

Name: _____



Date: _____

Notes

Algebra Section 3.5-3.6

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Goal: “I will find ratios and write and solve proportions”
“I will solve proportions using cross products”

Vocabulary:

Ratio: A way to compare two quantities. It can be written three ways. The order is very important.

3:4 3 to 4 $\frac{3}{4}$

Proportion: An equation that states that two ratios are equivalent

Ratios:

Ex: Derek and his brother decide to combine their CD collections. Derek has 44 CDs and his brother has 52 CDs.

- a) Find the ratio of Derek’s CDs to his brother’s.

44:52 44 to 52 $\frac{44}{52}$

- b) Find the ratio of Derek’s CDs to the entire collection.

44:96 44 to 96 $\frac{44}{96}$

Ex: A volleyball team plays 14 home matches and 10 away matches.

- a) Find the ratio of home matches to away matches.

14:10 14 to 10 $\frac{14}{10}$

- b) Find the ratio of home matches to all matches.

14:24 14 to 24 $\frac{14}{24}$

Ex: At a carwash fund raiser, 18 ninth grade students and 14 tenth grade students worked the first shift.

- a) Find the ratio of ninth grade students to tenth grade students.

18:14 18 to 14 $\frac{18}{14}$

- b) Find the ratio of ninth grade students to all students.

18:32 18 to 32 $\frac{18}{32}$

Proportions:

Example:

$$\frac{3}{8} = \frac{x}{4} \quad \text{Set up an equation by using the Cross Products Property.}$$

$$8x = 12 \quad \text{Solve by dividing each side by 8.}$$

$$x = \frac{12}{8} \quad \text{Simplify} \quad x = 1\frac{1}{2}$$

Try These:

$$\text{Ex: } \frac{w}{35} = \frac{4}{7}$$

$$7w = 140$$

$$w = 20$$

$$\text{Ex: } \frac{z}{54} = \frac{5}{9}$$

$$9z = 270$$

$$z = 30$$

$$\text{Ex: } \frac{9}{2} = \frac{m}{12}$$

$$2m = 108$$

$$m = 54$$

$$\text{Ex: } \frac{m+3}{8} = \frac{40}{64}$$

$$320 = 64(m + 3)$$

$$320 = 64m + 192$$

$$m = 2$$

Ex: A recipe for tomato salsa calls for 30 tomatoes to make 12 pints of salsa. How many tomatoes are needed to make 4 pints?

What are you comparing?

Write that as a ratio.

Set up a proportion to find the missing quantity.

tomatoes and pints of salsa

$$\frac{\text{tomatoes}}{\text{pints}} = \frac{30}{12}$$

$$\frac{\text{tomatoes}}{\text{pints}} = \frac{30}{12} = \frac{x}{4}$$

$$120 = 12x$$

$$x = 10$$

Ex: The elevator that takes passengers from the lobby of the John Hancock Center in Chicago to the observation level travels 150 feet in 5 seconds. The observation level is located on the 94th floor, at 1029 feet above the ground. How long does it take to get from the lobby to the observation deck?

What are you comparing?

Write that as a ratio.

Set up a proportion to find the missing quantity.

feet and seconds

$$\frac{\text{feet}}{\text{seconds}} = \frac{150}{5} = \frac{1029}{x}$$

$$150x = 5145$$

$$x = 34.3$$



Ex: When two full moons occur in the same month, the second full moon is called a “blue moon.” On average, 2 blue moons occur every 5 years. How many are likely to occur in the next 25 years?

What are you comparing? **blue moons and years**

Write that as a ratio.

$$\frac{\text{blue moons}}{\text{years}} = \frac{2}{5} = \frac{x}{25}$$

Set up a proportion to find the missing quantity.

$$5x = 50$$
$$x = 10$$

Cross Products:

Example: $\frac{2}{x} = \frac{5}{x-5}$

Equation: $2(x - 5) = 5x$

Solve: $2x - 10 = 5x$

$$-10 = 3x$$

$$-\frac{10}{3} = x \quad \text{Simplify} \quad -3\frac{1}{3} = x$$

Try These:

Ex: $\frac{4}{x} = \frac{8}{x-3}$

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

$$8x = 4x - 12$$

$$4x = -12$$

$$x = -3$$

Ex: $\frac{3}{x} = \frac{9}{x-4}$

$$9x = 3(x - 4)$$

$$9x = 3x - 12$$

$$6x = -12$$

$$x = -2$$

Vocabulary:

Scale Drawing (or model): Two-dimensional drawing of an object in which the dimensions of the drawing are in proportion to the dimension of the object.

Scale: Relates the drawing's or model's dimensions and the actual dimensions.

Ex: 1 in: 12 feet means:

One inch on a drawing means the dimensions are actually 12 feet.

Ex: A map's scale is 1 cm : 85 km. Using a meter stick, the distance between Cleveland and Cincinnati is about 4.2 cm.

a) How many kilometers apart are they? $\frac{cm}{km} = \frac{1}{85} = \frac{2.4}{x} \quad \frac{1}{85} = \frac{4.2}{x}$

$$x = 357 \text{ KM}$$

a) Use your reference to determine how many miles apart they are. **About 222 miles**