

# GCSE Maths – Statistics

## Measures of Central Tendency

Notes

WORKSHEET



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## Measures of Central Tendency

The **measures of central tendency** are **mean, median and mode**. They give a single value that describes how close items are to the central position within the data set. These are all measures that give an **average** of a data set. We can describe the central tendency of the data set by using mean, median and mode.

### Mode

The **mode** is the most popular value or values. It is the value(s) that occurs the most often in the data set.

**Example:** The following data set shows the weight (kg) of 7 guinea pigs:

Weight (kg) = {3, 2, 3, 4, 2, 3, 5}  
What is the mode of the data set?

*Order the data set from lowest value to highest value so that you can easily count how many values are the same.*

Weight (kg) = {2, 2, 3, 3, 3, 4, 5}

*There are three 3s, two 2s, one 4 and one 5 value. The value 3 occurs the most often so 3 is the mode.*

**3 kg is the mode weight.**

### Median

The **median** is the middle value when the data is in numerical order. Often the data will not already be in order so you will have to put the data in order from lowest to highest value to find the middle value (the median).

- When a data set has an odd number of values, the middle value in the ordered data is the median. For example, with **11** pieces of data the **6<sup>th</sup> data value** will be the median. You can check that it is the middle by counting the same number of items on each side of the median.

1, 1, 3, 4, 7, **9**, 12, 16, 20, 21, 21

- When a data set has an even number of values, the median is between the two middle values. To find the median, we need to find the average of the two middle values. For example, with **12** pieces of data we must find halfway and the next value. In this case, the **6<sup>th</sup> and 7<sup>th</sup> values**. The median will be halfway between these values – so we **add the 6<sup>th</sup> and 7<sup>th</sup> value together** and **divide this number by 2**.

1, 1, 3, 4, 7, **9, 12**, 16, 20, 21, 21, 22

$$(9 + 12) \div 2 = 10.5$$



**Example:** The number of pets owned by a group of children is recorded in a frequency table:

Number of pets owned	Frequency
0	2
1	5
2	1
3	2

Find the median number of pets owned.

1. First find the total number of children by adding up all the numbers in the frequency column. This will give us the total number of values in the data set.

$$2 + 5 + 1 + 2 = 10$$

*There are 10 values in the data set (10 children).*

2. Now write a list of the 10 values in the data set in order from lowest to highest.

*Use the table to work out how many of each value you need to list.*

*For example, the table shows that 2 children owned 0 pets so the list begins with 0, 0.*

**Data set in order from lowest to highest value: 0, 0, 1, 1, 1, 1, 1, 2, 3, 3**

3. Now that we have ordered the data set, we can calculate the median.

*There is an even number of values in the data set (10 children).*

*The median value is the 5<sup>th</sup> and 6<sup>th</sup> values added together, then divided by 2.*

**5<sup>th</sup> value: 1**

**6<sup>th</sup> value: 1**

$$1 + 1 = 2$$

$$2 \div 2 = 1$$

**The median is 1.**



## Mean

The **mean** of a set of data is the sum of all the values divided by the number of values.

$$\text{Mean} = \frac{\text{Sum of the values}}{\text{Total number of values}}$$

For example, the mean of the data set {1, 1, 3, 4, 7, 9, 12, 16, 20, 21, 21} is:

$$\text{Mean} = \frac{1 + 1 + 3 + 4 + 7 + 9 + 12 + 16 + 20 + 21 + 21}{11} = 10.45$$

**Example:** The scores of 10 students in a class were recorded for an exam.

Scores = {12 24 28 23 11 23 29 15 15 20}

Calculate the mean score.

1. Add up all ten of the numbers in the data set to find the sum of the values.

$$12 + 24 + 28 + 23 + 11 + 23 + 29 + 15 + 15 + 20 = 200$$

2. Divide the value of the sum by how many values there are. We are already told that there are 10 scores so divide 200 by 10.

$$200 \div 10 = 20$$

**The mean score is 20.**



## Measures of Central Tendency - Practice Questions

1. Below is a list of how much a group of friends earn per hour (£):

£7.00

£8.50

£6.55

£7.00

£5.65

£6.55

£9.75

£6.55

What is the mode amount of money that is earned per hour?

2. Find the median and mode for the following sets of data:

a) {30, 21, 59, 23, 12, 12, 21, 39, 14, 21, 21}

b) {1.5, 2.4, 3.0, 2.4, 4.5, 1.6, 1.6, 2.4, 1.5}

3. Eleanor has eight guinea pigs in her garden.

Their weight (in kilograms) is listed below.

Weight (kg) = {1.0, 2.5, 1.5, 1.6, 3.0, 2.5, 1.3, 2.2}

Find the median and mode weight of the rabbits.

4. Two schools are comparing the English exam scores of 5 of their best students. They gave their scores in the table below.

School A's exam scores	School B's exam scores
30	49
34	38
43	47
36	45
46	37

Which school has a higher mean exam score? Show your working.

*Worked solutions for the practice questions can be found amongst the worked solutions for the corresponding worksheet file.*



