

# 7.1 Percents and Fractions

**Objective:** Use a fraction to find the percent of a number.

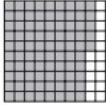
A \_\_\_\_\_ is a ratio whose denominator is 100. The symbol for percent is %.

**Writing Percents**

**Words** In the area model shown, 85 of the 100 squares are shaded. You can say that 85 percent of the squares are shaded.

**Numbers**  $\frac{85}{100} = 85\%$

**Algebra**  $\frac{p}{100} = p\%$



## Example 1: Writing Percents as Fractions, Fractions as Percents

Write the percents as fractions in simplest form.

1. 31%

2. 60%

3. 73%

4. 40%

Write the fractions as percents.

1.  $\frac{3}{10}$

2.  $\frac{4}{5}$

3.  $\frac{4}{25}$

4.  $\frac{9}{10}$

## Example 2: Writing Probability as a Percent

A computer randomly generates an integer from 1 to 10. Find the probability of the given event. Write your answer as a percent.

1. P(8)

2. P(2)

3. P(prime number)

A standard number cube is rolled. Find the probability of the given event.

1.  $P(\text{even number})$
2.  $P(\text{greater than } 3)$
3.  $P(7)$

### Example 3: Finding a Percent of a Number

In a survey of 85 people, 20% of them said they usually eat crackers with soup. How many people in the survey said they usually eat crackers with soup?

Find the percent of the number.

1. 30% of 80
2. 60% of 105

## 7.2 Percents and Proportions

**Objective:** Use proportions to solve percent problems.

### **Solving Percent Problems**

You can represent “ $a$  is  $p$  percent of  $b$ ” using the proportion

$$\frac{a}{b} = \frac{p}{100}$$

where  $a$  is a part of the base  $b$  and  $p\%$ , or  $\frac{p}{100}$ , is the percent.

### Example 1: Finding a Percent

1. What percent of 35 is 14?                      2. What percent of 56 is 14?

3. What percent of 80 is 30?                      4. What percent of 30 is 27?

5. What percent of 72 is 54?                      6. What percent of 125 is 98?

7. What percent of 80 is 40?                      8. What percent of 35 is 7?

### Example 2: Finding a Part of a Base

1. What number is 15% of 300?                      2. What number is 62% of 200?

3. What number is 24% of 200?

4. What number is 18% of 50?

**Example 3: Finding a Base**

1. You receive 189 votes, or 45% of the votes in the student council election. How many students voted?

2. 117 is 78% of what number?

3. In a heptathlon, an athlete earns points in seven track-and-field events. Suppose an athlete earns 836 points in the 100 meter hurdles. This score makes up 16% of the total score. What is the total score?

4. 105 is 84% of what number?

## 7.3 Percents and Decimals

**Objective:** Use decimals to solve percent problems.

### Percents and Decimals

- To write a decimal as a percent, move the decimal point two places to the  and .
- To write a percent as a decimal, move the decimal point two places to the  and .

### Example 1: Writing Decimals as Percents

Write the number as a percent.

1. 0.17

2. 2

3. 3.2

4. 0.54

5. 4

6. 0.4

7. 1.75

8. 0.03

### Example 2: Writing Percents as Decimals

Write the percent as a decimal.

1. 63%

2. 0.7%

3. 129%

4. 3%

5. 41%

6. 147%

7. 9%

8. 12.5%

### Example 3: Writing Fractions as Percents

Write the fraction as a percent.

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

2.  $\frac{7}{4}$

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

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

5.  $\frac{8}{9}$

6.  $\frac{11}{5}$

7.  $\frac{3}{4}$

8.  $\frac{13}{6}$

### Example 3: Writing Fractions as Percents

In a survey of 1300 adults, 18% said the day they dread the most is Monday. How many adults chose Monday?

Find the percent of the number.

1. 25% of 76

2. 110% of 65

3. 0.7% of 500

1. 20% of 85

2. 3.8% of 45

3. 125% of 64

## 7.4 The Percent Equation

**Objective:** Use equations to solve percent problems.

### **The Percent Equation**

You can represent “ $a$  is  $p$  percent of  $b$ ” using the equation

$$a = p\% \cdot b$$

where  $a$  is a part of the base  $b$  and  $p\%$  is the percent.

### Example 1: Finding a Part of a Base

In a newspaper's survey, 1100 adults were asked to name their favorite condiment. The most frequent response was ketchup, which was given by 47% of adults. How many adults chose ketchup?

Use the percent equation to answer the question.

1. What number is 15% of 60?
2. What number is 76% of 105?
3. What number is 16% of 75?
4. What number is 89% of 110?

### Example 2: Find a Commission

1. A sales person earns 5.5% commission on every car sold. The sales person sells a car for \$41,200. What is the commission?

What would the commission be if the sales person sold a car for \$45,000?

2. A car salesman earns 6.5% commission on every car sold. The salesman sells a car for \$21,800. What is the commission?

Find the commission if the car is sold for \$23,000.

### Example 3: Find a Percent

1. What percent of 24 is 84?
2. What percent of 15 is 21?
3. What percent of 72 is 45?
4. What percent of 25 is 60?
5. What percent of 48 is 45?
6. 2.7 is 7.5% of what number?
7. 33 is 30% of what number?
8. 90 is 37.5% of what number?

### Example 4: Finding a Base

1. Your friend paid \$48 for a ticket to a professional football game. This amount was 64% of the total amount your friend spent at the game. How much money did your friend spend?
2. Your friend paid \$9 for a movie ticket. This amount was 72% of the total amount your friend spent at the theater. How much money did your friend spend?



# 7.5 Percent of Change

**Objective:** Find a percent of change in a quantity.

A \_\_\_\_\_ indicates how much a quantity increases or decreases with respect to the original amount.

The \_\_\_\_\_ in a quantity when the new amount of the quantity is greater than the original amount.

The \_\_\_\_\_ in a quantity when the new amount of the quantity is less than the original amount.

**Percent of Change**

The percent of change is the ratio of the amount of increase or decrease to the original amount.

$$\text{Percent of change, } p\% = \frac{\text{Amount of increase or decrease}}{\text{Original amount}}$$

## Example 1: Finding a Percent of Increase

A school had 720 students enrolled last year. This year, 745 students are enrolled. By about what percent did they number of students change from last year to this year?

## Example 2: Finding a Percent of Decrease

Determine whether the change is increase or decrease. Then find the percent of increase or decrease.

1. Original: 576  
New: 216

\_\_\_\_\_  
\_\_\_\_\_

2. Original: 512  
New: 320

\_\_\_\_\_  
\_\_\_\_\_

3. Original: 20  
New: 15

\_\_\_\_\_  
\_\_\_\_\_

4. Original: 35  
New: 75

\_\_\_\_\_  
\_\_\_\_\_

5. Original: 102  
New: 51

\_\_\_\_\_  
\_\_\_\_\_

6. Original: 25  
New: 31

\_\_\_\_\_  
\_\_\_\_\_

### Example 3: Using a Percent of Increase

1. A professional baseball team announces that the average ticket price to one of their games will be 8% more than last year. If the average of a ticket was \$12 last year, how much will the average ticket cost this year?

2. There were about 198,000 spectators at an action sports event in 1995. The number of spectators increased by about 12% from 1995 to 2002. About how many spectators were there in 2002?

### Example 4: Finding a New Amount

In 1990, the average price per pound of light chunk tuna was \$2.11. By 2001, the average price per pound had decreased by 7.1%. What was the average price per pound in 2001?

Find the new amount.

1. Increase 54 by 25%

2. Decrease 78 by 40%

3. Decrease 85 by 28%

4. Increase 45 by 20%

5. Increase 25 by 24%

6. Increase 120 by 75%

7. Decrease 35 by 60%

8. Decrease 72 by 65%

## 7.6 Percent Applications

**Objective:** Find markups, discounts, sales tax, and tips.

An increase from the wholesale price of an item to the retail price is a \_\_\_\_\_.

A decrease from the original price of an item to the sale price is a \_\_\_\_\_.

### Example 1: Finding a Retail Price

1. A store buys decorative pillows from a manufacturer for \$2 each. The store marks up the price by 400%. What is the retail price?

Use the given information to find the new price.

2. Wholesale Price: \$7

Markup Percent: 150%

3. Wholesale price: \$13

Markup Percent: 110%

4. Wholesale Price: \$34

Markup Percent: 125%

5. Wholesale price: \$125

Markup Percent: 50%

### Example 2: Finding a Sale Price

1. You buy a backpack that is on sale for 25% off the original price of \$20. What is the sale price?

Use the given information to find the new price.

2. Original Price: \$15

Discount Percent: 40%

3. Original Price: \$42

Discount Percent: 25%

### Example 3: Using Sales Tax and Tips

1. You order pizza to be delivered. The bill is \$18. You give the delivery person a 15% tip. The sales tax is 5%. What is the total cost of the pizza?
2. The bill for your restaurant meal is \$22. You leave a 15% tip. The sales tax is 6%. What is the total cost of your meal?

Use the given information to find the total cost.

- |                         |                         |
|-------------------------|-------------------------|
| 3. Original Price: \$25 | 4. Original price: \$11 |
| Sales Tax: 5%           | Sales Tax: 6%           |
| Tip: 15%                | Tip: 15%                |

### Example 4: Finding an Original Amount

1. A store marks up the wholesale price of a blender by 125%. The retail price is \$30. What is the wholesale price?
2. A furniture store discounts the price of a desk lamp by 25%. The sale price is \$150. What is the original price?

Use the given information to find the original price.

- |                       |                       |
|-----------------------|-----------------------|
| 3. Retail Price: \$50 | 4. Sale Price: \$210  |
| Markup Percent: 90%   | Discount Percent: 30% |

## 7.7 Simple and Compound Interest

**Objective:** Calculate interest earned and account balances.

\_\_\_\_\_ is the amount earned or paid for the use of money.

The amount of money deposited or borrowed is the \_\_\_\_\_.

Interest that is earned or paid only on the principal is called \_\_\_\_\_.

The percent of the principal earned or paid per year is the \_\_\_\_\_.

The \_\_\_\_\_  $A$  of an account that earns simple annual interest is the sum of the principal  $P$  and the interest  $Prt$ . In symbols this means

### Simple Interest Formula

Simple interest  $I$  is given by the formula

$$I = Prt$$

where  $P$  is the principal,  $r$  is the annual interest rate (written as a decimal), and  $t$  is the time in years.

### Example 1: Finding Simple Interest

1. A \$2000 bond earns 3% simple interest per year on its purchase price. Find the interest earned after 5 years and the balance of the account.
  
  
  
  
  
  
  
  
  
  
2. If a \$1500 bond earns 4% simple interest per year on its purchase price, how much will it earn in interest after 2 years? What is the total balance of the account?

For an account that earns simple annual interest, find the interest and balance of the account.

3.  $P = \$500$ ,  $r = 7\%$ ,  $t = 4$  years

4.  $P = \$2500$ ,  $r = 3\%$ ,  $t = 9$  months

### Example 2: Finding an Interest Rate

1. You deposit \$900 into an account that earns simple annual interest. After 8 months, the balance is \$913.20. Find the annual interest rate.
2. Suppose you save \$1400 of your pay and deposit it into an account that earns 2% interest. The balance reaches \$1421. Find the amount of time needed to reach this balance.

Find the unknown quantity for an account that earns simple annual interest.

3.  $P = \$1000$ ,  $r = 2.5\%$ ,  $t = 2$  years

4.  $A = \$1424.50$ ,  $r = 3.5\%$ ,  $t = 6$  months

5.  $A = \$563$ ,  $P = \$500$ ,  $t = 7$  years

6.  $A = \$1670$ ,  $P = \$1600$ ,  $r = 3.5\%$