WANDOOR GANITHAM – S.S.L.C STUDY MATERIAL 2021

STATISTICS – CLASSES & MEDIAN

1 **The table below shows the workers in a factory sorted according to their daily wages .**

Daily wages (Rs)	Number of workers
400 - 500	7
500 - 600	8
600 - 700	10
700 - 800	9
800 - 900	5
900 - 1000	4

a) If the workers are arranged in increasing order of daily wage , the daily wage of of the worker at what position is taken as the median ?

b) If the workers are arranged in increasing order of daily wage , what is the daily wage of the worker at the 16^{th} position ?

c) Find the median daily wage ?

Answer.

Daily wages	Number of workers
Below 500	7
Below 600	15
Below 700	25
Below 800	34
Below 900	39
Below 1000	43

a) $N = 43$

$$\frac{N+1}{2} = \frac{43+1}{2} = \frac{44}{2} = 22$$

➤ **Median = Daily wage of the 22th worker =** x_{22}

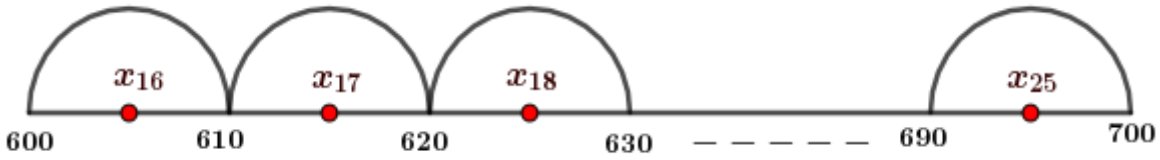
➤ **Median comes between 600 and 700 . (Median class : 600 – 700)**

➤ **There are 10 workers in the median class**

➤ **Divide the 100 rupees between 600 and 700 into 10 equal parts .**

➤ **Length of one sub division =** $\frac{100}{10} = 10 = d$

➤ **Assume that each such subdivision contains one worker whose daily wage is the mid value of that subdivision .**



b) $x_{16} = \frac{600+610}{2} = \frac{1210}{2} = 605$

(The daily wages in the median class are in arithmetic sequence)

c) Median = x_{22}

$= x_{16} + 6d = 605 + 6 \times 10 = 605 + 60 = Rs\ 665$

2 **71 households in a neighbourhood are sorted according to their monthly income in the table below .**

Monthly income (Rs)	Number of households
3000 - 4000	9
4000 - 5000	10
5000 - 6000	15
6000 - 7000	20
7000 - 8000	11
8000 - 9000	6

a) If the households are arranged in increasing order of monthly income , the monthly income of the household at what position is taken as the median ?

b) If the households are arranged in increasing order of monthly income , what is assumed to be the monthly income of the household at the 35^{th} position ?

c) Find the median of the monthly income ?

Answer.

Monthly income	Number of households
Below 4000	9
Below 5000	19
Below 6000	34
Below 7000	54
Below 8000	65
Below 9000	71

a) $N = 71$

→ $\frac{N+1}{2} = \frac{71+1}{2} = \frac{72}{2} = 36$

→ **Median = Mark of the 36^{th} student =** x_{36}

→ **Median comes between 6000 and 7000 . (Median class : 6000 – 7000)**

→ **There are 20 households in the median class .**

→ **Divide the 1000 rupees between 6000 and 7000 into 20 equal parts .**

→ **Length of one sub division =** $\frac{1000}{20} = 50 = d$

→ **Assume that each such subdivision contains one household whose monthly income is the mid value of that subdivision .**

b) $x_{35} = \frac{6000+6050}{2} = \frac{12050}{2} = 6025$

(The monthly incomes in the median class are in arithmetic sequence)

c) Median = x_{36}

= $x_{35}+d$ = $6025 + 50$ = $Rs\ 6075$

3 **The table below shows the children in a class sorted according to their marks in maths exam .**

Marks	Number of students
0 – 10	5
10 – 20	11
20 – 30	10
30 – 40	12
40 – 50	7

a) If the students are arranged in increasing order of marks , the mark of the student at what position is taken as the median ?

b) If the students are arranged in increasing order of marks , what is assumed to be the mark of the student at the 17^{th} position ?

c) Find the median mark ?

Answer.

Marks	Number of students
Below 10	5
Below 20	16
Below 30	26
Below 40	38
Below 50	45

a) $N = 45$

$\frac{N+1}{2}=\frac{45+1}{2}=\frac{46}{2}=23$

Median = mark of the 23rd student = x_{23}

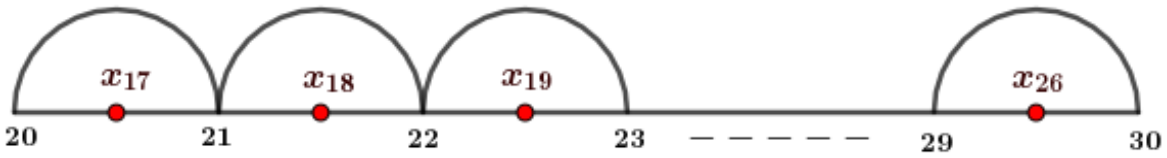
Median comes between 20 and 30 . (Median class : 20 – 30)

There are 10 students in the median class .

Divide the 10 marks between 20 and 30 into 10 equal parts .

Length of one sub division = $\frac{10}{10}=1=d$

Assume that each such subdivision contains one student whose mark is the mid value of that subdivision .



b) $x_{17}=\frac{20+21}{2}=\frac{41}{2}$

(The marks in the median class are in arithmetic sequence)

c) Median = x_{23}

$= x_{17}+6d = \frac{41}{2}+6\times1 = \frac{41}{2}+6=20.5+6=26.5$

4 **The table shows some households sorted according to their usage of electricity .**

Electricity usage (units)	Number of households
80 – 90	3
90 – 100	4
100 – 110	4
110 – 120	5
120 – 130	6
130 – 140	6

a) If the households are arranged in increasing order of usage of their electricity , half the sum of the usage of the households at what positions are taken as the median ?

b) If the households are arranged in increasing order of usage of their electricity , what is assumed to be the usage of the household at the 12^{th} position ?

c) Find the median usage ?

Answer .

Electricity usage	Number of households
Below 90	3
Below 100	7
Below 110	11
Below 120	16
Below 130	22
Below 140	28

a) $N = 28$

→ $\frac{N+1}{2} = \frac{28+1}{2} = \frac{29}{2} = 14.5$

→ **Median = Half the sum of the usages of the 14^{th} and 15^{th} households**

$= \frac{x_{14} + x_{15}}{2}$

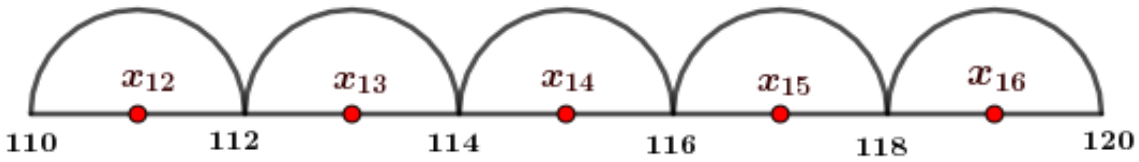
→ **Median comes between 110 and 120 . (Median class : 110 – 120)**

→ **There are 5 households in the median class .**

→ **Divide the 10 units between 110 and 120 into 5 equal parts .**

→ **Length of one sub division** $= \frac{10}{5} = 2 = d$

→ **Assume that each such subdivision contains one house hold whose usage is the mid value of that subdivision .**



b) $x_{12} = \frac{110+112}{2} = \frac{222}{2} = 111$

(The usages of electricity in the median class are in arithmetic sequence)

c) $x_{14} = x_{12} + 2d = 111 + 2 \times 2 = 111 + 4 = 115$

$x_{15} = x_{14} + d = 115 + 2 = 117$

Median $= \frac{x_{14}+x_{15}}{2} = \frac{115+117}{2} = \frac{232}{2} = 116$ *units*

5 **The table below shows the workers in a factory sorted according to their daily wages .**

Daily wages (Rs)	Number of workers
350 - 500	5
500 - 650	8
650 - 800	15
800 - 950	9
950 - 1100	7

a) If the workers are arranged in increasing order of daily wages , half the sum of the daily wage of the workers at what positions are taken as the median ?

b) If the workers are arranged in increasing order of daily wages , hat is assumed to be the daily wage of the worker at the 14th position ?

c) Find the median daily wage ?

Answer .

Daily wages	Number of workers
Below 500	5
Below 650	13
Below 800	28
Below 950	37
Below 1100	44

a) $N = 44$

$\frac{N+1}{2} = \frac{44+1}{2} = \frac{45}{2} = 22.5$

Median = Half the sum of the daily wages of the 22nd and 23rd workers

$= \frac{x_{22} + x_{23}}{2}$

Median comes between 650 and 800 . (Median class : 650 – 800)

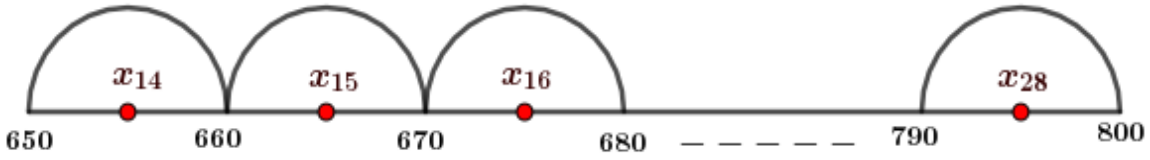
There are 15 workers in the median class .

.

Divide the 150 rupees between 650 and 800 into 15 equal parts .

Length of one sub division $= \frac{150}{15} = 10 = d$

Assume that each such subdivision contains one worker whose daily wage is the mid value of that subdivision .



b) $x_{14} = \frac{650+660}{2} = \frac{1310}{2} = 655$

(The daily wages in the median class are in arithmetic sequence)

c) $x_{22} = x_{14} + 8d = 655 + 8 \times 10 = 655 + 80 = 735$, $x_{23} = x_{22} + d = 735 + 10 = 745$

Median $= \frac{x_{22} + x_{23}}{2} = \frac{735+745}{2} = \frac{1480}{2} = Rs\ 740$