

## Session 125 | Statistics 1 | Worksheet 125

1) Atmospheric temperature of seven days in a week are given below .

$$26^{\circ}C, 28^{\circ}C, 25^{\circ}C, 30^{\circ}C, 27^{\circ}C, 26^{\circ}C, 25^{\circ}C$$

- Write the numbers in the ascending order.
- Calculate the mean of the temperatures.
- What is the median temperature?
- How many days are having temperature less than median temperature?
- How many temperatures are there below median temperature?

### Answers

- $x_n = 3n + 4$ .  $3n + 4 < 100 \rightarrow 3n < 96, n < 32$ . There are 31 numbers below 100 in the sequence
- Since 31 is odd  $\frac{31+1}{2} = 16$ th comes in the middle.  $x_{16} = 3 \times 16 + 4 = 52$
- $x_{31} = 3 \times 31 + 4 = 97$ . Sum =  $(7 + 97) \times \frac{31}{2} = \frac{104 \times 31}{2} = 1612$   
Mean =  $\frac{1612}{31} = 52$
- Middle term of the sequence is the median .It is the 16 th term  $x_{16} = 3 \times 16 + 4 = 52$
- Mean and median are equal.

2) Consider the counting numbers from 1 to 100.

- How many multiples of 7 are there below 100?
- Calculate the mean of the multiples of 7 below 100.
- What is the median of the multiples of 7 below 100?
- How many multiples are there more than median in this collection ?

### Answers

- 7, 14, 21 ... 98 are the numbers .  $7n = 98 \rightarrow n = \frac{98}{7} = 14$ .  
There are 14 numbers .
- Sum of multiples of 7 below 100 is  $7+14+21 \dots +98 = (7+98) \times \frac{14}{2} = 105 \times 7 = 735$   
Mean =  $\frac{735}{14} = 52.5$
- 7 th and 8 th comes in the middle .  $x_7 = 7 \times 7 = 49, x_8 = 7 \times 8 = 56$ . median =  $\frac{49+56}{2} = 52.5$
- $x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}$  are more than 52.5  
There are 7 numbers above median

3) The marks obtained in ten class tests are given below

$$14, 17, 11, 19, 15, 17, 13, 10, 14, 18$$

- Calculate the mean of the marks .

- b) What are the marks comes in the middle if the marks are arranged in the increasing order? 2  
 c) What is the median mark ?  
 d) How many class tests are there scoring mark above median mark?

#### Answers

- a) Mean =  $\frac{14+17+11+19+15+17+13+10+14+18}{10} = 14.8$   
 b) Marks in the ascending order 10, 11, 13, 14, 14, 15, 17, 17, 18, 19  
 $n = 10$  (even number ). 5 th and 6 th comes in the middle. These are 14 and 15  
 c) median =  $\frac{14+15}{2} = 14.5$   
 d) There are 5 marks above median 14.5

- 4) Consider the arithmetic sequence 7, 10, 13 ...  
 a) How many terms are there below 100?  
 b) Which term comes in the middle?  
 c) Calculate the mean of the numbers in the sequence below 100  
 d) Calculate the median of numbers in the sequence below 100  
 e) What is the relation between mean and median?

#### Answers

- a)  $x_n = 3n + 4$ .  $3n + 4 < 100 \rightarrow 3n < 96, n < 32$ . There are 11 numbers below 100 in this sequence .  
 b) Since 31 is odd  $\frac{31+1}{2} = 16$ th comes in the middle.  $x_{16} = 3 \times 16 + 4 = 52$   
 c)  $x_{31} = 3 \times 31 + 4 = 97$ . Sum =  $(7 + 97) \times \frac{31}{2} = \frac{104 \times 31}{2} = 1612$   
 Mean =  $\frac{1612}{31} = 52$   
 d) Middle term is the median .It is the 16 th term.  $x_{16} = 3 \times 16 + 4 = 52$   
 e) Mean and median are equal.

- 5) The algebraic form of an arithmetic sequence is  $3n + 2$   
 a) Write the sequence  
 b) Calculate the mean of first 20 terms.  
 c) Calculate the median of the first 20 numbers of this sequence number of this sequence .  
 d) What is the relation between mean and median.

#### Answers

- a) Sequence is 5, 8, 11 ...  
 b)  $x_{20} = 3 \times 20 + 2 = 62$   
 Sum of first 20 terms =  $(5 + 62) \times \frac{20}{2} = 670$   
 mean =  $\frac{670}{20} = 33.5$   
 c) 10 th and 11 th comes in the middle. .  $x_{10} = 32, x_{11} = 35$   
 Mean =  $\frac{32+35}{2} = 33.5$   
 d) Mean and median are equal.

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## Session 126 | Statistics 2 | Worksheet 126

- 1) Consider a group of numbers in an arithmetic sequence
  - a) What is the general form of its algebra ?
  - b) Calculate the mean of these numbers
  - c) Find the median .
  - d) Are mean and median equal? Write a statement about the result.

### Answers

- a)  $x_n = an + b$
- b) Sum of first  $n$  terms is  $= a(1 + 2 + 3 + \dots + n) + bn = a \times \frac{n}{2}(n + 1) + bn$   
 Mean = sum  $\div$  number of terms . Mean =  $(a \times \frac{n}{2}(n + 1) + bn \div n) = a \times \frac{n+1}{2} + b$ .
- c) In  $n$  is odd ,  $n + 1$  th term will be the median. It is  $x_{\frac{n+1}{2}} = a(\frac{n+1}{2}) + b$ . This is mean itself.  
 If  $n$  is even  $x_{\frac{n}{2}}$  and  $x_{\frac{n}{2} + 1}$ th terms comes in the middle. The mean of these middle terms is considered as the median.  
 $x_{\frac{n}{2}} = a\frac{n}{2} + b, x_{\frac{n}{2} + 1} = a(\frac{n}{2} + 1) + b$ .  
 Median =  $\frac{a \times \frac{n}{2} + b + a(\frac{n}{2} + 1) + b}{2} = a\frac{n+1}{2} + b$
- d) If the numbers are in arithmetic sequence mean and median are equal.

- 2) The scores of 40 students in a quiz are given below

Score	4	6	9	10	15
Number of Children	5	10	10	7	8

- a) Calculate the total score in the class
- b) Calculate mean score
- c) Find the median of the scores
- d) How many students are there above median score ?

## Answers

a) Total scores =  $4 \times 5 + 6 \times 10 + 9 \times 10 + 10 \times 7 + 15 \times 8 = 20 + 60 + 90 + 70 + 120 = 360$

b) mean =  $\frac{360}{40} = 9$

c) Look at the table given below

Scores	Number of students
<u>upto 4</u>	5
<u>upto 6</u>	15
<u>upto 9</u>	25
<u>upto 10</u>	32
<u>upto 15</u>	40

Number of students is 40. So 20<sup>th</sup> and 21<sup>st</sup> students comes in the middle. From the table it is clear that score of students from 16<sup>th</sup> to 25<sup>th</sup> is 9. Therefore score of 20<sup>th</sup> and 21<sup>st</sup> is 9.

Median score is 9.

d) Number of students above median score is 15.

3) The weights of 12 members of a team are given below

Weight	67	70	72	73	75
Number of members	4	3	2	2	1

a) Prepare a table for calculating the median

b) What is the median of the weights ?

c) How many members are having median weight and below?

d) How many members are there above median weight?

### Answers

a) Table

Weight	No
up to 67	4
up to 70	7
up to 72	9
up to 73	11
up to 75	12

b)  $n = 12$ (even). Therefore 6 th and 7 th members comes in the middle. From the table it is clear that 6 th and 7 th member has weight 70.

Median weight is 70

c) There are 4 members having weight below median weight .

d) There are 5 members having weight above median.

4) The daily wages of 200 workers in a factory are given below .

Wages	350	400	450	500	550	600
No. Workers	14	50	30	40	36	30

a) Prepare the table for calculating the median.

b) Find the median wage.

c) How many workers are getting median wage and below ?

d) How many workers are getting median wage and above ?

### Answers

a) Table

wages	Number
350	14
400	64
450	94
500	134
550	170
600	200

b)  $n = 200$ (even). So 100 th and 101st wage comes in the middle. From the table it is clear that wage of both 100 th and 101st worker is 500. Median is 500.

c) There are 94 workers having daily wage below 500.

d) There are 66 workers having wage above 500.

5) Answer the following questions.

- a) Find the mean of 100 odd numbers .
- b) Find the median of first 100 odd numbers
- c) What is the mean of first  $n$  even numbers ?
- d) What is the median of first  $n$  even numbers ?

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#### Answers

a) mean =  $\frac{100^2}{100} = 100$

b) 1, 3, 5, 7... are odd numbers.  $x_n = 2n - 1$ .

50 th and 51st odd numbers comes in the middle. These are  $2 \times 50 - 1, 2 \times 51 - 1$

Median =  $\frac{99+101}{2} = 100$

c) Mean =  $\frac{n(n+1)}{n} = n + 1$

d) 2, 4, 6, 8... ,  $x_n = 2n$

$\frac{n}{2}$  th and  $(\frac{n}{2} + 1)$  th comes in the middle. These are  $n$  and  $n + 2$ . Median  $\frac{n+n+2}{2} = n + 1$

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## Session 127 | Statistics 3 | Worksheet 127

1) The marks obtained by 39 students of a class are given below .

Marks	Number
0 -10	4
10 -20	13
20 -30	10
30 -40	7
40 -50	5

- What is meant by class and number of students in each class?
- Prepare a table showing the number of marks below the upper limit of each class
- If the marks are arranged as above which student comes in the middle?
- Name the class in which the mark of 20th student comes .
- How many students are there in this class ?
- Make sub classes in the median class showing equal sharing of marks to the children of the class. What is the middle mark of each sub class?
- If the marks in the subclasses are in an arithmetic sequence then what is the mark obtained by the student comes in the middle.
- Calculate median.



## Answers

- a) The class 0 – 10 and number 4 together means there are 4 students got the mark greater than or equal to 0 and less than 10. The mark 10 comes in the next class 10 – 20 and so on.
- b) Table is given below .

Marks	Number
Below 10	4
Below 20	13+4=17
Below 30	10+17=27
Below 40	27+7=34
<u>Upto</u> 50	34+5=39

- c) Since total number of students is 39, an odd number, 20 th student comes in the middle or 20 th mark comes in the middle.
- d) 20 th mark comes in the class 20 – 30
- e) This class contains 10 students or marks.
- f) If 10 marks are divided equally among 10 students, each one's share is 1  
Sub classes are

Sub class	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30
Share	1	1	1	1	1	1	1	1	1	1

20.5, 21.5, 22.5, 23.5, 24.5, 25.5, 26.5, 27.5, 28.5, 29.5

- g) Mark of 18 th student is 20.5, mark of 19 th student is 21.5, Mark of 20 th student is 22.5.  
The middle mark is 22.5
- h) median is 22.5

- 2) The marks obtained by 47 students in a class are given below .

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0 -10	6
10 - 20	9
20 - 30	17
30 - 40	10
40 - 50	5

- a) Prepare a table for calculating the median
- b) In which class 24 th mark comes ?
- c) What are the assumptions for calculating median?
- d) What is the mark obtained by 16 th student as per our assumption?
- e) Calculate the median .

## Answers

a) Table is given below

Marks	Number
Below 10	6
Below 20	15
Below 30	32
Below 40	42
Upto 50	47

b)  $n = 47$  (odd number). So  $\frac{47+1}{2}$  th mark(it is 24 th mark) comes in the middle.It is in the class 20 – 30

c) We assume that the marks in the median class are equally distributed among the members in that class. The marks make an arithmetic sequence in that class. The first term of the sequence is the mark corresponding to the first member of the class. The common difference is each one's share in the equal distribution.

d) 10 marks are distributed equally among 17 students.Each one's share is  $\frac{10}{17} = 0.58$   
Mark of 16 th student is  $20 + \frac{0.58}{2} = 20.29$

• e)]  $f = 20.29, d = 0.58, 24$  th mark is 9 th term of the arithmetic sequence.

$$x_9 = f + 8d = 20.29 + 8 \times 0.58 = 20.29 + 4.64 = 24.93.$$

median is 24.93

Common difference is obtained by dividing class width by frequency of the median class.  
Half of the frequency should be added to the lower limit to get the middle value . note

3) (TBQ) The table given below shows the daily wages of workers in a factory .

ദിനസംകൂലി	ജോലിക്കാരുടെ എണ്ണം
400-500	6
500-600	7
600-700	10
700-800	9
800-900	5
900-1000	4

a) Prepare a table for calculating the median.

b) In which class 21 st wage comes?

c) What are the assumptions for calculating median.

d) What is the wage of 14 th worker in the arrangement?

e) Calculate median

## Answers

a) table is given below

Wages	No of Workers
Below 500	6
Below 600	13
Below 700	23
Below 800	32
Below 900	37
Below 1000	41

b) Since  $n = 41$  odd,  $\frac{41+1}{2}$  th wage comes in the middle. It is 21 st wage. In comes in the class 600 – 700.

c) We assume that the wages in the median class are equally distributed among the workers in that class. The wages make an arithmetic sequence in that class. The first term of the sequence is the wage corresponding to the first member of the class. The common difference is each one's share in the equal distribution.

d) There are 10 workers in the median class. 100 rupees is equally divided among 10 workers. Each one's share is  $\frac{100}{10} = 10$ .

14 th worker is the first worker in the median class. Wage of 14 th worker is  $600 + \frac{10}{2} = 605$

d) In the assumed arithmetic sequence ,  $f = 605, d = 10. x_8 = f + 7d = 605 + 7 \times 10 = 605 + 70 = 675$

Median is 675

## Session 128 | Statistics 4 | Worksheet 128

1) The table shows the consumption of electricity in houses in a region.

Use of Electricity in Unit	Number of houses
80 - 90	3
90 - 100	6
100 - 110	7
110 - 120	10
120 - 130	9
130 - 140	5

- If the houses are arranged according to the increasing order of consumption which house comes in the middle .In which class it belongs to?
- If the consumptions in the median class are in an arithmetic sequence what is the consumption of 17 th house?
- What are the consumption amount of the houses comes in the middle?
- Calculate the median consumption of electricity?

## Answers

- a) Look at the table given below

Use of Electricity in Unit	Number of houses
Below 90	3
Below 100	9
Below 110	16
Below 120	26
Below 130	35
Upto 140	40

Total number of houses is 40. Therefore 20th and 21st houses come in the middle. These houses belong to the class 110 – 120.

- b) There are 10 houses in the class and the width consumption is 10 units. If 10 units is divided equally among 10 houses, each one's share is 1.  
Consumption of 17th house is  $110 + \frac{1}{2} = 110 + 0.5 = 110.5$
- c) 20th and 21st consumption units come in the middle. These are 4th and 5th terms of the arithmetic sequence with first term 110.5 and common difference 1.  
 $x_4 = 110.5 + 3 \times 1 = 113.5$ ,  $x_5 = 114.5$
- d) Median =  $\frac{113.5 + 114.5}{2} = 114$

- 2) The table gives the distribution of marks obtained by the students in a class in an examination

Marks	Number of houses
0 - 10	4
10 - 20	8
20 - 30	10
30 - 40	9
40 - 50	5

- a) Prepare a table for calculating the median.
- b) In which class do the middle marks occur?
- c) What will be the mark of 13th student according to the assumption of calculating median?
- d) What are the marks that come in the middle?
- e) Calculate the median.

## Answers

a) Look at the table given below

Marks	Number
Below 10	4
Below 20	12
Below 30	22
Below 40	31
Upto 50	36

b) Since  $n = 36$ , even, 18 th and 19 th marks comes in the middle. These marks are in the class 20 – 30

c) 10 marks are divided equally among 10 students. Each one's share is 1.  
Mark of 13 th student is  $20 + \frac{1}{2} = 20.5$

d) 18 th mark is the 8 th term of the arithmetic sequence with first term 20.5 and common difference 1.

$$x_6 = f + 5d = 20.5 + 5 \times 1 = 25.5, x_7 = 26.5$$

d) Median =  $\frac{25.5+26.5}{2} = 26$

3) (SSLC 2019 Model )

The table shows the marks obtained by the students in a class.

Score	Number
0 - 10	5
10 - 20	9
20 - 30	10
30 - 40	9
40 - 50	8

a) If the scores are arranged in the ascending order what are the positions of scores comes in the middle.

b) What is the mark of 15 th student?

c) Calculate the median.

## Answers

a) Look at the table.

Marks	Number
Below 10	5
Below 20	14
Below 30	24
Below 40	33
Upto 50	41

Since  $n = 41$ , odd  $\frac{41+1}{2} = 21$  st score comes in the middle.

- b) Middle score belongs to the class 20–30. There are 10 marks in this class and 10 students in it. Dividing marks equally among 10 children each one's share is 1. 15th score is 20.5
- c) Marks in the median class are in an arithmetic sequence.  $f = 20.5, d = 1$   
Seventh term of this sequence is  $f + 6d = 20.5 + 6 \times 1 = 26.5$   
Median = 26.5

4) (SSLC 2020 )

marks obtained by students in a class are given below

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0 -10	4
10 -20	7
20 -30	10
30 -40	12
40 -50	8

- a) If the scores are arranged in the increasing order what is the position of the mark comes in the middle.
- b) What is the mark obtained by 12 th student?
- c) Calculate median.

## Answers

a) Table

Marks	No
Below 10	4
Below 20	11
Below 30	21
Below 40	33
<u>Upto 50</u>	41

Since  $n = 41$ , odd, 21 mark comes in the middle. It is in the class 20 – 30.

b) 12 th mark is  $20 + 0.5 = 20.5$

c) In the arithmetic sequence with  $f = 20.5$ ,  $d = 1$  twentyfirst mark will be the median. It is 10th term of the sequence .  $x_{10} = f + 9d = 20.5 + 9 \times 1 = 29.5$   
Median is 29.5