

Chapter
15

Fair Game Review

Write the percent as a fraction or mixed number in simplest form.

1. 25%

2. 65%

3. 110%

4. 250%

5. 15%

6. 6%

7. A store marks up a pair of sneakers 30%. Write the percent as a fraction or mixed number in simplest form.

**Chapter
15****Fair Game Review** (continued)

Write the fraction or mixed number as a percent.

8. $\frac{1}{5}$

9. $\frac{1}{4}$

10. $\frac{21}{25}$

11. $1\frac{2}{5}$

12. $2\frac{13}{20}$

13. $1\frac{1}{2}$

14. You own $\frac{3}{5}$ of the coins in a collection. What percent of the coins do you own?

15.1

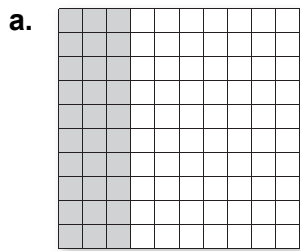
Percents and Decimals

For use with Activity 15.1

Essential Question How does the decimal point move when you rewrite a percent as a decimal and when you rewrite a decimal as a percent?

1 ACTIVITY: Writing Percents as Decimals

Work with a partner. Write the percent shown by the model. Write the percent as a decimal.

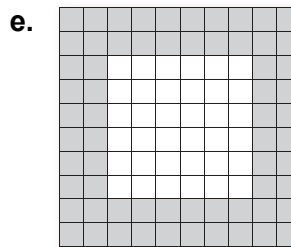
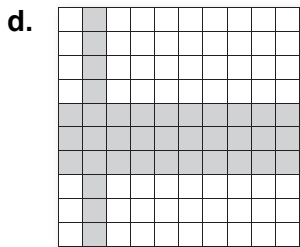
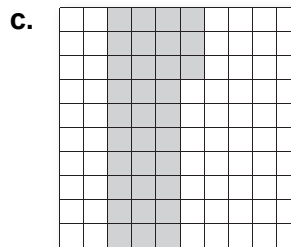
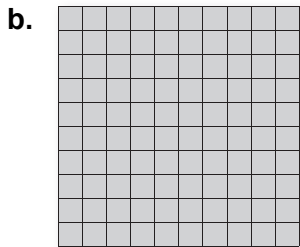


$\square = \frac{\square}{\square}$

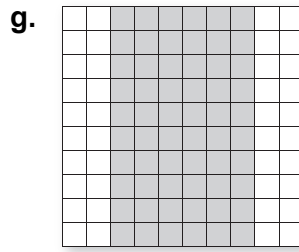
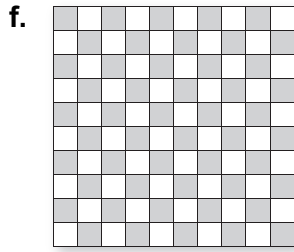
$= \frac{\square}{\square}$ Simplify.

$= \square$ Write fraction as a decimal.

(Labels: \square per \square cent)

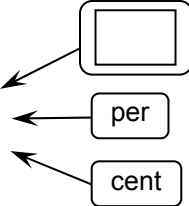


15.1 Percents and Decimals (continued)



2 ACTIVITY: Writing Percents as Decimals

Work with a partner. Write the percent as a decimal.

a. $13.5\% = \frac{\boxed{}}{\boxed{}}$ 

$= \frac{\boxed{}}{\boxed{}}$

$= \boxed{}$

Multiply numerator and denominator by 10.

Write fraction as a decimal.

b. 12.5%

c. 3.8%

d. 0.5%

15.1 Percents and Decimals (continued)**3** **ACTIVITY:** Writing Decimals as Percents

Work with a partner. Draw a model to represent the decimal. Write the decimal as a percent.

a. 0.1

b. 0.24

c. 0.58

d. 0.05

What Is Your Answer?

4. IN YOUR OWN WORDS How does the decimal point move when you rewrite a percent as a decimal and when you rewrite a decimal as a percent?

5. Explain why the decimal point moves when you rewrite a percent as a decimal and when you rewrite a decimal as a percent.

15.1**Practice**

For use after Lesson 15.1

Write the percent as a decimal.

1. 35% 2. 160% 3. 74.8% 4. 0.3%

Write the decimal as a percent.

5. 1.23 6. 0.49 7. 0.024 8. 0.881

Write the percent as a fraction in simplest form and as a decimal.

9. 48% 10. 15.5% 11. 84.95%

12. People with severe hearing loss were given a sentence and word recognition test six months after they got implants in their ears. The patients scored an average of 82% on the test. Write this percent as a decimal.

15.2 Comparing and Ordering Fractions, Decimals, and Percents

For use with Activity 15.2

Essential Question How can you order numbers that are written as fractions, decimals, and percents?

1 ACTIVITY: Using Fractions, Decimals, and Percents

Work with a partner. Decide which number form (fraction, decimal, or percent) is more common. Then find which is greater.

- a. 7% sales tax or $\frac{1}{20}$ sales tax b. 0.37 cup of flour or $\frac{1}{3}$ cup of flour
- c. $\frac{5}{8}$ -inch wrench or 0.375-inch wrench d. $12\frac{3}{5}$ dollars or 12.56 dollars
- e. 93% test score or $\frac{7}{8}$ test score f. $5\frac{5}{6}$ fluid ounces or 5.6 fluid ounces

2 ACTIVITY: Ordering Numbers

Work with a partner to order the following numbers.

$\frac{1}{8}$ 11% $\frac{3}{20}$ 0.172 0.32 43% 7% 0.7 $\frac{5}{6}$

- a. Decide on a strategy for ordering the numbers. Will you write them all as fractions, decimals, or percents?
- b. Use your strategy and a number line to order the numbers from least to greatest. (Note: Label the number line appropriately.)



15.2 Comparing and Ordering Fractions, Decimals, and Percents (continued)**3 ACTIVITY:** The Game of Math Card War**Preparation:**

- Cut index cards to make 40 playing cards.*
- Write each number in the table onto a card.

75%	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{3}{10}$	0.3	25%	0.4	0.25	100%	0.27
0.75	$66\frac{2}{3}\%$	12.5%	40%	$\frac{1}{4}$	4%	0.5%	0.04	$\frac{1}{100}$	$\frac{2}{3}$
0	30%	5%	$\frac{27}{100}$	0.05	$33\frac{1}{3}\%$	$\frac{2}{5}$	0.333...	27%	1%
1	0.01	$\frac{1}{20}$	$\frac{1}{8}$	0.125	$\frac{1}{25}$	$\frac{1}{200}$	0.005	0.666...	0%

To Play:

- Play with a partner.
- Deal 20 cards to each player facedown.
- Each player turns one card faceup. The player with the greater number wins. The winner collects both cards and places them at the bottom of his or her cards.
- Suppose there is a tie. Each player lays three cards facedown, then a new card faceup. The player with the greater of these new cards wins. The winner collects all 10 cards and places them at the bottom of his or her cards.
- Continue playing until one player has all the cards. This player wins the game.

*Cut-outs are available in the back of the Record and Practice Journal.

15.2 Comparing and Ordering Fractions, Decimals, and Percents (continued)

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you order numbers that are written as fractions, decimals, and percents? Give an example with your answer.

5. All but one of the U.S. coins shown has a name that is related to its value. Which one is it? How are the names of the others related to their values?



15.2**Practice**

For use after Lesson 15.2

Circle the number that is greater.

1. 0.06, 60% 2. 78%, $\frac{19}{25}$ 3. $\frac{23}{20}$, 110% 4. 0.23, 2.3%

Use a number line to order the numbers from least to greatest.

5. 44.5%, 0.4445, $\frac{4}{9}$, 0.44



6. $\frac{5}{12}$, 0.4, 42%, 0.416



7. The table shows the portion of each age group that recycles plastic. Order the groups by the portion that recycle from least to greatest.

Age Group	Echo Boomers	Gen X	Baby Boomers	Matures
Portion that Recycle	51%	0.57	0.61	$\frac{6}{10}$

15.3

The Percent Proportion

For use with Activity 15.3

Essential Question How can you use models to estimate percent questions?

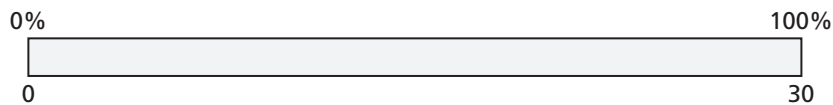
1 ACTIVITY: Estimating a Part

The statement “25% of 12 is 3” has three numbers. In real-life problems, any one of these can be unknown.

Question	Which number is missing?	Type of Question
What is 25% of 12?	_____	Find a part of a number.
3 is what percent of 12?	_____	Find a percent.
3 is 25% of what?	_____	Find the whole.

Work with a partner. Use a model to estimate the answer to each question.

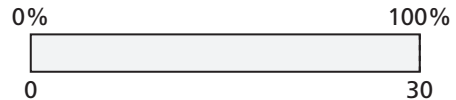
a. What number is 50% of 30?



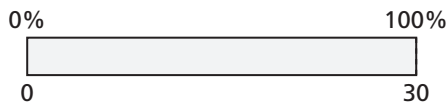
b. What number is 75% of 30?



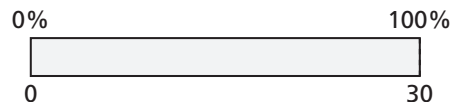
c. What number is 40% of 30?



d. What number is 6% of 30?



e. What number is 65% of 30?

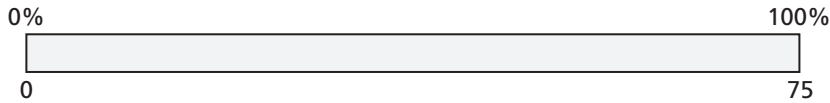


15.3 The Percent Proportion (continued)

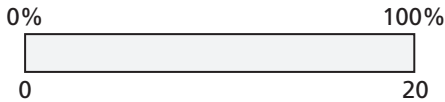
2 ACTIVITY: Estimating a Percent

Work with a partner. Use a model to estimate the answer to each question.

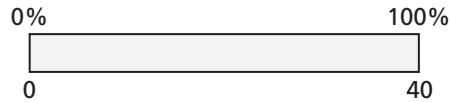
- a. 15 is what percent of 75?



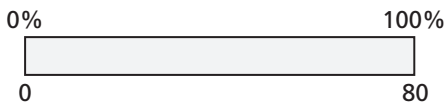
- b. 5 is what percent of 20?



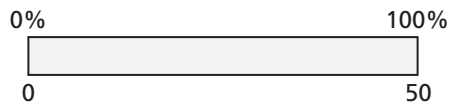
- c. 18 is what percent of 40?



- d. 50 is what percent of 80?



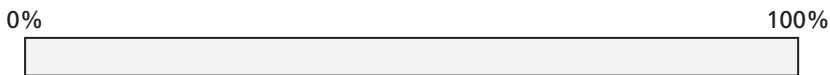
- e. 75 is what percent of 50?



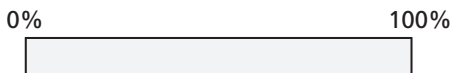
3 ACTIVITY: Estimating a Whole

Work with a partner. Use a model to estimate the answer to each question.

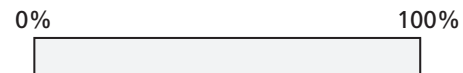
- a. 24 is $33\frac{1}{3}\%$ of what number?



- b. 13 is 25% of what number?

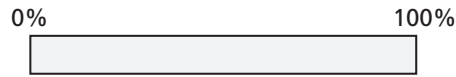


- c. 110 is 20% of what number?

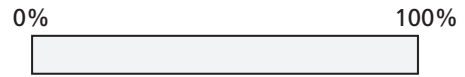


15.3 The Percent Proportion (continued)

d. 75 is 75% of what number?



e. 81 is 45% of what number?



4 ACTIVITY: Using Ratio Tables

Work with a partner. Use a ratio table to answer each question. Then compare your answer to the estimate you found using the model.

1d a. What number is 6% of 30?

Part	6		
Whole	100		30

1e b. What number is 65% of 30?

Part	65		
Whole	100		30

2c c. 18 is what percent of 40?

Part	18		
Whole	40		100

3e d. 81 is 45% of what number?

Part	45		81
Whole	100		

What Is Your Answer?

5. IN YOUR OWN WORDS How can you use models to estimate percent questions? Give examples to support your answer.

6. Complete the proportion below using the given labels.

percent	whole	=		
100	part			

15.3

Practice

For use after Lesson 15.3

Write and solve a proportion to answer the question.

1. 40% of 60 is what number?
2. 17 is what percent of 50?
3. 38% of what number is 57?
4. 44% of 25 is what number?
5. 52 is what percent of 50?
6. 150% of what number is 18?
7. You put 60% of your paycheck into your savings account. Your paycheck is \$235. How much money do you put in your savings account?

15.4

The Percent Equation

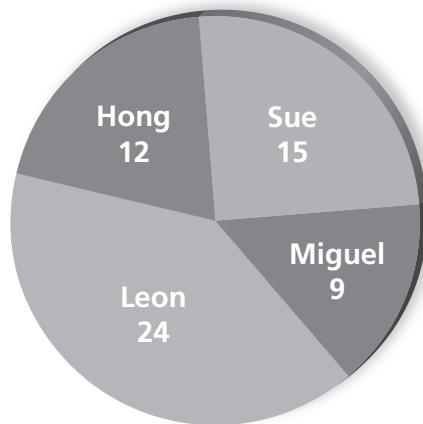
For use with Activity 15.4

Essential Question How can you use an equivalent form of the percent proportion to solve a percent problem?

1 ACTIVITY: Solving Percent Problems Using Different Methods

Work with a partner. The circle graph shows the number of votes received by each candidate during a school election. So far, only half the students have voted.

Votes Received by Each Candidate



- a. Complete the table.
- b. Find the percent of students who voted for each candidate. Explain the method you used to find your answers.

Candidate	<u>Number of votes received</u>
	<u>Total number of votes</u>
Sue	
Miguel	
Leon	
Hong	

- c. Compare the method you used in part (b) with the methods used by other students in your class. Which method do you prefer? Explain.

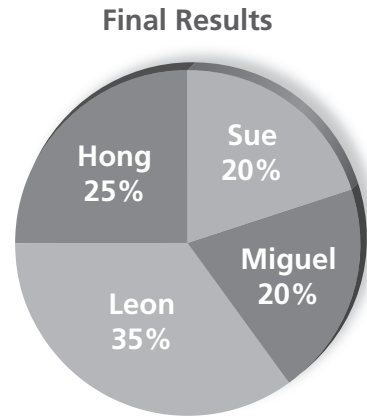
15.4 The Percent Equation (continued)

2 ACTIVITY: Finding Parts Using Different Methods

Work with a partner. The circle graph shows the final results of the election.

- a. Find the number of students who voted for each candidate. Explain the method you used to find your answers.

- b. Compare the method you used in part (a) with the methods used by other students in your class. Which method do you prefer? Explain.



3 ACTIVITY: Deriving the Percent Equation

Work with a partner. In Section 15.3, you used the percent proportion to find the missing percent, part, or whole. You can also use the *percent equation* to find these missing values.

- a. Complete the steps below to find the percent equation.

$$\frac{\text{part}}{\text{whole}} = \text{percent} \qquad \text{Definition of percent}$$

$$\frac{\text{part}}{\text{whole}} \cdot \boxed{} = \boxed{} \cdot \boxed{} \qquad \text{Multiply each side by the } \boxed{}.$$

$$\text{part} = \boxed{} \cdot \boxed{} \qquad \text{Divide out common factors. This is the percent equation.}$$

- b. You used two methods in Activity 2 to find the number of students who voted for each candidate. Do you prefer the percent proportion or the percent equation method?

15.4 The Percent Equation (continued)**4** **ACTIVITY:** Identifying Different Equations

Work with a partner. Without doing any calculations, choose the equation that you cannot use to answer each question.

- a. What number is 55% of 80?

$$a = 0.55 \cdot 80$$

$$a = \frac{11}{20} \cdot 80$$

$$80a = 0.55$$

$$\frac{a}{80} = \frac{55}{100}$$

- b. 24 is 60% of what number?

$$\frac{24}{w} = \frac{60}{100}$$

$$24 = 0.6 \cdot w$$

$$\frac{24}{60} = w$$

$$24 = \frac{3}{5} \cdot w$$

What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you use an equivalent form of the percent proportion to solve a percent problem?
6. Write a percent proportion and a percent equation that you can use to answer the question below.

16 is what percent of 250?

15.4

Practice

For use after Lesson 15.4

Write and solve an equation to answer the question.

1. What number is 35% of 80?
2. 8 is what percent of 5?

3. What percent of 125 is 50?
4. 12% of what number is 48?

5. 12 is what percent of 50?
6. What percent of 12 is 3?

7. You receive 15% of the profit from a car wash. How much money do you receive from a profit of \$300?

15.5

Percents of Increase and Decrease

For use with Activity 15.5

Essential Question What is a percent of decrease? What is a percent of increase?

1 ACTIVITY: Percent of Decrease

Work with a partner.

Each year in the Columbia River Basin, adult salmon swim upriver to streams to lay eggs and hatch their young.

To go up river, the adult salmon use fish ladders. But to go down the river, the young salmon must pass through several dams.

At one time, there were electric turbines at each of the eight dams on the main stem of the Columbia and Snake Rivers. About 88% of the young salmon passed through these turbines unharmed.

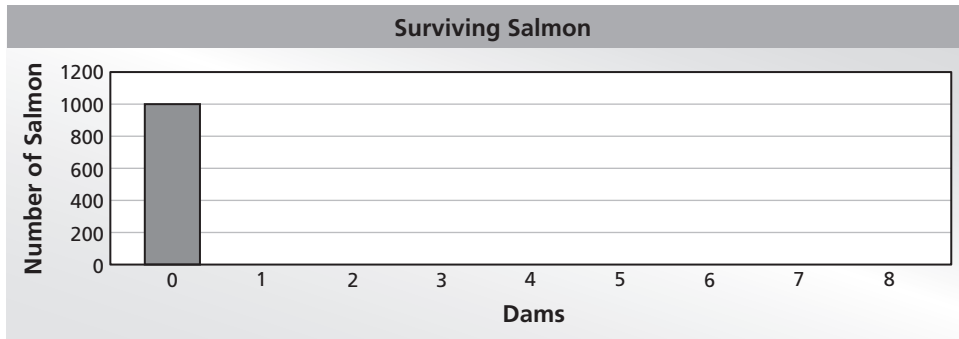


a. Complete the table to show the number of young salmon that made it through the dams.

Dam	0	1	2	3	4	5	6	7	8
Salmon	1000								

15.5 Percents of Increase and Decrease (continued)

b. Display the data in a bar graph.



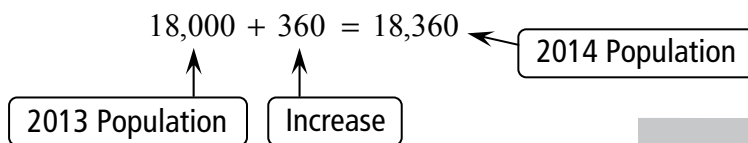
c. By what percent did the number of young salmon decrease when passing through each dam?

2 ACTIVITY: Percent of Increase

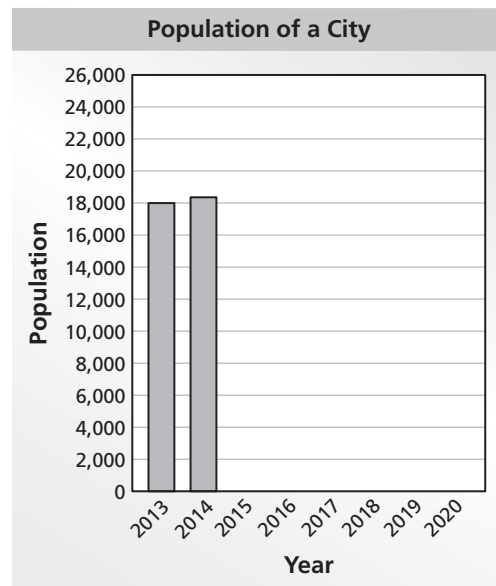
Work with a partner. In 2013, the population of a city was 18,000 people.

a. An organization projects that the population will increase by 2% each year for the next 7 years. Complete the table to find the populations of the city for 2014 through 2020. Then display the data in a bar graph.

For 2014: 2% of $18,000 = 0.02 \cdot 18,000 = 360$



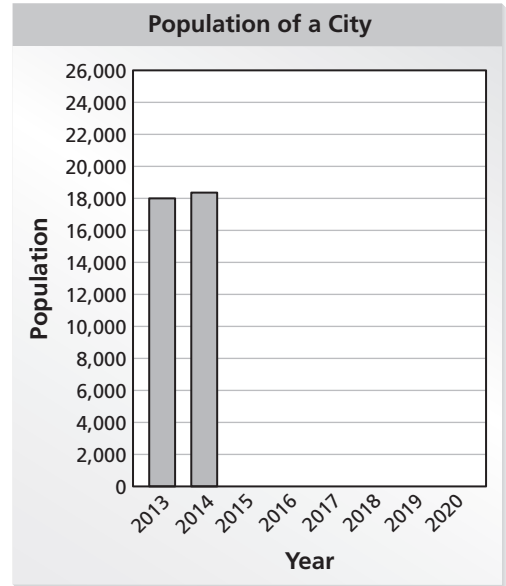
Year	Population
2013	18,000
2014	18,360
2015	
2016	
2017	
2018	
2019	
2020	



15.5 Percents of Increase and Decrease (continued)

- b. Another organization projects that the population will increase by 3% each year for the next 7 years. Repeat part (a) using this percent.

Year	Population
2013	
2014	
2015	
2016	
2017	
2018	
2019	
2020	



- c. Which organization projects the larger populations? How many more people do they project for 2020?

What Is Your Answer?

3. **IN YOUR OWN WORDS** What is a percent of decrease? What is a percent of increase?
4. Describe real-life examples of a percent of decrease and a percent of increase.

15.5

Practice

For use after Lesson 15.5

Find the new amount.

1. 120 books increased by 55%
2. 80 members decreased by 65%

Identify the percent of change as an *increase* or *decrease*. Then find the percent of change. Round to the nearest tenth of a percent, if necessary.

3. 25 points to 50 points
4. 125 invitations to 75 invitations

5. 32 pages to 28 pages
6. 7 players to 10 players

7. One week, 72 people got a speeding ticket. The next week, only 36 people got a speeding ticket. What is the percent of change in speeding tickets?

15.6

Discounts and Markups

For use with Activity 15.6

Essential Question How can you find discounts and selling prices?

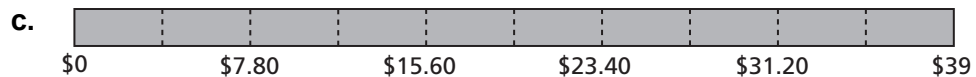
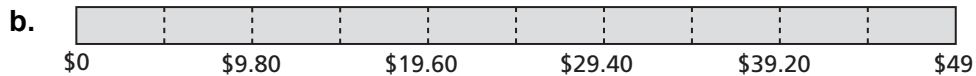
1 ACTIVITY: Comparing Discounts

Work with a partner. The same pair of sneakers is on sale at three stores. Which one is the best buy? Explain.

a. Regular Price: \$45

b. Regular Price: \$49

c. Regular Price: \$39



15.6 Discounts and Markups (continued)

2 ACTIVITY: Finding the Original Price

Work with a partner.

- a. You buy a shirt that is on sale for 30% off. You pay \$22.40. Your friend wants to know the original price of the shirt. Show how you can use the model to find the original price.



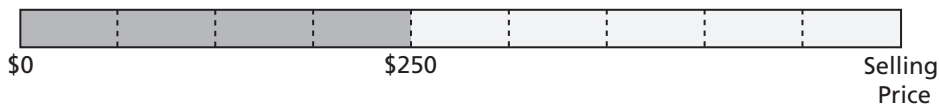
- b. Explain how you can use the percent proportion to find the original price.

3 ACTIVITY: Finding Selling Prices

You own a small jewelry store. You increase the price of jewelry by 125%.

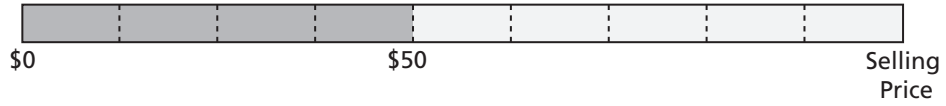
Work with a partner. Use a model to estimate the selling price of the jewelry. Then use a calculator to find the selling price.

- a. Your cost is \$250.

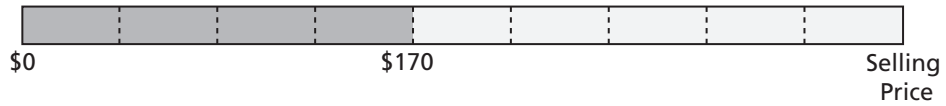


15.6 Discounts and Markups (continued)

b. Your cost is \$50.



c. Your cost is \$170.



What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you find discounts and selling prices?
Give examples of each.

15.6**Practice**

For use after Lesson 15.6

Complete the table.

	Original Price	Percent of Discount	Sale Price
1.	\$20	20%	
2.	\$95	35%	
3.		75%	\$55.50
4.		40%	\$78

Find the selling price.

5. Cost to store: \$20
Markup: 15%6. Cost to store: \$56
Markup: 80%7. Cost to store: \$110
Markup: 140%

8. A store buys an item for \$10. To earn a profit of \$25, what percent does the store need to markup the item?

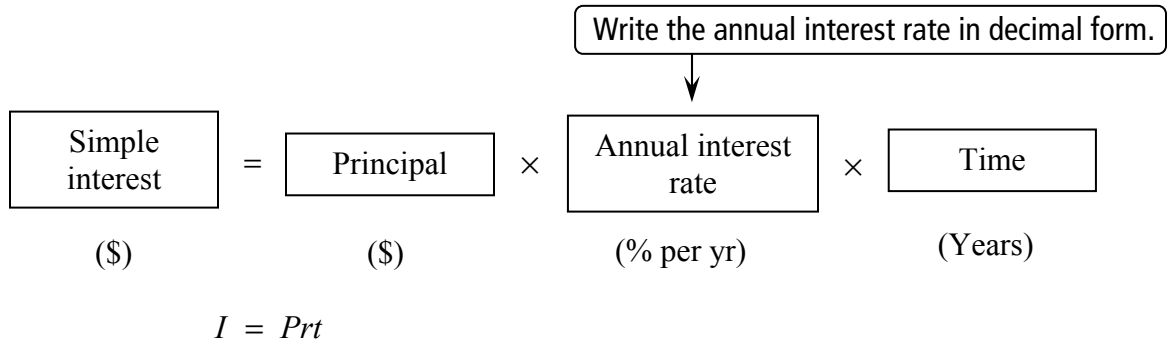
15.7

Simple Interest

For use with Activity 15.7

Essential Question How can you find the amount of simple interest earned on a savings account? How can you find the amount of interest owed on a loan?

Simple interest is money earned on a savings account or an investment. It can also be money you pay for borrowing money.



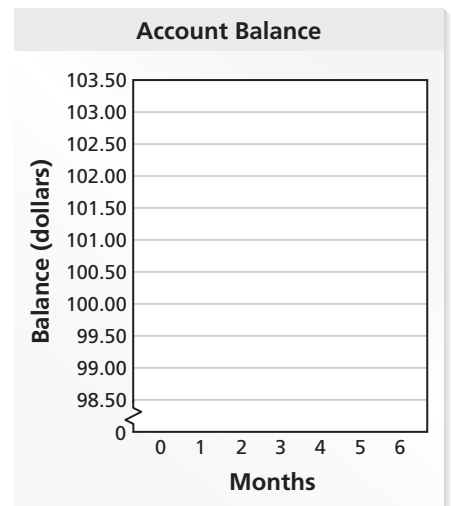
1 ACTIVITY: Finding Simple Interest

Work with a partner. You put \$100 in a savings account. The account earns 6% simple interest per year. (a) Find the interest earned and the balance at the end of 6 months. (b) Complete the table. Then make a bar graph that shows how the balance grows in 6 months.

a. $I = Prt$

b.

Time	Interest	Balance
0 month		
1 month		
2 months		
3 months		
4 months		
5 months		
6 months		



15.7 Simple Interest (continued)**2 ACTIVITY: Financial Literacy**

Work with a partner. Use the following information to write a report about credit cards. In the report, describe how a credit card works. Include examples that show the amount of interest paid each month on a credit card.

U.S. Credit Card Data

- A typical household with credit card debt in the United States owes about \$16,000 to credit card companies.
- A typical credit card interest rate is 14% to 16% per year. This is called the annual percentage rate.

3 ACTIVITY: The National Debt

Work with a partner. In 2012, the United States owed about \$16 trillion in debt. The interest rate on the national debt is about 1% per year.

- a. Write \$16 trillion in decimal form. How many zeros does this number have?

15.7 Simple Interest (continued)

- b. How much interest does the United States pay each year on its national debt?
- c. How much interest does the United States pay each day on its national debt?
- d. The United States has a population of about 314 million people. Estimate the amount of interest that each person pays per year toward interest on the national debt.

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you find the amount of simple interest earned on a savings account? How can you find the amount of interest owed on a loan? Give examples with your answer.

15.7**Practice**

For use after Lesson 15.7

An account earns simple interest. (a) Find the interest earned. (b) Find the balance of the account.

1. \$400 at 7% for 3 years
2. \$1200 at 5.6% for 4 years

Find the annual interest rate.

3. $I = \$18$, $P = \$200$, $t = 18$ months
4. $I = \$310$, $P = \$1000$, $t = 5$ years

Find the amount of time.

5. $I = \$60$, $P = \$750$, $r = 4\%$
6. $I = \$825$, $P = \$2500$, $r = 5.5\%$

7. You put \$500 in a savings account. The account earns \$15.75 simple interest in 6 months. What is the annual interest rate?