



TAILORED LEARNING, PERSONALIZED PROGRESS

LEARNING MODULE 1

Determine Measures of Central Tendency
of Ungrouped Data



GRADE 8

malms8.online

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DETERMINE MEASURES OF CENTRAL TENDENCY OF UNGROUPED DATA

WELCOME!

Get ready for a thrilling ride in our course through numbers and everyday life. We will unravel the mysteries of measures of central tendency, explore how they simplify data, and even dive into spreadsheet magic to make math more engaging and relatable. Buckle up for an exciting journey where we will crack codes, solve real-life puzzles, and discover the superhero powers of math—all while having a blast!



LEARNING OBJECTIVES

Analyze ungrouped data sets and apply appropriate statistical methods to algebraically calculate measures of central tendency accurately;

Manipulate data in spreadsheet software to organize, input, and graphically calculate measures of central tendency.

Appreciate the significance of measures of central tendency in simplifying and summarizing data

Measures of Central Tendency

The central tendency has three main measures: **mode**, **median** and **mean**.

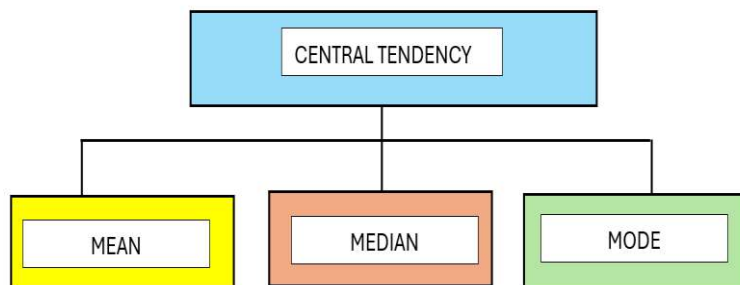


Figure 1.1. Central Tendency



MODE

The mode is the most commonly occurring value in a distribution. Sometimes the dataset may contain multiple modes and, in some cases, it does not contain any mode at all.



To understand it further, let's try and solve some few examples.

Example 1:

Consider this dataset showing the retirement age of 11 people, in whole years:

54, 54, 54, 55, 56, 57, 57, 58, 58, 60, and 60.

What is the mode from the given dataset?

This table shows a simple frequency distribution of the retirement age data.

Age	Frequency
54	3
55	1
56	1
57	2
58	2
60	2

Table 1.1. Age-Frequency Distribution

Since 3 is the highest frequency and it corresponds to the age of 54, the answer is 54.

To double-check our answer, we will use the Excel software. Upon doing so, it also states 54. **Therefore, the mode is 54.**

#	Data
1	54
2	54
3	54
4	55
5	56
6	57
7	57
8	58
9	58
10	60
11	60
Mode:	54

Table 1.2. Excel Calculation



Example 2:

Consider the given dataset – 5, 4, 2, 3, 2, 1, 5, 4, 5. What is the mode?

Mode
5
5
5
4
4
3
2
2
1

Table 1.3. Example 2 Mode Values

Since 5 appears the most often, which is three times, the answer is 5.

To double-check our answer, we will use the Excel software. Upon doing so, it also states 5. **Therefore, the mode is 5.**

#	Data
1	5
2	4
3	2
4	3
5	2
6	1
7	5
8	4
9	5
Mode:	5

Table 1.4. Excel Calculation

MEDIAN

Median is the middle value of the dataset in which the dataset is arranged in the ascending order or in descending order. When the dataset contains an even number of values, then the median value of the dataset can be found by taking the mean of the middle two values.



To understand it further, let's try and solve some few examples.

Example 1:

Consider the given dataset with the odd number of observations arranged in descending order – 23, 21, 18, 16, 15, 13, 12, 10, 9, 7, 6, 5, and 2. Identify the median.

Median odd
23
21
18
16
15
13
12
10
9
7
6
5
2

Table 2.1. Values with odd number of observations

Since 12 is the middle number from the sorted data, the answer is 12.

To double-check our answer, we will use the Excel software. Upon doing so, it also states 12. **Therefore, the median is 12.**

#	Data
1	23
2	21
3	18
4	16
5	15
6	13
7	12
8	10
9	9
10	7
11	6
12	5
13	2
Median:	12

Table 2.2. Excel Calculation

Example 2:

Now, consider another example with an even number of observations that are arranged in descending order – 40, 38, 35, 33, 32, 30, 29, 27, 26, 24, 23, 22, 19, and 17. Find the median.

Median even	
40	
38	
35	
33	
32	
30	
29	
27	
26	
24	
23	
22	
19	
17	

28

Table 2.3. Values with even number of observations

When you look at the given dataset, the two middle values obtained are 27 and 29. Now, find out the mean value for these two numbers.

$$i.e., \frac{27 + 29}{2} = 28$$

To double-check our answer, we will use the Excel software. Upon doing so, it also states 28. **Therefore, the median is 28.**

#	Data
1	40
2	38
3	35
4	33
5	32
6	30
7	29
8	27
9	26
10	24
11	23
12	22
13	19
14	17
Median:	28

Table 2.4. Excel Calculation



MEAN

The mean is the sum of the value of each observation in a dataset divided by the number of observations. This is also known as the arithmetic average.

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

where \bar{x} is the **mean**, $\sum x$ is the **sum of all the values**, and **n** is the **total number of values**.

To understand it further, let's try and solve some few examples.

Example 1:

Looking at the retirement age distribution again:

Participants	1	2	3	4	5	6	7	8	9	10	11
Age	54	54	54	55	56	57	57	58	58	60	60

Table 3.1. Retirement Age Distribution

Let's compute the mean.

The mean is calculated by adding together all the values and dividing by the number of observations (11) which is:

$$\bar{x} = \frac{54 + 54 + 54 + 55 + 56 + 57 + 57 + 58 + 58 + 60 + 60}{11}$$

$$\bar{x} = \frac{623}{11}$$

$$\bar{x} = 56.64 \sim 57$$

To double-check our answer, we will use the Excel software. Upon doing so, it also states 57. **Therefore, the mean retirement age is 57 years old.**



#	Data
1	54
2	54
3	54
4	55
5	56
6	57
7	57
8	58
9	58
10	60
11	60
Mean:	56.63636

Table 3.2. Excel Calculation

Example 2:

You measure the reaction times in milliseconds of 5 participants and order the dataset. Calculate the mean.

Participants	1	2	3	4	5
Time	287 ms	298 ms	345 ms	365 ms	380 ms

Table 3.3. Reaction Time Data Distrubution

$$\bar{x} = \frac{287ms + 298ms + 345ms + 365ms + 380ms}{5}$$

$$\bar{x} = \frac{1675ms}{5}$$

$$\bar{x} = 335 ms$$

To double-check our answer, we will use the Excel software. Upon doing so, it also states 335 ms. **Therefore, the mean reaction time is 335 milliseconds.**

#	Data
1	287
2	298
3	345
4	365
5	380
Mean	335

Table 3.4. Excel Calculation