**Unit 7 #4 Inverse Variation & Density**

In an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the values of the two variables change in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ manner – as one value \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If x decreases, the y value increases. We say that y varies inversely as the value of x.

An **inverse variation** between 2 variables, y and x, is a relationship that is expressed as:

where the variable k is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*\*\*The k value needs to be found using the first set of data.\*\*\*

Example: Find the constant, k.

The number of hours, h, it takes for a block of ice to melt varies inversely as the temperature, t. If it takes 2 hours for a square inch of ice to melt at 65º, find the constant of proportionality.

Start with the formula:

Substitute the values:

Then solve for k:

Example 1: In kick boxing, it is found that the force, f, needed to break a board, varies inversely with the length, l, of the board. If it takes 5 lbs of pressure to break a board 2 feet long, how many pounds of pressure will it take to break a board that is 6 feet long?

1. Set up the formula:
2. Find the missing constant, k, using the first set of data given.
3. Using the formula and constant, k, find the missing value in the problem.

Example 2: In a formula, Z varies inversely as p. If Z is 200 when p = 4, find Z when p = 10.

1. Set up the formula:
2. Find the missing constant, k, using the first set of data given.
3. Using the formula and constant, k, find the missing value in the problem.

Example 3: If x and y vary inversely and x = 1 when y = 11, Example 4: If x and y vary inversely and x = 2.5 when y = 100,

find x when y = 5.5. find x when y = 25.

**Find an equation of variation where y varies inversely as x.**

1. y = 5 when x = 2 2. y = 3 when x = 10

**Solve. Assume y varies inversely as x.**

3. y = 9 when x = 6. 4. y = 4 when x = 6. 5. y = 9 when x = 12.

 Find y when x = 2. Find y when x = 12 Find y when x = 3.

**DENSITY**

The formula for density is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, where d = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, m = \_\_\_\_\_\_\_\_\_\_\_\_\_, and v = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Basic Density Problems:**

1. What is the density of an object with a mass of 120g and a volume of 7mL?
2. What is the volume of 220 grams of an object with a density of 55g/cm3?
3. We have an object with a density of 620g/cm3 and a volume of 75cm3. What is the mass of this object?

**Inverse Variation with Density** \*Hint: solve problems just like inverse variation problems\*

Example 1: The volume, V, of a certain gas varies inversely with the amount of pressure P, placed on it. The volume of this gas is 175 cm3 when 3.2 kg/cm2 of pressure is placed on it. What amount of pressure must be placed on 400 cm3 of this gas?

Practice Problem 1: The volume V of gas varies inversely to the pressure P. The volume of a gas is 200 cm3 under pressure of 32 kg/cm2. What will be its volume under pressure of 40 kg/cm2?

Practice Problem 2: The volume, V, of a gas varies inversely as the pressure, p, in a container. If the volume of a gas is 200cc when the pressure is 1.6 liters per square centimeter, find the volume (to the nearest tenth) when the pressure is 2.8 liters per sq centimeter.