Computer Assisted Lesson on Direct and Inverse Proportions

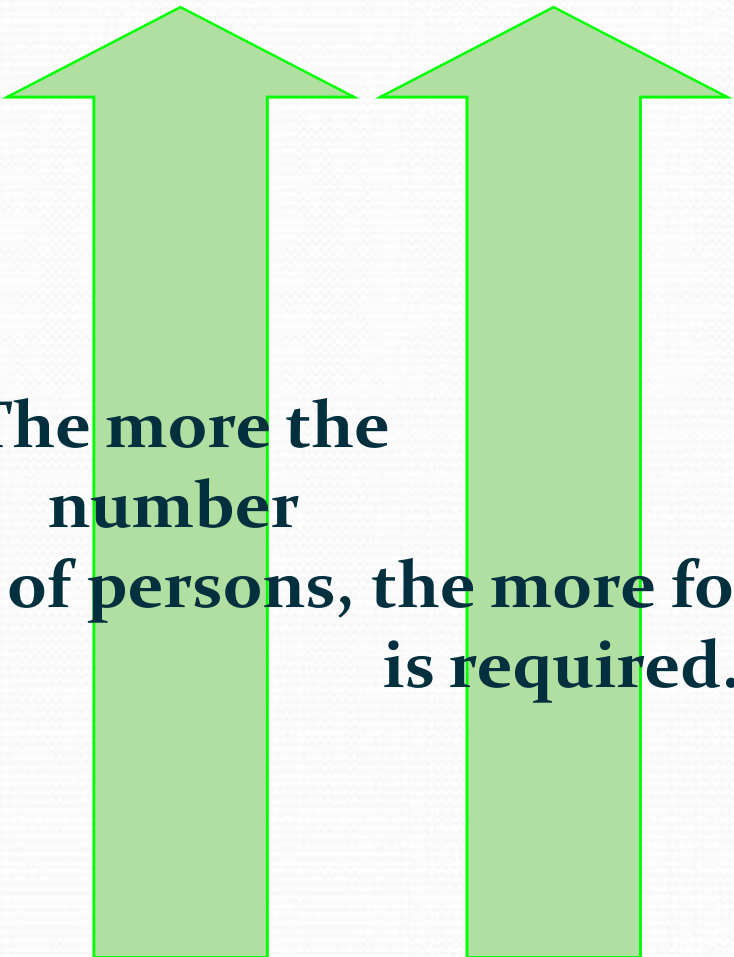*By*

BHARATULA V SAI RAVIKANTH,

B.Ed. 2020-2022. Semester-1,

R.V.R.R.College Of Education.
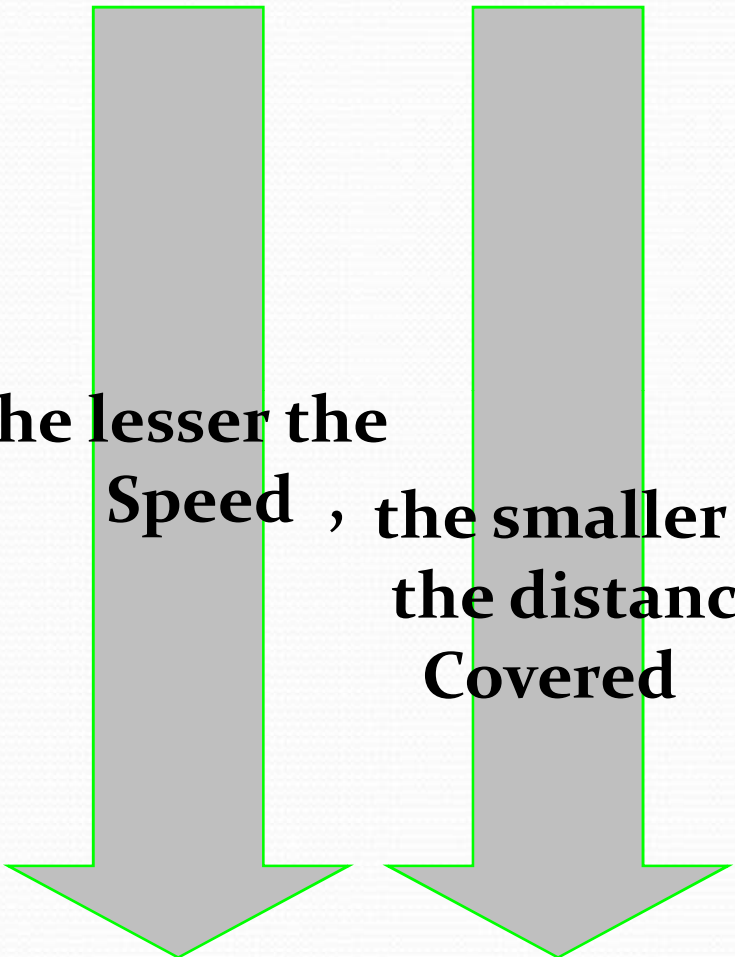
Direct Proportion

- Two quantities are **<u>directly proportional</u>** if an increase in one quantity corresponds to a constant increase in the other quantity, or if a decrease in one quantity corresponds to a constant decrease in the other quantity.

- Let **x** and **y** are two quantities that are in direct proportion. This is written as $x \propto y$ and read as **x** is directly proportional to **y.**

- $x / y = k \Rightarrow x = ky$ where **k** is constant of proportion. Then If y_1, y_2 are the values of **y** corresponding to the values x_1, x_2 of **x**, respectively then **we can write** $x_1/y_1 = x_2/y_2$

Examples Of Direct Proportion

The more the number of persons, the more food is required.

The lesser the Speed , the smaller the distance Covered

Let us try looking at one problem.

Mahesh earns 4500 Rupees in selling garlands on four Sundays. How many Sundays will it take her to earn 1,350 Rupees ?

Is this a problem involving direct proportion? Why do you say so?

Yes it is, because the more Sundays Mahesh sells, the more earnings she will have.

Let us solve the problem

Let us tabulate the given data in assuming unknown number of sundays as "n" and solve for its value

N0. of Sundays	Earnings in Rupees
4	450
n	1,350

$$\frac{4}{n} = \frac{450}{1350}$$

$$n = \frac{4 \times 1350}{450}$$

$$n = 12$$

Therefore, Mahesh should sell garlands on 12 Sundays to earn 1,350 Rupees.
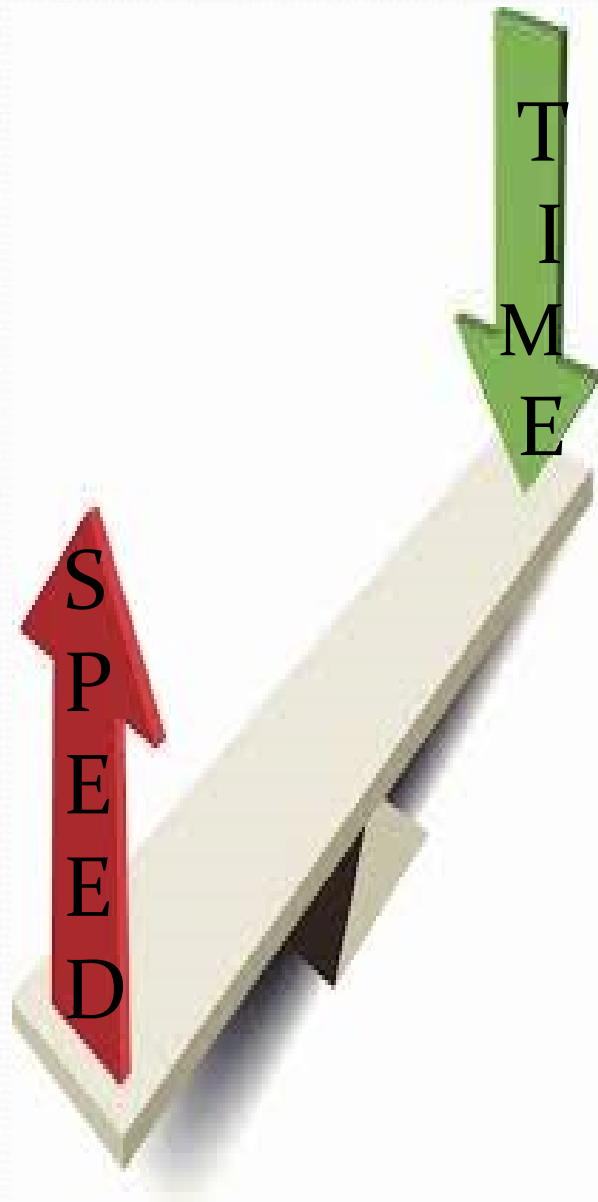
Inverse Proportion

- If Two quantities change in such a manner that, if quantity increases, the other quantity decreases in same proportion and vice versa, is called inverse proportion.

- Let **x** and **y** are two quantities in inverse proportion, there exists a relation of the type **x** x **y** =**k** between them, **k** being a constant.

- This is symbolically represented as .
$$y \propto \frac{1}{x}$$

- If y_1, y_2 are the values of **y** corresponding to the values x_1, x_2 of **x**, respectively then $x_1 y_1 = x_2 y_2$ or $x_1/x_2 = y_2/y_1$

Examples Of Inverse Proportion

Problem On Inverse proportion

- It takes 15 men 8 months to build a house. How long does it take 10 men to build the house?(Assume all men have equal capacity)

Is this a problem involving inverse proportion? Why do you say so?

Yes it is, because more the men, less the time required to complete the work and vice versa.

Let us solve the problem

- Let *x* represents the number of Men and *y* represents the number of days.

- So here $x_1/x_2 = y_2/y_1$

  where *x_1 =15 men, x_2 =10 men, y_1 =8 months* and

  y_2 =(?) days

  15/10 = y_2 / 8 => y_2 = (8 x 15) / 10

  = 12 months.

  Therefore 10 men build the house in 12 months

Compound Proportion

- Sometimes change in one quantity depends upon the change in two or more other quantities in same proportion. Then we equate the ratio of the first quantity to the compound ratio of the other two quantities

i. One quantity may be in direct proportion with the other two quantities.

ii. One quantity may be in inverseproportion with the other two quantities.

iii. One quantity may be in direct proportion with one of the two quantities and in inverse proportion with the remaining quantity

Let us look at a problem

- 175 workers dig a canal of 3150 m long in 36 days. How many workers are required to dig a canal of 3900m long in 24 days?

- **Solution**: Here the number of workers are in direct proportion to length of the canal and inversely proportion to number of days

No. of workers	Length of the tunnel (m)	No. of days
175	3150	36
x	3900	24
175 : x	3150:3900 = 21:26	36:24 = 3:2

Solution continued

- Number of workers $\propto$ length of the canal

$$175 : x = 21:26 \quad ---(1)$$

- Number of workers $\propto \dfrac{1}{\text{number of days}}$

$$175: x = \textit{inverse ratio of } 3:2$$

$$175 : x = 2:3 \quad ---(2)$$

Solution continued

- From (1) and (2)

$175:x$ = compound ratio of 21:26 and 2:3

$175:x$ = (21:26) x (2:3)

$175:x$ = 21 x 2 : 26 x 3

$175:x$ = 7:13

x = (175 x 13) / 7

= 325

Therefore number of workers required = 325

Exercise

1. The monthly average expenditure of a family with members is 280 $. Find the monthly average of family with only 3 members.

2. If 10 pumps are required to fill a tank in 3 hours. How many pumps of the same type are used to fill the tank in an hour?

3. 24 men working at 8 hours per day can do a piece of work in 15 day. In how many days can 20 men working at9 hours per day do the same work?

What we have discussed

- x and y are two quantities that are in direct proportion then
  $x / y = k \Rightarrow x = ky.$ Then If y_1, y_2 are the values of y corresponding to the values x_1, x_2 of x, respectively then **we can write** $x_1/y_1 = x_2/y_2$

- x and y are two quantities in inverse proportion, there exists a relation of the type $x \times y = k$ between them, k being a constant. Then If y_1, y_2 are the values of y corresponding to the values x_1, x_2 of x, respectively then $x_1 y_1 = x_2 y_2$ or $x_1/x_2 = y_2/y_1$

- Sometimes change in one quantity depends upon the change in two or more other quantities in same proportion. Then we equate the ratio of the first quantity to the compound ratio of the other two quantities

Answers to Exercise

1. 210 $
2. 30
3. 16 days

The End