Direct, Inverse and Joint Variation

_y_ varies directly as _x_

$$y = kx$$

_y_ increases, _x_ increases

_y_ decreases, _x_ decreases

_y_ varies inversely as _x_

$$y = \frac{k}{x}$$

_y_ increases, _x_ decreases

_y_ decreases, _x_ increases

$$k = \text{constant of variation}$$

_y_ varies jointly as _x_ and _z_

$$y = kxz$$

_y_ varies as the product of two or more quantities

1. _x_ varies directly as _y_. Find _x_ when $y = 24$ and $k = 3$.

2. _A_ varies directly as the square of _B_. Find _A_ when $B = 9$ and $k = \frac{3}{4}$.

3. x varies inversely as y. Find x when $y = 30$ and $k = \dfrac{1}{2}$.

4. x varies jointly as y and z. Find x when $y = 15$, $z = 3$ and $k = \dfrac{2}{3}$.

5. A varies directly as B and inversely as C. Find A when $B = 5$, $C = 20$ and $k = 4$.

6. U varies jointly as V and W and inversely as the square of x. Find U when $V = 6$, $W = 7$, $x = 9$ and $k = \dfrac{3}{2}$.

7. x varies directly as y. If $x = 12$ when $y = 3$, find x when $y = 5$.

8. *A* varies inversely as the square of *P*. If $A = 5$ when $P = 5$, find *A* when $P = 10$.

9. *F* varies jointly as M_1 and M_2 and inversely as *d*. If $F = 30$ when $M_1 = 6$, $M_2 = 10$ and $d = \dfrac{2}{5}$, find *F* when $M_1 = 12$, $M_2 = 20$ and $d = \dfrac{4}{5}$.

10. The recommended dosage of a certain medication is directly proportional to a person's weight. If Laurie weighs 125 pounds and is given 2500 milligrams, find the recommended dosage for Larry who weighs 165 pounds.

11. If it takes 8 hours for 6 painters to paint a house, how long will it take 5 painters to paint a house of the same size?

12. The intensity of light, I, varies inversely as the square of the distance, d. If the light intensity is 300-foot candles at 25 feet, find the light intensity at 15 feet.