Mathematics

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(Chapter – 14) (Statistics)
(Class – 10)

Exercise 14.4

Question 1:

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

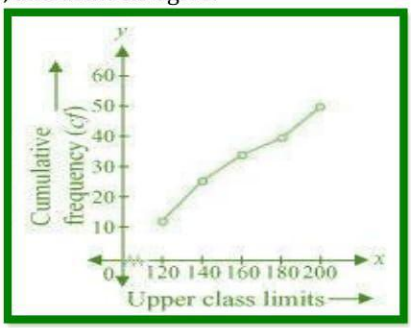
Daily income (in ₹)	100–120	120–140	140–160	160–180	180–200
Number of workers	12	14	8	6	10

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

Answer 1:

The frequency distribution table of less than type is as follows.

Daily income (in ₹) (upper class limits)	Cumulative frequency
Less than 120	12
Less than 140	12 + 14 = 26
Less than 160	26 + 8 = 34
Less than 180	34 + 6 = 40
Less than 200	40 + 10 = 50



Taking upper class limits of class intervals on x-axis and their respective frequencies on y-axis, its ogive can be drawn as follows.

Question 2:

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 verify the result by using the formula.

Answer 2:

The given cumulative frequency distributions of less than type are

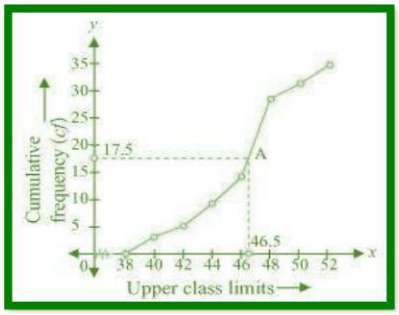
Weight (in kg) upper class limits	Number of students (cumulative frequency)
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Taking upper class limits on x-axis and their respective cumulative frequencies on y - axis, its ogive can be drawn.

Here, $n = 35$

So, $n/2 = 17.5$

Mark the point A whose ordinate is 17.5 and its x-coordinate is 46.5. Therefore, median of this data is 46.5.



It can be observed that the difference between two consecutive upper class limits is 2. The class marks with their respective frequencies are obtained as below.

Weight (in kg)	Frequency (f)	Cumulative frequency
Less than 38	0	0
38 – 40	3 – 0 = 3	3
40 – 42	5 – 3 = 2	5
42 – 44	9 – 5 = 4	9
44 – 46	14 – 9 = 5	14
46 – 48	28 – 14 = 14	28
48 – 50	32 – 28 = 4	32
50 – 52	35 – 32 = 3	35
Total (n)	35	

The cumulative frequency just greater than $\frac{n}{2}\left(i.e.\frac{35}{2}=17.5\right)$ is 28, belonging to class interval 46 – 48.

Median class = 46 – 48
Lower class limit (l) of median class = 46
Frequency (f) of median class = 14
Cumulative frequency (cf) of class preceding median class = 14
Class size (h) = 2

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h = 46 + \left(\frac{17.5 - 14}{14}\right) \times 2 = 46 + 0.5 = 46.5$$

Therefore, median of this data is 46.5.
Hence, the value of median is verified.

Question 3:

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 ogive.

Answer 3:

The cumulative frequency distribution of more than type can be obtained as follows.

Production yield (lower class limits)	Cumulative frequency
more than or equal to 50	100
more than or equal to 55	100 – 2 = 98
more than or equal to 60	98 – 8 = 90
more than or equal to 65	90 – 12 = 78
more than or equal to 70	78 – 24 = 54
more than or equal to 75	54 – 38 = 16

Taking the lower class limits on x-axis and their respective cumulative frequencies on y-axis, its ogive can be obtained as follows.