

MES04

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

DEPARTMENT OF CURRICULUM AND EDUCATIONAL MANAGEMENT
STUDIES

KEY FORMULAE REQUIRED FOR TESTS AND EXAMINATIONS IN
EDUCATIONAL STATISTICS

This is university property

Please do not make any marks on these papers

All answers should be rounded off to two (2) decimal places.

1. Mean of grouped data

$$\bar{x} = \frac{\sum fmp}{N} \text{ or } \frac{\sum fmp}{\sum f} \text{ where}$$

\bar{x} = mean

f = frequency

mp = middle point of class interval

N = number of scores in the distribution

2. Median of grouped data

$$\text{Median} = \lambda_m + \left[\frac{\frac{n}{2} - cfb}{f_m} \right] i \text{ where}$$

λ_m = the lower limit of the median class

n = number of pupils who wrote the test

cfb = cumulative frequency below the median class

i = class interval size

f_m = median class frequency

3. Mode of grouped data

$$\text{Mode} = \lambda + \left[\frac{f_m - f_i}{(f_m - f_i) + (f_m - f_h)} \right] ci \text{ where}$$

λ	=	the lower limit of the modal class
f_m	=	frequency of modal class
f_i	=	frequency of class below modal class
f_h	=	frequency of class above modal class
ci	=	class interval size

4. Percentile rank of ungrouped data

$$\text{Percentile Rank} = \frac{(n+1)-R}{n} \times 100\% \text{ where}$$

n = number of scores

R = position of score whose percentile rank we want to calculate from the top of the class

5. Percentile rank of grouped data

$$\text{Percentile Rank} = \lambda\% + \left[\frac{\text{score} - \text{LRL}}{h} \right] 1\% \text{ where}$$

$\lambda\%$	=	percentage of pupils scoring lower than the critical interval
score	=	raw score whose percentile rank we want to calculate
LRL	=	lower real limit of critical interval
h	=	class interval size
1%	=	percentage of pupils scoring within the critical interval

6. Standard deviation

$$\text{Standard deviation} = \sqrt{\frac{\sum(x-\bar{x})^2}{N}} \text{ or } \sqrt{\frac{\sum d^2}{N}}$$

x	=	scores
\bar{x}	=	mean of scores
N	=	number of scores
d	=	deviation of each score from the mean

7. Z Score

$$\text{Z Score} = \frac{x - \bar{x}}{sd}$$

x = score

\bar{x} = mean of scores

sd = Standard deviation of scores

8. Spearman Rank Order Co-relation Coefficient

$$\rho = 1 - \frac{6 \sum d^2}{N(N^2 - 1)} \text{ where}$$

I = one

ρ = correlation coefficient

d = differences between ranks of each pair of marks

N = number of scores in the distribution

9. Pearson Product Moment Correlation Coefficient

$$r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}} \text{ where}$$

N = number of marks in the distribution

X = scores in one set of marks

Y = scores in the other set of marks

10. t test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{sd_1^2}{N_1} + \frac{sd_2^2}{N_2}}}$$

t = calculated t value

\bar{x}_1 = mean of the first set of scores

\bar{x}_2 = mean of second set of scores

sd_1 = standard deviation of the first set of marks

sd_2 = standard deviation of the second set of marks

N_1 = number of scores in the first distribution

N_2 = number of scores in the second distribution

11. Chi-Square

$$X^2 = \sum \frac{(f_o - f_e)^2}{f_e} \text{ where}$$

X^2 = calculated Chi-Square

f_o = observed frequencies

f_e = expected frequencies

12. Item difficulty

$R/N \times 100\%$ where

R = number of pupils who got the item correct

N = number of pupils who attempted to answer the item.

13. Item discriminating power or index

$(H - L) \div N/2$ where

H = number of pupils in the top 25% of the class who got the item correct

L = number of pupils in the bottom 25% of the class who got the item correct

N = number of pupils who wrote the test