

11-VARIATIONS

(a relation between 2 or more variables)

Direct Variations

video content is incorrect
this is the update version

$$y : x \Rightarrow 2 : 1 \quad k = 2$$

If $y \propto x$

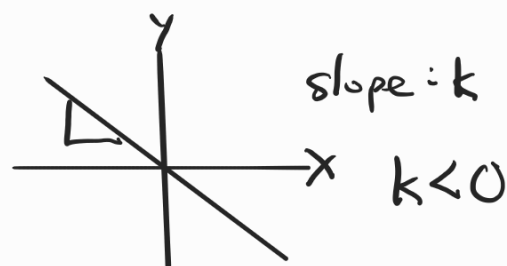
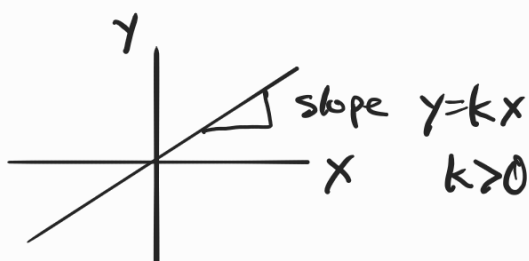
then

$$\frac{y_1}{x_1} = \frac{y_2}{x_2} = k$$

y is directly proportional to x

variation constant

graphically



Inversely Proportional

If $y \propto \frac{1}{x}$

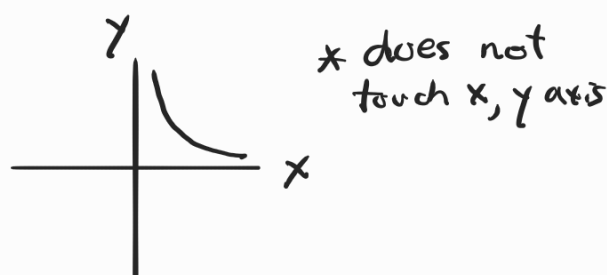
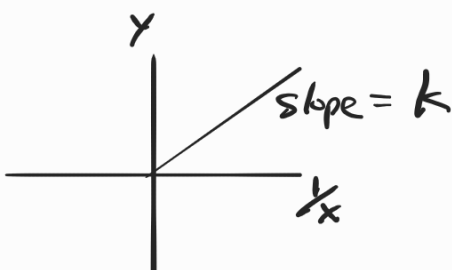
then

$$x_1 y_1 = x_2 y_2$$

as $y \uparrow$ $x \downarrow$

$$xy = k$$

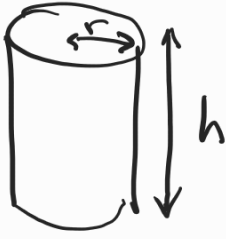
Graphically



Joint Variation

A variable varies as a product or quotient of 2 or more variables

Example



$$\text{Volume} = \pi r^2 h$$

↖ constant

We can say: V varies directly as $r^2 h$
 $V \propto r^2 h$

Partial Variations

In a partial variation, a variable is a sum of 2 or more parts, each part may be a constant or varies as some variable.

Examples:

$y = k_1 x + k_2 z$

y partly varies directly as x and partly varies directly as z ,
where k_1, k_2 are non-zero constants

$w = k_1 x + \frac{k_2}{\sqrt{x}}$

w partly varies directly as x , and partly varies inversely as $\sqrt{x}$,
where k_1, k_2 are non zero constants

