

Grade 12 Mathematics: Statistics & Probability Study Guide

Grade 12 | Mathematics | Study Guide | 2024

Free Study Resources for South African Matric Learners

1. Measures of Central Tendency

Mean, Median, Mode

- Mean ($\bar{x}$) = sum of all values / number of values
- Median = middle value when data is arranged in order
- Mode = most frequently occurring value

2. Measures of Spread

Range:	$\text{max value} - \text{min value}$
IQR:	$Q3 - Q1$
Variance (σ^2):	$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$
Std deviation (σ):	$\sigma = \sqrt{\text{variance}}$

Five Number Summary

Minimum, Q1 (lower quartile), Median (Q2), Q3 (upper quartile), Maximum
Q1 = median of lower half; Q3 = median of upper half

3. Box-and-Whisker Plots

Drawn from the five number summary. Whiskers extend to min and max. Box spans Q1 to Q3. A line inside the box marks the median. Outliers are values below $Q1 - 1.5 \times \text{IQR}$ or above $Q3 + 1.5 \times \text{IQR}$.

4. Regression & Correlation

Scatter Plots & Line of Best Fit

The regression line (line of best fit) has equation $\hat{y} = a + bx$.

Use your calculator to find a and b using the STAT function.

Correlation coefficient r: ranges from -1 to +1.

- r close to +1: strong positive correlation
- r close to -1: strong negative correlation
- r close to 0: weak/no correlation

TIP In exams, you may be asked to write the regression equation, predict a value, or comment on the strength/direction of correlation.

5. Probability

$P(A)$	$= \frac{n(A)}{n(S)}$
$P(A \text{ or } B)$	$= P(A) + P(B) - P(A \text{ and } B)$
$P(A')$	$= 1 - P(A)$ (complement)
Mutually excl.:	$P(A \text{ and } B) = 0$
Independent:	$P(A \text{ and } B) = P(A) \cdot P(B)$
Conditional:	$P(A B) = \frac{P(A \text{ and } B)}{P(B)}$

6. Counting Principles

Fundamental CP: $n_1 \times n_2 \times n_3 \times \dots$

Factorial: $n! = n \times (n-1) \times \dots \times 2 \times 1$

Permutations: $nPr = \frac{n!}{(n-r)!}$

Combinations: $nCr = \frac{n!}{(r! \cdot (n-r)!)}$

TIP Permutations = ORDER matters. Combinations = order does NOT matter. "How many ways to arrange" -> permutation. "How many ways to choose" -> combination.