NCERT solutions for class 10 maths chapter 14 Statistics Excercise: 14.1

Q1 A survey was conducted by a group of students as a part of their environment awareness program, in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house.

Number of plants	0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
Number of houses	1	2	1	5	6	2	3

Which method did you use for finding the mean, and why?

Answer:

Number of plants	Number of houses f_i	Classmark x_i	$f_i x_i$
0-2	1	1	1
2-4	2	3	6
4-6	1	5	5
6-8	5	7	35
8-10	6	9	54
10-12	2	11	22
12-14	3	13	39

	$\sum f_i$ =20		$\sum f_i x_i$ =162

Mean,

$$\overline{x} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{162}{20} = 8.1$$

We used the direct method in this as the values of x_i and f_i are small.

Q2 Consider the following distribution of daily wages of 50 workers of a factory.

Daily wages (in ₹)	500 - 520	520-540	540 - 560	560 - 580	580 -600
Number of workers	12	14	8	6	10

Find the mean daily wages of the workers of the factory by using an appropriate method.

Answer:

Let the assumed mean be a = 550

Daily Wages	Number of workers f_i	Classmark x_i	$d_i = x_i - a$	$f_i d_i$
500-520	12	510	-40	-480
520-540	14	530	-20	-280
540-560	8	550	0	0
560-580	6	570	20	120

580-600	10	590	40	400
	$\sum f_i$ =50			$\sum f_i x_i$ =-240

Mean,

$$\overline{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$
$$= 550 + \frac{-240}{50} = 550 - 4.8 = 545.20$$

Therefore, the mean daily wages of the workers of the factory is Rs. 545.20

Q3 following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs 18. Find the missing frequency f.

Daily pocket allowance (in ₹)	11 - 13	13 - 15	15 - 17	17 - 19	19 - 21	21 - 23	23 - 25
Number of children	7	6	9	13	f	5	4

Answer:

Daily pocket allowance	Number of children f_i	Classmark x_i	$f_i x_i$
11-13	7	12	84
13-15	6	14	84
15-17	9	16	144
17-19	13	18	234

19-21	f	20	20f
21-23	5	22	110
23-25	4	24	96
	$\sum f_i$ =44+f		$\sum f_i x_i$ =752+20f

Mean,

$$\overline{x} = \frac{\sum f_i x_i}{\sum f_i}$$
$$\implies 18 = \frac{752 + 20f}{44 + f}$$

$$\implies 18(44 + f) = (752 + 20f)$$
$$\implies 2f = 40$$
$$\implies f = 20$$

Therefore the missing f = 20

Q4 Thirty women were examined in a hospital by a doctor and the number of heartbeats per minute was recorded and summarised as follows. Find the mean heartbeats per minute for these women, choosing a suitable method.

Number of heartbeats per minute	65-68	68-71	71-74	74-77	77-80	80-83	83-86
Number of women	2	4	3	8	7	4	2

Answer:

Let the assumed mean be a = 75.5

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No. of heartbeats per minute	Number of women f_i	Classmark x_i	$d_i = x_i - a$	$f_i d_i$
65-68	2	66.5	-9	-18
68-71	4	69.5	-6	-24
71-74	3	72.5	-3	-9
74-77	8	75.5	0	0
77-80	7	78.5	3	21
80-83	4	81.5	6	24
83-86	2	84.5	9	18
	$\sum f_i$ =30			$\sum f_i x_i$ =12

Mean,

$$\overline{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$
$$= 75.5 + \frac{12}{30} = 75.5 + 0.4 = 75.9$$

Therefore, the mean heartbeats per minute of these women are 75.9

Q5 In a retail market, fruit vendors were selling mangoes kept in packing boxes. These boxes contained varying numbers of mangoes. The following was the distribution of mangoes according to the number of boxes.

Number of mangoes	50 - 52	53 - 55	56 - 58	59 - 61	62 - 64
Number of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose?

Answer:

Let the assumed mean be a = 57

Number of mangoes	Number of boxes f_i	Classmark x_i	$d_i = x_i - a$	$f_i d_i$
50-52	15	51	-6	-90
53-55	110	54	-3	-330
56-58	135	57	0	0
59-61	115	60	3	345
62-64	25	63	6	150
	$\sum f_i$ =400			$\sum f_i x_i$ =75

Mean,

$$\overline{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$

$$= 57 + \frac{75}{400} = 57 + 0.1875 = 57.1875 \approx 57.19$$

Therefore, the mean number of mangoes kept in a packing box is approx 57.19

Q6 The table below shows the daily expenditure on the food of 25 households in a locality.

Daily expenditure (in ₹)	100 - 150	150 - 200	200 - 250	250 - 300	300 - 350
Number of households	4	5	12	2	2

Find the mean daily expenditure on food by a suitable method.

Answer:

Let the assumed mean be a = 225 and h = 50

Daily Expenditure	Number of households f_i	Classmark x_i	$d_i = x_i - a$	$u_i = \dfrac{d_i}{h}$	$f_i u_i$
100-150	4	125	-100	-2	-8
150-200	5	175	-50	-1	-5
200-250	12	225	0	0	0
250-300	2	275	50	1	2
300-350	2	325	100	2	4
	$\sum f_i$ =25				$\sum f_i x_i$ = -7

Mean,

$$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$$
$$= 225 + \frac{-7}{25} \times 50 = 225 - 14 = 211$$

Therefore, the mean daily expenditure on food is Rs. 211

Q7 To find out the concentration of SO_2 in the air (in parts per million, i.e., ppm), the data was collected for 30 localities in a certain city and is presented below:

Concentration of SO_2 (in ppm)	Frequency
0.00 - 0.04	4
0.04 - 0.08	9
0.08 - 0.12	9
0.12 - 0.16	2
0.16 - 0.20	4
0.20 - 0.24	2

Find the mean concentration of SO_2 in the air.

Answer:

Class Interval	Frequency f_i	Classmark x_i	$f_i x_i$
0.00-0.04	4	0.02	0.08
0.04-0.08	9	0.06	0.54
0.08-0.12	9	0.10	0.90
0.12-0.16	2	0.14	0.28
0.16-0.20	4	0.18	0.72

0.20-0.24	2	0.22	0.44
	$\sum f_i$ =30		$\sum f_i x_i$ =2.96

Mean,

$$\overline{x} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{2.96}{30} = 0.099$$

Therefore, the mean concentration of SO_2 in the air is 0.099 ppm

Q8 A class teacher has the following absentee record of 40 students of a class for the whole term. Find the mean number of days a student was absent.

Number of days	0 - 6	6 - 10	10 - 14	14 - 20	20 - 28	28 - 38	38 - 40
Number of students	11	10	7	4	4	3	1

Answer:

Number of days	Number of Students f_i	Classmark x_i	$f_i x_i$
0-6	11	3	33
6-10	10	8	80
10-14	7	12	84

14-20	4	17	68
20-28	4	24	96
28-38	3	33	99
38-40	1	39	39
	$\sum f_i$ =40		$\sum f_i x_i$ =499

Mean,

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{499}{40} = 12.475 = \frac{499}{40} = 12.475 \approx 12.48$$

Therefore, the mean number of days a student was absent is 12.48 days.

Q9 The following table gives the literacy rate (in percentage) of 35 cities. Find the mean literacy rate.

Literacy rate (in %)	45 - 55	55 - 65	65 - 75	75 - 85	85 - 95
Number of cities	3	10	11	8	3

Answer:

Let the assumed mean be a = 75 and h = 10

Literacy rates	Number of	Classmark x_i	$d_i = x_i - a$	$u_i = \dfrac{d_i}{h}$	$f_i u_i$

	cities f_i				
45-55	3	50	-20	-2	-6
55-65	10	60	-10	-1	-10
65-75	11	70	0	0	0
75-85	8	80	10	1	8
85-95	3	90	20	2	6
	$\sum f_i$ = 35				$\sum f_i x_i$ = -2

Mean,

$$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$$
$$= 70 + \frac{-2}{35} \times 10 = 70 - 0.57 = 69.43$$

Therefore, the mean mean literacy rate is 69.43%

NCERT solutions for class 10 maths chapter 14 Statistics Excercise: 14.2

Q1 [The following table shows the ages of the patients admitted in a hospital during a year:](#)

Age (in years)	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65
Number of patients	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 23 and hence the modal class = 35-45

Lower limit (l) of modal class = 35, class size (h) = 10

Frequency (f_1) of the modal class = 23, frequency (f_0) of class preceding the modal class = 21, frequency (f_2) of class succeeding the modal class = 14.

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 35 + \left(\frac{23 - 21}{2(23) - 21 - 14} \right).10$$

$$= 35 + \frac{2}{11}.10$$

$$= 36.8$$

Now,

Age	Number of patients f_i	Classmark x_i	$f_i x_i$
5-15	6	10	60
15-25	11	20	220
25-35	21	30	630

35-45	23	40	920
45-55	14	50	700
55-65	5	60	300
	$\sum f_i$ =80		$\sum f_i x_i$ =2830

Mean,

$$\overline{x} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{2830}{80} = 35.37$$

The maximum number of patients are in the age group of 36.8, whereas the average age of all the patients is 35.37.

Q2 The following data gives information on the observed lifetimes (in hours) of 225 electrical components :

Lifetimes (in hours)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 61 and hence the modal class = 60-80

Lower limit (l) of modal class = 60, class size (h) = 20

Frequency (f_1) of the modal class = 61 frequency (f_0) of class preceding the modal class = 52, frequency (f_2) of class succeeding the modal class = 38.

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) .h$$

$$= 60 + \left(\frac{61 - 52}{2(61) - 52 - 38} \right) .20$$

$$= 60 + \frac{9}{32} .20$$

$$= 65.62$$

Thus, the modal lifetime of 225 electrical components is 65.62 hours

Q3 <u>The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure :</u>

Expenditure (in ₹)	Number of families
1000-1500	24
1500-2000	40
2000-2500	33
2500-3000	28
3000-3500	30
3500-4000	22
4000-4500	16
4500-5000	7

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 40 and hence the modal class = 1500-2000

Lower limit (l) of modal class = 1500, class size (h) = 500

Frequency (f_1) of the modal class = 40 frequency (f_0) of class preceding the modal class = 24, frequency (f_2) of class succeeding the modal class = 33.

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 1500 + \left(\frac{40 - 24}{2(40) - 24 - 33} \right).500$$

$$= 1500 + \frac{16}{23}.500$$

$$= 1847.82$$

Thus, the Mode of the data is Rs. 1847.82

Now,

Let the assumed mean be a = 2750 and h = 500

Expenditure	Number of families f_i	Classmark x_i	$d_i = x_i - a$	$u_i = \dfrac{d_i}{h}$	$f_i u_i$
1000-1500	24	1250	-1500	-3	-72
1500-2000	40	1750	-1000	-2	-80
2000-2500	33	2250	-500	-1	-33
2500-3000	28	2750	0	0	0
3000-3500	30	3250	500	1	30

3500-4000	22	3750	1000	2	44
4000-4500	16	4250	1500	3	48
4500-5000	7	4750	2000	4	28
	$\sum f_i$ =200				$\sum f_i x_i$ = -35

Mean,

$$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$$
$$= 2750 + \frac{-35}{200} \times 500 = 2750 - 87.5 = 2662.50$$

Thus, the Mean monthly expenditure is Rs. 2662.50

Q4 <u>The following distribution gives the state-wise teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data. Interpret the two measures.</u>

Number of students per teacher	Number of states/U.T.
15 - 20	3
20 - 25	8
25 - 30	9
30 - 35	10
35 - 40	3
40 - 45	0
45 - 50	0
50 - 55	2

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 10 and hence the modal class = 30-35

Lower limit (l) of modal class = 30, class size (h) = 5

Frequency (f_1) of the modal class = 10 frequency (f_0) of class preceding the modal class = 9, frequency (f_2) of class succeeding the modal class = 3

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 30 + \left(\frac{10 - 9}{2(10) - 9 - 3} \right).5$$

$$= 30 + \frac{1}{8}.5$$

$$= 30.625$$

Thus, Mode of the data is 30.625

Now,

Let the assumed mean be a = 32.5 and h = 5

Class	Number of states f_i	Classmark x_i	$d_i = x_i - a$	$u_i = \dfrac{d_i}{h}$	$f_i u_i$
15-20	3	17.5	-15	-3	-9
20-25	8	22.5	-10	-2	-16
25-30	9	27.5	-5	-1	-9
30-35	10	32.5	0	0	0

35-40	3	37.5	5	1	3
40-45	0	42.5	10	2	0
45-50	0	47.5	15	3	0
50-55	2	52.5	20	4	8
	$\sum f_i$ =35				$\sum f_i x_i$ = -23

Mean,

$$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$$
$$= 32.5 + \frac{-23}{35} \times 5 = 29.22$$

Thus, the Mean of the data is 29.22

Q5 The given distribution shows the number of runs scored by some top batsmen of the world in one-day international cricket matches.

Runs scored	Number of batsmen
3000 - 4000	4
4000 - 5000	18
5000 - 6000	9
6000 - 7000	7
7000 - 8000	6
8000 - 9000	3
9000 - 10000	1
10000 - 11000	1

Find the mode of the data.

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 18 and hence the modal class = 4000-5000

Lower limit (l) of modal class = 4000, class size (h) = 1000

Frequency (f_1) of the modal class = 18 frequency (f_0) of class preceding the modal class = 4, frequency (f_2) of class succeeding the modal class = 9

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 4000 + \left(\frac{18 - 4}{2(18) - 4 - 9} \right).1000$$

$$= 4000 + \frac{14}{23}.1000$$

$$= 4608.70$$

Thus, Mode of the data is 4608.70

Q6 A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mode of the data :

Number of cars	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Frequency	7	14	13	12	20	11	15	8

Answer:

The class having maximum frequency is the modal class.

The maximum frequency is 20 and hence the modal class = 40-50

Lower limit (l) of modal class = 40, class size (h) = 10

Frequency (f_1) of the modal class = 20 frequency (f_0) of class preceding the modal class = 12, frequency (f_2) of class succeeding the modal class = 11

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 40 + \left(\frac{20 - 12}{2(20) - 12 - 11} \right).10$$

$$= 40 + \frac{8}{17}.10$$

$$= 44.70$$

Thus, Mode of the data is 44.70

6. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mode of the data :
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NCERT solutions for class 10 maths chapter 14 Statistics Excercise: 14.3

Q1 The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median, mean and mode of the data and compare them.

Monthly consumption (in units)	Number of consumers
65 - 85	4
85 - 105	5
105 - 125	13
125 - 145	20
145 - 165	14
165 - 185	8
185 - 205	4

Answer:

Let the assumed mean be a = 130 and h = 20

Class	Number of consumers f_i	Cumulative Frequency	Classmark x_i	$d_i = x_i - a$	$u_i = \dfrac{d_i}{h}$	$f_i u_i$
65-85	4	4	70	-60	-3	-12
85-105	5	9	90	-40	-2	-10
105-125	13	22	110	-20	-1	-13
125-145	20	42	130	0	0	0
145-165	14	56	150	20	1	14

165-185	8	64	170	40	2	16
185-205	4	68	190	60	3	12
		$\sum f_i = N$ = 68				$\sum f_i x_i$ = 7

MEDIAN:

$N = 68 \implies \dfrac{N}{2} = 34$

$\therefore$ Median class = 125-145; Cumulative Frequency = 42; Lower limit, l = 125;

c.f. = 22; f = 20; h = 20

$Median = l + \left(\dfrac{\frac{n}{2} - c.f}{f} \right).W$

$= 125 + \left(\dfrac{34 - 22}{20} \right).20$

$= 125 + 12$

$= 137$

Thus, the median of the data is 137

MODE:

The class having maximum frequency is the modal class.

The maximum frequency is 20 and hence the modal class = 125-145

Lower limit (l) of modal class = 125, class size (h) = 20

Frequency (f_1) of the modal class = 20; frequency (f_0) of class preceding the modal class = 13, frequency (f_2) of class succeeding the modal class = 14.

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 125 + \left(\frac{20 - 13}{2(20) - 13 - 14} \right).20$$

$$= 125 + \frac{7}{13}.20$$

$$= 135.76$$

Thus, Mode of the data is 135.76

MEAN:

Mean,

$$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$$

$$= 130 + \frac{7}{68} \times 20 = 137.05$$

Thus, the Mean of the data is 137.05

Q2 <u>If the median of the distribution given below is 28.5, find the values of x and y.</u>

Class interval	Frequency
0 - 10	5
10 - 20	x
20 - 30	20
30 - 40	15
40 - 50	y
50 - 60	5
Total	**60**

Answer:

Class	Number of	Cumulative

	consumers f_i	Frequency
0-10	5	5
10-20	x	5+x
20-30	20	25+x
30-40	15	40+x
40-50	y	40+x+y
50-60	5	45+x+y
	$\sum f_i = N$ = 60	

$$N = 60 \implies \frac{N}{2} = 30$$

Now,

Given median = 28.5 which lies in the class 20-30

Therefore, Median class = 20-30

Frequency corresponding to median class, f = 20

Cumulative frequency of the class preceding the median class, c.f. = 5 + x

Lower limit, l = 20; Class height, h = 10

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f} \right).W$$

Also,

Therefore, the required values are: x=8 and y=7

Q3 <u>A life insurance agent found the following data for the distribution of ages of 100 policyholders. Calculate the median age, if policies are given only to persons having age 18 years onwards but less than 60 years.</u>

Age (in years)	Number of policy holders
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	92
Below 55	98
Below 60	100

Answer:

Class	Frequency f_i	Cumulative Frequency
15-20	2	2
20-25	4	6
25-30	18	24

30-35	21	45
35-40	33	78
40-45	11	89
45-50	3	92
50-55	6	98
55-60	2	100

$$N = 100 \implies \frac{N}{2} = 50$$

Therefore, Median class = 35-45

Frequency corresponding to median class, f = 21

Cumulative frequency of the class preceding the median class, c.f. = 24

Lower limit, l = 35; Class height, h = 10

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f} \right).W$$
$$= 35 + \left(\frac{50 - 45}{33} \right).5$$

$$= 35.75$$

Thus, the median age is 35.75 years.

Q4 The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table :

Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

Find the median length of the leaves.

(Hint: The data needs to be converted to continuous classes for finding the median since the formula assumes continuous classes. The classes then change to 117.5 - 126.5, 126.5 - 135.5, . . ., 171.5 - 180.5.)

Answer:

The data needs to be converted to continuous classes for finding the median since the formula assumes continuous classes.

Class	Frequency f_i	Cumulative Frequency
117.5-126.5	3	3
126.5-135.5	5	8
135.5-144.5	9	17

144.5-153.5	12	29
153.5-162.5	5	34
162.5-171.5	4	38
171.5-180.5	2	40

$$N = 40 \implies \frac{N}{2} = 20$$

Therefore, Median class = 144.5-153.5

Lower limit, l = 144.5; Class height, h = 9

Frequency corresponding to median class, f = 12

Cumulative frequency of the class preceding the median class, c.f. = 17

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f} \right).W$$
$$= 144.5 + \left(\frac{20 - 17}{12} \right).9$$

$$= 146.75$$

Thus, the median length of the leaves is 146.75 mm

Q5 The following table gives the distribution of the lifetime of 400 neon lamps :

Life time (in hours)	Number of lamps
1500 - 2000	14
2000 - 2500	56
2500 - 3000	60
3000 - 3500	86
3500 - 4000	74
4000 - 4500	62
4500 - 5000	48

Find the median lifetime of a lamp.

Answer:

Class	Frequency f_i	Cumulative Frequency
1500-2000	14	14
2000-2500	56	70
2500-3000	60	130
3000-3500	86	216
3500-4000	74	290

4000-4500	62	352	
4500-5000	48	400	

$$N = 400 \implies \frac{N}{2} = 200$$

Therefore, Median class = 3000-3500

Lower limit, l = 3000; Class height, h = 500

Frequency corresponding to median class, f = 86

Cumulative frequency of the class preceding the median class, c.f. = 130

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f}\right).W$$
$$= 3000 + \left(\frac{200 - 130}{86}\right).500$$

$$= 3000 + 406.97$$

$$= 3406.97$$

Thus, the median lifetime of a lamp is 3406.97 hours

$$= 146.75$$

Thus, the median length of the leaves is 146.75 mm

Q6 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows:

Number of letters	1 - 4	4 - 7	7 - 10	10 - 13	13 - 16	16 - 19
Number of surnames	6	30	40	16	4	4

Answer:

Class	Number of surnames f_i	Cumulative Frequency	Classmark x_i	$f_i x_i$
1-4	6	6	2.5	15
4-7	30	36	5.5	165
7-10	40	76	8.5	340
10-13	16	92	11.5	184
13-16	4	96	14.5	51
16-19	4	100	17.5	70
		$\sum f_i = N$ = 100		$\sum f_i x_i$ = 825

MEDIAN:

$$N = 100 \implies \frac{N}{2} = 50$$

∴ Median class = 7-10; Lower limit, l = 7;

Cumulative frequency of preceding class, c.f. = 36; f = 40; h = 3

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f} \right).W$$

$$= 7 + \left(\frac{50 - 36}{40} \right).3$$

$$= 8.05$$

Thus, the median of the data is 8.05

MODE:

The class having maximum frequency is the modal class.

The maximum frequency is 40 and hence the modal class = 7-10

Lower limit (l) of modal class = 7, class size (h) = 3

Frequency (f_1) of the modal class = 40; frequency (f_0) of class preceding the modal class = 30, frequency (f_2) of class succeeding the modal class = 16

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right).h$$

$$= 7 + \left(\frac{40 - 30}{2(40) - 30 - 16} \right).3$$

$$= 125 + \frac{10}{34}.3$$

$$= 7.88$$

Thus, Mode of the data is 7.88

MEAN:

Mean,

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{825}{100} = 8.25$$

Thus, the Mean of the data is 8.25

Q7 The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in kg)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75
Number of students	2	3	8	6	6	3	2

Answer:

Class	Number of students f_i	Cumulative Frequency
40-45	2	2
45-50	3	5
50-55	8	13
55-60	6	19
60-65	6	25
65-70	3	28
70-75	2	30

MEDIAN:

$$N = 30 \implies \frac{N}{2} = 15$$

∴ Median class = 55-60; Lower limit, l = 55;

Cumulative frequency of preceding class, c.f. = 13; f = 6; h = 5

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f}\right).W$$

$$= 55 + \left(\frac{15 - 13}{6}\right).5$$

$$= 55 + \frac{2}{6}.5$$

$$= 56.67$$

Thus, the median weight of the student is 56.67 kg

NCERT solutions for class 10 maths chapter 14 Statistics Excercise: 14.4

Q1 The following distribution gives the daily income of 50 workers of a factory.

Daily income (in ₹)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

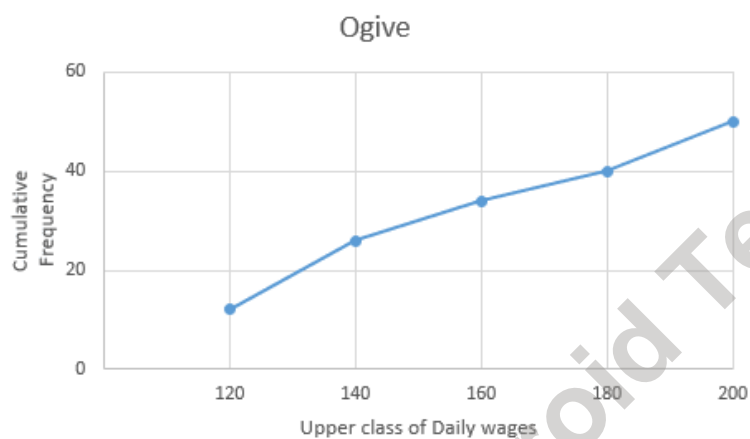Convert the distribution above to a less than type cumulative frequency distribution, and draw its ogive.

Answer:

Daily Income (Upper-Class Limit)	Cumulative Frequency
Less than 120	12
Less than 140	26
Less than 160	34

Less than 180	40
Less than 200	50

Now,

Taking upper-class interval on the x-axis and their respective frequencies on the y-axis,

Q2 During the medical check-up of 35 students of a class, their weights were recorded as follows:

Weight (in kg)	Number of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type ogive for the given data. Hence obtain the median weight from the graph and verify the result by using the formula.

Answer:

Taking upper-class interval on the x-axis and their respective frequencies on the y-axis,

Ogive
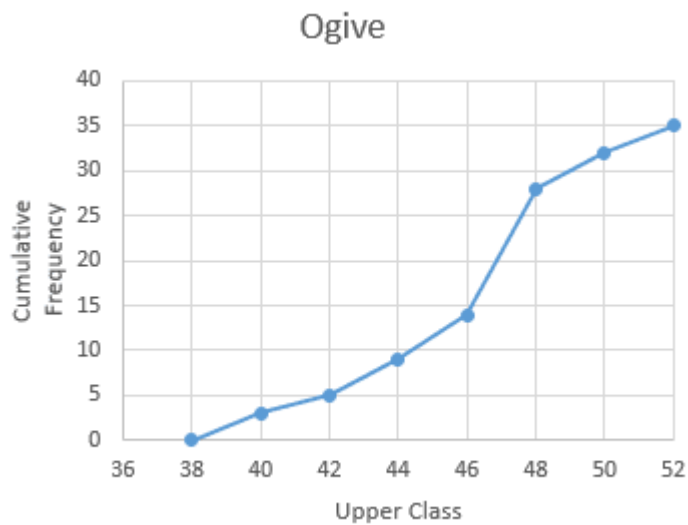
$$N = 35 \implies \frac{N}{2} = 17.5$$

Marking a point on the curve whose ordinate is 17.5 gives an x-ordinate= 46.5.

Hence, the Median of the data is 46.5

Now,

Weight (Class)	Frequency	Cumulative Frequency
>38	0	0
38-40	3	3
40-42	2	5
42-44	4	9

44-46	5	14
46-48	14	28
48-50	4	32
50-52	3	35

$$N = 35 \implies \frac{N}{2} = 17.5$$

∴ Median class = 46-48; Lower limit, l = 46;

Cumulative frequency of preceding class, c.f. = 14; f = 14; h = 2

$$Median = l + \left(\frac{\frac{n}{2} - c.f}{f} \right) .W$$

$$= 46 + \left(\frac{17.5 - 14}{14} \right) .2$$

$$= 46 + \frac{7}{14}$$

$$= 46.5$$

Thus, the median using formula is 46.5 which verifies the result.

Q3 The following table gives production yield per hectare of wheat of 100 farms of a village.

Production yield (in kg/ha)	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80
Number of farms	2	8	12	24	38	16

Change the distribution to a more than type distribution, and draw its ogive.

Answer:

Production yield		Cumulative

(Upper-Class Limit)	Frequency
More than or equal to 50	100
More than or equal to 55	98
More than or equal to 60	90
More than or equal to 65	78
More than or equal to 70	54
More than or equal to 75	16

Now,

Taking lower class limit on the x-axis and their respective frequencies on the y-axis,