

Joint and Combined Variation

Joint Variation ~ more than one variable varies directly with another variable

it could be written in the following two ways:

a) "y varies jointly as x and z"

b) "y varies directly as the product of x and z"

$$y = kxz$$

Example 1 ~

If y varies jointly as x and z , and $y = 5$ when $x = -4$ and $z = -2$, find y when $x = -6$ and $z = -3$

a) solve for k using the formula $\sim y = kxz$

b) write the new equation using the k value

c) plug x and z into the new equation to solve for y

Example 2 ~

The wind force F on a vertical surface varies jointly as the area A on the surface and the square of the wind speed S . The force is 340 Newtons on a vertical surface of area 1m^2 when the wind blows at 18 m/sec. Find the force exerted by a wind of 35 m/sec on a vertical surface of area 2m^2 .

Combined Variation

when direct and inverse variation occur together

can be written as "y varies directly as x and inversely as z"

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

Example 3 ~

If y varies directly as the square of x and inversely as z and $y = 7.2$ when $x = 0.3$ and $z = 4$, find y when $x = 1$ and $z = 40$

a) find k using the formula $\sim y = \frac{kx^2}{z}$

b) write the new equation using the k value

c) plug x and z into the new equation to solve for y

Example 4 ~

A baseball pitcher's earned run average varies directly as the number of earned runs and inversely as the number of innings pitched. If a pitcher had an ERA of 2.56 having given up 72 runs in 253 innings, how many earned runs would the pitcher have given up if he had pitched 300 innings?