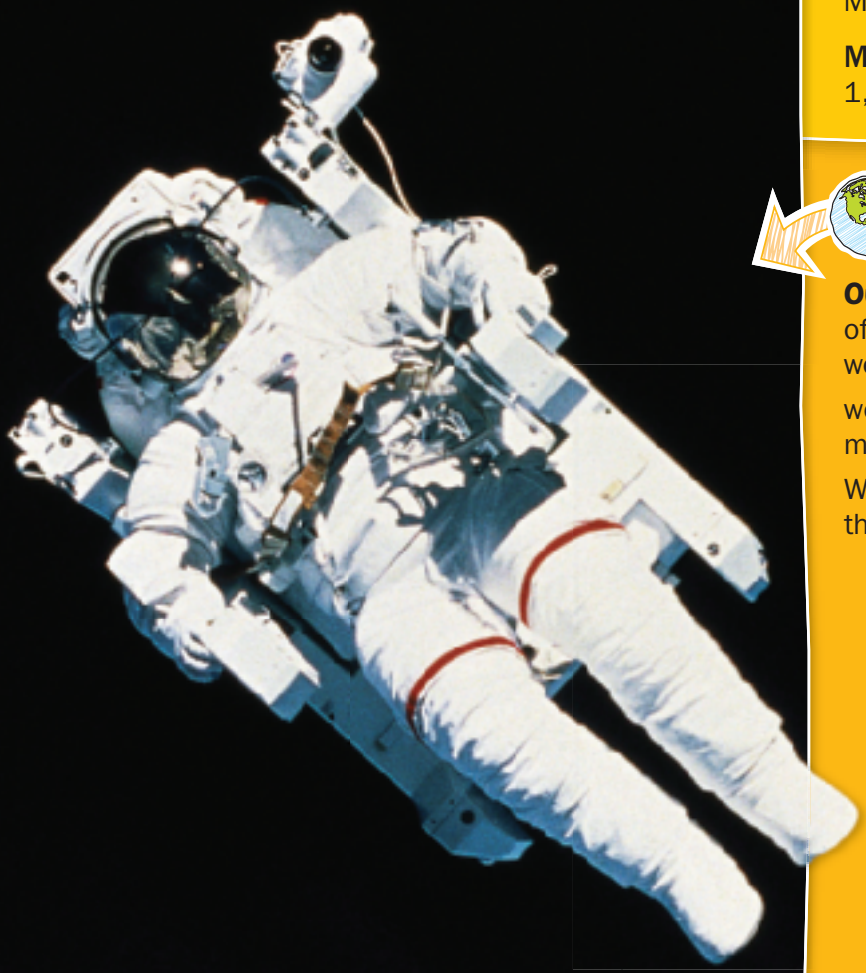
Chapter 4

Fractions, Decimals, and Percents



StockTrek/Getty Images

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Common Core GPS

Content Standards
MCC6.RP.3, MCC6.RP.3c

Mathematical Practices
1, 2, 3, 4, 5, 6, 7

Math in the Real World

Outer Space Due to the pull of gravity, an astronaut who weighs 180 pounds on Earth would weigh $\frac{1}{6}$ of that on the moon.

Write the astronaut's weight on the moon in the box below.

FOLDABLES® Study Organizer

1. Cut out the correct Foldable from the FL pages in the back of this book.
2. Place your Foldable on the Key Concept page toward the end of this chapter.
3. Use the Foldable throughout this chapter to help you learn about fractions, decimals, and percents.

What Tools Do You Need?

Vocabulary

least common denominator
percent
percent proportion
proportion
rational number

Study Skill: Reading Math

Everyday Meaning The key to understanding word problems is to understand the meaning of the mathematical terms in the problem.

You will use the terms *factor* and *multiple* in this chapter. Here are two sentences that show their everyday meanings.

- Weather was a *factor* in their decision to postpone the picnic.
- The star quarterback won *multiple* post-season awards.

The table shows how the everyday meaning is connected to the mathematical meaning.

Term	Everyday Meaning	Mathematical Meaning	Connection
Factor	something that actively contributes to a decision or result	2 and 3 are factors of 6.	A factor helps to make a decision. In mathematics, factors "make up" a product.
Multiple	consisting of more than one or shared by many	The multiples of 2 are 0, 2, 4, 6, ...	Multiple means many. In mathematics, a number has infinitely many multiples.

Practice Make a list of other words that have the prefixes *fact-* or *multi-*. Determine what the words in each list have in common.

Word	Meaning	Connection

When Will You Use This?

Your Turn! You will solve this problem in the chapter.

Are You Ready?

Try the Quick Check below.
Or, take the Online Readiness Quiz.

Quick Review

Common Core Review MCC6.NS.4

Example 1

Find the GCF of 30 and 54.

First, make an organized list of the factors for each number. Then circle the common factors.

30: 1, 2, 3, 5, 6, 10, 15, 30
54: 1, 2, 3, 6, 9, 18, 27, 54

So, the greatest common factor, or GCF, is 6.

Example 2

Find the LCM of 15 and 40.

Write the prime factorization

$15 = 3 \times 5$
$40 = 2 \times 2 \times 2 \times 5$

Find the product of the prime factors. Use the common prime factor, 5, only once.

The least common multiple, or LCM, is $2 \times 2 \times 2 \times 3 \times 5$ or 120.

Quick Check

Greatest Common Factor **Find the GCF of each set of numbers.**

1. 32 and 52 _____

2. 48 and 60 _____

3. 18, 54, and 72 _____

Show your work.

Least Common Multiple **Find the LCM for each set of numbers.**

4. 5 and 7 _____

5. 12 and 30 _____

6. 6, 2, 22 _____

7. The front gear of a bicycle has 54 teeth. The back gear has 18 teeth. How many complete rotations must the smaller gear make for both gears to be aligned in the original starting positions?

_____

How Did You Do?

Which problems did you answer correctly in the Quick Check? Shade those exercise numbers below.

1 2 3 4 5 6 7

Decimals and Fractions

What You'll Learn

Scan the lesson. List two real-world scenarios in which you would use decimals written as fractions.

- _____

_____

- _____

_____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Vocabulary

rational number

Common Core GPS

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5

Real-World Link

Watch

Music The instruments below show the part of students in the school orchestra that play each type of instrument.

Brass  0.25

1. Write 0.25 in word form: _____

2. Write 0.25 as a fraction: $\frac{\square}{100}$

Percussion  0.15

3. Write 0.15 in word form: _____

4. Write 0.15 as a fraction: $\frac{\square}{100}$

Strings  0.31

5. Write 0.31 in word form: _____

6. Write 0.31 as a fraction: $\frac{\square}{100}$

Woodwind  0.29

7. Write 0.29 in word form: _____

8. Write 0.29 as a fraction: $\frac{\square}{100}$

Work Zone

Write Decimals as Fractions and Mixed Numbers

Decimals like 0.25, 0.15, 0.31, and 0.29 can be written as fractions with denominators of 10, 100, 1,000, and so on. Any number that can be written as a fraction is a **rational number**.

Decimals like 3.25, 26.82, and 125.54 can be written as mixed numbers in simplest form.

Examples

Tutor

Write each decimal as a fraction in simplest form.

1. **0.6**

The place-value chart shows that the place value of the last decimal place is tenths.

$0.6 = \frac{6}{10}$ Say six tenths.

$= \frac{\overset{3}{\cancel{6}}}{\underset{5}{\cancel{10}}}$ Simplify. Divide the numerator and denominator by the GCF, 2.

$= \frac{3}{5}$

1,000	100	10	1	0.1	0.01	0.001
thousands	hundreds	tens	ones	tenths	hundredths	thousandths
O	O	O	O .	6	O	O

2. **0.45**

$0.45 = \frac{45}{100}$ Say *forty-five hundredths.*

$= \frac{\overset{9}{\cancel{45}}}{\underset{20}{\cancel{100}}}$ Simplify.

$= \frac{9}{20}$

1,000	100	10	1	0.1	0.01	0.001
thousands	hundreds	tens	ones	tenths	hundredths	thousandths
O	O	O	O .	4	5	O

3. **0.375**

$0.375 = \frac{375}{1{,}000}$ Say *three hundred seventy-five thousandths.*

$= \frac{\overset{3}{\cancel{375}}}{\underset{8}{\cancel{1{,}000}}}$ Simplify.

$= \frac{3}{8}$

1,000	100	10	1	0.1	0.01	0.001
thousands	hundreds	tens	ones	tenths	hundredths	thousandths
O	O	O	O .	3	7	5

Mental Math

Here are some commonly used decimal-fraction equivalencies:

$0.1 = \frac{1}{10}$ $0.2 = \frac{1}{5}$

$0.25 = \frac{1}{4}$ $0.5 = \frac{1}{2}$

$0.75 = \frac{3}{4}$

It is helpful to memorize these.

Show your work.

a. _____

b. _____

c. _____

Got It? Do these problems to find out.

a. 0.8 **b.** 0.28 **c.** 0.125

Example

Tutor

4. **The average length of a conch shell is 9.87 inches. Express 9.87 as a mixed number in simplest form.**

$9.85 = 9\frac{85}{100}$ Say *nine and eighty-five hundredths.*

$= 9\frac{\overset{17}{\cancel{85}}}{\underset{20}{\cancel{100}}}$ or $9\frac{17}{20}$ in. Simplify.

Got It? Do this problem to find out.

d. It takes approximately 4.65 quarts of milk to make a pound of cheese. Express this amount as a mixed number in simplest form.

Show your work.

d. _____

Write Fractions and Mixed Number as Decimals

For fractions with denominators that are *factors* of 10, 100, or 1,000, you can write equivalent fractions with these denominators.

Example

Tutor

5. **Write $\frac{9}{12}$ as a decimal.**

Method 1 **Write an equivalent fraction.**

$\frac{9}{12} \overset{\div 3}{=} \frac{3}{4} \overset{\times 25}{=} \frac{75}{100}$ Simplify $\frac{9}{12}$. Then multiply the numerator and denominator of $\frac{3}{4}$ by 25.

$= 0.75$ Read 0.75 as *seventy-five hundredths.*

Method 2 **Divide the numerator by the denominator.**

$\frac{9}{12}$

$$\begin{array}{r} 0.75 \\ 12\overline{)9.00} \\ -\ 84 \\ \hline 60 \\ -\ 60 \\ \hline 0 \end{array}$$

To divide 9 by 12, place a decimal point after 9 and annex as many zeros as necessary to complete the division.

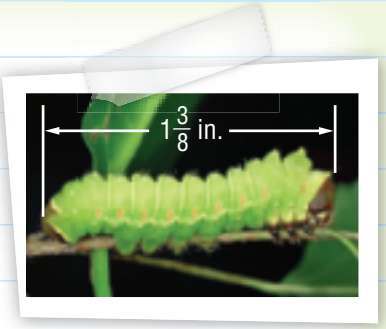
e. _____

f. _____

g. _____

Got It? Do these problems to find out.

e. $\frac{3}{5}$ **f.** $\frac{14}{25}$ **g.** $\frac{102}{250}$



Example

Tutor

6. **A caterpillar can have as many as 4,000 muscles, compared to humans, who have about 600. Write the length of the caterpillar as a decimal.**

$1\frac{3}{8} = 1 + \frac{3}{8}$ Definition of a mixed number

$= 1 + \frac{375}{1{,}000}$ Multiply the numerator and the denominator by 125.

$= 1 + 0.375$ or 1.375 Read 1.375 as *one and three hundred seventy-five thousandths.*

The length of the caterpillar is 1.375 inches.

Guided Practice

Check

Write each decimal as a fraction or mixed number in simplest form. (Examples 1–4)

1. 0.4 = _____

2. 0.64 = _____

3. 2.75 = _____

Show your work.

Write each fraction or mixed number as a decimal. (Examples 5 and 6)

4. $\frac{27}{75}$ = _____

5. $\frac{7}{2}$ = _____

6. $3\frac{1}{5}$ = _____

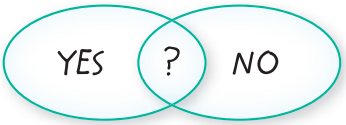
7. Mr. Ravenhead's car averages 23.75 miles per gallon of gasoline. Express this amount as a mixed number in simplest form. (Example 4) _____

8. STEM The Siberian tiger can grow up to $10\frac{4}{5}$ feet long. Express this length as a decimal. (Example 6) _____

9. **Building on the Essential Question** What is the relationship between fractions and decimals?

Rate Yourself!

Are you ready to move on? Shade the section that applies.



For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Write each decimal as a fraction in simplest form. (Examples 1–3)

1. 0.5 = _____

2. 0.7 = _____

3. 0.33 = _____

4. 0.875 = _____

Show your work.

Write each fraction or mixed number as a decimal. (Examples 5 and 6)

5 $\frac{77}{200}$ = _____

6. $\frac{1}{20}$ = _____

7. $\frac{12}{75}$ = _____

8. $8\frac{21}{40}$ = _____

9 STEM Mercury orbits the Sun in $87\frac{24}{25}$ Earth days. Venus orbits the Sun in $224\frac{7}{10}$ Earth days, and Mars orbits the Sun in $686\frac{49}{50}$ days. Write each mixed number as a decimal. (Example 6)

_____

10. STEM Last week, a share of stock gained a total of 1.64 points. Express this gain as a fraction in simplest form. (Example 4)

_____

11. CCSPS **Use Math Tools** The table shows the ingredients in an Italian sandwich.

Ingredient	Amount (lb)
meat	0.35
vegetables	0.15
secret sauce	0.05
bread	0.05

a. What fraction of a pound is each ingredient?

_____

_____

b. How much more meat is in the sandwich than vegetables? Write the amount as a fraction in simplest form.

_____

_____

c. What is the total weight of the Italian sandwich? Write the amount as a fraction in simplest form. _____

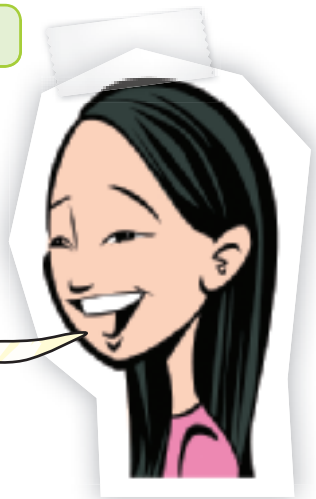
_____

12. Paloma can run the 100-meter dash in $16\frac{1}{5}$ seconds. Savannah's best time is 19.8 seconds. How much faster is Paloma than Savannah in the 100-meter dash? _____

13 STEM The average length of a ladybug can range from 0.08 to 0.4 inch. Find two lengths that are within the given span. Write them as fractions in simplest form. _____

H.O.T. Problems Higher Order Thinking

14. CCSPS **Find the Error** Mei is writing 4.28 as a mixed number. Find her mistake and correct it.



15. CCSPS **Persevere with Problems** Decide whether the following statement is *always, sometimes,* or *never* true. Explain your reasoning.

Any decimal that ends with a digit in the thousandths place can be written as a fraction with a denominator that is divisible by both 2 and 5.

16. CCSPS **Reason Inductively** Write a fraction with a decimal value between $\frac{1}{2}$ and $\frac{3}{4}$. Write both the fraction and the equivalent decimal.

Georgia Test Practice

17. Which of the following statements is *not* true?

Ⓐ $0.6 = \frac{3}{5}$

Ⓑ $0.125 = \frac{1}{8}$

Ⓒ $2.015 = 2\frac{1}{100}$

Ⓓ $10.38 = 10\frac{19}{50}$

Name _____ My Homework _____

Extra Practice

Write each decimal as a fraction or mixed number in simplest form.

18. $0.3 = \frac{3}{10}$

0.3 is three tenths.

Homework Help

19. $0.65 =$ _____

20. $0.425 =$ _____

21. $9.35 =$ _____

Write each fraction or mixed number as a decimal.

22. $\frac{19}{25} =$ _____

23. $\frac{311}{500} =$ _____

24. $\frac{5}{8} =$ _____

25. $14\frac{3}{5} =$ _____

26. Evita lives 0.85 mile from her school. Write this distance as a fraction in simplest form.

_____

27. Rancho Middle School has an average of $23\frac{3}{8}$ students per teacher. Write this mixed number as a decimal.

_____

28. Alan bought 20 yards of fencing. He used 5.9 yards to surround one flower garden and 10.3 yards to surround another garden. Write the amount remaining as a fraction in simplest form.

_____

29. In a survey, 9 out of 15 students named math as their favorite class. Express this rate as a decimal.

_____

30. CCSPS **Use Math Tools** The frequency table shows the favorite college football teams of middle school students. What fraction of the students chose the Sooners? Write the fraction as a decimal.

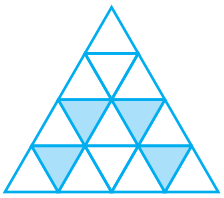
_____

_____

Team	Tally	Frequency
Buckeyes	|||	3
Gators	𝍸 |	6
Sooners	𝍸	5
Tigers	||	2
Lions	||||	4

Georgia Test Practice

31. Chase shaded 0.25 of the design. Which fraction in simplest form represents the shaded part of the design?



Ⓐ $\frac{1}{2}$ Ⓒ $\frac{4}{16}$

Ⓑ $\frac{25}{100}$ Ⓓ $\frac{1}{4}$

32. The formula $d = v + \frac{1}{20}v^2$ can be used to find the distance d required to stop a certain model car traveling at v miles per hour. Which of the following represents $\frac{1}{20}$?

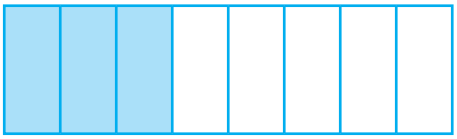
Ⓕ 0.05 Ⓗ 0.4

Ⓖ 0.21 Ⓘ 1.2

33. Short Response Lori ran the distances shown in the table. Write the total distance, in miles, as a fraction in simplest form.

Day	Distance (mi)
Monday	0.35
Wednesday	0.2
Friday	0.25

34. Which decimal represents the shaded portion of the figure below?



Ⓐ 0.25 Ⓒ 0.375

Ⓑ 0.333 Ⓓ 0.4

Common Core Review

Simplify each fraction. MCC4.NF.1

35. $\frac{20}{100} = \frac{\square}{\square}$

36. $\frac{35}{100} = \frac{\square}{\square}$

37. $\frac{72}{100} = \frac{\square}{\square}$

38. Jasper made 230 flyers for a dance. He handed two flyers out to each student. How many students received flyers? MCC4.NBT.6

39. Look for a pattern and complete the table. MCC5.NBT.2

Multiplication Problem	Product
36×100	3,600
36×10	
36×1	
36×0.1	
36×0.01	

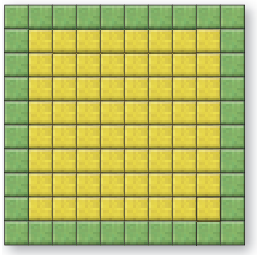
Inquiry Lab
Model Percents

Inquiry **HOW can you model a percent?**

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 3, 4

Mosaics Jackie is using 1-inch tiles to make the mosaic shown at the right. She needs a total of 100 tiles. What percent of the tiles are green?



What do you know? _____

_____

What do you need to find? _____

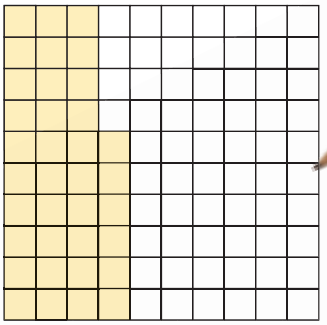
_____

Investigation 1

Tools

A 10 × 10 grid can be used to represent *hundredths.* It can also represent percents. The word *percent* (%) means *out of one hundred.* For example, 50% means 50 out of one hundred.

Step 1 Use a 10 × 10 grid to model the percent of tiles in the mosaic that are green.



Step 2 In the mosaic, ☐ tiles out of 100 are green.

So, ☐ % of the squares are green.

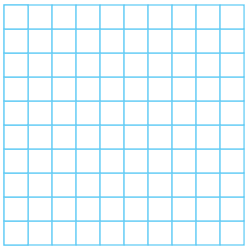
Investigation 2

Model 18% with a 10 × 10 grid.

Step 1 18% means ☐ out of 100.

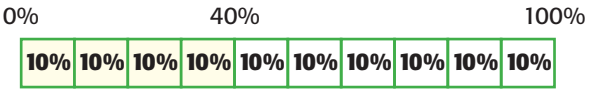
Step 2 Shade the squares filling one column at a time.

Shade ☐ squares out of 100.



Investigation 3

Percents can also be modeled with bar diagrams. The entire bar represents 100%. The bar diagram below is divided into 10 equal sections, each representing 10%. The shaded region represents 40%.



Model 60% with a bar diagram.

Step 1 The bar diagram below is divided into ☐ equal sections.
To find the value of each section, divide. 100% ÷ 5 = 20%.

So, each section represents ☐%.

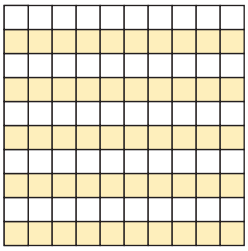
Step 2 ☐% + ☐% + ☐% = 60%

Shade ☐ sections of the diagram.

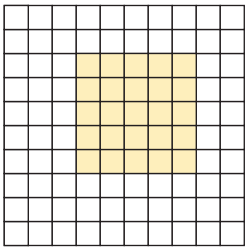
Collaborate

Work with a partner. Identify each percent modeled.

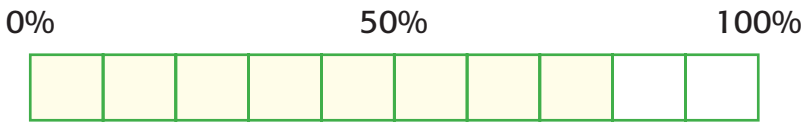
1. _____



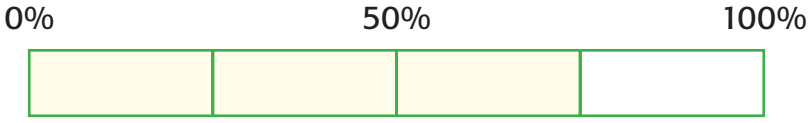
2. _____



3. _____



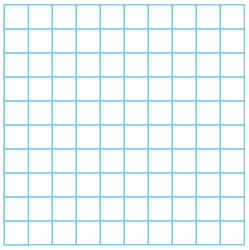
4. _____



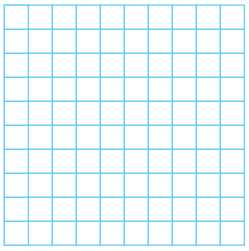
Work with a partner. Model each percent.

5. 37%

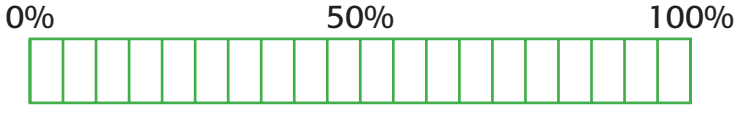
Show your work.



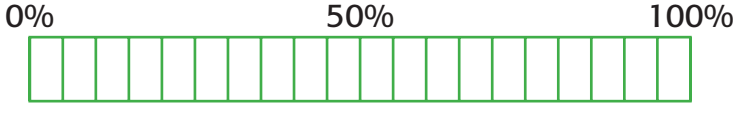
6. 8%



7. 45%



8. 5%



Analyze

Work with a partner to determine the number of shaded sections for each model. The first one is done for you.

	Percent	Number of Shaded Sections using each Model		
		10 × 10 Grid	Bar Diagram with 10 Equal Sections	Bar Diagram with 20 Equal Sections
	45	45	4.5	9
9.	15			
10.	30			
11.	55			
12.	70			
13.	85			
14.	65			

15. Refer to Exercise 10. Identify the fraction of each model that would be shaded. Then circle the method that corresponds to the fraction that is written in simplest form.

a. 10 × 10 grid _____

b. bar diagram with 10 equal sections _____

c. bar diagram with 20 equal sections _____

16. CCSPS **Reason Inductively** How can you write a percent as a fraction with a denominator of 100? _____

_____

Reflect

17. CCSPS **Model with Mathematics** Write a real-world problem that involves a percent. Then model the percent used in the problem. _____

_____

18. inquiry HOW can you model a percent? _____

_____

Percents and Fractions

What You'll Learn

Scan the lesson. Predict two things you will learn about writing a fraction as a percent.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Vocabulary

percent

Common Core GPS

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5

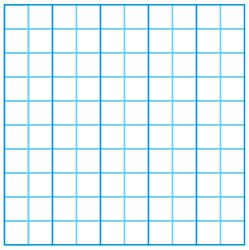
Real-World Link

Tools

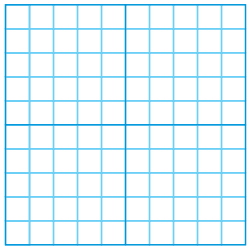
Sports Students were asked to choose their favorite sport to play.

1. For each sport, shade a 10 × 10 grid that represents the number of students that chose the sport.

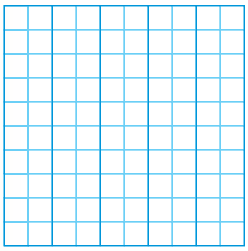
Basketball: 3 out of 20



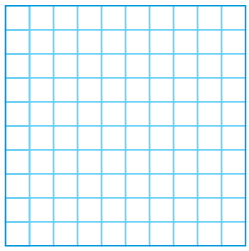
Football: 3 out of 25

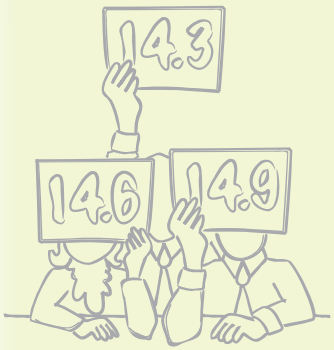


Gymnastics: 1 out of 20



Swimming: 9 out of 100





2. What fraction with a denominator of 100 to represent the number of students who chose each sport?

Basketball: $\frac{\square}{\square}$ Football: $\frac{\square}{\square}$

Gymnastics: $\frac{\square}{\square}$ Swimming: $\frac{\square}{\square}$

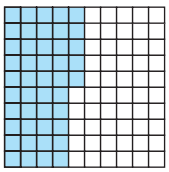
Key Concept

Percents as Fractions

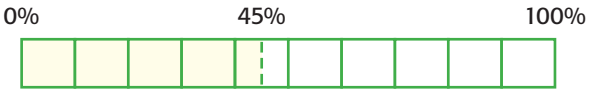
Words A **percent** is a ratio that compares a number to 100.

Example 45% ⇒ 45 out of 100 or $\frac{45}{100}$

Models



45%



To write a percent as a fraction, first write the percent as a rate per 100. Then simplify.

Work Zone

Check for Reasonableness

In Example 2, you can conclude that $\frac{11}{20}$ is a reasonable answer because 55% is a little more than 50%, and $\frac{11}{20}$ is a little more than $\frac{10}{20}$ or $\frac{1}{2}$.

Examples

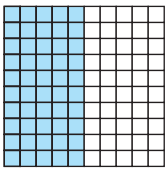
Watch Tutor

1. **Write 50% as a fraction in simplest form.**

50% means *50 out of 100.*

$50\% = \frac{50}{100}$ Definition of percent

$= \frac{\overset{1}{\cancel{50}}}{\underset{2}{\cancel{100}}}$ or $\frac{1}{2}$ Simplify. Divide the numerator and the denominator by the GCF, 50.



50% = $\frac{1}{2}$

2. **In a recent survey, 55% of cell phone owners said they text message. What fraction of cell phone owners is this?**

$55\% = \frac{55}{100}$ Definition of percent

$= \frac{11}{20}$ Simplify.

So, $\frac{11}{20}$ of cell phone owners text message.

Show your work.

a. _____

b. _____

c. _____

Got It? Do these problems to find out.

Write each percent as a fraction in simplest form.

a. 75% **b.** 90% **c.** 38%

Example

Tutor

3. **The table shows the percent of each movie type rented during a month. What fraction of the rentals were action movies?**

Types of Movies	
action	35%
children's	5%
comedy	45%
drama	5%
horror	5%
romance	5%

$35\% = \frac{35}{100}$ Definition of percent

$= \frac{\overset{7}{\cancel{35}}}{\underset{20}{\cancel{100}}}$ Divide the numerator and denominator by the GCF, 5.

Action movies were rented $\frac{7}{20}$ of the time.

Got It? **Do this problem to find out.**

d. Write the fraction of rentals that were horror movies.

Show your work.

d. _____

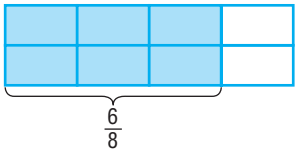
Fractions as Percents

To write a fraction as a percent, find an equivalent ratio with 100 as a denominator.

Example

Tutor

4. **Write the fraction $\frac{6}{8}$ as a percent.**



$\frac{6}{8} = \frac{3}{4}$ Simplify by dividing by the GCF, 2.

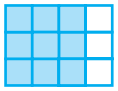
$\frac{3}{4} = \frac{\blacksquare}{100}$ Write equivalent ratios. One ratio is the fraction. The other ratio is the unknown value compared to 100.

$\frac{3}{4} \overset{\times 25}{=} \frac{75}{100}$ Since $4 \times 25 = 100$, multiply 3 by 25 to find the unknown value.

So, $\frac{75}{100}$ or 75% of the rectangle is shaded.

Got It? **Do this problem to find out.**

e. Write the fraction $\frac{9}{12}$ as a percent.



e. _____

Example

Tutor

5. **Mitch made 12 out of 40 shots during the championship game. What percent of his shots did Mitch make?**

$\frac{12}{40} = \frac{3}{10}$ Simplify $\frac{12}{40}$ by dividing the numerator and denominator by the GCF, 4.

$\frac{3}{10} \overset{\times 10}{=} \frac{\square}{100}$ Write equivalent ratios.

$\frac{3}{10} = \frac{30}{100}$ Since $10 \times 10 = 100$, multiply 3 by 10 to find the unknown value.

So, $\frac{12}{40} = \frac{30}{100}$ or 30%.

Got It? **Do this problem to find out.**

Show your work.

f. Alana spelled 19 out of 25 words correctly. What percent of the words did Alana spell correctly?

f. _____

Guided Practice

Check

Write each percent as a fraction in simplest form. (Examples 1–3)

Show your work.

1. 15% = _____

2. 80% = _____

3. 33% = _____

Write each fraction as a percent. Use a model if needed. (Example 4)

4. $\frac{3}{10}$ = _____

5. $\frac{3}{20}$ = _____

6. $\frac{2}{5}$ = _____

7. Elsa ran 7 out of 10 days. What percent of the days did she run? (Example 5)

8. **Building on the Essential Question** Why is it helpful to write a fraction as a percent?

Rate Yourself!

How confident are you about percents and fractions? Check the box that applies.

For more help, go online to access a Personal Tutor.

Tutor

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Write each percent as a fraction in simplest form. (Examples 1–3)

1. 2% = _____

Show your work.

2. 20% = _____

3. 85% = _____

4. 4% = _____

Write each fraction as a percent. Use a model if needed. (Example 4)

5. $\frac{2}{10}$ = _____

6. $\frac{3}{4}$ = _____

7. $\frac{7}{20}$ = _____

8. $\frac{11}{25}$ = _____

9. During his workout, Elan spent 28% of the time on the treadmill. What fraction of his workout was on the treadmill? (Examples 1–3)

_____

10. A cat spends about 7 out of 10 hours sleeping. About what percent of a cat's day is spent sleeping? (Example 5)

_____

11. A survey showed that 82% of youth most often use the Internet at home. What fraction of youth surveyed most often use the Internet somewhere else?

_____

12. Cedro collects state quarters. He has 42 out of 50 available quarters. What is 42 out of 50 as a percent?

_____

13. Use the table to determine what percent of students prefer school uniforms and what percent do not prefer school uniforms. What is the relationship between these two percents?

_____

_____

Prefer School Uniforms	
No	Yes
𝍸 𝍸 𝍸	𝍸

14. **Multiple Representations** The table shows the percent of Earth's atmosphere that is each element.

Element	Percent
Nitrogen	78
Oxygen	21
Other	1

a. Bar Diagram Model 21% using a bar diagram.

0% 100%

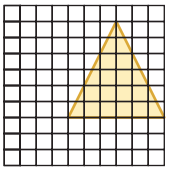
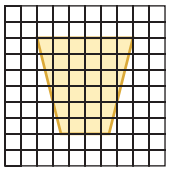
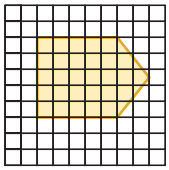
b. Number Write the percent of Earth's atmosphere that is nitrogen as a fraction in simplest form. _____

H.O.T. Problems Higher Order Thinking

15. **Reason Inductively** Write three fractions that can be written as percents between 50% and 75%. Justify your solution.

_____

16. **Persevere with Problems** For each model below, write the shaded region as a percent and as a fraction.

a.  _____ **b.**  _____ **c.**  _____

17. **Which One Doesn't Belong?** Identify the number that does not belong with the other three. Explain your reasoning.

$\frac{9}{20}$ $\frac{45}{100}$ 45% $\frac{8}{45}$

_____

18. **Persevere with Problems** Complete each blank to find an expression that is equal to 16%.

a. _____ for every 100 **b.** _____ for every 50

c. 1 for every _____ **d.** 0.5 for every _____

Georgia Test Practice

19. Of Bernie's insect collection, 15 out of 25 insects are butterflies. Which of the following is *not* another way of expressing 15 out of 25?

Ⓐ $\frac{3}{5}$ Ⓑ 0.6 Ⓒ 60% Ⓓ $\frac{5}{3}$

Name _____ My Homework _____

Extra Practice

Write each percent as a fraction in simplest form.

20. 14% = $\frac{7}{50}$

Homework Help

$14\% = \frac{14}{100}$

$\frac{14}{100} = \frac{7}{50}$ (÷ 2 on both)

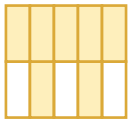
21. 47% = _____

22. 86% = _____

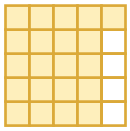
23. 88% = _____

Write each fraction as a percent. Use a model if needed.

24. $\frac{7}{10}$ = _____



25. $\frac{21}{25}$ = _____



26. $\frac{3}{5}$ = _____

27. $\frac{18}{25}$ = _____

28. In a recent year, 22% of E-mail users said they spend less time using E-mail because of spam. What fraction of E-mail users is this?

_____

_____

29. About $\frac{19}{20}$ of celery is water. What percent is this?

_____

_____

30. CCSPS **Use Math Tools** Mrs. Lane took a survey of the types of pants her students were wearing. She collected the data at the right. What percent of her students were wearing shorts?

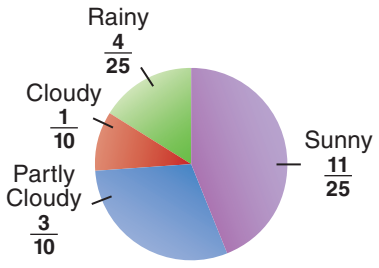
_____

_____

Type of Pants	Number of Students
Jeans	14
Shorts	9
Capris	2

31. STEM The circle graph shows the fraction of each type of weather during September.

Weather During September



a. What percent of the days were sunny? _____

b. What percent of the days were rainy? _____

c. What percent of the days were sunny or rainy? _____

d. What percent of the days were cloudy or partly cloudy?

_____

Georgia Test Practice

32. On Friday, 65% of the students at Plainview Middle School bought a hot lunch in the cafeteria. What fractional part of the school did *not* buy a hot lunch in the cafeteria?

Ⓐ $\frac{1}{65}$ Ⓒ $\frac{7}{20}$

Ⓑ $\frac{13}{20}$ Ⓓ $\frac{6}{5}$

33. The average brain is about 2% of a person's total body weight. Which fraction is equivalent to 2%?

Ⓕ $\frac{1}{2}$ Ⓗ $\frac{1}{50}$

Ⓖ $\frac{1}{5}$ Ⓘ $\frac{1}{500}$

34. Short Response The table shows the number of votes for the new school mascot. What percent of the students chose a mascot other than Tigers?

Mascot	Number of Students
Polar Bears	6
Tigers	14
Vikings	19
Eagles	11

Common Core Review

Multiply. MCC5.NBT.2

35. 0.685 × 100 = _____

36. 0.09 × 10 = _____

37. 3.255 × 100 = _____

38. Refer to the table. Which lap has the slowest time? MCC5.NBT.3b

Lap	Time (minutes)
1	1.59
2	1.85
3	1.64

39. Ruby has $10. She buys the items shown. How much will Ruby have left? MCC5.NBT.7

Percents and Decimals

What You'll Learn

Scan the lesson. List two real-world scenarios in which you would write decimals as percents.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Common Core GPS

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5, 6

Real-World Link

Watch

School A recent survey tells the favorite subjects of students at Martin Middle School.

Math: 28% Art: 16%	Science: 21% English: 13%	Social Studies: 15% Other: 7%

1. Write a fraction with a denominator of 100 to represent the percent for each subject.

Math: $\frac{\square}{100}$ **Science:** $\frac{\square}{100}$

Art: $\frac{\square}{100}$ **Social Studies:** $\frac{\square}{100}$

English: $\frac{\square}{100}$ **Other:** $\frac{\square}{100}$

2. Write each fraction from Exercise 1 as a decimal.

Math: ____ **Science:** ____

Art: ____ **Social Studies:** ____

English: ____ **Other:** ____

3. **Make a Conjecture** Look back at Exercise 2. Compare the decimals to the percents. Explain how to write a percent as a decimal. _____

_____

Key Concept

Write Percents as Decimals

Words To write a percent as a decimal, divide by 100 and remove the % sign. This is the same as moving the decimal point two places to the left.

Example $48\% = 48\%$
$= 0.48$

Work Zone

Another way to write a fraction as a decimal is to write the percent as a fraction. Then write the fraction as a decimal.

Examples

Tutor

Write each percent as a decimal.

1. **56%**

Method 1 **Write the percent as a fraction.**

$56\% = \frac{56}{100}$ Rewrite the percent as a fraction with a denominator of 100.

$= 0.56$ Write *56 hundredths* as a decimal.

Method 2 **Move the decimal point.**

$56\% = 56\%$ Move the decimal point two places to the left.

$= 0.56$ Remove the percent sign.

2. **8%**

$8\% = \frac{8}{100}$ Rewrite the percent as a fraction with a denominator of 100.

$= 0.08$ Write *8 hundredths* as a decimal.

3. **2%**

Show your work.

a. _____

b. _____

c. _____

$2\% = 02\%$ Move the decimal point two places to the left.

$= 0.02$ Remove the percent sign.

Got It? **Do these problems to find out.**

a. 32% **b.** 6% **c.** 93%

Write Decimals as Percents

Key Concept

Words To write a decimal as a percent, multiply by 100 and add a % sign. This is the same as moving the decimal point two places to the right.

Example $0.36 = 0.36\%$
$= 36\%$

Another way to write a decimal as a percent is to write the decimal as a fraction with a denominator of 100. Then write the fraction as a percent.

STOP and Reflect

Why does it help to write a decimal as a fraction with a denominator of 100 when writing decimals as percents?

Examples

Tutor

4. **Write 0.38 as a percent.**

Method 1 **Write the decimal as a percent.**

$0.38 = \frac{38}{100}$ Write *38 hundredths* as a fraction.

$= 38\%$ Write the fraction as a percent.

Method 2 **Move the decimal point.**

$0.38 = 0.38$ Move the decimal point two places to the right.

$= 38\%$ Add the percent sign.

5. **Write 0.2 as a percent.**

$0.2 = \frac{2}{10}$ Write *2 tenths* as a fraction.

$\frac{2}{10} \overset{\times 10}{=} \frac{20}{100}$ Write the equivalent fraction with a denominator of 100.

$= 20\%$ Write the fraction as a percent.

Got It? **Do these problems to find out.**

Write each decimal as a percent.

d. 0.47 **e.** 0.73 **f.** 0.5

Show your work.

d. _____

e. _____

f. _____

Example

Tutor

6. **The United States produces more corn than any other country, producing 0.4 of the total corn crops. Write 0.4 as a percent.**

$0.4 = 0.40$ Annex a zero.

$= 0.40\%$ Multiply by 100 and add a % sign.

$= 40\%$ Simplify.

Check $0.4 = \frac{40}{100}$ Write the decimal as a fraction with a denominator of 100.

$= 40\%$ ✓ Write the fraction as a percent.

Guided Practice

Check

Write each percent as a decimal. (Examples 1–3)

1. 27% = _____

2. 15% = _____

3. 4% = _____

Show your work.

Write each decimal as a percent. (Examples 4 and 5)

4. 0.3 = _____

5. 0.82 = _____

6. 0.51 = _____

7. STEM About 0.7 of the human body is water. What percent is equivalent to 0.7? (Example 6) _____

8. **Building on the Essential Question** What is the relationship between percents and decimals?

_____

_____

_____

Rate Yourself!

How well do you understand percents and decimals? Circle the image that applies.

Clear | Somewhat Clear | Not So Clear

For more help, go online to access a Personal Tutor.

Tutor

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Write each percent as a decimal. (Examples 1–3)

1. 35% = _____

Show your work.

2. 2% = _____

3. 31% = _____

4. 95% = _____

Write each decimal as a percent. (Examples 4 and 5)

5. 0.22 = _____

6. 0.79 = _____

7. 0.1 = _____

8. 0.16 = _____

9. **Financial Literacy** A bank offers an interest rate of 4% on a savings account. Write 4% as a decimal. (Examples 1–3)

_____

10. When making a peanut butter and jelly sandwich, 96% of people put the peanut butter on first. Write 96% as a decimal. (Examples 1–3)

_____

11. In a recent year, 0.12 of Americans downloaded a podcast from the Internet. What percent is equivalent to 0.12? (Example 6)

_____

12. In a recent year, the number of homes with digital cameras grew 0.44 from the previous year. Write 0.44 as a percent. (Example 6)

_____

13. **Financial Literacy** The formula $I = prt$ gives the simple interest I earned on an account where an amount p is deposited at an interest rate r for a certain number of years t. Use the table to order the accounts from least to greatest interest earned after 5 years.

_____

_____

Accounts at First Savings Bank

Account	p ($)	r (%)
A	350	4
B	500	3.5
C	280	4.25

14. **Persevere with Problems** Daphne wants to buy a coat that costs $80. The store that sells the coat has multiple locations. The sales tax in each county is shown in the table. How much more would the coat cost in Delaware county than Fairfield county?

County	Tax Rate (%)
Delaware	7.25
Fairfield	6.5
Franklin	6.75

15. Dante took three tests on Friday. He got a 92% on his English test, an 88% on his math test and a 90% on his science test. Write each percent as a decimal in order from least to greatest.

H.O.T. Problems Higher Order Thinking

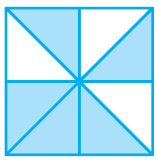
16. **Reason Inductively** Write a decimal between 0.5 and 0.75. Then write it as a fraction in simplest form and as a percent.

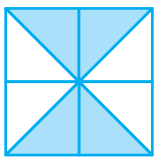
17. **Persevere with Problems** How would you write $43\frac{3}{4}\%$ as a decimal?

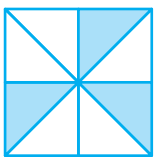
18. **Model with Mathematics** Write a problem about a real-world situation in which you would either write a percent as a decimal or write a decimal as a percent.

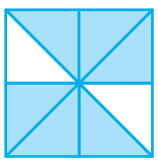
Georgia Test Practice

19. Each square below is divided into sections of equal size. Which square has 75% of its total area shaded?

Ⓐ 

Ⓒ 

Ⓑ 

Ⓓ 

Name _____ My Homework _____

Extra Practice

Write each percent as a decimal.

20. 17% = 0.17

17% = $\frac{17}{100}$

= 0.17

Homework Help

21. 3% = _____

22. 1% = _____

23. 11% = _____

Write each decimal as a percent.

24. 0.99 = _____

25. 0.62 = _____

26. 0.6 = _____

27. 0.87 = _____

28. In one day at a store, 7% of the sales were from shoes. Write 7% as a decimal.

_____

29. In one hour on a certain street, 65% of the cars that passed were black. Write 65% as a decimal.

_____

30. In a recent year, 0.57 of those registered to vote in the United States voted in an election. Write 0.57 as a percent.

_____

31. In a recent study, 0.82 of Americans own a cell phone. What percent is equivalent to 0.82?

_____

32. **Be Precise** In the United States, sales tax is added to items that you purchase. The rate of sales tax varies by state and sometimes by county or region. Use the table to order the counties from least to greatest sales tax.

_____

_____

County Sales Tax	
County	**Sales Tax**
A	6.75%
B	0.0625
C	$\frac{7}{100}$

Georgia Test Practice

33. When you buy a sweater, 6.75% sales tax is added to the price of the sweater. What is 6.75% written as a decimal?

Ⓐ 67,500 Ⓒ 0.675

Ⓑ 67.5 Ⓓ 0.0675

34. The table shows the free throw percentage during practice for three members of a basketball team. What is Zoe's percentage written as a decimal?

Player	Free Throws (%)
Abby	45
Sofia	68
Zoe	52

Ⓕ 52 Ⓗ 0.52

Ⓖ 5.2 Ⓘ 0.052

35. **Short Response** Tamika is buying the baseball hat shown below. What decimal represents 25%?

36. At baseball practice, Neil caught 23 out of 25 hits in the outfield. Which of the following is *not* another way of expressing 23 out of 25?

Ⓐ $\frac{23}{25}$ Ⓒ 0.92

Ⓑ 23% Ⓓ 92%

Common Core Review

Fill in each ◯ with <, >, or = to make a true statement. MCC5.NBT.3b

37. 2.50 ◯ 2.5

38. 0.006 ◯ 0.1

39. 0.015 ◯ 0.005

40. The table shows results for the 100 meter sprint. Who had the fastest time? MCC5.NBT.3b

Athlete	Time (s)
Bryson	12.14
Malik	11.84
Marcell	11.94
Wyatt	12.44

41. Aliah ate 0.75 sandwich. Her brother ate 1.5 sandwiches. Who ate more? MCC5.NBT.3b

Percents Greater than 100% and Percents Less than 1%

What You'll Learn

Scan the lesson. List two headings you would use to make an outline of the lesson.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

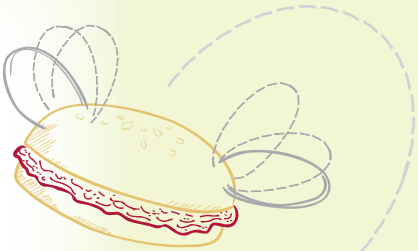
Common Core GPS

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5

Real-World Link

Plants There are over 220,000 species of plants on Earth. Of those, 590 are carnivorous. Plants such as a Venus Fly Trap catch their prey as food.



1. Write the fraction of species of carnivorous plants in simplest form.

$$\frac{\square}{220{,}000} \div \frac{\square}{\square} = \frac{\square}{22{,}000}$$

2. Write your answer to Exercise 1 as a decimal rounded to the thousandth. Use division to find your answer.

)_____

_____ ≈ _____

3. Write your answer to Exercise 2 as a fraction.

_____

_____

4. **Make a Conjecture** Since 0.3 = 30% and 0.03 = 3%, what percent is equal to 0.003? Explain.

_____

_____

Work Zone

Percents as Decimals and Fractions

Percents greater than 100% or less than 1% can also be written as decimals or as fractions.

Examples

Tutor

1. **Write 0.2% as a decimal and as a fraction in simplest form.**

$0.2\% = 00.2$ Divide by 100 and remove % symbol.

$= 0.002$ Decimal form

$= \frac{2}{1{,}000}$ or $\frac{1}{500}$ Fraction form

2. **Write 170% as a mixed number in simplest form and as a decimal.**

$170\% = \frac{170}{100}$ Definition of percent

$= 1\frac{70}{100}$ or $1\frac{7}{10}$ Mixed number form

$= 1.7$ Decimal form

Got It? **Do these problems to find out.**

Write each percent as a decimal and as a mixed number or fraction in simplest form.

a. 0.25% **b.** 300% **c.** 530%

Real World

Example

Tutor

3. **Jimmy's savings increased by 250%. Write 250% as a mixed number in simplest form and as a decimal.**

$250\% = \frac{250}{100}$ Definition of a percent

$= 2\frac{50}{100}$ or $2\frac{1}{2}$ Mixed number form

$= 2.5$ Decimal form

So, Jimmy more than doubled his savings.

Got It? **Do this problem to find out.**

d. The stock price for a corporation increased by 0.11%. Write 0.11% as a decimal and as a fraction in simplest form.

Percents

A percent less than 1% equals a number less than 0.01 or $\frac{1}{100}$. A percent greater than 100% equals a number greater than 1.

Show your work.

a. _____

b. _____

c. _____

d. _____

Mixed Numbers and Decimals as Percents

To write a decimal as a percent, multiply by 100 and add a percent sign. To write a mixed number as a percent, first write the mixed number as an improper fraction.

Example

Tutor

4. **Write $1\frac{1}{4}$ as a percent.**

$1\frac{1}{4} = \frac{5}{4}$ Write $1\frac{1}{4}$ as an improper fraction.

$\frac{5}{4} = \frac{\blacksquare}{100}$ Find an equivalent fraction.

$\frac{5}{4} = \frac{125}{100}$ ($\times 25$) Since $4 \times 25 = 100$, multiply 5 by 25 to find an equivalent fraction.

So, $1\frac{1}{4}$ is $\frac{125}{100}$ or 125%.

Got It? Do these problems to find out.

Write each mixed number as a percent.

e. $2\frac{9}{10}$ **f.** $3\frac{2}{5}$

Examples

Tutor

5. **Write 1.68 as a percent.**

$1.68 = 1.68$ Multiply by 100.

$= 168\%$ Add % symbol.

6. **Write 0.0075 as a percent.**

$0.0075 = 0.0075$ Multiply by 100.

$= 0.75\%$ Add % symbol.

Got It? Do these problems to find out.

g. 2.5 **h.** 0.004 **i.** 0.0016

Alternative Method

$1 = 100\%$

$\frac{1}{4} = 25\%$

So, $1\frac{1}{4} = 125\%$.

Show your work.

e. _____

f. _____

STOP and Reflect

Is the decimal 6.7 equal to 67%? Explain below.

g. _____

h. _____

i. _____

Example

7. STEM **The cheetah is the fastest land mammal in the world. The peregrine falcon is the fastest bird in the world. Its speed is 2.1 times as fast as the cheetah. Write this number as a percent.**

$2.1 = 2.10$ Multiply by 100.

$= 210\%$ Add % symbol.

The peregrine falcon's speed is 210% of the cheetah's speed.

Got It? **Do this problem to find out.**

j. STEM The slowest land mammal is the sloth. Its speed is about 0.0016 that of a cheetah. Write this number as a percent.

Show your work.

j. _____

Guided Practice

Write each percent as a decimal and as a mixed number or fraction in simplest form. (Examples 1–3)

1. 325% = _____

2. 480% = _____

3. 0.6% = _____

Show your work.

Write each mixed number or decimal as a percent. (Examples 4–6)

4. $1\frac{4}{5}$ = _____

5. 0.0015 = _____

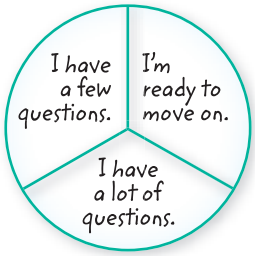
6. 2.75 = _____

7. A manufacturing company finds that 0.0019 of the light bulbs it makes are defective. Write this as a percent. (Example 7) _____

8. **Building on the Essential Question** How are percents greater than 100% used in real-world contexts?

Rate Yourself!

Are you ready to move on? Shade the section that applies.



For more help, go online to access a Personal Tutor.

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Write each percent as a decimal and as a mixed number or fraction in simplest form. (Examples 1–3)

1. 350% = _____

Show your work.

2. 600% = _____

3 0.15% = _____

4. 0.55% = _____

Write each mixed number as a percent. (Example 4)

5. $2\frac{1}{2}$ = _____

6. $9\frac{3}{4}$ = _____

7. $4\frac{1}{5}$ = _____

8. $7\frac{3}{10}$ = _____

Write each decimal as a percent. (Examples 5 and 6)

9. 8.5 = _____

10. 2.64 = _____

11. 0.009 = _____

12. 0.0034 = _____

13 The size of a large milk shake is 1.4 times the size of a medium milk shake. Write 1.4 as a percent. (Example 7)

_____

_____

14. STEM Fresh water from lakes accounts for only 0.001 of the world's water supply. Write this decimal as a percent. (Example 7)

_____

_____

15. In a recent year, the United States Census Bureau reported that 0.3% of the population in the United States was Japanese. Write this percent as a decimal and as a fraction. Then interpret its meaning as a ratio of the United States population.

_____

_____

16. Adrienne answered all 21 multiple-choice questions correctly on her science test. If her teacher decided to let one of the questions count as a bonus, worth the same number of points as the other problems on the test, what was Adrienne's test score? Write your answer as a decimal and as a percent.

_____

_____

17. **Use Math Tools** Refer to the table at the right.

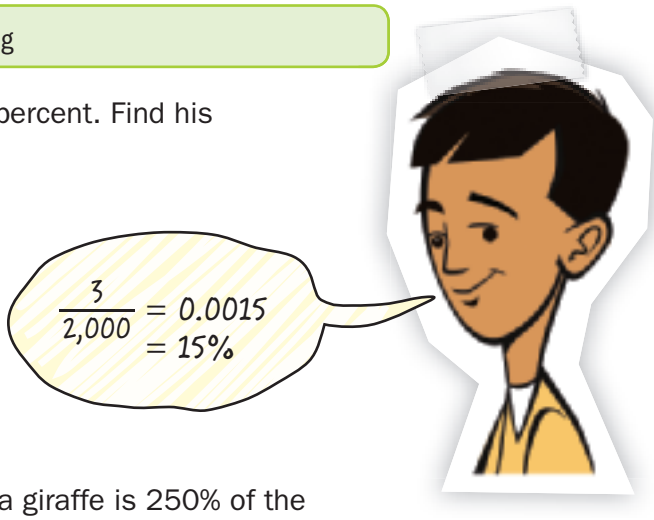
a. Write the percent of magnesium found in the human body as a decimal.

b. Which element makes up $\frac{1}{400}$ of the human body?

Elements in the Human Body	
Element	**Percent**
Magnesium	0.05
Potassium	0.35
Sodium	0.15
Sulfur	0.25

H.O.T. Problems Higher Order Thinking

18. **Find the Error** Raj is writing $\frac{3}{2{,}000}$ as a percent. Find his mistake and correct it.



19. **Persevere with Problems** The speed of a giraffe is 250% of the speed of a squirrel. If a squirrel's speed is 12 miles per hour, find the speed of a giraffe.

20. **Model with Mathematics** Write a real-world problem involving a percent greater than 100%. Then solve the problem.

Georgia Test Practice

21. A certain stock increased its value by 467% over 10 years. Which number is *not* equivalent to 467%?

Ⓐ 4.67

Ⓑ 0.467

Ⓒ $4\frac{67}{100}$

Ⓓ $\frac{467}{100}$

Name _____ My Homework _____

Extra Practice

Write each percent as a decimal and as a mixed number or fraction in simplest form.

22. 475% = 4.75; $4\frac{3}{4}$

Homework Help

$475\% = \frac{475}{100}$

$= 4\frac{75}{100}$ or $4\frac{3}{4}$

$= 4.75$

23. 400% = _____

24. 0.05% = _____

25. 0.04% = _____

Write each decimal as a percent.

26. 1.07 = _____

27. 35 = _____

28. 0.003 = _____

29. 0.0077 = _____

30. A collectible action figure sold for 193% of its original price. Write this percent as a decimal and as a mixed number or fraction in simplest form.

_____

_____

31. A car's tire pressure decreased by 0.098 of its original pressure. Write 0.098 as a percent.

_____

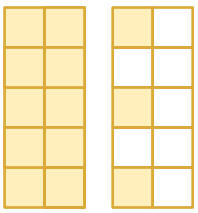
Write each percent as a decimal.

32. $\frac{3}{4}\%$ = _____

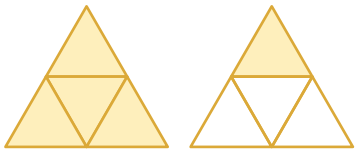
33. $\frac{3}{25}\%$ = _____

CCGPS **Use Math Tools** **One complete figure represents 100%. Write a percent to represent the shaded portion of each figure below.**

34. _____

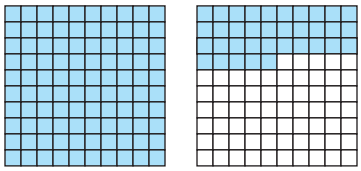


35. _____



Georgia Test Practice

36. If one complete grid represents 100%, what percent of the figure below is shaded?



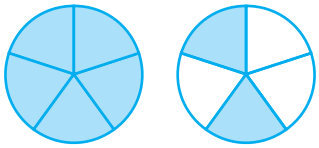
Ⓐ 25%
Ⓒ 125%
Ⓑ 100%
Ⓓ 135%

37. **Short Response** The medium-size sub sandwich is 1.33 times larger than the small-size sub sandwich. Write 1.33 as a percent.

38. About 0.036% of the water on Earth is found in lakes and rivers. What is 0.036% written as a fraction in simplest form?

Ⓕ $\frac{9}{25}$
Ⓗ $\frac{9}{25{,}000}$
Ⓖ $\frac{36}{100{,}000}$
Ⓘ $\frac{18}{50{,}000}$

39. What percent of one circle is modeled below?



Ⓐ 40%
Ⓒ 120%
Ⓑ 100%
Ⓓ 140%

Common Core Review

Compare the fractions using <, >, or =. MCC4.NF.2

40. $\frac{3}{6}$ ◯ $\frac{1}{8}$

41. $\frac{10}{17}$ ◯ $\frac{11}{12}$

42. $\frac{7}{9}$ ◯ $\frac{5}{11}$

43. Evangeline walked $\frac{3}{10}$ of a mile on Monday, $\frac{5}{10}$ of a mile on Tuesday, and $\frac{25}{100}$ of a mile on Wednesday. Plot each distance on the number line. MCC4.NF.6

44. The flute players are $\frac{3}{10}$ of the band and the trumpet players are $\frac{1}{12}$ of the band. Is a greater fraction of the band flute players or trumpet players? MCC4.NF.2

Solve a Simpler Problem

Content Standards
MCC6.RP.3, MCC6.RP.3c
Mathematical Practices
1, 3, 4

Case #1 First Place Pizza

The daily lunch report indicated that 80% of the 300 students at Midtown Middle School chose pizza for lunch.

How many students bought pizza for lunch?

1 Understand *What are the facts?*

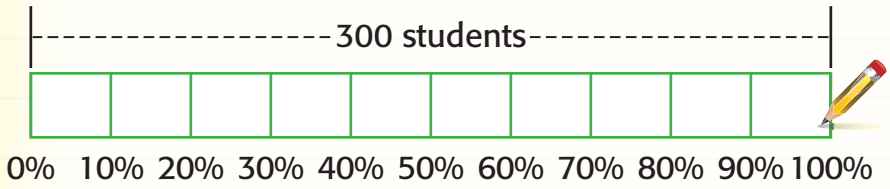
- The lunch report says 80% chose pizza.
- There are 300 students at the school.

2 Plan *What is your strategy to solve this problem?*

Solve a simpler problem by finding 10% of the total students. Then use the result to find 80% of the total students.

3 Solve *How can you apply the strategy?*

Complete the bar diagram. Fill in the value of each section.



There are 300 ÷ 10, or 10 groups with ____ students in each group.

Multiply. ____ × 8 = ____

So, ____ students chose pizza for lunch.

4 Check *Does the answer make sense?*

You know that 80% is close to 75%, which is $\frac{3}{4}$. Since $\frac{1}{4}$ of 300 is 75, $\frac{3}{4}$ of 300 is ____. So, my answer is reasonable.

Analyze the Strategy

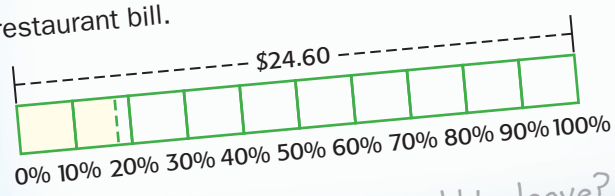
Watch Tutor

Reason Inductively Explain when you would use the *solve a simpler problem* strategy. _____

_____

Case #2 Top Tip

Heidi's dad wants to leave an 18% tip for a $24.60 restaurant bill.



About how much money should he leave?

1 Understand

Read the problem. What are you being asked to find?

I need to estimate _____.

Underline key words and values. What information do you know?

Heidi's dad wants to leave an _____ on a _____ bill.

Is there any information that you do *not* need to know?

I do not need to know _____.

2 Plan

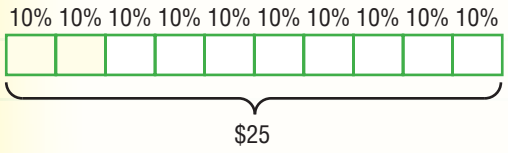
Choose a problem-solving strategy.

I will use the _____ strategy.

3 Solve

Use your problem-solving strategy to solve the problem.

Solve a simpler problem by finding 20% of $25.00. Use the result to estimate 18%. The whole is _____. Make a bar diagram that is divided into _____. Each part represents _____. The two shaded parts represent _____.



Because the whole is $25.00, each part is _____.

So, 18% of $24.60 is about _____.

4 Check

Use information from the problem to check your answer.

0.18 × 24.60 = _____. So, $5 is a reasonable estimate.

Collaborate Work with a small group to solve the following cases. Show your work on a separate piece of paper.

Case #3 Books

Ebony estimates that she reads 100 books per year.

About how many books does she read per week?

Case #4 Candy

A candy factory can make 1,200 individually wrapped pieces of chocolate candy in one minute, 35% of which have caramel.

About how many pieces have caramel?

Case #5 Bracelets

Ruthie has 35 shape-bracelets, 60% of which are sea animals.

How many bracelets are sea animals?

Circle a strategy below to solve the problem.

- Look for a pattern.
- Draw a diagram.
- Act it out.
- Make a list.

Case #6 Border

Part of a strip of border for a bulletin board is shown. All of the sections of the border are the same width.

If the first shape on the strip is a triangle and the strip is 74 inches long, what is the last shape on the strip?

Mid-Chapter Check

Vocabulary Check

1. Define *percent*. Write $\frac{25}{100}$ as a percent then write $\frac{25}{100}$ as a decimal. (Lesson 2)

Skills Check and Problem Solving

Write each fraction as a decimal and each decimal as a fraction in simplest form. (Lesson 1)

2. $\frac{8}{20} =$ _____

3. $0.64 =$ _____

4. $\frac{3}{100} =$ _____

Write each percent as a decimal and each decimal as a percent. (Lessons 3 and 4)

5. $73\% =$ _____

6. $0.1 =$ _____

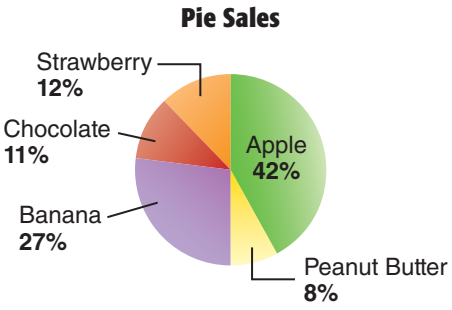
7. $254\% =$ _____

8. The number of chorus students increased by a factor of 1.2 from the previous year. Write 1.2 as a percent. (Lesson 4)

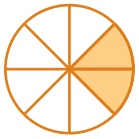
9. CCGPS **Use Math Tools** The graph shows the pie sales during one week for Polly's Pies. (Lessons 2 and 3)

a. What fraction of the pies sold was apple?

b. Write the percent of strawberry pies sold as a decimal.



10. **Georgia Test Practice** Each circle is divided into sections of equal size. Which circle has 25% of its total area shaded? (Lesson 2)

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Compare and Order Fractions, Decimals, and Percents

What You'll Learn

Scan the lesson. Predict two things you will learn about comparing and ordering fractions.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Vocabulary

least common denominator (LCD)

Common Core GPS

Content Standards
Preparation for MCC6.RP.3c

Mathematical Practices
1, 2, 3, 4, 5, 6

Vocabulary Start-Up

The **least common denominator**, or LCD, is the least common multiple of the denominators of two or more fractions.

Complete the graphic organizer. Write the meaning of each word in the appropriate box. Provide examples.

Least	Common
least common denominator	
Denominator	**Multiple**

Real-World Link

- Earnest is baking, but he wants to use only one measuring cup. He needs $\frac{1}{2}$ cup of sugar and $\frac{3}{4}$ cup of flour. What is the least common multiple of the denominators? ☐
- What size measuring cup should he use: $\frac{1}{2}$ cup, $\frac{1}{3}$ cup, or $\frac{1}{4}$ cup? Explain. _____

Work Zone

Compare and Order Fractions

To compare fractions, you can follow these steps.

1. Find the least common denominator (LCD) of the fractions. That is, find the least common multiple of the denominators.
2. Write an equivalent fraction for each fraction using the LCD.
3. Compare the numerators.

Example

Tutor

Fill in each ◯ with <, >, or = to make a true statement.

1. $\frac{5}{8} \bigcirc \frac{7}{12}$

The LCM of the denominators, 8 and 12, is 24. So, the LCD is 24. Write an equivalent fraction with a denominator of 24 for each fraction.

$\frac{5}{8} \overset{\times 3}{=} \frac{15}{24}$ $\quad \frac{7}{12} \overset{\times 2}{=} \frac{14}{24}$

$\frac{15}{24} > \frac{14}{24}$, since $15 > 14$. So, $\frac{5}{8} > \frac{7}{12}$.

Least Common Multiple

$2 = 2$
$14 = 2 \times 7$
$4 = 2 \times 2$
$7 = 7$

The LCM is $2 \times 2 \times 7$ or 28.

Got It? Do these problems to find out.

a. $\frac{2}{3} \bigcirc \frac{4}{9}$ **b.** $\frac{5}{12} \bigcirc \frac{7}{8}$ **c.** $\frac{1}{6} \bigcirc \frac{5}{18}$

Example

Watch Tutor

2. Order the fractions $\frac{1}{2}$, $\frac{9}{14}$, $\frac{3}{4}$, and $\frac{5}{7}$ from least to greatest.

Rewrite each fraction using the LCD of 28.

$\frac{1}{2} \overset{\times 14}{=} \frac{14}{28}$ $\quad \frac{9}{14} \overset{\times 2}{=} \frac{18}{28}$ $\quad \frac{3}{4} \overset{\times 7}{=} \frac{21}{28}$ $\quad \frac{5}{7} \overset{\times 4}{=} \frac{20}{28}$

Since $\frac{14}{28} < \frac{18}{28} < \frac{20}{28} < \frac{21}{28}$, the order of the original fractions from least to greatest is $\frac{1}{2}$, $\frac{9}{14}$, $\frac{5}{7}$, $\frac{3}{4}$.

Got It? Do this problem to find out.

Show your work.

d. Order $\frac{1}{2}$, $\frac{5}{6}$, $\frac{2}{3}$, and $\frac{3}{5}$ from least to greatest.

d. _____

Compare Fractions, Decimals, and Percents

It may be easier to compare fractions, decimals, and percents when they are all written as decimals.

$\frac{1}{5} = 0.2 = 20\%$	$\frac{2}{5} = 0.4 = 40\%$	$\frac{3}{5} = 0.6 = 60\%$	$\frac{4}{5} = 0.8 = 80\%$
$\frac{1}{8} = 0.125 = 12.5\%$	$\frac{3}{8} = 0.375 = 37.5\%$	$\frac{1}{3} = 0.\overline{3} = 33.\overline{3}\%$	$\frac{2}{3} = 0.\overline{6} = 66.\overline{6}\%$

Examples

Tutor

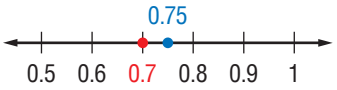
Fill in each ◯ with $<$, $>$, or $=$ to make a true statement.

3. $\frac{3}{4}$ ◯ **0.7**

$\frac{3}{4}$ ◯ 0.7 Write the sentence.

0.75 ◯ 0.70 Write $\frac{3}{4}$ as a decimal. Annex a zero to 0.7.

$0.7\mathbf{5} > 0.7\mathbf{0}$ Compare the hundredths place. $5 > 0$



Since 0.75 is to the right of 0.7 on the number line, $\frac{3}{4} > 0.7$.

4. **Lucita made 85% of her free throws. Henri made $\frac{7}{8}$ of his free throws. Who has the better average? Explain.**

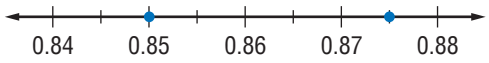
85% ◯ $\frac{7}{8}$ Write the sentence.

0.850 ◯ 0.875 Write each number as a decimal. Annex a zero to 0.85.

$0.8\mathbf{5}0 < 0.8\mathbf{7}5$ Compare the hundredths place. $5 < 7$

Since $0.850 < 0.875$, Henri has the better average.

Check



Since 0.85 is to the left of 0.875, the answer is correct. ✓

Got It? **Do these problems to find out.**

e. $\frac{2}{3}$ ◯ 0.6 **f.** 0.7 ◯ $\frac{8}{11}$ **g.** $\frac{1}{5}$ ◯ 0.2

h. 42% ◯ 0.44 **i.** 7% ◯ $\frac{7}{10}$ **j.** 6.5 ◯ 650%

Example

Tutor

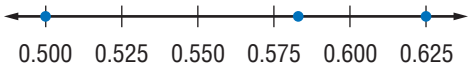
5. **The table shows the school carnival attendance. Which grade has the greatest part of the class attending the carnival?**

Grade	Attendance
6	$\frac{5}{8}$
7	0.5
8	58.3%

Order the numbers from least to greatest. Express each number as a decimal with the same number of places.

$\frac{5}{8} = 0.625$ $\quad 0.5 = 0.500$ $\quad 58.3\% = 0.583$

Graph the numbers on a number line.



From least to greatest, the numbers are 0.5, 58.3%, and $\frac{5}{8}$.

Since $\frac{5}{8}$ represents Grade 6, Grade 6 has the greatest part of the class attending the school carnival.

Got It? **Do this problem to find out.**

Show your work.

k. Hiroshi found that $\frac{3}{5}$ of his class prefers vanilla ice cream, 26% prefers chocolate, and 0.14 prefers strawberry. Which kind of ice cream do students prefer the least?

k. _____

Guided Practice

Check

1. Order the fractions $\frac{4}{5}$, $\frac{1}{2}$, $\frac{9}{10}$, and $\frac{3}{4}$ from least to greatest. (Examples 1 and 2)

Show your work.

2. Cora spends $\frac{2}{3}$ of her free time blogging on the Internet. Leah spends 60% of her free time blogging on the Internet. Who spends more of her free time blogging? (Examples 3 and 4)

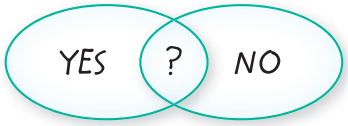
3. The table shows the wins for some middle school football teams. Which team has the greatest fraction of wins? (Example 5)

Team	Wins
Eagles	95%
Wolves	$\frac{9}{10}$
Mustangs	0.89

4. **Building on the Essential Question** How do you compare fractions, decimals, and percents?

Rate Yourself!

Are you ready to move on? Shade the section that applies.



For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Fill in each ◯ with <, >, or = to make a true statement. (Examples 1 and 3)

1. $\frac{1}{3}$ ◯ $\frac{3}{5}$

2. $\frac{7}{12}$ ◯ $\frac{1}{2}$

3 $\frac{1}{4}$ ◯ 0.4

4. 0.7 ◯ $\frac{7}{9}$

Show your work.

Order the fractions from least to greatest. (Example 2)

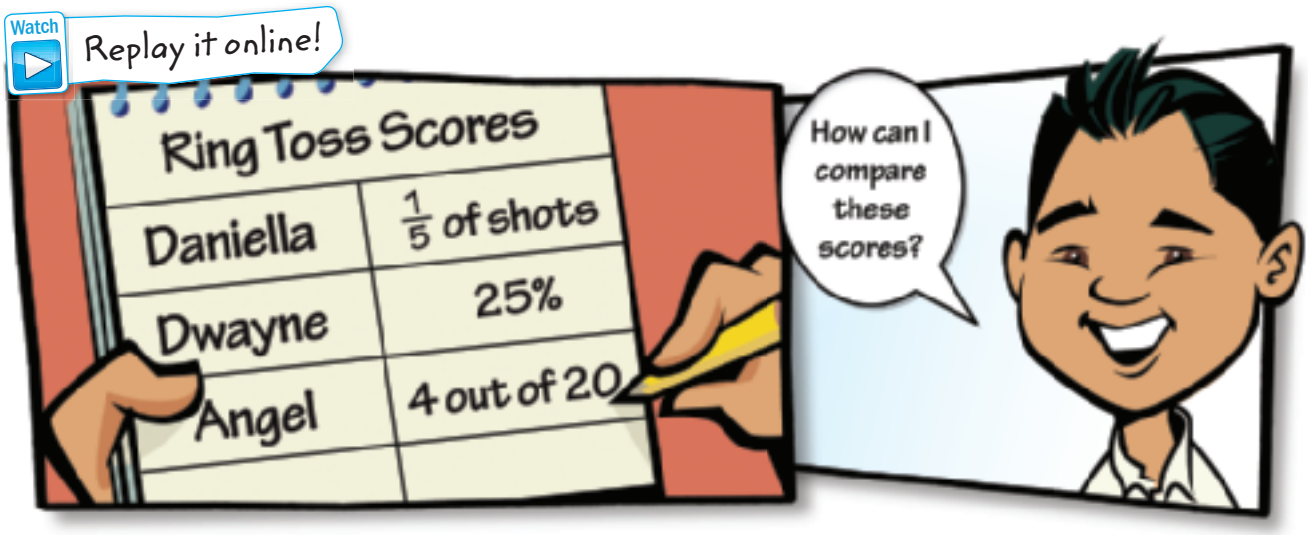
5. $\frac{1}{2}, \frac{2}{3}, \frac{1}{4}, \frac{5}{6}$

6. $\frac{2}{3}, \frac{2}{9}, \frac{5}{6}, \frac{11}{18}$

7. Darius spends 35% of his time doing math homework. Alex spends $\frac{2}{5}$ of his time doing math homework. Who spends more homework time on math? Explain. (Example 4)

8. Three snack bars contain $\frac{1}{5}$, 0.22, and 19% of their Calories from fat. Which snack bar contains the least amount of Calories from fat? (Example 5)

9. CCSPS **Model with Mathematics** Use the graphic novel frame below for Exercises a–b.



a. Write each score as a decimal. _____

b. Compare the three scores. _____

10. **Be Precise** Complete the graphic organizer. Write the original numbers to complete the statement.

Number	Steps to Write the Number as a Decimal with Three Places	Decimal
$\frac{3}{8}$	Divide the _____ by the _____.	0.375
0.3	The number is a decimal. Annex _____ zeros.	0.300
38.7%	Move the _____ point _____ places to the left. Remove the _____ symbol.	0.387

So, _____ < _____ < _____.

11 Order the portion of responses listed in the table from least to greatest.

_____

Number of Times Eating Fast Food per Week	0	1–2	3–4	5+
Portion of Responses	17%	$\frac{11}{20}$	0.2	8%

H.O.T. Problems Higher Order Thinking

12. **Reason Abstractly** Specify three fractions with different denominators that have an LCD of 24. Then arrange the fractions in order from least to greatest.

_____

13. **Persevere with Problems** Order $\frac{3}{8}$, $\frac{3}{7}$, and $\frac{3}{9}$ from least to greatest without writing equivalent fractions with a common denominator. Explain your strategy. _____

_____

14. **Persevere with Problems** Are the fractions $\frac{3}{9}$, $\frac{3}{10}$, $\frac{3}{11}$, and $\frac{3}{12}$ arranged in order from least to greatest or from greatest to least? Explain.

_____

_____

Georgia Test Practice

15. Which of the following numbers has a value between 0 and 1?

Ⓐ $\frac{7}{8}$ Ⓑ 114% Ⓒ 1.14 Ⓓ $\frac{8}{7}$

Name _____ My Homework _____

Extra Practice

Fill in each ◯ with <, >, or = to make a true statement.

16. $\frac{7}{8}$ ◯ $\frac{5}{6}$

Homework Help

$\frac{7}{8} = \frac{21}{24}$; $\frac{5}{6} = \frac{20}{24}$

$\frac{21}{24} > \frac{20}{24}$ so $\frac{7}{8} > \frac{5}{6}$

17. $\frac{14}{18}$ ◯ $\frac{7}{9}$

18. 0.75 ◯ $\frac{1}{2}$

19. $\frac{1}{3}$ ◯ 0.33

Order the fractions from least to greatest.

20. $\frac{1}{6}, \frac{2}{5}, \frac{3}{5}, \frac{3}{7}$

21. $\frac{5}{8}, \frac{3}{4}, \frac{1}{2}, \frac{9}{16}$

22. Shop Rite has jeans on sale for $\frac{3}{10}$ off. Save More has jeans on sale for 33% off. Which store has a better sale on jeans? Explain.

23. A city's population rose 3% one year, 0.08 the next year, and by $\frac{2}{50}$ the next year. Order these increases from least to greatest.

Order the numbers from least to greatest.

24. 0.4, $\frac{5}{8}$, 38%

25. $\frac{1}{2}$, 0.55, $\frac{5}{7}$

26. CCSPS **Use Math Tools** The table shows the favorite subjects of students in a recent survey.

Favorite Subject	
Subject	**Portion of Students**
Art	$\frac{4}{25}$
English	13%
Math	0.28
Other	7%
Science	$\frac{21}{100}$
Social Studies	0.15

a. Did more students choose art or math? Explain.

b. Which subject did most students choose? Explain.

c. Order the subjects from least to greatest.

Georgia Test Practice

27. Fairview Elementary started a recycling program. The display shows the portion of each item that is recycled at the school.

Which of the following lists the items recycled from least to greatest?

Ⓐ plastic, glass, aluminum, paper

Ⓑ glass, plastic, aluminum, paper

Ⓒ paper, glass, plastic, aluminum

Ⓓ aluminum, paper, glass, plastic

28. A plumber needs to drill a hole that is just slightly larger than $\frac{3}{16}$ inch in diameter. Which measure is the smallest but still larger than $\frac{3}{16}$ inch?

Ⓕ $\frac{3}{32}$ inch

Ⓖ $\frac{5}{16}$ inch

Ⓗ $\frac{13}{64}$ inch

Ⓘ $\frac{17}{32}$ inch

29. **Short Response** Mr. Tucker has four sockets in his tool chest that are labeled $\frac{3}{4}$ in., $\frac{3}{16}$ in., $\frac{11}{32}$ in., and $\frac{1}{8}$ in. Order the sizes of sockets from smallest to largest.

_____

Common Core Review

Round each decimal to the nearest hundredth. MCC5.NBT.4

30. 0.623 ≈ _____

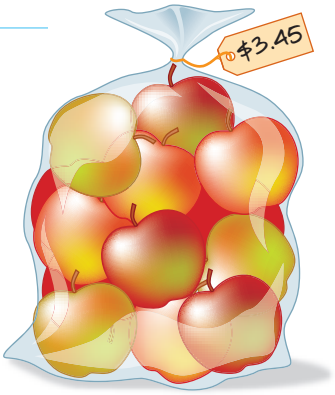
31. 4.288 ≈ _____

32. 5.105 ≈ _____

33. In a survey, $\frac{9}{25}$ of students ride the bus to school and $\frac{19}{50}$ walk to school. What fraction of students ride the bus or walk to school? MCC4.NF.3d

_____

34. The student council bought 7 bags of apples for their fall party. How much did they pay for the apples? MCC5.NBT.7



_____

_____

Estimate with Percents

What You'll Learn

Scan the lesson. Predict two things you will learn about estimating with percents.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

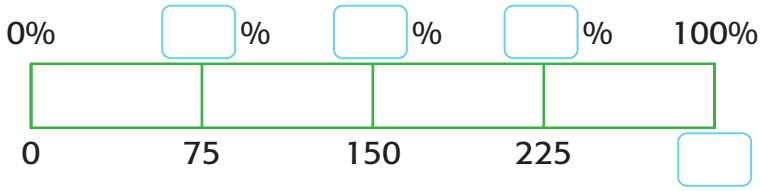
Common Core GPS

Content Standards
MCC6.RP.3, MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5

Real-World Link

Movies Josefina surveyed 298 students and found that 52% like scary movies. Estimate the number of students that like scary movies.



1. Write the common percents from 0% to 100% at the top of the bar diagram.
2. What common percent is 52% close to? ☐ Shade the bar diagram above to show your answer.
3. Round 298 to the nearest hundred. 298 ≈ ☐ Write your answer in the box below 100%.
4. Use the bar diagram to estimate 52% of 298. Explain.

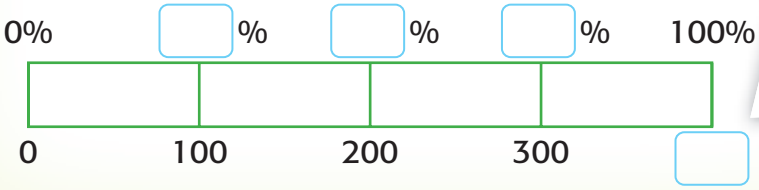
_____

_____

_____

_____

5. Use the bar diagram below to estimate 73% of 400. _____



Work Zone

Estimate the Percent of a Number

Estimating with percents will provide a reasonable solution to many real-world problems. Choose compatible numbers when estimating the percent of a number.

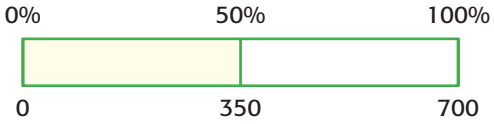
Examples

Tutor

1. **Estimate 47% of 692.**

47% is close to 50% or $\frac{1}{2}$. Round 692 to 700.

$\frac{1}{2}$ of 700 is 350. $\frac{1}{2}$ or *half* means to divide by 2.



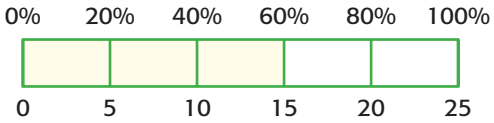
So, 47% of 692 is about 350.

2. **Estimate 60% of 27.**

60% is $\frac{3}{5}$.

Round 27 to 25 since it is divisible by 5.

$\frac{1}{5}$ of 25 is 5. $\frac{1}{5}$, or *one fifth*, means divide by 5.



Show your work.

So, $\frac{3}{5}$ of 25 is 3×5 or 15.

So, 60% of 27 is about 15.

Got It? **Do these problems to find out.**

Estimate each percent.

a. 48% of 76 **b.** 18% of 42 **c.** 73% of 41

a. _____

b. _____

c. _____

Example

Tutor

3. STEM **Polar bears can eat as much as 10% of their body weight in less than one hour. If an adult male polar bear weighs 715 pounds, about how much food can he eat in one hour?**

To determine how much food a polar bear can eat in one hour, you need to estimate 10% of 715.

Method 1 **Find equivalent ratios.**

$10\% = \frac{1}{10}$ and $715 \approx 700$

$\frac{1}{10} = \frac{\blacksquare}{700}$ Write the equivalent ratios.

$\frac{1}{10} \overset{\times 70}{=} \frac{\blacksquare}{700}$ Since $10 \times 70 = 700$, multiply 1 by 70.

The unknown value is 70.

Method 2 **Use mental math.**

$10\% = \frac{1}{10}$ and $715 \approx 700$

$\frac{1}{10}$ of 700 is 70.

So, a polar bear can eat about 70 pounds of food in one hour.

Got It? **Do this problem to find out.**

Show your work.

d. Kayleigh decided to donate 30% of her savings. If she has $238 in her savings account, about how much will she donate?

d. _____

Estimate Using the Rate per 100

You can also estimate with percents using a rate per 100.

STOP **and Reflect**

When would you use mental math to estimate the percent of a number? Explain below.

Examples

Tutor

4. **Estimate 17% of 198.**

17% = 17 out of 100 Write the percent as a rate per 100.

198 ≈ 200 Round to the nearest hundred.

Since 200 is 100 + 100, add 17 + 17 to estimate 17% of 198.

34 is about 17% of 198.

5. **An airline records the snack orders of passengers. Last year 9% of all passengers ordered ginger ale to drink. There are 408 passengers on the flight to Houston, Texas. About how many passengers does the airline expect to order ginger ale on this flight?**

Estimate 9% of 408.

9% = 9 out of 100 Write the percent as a rate per 100.

408 ≈ 400 Round to the nearest hundred.

Since 400 is 100 × 4, multiply 9 × 4 to estimate 9% of 408.

36 is about 9% of 408. So, about 36 passengers will order ginger ale.

Show your work.

e. _____

f. _____

g. _____

Got It? **Do these problems to find out.**

Estimate using a rate per 100.

e. 27% of 307

f. 76% of 192

g. Last year 24% of the zoo visitors were under the age of 3. Last week, the zoo had 996 visitors. About how many of the zoo visitors were under the age of 3?

Guided Practice

Check

Estimate each percent. (Examples 1 and 2)

1. 19% of $53 ≈ _____

Show your work.

2. 21% of 96 ≈ _____

3. 59% of 16 ≈ _____

4. A purse that originally cost $29.99 is on sale for 50% off. About how much is the sale price of the purse? (Example 3)

_____

5. Mr. Marcucci received a bonus of $496 from his employer. He has to pay 33% of his bonus to taxes. How much will Mr. Marcucci pay in taxes? (Examples 4 and 5)

_____

6. **Building on the Essential Question** When is an estimate more useful than an exact answer?

_____

_____

Rate Yourself!

How confident are you about estimating with percents? Shade the ring on the target.

For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Estimate each percent. (Examples 1 and 2)

1. 47% of $118 ≈ _____

2. 19% of 72 ≈ _____

3. 42% of 16 ≈ _____

4. 67% of 296 ≈ _____

Show your work.

Estimate using a rate per 100. (Example 4)

5. 24% of 289 ≈ _____

6. 67% of 208 ≈ _____

7. STEM Penguins spend almost 75% of their lives in the sea. An Emperor Penguin in the wild has a life span of about 18 years. About how many years does this penguin spend in the sea? (Example 3)

_____

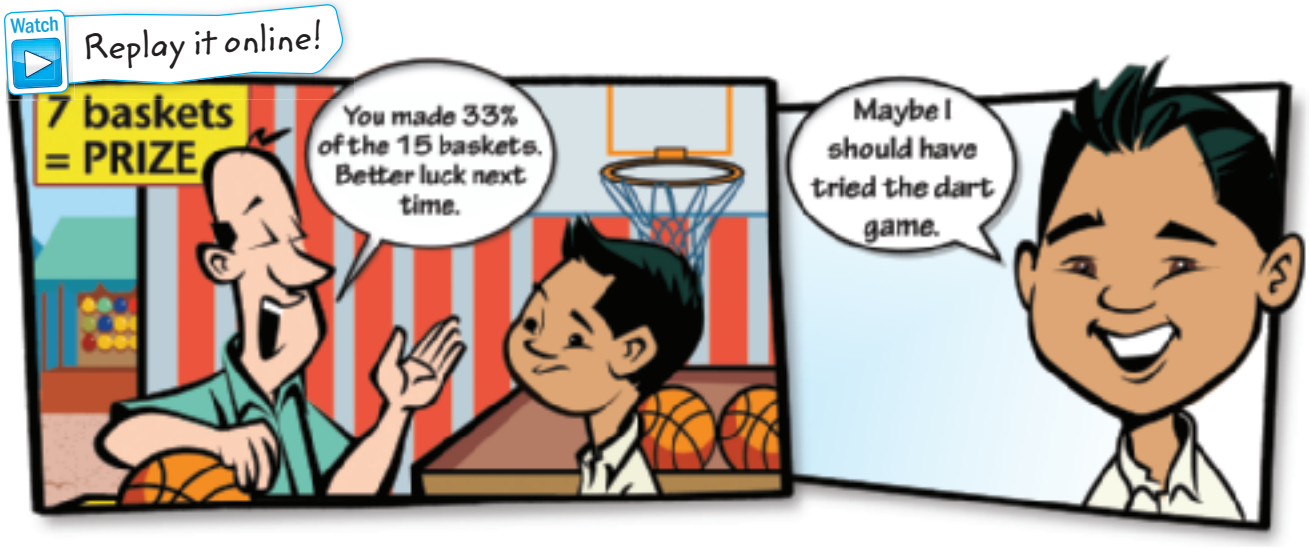
_____

8. In Nathan's baseball card collection, 58% of the cards are players from the National League. He has 702 baseball cards. About how many baseball cards are players from the National League? Use a rate per 100 to estimate. (Example 5)

_____

_____

9. CCSPS **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.



a. Suppose Angel is shooting baskets and makes 40% of the 15 shots. Does he win a prize? Explain your reasoning.

_____

b. About what percent of the baskets need to be made in order to win a prize? _____

10. About 42% of Alaska's population lives in the city of Anchorage. If Alaska has a total population of 648,818, about how many people live in Anchorage?

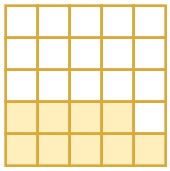
11 During the basketball season, Tyrone made 37 baskets out of 71 attempts. About what percent of his shots did he miss?

Use Math Tools **Estimate the percent that is shaded in each figure.**

12.

13.

14.



H.O.T. Problems Higher Order Thinking

15. **Reason Inductively** Rachel wants to buy a shirt regularly priced at $32. It is on sale for 40% off. Rachel estimates that she will save $\frac{2}{5}$ of $30 or $12. Will the actual amount be more or less than $12? Explain.

16. **Persevere with Problems** Order 10% of 20, 20% of 20, and $\frac{1}{5}$% of 20 from least to greatest.

17. **Construct an Arguement** A classmate is trying to estimate 42% of $122. Explain how your classmate should solve the problem.

Georgia Test Practice

18. Evan wants to buy a digital camera that sells for $199.99. If he uses his discount card, he will save 18%. About how much will he save using the discount card?

Ⓐ $20
Ⓑ $40
Ⓒ $50
Ⓓ $160

Name _____ My Homework _____

Extra Practice

Estimate each percent.

19. 53% of 59 ≈ $\frac{1}{2}$ of 60 is 30.

Homework Help

53% is close to 50% or $\frac{1}{2}$. Round 59 to 60.

20. 35% of 147 ≈ _____

21. 26% of 125 ≈ _____

22. 79% of 82 ≈ _____

Estimate using a rate per 100.

23. 19% of 288 ≈ _____

24. 74% of 315 ≈ _____

25. 61% of 407 ≈ _____

26. 89% of 195 ≈ _____

27. Trevon spent 8 hours and 15 minutes at an amusement park yesterday. He spent 75% of the time at the park on rides. About how much time did he spend on rides?

_____

_____

28. A group of friends went on a hiking trip. They planned to hike a total of 38 miles. They want to complete 25% of the hike by the end of the first day. About how many miles should they hike the first day?

_____

_____

29. Briana has just finished her sixth grade scrapbook. In her scrapbook, 47% of the pages include her twin sister, Bethany. The scrapbook has 896 photos. About how many photos include Bethany? Use a rate per 100 to estimate.

_____

_____

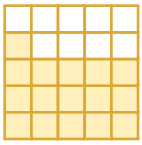
30. The community garden has 596 vegetables. In the garden, 64% of the vegetables are green vegetables. About how many vegetables in the garden are green? Use a rate per 100 to estimate.

_____

_____

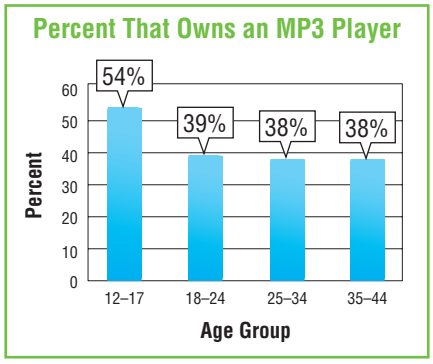
CCSPS **Use Math Tools** **Estimate the percent that is shaded in each figure.**

31.  _____

32.  _____

Georgia Test Practice

33. Refer to the graph. If 4,134 people were surveyed, which of the following can be used to estimate the number of 18- to 24-year-olds that own a portable MP3 player?



Ⓐ $\frac{1}{2}$ of 4,000 = 2,000

Ⓑ $\frac{2}{5}$ of 4,000 = 1,600

Ⓒ $\frac{1}{3}$ of 4,000 = 1,300

Ⓓ $\frac{1}{5}$ of 4,000 = 800

34. Short Response In a survey of teens, 21% said their friends like to read and talk about books. About how many teens out of 1,095 would say their friends read and talk about books?

_____

35. After a group of 24 parts were tested, 5 were found to be defective. About what percent of the parts tested were defective?

Number Tested	Number Defective
24	5

Ⓕ 5%

Ⓖ 20%

Ⓗ 25%

Ⓘ 33%

Common Core Review

Write each fraction as a decimal. MCC4.NF.6

36. $\frac{22}{100}$ = _____

37. $\frac{7}{100}$ = _____

38. $\frac{67}{100}$ = _____

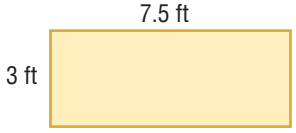
39. $\frac{15}{100}$ = _____

40. $\frac{12}{100}$ = _____

41. $\frac{6}{100}$ = _____

42. At a clothing store, T-shirts are on sale for $9.97 each. What is the cost of 3 T-shirts? MCC5.NBT.7 _____

43. The Sylvester family planted a garden with the dimensions shown. What is the area of the garden? MCC5.NBT.7



_____

Inqury Lab
Percent of a Number

Content Standards
MCC6.RP.3, MCC6.RP.3c

Mathematical Practices
1, 3, 4

Inquiry **HOW can you model the percent of a number?**

Movies There were 180 people in a movie theater. Twenty percent of them received the student discount and 10% received the senior citizen discount. The rest did not receive a discount. How many people did not receive a discount?

What do you know? _____

_____

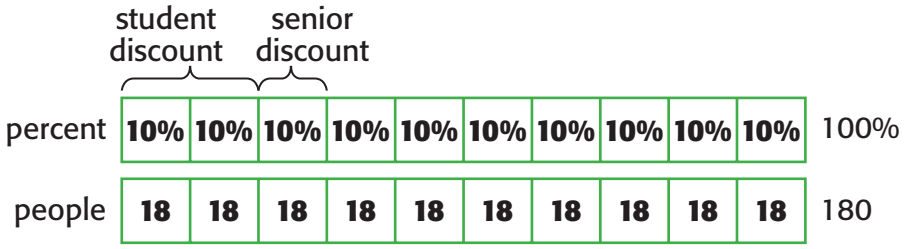
What do you need to find? _____

_____

Investigation

Model the situation using two bar diagrams.

Step 1 Use a bar diagram to represent 100%. Then use another bar diagram of equal length to represent 180 people.



Step 2 Divide each bar into 10 equal parts. Think: 180 ÷ 10 = ☐

So, each part of 180 represents ☐ people.

Step 3 Determine how many people did not receive a discount. Shade 2 sections of each bar diagram to represent the student discount. Shade 1 section of each bar diagram to represent the senior discount.

There are ☐ unshaded sections in each bar diagram.

☐ × ☐ = ☐

So, ☐ people at the movie did not receive a discount.

Collaborate

Model with Mathematics **Work with a partner. Find the percent of each number using two bar diagrams.**

1. 50% of 80 children = _____

2. 25% of $32 = _____

3. 80% of 40 points = _____

4. 30% of 70 teachers = _____

Reflect

5. **Reason Inductively** Explain how to use two bar diagrams to find 45% of $60.

_____

_____

_____

6. HOW can you model the percent of a number?

_____

_____

Percent of a Number

What You'll Learn

Scan the lesson. List two real-world scenarios in which you would use the percent of a number.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Common Core GPS

Content Standards
MCC6.RP.3, MCC6.RP.3c

Mathematical Practices
1, 3, 4, 5

Real-World Link

Snacks In a survey, 200 students chose their favorite snacks. Use the table to find the number of students who chose each snack.

Snack	Percent	Fraction	Equivalent Fraction	Number of Responses
Fruit	23%	$\frac{23}{100}$	$\frac{46}{200}$	46 out of 200
Cheese	15%	$\frac{\square}{100}$	$\frac{\square}{200}$	$\square$ out of 200
Veggies	17%	$\frac{\square}{100}$	$\frac{\square}{200}$	$\square$ out of 200
Cookies	15%	$\frac{\square}{100}$	$\frac{\square}{200}$	$\square$ out of 200
Chips	18%	$\frac{\square}{100}$	$\frac{\square}{200}$	$\square$ out of 200
No Snack	12%	$\frac{\square}{100}$	$\frac{\square}{200}$	$\square$ out of 200

Check Add the number of responses in the last column.

$46 + \square + \square + \square + \square + \square = 200$ ✓

1. How does finding the percent as a rate per 100 help you find the number of responses out of 200?

_____

_____

_____

Work Zone

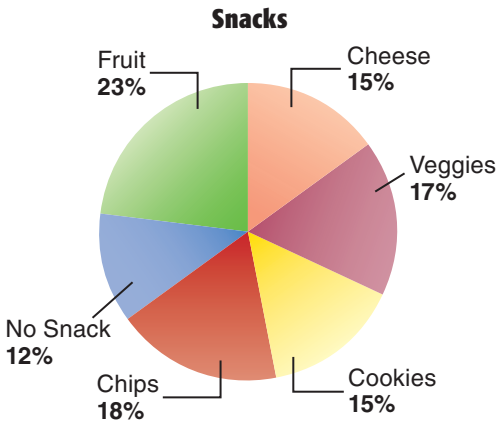
Find the Percent of a Number

You can use fractions and decimals to find the percent of a number. To find the percent of a number, write the percent as a fraction with a denominator of 100. Then multiply the fraction by the number.

Example

Tutor

1. **Refer to the circle graph. Suppose there are 300 students at York Middle School. Find the number of students that have cheese as a snack.**



Method 1 **Write the percent as a fraction.**

$15\% = \frac{15}{100}$ or $\frac{3}{20}$ Write the percent as a rate per 100.

$\frac{3}{20}$ of $300 = \frac{3}{20} \times 300$ Multiply.

$= 45$

Method 2 **Write the percent as a decimal.**

$15\% = 0.15$

0.15 of $300 = 0.15 \times 300$

$= 45$

So, 45 students have cheese as a snack.

Check Use a bar diagram.

$30 + \frac{1}{2} \times 30 = 30 + 15$ or 45 ✓

STOP and Reflect

If 50 students were surveyed, how many students chose no snack?

Show your work.

a. _____

Got It? **Do this problem to find out.**

a. Find the number of students at York Middle School that have chips as a snack.

Percents Greater Than 100% and Less Than 1%

You may choose whether to write a percent as a fraction or as a decimal based on the problem.

Examples

Tutor

2. **Find 145% of 320.**

$145\% = \frac{145}{100}$ or $\frac{29}{20}$ — Write 145% as a rate per 100. Then simplify.

$145\% \text{ of } 320 = \frac{29}{20} \times 320$ — Write the multiplication problem.

$= \frac{29}{\cancel{20}_{1}} \times \frac{\cancel{320}^{16}}{1}$ — Divide the numerator and denominator by 20.

$= 29 \times 16$ — Simplify.

$= 464$ — Multiply.

So, 145% of 320 is 464.

3. **Find 220% of 65.**

$220\% = \frac{220}{100}$ or $\frac{\square}{\square}$ — Write 220% as a fraction in simplest form.

$220\% \text{ of } 65 = \frac{\square}{\square} \times \square$ — Write the multiplication problem.

$=$ _____ — Divide by the GCF.

$=$ ____ $\times$ ____ — Simplify.

$=$ _____ — Multiply.

So, 220% of 65 is _____.

4. **Find 0.25% of 58.**

$0.25\% = 0.0025$ — Write 0.25% as a decimal.

$0.25\% \text{ of } 58 = 0.0025 \times 58$ — Write the multiplication problem.

$= 0.145$ — Multiply.

So, 0.25% of 58 is 0.145.

Got It? **Do these problems to find out.**

Find the percent of each number.

b. 128% of 550 **c.** 0.3% of 200 **d.** 0.85% of 600

Show your work.

b. _____

c. _____

d. _____

Example

5. **In a recent state Special Olympics meet, Franklin County sent a team of 70 players. Twenty percent of the team competed in soccer. How many athletes competed in soccer?**

$20\% = 0.20$ Write 20% as a decimal.

20% of $70 = 0.2 \times 70$ Write the multiplication problem.

$= 14$ Multiply.

So, 14 team members were soccer players.

Got It? **Do this problem to find out.**

e. In the same meet, 15% of the team from Delaware County competed in tennis. If there were 20 members on the team, how many competed in tennis?

Show your work.

e. _____

Guided Practice

Find the percent of each number. (Examples 1–4)

1. 32% of 60 = _____

Show your work.

2. 0.55% of 220 = _____

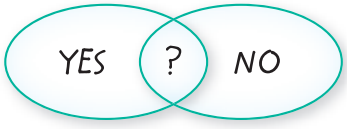
3. 275% of 4 = _____

4. Troy wants to buy a jersey of his favorite MLS team. The jersey is 30% off the original price. If the original price of the jersey is $35, what is the amount Troy will save? (Example 5) _____

5. **Building on the Essential Question** How do you find a percent of a number?

Rate Yourself!

Are you ready to move on? Shade the section that applies.



For more help, go online to access a Personal Tutor.

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

The cafeteria at Midtown Middle School surveyed 575 students about their favorite food. Find the number of students that responded for each of the following. (Example 1)

1. chicken: 8% =

2. salad: 20% =

3. burgers: 16% =

4. fruit: 24% =

Show your work.

Find the percent of each number. (Examples 2–4)

5 0.9% of 1,000 =

6. 0.46% of 80 =

7. 350% of 96 =

8. 222% of 55 =

9 The original price of a pair of shoes is $42. The sale price is 20% off the original price. What is the amount off the original price?

(Example 5) _____

10. Torri had $20 to buy a birthday present for her dad. She decided to buy a DVD for $18. The sales tax is 7%. Does she have enough money? Explain your reasoning.

11. Twenty-four students in Jamal's class are wearing tennis shoes. There are thirty students in his class. Jamal says that 70% of his class is wearing tennis shoes. Is Jamal correct? Explain your reasoning.

12. CCSPS **Use Math Tools** Marisol keeps track of her weekly quiz grades as shown in the table.

Test	Number Correct	Score	Total
Math	68		85
Science		90%	70

a. Complete the table.

b. In which class did Marisol have the higher score?

c. Suppose Marisol scored a 96% on an English test. There were 50 questions on the test. How many did Marisol answer correctly?

13. **Use Math Tools** Use the graphic organizer to compare and contrast percents and fractions. Use the phrases *less than*, *equal to*, and *greater than* to complete each statement. Write an example in the space provided.

Percent	Shared Concept	Fraction
A whole is represented by a percent that is _____ 100%. Example: _____	whole	A whole is represented by a fraction with a numerator that is _____ the denominator. Example: _____
Part of a whole is represent by a percent that is _____ 100%. Example: _____	part of a whole	Part of a whole is represented by a fraction with a numerator that is _____ the denominator. Example: _____
An amount that is greater than one is represented by a percent that is _____ 100%. Example: _____	more than one	An amount that is greater than one is represented by a fraction with a numerator that is _____ the denominator. Example: _____

H.O.T. Problems Higher Order Thinking

14. **Model with Mathematics** Write and solve a real-world problem in which the percent of a number results in a number greater than the number itself.

15. **Justify Conclusions** Is 16% of 40 the same as 40% of 16? Explain your reasoning.

16. **Persevere with Problems** Find 15% of 15% of 15% of 500. How does this compare to finding 45% of 500?

Georgia Test Practice

17. At birth, a newborn's head is about 25% of its total length. If a baby is 18 inches long, about how many inches is the baby's head?

Ⓐ 3.5 inches
Ⓒ 4.5 inches
Ⓑ 4 inches
Ⓓ 5 inches

Name _____ My Homework _____

Extra Practice

Find the percent of each number.

18. 6% of 95 = 5.7

Homework Help

6% = 0.06

0.06 × 95 = 5.7

19. 15% of 110 = _____

20. 75% of 260 = _____

21. 28% of 575 = _____

22. 0.6% of 36 = _____

23. 108% of 148 = _____

24. 102% of 750 = _____

25. 0.03% of 1,500 = _____

26. Brenna completes 65% of her first serves. If she attempted 80 first serves last match, how many did she complete?

_____

_____

27. Jack is mixing a cleaning solution that is 12% bleach. After mixing the solution, Jack has 150 ounces of cleaning solution. How many ounces of bleach did Jack use?

_____

_____

28. What is 38% of 250?

_____

29. 76% of 524 is what number?

_____

30. What is 26% of 360?

_____

31. 55% of 387 is what number?

_____

32. CCSPS **Use Math Tools** Mr. Blackwell tracks sales of ski equipment each week for a month. Complete the table to determine which week had the highest percent of ski equipment sales.

_____

Week Number	Ski Equipment Sales ($)	Percent of Total Sales	Total Sales ($)
1		50	400
2	175		250
3		65	300
4	110		275

Georgia Test Practice

33. Which of the following does *not* represent how to find the amount taken off the price of the stereo?

Ⓐ 0.3×42

Ⓑ $\frac{3}{10} \times 42$

Ⓒ $42 \div 0.3$

Ⓓ 3×4.2

34. Carlos has read 45% of his book. If his book has 480 pages, how many pages has he read?

Ⓕ 45 pages

Ⓖ 216 pages

Ⓗ 264 pages

Ⓘ 435 pages

35. Short Response There are 450 cars in a car lot. About 28% of them are hybrid cars. About how many cars in a lot are hybrid cars? Explain your reasoning.

_____

_____

Common Core Review

Multiply. MCC5.NBT.7

36. $1.63 \times 20 =$ _____

37. $7.5 \times 12 =$ _____

38. $0.6 \times 15 =$ _____

39. $0.15 \times 50 =$ _____

40. $12 \times 1.2 =$ _____

41. $6 \times 0.8 =$ _____

42. Ella has 4 trading cards. Connor has 8 trading cards. Eight divided by what number equals 4? MCC4.NBT.6 _____

_____

43. The art club had the members vote on three places to take a field trip. The results are in the table. If all of the members voted, what part of the club voted for the Carnegie Museum of Art? MCC5.NBT.7

Trip	Part of Club
Carnegie Museum of Art	
Fallingwater	0.20
Westemoreland Museum of American Art	0.48

Lesson 8

Solve Percent Problems

What You'll Learn

Scan the lesson. Predict two things you will learn about solving percent problems.

- _____
- _____

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Vocabulary

proportion
percent proportion

Common Core GPS

Content Standards
MCC6.RP.3, MCC6.RP.3c

Mathematical Practices
1, 2, 3, 4, 7

Vocabulary Start-Up

A **proportion** is an equation that shows that two ratios are equivalent. In a **percent proportion**, one ratio compares a part to the whole. The other ratio is the equivalent percent written as a fraction with a denominator of 100.

How do you compare part and whole?

fraction	ratio	percent
$\frac{2}{5}$ $\frac{\text{part}}{\text{whole}}$ What do you call the part? _____ The whole? _____	Using the information in the first ratio, fill in the others. $\frac{2}{5}$ □ to □ □ : □	$\frac{2}{5} = \frac{\square}{100}$ □ % of 5 = 2

Real-World Link

Basketball Kara is on her school basketball team. She has completed 9 out of 12 free throw shots successfully. Write the ratio as a percent and as a fraction in simplest form.

_____

Work Zone

Use Number Lines to Find the Whole

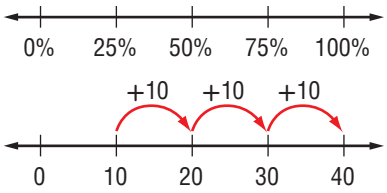
If you know the part and the percent, you can find the whole, or the total. You have used bar diagrams to solve percent problems. Double number lines are another way to illustrate percents.

Examples

Tutor

1. **10 is 25% of what number?**

Use double number lines to model 25% and 10.



To model 25%, divide the number line into four parts.

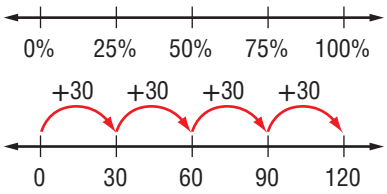
Write 10 at the 25% mark. Add 10 at each mark to find the whole.

The number 40 is at the 100% mark.

So, 10 is 25% of 40.

2. **Country music makes up 75% of Landon's music library. If he has downloaded 90 country music songs, how many songs does Landon have in his music library?**

Use double number lines to model 75% and 90.



To model 75%, divide the number line into four parts.

$90 \div 3 = 30$. Add 30 at each mark to find the whole.

The number 120 is at the 100% mark.

So, Landon has 120 songs in his music library.

Check Look back at the number lines. The number 90 should line up with 75%. ✓

Show your work.

a. _____

b. _____

c. _____

Got It? **Do these problems to find out.**

a. 30 is 50% of what number? **b.** 60 is 20% of what number?

c. Peyton spent 60% of her money to buy a new television. If the television cost $300, how much money did she have?

Use the Percent Proportion

The diagram uses a percent proportion to show that 75% of 32 is 24.

$$\left.\begin{array}{l}\text{part} \rightarrow \\ \text{whole} \rightarrow\end{array}\right. \frac{24}{32} = \frac{75}{100} \Big\} \text{percent}$$

Examples

Tutor

3. **15 is 30% of what number?**

Words 15 is 30% of what number?

Proportion $\left.\begin{array}{l}\text{part} \rightarrow \\ \text{whole} \rightarrow\end{array}\right. \frac{15}{\blacksquare} = \frac{30}{100} \Big\}$ percent

$\frac{15}{\blacksquare} = \frac{30}{100}$ Write the proportion.

$\frac{15}{50} = \frac{30}{100}$ ($\div 2$ above and below) Since 15 is one half of 30, divide 100 by 2.

So, 15 is 30% of 50.

4. **225 is 75% of what number?**

$\frac{\square}{\blacksquare} = \frac{\square}{100}$ Write the proportion.

$\frac{\square}{\square} = \frac{\square}{100}$ Since $75 \times \square = 225$, multiply 100 by $\square$.

So, 225 is 75% of _____.

Got It? **Do these problems to find out.**

d. 75 is 15% of what number?

e. 9 is 36% of what number?

f. 7 is 70% of what number?

g. 7 is 35% of what number?

STOP and Reflect

Write a percent proportion below to show that 50 is 25% of 200.

Show your work.

d. _____

e. _____

f. _____

g. _____

Example

5. **Before 1982, pennies were 95% zinc and 5% copper. If 100 pennies minted in 1980 have an approximate mass of 15 grams of copper, what is the total mass of 100 pennies?**

The percent is 5 and the part is 15. You need to find the whole.

$\frac{15}{\blacksquare} = \frac{5}{100}$ Write the proportion.

$\frac{15}{300} = \frac{5}{100}$ ($\times 3$ above and below) Since $5 \times 3 = 15$, multiply 100 by 3.

The total mass of 100 pennies is 300 grams.

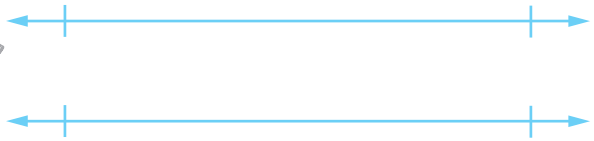
Guided Practice

Use double number lines to find the whole. (Example 1)

1. 40 is 20% of what number? _____

2. 90 is 25% of what number? _____

Show your work.



Write a percent proportion and solve each problem. (Examples 3 and 4)

3. 120 is 30% of what number?

4. 60 is 15% of what number?

5. In the first year of ownership, a new car can lose 20% of its value. If a car lost $4,200 of value in the first year, how much did the car originally cost? (Examples 2 and 5)

6. **Building on the Essential Question** How can you use proportions to solve percent problems?

Rate Yourself!

How well do you understand percent problems? Circle the image that applies.

Clear | Somewhat Clear | Not So Clear

For more help, go online to access a Personal Tutor.

FOLDABLES Time to update your Foldable!

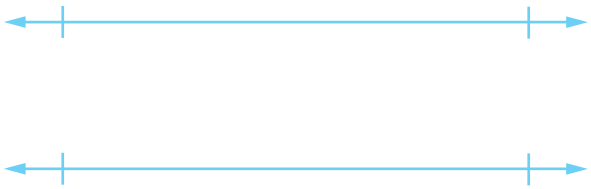
Name _____ My Homework _____

Independent Practice

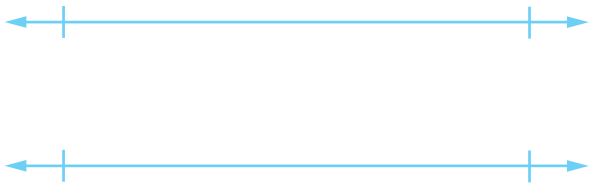
Go online for Step-by-Step Solutions eHelp

Use double number lines to find the missing number. (Example 1)

1. 63 is 90% of what number? _____



2. 80 is 25% of what number? _____



Write a percent proportion and solve each problem. (Examples 3 and 4)

3 22 is 44% of what number?

4. 450 is 75% of what number?

5 A store is having a sale where winter clothes are 60% of the original price. A sweater is on sale for $30. What was the original price of the sweater? (Examples 2 and 5)

6. Kai calculates that he spends 15% of a school day in science class. If he spends 75 minutes in science class, how many minutes does Kai spend in school?

(Examples 2 and 5) _____

For Exercises 7–9, use the table.

Punch Recipe	
Ginger Ale	40%
Orange Juice	25%
Pineapple Juice	20%
Sorbet	15%

7. If you have 3 cups of pineapple juice, how many total cups of punch can you make? _____

8. How many cups of sorbet are used in 8 cups of punch?

9. Elise does not like sorbet, so she omits that ingredient and adds 5 percent of each of the other ingredients. How many cups of punch will she have if she uses 6 cups of orange juice? _____

10. **Identify Structure** Complete the following graphic organizers. Identify the missing information.

a.

$\frac{3}{4}$	part	3
	whole	

b.

47%	part	
	whole	100%

c.

12% of 225	part	12%
	whole	

d.

120 out of 400	part	
	whole	

e. How does identifying the part and the whole help you to write the percent proportion? _____

_____

H.O.T. Problems Higher Order Thinking

11. **Reason Abstractly** Write a percent proportion where the percent and the whole are known. Solve the problem to find the part. _____

_____

12. **Persevere with Problems** Using what you know about percents, explain why a commercial that says "80% of dentists use this toothpaste" might be misleading. _____

_____

_____

_____

13. **Reason Inductively** The purity of gold is listed in karats. Refer to the table. If a necklace is 75% gold, what karat is it? Explain your reasoning. _____

_____

Karats	Pure Gold (%)
24	100
12	50

14. **Construct an Argument** Omar scored an 82% on his first test of the quarter. Will a score of 38 out of 50 on the second test help or hurt his grade? Explain your reasoning. _____

_____

Georgia Test Practice

15. At a zoo, an Asian elephant eats roughly 5% of its body weight each day. If an Asian elephant eats 300 pounds of food a day, how much does it weigh?

Ⓐ 1,500 lb Ⓒ 18,000 lb

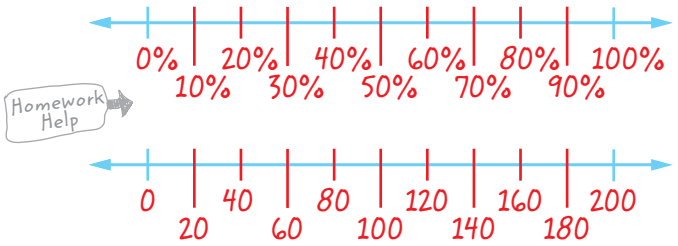
Ⓑ 6,000 lb Ⓓ 120,000 lb

Name _____ My Homework _____

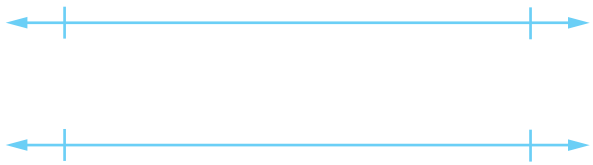
Extra Practice

Use double number lines to find the missing number.

16. 140 is 70% of what number? 200



17. 240 is 60% of what number? _____



Write a percent proportion and solve each problem.

18. 95 is 95% of what number?

19. 270 is 90% of what number?

20. CCSS **Justify Conclusions** Action movies make up 85% of Devon's movie collection. If he has 20 movies, how many action movies are in Devon's collection? Explain your reasoning to a classmate.

21. The drama club held a car wash on Saturday and Sunday. They washed a total of 60 cars. If they washed 40% of the cars on Sunday, how many cars did they wash on Sunday?

22. A tiger can eat food that weighs up to 15% of its body weight. If a tiger can eat 75 pounds of food, how much does a tiger weigh?

23. According to the school survey, 12% of the students at Rockwood Junior High School speak Spanish. There are 36 students at the school who speak Spanish. How many students were surveyed?

24. Miley's Music has a sale on music CDs. All music CDs are discounted 15%. Mariana's receipt indicates that she saved $3 on her CD purchase. What is the full price of her music CD before the discount?

25. The interior paint color, Melon Madness, is 30% yellow. Raul used 72 ounces of yellow paint to mix the last batch. How many ounces of Melon Madness did he make in the last batch?

Georgia Test Practice

26. Refer to survey results shown below.

Favorite Subject	
English	23%
Science	30%
Social Studies	15%
Math	■
Music	12%

If 150 students were surveyed, how many students chose math as their favorite subject?

Ⓐ 7.5 Ⓒ 30

Ⓑ 20 Ⓓ 120

27. Isabel ran 9 miles with her friend Kaylee last week. This was 60% of the distance she ran all week. How far did she run last week?

Ⓕ 9 miles Ⓗ 15 miles

Ⓖ 12 miles Ⓘ 20 miles

28. Hiroshi borrowed 3 non-fiction books from the library. This was 25% of the books he checked out. How many books did Hiroshi check out?

Ⓐ 3 books Ⓒ 9 books

Ⓑ 6 books Ⓓ 12 books

29. Short Response The student council had a canned food drive. They collected a total of 63 cans on Wednesday. This is 21% of the total. How many canned goods were collected in all?

_____

Day	Percent Collected
Wednesday	21
Thursday	46
Friday	33

Common Core Review

Find the equivalent fraction. MCC4.NF.1

30. $\frac{84}{120} = \frac{\square}{10}$

31. $\frac{60}{98} = \frac{30}{\square}$

32. $\frac{40}{64} = \frac{5}{\square}$

33. $\frac{32}{41} = \frac{96}{\square}$

34. $\frac{13}{15} = \frac{\square}{60}$

35. $\frac{24}{32} = \frac{12}{\square}$

36. A store has a sale for $\frac{3}{10}$ off gloves. Write $\frac{3}{10}$ as a decimal. MCC4.NF.5

_____

37. Xavier runs 0.75 mile each day. How far has he run at the end of 6 days? MCC5.NBT.7

_____

21ST CENTURY CAREER in Movies

Special Effects Animator

Are you fascinated by how realistic the special effects in movies are today? If you have creative talent and are good with computers, a career in special effects animation might be a great fit for you. Special effects animators use their artistic ability and expertise in computer-generated imagery (CGI) to simulate real-life objects like water and fire. They are also able to create fantastic images like flying superheroes, exploding asteroids, and monsters taking over cities.

Ton Koene/Age Fotostock (t); Melissa Moseley/Sony Pictures/Bureau L.A. Collection/CORBIS (b)

College & Career READINESS

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Is This the Career for You?

Are you interested in a career as a special effects animator? Take some of the following courses in high school.

- Digital Animation
- Calculus
- Geometry
- Physics
- Art/Sculpture

Turn the page to find out how math relates to a career in Movies.

The Effects are Amazing!

Special effects animators must specify when objects fade or change color. Table 1 shows when an object starts fading out. Table 2 shows the percent of an object's total lifetime that it has the initial color, cross-fading of colors, and the final color. Use the tables to solve each problem.

1. Express the part of total lifetime for each object in Table 1 as a fraction in simplest form. _____
2. At what percent of the light beam's total lifetime does it begin to fade out? _____
3. In Table 2, express the percents for the cross-fading of both objects as decimals. _____
4. Which best describes the part of the robot's lifetime in which it has the initial color: $\frac{3}{100}$, $\frac{3}{10}$, or $1\frac{3}{10}$? _____
5. What fraction of the tornado's lifetime does it have the initial color? _____
6. What fraction of the robot's lifetime does it have the final color? _____

Table 1
Fading Out an Object

Object	Part of Total Lifetime
Explosion	0.72
Fog	0.24
Light beam	0.65

Table 2
Changing Color of an Object

Object	Percent of Total Lifetime		
	Initial Color	Cross-Fading	Final Color
Robot	30%	15%	55%
Tornado	12%	77%	11%

Career Project

It's time to update your career profile! Choose one of your favorite movies. Use the Internet to research how the movie's special effects were created. Write a brief description of the processes used by the special effects animators.

_____

_____

_____

_____

_____

List several jobs that are created by the movie industry.

- _____
- _____
- _____
- _____
- _____

Chapter Review

Vocabulary Check

Unscramble each of the clue words. After unscrambling all of the terms, use the numbered letters to find the phrase.

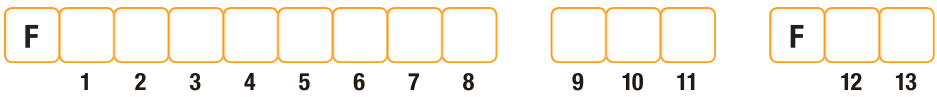
INROALAT NUEMBR

TEEPNCR

LESTA MOCNOM EOMITNORNAD

PIONORTOPR

CTREENP ROIPPTORNO



Complete each sentence using one of the unscrambled words above.

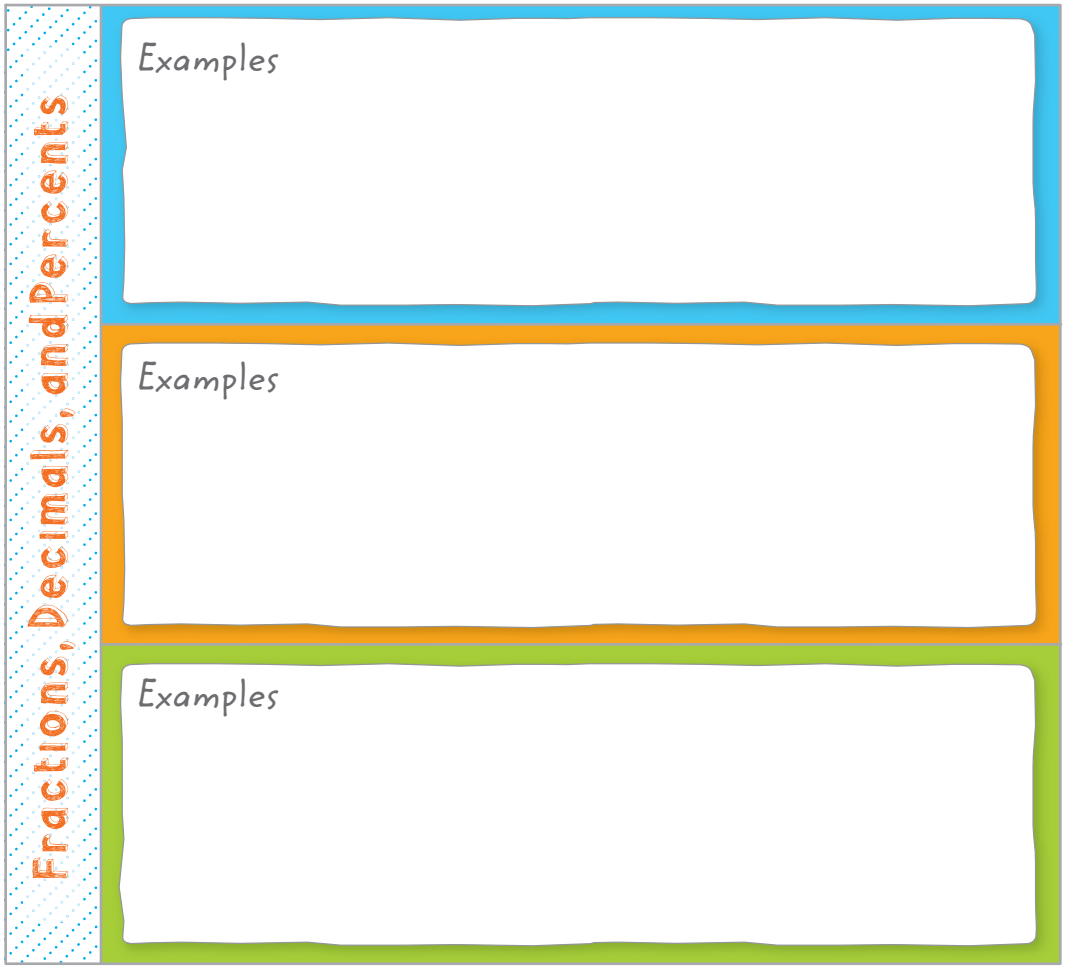
1. A _____ is a ratio that compares a number to 100.
2. A _____ is an equation that shows that two ratios are equivalent.
3. In a _____, one ratio compares a part to a whole.
4. A number that can be written as a fraction is a _____.
5. The _____ is the least common multiple of the denominators of two or more fractions.

Key Concept Check

Use Your FOLDABLES

Use your Foldable to help review the chapter.

Tape here



Got it?

The problems below may or may not contain an error. If the problem is correct, write a "✓" by the answer. If the problem is not correct, write an "X" over the answer and correct the problem.

1. $\frac{4}{5} = \cancel{0.4}$

The first one is done for you.

$\frac{4}{5} \rightarrow 5\overline{)4.0}$

0.8

-40

0

2. $0.55 = \frac{11}{20}$

3. $120\% = \frac{3}{25}$

Problem Solving

1. **Use Math Tools** The table shows how Eva budgets her weekly allowance. Write each decimal as a fraction in simplest form. (Lesson 1)

Category	Portion
Savings	0.4
Charity	0.15
Shopping	0.45

2. Jonah's savings increased by 0.15% in one month. Write 0.15% as a decimal and fraction in simplest form. (Lesson 4)

3. An executive of a marshmallow company said that the marshmallows are 80% air. What fraction of a marshmallow is air? (Lesson 2)

4. In a parking lot, 30% of the cars have a GPS. Write this as a decimal. (Lesson 3)

5. Miguel spent $\frac{1}{8}$ of his savings on a new video game system. Mila spent 12% of her savings on a DVD, and Manny spent 0.1 of his savings on a skateboard. Who spent the most of their savings? (Lesson 5)

6. **Be Precise** For each state in the table, find the number of square miles of each state that are covered by forests. (Lesson 7)

State	Percent of Land Covered by Forests	Area of State (square miles)
California	14	158,609
Kentucky	49	40,409
Ohio	27	44,825

7. In one year, Orlando received 62.51 inches of rain. In September, the city received 25% of that rainfall. About how much rain did Orlando receive in September? (Lesson 6)

8. The original price of a movie is $18. The sale price is 20% off the original price. What is the amount off the original price? (Lesson 8)

Reflect

Answering the Essential Question

Use what you learned about fractions, decimals, and percents to complete the graphic organizer.

Essential Question

WHEN is it better to use a fraction, a decimal, or a percent?

Converting Fractions, Decimals, and Percents	
Fraction $\frac{1}{8}$ →	Decimal:
	Percent:
Decimal 0.8 →	Percent:
	Fraction:
Percent 55% →	Fraction:
	Decimal:

Answer the Essential Question. WHEN is it better to use a fraction, a decimal, or a percent?