Name_____ Date_____ Period_____

DIRECT, INVERSE AND JOINT VARIATION WORKSHEET

Direct Variation: $y = kx$ **Inverse Variation:** $y = k / x$ **Joint Variation:** $y = kxz$

Combined Variation: Combining any of the three types of variation listed above within a single problem.

Four Steps to Solve a Variation Problem

1. Write the general variation formula for the problem.
2. Use the formula to find the constant of variation, ***k***.
3. Rewrite the formula, including the value of ***k***.
4. Answer the question.

State whether each equation represents a direct, inverse, or joint variation. Name the constant of variation.

1) $y = 2x$ 2) $\frac{x}{5} = y$ 3) $xy = 12$ 4) $D = \frac{3}{4}gh$

Translate each statement into a formula. Use *k* as the constant of variation.

5) E varies jointly as M and the square of V.

6) The volume, V, of a gas varies directly as the temperature, T, and inversely as the pressure P.

7) The mass, M, of a cement block varies jointly as the length, L, width, W, and thickness, T, of the block.

8) P varies directly as the square of V and inversely as R.

Write an equation for each statement. Then, solve the equation.

9) If *y* varies inversely as *x* and $y = 2$ when $x = 8$, find *x* when $y = 14$.

10) Suppose *y* varies jointly with *x* and *z*. If $y = 20$ when $x = 2$ and $z = 5$, find *y* when $x = 14$ and $z = 8$.

11) If *y* varies inversely as *x* and $x = 7$ when $y = 21$, find *y* when $x = 42$.

12) Find *y* when $x = 1.5$, if *y* varies directly as *x* and $y = -16$ when $x = 6$.

Solve the following word problems.

13) The frequency of a vibrating string varies inversely as its length. A string 3 feet long vibrates 175 cycles per second. Find the frequency of a 5 foot string.

14) The force of the wind blowing on a vertical surface varies jointly as the area of the surface and the square of the velocity. If a wind blowing at 50 mph exerts a force of 75 pounds on a surface of 500 ft^2, how much force will a wind of 75 mph place on a surface of 10 ft^2?

15) The volume of a can varies jointly as the height of the can and the square of its radius. A can with an 8 inch height and 4 inch radius has a volume of 402.12 in^3. What is the volume of a can that has a 2 inch radius and a 10 inch height?

16) The time required to process a shipment of goods at Wal-Mart varies directly with the number of items in the shipment and inversely with the number of workers assigned. If 15,000 items can be processed by 8 workers in 10 hours, then how long would it take 12 workers to process 20,000 items?

17) A person's level of fatness is measured using the Body Mass Index, or BMI. A BMI (rounded to the nearest whole number) in the low 20's is desirable. BMI varies directly as a person's weight in pounds and inversely as the square of the person's height in inches. A person who weighs 140 pounds and is 70 inches tall has a BMI of 20. Find the BMI of a person who weighs 165 pounds and is 71 inches tall.

18) Disregarding wind resistance, the distance a body falls from rest varies directly as the square of the time it falls. If a skydiver falls 64 *ft* in 2 seconds, how far will he fall in 10 seconds?

19) Albertson's found that the demand for Coke products varies inversely as the price of the product. When the price of a Coke product is $2.75, the weekly demand is 1250. Find the weekly demand if the price is raised to $4.00.

20) The maximum load of a horizontal beam that is supported at both ends varies jointly as the width and the square of the height and inversely as the length between the supports. A beam 6 m long, 0.1 m wide, and 0.06 m high supports a load of 360 kg. What is the maximum load supported by a beam 16 m long, 0.2 m wide, and 0.08 m high?