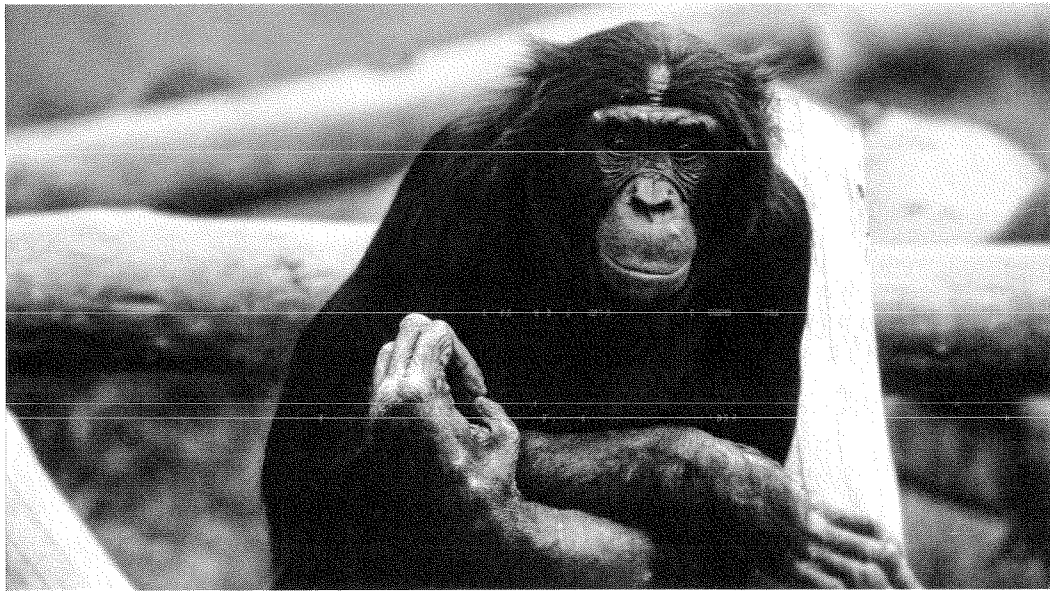# 6

Percents

Zoology is a branch of biology which involves the study of animals. In Lesson 6.2, you will solve problems like those that a zoologist would solve, such as finding the mass of the brains of different animals.

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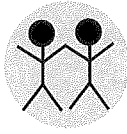## 6.1 One in a Hundred

Percents

Objectives

In this lesson, you will:
- Write percents as decimals and fractions.
- Write decimals and fractions as percents.

Key Terms
- percent

Human beings developed fractions to deal with parts of wholes, decimals to make computations easier, and ratios and proportions to solve problems. However, they needed a way to think about proportional parts that was consistent and efficient. So, the concept of *percent* was born.

Problem 1

You are volunteering at your local public library. The librarian wants to order some new children's books, and asks you to do some research. You find a recent survey titled *Teachers' Top 100 Books*. Eight of the books are by Dr. Seuss.

A. The librarian wants to know the *percent* of the books that are by Dr. Seuss. You know that the word percent means "per cent" or "per hundred." You determine that the ratio of Dr. Seuss' books to the total number of books is 8 to 100. A **percent** is a ratio whose denominator is 100. For example, 8% or 8 per hundred can be written as $\frac{8}{100}$, which simplifies to $\frac{2}{25}$.

Work with your partner to write each percent as a fraction.
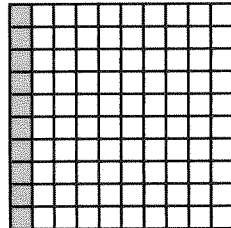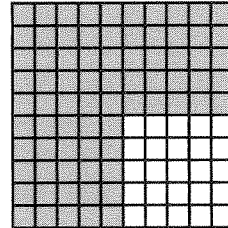
10%   75%   30%

B. Because percent is per hundred, we can write a percent as a decimal by first writing the percent as a fraction with a denominator of 100 and then writing the fraction as a decimal. For example, $12\% = \frac{12}{100} = 0.12$. Write each percent as a decimal.

45%   92%   11%

6%   70%   100%

1. We can also write decimals as percents by writing the decimal as a fraction with a denominator of 100 and then writing the fraction as a percent. For example, $0.15 = \frac{15}{100} = 15\%$. Write each decimal as a percent.

   0.34   0.50   0.65

   0.08   0.1   1.0
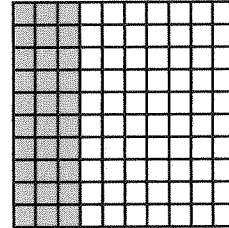

2. Writing fractions as percents is slightly more complicated. We can write the fraction with a denominator of 100.

   $$\frac{1}{4} = \frac{25}{100} = 25\%$$

   We can also write the fraction as a decimal and then as a percent.

   $\frac{7}{20}$ $20\overline{)7.00}^{\,0.35}$ $0.35 = 35\%$

   Work with your partner to write each fraction as a percent using either method.

   $\frac{4}{5}$ $\frac{11}{20}$ $\frac{21}{25}$

   $\frac{1}{8}$ $\frac{13}{40}$ $\frac{1}{3}$

3. What was different about writing $\frac{1}{3}$ as a percent? Use a complete sentence to explain.

4. Because 3 does not divide evenly into 1, we usually write the remainder as a fraction. So, $\frac{1}{3}$ is usually written as $33\frac{1}{3}\%$. Write each fraction as a percent.

   $\frac{5}{6}$ $\frac{5}{12}$ $\frac{7}{15}$

   $\frac{5}{9}$ $\frac{3}{7}$ $\frac{3}{11}$

Take Note

Percents can be decimal numbers, like 20.5%, as well as whole numbers. As a fraction, the percent 20.5% is $\frac{20.5}{100}$ and as a decimal, the percent is 0.205.

6

Problem 2

A. The librarian asks you to analyze the results of her survey of 100 library users. The survey results are shown below. Help the librarian analyze the data by completing the table.

Improvement	Fraction	Decimal	Percent
60 out of 100 requested more books	$\dfrac{3}{5}$	0.6	60%
30 out of 100 requested more computers for public use	$\dfrac{3}{10}$		
35 out of 100 requested more up-to-date fiction books		0.35	
47 out of 100 requested a larger building			47%
56 out of 100 requested more up-to-date nonfiction books		0.56	
55 out of 100 requested that the library be open more hours			55%
48 out of 100 requested more books on tape	$\dfrac{12}{25}$		
5 out of 100 requested more movie titles	$\dfrac{1}{20}$		
3 out of 100 requested additional branches of the library be opened		0.03	
100 out of 100 requested more CD titles			100%

B. Form a group with another partner team. Compare your answers in the table. Be sure that if you have any answers on which you do not agree, you work together to find out why.

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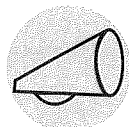
6.2 Brain Waves
Making Sense of Percents

Objectives

In this lesson, you will:
- Use benchmark percents of 1% and 10% to find the percent of a number.
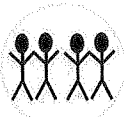
Key Terms
- benchmark percent

Now that we know that percent means per hundred, let's see what this tells us about the percent of a particular number.

Problem 1

For science class you are writing a report about the amount of water in the brains of different animals. You learn that the average mass of a chimpanzee's brain is about 400 grams. You know that 78% of the chimpanzee's brain is water. You want to find the mass of the water in the chimpanzee's brain.

A. To find the mass of water, you are really finding 78% of 400 grams. First, let's find some common percents of 400.

What is 1% or $\frac{1}{100}$ of 400?

What is 10% of 400?

What is 100% of 400?

What is 200% of 400?

Use complete sentences to explain how you found the answers.

B. Because you know 1% of 400, you can find some other percents of 400.

What is 35% of 400?

What is 60% of 400?

What is 66% of 400?

What is 78% of 400?

Use complete sentences to explain how you found the answers.

6

Investigate Problem 1

1. Math Path: Benchmark Percents

A **benchmark percent** is a percent that is commonly used, such as 1% or 10%. You can use benchmark percents to find the percent of any number.

What is 1% or $\frac{1}{100}$ of 120?

What is 10% of 120?

What is 100% of 120?

What is 200% of 120?

2. Use the answer that you found for 1% of 120 to find some other percents of 120.

What is 45% of 120?

What is 70% of 120?

What is 13% of 120?

What is 85% of 120?

Use complete sentences to explain how you found these answers.

3. Use benchmark percents to find each percent of 65.

What is 1% or $\frac{1}{100}$ of 65?

What is 10% of 65?

What is 100% of 65?

What is 200% of 65?

4. Use the answer that you found for 1% of 65 to find some other percents of 65.

What is 12% of 65?

What is 50% of 65?

What is 73% of 65?

What is 55% of 65?

Use complete sentences to explain how you found these answers.

6

Finding 1% of a number allows us to find any percent of the number by just multiplying the number representing the percent by 1% of the number. This method works best when we need to find multiple percents of the same number.

Problem 2

In your report, you want to compare the weight of a chimpanzee's brain with the weights of the brains of other mammals.

A. In some cases, a chimpanzee's brain weight is more than that of other mammals. Complete the table by finding the average weight of each mammal's brain. In this case, suppose that a chimpanzee's brain weighs 400 grams.

Animal	Lion	Sheep	Cat	Rabbit
Average Brain Weight as a Percent of a Chimp's Brain Weight	60%	35%	7%	2.5%
Average Brain Weight (grams)				

B. In some cases, a chimpanzee's brain weight is less than that of other mammals. Complete the table by finding the average weight of each mammal's brain. In this case, suppose that a chimpanzee's brain weighs 420 grams.

Animal	Dolphin	Human	Giraffe	Bear
Average Brain Weight as a Percent of a Chimp's Brain Weight	375%	350%	162%	119%
Average Brain Weight (grams)				

C. In some cases, a chimpanzee's brain weight is much more than that of other mammals. Complete the table by finding the average weight of each mammal's brain. In this case, suppose that a chimpanzee's brain weighs 450 grams.
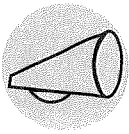
Animal	Opossum	Guinea Pig	Hedgehog	Rat
Average Brain Weight as a Percent of a Chimp's Brain Weight	1.5%	1%	0.8%	0.5%
Average Brain Weight (grams)				

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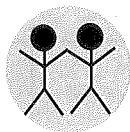# Commissions, Taxes, and Tips
Finding the Percent of a Number

Objectives

In this lesson, you will:
- Use a proportion to find the percent of a number.

Key Terms
- commission

Problem 1

Salespeople are often paid part of their compensation as a commission. A **commission** is a percent of the total dollar amount that a salesperson sells.

A. A salesperson in a large department store receives a 3% commission on his total sales. If he sells a total of $425, how much will he be paid in commission? Find his commission by first finding 1% of 425 and then using that answer to find 3% of 425. Use a complete sentence to write your answer.

B. We can also write 3% as a fraction: $3\% = \dfrac{\boxed{}}{\boxed{}}$.

We can use this fraction as a ratio to write a proportion that represents this situation. In the proportion, we need to compare the part to the whole in both ratios.

$$\frac{\text{part}}{\text{whole}} = \frac{3}{100} \qquad \frac{\text{part}}{\text{whole}} = \frac{x}{425}$$

We can write the proportion $\dfrac{3}{100} = \dfrac{x}{425}$. Solve the proportion to find the commission.

C. Write and solve a proportion to find the salesperson's commission if he sells $550.

D. Write and solve a proportion to find the salesperson's commission if he sells $325.

6

Investigate Problem 1

1. A company who sells math textbooks has six salespeople. The table lists each person's sales for a particular week. Complete the table by finding each salesperson's commission.

Salesperson	Total Sales	Percent Commission	Commission
Mr. Allen	$2588.25	4%	
Ms. White	$2106.50	2%	
Mr. Ramirez	$4555.00	3%	
Ms. Hunt	$6258.20	5%	
Mr. Lee	$3430.75	4%	
Ms. Todd	$1005.80	2%	

Write a complete sentence to explain the method that you used to find the commissions.

2. For some items that you buy, sales tax is added to the price of the item. Sales tax is usually calculated as a percent of the price of the item. In a city, the sales tax is 5%. Write and solve a proportion to find the sales tax on each item.

A CD for $10   A video game for $50

A jacket for $115.20   A movie for $25.60

School supplies for $34.30   Groceries for $78.90

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Problem 2

Many restaurant servers make some of their pay from tips. One rule of thumb is that you should leave 15% of the total bill as a tip. Write and solve a proportion to find the amount of the tip that you should leave. Then complete the restaurant bill.

Bill: $ 25.60	Bill: $ 75.80	Bill: $ 35.98
Tip: $_____	Tip: $_____	Tip: $_____
Total: $_____	Total: $_____	Total: $_____

Investigate Problem 2

1. At a restaurant, you and your friend order a meal that costs $24.00. You leave a 20% tip. The sales tax is 6%. What is the total that you spent at the restaurant?

   Write and solve a proportion to find the tip.

   Write and solve a proportion to find the sales tax.

   Find the total that you spent at the restaurant. Use a complete sentence to explain.

2. We have used two methods to find the percent of a number:

   Find 1% and then multiply the result by the percent to find the answer.

   Write and solve a proportion.

   Use either method to find the indicated percent of each number.

   25% of 72   35% of 90

   19% of 400   140% of 60

   250% of 32   12% of 252,020

6

6

Find It on the Fifth Floor
Finding One Whole, or 100%

Objectives

In this lesson, you will:
- Use a proportion to find a number that corresponds to 100%.

Key Terms
- discount
- markup

Problem 1

An accountant is reviewing a department store's financial statements. However, some of the information is missing from the files. She needs to determine the dollar amount of each employee's total sales based on the employee's bonus. Each employee's bonus is a percent of his or her total sales. Employee names, bonus percents, and bonus amounts are listed in the table. Help the accountant by determining each employee's total sales that result in the bonus amount.

Employee Name	Bonus Percent	Bonus Amount	Total Sales
Kiesha	18%	$540	
Tonya	21%	$768	
Ruth	15%	$650	
Mario	10%	$325	
Joseph	23%	$678	

A. Work with your partner to find Kiesha's total sales. Determine what 1% of the total sales would be by dividing the bonus amount by the bonus percent (in percent form) and then find the total sales by multiplying by 100.

B. Check your answer to Part (A) by writing a proportion. Then solve the proportion to find Kiesha's total sales. Enter Kiesha's total sales in the table.

$$\frac{part}{whole} = \frac{18}{100} \qquad \frac{part}{whole} = \frac{540}{x}$$

Complete the proportion: $\dfrac{\boxed{}}{100} = \dfrac{\boxed{}}{x}$

C. Use either method to complete the table. Show your work below.

6

Investigate Problem 1

1. A manager at the department store keeps track of "points" for each employee. Employees earn points by being on time for work and for keeping the department neat. On a particular day, he gives "smile" points for each time that the employee smiles at a customer. He recorded the smile points that each employee should receive, along with the percent of total points that smile points represented. He had a problem with his computer, though, and the column with the employees' total points was erased. Now he needs to find the total points that each employee has earned. Use proportions to help the manager complete the table.

Employee Name	Smile Points	Percent of Total Points	Total Points
Garrett	15	5%	
Ricardo	26	8%	
Brent	6	2%	
Lin	21	6%	
Danielle	45	12%	

Problem 2

In selling, a decrease in the price of an item is called a **discount.** When the price of an item is increased, the increase is called a **markup.** The department store recently had a big sale where the prices of items were marked 25% off of the regular price.

Now that the sale is over, Tremain needs to mark each of the items back up to its original price. The items and their sale prices are listed in the table. Write and solve a proportion to find the original price for each item. Show your work at the left. The first item is done for you.

Item	Sale Price	Original Price
Shirt	$24.00	$32
Pants	$36.00	
Sweater	$59.95	
Suit	$299.00	
Sports coat	$159.95	

$$\text{Shirt} = \frac{\text{part}}{\text{whole}} = \frac{75}{100} \quad \frac{\text{part}}{\text{whole}} = \frac{24}{x}$$

$$\frac{75}{100} = \frac{24}{x}$$
$$75x = 2400$$
$$x = 32$$

A. If the sale price was 25% off of the original price, what percent of the original price is the sale price? Use complete sentences to explain your answer.

6

Investigate Problem 2

1. The department store realizes it isn't making enough money.
   The store manager decides to mark up prices by 20%.
   All of the tags still have the lower original price on them.
   Find the new price for each item.

Item	Original Price	New Price
Shirts	$22.00	
Pants	$29.00	
Shoes	$65.00	
Jackets	$50.00	

2. The department store orders toasters from a company that
   produces three different models of toasters. The company has
   found that the percent of each shipment that is defective differs
   by model. Model A's defect rate is 2.5%, Model B's defect rate
   is 1.75%, and Model C's defect rate is 3.2%.

   On a particular shipment, the company forgets to mark the
   total shipped of each model. You only know that you received
   5 defective Model A toasters, 7 defective Model B toasters, and
   16 defective Model C toasters. How many of each model was
   shipped? You can determine the shipment numbers based on
   the number of defective toasters and the rate for each model.
   Show all of your work at the left.

3. The Music Department of the department store sold 12 jazz CDs
   last month. Jazz sales during that month made up 2% of the
   Music Department's total sales. Using a proportion, find the
   number of CDs that the store sold during that month.

   Suppose that the store sells 14 jazz CDs during the next month
   and the percent of sales from jazz CDs is still 2%. What is the
   total number of CDs that the store will sell?

4. Solve the problem: 25 is 10% of what number?

   You know that 38% of a number is 342. What is the number?

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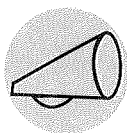
It's Your Money

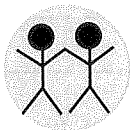## Finding Percents Given Two Numbers

Objectives

In this lesson, you will:
- Use a proportion to find percent, given two numbers.
- Find simple interest.

Key Terms

- principal
- simple interest

Problem 1

In order to make a budget, you keep a record of your expenses for a month. You want to make a circle graph of the information so that you can see where your money is going. The table shows the amounts that you spent in each category.

Expense	Amount	Percent of Income
Bus fare	$25	
Lunch at school	$35	
Clothes and shoes	$30	
CDs	$20	
Movie tickets	$15	
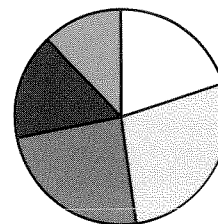
A. Your total income from your part-time job is $125 for the month. For each expense, work with your partner to find the percent of your income that the expense represents using two methods.

The first method is to determine the number that 1% of the income would be and then find how many 1%s there are in each expense. For the "Bus fare" expense you have:

1% of the income: $\frac{1}{100}(125) = \frac{1}{100} = 1.25$

Number of 1%s in bus fare: $\frac{25}{1.25} = \boxed{}$

B. The second method is to write and solve a proportion. Solve the proportion to find the percent of income that the expense represents. For the "Bus fare" expense you have:

$\frac{part}{whole} = \frac{x}{100}$ $\frac{part}{whole} = \frac{25}{125}$

Complete and solve the proportion: $\frac{x}{100} = \frac{\boxed{}}{\boxed{}}$

Enter the percent in the table. Complete the table by finding the percent for each expense. Then enter each expense in the correct place in the circle graph.

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Investigate Problem 1
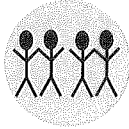
1. You make $150 a month at your part-time job. You want to start saving money to put in a savings account. At the end of the month, you put what money you have left into your savings account. Complete the table below to find what percent of your income you are saving and what percent of your income you are spending.

Expense	Amount	Percent of Income
Lunch	$30	
Bus fare	$15	
Shopping	$50	
Movies	$20	
Saved	$35	

2. Three friends are trying to determine which of them is getting the best percent of return on their investment. Each person's total investment and his or her return are listed in the table. Complete the table by calculating the percent returns. Use either method to find the percents.

Person	Total Investment	Total Return	Percent Return
Jefferson	$25,000	$450	
Kate	$22,500	$425	
Liam	$32,000	$525	

Problem 2

At a bank, interest is an amount paid by the bank for using your money. The **principal** is the amount of money that you deposit into the bank. **Simple interest** is when interest is paid only as a percent of the principal. To find simple interest, find the product of the principal, the annual interest rate (written as a decimal), and the time in years that the money is in the bank.

Find the amount of simple interest earned for the deposit.

Principal: $300   Time: 15 years

Annual interest rate: 3%   Annual interest rate
                                    as a decimal: 0.03

Simple Interest = (Principal)(Annual interest rate)(Time in years)

= (_____)(_____)(_____)

= _____

6

Investigate Problem 2

1. Gavin and Susanna have bank accounts at different banks. Gavin's bank has an annual interest rate of 0.04. Susanna's bank has an annual interest rate of 0.03. They want to know whose simple interest will be higher in 5 years. Given the principal for each, find the simple interest for Gavin and Susanna.

Name	Principal	Simple Interest
Gavin	$325	
Susanna	$440	

    Who will have the higher simple interest in 10 years?

    Who will have the higher simple interest in 15 years?

    Find the simple interest after 5 years if Gavin and Susanna's annual interest rates were switched. Who will have the higher simple interest?

2. Join your group with another. Compare your answers to Question 1. Be sure that if you have any answers on which you do not agree, you work together to find out why.

3. The number 40 is what percent of 200?

    The number 45 is what percent of 180?

    What percent of 250 is 135?

    What percent of 120 is 240?

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6.6

So You Want to Buy a Car
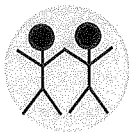## Percent Increase and Percent Decrease

Objectives

In this lesson, you will:
- Find the percent of increase of a quantity.
- Find the percent of decrease of a quantity.

Key Terms
- percent increase
- percent decrease

As we have discovered so far in Chapter 6, percents are used in many different situations in daily life including salaries, bonuses, commissions, tips, sales tax, discounts, interest on loans and savings, investment returns, and many others. Many of these can be classified as representing either a *percent increase* or a *percent decrease*.

Problem 1

You can describe a change in quantities using a percent of change. A **percent increase** occurs when a new amount of a quantity is greater than the original amount, such as real estate values that increase by 12% per year. A **percent decrease** occurs when a new amount of a quantity is less than the original amount, such as the value of a car decreasing at 10% per year.

A. You are saving to buy a car. You have a savings account that earns simple interest at a rate of 2.5% per year. This means that for every $100 in the savings account, the bank puts an additional $2.50 into your account at the end of the year. How much interest would you receive in one year if you start with $4000 in your savings account? Work with your partner to find the answer. Show your work below.

B. What is the total amount of money in the account after the interest is added?

C. You can find the percent increase in the amount of money in your savings account. The percent increase is the ratio:

$$\text{percent increase} = \frac{\text{amount of increase}}{\text{original amount}}$$

Complete the ratio to find the percent increase in the amount of money in your savings account after one year if you deposit $5000 at the beginning of the year and have $5150 in the account at the end of the year. Write the ratio as a decimal and then as a percent.

$$\text{percent increase} = \frac{\text{amount of increase}}{\text{original amount}} = \frac{5150 - \boxed{}}{5000} = \frac{\boxed{}}{\boxed{}}$$

$$= \boxed{} = \boxed{}\%$$

6

Investigate Problem 1

1. A car dealer advertises a sale on one of last year's models. The original price is $13,000 and the sale price is $10,400. The salesperson is having difficulty determining the discount. Work with your partner to find the discount. Show your work. Write your answer as a complete sentence.

 $13,000 – $10,400 = _____

   Use a ratio to find the percent decrease in the price of the car.

   $$\text{percent decrease} = \frac{\text{amount of decrease}}{\text{original amount}} = \frac{\boxed{} - \boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

   $$= \boxed{} = \boxed{}\%$$

2. The average price of a gallon of gasoline has changed dramatically since 1940. The table shows the average price for a gallon of gasoline for different 10-year periods. Complete the table by finding the amount of increase and the percent increase from one 10-year period to the next. Show your work at the right.

10-year Period	Price per Gallon		Amount of Increase	Percent Increase
1940	$0.18			
1950	$0.27			
1960	$0.31			
1970	$0.36			
1980	$1.22			
1990	$1.22			
2000	$1.56			

3. During which 10-year period was the percent increase the greatest? Write your answer using a complete sentence.

4. Form a group with another partner team. Compare your answers to Questions 2 and 3. Be sure that if you have any answers on which you do not agree, you work together to find out why.

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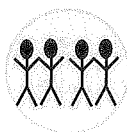
5. You decide to purchase a few accessories for your car. The table below lists a number of items, each item's retail price, and each item's sale price. Complete the table by finding the amount of decrease and the percent decrease (discount) of each item. Show your work below.

Item	Retail Price	Sale Price	Amount of Decrease	Discount
Floor mats	$45.00	$38.70		
Seat covers	$36.70	$33.03		
Travel mug	$15.00	$11.25		
Car emergency kit	$89.80	$76.33		
Car cover	$159.80	$111.86		

6. You consider getting a loan to buy a car. The monthly payment amounts for two different loans for three different cars are shown below.

Car	Payments for a 36-month Loan	Payments for a 48-month Loan
Car 1 (new, $18,000)	$582	$448
Car 2 (new, $13,000)	$420	$324
Car 3 (used, $10,000)	$326	$253

What is the percent increase in the monthly payment amount if you buy Car 1 at 36 months instead of Car 3 at 48 months? Use one decimal place in your answer.

What is the percent decrease in the monthly payment amount if you buy Car 2 at 48 months instead of Car 2 at 36 months? Use one decimal place in your answer.

7. For each set of numbers, find the percent of change. Is the percent change a percent increase or a percent decrease?

original: 25   original: 80   original: 120

new: 5   new: 56   new: 240

6

6

Looking Back at Chapter 6

Key Terms

percent   p. 169
benchmark percent   p. 174
commission   p. 177

discount   p. 182
markup   p. 182
principal   p. 186

simple interest   p. 186
percent increase   p. 189
percent decrease   p. 189

Summary

Writing Percents as Fractions (p. 169)

To write a percent as a fraction, write the percent as a ratio with a denominator of 100. Then simplify the fraction, if possible.

Examples $23\% = \dfrac{23}{100}$ $75\% = \dfrac{75}{100} = \dfrac{3}{4}$ $56\% = \dfrac{56}{100} = \dfrac{14}{25}$

Writing Percents as Decimals (p. 169)

To write a percent as a decimal, first write the percent as a fraction with a denominator of 100. Then write the fraction as a decimal.

Examples $46\% = \dfrac{46}{100} = 0.46$ $87\% = \dfrac{87}{100} = 0.87$ $3\% = \dfrac{3}{100} = 0.03$

Writing Decimals as Percents (p. 170)

To write a decimal as a percent, write the decimal as a fraction with a denominator of 100. Then write the fraction as a percent.

Examples $0.82 = \dfrac{82}{100} = 82\%$ $0.49 = \dfrac{49}{100} = 49\%$ $0.307 = \dfrac{30.7}{100} = 30.7\%$

Writing Fractions as Percents (p. 170)

To write a fraction as a percent, first write the fraction with a denominator of 100. Then write the fraction as a percent. We can also write the fraction as a decimal and then as a percent.

Examples $\dfrac{5}{25} = \dfrac{20}{100} = 20\%$ $\dfrac{6}{15} = 0.4 = 40\%$

Using Benchmark Percents to Find the Percent of a Number (p. 174)

To find the percent of a number using a benchmark percent, first write the benchmark percent (1%, 10%, etc.) as a fraction and multiply the fraction by the given number. Then multiply the result by the percent you want to find, written as a whole number.

Example   To find 25% of 340, first find 1% of 340 by writing 1% as a fraction and multiplying the result by 340.

$$1\% = \dfrac{1}{100} \qquad \dfrac{1}{100} \times \dfrac{340}{1} = \dfrac{340}{100} = 3.4$$

To find 25% of 340, multiply 1% of 340, which is 3.4, by 25.

$$3.4 \times 25 = 85$$

6

Using a Proportion to Find the Percent of a Number (p. 177)

To find the percent of a number using a proportion, first write the percent as a fraction with a denominator of 100. Next, write a ratio that compares the percent of the number to the whole number. Finally, write and solve a proportion that uses ratios that compare the parts to the wholes.

Examples

To find the number that is 6% of 750, write and solve a proportion that uses ratios that compare the parts to the wholes.

$$6\% = \frac{6}{100} \qquad\qquad \frac{6}{100} = \frac{x}{750}$$

$$x = 45$$

A salesperson earns a 5% commission on an item that she sold for $225. How much does she earn on the item? Write and solve a proportion that uses ratios that compare the parts to the wholes.

$$5\% = \frac{5}{100} \qquad\qquad \frac{5}{100} = \frac{x}{225}$$

$$x = 11.25$$

Finding a Discounted Price (p. 182)

To find the price for an item that has been discounted, first write the discount percent as a fraction. Then write and solve a proportion that uses ratios that compare the parts to the wholes.

Example

A sweater's original price is $35. The sale price is 20% off of the original price. What percent of the original price is the sale price? What is the sale price of the sweater?

Because the sale price is 20% off, the sale price is 80% of the original price.

$$\frac{80}{100} = \frac{x}{35}$$

$$100x = 2800$$

$$x = 28$$

The sale price of the sweater is $28.

Finding the Markup (p. 183)

To find the price for an item that has been marked up, first write the markup percent as a fraction. Then write and solve a proportion that uses ratios that compare the parts to the wholes.

Example

A department store buys hair dryers at a cost of $4 each. The store then marks up the cost by 25%. What percent of the original price is the markup price?

What is the markup price of a hair dryer?

Because the markup price will be 25% more than the original price, the markup price is 125% of the original price.

$$\frac{125}{100} = \frac{x}{4}$$

$$100x = 500$$

$$x = 5$$

The markup price of a hair dryer is $5.

Finding Percents Given Two Numbers (p. 185)

To answer the question, "The number a is what percent of b?" first find 1% of a. Then, find how many 1%s are in b. Or, you can write and solve the proportion $\frac{x}{100} = \frac{a}{b}$, where x is the percent written as a whole number.

Example

To answer the question, "The number 42 is what percent of 600?" find 1% of 600, then find how many 1%s are in 42.

$$1\% \text{ of } 600 = \frac{1}{100} \times 600 = \frac{600}{100} = 6$$

Because $42 \div 6 = 7$, the number 42 is 7% of 600.

Example

To find the answer to the question, "The number 42 is what percent of 600?" you can write and solve a proportion.

$$\frac{x}{100} = \frac{42}{600}$$

$$600x = 4200$$

$$x = 7$$

So, the number 42 is 7% of 600.

Finding Simple Interest (p. 186)

To find the simple interest paid by a bank, find the product of the principal, the annual interest rate (written as a decimal), and the time in years that the money is in the bank.

Example

You deposit $500 into an account for 3 years that pays 2% annual interest. How much interest does the account earn?

Simple interest = $(500)(0.02)(3) = 30$

The account earned $30 in simple interest.

Finding a Percent Increase (p. 189)

To find a percent increase, use the following ratio.

$$\text{percent increase} = \frac{\text{amount of increase}}{\text{original amount}}$$

Example

You are saving money to buy a stereo. Last month you had $200 in your bank account. This month you have $230 in your account. The percent increase in the amount of your bank account is $(230 - 200) \div 200 = 0.15 = 15\%$.

Finding a Percent Decrease (p. 190)

To find a percent decrease, use the following ratio.

$$\text{percent decrease} = \frac{\text{amount of decrease}}{\text{original amount}}$$

Example

The stereo you want to buy is on sale. The original price was $270. The sale price is $225. The percent decrease in the price of the stereo, rounded to the nearest tenth of a percent, is $(270 - 225) \div 270 \approx 0.167 = 16.7\%$.

Looking Ahead to Chapter 7

7

Focus   In Chapter 7, you will work with integers. You will add, subtract, multiply, and divide integers. You will also work with number lines, absolute value, and scientific notation.

Chapter Warm-up

Answer these questions to help you review skills that you will need in Chapter 7.

Use mental math to find the product or quotient.

1. 3×9

2. 6×7

3. 5×8

4. $38 \div 2$

5. $45 \div 9$

6. $18 \div 6$

Write the prime factorization of the number.

7. 48

8. 64

9. 56

Read the problem scenario below.

Perry got 93 out of 100 problems correct on his math test. About half of the class scored above 82%.

10. What percent did Perry get on his math test?

11. Was his percent higher or lower than 82%? By how much was his percent higher or lower than 82%?

Key Terms

integer　p. 199
negative integer　p. 199
positive integer　p. 199
number line　p. 199
profit　p. 201
loss　p. 201
sum　p. 204

integer addition　p. 206
difference　p. 209
integer subtraction　p. 210
product　p. 211
quotient　p. 213
absolute value　p. 215
opposites　p. 217

additive inverse　p. 217
power　p. 219
exponent　p. 219
power of ten　p. 219
expanded form　p. 219
scientific notation　p. 223
negative exponent　p. 224