

MATH 1010 ~ Intermediate Algebra

Chapter 2: Linear Equations and Inequalities

Section 2.2: [Linear Equations and Problem Solving](#)

Objectives:

- ◆ Use mathematical modeling to write algebraic equations representing real-life situations.
- ◆ Solve percent problems.
- ◆ Use ratios to compare unit prices for products.
- ◆ Solve proportions.

Which is the better deal?

A 12-pack of soda for \$3.50 or a 2-liter bottle for \$1.29?

Percent Problems $\underline{\quad}$ is $\underline{\quad}\%$ of $\underline{\quad}$
 $=$ (multiplication)

1. $\underbrace{\quad}_x$ is 58% of 800?

$$x = 0.58(800)$$

$$x = 464$$

2. 18 is 2.4 % of what?

$$\frac{18}{0.024} = \frac{0.024x}{0.024}$$

$$750 = x$$

3. 900 is what percent of 500?

$$\frac{900}{500} = \frac{x(500)}{500}$$

$$1.8 = x$$

$$180\% = x$$

EXAMPLE

Write an equation for each problem and solve.

- a) You spent \$748 of your monthly income of \$3400 for rent. What percent of your monthly income is your monthly rent?

$$\underline{748} \text{ is } \underline{x\%} \text{ of } \underline{3400}$$

$$\frac{748}{3400} = \frac{3400x}{3400} \Leftrightarrow x = 0,22 = 22\%$$

- b) The price of soft drinks has gone up 2.5% in the last year. How much would you expect to pay for the 2-liter bottle which was formerly priced at \$1.59?

$$\underline{x} \text{ is } \underline{1025\%} \text{ of } \underline{1.59}$$

$$x = 1025 (1.59)$$

$$x = \$1.63$$

Ratios and Unit prices

Ratio $\frac{a:b}{a:b} = \frac{a}{b}$ "a to b" unitless
comparison of 2 #s; use same units of measure

Examples of ratios: 36 inches to 5 ft.

$$36 \text{ in} : 5 \text{ ft} = \frac{36 \text{ in}}{5 \text{ ft}} = \frac{3 \cancel{\text{ft}}}{5 \cancel{\text{ft}}} = \frac{3}{5}$$

Examples of unit prices: 64 ounces of juice for \$1.29

$$\frac{\$1.29}{64 \text{ oz}} = \$0.02/\text{oz}$$

① EXAMPLE:

Which is a better buy? 10.5 oz package of cookies for \$1.79
or
16 oz package of cookies for \$2.39?

unit price $\frac{\$}{\text{oz}}$

$$\frac{\$ 1.79}{10.5 \text{ oz}} \approx \$ 0.17/\text{oz} \text{ or } 17 \text{¢}/\text{oz}$$

$$\frac{\$ 2.39}{16 \text{ oz}} \approx \$ 0.15/\text{oz}$$

Proportions (an eqn)

A proportion is a statement that equates two ratios.

$$\frac{a}{b} = \frac{c}{d}$$

② EXAMPLES: Solve for x.

$$a) \frac{x}{36} = \left(\frac{6}{7}\right) 36$$

$$x = \frac{6(36)}{7} = \frac{216}{7}$$

$$b) \frac{x-3}{3} = \left(\frac{x+8}{12}\right) 12$$

LCD=12

$$4(x-3) = x+8$$

$$4x-12 = x+8$$

$$\begin{array}{r} -x \\ -x \end{array}$$

$$3x-12 = 8$$

$$\begin{array}{r} +12 \\ +12 \end{array}$$

$$\frac{3x}{3} = \frac{20}{3}$$

$$x = \frac{20}{3}$$

c) Given these similar triangles, find the value of z.

