

ATOMIC ENERGY CENTRAL SCHOOL

Class- 7

Subject- MATHEMATICS

CHAPTER – 3 Modules- 2/3

DATA HANDLING (HAND OUT)

In continuation with module – 1, we are going to learn

RANGE – The difference between the highest value and the lowest value of the observations is called range of the distribution.

Range = Highest value – Lowest value.

It gives the idea about the spread of the observations.

Example: Marks obtained by a student in 5 subjects are 68, 75, 69, 80, 74.

Here the highest marks scored = 80

the lowest marks scored = 68

$$\text{Range} = 80 - 68 = 12$$

MODE – It is also one of the representative values. When we visit to a shoe shop, we have seen, a shopkeeper has a stock of shoes of different sizes for different age group people.

The sizes of the shoes are like 1, 2, 4, 5, 6, 7, 8, 9 etc. It is not possible for the shopkeeper to keep equal number of shoes of all sizes in stock.

He has to observe that which sizes of shoes are being sold in large number.

Mode is that representative value which helps him to decide, which sizes of shoes should be kept in large number in stock.

Mode: The observation having the highest frequency is called the mode of the distribution.

Example: In a particular day in first half a shopkeeper sold the shoes following sizes-

2, 4, 5, 5, 6, 7, 2, 5, 4, 5, 6, 6, 7, 4, 7, 7, 4, 7.

We arrange the data in increasing order

2, 2, 4, 4, 4, 4, 5, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 7

We see that 7 occurs the most often or having the highest frequency.

So, mode = 7.

If large number of data is given then we have to make a frequency distribution table.

Example: In a class test, marks obtained in Maths by the students out of 10 are as follows-

4,6,7,5,3,5,4,5,2,6,2,5,1,9,6,5,8,4,6,7

Marks obtained	Tally marks	Frequency
1	/	1
2	//	2
3	/	1
4	///	3
5	////	4
6	////	4
7	//	2
8	/	1
9	/	1

Here we see that frequency of 5 is 5 which is the highest frequency

So mode = 5.

MEDIAN: Median is also one of the representative values.

Why we need median, we have to observe the following situations.

The run scored in a cricket match by 11 players are as follows. The coach of the team wants to divide the players into two equal groups for daily practice.

6,15,120,50,100,80,10,10,15,8,10.

$$\begin{aligned} 1. \text{ Mean} &= \frac{\text{sum of all the observations}}{\text{total number of observations}} \\ &= \frac{6+15+120+50+100+80+10+10+15+8+10}{11} \\ &= \frac{424}{11} = 38.5 \end{aligned}$$

Nos. of players score more than 38.5 is 5,

Nos. of players score less than 38.5 is 7,

This is not equally divided. So mean is not applicable here.

2. Mode: We arrange the runs in increasing order.

6,8,10,10,10,15,15,50,80,100,120.

So the mode is 10.

Nos. of players score at the mode 10 is 9,

Nos. of players score less than the mode 10 is 2,

This is not equally divided. So mode is not applicable here.

3. We arrange the runs in increasing order.

6,8,10,10,10,15,15,50,80,100,120.

Number of observations (n) = 11 (odd)

$\frac{(n+1)}{2}$ th term = $\frac{11+1}{2}$ = 6th term = 15. (Count 6 from the beginning or from the last in increasing order of the runs as written above)

So, 15 is the middle value.

So 5 players are there in each group. One player having runs 15 is extra and work as umpire.

This middle value is called median.

Median: When the given observations are arranged in increasing order or decreasing order, then the middle observation is called the median.

To find the median first we arrange the observations in increasing order or decreasing order.

Let the number of observations = n

If number of observations = n is **odd**, then

$$\text{Median} = \frac{(n+1)}{2} \text{th term}$$

If number of observations = n is **even**, then

We find $\frac{n}{2}$ th term and $(\frac{n}{2} + 1)$ th term

$$\text{Median} = \frac{\frac{n}{2} \text{th} + (\frac{n}{2} + 1) \text{th term}}{2}$$

Example-1; The marks obtained by some students in a class test are 6, 5, 14, 8, 11, 13, 8, 7, 3, 8.

We arrange the marks in increasing order.

3,5,6,7,8,8,8,11,13,14

Here n = 10 (even)

$$\frac{n}{2} \text{th term} = \frac{10}{2} = 5^{\text{th}} \text{ term} = 8$$

$$(\frac{n}{2} + 1) \text{th term} = 5+1 = 6^{\text{th}} \text{ term} = 8$$

$$\text{Median} = \frac{8+8}{2} = \frac{16}{2} = 8.$$

Interpretation- 50% of the students got more than 8 and 50% of the students got less than 8.

Example-2: Find the median of the data 12,14,15,18,14,19,14,13,9.

We arrange the observations in increasing order.

9, 12, 13,14,14,14,15,18,19

$n=9$ (odd)

$$\text{Median} = \frac{(n+1)}{2} \text{th term} = \frac{9+1}{2} = \frac{10}{2} = 5^{\text{th}} \text{ term} = 14.$$

Example-3: Find the mean, mode and median of the data 4,5,3,6,3,5,3,4,3.

$$(i) \text{ Mean} = \frac{\text{sum of all the observations}}{\text{total number of observations}}$$

$$= \frac{4+5+3+6+3+5+3+4+3}{9}$$

$$= \frac{36}{9} = 4.$$

(ii) We arrange the observations in increasing order.

3, 3, 3,3,4,4,5,5,6

Here 3 has the highest frequency. So mode = 3.

(iii) We arrange the observations in increasing order.

3, 3, 3,3,4,4,5,5,6

$n=9$ (odd)

$$\text{Median} = \frac{(n+1)}{2} \text{th term} = \frac{9+1}{2} = \frac{10}{2} = 5^{\text{th}} \text{ term} = 4$$

Example-4: The ages (in year) of 8 people are 36, 72, 48, 63, 75, 39, 85 and 63.

(i) Find the range.

(ii) Mean and median.

Ans. The highest value = 85

The lowest value = 36

$$\text{Range} = 85 - 36 = 49.$$

(ii) Sum of ages = $36+72+48+63+75+39+85+63=480$.

$$\begin{aligned}\text{Mean} &= \frac{\text{sum of all the observations}}{\text{total number of observations}} \\ &= \frac{480}{8} = 60.\end{aligned}$$

(b) We arrange the observations in increasing order.

36, 39, 48, 62, 63, 72, 75, 85.

$n = 8$ (even)

$$\frac{n}{2}\text{th term} = \frac{8}{2} = 4^{\text{th}} \text{ term} = 62.$$

$$\left(\frac{n}{2} + 1\right) \text{th term} = 4+1 = 5^{\text{th}} \text{ term} = 63.$$

$$\text{Median} = \frac{62+63}{2} = \frac{125}{2} = 62.5.$$

What we have learnt

(a) The difference between the highest value and the lowest value of the observations is called range of the distribution.

$$\text{Range} = \text{Highest value} - \text{Lowest value}.$$

(b) Mode of a set of observations is an observation which has the highest frequency.

(c) Median of a set of observations is the middle value, when the observations are arranged in increasing or decreasing order.

(d) If nos. of observations are odd, then

$$\text{Median} = \frac{(n+1)}{2} \text{th term}.$$

(e) If nos. of observations is even, then

$$\text{Median} = \frac{\frac{n}{2} \text{th} + \left(\frac{n}{2} + 1\right) \text{th term}}{2}$$

ASSIGNMENT:

1. Fill in the blanks:- For the data 5, 4, 0, 1, 6, 2, 4, 3, 7 and 8.

(i) Mean of the data is -----

(ii) Range of the data is -----.

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(iii) Median of the data is -----.

(iv) Mode of the data is -----.

Q2. Find range of the data:

89, 125, 100, 115, 80, 180, 160 and 115.

Q3. Find the mode of the following data.

11, 15, 10, 14, 15, 12, 13, 13, 10, 15, 12, 10, 14, 11, 10, 15, 13, 15, 11, 12.

Q4. Find the median of the following data.

110, 140, 130, 120, 140, 120, 120, 130, 120, 110.

Q5. Find the median of the following marks obtained by some students out of 25.

20, 25, 18, 18, 10, 8 and 14 and interpret the data.
