Cosmo School

The words **Data** and **Information** may look similar and many people use these words very frequently, But both have lots of differences between

What is Data?

Data is a raw and unorganized fact that required to be processed to make it meaningful. Data can be simple at the same time unorganized unless it is organized. Generally, data comprises facts, observations, perceptions numbers, characters, symbols, image, etc.

Data is always interpreted, by a human or machine, to derive meaning. So, data is meaningless. Data contains numbers, statements, and characters in a raw form

What is Information?

Information is a set of data which is processed in a meaningful way according to the given requirement. Information is processed, structured, or presented in a given context to make it meaningful and useful.

It is processed data which includes data that possess context, relevance, and purpose. It also involves manipulation of raw data

Mean, Median and Mode

We use **statistics** such as the mean, median and mode to obtain information about a population from our sample set of observed values.

Mean

The **mean/Arithmetic mean or average** of a set of data values is the sum of all of the data values divided by the number of data values. That is:

$$\text{Mean} = \frac{\text{Sum of all data values}}{\text{Number of data values}}$$

Symbolically,

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

where $\bar{x}$ (read as 'x bar') is the mean of the set of x values,

$\sum x$ is the sum of all the x values, and

n is the number of x values.

Example 1

The marks of seven students in a mathematics test with a maximum possible mark of 20 are given below:

    15   13   18   16   14   17   12

Find the mean of this set of data values.

Solution:

$$\text{Mean} = \frac{\text{Sum of all data values}}{\text{Number of data values}}$$

$$= \frac{15+13+18+16+14+17+12}{7}$$

$$= \frac{105}{7}$$

$$= 15$$

So, the mean mark is 15.
Symbolically, we can set out the solution as follows:

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

$$= \frac{15+13+18+16+14+17+12}{7}$$

$$= \frac{105}{7}$$

$$= 15$$

So, the mean mark is 15.

Median

The **median** of a set of data values is the middle value of the data set when it has been arranged in ascending order. That is, from the smallest value to the highest value.

Example 2

The marks of nine students in a geography test that had a maximum possible mark of 50 are given below:

    47   35   37   32   38   39   36   34   35

Find the median of this set of data values.

Solution:

Arrange the data values in order from the lowest value to the highest value:

32   34   35   35   36   37   38   39   47,

Here, Data is odd

The fifth data value, 36, is the middle value in this arrangement.

∴ Median = 36

Note:

The number of values, n, in the data set $= 9$

$$\text{Median} = \frac{1}{2}(9+1) \text{ th value}$$
$$= 5\text{th value}$$
$$= 36$$

In general:

$$\text{Median} = \frac{1}{2}(n+1) \text{ th value, where } n \text{ is the number of data values in the sample}$$

If the number of values in the data set is even, then the **median** is the average of the two middle values.

Example 3

Find the median of the following data set:
   12   18   16   21   10   13   17   19

Solution:

Arrange the data values in order from the lowest value to the highest value:
   10   12   13   16   17   18   19   21

The number of values in the data set is 8, which is even. So, the median is the average of the two middle values.

$$\therefore \text{Median} = \frac{\text{4th data value} + \text{5th data value}}{2}$$
$$= \frac{16+17}{2}$$
$$= \frac{33}{2}$$
$$= 16.5$$

Alternative way:

There are 8 values in the data set.

$$\therefore n = 8$$
$$\text{Now, median} = \left(\frac{n+1}{2}\right) \text{th value}$$
$$= \left(\frac{8+1}{2}\right)$$
$$= \frac{9}{2}$$
$$= 4.5 \text{th value}$$

The fourth and fifth scores, 16 and 17, are in the middle. That is, there is no one middle value.

$$\therefore \text{Median} = \frac{16+17}{2}$$
$$= \frac{33}{2}$$
$$= 16.5$$

Note:

- Half of the values in the data set lie below the median and half lie above the median.
- The median is the most commonly quoted figure used to measure property prices. The use of the median avoids the problem of the mean property price which is affected by a few expensive properties that are not representative of the general property market
- Mode

The **mode** of a set of data values is the value(s) that occurs most often.

The mode has applications in printing. For example, it is important to print more of the most

popular books; because printing different books in equal numbers would cause a shortage of some books and an oversupply of others.

Likewise, the mode has applications in manufacturing. For example, it is important to manufacture more of the most popular shoes; because manufacturing different shoes in equal numbers would cause a shortage of some shoes and an oversupply of others.

Exampe 4

Find the mode of the following data set:

48   44   48   45   42   49   48

Solution:

The mode is 48 since it occurs most often.

Creative Question (try yours self)

1.A student writes the following numbers talking from 20 to 40.
   21,37,40,22,39,35,22,25,32,22,21,37,40,22,39,35,25,22,37,39,32,22,37,32,40,37,22,35,22.
   a) Arranging these data in ascending order
   b) Determines the median and mode of the data
   c) Find the arithmetic mean of the given data

2.The numerical values of some data are 5, 7, 12, 10, 9, 19, 13, 15, 16, 24, 21, 23, 25, 11, 14, 20.
   a) Arrange the data in order and find the mean.
   b) Find the median.
   c) Find the mode.

3.The secured marks in Mathematics of 15 students of class six in Cosmo school & college are : 95, 62, 87, 32, 59, 92, 82, 66, 75, 99, 44, 37,58, 51, 62.
   a. Is the data an organized data ? Bring the data in an organized form.
   b. Determine arithmetic mean of the data.
   c. Find median and mode of the data

   M.C.Q

1. What is the arithmetic mean of the numbers 14,16,18,5,17 ?
    a) 16   c) 13
    b) 14   d) 16
2. What is the median of the numbers 27,22,20,21,18?
    a) 27   c) 20
    b) 18   d) 21
3. What is the median of the numbers 8,9,10,12,14,16?
    a) 9   c) 16
    b) 11   d) 14
4. Which of the numbers 48,47,50,47,52,50,47 is the mode?
    a) 50   b) 47

c) 48   d) 52
5.   Which one of the numbers 30,45,42,48,53,46 is the mode
   a) 42   c) 30
   b) 45   d) No mode

6. What is the median of the numbers :- 10, 12, 13, 15, 16, 19, 25 ?
   (a) 12   (b) 13   (c)   15   (d)   16
   Answer to the question no. 7 and 8 based on the following information the daily   expenditures
in taka of 10 students of class Seven are as follow :- 20, 22, 50, 40, 32, 28, 45, 30, 25, 48.
7. What is the range of data ?
a)   29   b)   30   c)   31   d)   32
8. What is the average of data ?
a)   29   b) 30
c)   31   d) 34

9. What is called the data that is collected
directly from the source ?
a)   Primary data   b) Data
c) Secondary data   d)   Indirect data

10. How many types of statistical data ?
a)   1   b)   2   c)   3
d)   4