The Panda Math Tutor

www.thepandamathtutor.com

Averages and Spread Measures

IGCSE Mathematics

The Panda Math Tutor

Prepared by

Nikolas Agisilaou

Quality Mathematics Education for Students

Contents

1 Introduction to Averages and Measures of Spread **2**

2 The Mean **2**
2.1 Mean from a Frequency Table 3
2.2 Estimated Mean from Grouped Data 5

3 The Median **6**
3.1 Median from a Frequency Table 7

4 The Mode **8**

5 Comparing Mean, Median, and Mode **10**

6 Range **11**

7 Quartiles and the Interquartile Range **11**

8 Cumulative Frequency **13**

9 Box-and-Whisker Plots **15**

10 Comparing Two Data Sets **16**

11 Summary **18**

12 Additional Resources **19**
12.1 Tips for Success in IGCSE Exams 19
12.2 Common Exam Question Types 20

The Panda Math Tutor

1 Introduction to Averages and Measures of Spread

Note

Statistics is the branch of mathematics concerned with collecting, organising, displaying, and analysing data. When we have a set of data, two key questions arise:

1. **What is a typical or central value?** → Answered by **averages** (measures of central tendency)
2. **How spread out is the data?** → Answered by **measures of spread**

In this chapter, we will explore:

- The mean, median, and mode for raw data and frequency tables
- The estimated mean for grouped data
- The modal class for grouped data
- The range and interquartile range (IQR) as measures of spread
- Reading and interpreting cumulative frequency graphs
- Box-and-whisker plots
- Comparing two data sets

The Panda Math Tutor

2 The Mean

Definition

The **mean** (also called the arithmetic mean) of a data set is found by adding all the values together and dividing by the number of values.

$$\bar{x} = \frac{\sum x}{n}$$

where $\sum x$ means "the sum of all values" and n is the total number of values.

Method

Calculating the Mean from a List of Values

Step 1: Add all the values together to find $\sum x$

Step 2: Count the total number of values, n

Step 3: Divide: $\bar{x} = \dfrac{\sum x}{n}$

Example

The ages of seven students in a study group are:

$$14,\ 15,\ 13,\ 16,\ 15,\ 14,\ 15$$

Find the mean age.

Solution:

Step 1: Sum of values:

$$\sum x = 14 + 15 + 13 + 16 + 15 + 14 + 15 = 102$$

Step 2: Number of values: $n = 7$

Step 3:

$$\bar{x} = \frac{102}{7} \approx 14.57 \text{ years (to 2 d.p.)}$$

The Panda Math Tutor

Warning

The mean is affected by extreme values (outliers)!

For example, if one student aged 40 is added to the group above, the mean jumps to:

$$\bar{x} = \frac{102 + 40}{8} = \frac{142}{8} = 17.75$$

This no longer represents the typical student. In cases with outliers, the **median** is often a better measure of central tendency.

2.1 Mean from a Frequency Table

When data is presented in a frequency table, we use a modified formula.

Preview ends here

17 more pages are in the full pack.

Averages and Spread Measures — Main Notes — €9.99

Buy the pack and the complete PDF lands in your inbox.

Personal study use only — please don't resell or share.