

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Notes

Algebra Section 3.5-3.6

Pages 162-173



**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 94<sup>th</sup> 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?

feet and seconds

Write that as a ratio.

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

Set up a proportion to find the missing quantity.

$$150x = 5145$$

$$x = 34.3$$



**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**