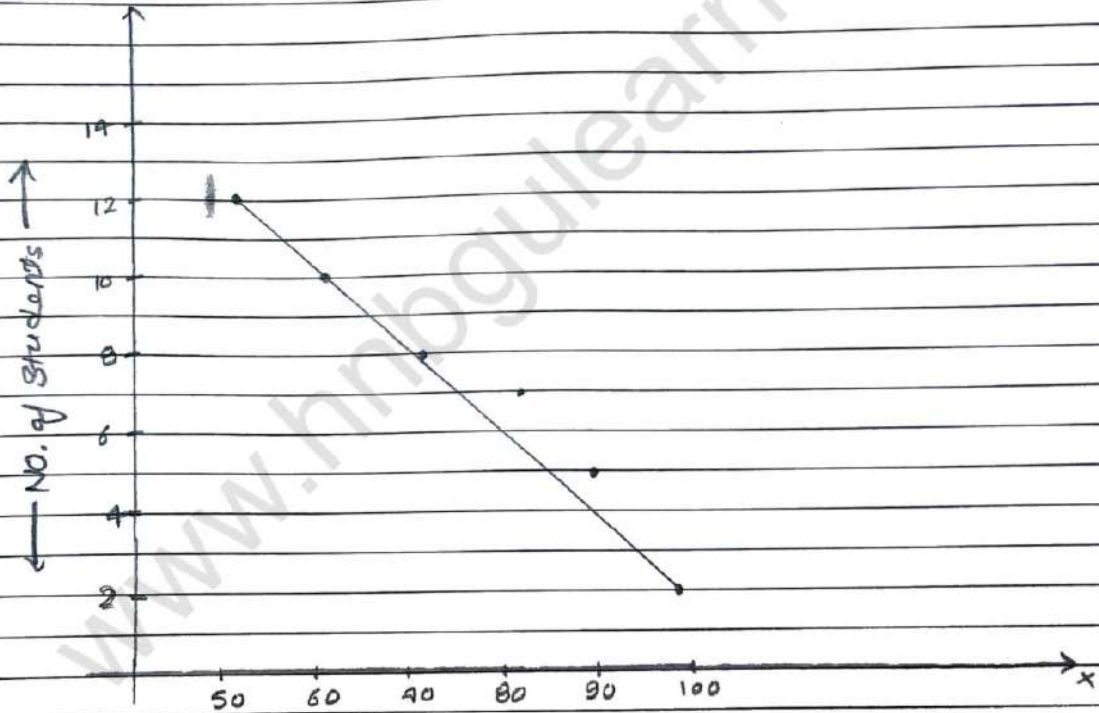


भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. 31

Ans. From the shape of the curve it is clear that only a few children got very high marks. This implies that there is a negative correlation between the two variables.



[Marks obtained out of 100]

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. 25

Coefficient of Correlation

Correlation Coefficients are indicators of the strength of linear relation between different variables, x and y . A linear correlation coefficient that is greater than zero indicates positive relationship. A value less than zero signifies a negative relationship. A value of zero indicates no relationship between the two coefficients.

It establishes a relation between the predicted and actual value obtained at the end of statistical experiment. Two methods of calculating coefficient of correlation are:-

[1] Karl Pearson's coefficient of correlation

It evaluates the linear relationship between two continuous variables. It is used extensively and it measures the level of relation between linearly related variables. It is expressed by -

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2} \sqrt{\sum (y - \bar{y})^2}} \quad \text{where } \bar{x} \text{ \& } \bar{y} \text{ are mean of variable of } x \text{ \& } y \text{ respectively}$$

It also has an alternate formula i.e.

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{N}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{N}} \sqrt{\sum y^2 - \frac{(\sum y)^2}{N}}}$$

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. _____

Note -

[1] 'r' is a dimensionless number whose numerical value lies between +1 to -1. The value +1 represents a perfect correlation where as -1 reflects a perfect negative correlation. Value 0 reflects lack of correlation.

[2] Coefficient of correlation is a pure number, independent of any unit of measure.

[3] It's independent of any change in origin and scale of x and y values.

Example 11 -

Q. A scholar is studying about relation of marks of two subjects from the following data, calculate coefficient of data.

SNo.	1	2	3	4	5
Geography	82	70	84	80	66
Economics	64	40	35	48	54

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. 22

Ans.	S.No.	Geo(x)	eco(y)	x ²	y ²	xy
	1	82	64	6124	4096	5208
	2	76	40	4000	1600	2800
	3	34	25	1156	1225	1190
	4	80	48	6400	2304	3840
	5	66	54	4356	2916	3564
	Total	332	241	23,536	12141	18642

Using formula ; $r = \frac{\sum xy - (\sum x \sum y) / N}{\sqrt{\frac{\sum x^2 - (\sum x)^2}{N} \times \frac{\sum y^2 - (\sum y)^2}{N}}}$

$$r = \frac{18642 - (332 \times 241) / 5}{\sqrt{\frac{23536 - (332)^2}{5} \times \frac{12141 - (241)^2}{5}}}$$

$$r = \frac{639.6}{\sqrt{1491.2 \times 524.8}}$$

$$r = \frac{639.6}{38.6 \times 22.9}$$

$$r = \frac{639.6}{883.94}$$

$$r = 0.723$$

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. _____

[2] Scatter diagrams

The Karl Pearson's correlation coefficient is not applicable in cases where the direct quantitative measurement of a phenomenon under study is not possible. Sometime we are required to examine the extent of association between two ordinal ranked variables such as two scaled opening. In such cases, a measure to ascertain the degree of association between rank of two variables x & y is called Rank correlation. It was given by Edward Spearman.

Its express through the formulae

$$P = \frac{1 - 6 \sum d^2}{n(n^2 - 1)}$$

P = Spearman's Rank coefficient

d = difference btw two ranks of each observation

n = number of observations

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. 29

Ans.

children	Rank in Test (x)	Rank in Field Y	Diff in Rank D = (x - Y)	D ²
1	7	6	2	4
2	1	3	-2	4
3	10	9	1	1
4	5	4	1	1
5	6	8	-2	4
6	8	10	-2	4
7	9	7	2	4
8	2	2	0	0
9	3	1	2	4
10	4	5	1	1

$\Sigma D^2 = 24$

$$P = 1 - \frac{6 \times \Sigma D^2}{N^3 - N}$$

$$P = 1 - \frac{6 \times 24}{1000 - 10}$$

$$P = 1 - \frac{144}{990}$$

$$P = 1 - 0.14$$

$$P = 0.855$$

Teacher's Signature _____

भूगोल प्रयोगात्मक (Geography Practical)

Date _____

Page No. _____

These are used to examine the relationship between both areas (x & y) with one variable. Now while plotting the graph if the points are connected then the points drop along the curve or line.

A Scatter diagram gives an idea about nature of relationship.

In a Scatter diagram, if all points stretch in one line then the correlation is perfect and is unity. However if points are scattered widely throughout the line, then the correlation is said to be low. If scatter points rest near a line, correlation is said to be linear.

The slope of the line tells if its a positive or negative relation.

Example 13-

Draw a Scatter diagram for the following data and tell the type of relationship.

Marks obtained	Students
40-50	12
50-60	10
60-70	8
70-80	7
80-90	5
90-100	2