

Using Ratios to Solve Problems

Ratio is a _____ of two numbers

Ratios can come in several forms. Three common ratios are

- ◆ _____ (4 parts oil to 1 part vinegar)
- ◆ _____ (60 miles per hour)
- ◆ _____ (1 inch = 100 miles)

Writing proportions to solve problems involving ratios

Example: If there are 95 grams of fat in 16 ounces of hamburger, how many ounces of fat are in 3 ounces of hamburger?

Ratio: $\frac{\text{grams fat}}{\text{oz hamburger}}$

Proportion: $\frac{95 \text{ g}}{16 \text{ oz}} = \frac{x \text{ g}}{3 \text{ oz}}$

Cross multiply
Solve

$$\frac{95}{16} = \frac{x}{3}$$

$$95(3) = (x)(16)$$

There are 17.8125 grams of fat in 3 ounces of hamburger.

Reality check: Does this make sense?

IMPORTANT!! Comparisons must stay the same – for example, grams of fat to ounces of hamburger for each ratio.

Example: Peanuts sell for \$0.75 a pound. Rosie has \$0.50. How many pounds of peanuts can she buy?

Ratio: $\frac{\$}{\text{pounds}}$

Proportion: $\frac{\$0.75}{\text{__ pound}} = \frac{\$0.50}{\text{__ pound}}$

Cross multiply
Solve

$$\frac{0.75}{1} = \frac{\$0.50}{x}$$

$$(0.75)(x) = (1)(0.50)$$

Rosie can buy _____ pounds of peanuts.

Reality check: Does this make sense?

Example: A recipe uses 3 cups of grated cheese to make 10 servings. How much cheese is needed to make 6 servings?

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Practice Problems:

1. During the big storm, 29 inches of snow fell in 8 hours. Find the rate of snowfall per hour.
2. To make his special salad dressing, Wolfgang combines 7 oz of oil with 4 oz of vinegar. One day he needed a larger amount so he used 5 oz of vinegar. How much oil did he need?
3. The ratio of height to width for a TV screen is 9 to 16. How high is a screen that is 30 inches wide?
4. A marathon runner ran the first 3 miles in 17.2 minutes. If she continues running at the same pace, how long will it take her to run the entire marathon of 26.2 miles?
5. A map of Yosemite National Park is drawn to scale of 1 inch = 1.44 miles. Tioga Pass is 22.752 miles from Yosemite Falls. How far is it on the map?
6. A flagpole casts a shadow 22 feet long. At the same time, a man 6 feet tall casts a shadow 4 feet long. How tall is the flagpole.

Using Ratios to Solve Problems

Answers for teachers:

Ratio is a Comparison of two numbers

Ratios can come in several forms. Three common ratios are

- ◆ Comparison (4 parts oil to 1 part vinegar)
- ◆ Rate (60 miles per hour)
- ◆ Scale (1 inch = 100 miles)

Writing proportions to solve problems involving ratios

Example: If there are 95 grams of fat in 16 ounces of hamburger, how many ounces of fat are in 3 ounces of hamburger?

Ratio: $\frac{\text{grams fat}}{\text{oz hamburger}}$

Proportion: $\frac{95 \text{ g}}{16 \text{ oz}} = \frac{x \text{ g}}{3 \text{ oz}}$

Cross multiply
Solve

$$\frac{95}{16} = \frac{x}{3}$$
$$95(3) = (x)(16)$$
$$285 = 16x$$
$$17.8125 = x$$

There are 17.8125 grams of fat in 3 ounces of hamburger.

Reality check: Does this make sense?
3 oz is less than $\frac{1}{4}$ of 16 oz; $\frac{1}{4}$ of 95 g is 27 grams, so this is in the ballpark.

IMPORTANT!! Comparisons must stay the same – for example, grams of fat to ounces of hamburger for each ratio.

Example: Peanuts sell for \$0.75 a pound. Rosie has \$0.50. How many pounds of peanuts can she buy?

Ratio: $\frac{\$}{\text{pounds}}$

Proportion: $\frac{\$0.75}{1 \text{ pound}} = \frac{\$0.50}{x \text{ pound}}$

Cross multiply
Solve

$$\frac{0.75}{1} = \frac{\$0.50}{x}$$
$$(0.75)(x) = (1)(0.50)$$
$$.75x = .50$$
$$x = .67$$

Rosie can buy 0.67 pounds of peanuts.
Reality check: Does this make sense?
0.67 is less than a pound but more than $\frac{1}{2}$ a pound; \$0.50 is less than the cost of a pound of peanuts but more than the cost of half a pound.

Example: A recipe uses 3 cups of grated cheese to make 10 servings. How much cheese is needed to make 6 servings?

$$\frac{3 \text{ cups}}{10 \text{ servings}} = \frac{x \text{ cups}}{6 \text{ servings}}$$

$$\frac{3}{10} = \frac{x}{6}$$

$$18 = 10x$$

$$1.8 = x$$

Using Ratios to Solve Problems

Answers to practice problems

NOTE: proportions may be set up in many ways; the answers here show just one way to set up the proportion.

$$1. \quad \frac{29 \text{ in}}{8 \text{ hrs}} = \frac{x \text{ in}}{1 \text{ hr}}$$

$$(29)(1) = 8x$$

$$x = 3.625$$

3.625 in / hr

$$2. \quad \frac{7 \text{ oz oil}}{4 \text{ oz vinegar}} = \frac{x \text{ oz oil}}{5 \text{ oz vinegar}}$$

$$(7)(5) = 4x$$

$$x = 8.75$$

8.75 oz oil

$$3. \quad \frac{9 \text{ height}}{16 \text{ width}} = \frac{x}{30 \text{ wide}}$$

$$9(30) = 16x$$

$$x = 16.875$$

16.875 inches

$$4. \quad \frac{3 \text{ mi}}{17.2 \text{ minutes}} = \frac{26.2 \text{ mi}}{x \text{ minutes}}$$

$$3x = (17.2)(26.2)$$

$$x = 150.21$$

150.21 minutes

$$5. \quad \frac{1 \text{ in}}{1.44 \text{ mi}} = \frac{x \text{ in}}{22.752 \text{ mi}}$$

$$22.752(1) = 1.44x$$

$$x = 15.8$$

15.8 inches on the map

$$6. \quad \frac{6 \text{ man}}{4 \text{ shadow}} = \frac{x \text{ flagpole}}{22 \text{ shadow}}$$

$$(6)(22) = 4x$$

$$x = 33$$

The flagpole is 33 ft high