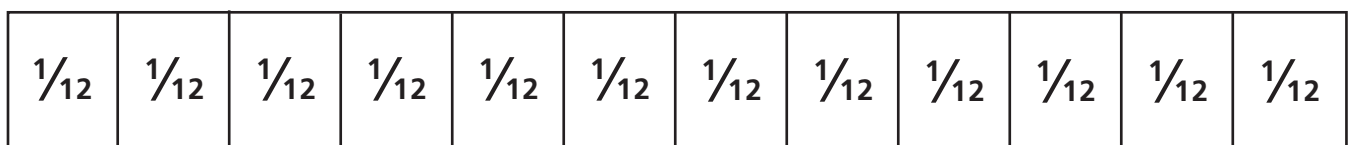
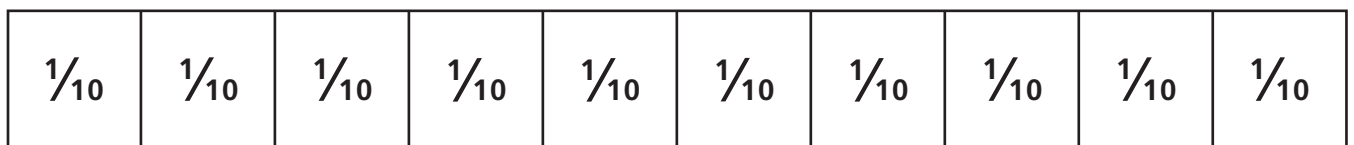
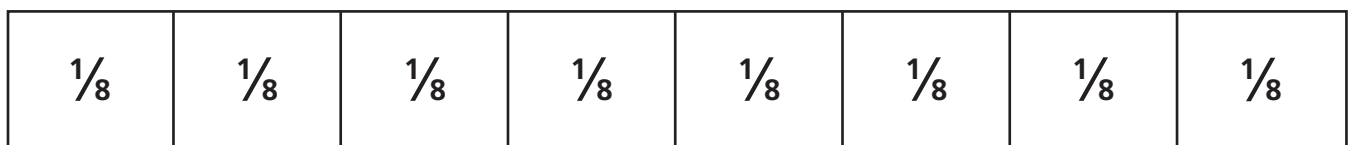
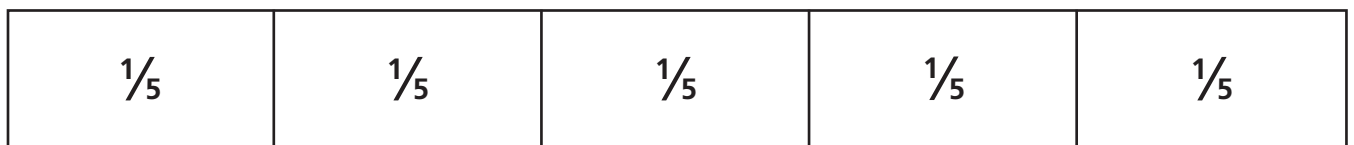
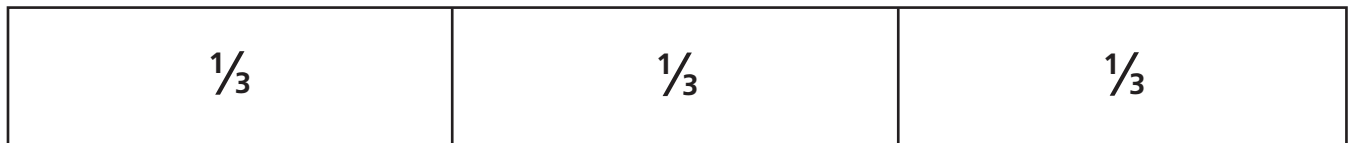
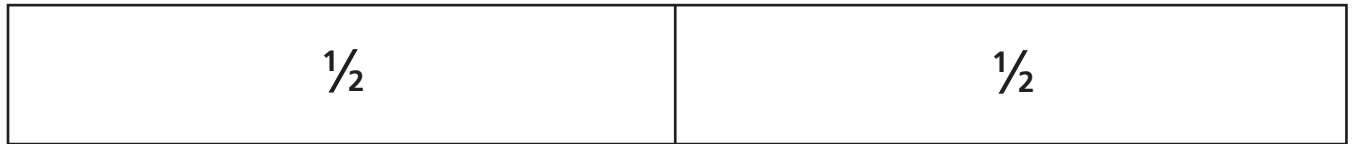
During the activity, discuss the following questions with your students to gauge their understanding of the Standard Indicator:

 What is the reciprocal of $\frac{7}{8}$?

 How would you determine the reciprocal of $3\frac{3}{4}$?

 What is the solution of $\frac{3}{4} \div 2$?

Fraction Bars



Fraction Bars

Teacher Directions

Distribute copies of the BLM *Fraction Bars*. Have students use the BLM to make models to help in understanding. Direct students to complete the BLM *Dividing Fractions* to practice this Standard Indicator.

Answer Key

Not applicable.

Dividing Fractions

1. Divide:

(a) $\frac{1}{2} \div \frac{2}{3} =$

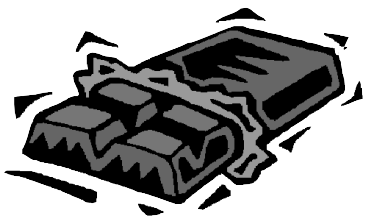
(b) $\frac{2}{5} \div \frac{4}{7} =$

(c) $6 \div \frac{8}{15} =$

(d) $\frac{3}{5} \div \frac{9}{25} =$

(e) $\frac{7}{8} \div 2\frac{1}{16} =$

(f) $1\frac{2}{15} \div 3 =$



2. Bob wants to share his chocolate bar with his friends. He has $\frac{2}{3}$ of a bar and he wants to give each friend $\frac{1}{6}$ of it. How many friends can Bob feed?

3. Farmer Fred has $\frac{4}{5}$ of an acre of farmland. He wants to plant 8 different crops this year. What fraction of an acre will he have for each crop?

4. How many strips of wallpaper $\frac{4}{45}$ m long can be cut from a strip $\frac{2}{5}$ m long?



Dividing Fractions

Teacher Directions

Distribute the BLM *Dividing Fractions* to students. Have students use the BLM *Fraction Bars* to make models to help in understanding. Students complete BLM *Dividing Fractions* to practice this Standard Indicator.

Answer Key

1.

(a) $\frac{3}{4}$

(b) $\frac{7}{10}$

(c) $11\frac{2}{8}$ or $11\frac{1}{4}$

(d) $1\frac{2}{3}$

(e) $\frac{2}{3}$

(f) $\frac{4}{15}$

2. 4 friends

3. $\frac{1}{10}$ acre

4. $4\frac{1}{2}$ strips