9•3 Using a Calculator to Convert Fractions to Decimals

Objectives To introduce renaming any fraction as a decimal by using a calculator; and to reinforce fraction/percent equivalencies for fourths, fifths, and tenths.

1 Teaching the Lesson

Key Activities

Students rename fractions as decimals by dividing on their calculators. Students observe that the decimal equivalent to a fraction is either a terminating decimal or a repeating decimal.

Key Concepts and Skills

- Explore terminating and repeating decimals. [Number and Numeration Goal 5]
- Use a calculator to rename fractions as decimals. [Number and Numeration Goal 5]
- Describe patterns in terminating and repeating decimals. [Patterns, Functions, and Algebra Goal 1]

Key Vocabulary

terminating decimal • repeating decimal

Ongoing Assessment: Recognizing Student Achievement Use Mental Math and Reflexes. [Number and Numeration Goal 5]

materials

- ☐ *Math Journal 2,* pp. 342 and 343
- ☐ Study Link 9•2
- ☐ Teaching Aid Master (*Math Masters,* p. 388 or 389)
- ☐ calculator
- ☐ slate

2 Ongoing Learning & Practice

Students play *Fraction/Percent Concentration* to practice "easy" fraction/percent equivalencies.

Students practice and maintain skills through Math Boxes and Study Link activities.

materials

- ☐ *Math Journal 2,* p. 255
- ☐ *Student Reference Book,* p. 246
- ☐ Study Link Master (*Math Masters,* p. 284)
- ☐ Game Masters (*Math Masters,* pp. 481 and 482)
- ☐ calculator
- ☐ scissors

***See* Advance Preparation**

3 Differentiation Options

ENRICHMENT

Students name "easy" fractions and mixed numbers that are close but not equivalent to given decimals.

EXTRA PRACTICE

Partners use flash cards to help each other memorize equivalent names for fractions, decimals, and percents.

materials

- ☐ Teaching Aid Masters (*Math Masters,* pp. 388 or 389, and 446)
- ☐ scissors

Additional Information

Advance Preparation For Part 2, consider copying the *Fraction/Percent Concentration* Cards (*Math Masters,* pages 481 and 482) on cardstock.

Technology

Assessment Management System
Mental Math and Reflexes
See the **iTLG.**

Getting Started

Mental Math and Reflexes ★

Write fractions on the board. For each fraction, students write the equivalent decimal and percent on their slates. Have students explain their strategies for the ●●● problems.
Suggestions:

●○○ $\frac{41}{100}$ 0.41, 41%
$\frac{93}{100}$ 0.93, 93%
$\frac{9}{10}$ 0.9, 90%
$\frac{6}{100}$ 0.06, 6%

●●○ $\frac{1}{4}$ 0.25, 25%
$\frac{3}{4}$ 0.75, 75%
$\frac{1}{5}$ 0.20, 20%
$\frac{4}{5}$ 0.80, 80%

●●● $\frac{4}{2}$ 2, 200%
$\frac{1}{20}$ 0.05, 5%
$\frac{11}{20}$ 0.55, 55%
$\frac{9}{25}$ 0.36, 36%

Math Message

Use your calculator to divide the numerators of the following fractions by the denominators: $\frac{1}{2}$, $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{6}{10}$. What do you notice?

Study Link 9•2 Follow-Up

Have students compare answers and discuss the fractions they chose. For example, a nickel could be represented by $\frac{5}{100}$ or $\frac{1}{20}$. Have them consider which form they might find more helpful to figure decimals and percents.

Ongoing Assessment: Recognizing Student Achievement

Mental Math and Reflexes ★

Use **Mental Math and Reflexes** to assess students' ability to rename fourths, fifths, tenths, and hundredths as decimals and percents. Students are making adequate progress if they are able to answer the ●○○ and ●●○ problems correctly. Some students may be able to solve the ●●● problems.

[Number and Numeration Goal 5]

1 Teaching the Lesson

Math Message Follow-Up

WHOLE-CLASS ACTIVITY

(*Math Journal 2,* pp. 342 and 343)

Have volunteers share their observations. One possible answer is:

▷ The number on the calculator display is the decimal name for the fraction. For example, 1 divided by 2 = 0.5. This is the decimal name for $\frac{1}{2}$.

Have students turn to journal pages 342 and 343 to verify that these are the correct decimal names for the fractions.

Help students summarize: One way to rename a fraction as a decimal is to divide its numerator by its denominator.

Tell students that in this lesson they will practice using a calculator to rename any fraction as a decimal.

Student Page

Games

Fraction/Percent Concentration

Materials ☐ 1 set of Fraction/Percent Tiles (*Math Masters,* pp. 481 and 482)
☐ 1 calculator

Players 2 or 3

Skill Recognizing fractions and percents that are equivalent

Object of the game To collect the most tiles by matching equivalent fraction and percent tiles.

Directions

Advance Preparation Before beginning the game, write the letter "F" on the back of each fraction tile. And write the letter "P" on the back of each percent tile.

1. Spread the tiles out number-side down on the table. Create 2 separate piles—a fraction pile and a percent pile. Mix up the tiles in each pile. The 12 fraction tiles should have the letter "F" showing. The 12 percent tiles should have the letter "P" showing.
2. Players take turns. At each turn, a player turns over both a fraction tile and a percent tile. If the fraction and the percent are equivalent, the player keeps the tiles. If the fraction and the percent are not equivalent, the player turns the tiles number-side down.
3. Players may use a calculator to check each other's matches.
4. The game ends when all tiles have been taken. The player with the most tiles wins.

Variations Write the letter "D" on the back of each decimal tile. Play the game using only the "F" and "D" tiles. Or, play the game using only the "P" and "D" tiles.

10%	20%	25%	30%
40%	50%	60%	70%
75%	80%	90%	100%
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{5}$
$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{10}$
$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{2}{2}$

Fraction/Percent Tiles (number-side up)

***Student Reference Book,* p. 246**

Game Master

Name Date Time

Fraction/Percent Concentration

10%	20%	25%	30%
40%	50%	60%	70%
75%	80%	90%	100%
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{5}$
$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{10}$
$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{2}{2}$

***Math Masters,* p. 481**

Using a Calculator to Rename Any Fraction as a Decimal

INDEPENDENT ACTIVITY

(*Math Journal 2,* pp. 342 and 343; *Math Masters,* p. 388 or 389)

Ask students to rename each fraction on journal pages 342 and 343 as a decimal by using division. Tell them to write each digit shown in the calculator display, up to 6 digits following the decimal point.

When they have finished, ask students to look for patterns in the results and write about them in a Math Log or on an Exit Slip. *For example:*

- Some of the fractions have short decimal names with 1, 2, or 3 digits after the decimal point and no other digits beyond that. What do these fractions with short decimal names have in common? They are fractions whose denominators are 2, 4, 5, 8, and 10.
- The other fractions have long decimal names that look like they could go on forever if the calculator display could show an endless number of digits. Do you see any patterns in these longer decimal names? If you read the digits from left to right, you come to a digit that seems to repeat forever. For example, $\frac{7}{12}$ has the decimal name 0.5833333333; if you could see more decimal places, they would all be 3s.

Links to the Future

When a fraction is renamed as a decimal, it will be either a **terminating decimal** or a **repeating decimal.** A repeating decimal is one in which a digit or group of digits is repeated endlessly. It is not necessary to use this vocabulary with students. The topic of terminating and repeating decimals will be discussed in later grades. The activity here should be viewed as an exploration of a topic that will be treated formally later.

2 Ongoing Learning & Practice

Playing *Fraction/Percent Concentration*

PARTNER ACTIVITY

(*Student Reference Book,* p. 246; *Math Masters,* pp. 481 and 482)

Students play *Fraction/Percent Concentration* to develop automaticity with the "easy" fraction/percent equivalencies. Have students write P on the back of each percent tile, F on the back of each fraction tile, and D on the back of each decimal tile.

Adjusting the Activity

Have students play with fewer fraction/percent pairs or play with the cards faceup.

Have students play the game using only the Fraction Tiles and the Decimal Tiles (*Math Masters,* page 482).

AUDITORY ◆ KINESTHETIC ◆ TACTILE ◆ VISUAL

Math Boxes 9•3

INDEPENDENT ACTIVITY

(*Math Journal 2,* p. 255)

Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 9-1. The skill in Problem 6 previews Unit 10 content.

Writing/Reasoning Have students write a response to the following: *Mario said, "Without using a protractor, I estimated that the measure of ∠RLA in Problem 5 was about 45°." Explain how Mario might have estimated the measure.* Sample answer: A right angle measures 90°. Angle *RLA* looks like it is about $\frac{1}{2}$ the size of a right angle, and $\frac{1}{2}$ of 90° is 45°.

Study Link 9•3

INDEPENDENT ACTIVITY

(*Math Masters,* p. 284)

Home Connection Students use a calculator to convert fractions to decimals and make up some conversion problems of their own.

Game Master

Name Date Time

Fraction/Percent Concentration continued

0.10	0.20	0.25	0.30
0.40	0.50	0.60	0.70
0.80	0.75	0.90	1

0.10	0.20	0.25	0.30
0.40	0.50	0.60	0.70
0.80	0.75	0.90	1

***Math Masters,* p. 482**

Math Masters, page 482 provides two sets of decimal cards. Each student needs only one set.

Study Link Master

Name Date Time

STUDY LINK 9•3 **Calculator Decimals**

1. Use your calculator to rename each fraction below as a decimal.

$\frac{1}{2}$	0	.	5					
$\frac{1}{3}$	0	.	3	3	3	3	3	3
$\frac{1}{4}$	0	.	2	5				
$\frac{1}{5}$	0	.	2					
$\frac{1}{6}$	0	.	1	6	6	6	6	6
$\frac{1}{7}$	0	.	1	4	2	8	5	7
$\frac{1}{8}$	0	.	1	2	5			
$\frac{1}{9}$	0	.	1	1	1	1	1	1
$\frac{1}{10}$	0	.	1					
$\frac{1}{11}$	0	.	0	9	0	9	0	9
$\frac{1}{12}$	0	.	0	8	3	3	3	3
$\frac{1}{13}$	0	.	0	7	6	9	2	3

$\frac{1}{14}$	0	.	0	7	1	4	2	8
$\frac{1}{15}$	0	.	0	6	6	6	6	6
$\frac{1}{16}$	0	.	0	6	2	5		
$\frac{1}{17}$	0	.	0	5	8	8	2	3
$\frac{1}{18}$	0	.	0	5	5	5	5	5
$\frac{1}{19}$	0	.	0	5	2	6	3	1
$\frac{1}{20}$	0	.	0	5				
$\frac{1}{21}$	0	.	0	4	7	6	1	9
$\frac{1}{22}$	0	.	0	4	5	4	5	4
$\frac{1}{23}$	0	.	0	4	3	4	7	8
$\frac{1}{24}$	0	.	0	4	1	6	6	6
$\frac{1}{25}$	0	.	0	4				

2. Make up some of your own. Answers vary.

$\frac{1}{73}$	0	.	0	1	3	6	9	8
$\frac{1}{\ }$								
$\frac{1}{\ }$								

$\frac{1}{\ }$								
$\frac{1}{\ }$								
$\frac{1}{\ }$								

Practice

3. $6\overline{)96}$ = 16
4. 91 / 5 = 18 R1, or $18\frac{1}{5}$
5. 108 = 864 ÷ 8
6. 575 ÷ 7 = 82 R1, or $82\frac{1}{7}$

***Math Masters,* p. 284**

Student Page

Date Time

LESSON 9•3 **Math Boxes**

1. Write A or P to tell whether you would need to find the area or the perimeter in each situation.
   a. buying a garden fence P
   b. finding the square footage of your bedroom A
   c. buying wallpaper for the kitchen A

2. Complete.
   Rule: $-\frac{3}{9}$, or $-\frac{1}{3}$

in	out
$\frac{7}{9}$	$\frac{4}{9}$
$\frac{4}{9}$	$\frac{1}{9}$
$\frac{9}{18}$	$\frac{3}{18}$, or $\frac{1}{6}$
$\frac{6}{9}$	$\frac{1}{3}$

3. Multiply. Use a paper-and-pencil algorithm.
   1,472 = 64 • 23

4. Find the approximate latitude and longitude of these Region 4 cities.
   a. Calcutta, India latitude 22° N, longitude 87° E
   b. Seoul, Korea latitude 37° N, longitude 126° E

5. Angle *RLA* is an acute (acute or obtuse) angle.
   The measure of ∠*RLA* is 49°

6. Use a straightedge to draw the line of symmetry.

***Math Journal 2,* p. 255**

3 Differentiation Options

ENRICHMENT

SMALL-GROUP ACTIVITY

5–15 Min

Finding Decimals Close to "Easy" Fractions

(*Math Masters,* p. 388 or 389)

To apply students' understanding of decimal/fraction equivalencies, have them name "easy" fractions that are close but not equivalent to given decimals.

Write decimals on the board. In a Math Log or on an Exit Slip, have students write a decimal number that is close to the given decimal and has an "easy" fraction equivalent. Ask students to explain their choice. Students may choose different equivalent fractions. Ask them to decide which is closer. *Suggestions:*

Sample answers:

- 1.77 1.75, $1\frac{3}{4}$
- 0.836 0.8, $\frac{8}{10}$
- 2.59 2.5, $2\frac{1}{2}$
- 0.098 0.1, $\frac{1}{10}$
- 4.287 4.25, $4\frac{1}{4}$
- 0.617 0.6, $\frac{6}{10}$, or $\frac{3}{5}$

EXTRA PRACTICE

PARTNER ACTIVITY

5–15 Min

Memorizing Equivalent Names for "Easy" Fractions

(*Math Masters,* p. 446)

To practice "easy" fraction, decimal, and percent equivalencies, have students cut out and use the cards on *Math Masters,* page 446.

Instruct students to place the cards facedown in a pile between them. Partners take turns. One student picks up a card and covers one of the equivalent names with a thumb. The other student must identify the hidden number.

Teaching Aid Master

Name Date Time

"Easy" Equivalents

$\frac{1}{2}$	0.50	50%	$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%	$\frac{1}{5}$	0.20	20%
$\frac{2}{5}$	0.40	40%	$\frac{3}{5}$	0.60	60%
$\frac{4}{5}$	0.80	80%	$\frac{1}{10}$	0.10	10%
$\frac{3}{10}$	0.30	30%	$\frac{7}{10}$	0.70	70%
$\frac{9}{10}$	0.90	90%	$\frac{2}{2}$	1	100%

Math Masters, p. 446