

Inverse Variation Notes

Inverse variation:

Two variables are inversely proportional if one variable decreases corresponding to an increase in other variable.

In inverse variation, the product of the two variables is a constant. In the form where y varies inversely as x , and k is the constant of the variation or proportionality.

$$xy = k \text{ or } y = \frac{k}{x},$$

Sample Problem 1: Solve the problem involving inverse variation.

1. The relationship between the worker and the time required to finish the job. is shown in the table below

Number of worker (x)	1	2	3	4	5	6
Number of days (y)	36	18				

A. Find the value of the constant k ?

B. Complete the table above.

Solution:

A. $y \propto \frac{k}{x}$

$$\begin{aligned} 36 &= \frac{k}{1} \\ 36(1) &= k \\ k &= 36 \end{aligned}$$

B. $y \propto \frac{k}{x}$

$$y = \frac{36}{3}$$

$$y = 12$$

12 hours

$$y = \frac{36}{4}$$

$$y = 9$$

9 hours

$$y = \frac{36}{5}$$

$$y = 7.2$$

7 hours and 12 minutes

$$y = \frac{36}{6}$$

$$y = 6$$

6 hours

2. If y varies inversely as x^2 , and $y = 25$ when $x = 2$, (a) find the equation relating x and y . (b) Find also the value of y when $x = 1/2$.

Solution:

Since $y \propto \frac{1}{x^2}$, then $y = \frac{k}{x^2}$, where k is a constant.

Substitute $y = 25$ when $x = 2$,

$$\begin{aligned} 25 &= \frac{k}{2^2} \\ k &= 25 \times 4 \\ k &= 100 \end{aligned}$$

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Therefore $y = \frac{100}{x^2}$

$$y = \frac{100}{\left(\frac{1}{2}\right)^2}$$

$$y = 400$$

3. The time H in hours taken to deliver a batch of brochures to a shopping center varies inversely as the number of people N delivering them. For one job, 50 people take 8h.

A. Find the equation relating H and N .

B. Calculate (1) H when $N = 80$ and (2) H when $N = 16$.

Solution:

A. Since $H \propto \frac{1}{N}$, then $H = \frac{m}{N}$, where m is a constant.

Substitute $H = 8$ when $N = 50$

$$8 = \frac{m}{50}$$
$$m = 8(50)$$
$$m = 400$$

The equation is $H = \frac{400}{N}$

B. (1) When $N = 80$, $H = \frac{400}{80} = 5$

(2) When $N = 16$, $H = \frac{400}{16} = 25$