

Chapter 8

Resource Masters



Mathematics

Applications and Concepts

Course 2



Glencoe

New York, New York Columbus, Ohio Chicago, Illinois Peoria, Illinois Woodland Hills, California

8-1**Study Guide and Intervention****Percent and Estimation**

To estimate the percent of a number, you can use a fraction or a multiple of 10% or 1%.

EXAMPLE 1 Estimate 77% of 800.

77% is about 75% or $\frac{3}{4}$.

$$77\% \text{ of } 800 \approx \frac{3}{4} \cdot 800 \quad \text{Use } \frac{3}{4} \text{ to estimate.}$$

$$\approx 600 \quad \text{Multiply.}$$

So, 77% of 800 is about 600.

EXAMPLE 2 Estimate 137% of 50.

137% is more than 100%, so 137% of 50 is greater than 50.

137% is about 140%.

$$140\% \text{ of } 50 = (100\% \text{ of } 50) + (40\% \text{ of } 50) \quad 140\% = 100\% + 40\%$$

$$= (1 \cdot 50) + \left(\frac{2}{5} \cdot 50\right) \quad 100\% = 1 \text{ and } 40\% = \frac{2}{5}$$

$$= 50 + 20 \text{ or } 70 \quad \text{Simplify.}$$

So, 137% of 50 is about 70.

EXAMPLE 3 Estimate 0.5% of 692.

0.5% is half of 1%. 692 is about 700.

$$1\% \text{ of } 700 = 0.01 \cdot 700 \quad \text{To multiply by 1\%, move the decimal point two places to the left.}$$

$$= 7$$

One half of 7 is $\frac{1}{2} \cdot 7$ or 3.5.

So, 0.5% of 697 is about 3.5.

EXERCISES

Estimate.

1. 24% of 36

2. 81% of 25

3. 11% of 67

4. 150% of 179

5. 67% of 450

6. 79% of 590

7. 0.4% of 200

8. 42% of 61

9. 19% of 41

10. 129% of 54

11. 32% of 66

12. 0.2% of 150

8-1**Practice: Skills*****Percent and Estimation*****Estimate by using fractions.**

1. 51% of 128
2. 76% of 200
3. 32.9% of 90
4. 23% of 8
5. 19% of 45
6. 81% of 16

Estimate by using 10%.

7. 12% of 98
8. 89% of 300
9. 31% of 80
10. 28% of 49
11. 62% of 13
12. 77% of 28

Estimate.

13. 308% of 500
14. 0.5% of 87
15. 153% of 20
16. 0.6% of 41
17. 231% of 54
18. 0.9% of 116
19. 0.26% of 36
20. 425% of 119

8-1**Practice: Word Problems****Percent and Estimation**

<p>1. ORCHESTRA The orchestra at Millard Middle School has 120 members. Of these, 17% are eighth-grade students. Estimate the number of eighth-grade students in the orchestra.</p>	<p>2. RESTAURANTS In one west coast city, 34% of the restaurants are on the river. The city has 178 restaurants. Estimate the number of restaurants that are on the river.</p>
<p>3. FARMING Rhonda planted green beans on 67% of her farm. Rhonda's farm has 598 acres of land. Estimate the number of acres of green beans on Rhonda's farm.</p>	<p>4. HOTELS At the Eastward Inn hotel, 47% of the rooms face the pool. The hotel has 92 rooms. Estimate the number of rooms that face the pool.</p>
<p>5. TREES The students in Leon's seventh grade science class determined that 42% of the trees at a local park are pine trees. If there are 632 trees in the park, about how many of them are pine trees?</p>	<p>6. BOOKS Jenna has read 0.7% of a book. If the book has 431 pages, estimate the number of pages Jenna has read.</p>
<p>7. FITNESS At the office where Mika works, 40% of the 18 employees exercise at least three times a week. Estimate the number of people who exercise at least three times a week.</p>	<p>8. PETS Of all seventh grade students at Hart Middle School, 0.3% of the students own a pet iguana. If there are 610 seventh grade students at Hart, about how many own pet iguanas?</p>

8-1**Reading to Learn Mathematics****Percent and Estimation**

Pre-Activity *Read the introduction at the top of page 334 in your textbook. Write your answers below.*

1. What fraction of people surveyed chose Labor Day as their favorite grilling day? How many of the 80 people surveyed is this?
2. About 50% of the people surveyed chose the Fourth of July as their favorite grilling day. Explain how you could use a fraction to estimate the number of people who chose this day. Then estimate.
3. Use a fraction to estimate the number of people surveyed who chose Memorial Day as their favorite grilling day.

Reading the Lesson

4. In Example 1, what does the \approx sign mean in the sentence 48% of 60 $\approx \frac{1}{2} \cdot 60$? Why is it necessary to use this sign?
5. In Example 3, what is an easy way to estimate 71%?
6. In Example 6, what is an easy way to find 0.5% of a number?

Helping You Remember

7. Write fraction equivalents in simplest form for the following percents. Then work with a partner. Take turns asking each other fraction equivalents for any of the percents in the table, or think of others to quiz each other.

20%	40%	60%	80%
25%	50%	75%	100%

8-1

Enrichment

Made in the Shade

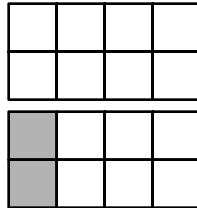
To shade 25% of the figure below, ask yourself how many of the eight squares need to be shaded. Then use the percent proportion to find the answer.

$$\frac{x}{8} = \frac{25}{100}$$

$$100x = 8 \times 25$$

$$\frac{100x}{100} = \frac{200}{100}$$

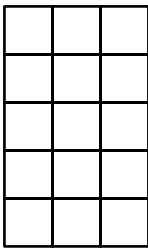
$$x = 2$$



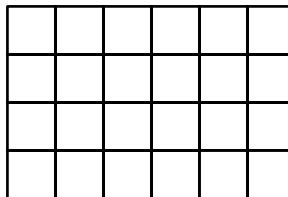
If you shade two squares, you have shaded 25% of the figure.

Shade the indicated percent of each diagram.

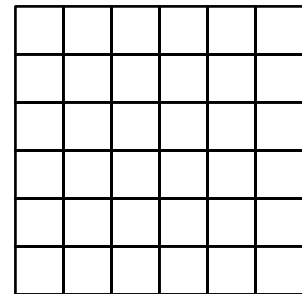
1. Shade 40%.



2. Shade 37.5%.

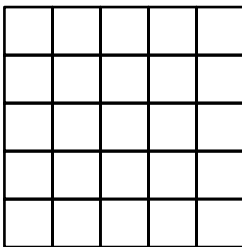


3. Shade $16\frac{2}{3}\%$.

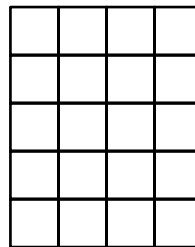


Shade the indicated percent of each diagram. You will need to divide the squares in each diagram into smaller squares.

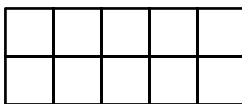
4. Shade 30%.



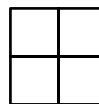
5. Shade 62.5%.



6. Shade 27.5%.



7. Shade 28.125%.



8-2**Study Guide and Intervention****The Percent Equation**

To solve any type of percent problem, you can use the **percent equation**, $\text{part} = \text{percent} \cdot \text{base}$, where the percent is written as a decimal.

EXAMPLE 1 600 is what percent of 750?

600 is the part and 750 is the base. Let n represent the percent.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{base}}$$

$$600 = n \cdot 750 \quad \text{Write an equation.}$$

$$\frac{600}{750} = \frac{750n}{750} \quad \text{Divide each side by 750.}$$

$$0.8 = n \quad \text{Simplify.}$$

$$80\% = n \quad \text{Write 0.8 as a percent.}$$

So, 600 is 80% of 750.

EXAMPLE 2 45 is 90% of what number?

45 is the part and 90% or 0.9 is the percent. Let n represent the base.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{base}}$$

$$45 = 0.9 \cdot n \quad \text{Write an equation.}$$

$$\frac{45}{0.9} = \frac{0.9n}{0.9} \quad \text{Divide each side by 0.9.}$$

$$50 = n \quad \text{The base is 50.}$$

So, 45 is 90% of 50.

EXERCISES

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. What percent of 56 is 14?
2. 36 is what percent of 40?
3. 80 is 40% of what number?
4. 65% of what number is 78?
5. What percent of 2,000 is 8?
6. What is 110% of 80?
7. 85 is what percent of 170?
8. Find 30% of 70.

8-2**Practice: Skills*****The Percent Equation***

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. 25% of 176 is what number?
2. What is 90% of 20?
3. 24 is what percent of 30?
4. 80% of what number is 94?
5. What is 60% of 45?
6. 9 is what percent of 30?
7. What percent of 125 is 25?
8. What is 120% of 20?
9. 2% of what number is 5?
10. 15% of 290 is what number?
11. 16 is what percent of 4,000?
12. What is 140% of 60?
13. 344.8 is what percent of 862?
14. 6% of what number is 21?
15. What number is 60% of 605?
16. 32% of 250 is what number?
17. Find 30% of 70.
18. What is 80% of 65?

8-2**Practice: Word Problems*****The Percent Equation***

<p>1. DINING Jonas and Linda's restaurant bill comes to \$23.40. They are planning to tip the waiter 15% of their bill. How much money should they leave for a tip?</p>	<p>2. CHESS The Briarwood Middle School chess club has 55 members. 22 of the members are in seventh grade. What percent of the members of the chess club are in seventh grade?</p>
<p>3. TENNIS In the city of Springfield, 75% of the parks have tennis courts. If 15 parks have tennis courts, how many parks does Springfield have altogether?</p>	<p>4. COLLEGE There are 225 students in eighth grade at Jefferson Middle School. A survey shows that 64% of them are planning to attend college. How many Jefferson eighth grade students are planning to attend college?</p>
<p>5. BASEBALL In the 2001 season, the Chicago Cubs won 88 out of 162 games. What percent of games did the Cubs win? Round to the nearest tenth if necessary.</p>	<p>6. HOUSING In the Stoneridge apartment complex, 35% of the apartments have one bedroom. If there are 49 one-bedroom apartments, what is the total number of apartments at Stoneridge?</p>
<p>7. SPACE On Mars, an object weighs 38% as much as on Earth. How much would a person who weighs 165 pounds on Earth weigh on Mars?</p>	<p>8. FOOTBALL In the 2001 season, quarterback Matt Hasselbeck of the Seattle Seahawks had 8 passes intercepted out of 321 attempts. What percent of Matt Hasselbeck's passes were intercepted? Round to the nearest tenth if necessary.</p>

8-2**Reading to Learn Mathematics*****The Percent Equation***

Pre-Activity *Read the introduction at the top of page 340 in your textbook. Write your answers below.*

1. Suppose a person weighs 120 pounds. Use the percent proportion to find the number of pounds of oxygen, carbon, and hydrogen.
2. Express the percent of each element as a decimal.
3. Multiply each decimal by 120. Record your results.
4. Compare the answers to Exercises 1 and 3.

Reading the Lesson

5. The word *percent* is used in both the percent proportion and the percent equation. There is one major difference in the way percent is represented in each. What is the difference?
6. Write the following problems as percent proportions and as percent equations.

Problem	Percent Proportion	Percent Equation
9 is 60% of what number?		
Find 50% of 6.		
40% of what number is 48?		
18 is what percent of 72?		

Helping You Remember

7. Work with a partner. One person should ask a question like the questions given as examples in the concept summary box. The other person should name the type of percent problem and name the equation that should be used to solve the problem. Do not solve the equation. Then trade roles. Continue until each of you can name the problem type and the related equation easily.

8-2**Enrichment****Just the Facts**

Use the percent proportion and your calculator to help discover some interesting facts about the United States. Round your answers to the nearest tenth of a percent.

1. The United States produced 84,412 million eggs in 2000. The state of Ohio produced 8,163 million eggs—more than any other state. What percent of the eggs produced in the United States were produced outside Ohio?
2. The resident population of the United States in 2000 was 281,421,906 people. Of these people, 33,871,648 lived in California. What percent of the population was not living in California?
3. In the 2000 presidential election, 50,459,211 people voted for George W. Bush, and 51,003,894 people voted for Al Gore. Of the people who voted for these two candidates, what percent voted for George W. Bush?
4. During the period 1990–1998, Las Vegas, Nevada, was the fastest-growing metropolitan area in the United States. Its population grew from 852,646 to 1,321,546 people. By what percent did the population increase during this period?
5. The amount Americans had in personal savings in 1990 was 208.7 billion dollars. In 2000, it was 67.7 billion dollars. By what percent did personal savings decrease from 1990 to 2000?
6. In 1990, the average annual personal income in the United States was \$19,614. In 2000, it rose to \$30,069. By what percent did the average annual personal income increase from 1990 to 2000?
7. During the period 1998–2008, computer engineering is expected to be the fastest-growing occupation in the United States. In 1998, 299 thousand computer engineers were employed. There are projected to be 622 thousand employees in 2008. By what percent will the number of computer engineers increase from 1998 to 2008?

8-3**Study Guide and Intervention****Using Statistics to Predict**

Data gathered by surveying a random sample of the population may be used to make predictions about the entire population.

EXAMPLE 1 In a survey, 200 people from a town were asked if they thought the town needed more bicycle paths. The results are shown in the table. Predict how many of the 28,000 people in the town think more bicycle paths are needed.

More Bicycle Paths Needed?	
Response	Percent
yes	39%
no	42%
undecided	19%

Use the percent proportion.

$$\frac{a}{b} = \frac{p}{100} \quad \text{Percent proportion}$$

$$\begin{array}{l} \text{part of the population} \quad \longrightarrow \\ \text{entire population} \quad \longrightarrow \end{array} \quad \frac{a}{28,000} = \frac{39}{100} \quad \text{Survey results: } 39\% = \frac{39}{100}$$

$$100a = 28,000(39) \quad \text{Cross products}$$

$$a = 10,920 \quad \text{Simplify.}$$

So, about 10,920 people in the town think more bicycle paths are needed.

EXERCISES

- VOTES** In a survey of voters in Binghamton, 55% of those surveyed said they would vote for Armas for city council. If 24,000 people vote in the election, about how many will vote for Armas?
- LUNCH** A survey shows that 43% of high school and middle school students buy school lunches. If a school district has 2,900 high school and middle school students, about how many buy school lunches?
- CLASS TRIP** Students of a seventh grade class were surveyed to find out how much they would be willing to pay to go on a class trip. 24% of the students surveyed said they would pay \$21 to \$30. If there are 360 students in the seventh grade class, about how many would be willing to pay for a trip that cost \$21 to \$30?

8-3**Practice: Skills*****Using Statistics to Predict***

CELL PHONES For Exercises 1–3, use the table at the right. It shows the results of a survey in which students 12 to 17 years old were asked how often they use a cell phone.

Frequency of Use	Percent
more than twice a week	32%
once or twice a week	16%
once or twice a month	23%
less than once a month	12%
never used one	17%

1. Out of 215 students 12 to 17 years old, how many would you predict use a cell phone once or twice a week?
2. Predict how many students 12 to 17 years old in a group of 375 have never used a cell phone.
3. How many students 12 to 17 years old out of 1,200 would you expect use a cell phone at least once or twice a week?

PIZZA For Exercises 4–6, use the table at the right. It shows the results of a survey in which a random sample of seventh graders at Kiewit Middle School were asked to name their favorite pizza topping.

Pizza Topping	Percent
pepperoni	46%
peppers	28%
olives	8%
onions	2%
pineapple	4%
mushrooms	12%

4. There are 32 students in Mrs. Chen's seventh grade class. Predict how many would choose olives as their favorite topping.
5. There are 210 seventh grade students eating lunch in the cafeteria. How many of them would choose peppers as their favorite topping?
6. Predict how many of the 524 seventh graders at Kiewit Middle School would choose pepperoni as their favorite pizza topping.
7. **BACKPACKS** A survey showed that 78% of students who take a bus to school carry a backpack. Predict how many of the 654 students who take a bus also carry a backpack.

8-3**Practice: Word Problems*****Using Statistics to Predict***

- 1. SHOES** The table shows the results of a survey in which seventh graders were asked how many pairs of shoes they own. Predict how many of the 632 seventh graders at Seneca West Middle School own more than 7 pairs of shoes.

Shoes	Percent
3 or less	10%
4	20%
5	21%
6	22%
7	19%
more than 7	8%

- 2. ACTIVITIES** Of the students listed as members of a high school academic team, 75% were involved in sports, speech, music or debate. If 111 students were listed as part of the teams, how many were involved in sports, speech, music, or debate?

- 3. MOVIEGOERS** A research study found that about 63% of people 18 or older who go to the movies at least once a month own a personal computer. Out of 500 people 18 and older who go to the movies once or more a month, how many of them would you expect to own a personal computer?

- 4. HAIR** A survey showed that 37% of people 12 to 17 years old use hair gel. Predict how many of the 30 students in Mr. Avalon's ninth grade class use hair gel.

- 5. GRADUATION** A survey of first-year students at North Carolina State University showed that about 73% expect to complete their degree in 4 years. If there are 3,333 first-year students, how many of them expect to complete their degree in 4 years?

- 6. INTERNET** A recent survey conducted by the Millard school district showed that 87% of households of students have Internet access at home. If there are 19,000 Millard households, how many have Internet access?

8-3**Reading to Learn Mathematics*****Using Statistics to Predict***

Pre-Activity *Read the introduction at the top of page 345 in your textbook. Write your answers below.*

1. What ages of children are represented?
2. Can you tell how many were surveyed? Explain.
3. Describe how you could use the graphic to predict how many students in your school have no restrictions on their television viewing.

Reading the Lesson

4. Look up the word *random* in a dictionary. Write the meaning of the word as it is used in this lesson.
5. In order to make predictions about a group of people, what do you need to know, according to this lesson?
6. What are two methods for calculating a prediction about a population?

Helping You Remember

7. Take a survey of your class, such as how many people are wearing blue today. Be sure to gather results from your whole class. Based on your results, make a prediction about all of the students in your grade level at your school. Find out the total number of students in your grade from your teacher or school office.

8-3**Enrichment****Table of Random Digits**

A table of random digits can be used to simulate probability experiments. This table of random digits contains 50 digits.

8	1	5	8	6	7	9	9	8	0
9	9	3	7	3	3	1	8	7	4
7	3	0	9	9	2	4	6	2	4
4	0	5	2	9	9	6	3	8	2
8	4	2	1	6	3	7	0	3	1

8	1	5	<u>8</u>	<u>6</u>	7	9	9	<u>8</u>	<u>0</u>
9	9	3	7	3	3	1	8	7	4
7	3	0	9	9	<u>2</u>	<u>4</u>	<u>6</u>	<u>2</u>	<u>4</u>
<u>4</u>	<u>0</u>	5	2	9	9	6	3	<u>8</u>	<u>2</u>
<u>8</u>	<u>4</u>	<u>2</u>	1	6	3	7	0	3	1

For example, how often might someone expect a coin to land heads up two consecutive times or more in 50 tosses? Our table can be used to make this prediction. Since the table contains the digits 0 through 9, let's say a toss of heads represents the digits 0, 2, 4, 6, and 8, or $\frac{1}{2}$ of the possible digits that appear in the table.

Using the table to imitate the 50 tosses, we must look for the digits 0, 2, 4, 6, and 8 that occur two or more times consecutively. These have been circled in the table at the right above, and we would expect to toss two or more consecutive heads 4 times in 50 trials.

Use the table of random digits to answer the following questions.

- How many times might a coin toss of 3 or more consecutive tails occur in 50 trials? (*Hint:* Let 1, 3, 5, 7, and 9 represent a toss of tails.)
- How many times might a coin toss of 4 or more consecutive heads occur in 50 trials? (*Hint:* Let 0, 2, 4, 6, and 8 represent a toss of heads.)
- Letting the digits 1, 3, 5, 7, and 9 represent a coin toss of tails, what is the maximum number of consecutive tails that could be expected in 50 tosses?
- Letting the digits 0, 2, 4, 6, and 8 represent a coin toss of heads, what is the maximum number of consecutive heads that could be expected in 50 tosses?

8-4**Study Guide and Intervention****Percent of Change**

A **percent of change** is a ratio that compares the change in quantity to the original amount. If the original quantity is increased, it is a **percent of increase**. If the original quantity is decreased, it is a **percent of decrease**.

EXAMPLE 1 Last year, 2,376 people attended the rodeo. This year, attendance was 2,950. What was the percent of change in attendance to the nearest whole percent?

Since this year's attendance is greater than last year's attendance, this is a percent of increase.

The amount of increase is $2,950 - 2,376$ or 574.

$$\begin{aligned} \text{percent of increase} &= \frac{\text{amount of increase}}{\text{original amount}} && \leftarrow \begin{array}{|l|} \hline \text{new amount} - \\ \text{original amount} \\ \hline \end{array} \\ &= \frac{574}{2,376} && \text{Substitution} \\ &\approx 0.24 \text{ or } 24\% && \text{Simplify.} \end{aligned}$$

Rodeo attendance increased by about 24%.

EXAMPLE 2 John's grade on the first math exam was 94. His grade on the second math exam was 86. What was the percent of change in John's grade to the nearest whole percent?

Since the second grade is less than the first grade, this is a percent of decrease. The amount of decrease is $94 - 86$ or 8.

$$\begin{aligned} \text{percent of decrease} &= \frac{\text{amount of decrease}}{\text{original amount}} && \leftarrow \begin{array}{|l|} \hline \text{original amount} - \\ \text{new amount} \\ \hline \end{array} \\ &= \frac{8}{94} && \text{Substitution} \\ &\approx 0.09 \text{ or } 9\% && \text{Simplify.} \end{aligned}$$

John's math grade decreased by about 9%.

EXERCISES

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. original: 4
new: 5

2. original: 1.0
new: 1.3

3. original: 15
new: 12

4. original: \$30
new: \$18

5. original: 60
new: 63

6. original: 160
new: 136

7. original: 7.7
new: 10.5

8. original: 9.6
new: 5.9

8-4**Practice: Skills*****Percent of Change***

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. original: 35
new: 70

2. original: 8
new: 12

3. original: 45
new: 30

4. original: \$350
new: \$400

5. original: \$75
new: \$60

6. original: 250
new: 100

7. original: \$30
new: \$110

8. original: 35
new: 28

9. original: \$12.50
new: \$15

10. original: 80
new: 52

11. original: 45
new: 63

12. original: 120
new: 132

13. original: \$210
new: \$105

14. original: 84
new: 111

15. original: \$84
new: \$100

16. original: 6.8
new: 8.2

17. original: 1.5
new: 2.5

18. original: 91
new: 77

19. original: \$465.50
new: \$350

20. original: \$87.05
new: \$100

21. original: 144
new: 108

22. original: 20.8
new: 12.2

23. original: \$75
new: \$15

24. original: 8.6
new: 7

8-4**Practice: Word Problems*****Percent of Change***

<p>1. SHOES A popular brand of running shoes costs a local store \$68 for each pair. If the store sells the shoes for \$119, what is the percent of increase in the price?</p>	<p>2. CLUBS Last year the backgammon club had 30 members. This year the club has 24 members. Find the percent of decrease in the number of members.</p>
<p>3. READING In the seventh grade, Rachel read 15 books. In the eighth grade, she read 18 books. Find the percent of increase in the number of books Rachel read.</p>	<p>4. VOTES Last year 762 students voted in the student council election at San Bruno Middle School. This year 721 students voted. To the nearest tenth, what was the percent of change in the number of students that voted?</p>
<p>5. HEIGHT When Hugo was 9 years old he was 56 inches tall. Hugo is now 12 years old and he is 62 inches tall. Find the percent of increase in Hugo's height to the nearest tenth.</p>	<p>6. PLANTS Alicia planted 45 tulip bulbs last year. This year she plans to plant 65 bulbs. Find the percent of increase in the number of tulip bulbs to the nearest tenth.</p>
<p>7. PICTURES The 2002 yearbook at Middleton Middle School had 236 candid pictures of students. The 2001 yearbook had 214 candid pictures of students. To the nearest tenth, what was the percent of change in the number of candid student pictures?</p>	<p>8. POPULATION In 1990, there were 4,298,000 Mexican immigrants living in the United States. In 2000 this number had increased to 7,858,000. Find the percent of increase to the nearest tenth.</p>

8-4**Reading to Learn Mathematics*****Percent of Change***

Pre-Activity *Complete the Mini Lab at the top of page 350 in your textbook. Write your answers below.*

Model each percent of change.

1. 25% increase
2. 75% increase
3. 30% increase
4. **Describe** a model that represents a 100% increase, a 200% increase, and a 300% increase.
5. **Describe** how this process would change to show percent of decrease.

Reading the Lesson

6. In a percent of change, what are the two numbers that are being compared?
7. How can you tell if a percent of change is a percent of increase or a percent of decrease?
8. Tell how to find the amount of increase and the amount of decrease.

Helping You Remember

9. Find an example of something in your life that has increased or decreased, such as your height in the past year. Calculate the percent of change and share your results with your class.

8-4**Enrichment****A Taxing Exercise**

People who earn income are required by law to pay taxes. The amount of tax a person owes is computed by first subtracting the amount of all *exemptions* and *deductions* from the amount of income, then using a tax table like this.

Schedule X—Use if your filing status is **Single**

If the amount on Form 1040, line 37, is: <i>Over</i> —	<i>But not over</i> —	Enter on Form 1040, line 38	<i>of the amount over</i> —
\$0	\$20,350	-----15%	\$0
20,350	49,300	\$3,052.50 + 28%	20,350
49,300	-----	11,158.50 + 31%	49,300

Compute each person's income. Subtract \$5,550 for each person's exemption and deduction. Then use the tax rate schedule to compute the amount of federal tax owed.

1. A cashier works 40 hours each week, earns \$7.50 per hour, and works 50 weeks each year.
2. A newspaper carrier works each day, delivers 154 papers daily, and earns \$0.12 delivering each paper.
3. A baby-sitter earns \$3.50 per hour per child. During a year, the baby-sitter works with two children every Saturday for 8 hours and with three children every other Sunday for 6 hours.
4. While home from college for the summer, a painter earns \$17.00 per hour, working 45 hours each week for 15 weeks.
5. Working before and after school in the school bookstore, an employee works 2.5 hours each day for 170 days and earns \$4.60 per hour.
6. After graduating from college, a computer programmer accepts a position earning \$2,450 monthly.

8-5**Study Guide and Intervention****Sales Tax and Discount**

Sales tax is a percent of the purchase price and is an amount paid in addition to the purchase price.
Discount is the amount by which the regular price of an item is reduced.

EXAMPLE 1 **SOCCER** Find the total price of a \$17.75 soccer ball if the sales tax is 6%.

Method 1

First, find the sales tax.

$$6\% \text{ of } \$17.75 = 0.06 \cdot 17.75 \\ \approx 1.07$$

The sales tax is \$1.07.

Next, add the sales tax to the regular price.

$$1.07 + 17.75 = 18.82$$

The total cost of the soccer ball is \$18.82.

Method 2

$$100\% + 6\% = 106\% \quad \text{Add the percent of tax to } 100\%.$$

The total cost is 106% of the regular price.

$$106\% \text{ of } \$17.75 = 1.06 \cdot 17.75 \\ \approx 18.82$$

EXAMPLE 2 **TENNIS** Find the price of a \$69.50 tennis racket that is on sale for 20% off.

First, find the amount of the discount d .

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{base}}$$

$$d = 0.2 \cdot 69.50 \quad \text{Use the percent equation.}$$

$$d = 13.90 \quad \text{The discount is } \$13.90.$$

So, the sale price of the tennis racket is \$69.50 – \$13.90 or \$55.60.

EXERCISES

Find the total cost or sale price to the nearest cent.

- \$22.95 shirt; 7% sales tax
- \$39.00 jeans; 25% discount
- \$35 belt; 40% discount
- \$115.48 watch; 6% sales tax
- \$16.99 book; 5% off
- \$349 television; 6.5% sales tax

8-5**Practice: Skills*****Sales Tax and Discount*****Find the total cost or sale price to the nearest cent.**

1. \$49.95 CD player; 5% discount
2. \$69 shoes; 6% sales tax
3. \$2.99 socks; 5.5% sales tax
4. \$119 coat; 40% discount
5. \$299 DVD player; 7% sales tax
6. \$49 tie; 15% discount
7. \$59 power tool; 5% sales tax
8. \$17.99 CD; 10% discount
9. \$79 cell phone; 20% discount
10. \$65 concert ticket; 7.5% sales tax
11. \$459 television; 30% discount
12. \$19,995 car; 6.5% sales tax

Find the percent of discount to the nearest percent.

13. boots: regular price, \$89
sale price, \$62.50
14. video game: regular price, \$14.99
sale price, \$12.64
15. drum set: regular price, \$1,240
sale price, \$1,099
16. gloves: regular price, \$24
sale price, \$16.40
17. sweater: regular price, \$48
sale price, \$34
18. sunglasses: regular price, \$80
sale price, \$62.95
19. dinner for two: regular price, \$75
sale price, \$70
20. bicycle: regular price, \$189
sale price, \$147.85

8-5**Practice: Word Problems*****Sales Tax and Discount***

<p>1. SKATEBOARDS Ines wants to buy a skateboard but she does not know if she has enough money. The price of the skateboard is \$85 and the sales tax is 6%. What will be the total cost of the skateboard?</p>	<p>2. PRETZELS The Spanish club sold hot pretzels as a fund-raiser. The pretzels normally sold for \$1.50, but near the end of the sale they wanted to sell as many as possible, so they reduced the price by 30%. What was the new price for a hot pretzel?</p>
<p>3. COMPUTERS Andrea ordered a computer on the Internet. The computer cost \$1,499 plus $7\frac{1}{2}\%$ sales tax. What was the total amount Andrea paid for her computer?</p>	<p>4. BOOKS Nate went shopping at a bookstore. The price of the book he selected was \$14.95, but it had a sale sticker on it. When he paid for the book, he was charged \$12.71 before sales tax was added. What was the percent of discount to the nearest percent?</p>
<p>5. CELL PHONES Justin is buying a cell phone that has a regular price of \$149. The cell phone is on sale for 15% off the regular price. What will be the sale price?</p>	<p>6. MAGAZINES Ivan bought two magazines for \$4.95 each. If the sales tax was 6.75%, what was the total amount that he paid for the magazines?</p>
<p>7. MOVIES A video store is having a sale in which DVDs are on sale for 20% off. During this sale, what is the cost of three DVDs that regularly cost \$16.99?</p>	<p>8. MODELS The original price of a collectible model airplane is \$115. The discounted price is \$99. What is the percent of discount to the nearest percent?</p>

8-5**Reading to Learn Mathematics*****Sales Tax and Discount***

Pre-Activity *Read the introduction at the top of page 354 in your textbook. Write your answers below.*

1. Calculate the sales tax by finding 6% of \$1,299.
2. What will be the total cost including the sales tax?
3. Use a calculator to multiply 1.06 and 1,299. How does the result compare to your answer in Exercise 2?

Reading the Lesson

4. In Example 1, the \approx is used when the sales tax is found. Why is the value of 0.0425 times 90 rounded?
5. Calculate the total cost of the item in Example 1 using the method shown in Example 2. What two numbers will you multiply to find the total cost?
6. In Example 2, why is the sales tax added to 100%?
7. In Examples 3 and 4, the percent equation is used to find discount price and to find the percent of discount. When using the percent equation, how do you represent the percent?

Helping You Remember

8. Use the Internet to find the state sales tax in your state, including tax on food, prescription drugs, and nonprescription drugs, if applicable. Then suppose you have a cold and you go to a local pharmacy. You purchase a box of crackers for \$2.99 and a bottle of over-the-counter pain reliever for \$8.49. Your doctor ordered a prescription for you for your cold and you pay \$10 for this prescription. Using the sales tax for your state, what is your total cost at the pharmacy, including taxes?

8-5**Enrichment****Missing Fact Match**

The problems on this page are missing a key fact and cannot be solved.

Find the missing fact in Column 2 that completes each problem in Column 1. After each missing fact has been matched to its problem in Column 1, find each answer.

Problem	Missing Fact	Answer
1. The school band held a fund-raiser by selling band buttons. Each button sold for \$1.50, which included a 20% profit. How much profit did the fund-raiser earn?	_____ The team had 12 players.	1. _____
2. The athletic department received a bill of \$153.36, including tax, for extra uniforms. Find the cost of the uniforms before tax.	_____ Regular price is \$22.50.	2. _____
3. If everyone is present, there are 25 students in a mathematics class. How many students were in class on Monday?	_____ Paper products are 25% off.	3. _____
4. The volleyball team stopped after the game to eat. The bill was \$57.60, not including a 15% tip. If the bill was split equally among the players, what was each player's share?	_____ They reached 150% of their goal.	4. _____
5. The school bookstore does not tax supplies and is having a spring sale. Find the cost of two spiral notebooks that regularly sell for \$1.40 each.	_____ Sales tax on clothing is 8%.	5. _____
6. A department store advertises 40% off jeans in a back-to-school sale. If sales tax is 5%, what is the cost of two pairs of jeans?	_____ Total sales were 1,200 buttons.	6. _____
7. Last season, the goal of the basketball team was to win 12 games. How many games did they win last season?	_____ Monday's attendance was 92%.	7. _____

8-6**Study Guide and Intervention****Simple Interest**

Simple interest is the amount of money paid or earned for the use of money. To find simple interest I , use the formula $I = prt$. Principal p is the amount of money deposited or invested. Rate r is the annual interest rate written as a decimal. Time t is the amount of time the money is invested in years.

EXAMPLE 1 Find the simple interest earned in a savings account where \$136 is deposited for 2 years if the interest rate is 7.5% per year.

$$I = prt \quad \text{Formula for simple interest}$$

$$I = 136 \cdot 0.075 \cdot 2 \quad \text{Replace } p \text{ with } \$136, r \text{ with } 0.075, \text{ and } t \text{ with } 2.$$

$$I = 20.40 \quad \text{Simplify.}$$

The simple interest earned is \$20.40.

EXAMPLE 2 Find the simple interest for \$600 invested at 8.5% for 6 months.

$$6 \text{ months} = \frac{6}{12} \text{ or } 0.5 \text{ year} \quad \text{Write the time as years.}$$

$$I = prt \quad \text{Formula for simple interest}$$

$$I = 600 \cdot 0.085 \cdot 0.5 \quad p = \$600, r = 0.085, t = 0.5$$

$$I = 25.50 \quad \text{Simplify.}$$

The simple interest is \$25.50.

EXERCISES

Find the interest earned to the nearest cent for each principal, interest rate, and time.

1. \$300, 5%, 2 years

2. \$650, 8%, 3 years

3. \$575, 4.5%, 4 years

4. \$735, 7%, $2\frac{1}{2}$ years

5. \$1,665, 6.75%, 3 years

6. \$2,105, 11%, $1\frac{3}{4}$ years

7. \$903, 8.75%, 18 months

8. \$4,275, 19%, 3 months

8-6**Practice: Skills*****Simple Interest***

Find the interest earned to the nearest cent for each principal, interest rate, and time.

1. \$500, 4%, 2 years
2. \$350, 6.2%, 3 years
3. \$740, 3.25%, 2 years
4. \$725, 4.3%, $2\frac{1}{2}$ years
5. \$955, 6.75%, $3\frac{1}{4}$ years
6. \$1,540, 8.25%, 2 years
7. \$3,500, 4.2%, $1\frac{3}{4}$ years
8. \$568, 16%, 8 months

Find the interest paid to the nearest cent for each loan balance, interest rate, and time.

9. \$800, 9%, 4 years
10. \$280, 5.5%, 4 years
11. \$1,150, 7.6%, 5 years
12. \$266, 5.2%, 3 years
13. \$450, 22%, 1 year
14. \$2,180, 7.7%, $2\frac{1}{2}$ years
15. \$2,650, 3.65%, $4\frac{1}{2}$ years
16. \$1,245, 5.4%, 6 months

8-6**Practice: Word Problems*****Simple Interest***

<p>1. SAVINGS ACCOUNT How much interest will Hannah earn in 4 years if she deposits \$630 in a savings account at 6.5% simple interest?</p>	<p>2. INVESTMENTS Terry invested \$2,200 in the stock market for 2 years. If the investment earned 12% simple interest, how much money did Terry earn in interest in 2 years?</p>
<p>3. SAVINGS ACCOUNT Malik deposited \$1,050 in a savings account, and it earned \$241.50 in simple interest after four years. Find the interest rate on Malik's savings account.</p>	<p>4. INHERITANCE Kelli Rae's inheritance from her great-grandmother was \$220,000 after taxes. If Kelli Rae invests this money in a savings account that earns \$18,260 in simple interest every year, what is the interest rate on her account?</p>
<p>5. RETIREMENT Mr. Pham has \$410,000 in a retirement account that earns 3.85% simple interest each year. Find the amount earned each year by this investment.</p>	<p>6. COLLEGE FUND When Melissa was born, her parents put \$8,000 into a college fund account that earned 9% simple interest. Find the total amount in the account after 18 years.</p>
<p>7. LOTTERY Raj won \$900,000 in a regional lottery. After paying \$350,000 in taxes, he invested the remaining money in a savings account at 4.25% simple interest. How much money is in the account if Raj makes no deposits or withdrawals for two years?</p>	<p>8. SAVINGS Mona opened a savings account with a \$500 deposit and a simple interest rate of 5.6%. If there were no deposits or withdrawals, how much money is in the account after $8\frac{1}{2}$ years?</p>

8-6**Reading to Learn Mathematics*****Simple Interest***

Pre-Activity *Read the introduction at the top of page 358 in your textbook. Write your answers below.*

1. Calculate 2.25% of \$1,000 to find the amount of money that Brooke can earn in one year for a CD at State Credit Union.
2. Find the amount of money that she can earn in one year at the other three banks.

Reading the Lesson

3. In Example 4, why is t replaced with $\frac{1}{12}$?
4. Complete the following table that gives the conversion of months to years.

Number of months	2	3	4	6	8	9	10
Ratio of number of months to 12 months							
Simplified ratio							

Helping You Remember

5. Write the formula for simple interest and explain what each of the letters in the formula stands for.
6. Look up the word *interest* in a dictionary. Write the meaning that matches the way the word is used in this lesson.
7. When do you earn interest? When do you have to pay interest?

8-6**Enrichment****Taking an Interest**

When interest is paid on both the amount of the deposit and any interest already earned, interest is said to be **compounded**. You can use the formula below to find out how much money is in an account for which interest is compounded.

$$A = P(1 + r)^n$$

In the formula, P represents the principal, or amount deposited, r represents the rate applied each time interest is paid, n represents the number of times interest is given, and A represents the amount in the account.

EXAMPLE

A customer deposited \$1,500 in an account that earns 8% per year. If interest is compounded and earned semiannually, how much is in the account after 1 year?

Use the formula $A = P(1 + r)^n$.

Since interest is earned semiannually, $r = 8 \div 2$ or 4% and $n = 2$.

$$\begin{aligned} A &= 1,500(1 + 0.04)^2 && \text{Use a calculator.} \\ &= 1,622.40 \end{aligned}$$

After 1 year, there is \$1,622.40 in the account.

Use the compound interest formula and a calculator to find the value of each of these investments. Round each answer to the nearest cent.

- \$2,500 invested for 1 year at 6% interest compounded semiannually
- \$3,600 invested for 2 years at 7% interest compounded semiannually
- \$1,000 invested for 5 years at 8% interest compounded annually
- \$2,000 invested for 6 years at 12% interest compounded quarterly
- \$4,800 invested for 10 years at 9% interest compounded annually
- \$10,000 invested for 15 years at 7.5% interest compounded semiannually