<u>3.5/3.6: Write and Solve Ratios and Proportions</u>

Goals: *Write ratios in simplest form
*Solve proportions using cross-products
*Write and solve proportions from real-world situations

<u>Ratio</u>: a comparison of __two_____ quantities using ___division_________

<u>Proportion</u>: an __equation__________ stating two __ratios____________ are _______equal_______

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.

$\frac{\text{Derek}}{\text{Bro}} = \frac{44}{52} = \frac{11}{13}$ This means that for every 11 CD's Derek has, his brother has 13

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

$\frac{\text{Derek}}{\text{Total}} = \frac{44}{96} = \frac{11}{24}$ This means that for every 24 CD's, Derek has 11 of them

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

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

$$\frac{14}{10} = \frac{7}{5}$$

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

$$\frac{14}{24} = \frac{7}{12}$$

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.

$$\frac{18}{14} = \frac{9}{7}$$

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

$$\frac{18}{32} = \frac{9}{16}$$

Proportion: An equation stating that two rations are equal

To solve a proportion: Cross multiply, then solve like a normal equation.

Solve:

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

$7w = 35(4)$
$7w = 140$
$w = 20$

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

$2m = 9(12)$
$2m = 108$
$m = 54$

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

$9z = 270$
$z = 30$

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

$64(m + 3) = 320$
$64m + 192 = 320$
$64m = 128$
$m = 2$

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?

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

$12x = 120$
$x = 10$ tomatoes

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^{th} floor, at 1029 feet above the ground. How long does it take to get from the lobby to the observation deck?

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

$150x = 5145$
$x = 34.3$ seconds

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?

$$\frac{2}{5} = \frac{x}{25}$$

$50 = 5x$

$x = 10$

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

$4(x - 3) = 8x$
$4x - 12 = 8x$
$-12 = 4x$
$x = -3$

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

$3(x - 4) = 9x$
$3x - 12 = 9x$
$-12 = 6x$
$-2 = x$

<u>Scale Drawing (or model)</u>: A drawing or model in which the dimensions are proportional to the actual object

<u>Scale</u>: relates the object's dimensions to the dimensions or the drawing or model

Ex: 1 in: 12 feet means: 1 inch on a drawing or model means 12 feet on the actual object

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. How many kilometers apart are they?

$$\frac{1}{85} = \frac{4.2}{x}$$

$x = 357$ KM