VARIATION

Direct

$x \uparrow \quad y \uparrow$

$x \downarrow \quad y \downarrow$

$$y = Kx$$

$y = 5x$

1	5
2	10
6	30

Inverse

$x \uparrow \quad y \downarrow$

$x \downarrow \quad y \uparrow$

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

$y = \frac{48}{x}$

2	24
4	12
8	6
16	3

Joint

- multiple variables
- can be a combination of direct & inverse

$$y = \frac{Kx}{z}$$

$$y = \frac{Kx^2}{\sqrt[3]{x}}$$

y varies directly as x and y = 56 when x = 4. Find y when x = 10.

1) Find the eq.
2) Solve for K.
3) Answer question.

$y = Kx$

$56 = K \cdot 4$

$14 = K$

$y = 14x$

$y = 14 \cdot 10$

$= \boxed{140}$

The weight (W) of an object varies inversely as the square of the distance from the center of the earth. At sea level (6400 km from the center of the earth) a person weighs 100 kg. What does she weigh in a spacecraft 200 km above the surface of the earth?

$W = \frac{K}{d^2}$

$6400^2 \quad 100 = \frac{K}{(6400)^2} \quad (6400)^2$

$4,096,000,000 = K$

$W = \frac{4,096,000,000}{d^2}$

$W = \frac{4,096,000,000}{(6600)^2}$

$= 94.03 \text{ Kg}$

Wind Power--The power in a windmill varies jointly with the efficiency (E), the square of the diameter of the blades, and the cube of the wind velocity in ft/sec. A windmill which has blades 10 ft. in diameter, an efficiency of 0.4 and is being pushed by a wind with velocity of 9.3 ft/ sec will generate 10,000 watts of power. How much power is generated when the wind velocity increases to 25 ft/sec?

$$P = K \cdot E \cdot d^2 \cdot V^3$$

$$\frac{10{,}000}{0.4 \cdot 10^2 \cdot 9.3^3} = K \cdot (0.4)(10)^2(9.3)^3$$

$$0.3108 = K$$

$$P = (0.3108)(0.4)(10)^2(25)^3$$

$$P = 194{,}254.5 \text{ watts}$$