

Section 11.1 Percents

Percent	Fraction	Decimal
20%	$\frac{2}{10}$	$\underline{.20}$

Which test had a higher score?

Test Chapter 15 16 out of 20 $\cdot 80$

Test Chapter 12 35 out of 46 $\cdot 76$

Change a fraction to a percent.

$$\frac{6}{8} \quad \text{Divide } \underline{.75} \quad 75\%$$

Change a decimal to a percent.

$$\underline{0.62} \quad 62\%$$

Change a percent to a decimal.

$$\underline{8\%} \quad .08$$

EXAMPLE 4 *How Old Is Old?*

A Yahoo! Question of the Week asked, "At what age do you consider someone old?" Out of the 3496 people who responded, 1017 said age 80 is old. What percent of respondents believe that age 80 is old?

What % of ^{whole} respond is part

$$X \cdot 3496 = 1017$$

$$\frac{1017}{3496} = .29$$

29%

EXAMPLE 5 *Cherry Production*

According to the U.S. Department of Agriculture, in 2005 the United States produced about 244 million pounds of cherries. Of these cherries, 190 million pounds were produced in Michigan, 19 million pounds were produced in Utah, 18 million pounds were produced in Washington, and 17 million pounds were produced in other states. Determine the percent of cherries produced in each of the following: Michigan, Utah, Washington, and other states.

↓

$$X \cdot 244 = 190$$

$$\frac{190}{244}$$

77.9%

$$X \cdot 244 = 19$$

$$\frac{19}{244}$$

$$\text{Percent change} = \frac{\begin{matrix} \text{new} \\ \text{closest to current} \end{matrix} \left(\begin{matrix} \text{amount in} \\ \text{latest period} \end{matrix} \right) - \begin{matrix} \text{oldest} \\ \text{amount in} \end{matrix} \left(\begin{matrix} \text{amount in} \\ \text{previous period} \end{matrix} \right)}{\begin{matrix} \text{amount in previous period} \\ \text{oldest} \end{matrix}} \times 100$$

EXAMPLE 6 *Baseball Record*

In 2005, the major league baseball team with the most improved record for winning games was the Arizona Diamondbacks. In 2004, the Diamondbacks won 51 games. In 2005, the Diamondbacks won 77 games. Find the percent increase in the number of games won by the Diamondbacks from 2004 to 2005.

$$\frac{(77 - 51)}{51} \times 100 = 51\%$$

EXAMPLE 7 *Labor Union Membership*

There were approximately 15.7 million labor union members in the United States in 2005. This number is down from approximately 16.3 million labor union members in 2001 (see the bar graph in the margin). Determine the percent change in labor union membership from 2001 to 2005.

$$\frac{(15.7 - 16.3)}{16.3} \times 100 = -3.7\%$$

$$\text{Percent markup (or markdown) on cost} = \frac{\text{new selling price} - \text{oldest dealer's cost}}{\text{oldest dealer's cost}} \times 100$$

$$\frac{17000 - 10000}{10000}$$

Example 8

Holdren Hardware stores pay \$48.76 for glass fireplace screens. They regularly sell them for \$79.88. At a sale they sell them for \$69.99. Determine

- a) the percent markup on the regular price.
b) the percent markup on the sale price.

$$\text{a) } \frac{79.88 - 48.76}{48.76} \times 100 = 63.8\%$$

$$\text{b) } \frac{69.99 - 48.76}{48.76} \times 100 = 43.6\%$$

Example 9

To help get rid of its remaining 2013 calendars, Cardin's Pharmacy reduces the price to \$4.00. If Cardin's cost per calendar was \$5.00, determine the percent markdown on the calendars.

$$\frac{4 - 5}{5} = \frac{-1}{5} = -20\%$$

Other percent problems

What is a 15% tip on a restaurant bill of \$24.66?

$$x = .15 \cdot 24.66$$

$$x = \$3.70$$

If Nancy Johnson made a sale of \$500 and received a commission of \$25. what percent of the sale is the commission?

$$x \cdot 500 = 25$$

$$x = \frac{25}{500} = .05 \quad 5\%$$

If the price of a jacket was reduced by 25% or \$12.50, what was the original price of the jacket?

What % \cdot whole = part

$$.25 \cdot x = \frac{12.50}{.25}$$

$$x = 50$$

Worksheet 11-1

1. There were approximately 15.7 million labor union members in the SD in 2005. This number is down from approximately 16.3 million members in 2001. Determine the percent change in labor union membership from 2001 to 2005.
2. Aces Hardware stores pay \$48.76 for glass fireplace screens. They regularly sell them for \$79.88. At a sale they sell them for \$69.99. Determine the percent mark up on the regular and sale price.
3. To help get rid of its remaining 2010 calendars, CVS reduces the price to \$4.00. If CVS 's cost per calendar was \$5.00. determine the percent markdown on the calendars.

Example 10

Melissa Bell wishes to buy a house for \$287,000. To obtain a mortgage, she needs to pay 20% of the selling price as a down payment. Determine the amount of Melissa's down payment.

$$\begin{aligned} .20(287,000) &= x \\ &= 57,400 \end{aligned}$$

Example 11

In 2006, Chess Federation (USCF) had about 84,000 members. Of these members, about 11,000 were considered youth members (under the age of 18). What percent of USCF members were youth members?

$$\begin{aligned} x \cdot 84000 &= \frac{11000}{84000} \\ x &= 13.1\% \end{aligned}$$

Example 12

About 337,567,000 or about 31% of India's population is younger than 15 years old. What is the approximate population of India?

$$\begin{aligned} .31 \cdot x &= 337,567,000 \\ x &= 1,088,925,806 \end{aligned}$$

Applied Topics in Math
Worksheet 11.1

Name _____

Set up an equation for each word problem and solve.

1. There were approximately 15.7 million labor union members in the SD in 2005. This number is down from approximately 16.3 million members in 2001. Determine the percent change in labor union membership from 2001 to 2005.

2. Aces Hardware stores pay \$10 for snow roof rakes. They regularly sell them for \$45. At a sale this past weekend, they were selling the rakes for \$40.
 - a) Determine the percent markup on the regular price.

 - b) Determine the percent markup on the weekend sale price.

3. To help get rid of its remaining winter sweaters, Target reduces the price to \$10.00. If the cost per calendar was \$23.00, determine the percent markdown on the sweaters.

4. What is an 18% tip on a restaurant bill of \$58.95?

How much money do you owe overall including the tax and tip? (assume 6.5% sales tax in CT)

How much would each of you contribute if you went out to dinner with two friends?

5. If Nikki made a sale of \$400 and received a commission of \$25, what percent of the sale was the commission?

6. If the price of a pair of jeans was reduced by 30% or \$10, what was the original price of the jeans?

7. Sarah wishes to buy a house for \$356,000. To obtain a 30-year mortgage, she needs to pay 15% of the selling price as a down payment. Determine the amount of Sarah's down payment.

8. About 130,423,000, or about 28%, of USA's population is younger than 15 years old. What is the approximate population of USA?

9. A coat is marked down 10%, and the customer has a coupon that reads "take an additional 15% off of all sale items". Does that mean that the customer is getting 25% off of the original price?

10. The regular price of a chair is \$189.99. Determine the sale price if the regular price is reduced by 10% and then this price is reduced by another 25%.
 - a) What would the sale price of the chair be if the chair was 25% off of the original price?

26. *Potassium* The U.S. Department of Agriculture's recommended daily allowance (USRDA) of potassium for adults is 3500 mg. One serving of Cheerios provides 95 mg of potassium. What percent of the USRDA of potassium does one serving of Cheerios provide?

27. *Reduced Fat Milk* One serving of whole milk contains 8 g of fat. Reduced-fat milk contains 41.25% less fat per serving than whole milk. How many grams of fat does one serving of reduced-fat milk contain?

41. *Decreasing Population* In 2000, the population of North Dakota was 642,200. In 2005, the population of North Dakota had decreased to 636,677. Determine the percent decrease in North Dakota's population from 2000 to 2005.
42. *Increasing Population* The population of the United States rose from approximately 248.7 million in 1990 to approximately 298.3 million in 2006. Determine the percent increase in the U.S. population from 1990 to 2006.

ix and Tip According to the Original Tipping Page (www.tipping.org), it is appropriate to tip waiters and waitresses 15–20% of the total restaurant bill, *including the tax*. Mary and Keith's dinner costs \$43.50 before tax, and the tax rate is 6%.

What is the tax on Mary and Keith's dinner?

What is the total bill, including tax, before the tip?

If Mary and Keith decide to tip 15% of the total bill, how much is the tip?

What is the total cost of the dinner including tax and tip?

55. *Percentage of A's* In a mathematics class, eighteen students received an A on the third test, which is 150% of the students who received an A on the second test. How many students received an A on the second test?

56. *Employee Increase* The Fastlock Company hired 57 new employees, which increased its staff by 30%. What was the original number of employees?

59. *Vacuum Cleaner Sales* A Kirby vacuum cleaner dealership sold 430 units in 2006 and 407 units in 2007. Find the percent increase or decrease in the number of units sold.

60. *Vacuum Cleaner Markup* If the Kirby dealership in Exercise 59 pays \$320 for each unit and sells it for \$699, what is the percent markup?