

**CBSE Test Paper 05**  
**Chapter 14 Statistics**

1. The wickets taken by a bowler in 10 cricket matches are 2, 6, 4, 5, 0, 2, 1, 3, 2, 3. The median of the data is **(1)**
- 2.5
  - 1
  - 2
  - 3

2. The measure of central tendency that can be obtained graphically is **(1)**
- none of these
  - median
  - mode
  - mean

3. In the given data if  $n = 230$ ,  $l = 40$ ,  $cf = 76$ ,  $h = 10$ ,  $f = 65$ , then its median is **(1)**
- 48
  - 40
  - 47
  - 46

4. The times, in seconds, taken by 75 athletes to run a 500m race are tabulated as below:

| Class     | 65-85 | 85-105 | 105-125 | 125-145 | 145-165 | 165-185 | 185-205 |
|-----------|-------|--------|---------|---------|---------|---------|---------|
| Frequency | 4     | 5      | 18      | 20      | 17      | 7       | 4       |

The number of athletes who completed the race in less than 125 seconds is **(1)**

- 20
  - 17
  - 18
  - 27
5. In a data, if  $l = 40$ ,  $h = 15$ ,  $f_1 = 7$ ,  $f_0 = 3$ ,  $f_2 = 6$ , then the mode is **(1)**
- 82
  - 62
  - 52
  - 72

6. If  $\sum f_i = 11$ ,  $\sum f_i x_i = 2p + 52$  and the mean of any distribution is 6, find the value of p. **(1)**
7. The mean of a set of numbers is  $\bar{x}$ . If each number is multiplied by k, then find the mean of the new set. **(1)**
8. A set of numbers consists of four 5's, six 7's, ten 9's, eleven 12's, three 13's, two 14's. Find the mode of this set of numbers. **(1)**
9. Find the value of x, if the mode of the following data is 25: **(1)**  
15, 20, 25, 18, 14, 15, 25, 15, 18, 16, 20, 25, 20, x, 18
10. Following distribution gives cumulative frequencies of 'more than type':

| Marks obtained                            | More than or equal to 5 | More than or equal to 10 | More than or equal to 15 | More than or equal to 20 |
|---|-------------------------|--------------------------|--------------------------|--------------------------|
| Number of students (cumulative frequency) | 30                      | 23                       | 8                        | 2                        |

Change the above data to a continuous grouped frequency distribution. **(1)**

11. The arithmetic mean of the following data is 25, find the value of k. **(2)**

|       |   |    |    |    |    |
|-------|---|----|----|----|----|
| $x_i$ | 5 | 15 | 25 | 35 | 45 |
| $f_i$ | 3 | k  | 3  | 6  | 2  |

12. The annual profits earned by 30 shops of a shopping complex in a locality are recorded in the table shown below:

| Profit(in lakhs Rs)      | Number of Shops |
|--------------------------|-----------------|
| More than or equal to 5  | 30              |
| More than or equal to 10 | 28              |
| More than or equal to 15 | 16              |
|                          |                 |

|                          |    |
|--------------------------|----|
| More than or equal to 20 | 14 |
| More than or equal to 25 | 10 |
| More than or equal to 30 | 7  |
| More than or equal to 35 | 3  |

If we draw the frequency distribution table for the above data, find the frequency corresponding to the class 20-25. **(2)**

13. Find the value of  $p$  for the following distribution whose mean is 16.6. **(2)**

|          |    |    |    |     |    |    |    |
|----------|----|----|----|-----|----|----|----|
| <b>x</b> | 8  | 12 | 15 | $p$ | 20 | 25 | 30 |
| <b>f</b> | 12 | 16 | 20 | 24  | 16 | 8  | 4  |

14. Draw an ogive to represent the following frequency distribution: **(3)**

|                        |     |     |       |       |       |
|------------------------|-----|-----|-------|-------|-------|
| <b>Class-interval</b>  | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 |
| <b>No. of students</b> | 2   | 6   | 10    | 5     | 3     |

15. Five coins were simultaneously tossed 1000 times, and at each toss the number of heads was observed. The number of tosses during which 0,1,2,3,4 and 5 heads were obtained are shown in the table below. Find the mean number of heads per toss **(3)**

|                                  |    |     |     |     |     |    |
|----------------------------------|----|-----|-----|-----|-----|----|
| <b>No. of heads per toss (x)</b> | 0  | 1   | 2   | 3   | 4   | 5  |
| <b>No. of tosses (f)</b>         | 38 | 144 | 342 | 287 | 164 | 25 |

16. Compare the modal ages of two groups of students appearing for an entrance test: **(3)**

|                     |              |              |              |              |              |
|---------------------|--------------|--------------|--------------|--------------|--------------|
| <b>Age in years</b> | <b>16-18</b> | <b>18-20</b> | <b>20-22</b> | <b>22-24</b> | <b>24-26</b> |
| Group A             | 50           | 78           | 46           | 28           | 23           |
| Group B             | 54           | 89           | 40           | 25           | 17           |

17. Calculate the median from the following data: **(3)**

|  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|

|                      |       |       |       |       |       |       |       |       |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Rent (in Rs.)</b> | 15-25 | 25-35 | 35-45 | 45-55 | 55-65 | 65-75 | 75-85 | 85-95 |
| <b>No. of Houses</b> | 8     | 10    | 15    | 25    | 40    | 20    | 15    | 7     |

18. From the following information, construct less than and more than Ogive and find out median from it. **(4)**

|                       |      |       |       |       |       |       |
|-----------------------|------|-------|-------|-------|-------|-------|
| <b>Wages (Rs.)</b>    | 0-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| <b>No. Of workers</b> | 10   | 15    | 30    | 32    | 8     | 5     |

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

|                             |         |         |           |         |         |         |
|-----------------------------|---------|---------|-----------|---------|---------|---------|
| <b>Daily income (in Rs)</b> | 200-250 | 250-300 | 300 - 350 | 350-400 | 400-450 | 450-500 |
| <b>Number of workers</b>    | 10      | 5       | 11        | 8       | 6       | 10      |

Convert the distribution to a 'less than type' cumulative frequency distribution and draw its ogive. Hence obtain the median of daily income. **(4)**

20. To find out the concentration of  $\text{SO}_2$  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:

| <b>Concentration of <math>\text{SO}_2</math> (in ppm)</b> | <b>Frequency</b> |
|---|------------------|
| 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  $\text{SO}_2$  in the air. **(4)**

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**Chapter 14 Statistics**

**Solution**

1. a. 2.5

**Explanation:** Arranging the given data in ascending order, we get

0, 1, 2, 2, 2, 3, 3, 4, 5, 6

Here,  $n = 10$ , which is even.

$$\begin{aligned} \therefore \text{Median} &= \frac{1}{2} \left[ \left( \frac{n}{2} \right)^{\text{th}} \text{ term} + \left( \frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}] \\ \Rightarrow \text{Median} &= \frac{1}{2} [2 + 3] = \frac{5}{2} \\ &= 2.5 \end{aligned}$$

2. b. median

**Explanation:** The measure of central tendency that can be obtained graphically is Median.

The median is less affected by outliers and skewed data distribution i.e. when the distribution is not symmetrical.

3. d. 46

**Explanation:** Median =  $l + \frac{\frac{n}{2} - cf}{f} \times h$

$$\begin{aligned} &= 40 + \frac{\frac{230}{2} - 76}{65} \times 10 \\ &= 40 + \frac{115 - 76}{65} \times 10 \\ &= 40 + \frac{39}{65} \times 10 \\ &= 40 + \frac{390}{65} \\ &= 40 + 6 \\ &= 46 \end{aligned}$$

4. d. 27

**Explanation:**

|                  |           |            |             |             |             |             |             |
|------------------|-----------|------------|-------------|-------------|-------------|-------------|-------------|
| <b>Class</b>     | 65-<br>85 | 85-<br>105 | 105-<br>125 | 125-<br>145 | 145-<br>165 | 165-<br>185 | 185-<br>205 |
| <b>Frequency</b> | 4         | 5          | 18          | 20          | 17          | 7           | 4           |

|                             |   |   |    |    |    |    |    |
|-----------------------------|---|---|----|----|----|----|----|
| <b>Cumulative Frequency</b> | 4 | 9 | 27 | 47 | 64 | 71 | 75 |
|-----------------------------|---|---|----|----|----|----|----|

Therefore, the number of athletes who completed the race in less than 125 seconds is 27.

5. c. 52

**Explanation:**  $\text{Mode} = l + \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$

$$= 40 + \frac{7-3}{7 \times 2 - 3 - 6} \times 15$$

$$= 40 + \frac{4}{5} \times 15$$

$$= 40 + 12$$

$$= 52$$

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

$$\Rightarrow 6 = \frac{2p+52}{11}$$

$$\Rightarrow 2p = 66 - 52$$

$$\Rightarrow 2p = 14$$

$$\Rightarrow p = 7$$

7. Let numbers be  $x_1, x_2, \dots, x_n$ .

$$\text{Mean} = \frac{x_1 + x_2 + \dots + x_n}{n} = \bar{x}$$

$$\text{New observations} = \frac{kx_1 + kx_2 + \dots + kx_n}{n}$$

$$= \frac{k(x_1 + x_2 + \dots + x_n)}{n} = k\bar{x}$$

8.

| Observation | Frequency |
|-------------|-----------|
| 5           | 4         |
| 7           | 6         |
| 9           | 10        |
| 12          | 11        |
| 13          | 3         |
| 14          | 2         |

Mode = 12

Since, It has highest frequency

9. The frequency table of the given data is as given below:

|                                     |    |    |    |    |    |    |          |
|-------------------------------------|----|----|----|----|----|----|----------|
| <b>Value (<math>x_i</math>)</b>     | 14 | 15 | 16 | 18 | 20 | 25 | <b>x</b> |
| <b>Frequency (<math>f_i</math>)</b> | 1  | 3  | 1  | 3  | 3  | 3  | 1        |

It is given that the mode of the given data is 25. So, it must have the maximum frequency. That is possible only when  $x = 25$ .

Hence,  $x = 25$ .

10.

|             |               |               |             |       |
|-------------|---------------|---------------|-------------|-------|
| <b>C.I.</b> | 5-10          | 10-15         | 15-20       | 20-25 |
| <b>f</b>    | $30 - 23 = 7$ | $23 - 8 = 15$ | $8 - 2 = 6$ | 2     |

11.

|          |  |                   |                        |
|----------|--|-------------------|------------------------|
| <b>X</b> |  | <b>f</b>          | <b>fx</b>              |
| 5        |  | 3                 | 15                     |
| 15       |  | k                 | 15k                    |
| 25       |  | 3                 | 75                     |
| 35       |  | 6                 | 210                    |
| 45       |  | 2                 | 90                     |
|          |  | <b>N = k + 14</b> | <b>Sum = 15k + 390</b> |

Given mean = 25

$$\frac{\text{Sum}}{N} = 25$$

$$15k + 390 = 25k + 350$$

$$25k - 15k = 40$$

$$10k = 40$$

$$k = 4$$

12. The frequency table is as follows:

|                                    |                                  |
|------------------------------------|----------------------------------|
| <b>Classes Profit(in lakhs Rs)</b> | <b>Frequency Number of shops</b> |
| 5 - 10                             | 2                                |

|         |    |
|---------|----|
| 10 - 15 | 12 |
| 15 - 20 | 2  |
| 20 - 25 | 4  |
| 25 - 30 | 3  |
| 30 - 35 | 4  |
| 35 - 40 | 3  |

The frequency corresponding to the class 20 - 25 is 4.

13.

| $x_i$ | $f_i$            | $f_i x_i$                   |
|-------|------------------|-----------------------------|
| 8     | 12               | 96                          |
| 12    | 16               | 192                         |
| 15    | 20               | 300                         |
| p     | 24               | 24p                         |
| 20    | 16               | 320                         |
| 25    | 8                | 200                         |
| 30    | 4                | 120                         |
|       | $\sum f_i = 100$ | $\sum f_i x_i = 24p + 1228$ |

Mean = 16.6

$$\text{Mean} = \frac{\sum f_i x_i}{\sum x_i}$$

$$\frac{24p + 1228}{100} = 16.6$$

$$24p + 1228 = 1660$$

$$p = \frac{432}{24}$$

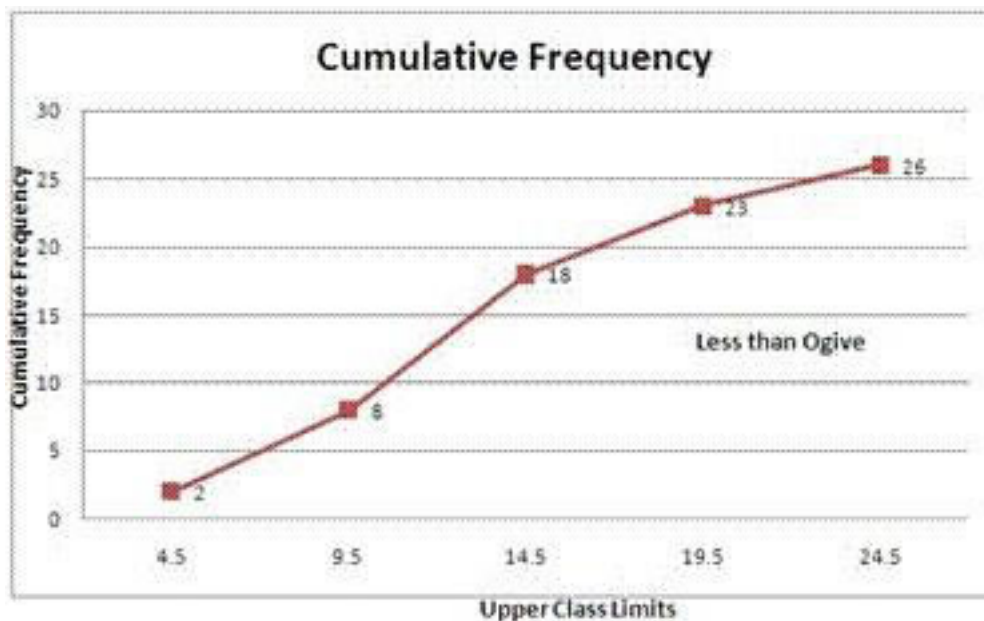
$$p = 18$$

14. The given frequency distribution is not continuous, so we will first make it continuous and then prepare the cumulative frequency:

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

| Class-interval | No. of Students | Less than | Cumulative frequency |
|----------------|-----------------|-----------|----------------------|
| 0.5-4.5        | 2               | 4.5       | 2                    |
| 4.5-9.5        | 6               | 9.5       | 8                    |
| 9.5-14.5       | 10              | 14.5      | 18                   |
| 14.5-19.5      | 5               | 19.5      | 23                   |
| 19.5-24.5      | 3               | 24.5      | 26                   |

Plot the points (4.5, 2), (9.5, 8), (14.5, 18), (19.5, 23), (24.5,26) by taking the upper class limit over the x-axis and cumulative frequency over the y-axis.



15. Let the assumed mean (A) = 2

| No. of heads per toss $x_i$ | No of intervals $f_i$ | $u_i=A_i-x=A_i-2$ | $f_i u_i$ |
|-----------------------------|-----------------------|-------------------|-----------|
| 0                           | 38                    | -2                | -7        |
| 1                           | 144                   | -1                | -144      |
| 2                           | 342                   | 0                 | 0         |
| 3                           | 287                   | 1                 | 287       |
| 4                           | 164                   | 2                 | 328       |
| 5                           | 25                    | 3                 | 75        |

|  |                 |  |                  |
|--|-----------------|--|------------------|
|  | <b>N = 1000</b> |  | <b>Sum = 470</b> |
|--|-----------------|--|------------------|

$$\text{Mean number of per toss} = 2 + \frac{470}{1000} = 2 + 0.47 = 2.47$$

16.

| Age in years | 16-18 | 18-20 | 20-22 | 22-24 | 24-26 |
|--------------|-------|-------|-------|-------|-------|
| Group A      | 50    | 78    | 46    | 28    | 23    |
| Group B      | 54    | 89    | 40    | 25    | 17    |

For Group A:

Here the maximum frequency is 78, then the corresponding class 18 - 20 is modal class.

$$l = 18, h = 20 - 18 = 2, f_0 = 78, f_1 = 50, f_2 = 46.$$

$$\begin{aligned} \text{median} &= l + \frac{f_0 - f_1}{2f_0 - f_1 - f_2} \times h \\ &= 18 + \frac{78 - 50}{2 \times 78 - 50 - 46} \times 2 \\ &= 18 + \frac{56}{60} \\ &= 18 + 0.93 \\ &= 18.93 \text{ years} \end{aligned}$$

For group B:

Here the maximum frequency is 89, then the corresponding class 18 - 20 is the modal class.

$$l = 18, h = 20 - 18 = 2, f_0 = 89, f_1 = 54, f_2 = 40$$

$$\begin{aligned} &= l + \frac{f_0 - f_1}{2f_0 - f_1 - f_2} \times h \\ &= 18 + \frac{89 - 54}{2 \times 89 - 54 - 40} \times 2 \\ &= 18 + \frac{70}{84} \\ &= 18 + 0.83 \\ &= 18.83 \text{ years} \end{aligned}$$

Hence the modal age for the Group A is higher than that for Group B.

17.

| Class interval | Frequency | Cumulative frequency |
|----------------|-----------|----------------------|
| 15-25          | 8         | 8                    |
|                |           |                      |

|       |           |       |
|-------|-----------|-------|
| 25-35 | 10        | 18    |
| 35-45 | 15        | 33    |
| 45-55 | 25        | 58(F) |
| 55-65 | 40(f)     | 98    |
| 65-75 | 20        | 118   |
| 75-85 | 15        | 133   |
| 85-95 | 7         | 140   |
|       | $N = 140$ |       |

$$N = 140$$

$$\therefore \frac{N}{2} = \frac{140}{2} = 70$$

The cumulative frequency just greater than  $\frac{N}{2}$  is 98.

$\therefore$  median class is 55-65 .

$$l = 55, f = 40, F = 58, h = 65 - 55 = 10$$

$$\therefore \text{Median} = l + \frac{\frac{N}{2} - F}{f} \times h$$

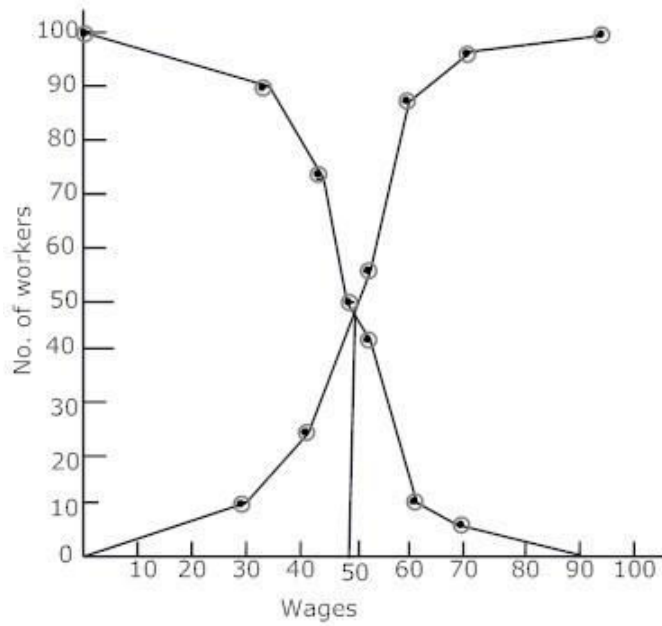
$$= 55 + \frac{70 - 58}{40} \times 10$$

$$= 55 + 3$$

$$= 58$$

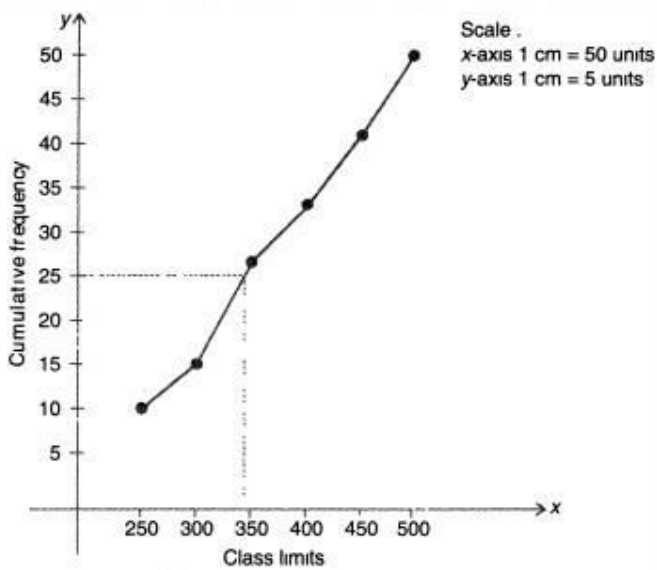
18.

| Wages (Rs) | Frequency (less than) | Wages | C.F (More then) | Wages | C.F |
|------------|-----------------------|-------|-----------------|-------|-----|
| 0-30       | 10                    | 30    | 10              | 0     | 100 |
| 30-40      | 15                    | 40    | 25              | 30    | 90  |
| 40-50      | 30                    | 50    | 55              | 40    | 75  |
| 50-60      | 32                    | 60    | 87              | 50    | 45  |
| 60-70      | 8                     | 70    | 95              | 60    | 13  |
| 70-80      | 5                     | 80    | 100             | 70    | 5   |



19.

| Daily income (Classes) | No. of workers (c.f) |
|------------------------|----------------------|
| Less than 250          | 10                   |
| Less than 300          | 15                   |
| Less than 350          | 26                   |
| Less than 400          | 34                   |
| Less than 450          | 40                   |
| Less than 500          | 50                   |



From graph,  $\frac{N}{2} = \frac{50}{2} = 25$

Hence, Median of daily income = Rs 345

20. We may find class marks for each interval by using the relation

$$x = \frac{\text{upperlimit} + \text{lowerclasslimit}}{2}$$

Class size of this data = 0.04

| Concentration of SO <sub>2</sub> | Frequency f <sub>i</sub> | Class interval x <sub>i</sub> | d <sub>i</sub> = x <sub>i</sub> - 0.14 | u <sub>i</sub> | f <sub>i</sub> u <sub>i</sub> |
|----------------------------------|--------------------------|-------------------------------|--|----------------|-------------------------------|
| 0.00 – 0.04                      | 4                        | 0.02                          | -0.12                                  | -3             | -12                           |
| 0.04 – 0.08                      | 9                        | 0.06                          | -0.08                                  | -2             | -18                           |
| 0.08 – 0.12                      | 9                        | 0.10                          | -0.04                                  | -1             | -9                            |
| 0.12 – 0.16                      | 2                        | 0.14                          | 0                                      | 0              | 0                             |
| 0.16 – 0.20                      | 4                        | 0.18                          | 0.04                                   | 1              | 4                             |
| 0.20 – 0.24                      | 2                        | 0.22                          | 0.08                                   | 2              | 4                             |
| <b>Total</b>                     | $\sum f_i = 30$          |                               |  |                | $\sum f_i u_i = -31$          |

let a = 0.14

$$\text{Mean } \bar{x} = a + \left( \frac{\sum f_i u_i}{\sum f_i} \right) \times h$$

$$= 0.14 + (0.04) \left( \frac{-31}{30} \right)$$

$$= 0.099 \text{ ppm}$$