

STATISTICS KEY POINTS

The three measures of central tendency are :

- i. Mean
 - ii. Median
 - iii. Mode
- Mean Of grouped frequency distribution can be calculated by the following methods.

(i) Direct Method

$$\text{Mean} = \bar{X} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}$$

Where X_i is the class mark of the i^{th} class interval and f_i frequency of that class

(ii) Assumed Mean method or Shortcut method

$$\text{Mean} = \bar{X} = a + \frac{\sum_{i=1}^n f_i d_i}{\sum_{i=1}^n f_i}$$

Where a = assumed mean

And $d_i = X_i - a$

(iii) Step deviation method.

$$\text{Mean} = \bar{X} = a + \frac{\sum_{i=1}^n f_i u_i}{\sum_{i=1}^n f_i} \times h$$

Where a = assumed mean

h = class size

And $u_i = (X_i - a)/h$

- Median of a grouped frequency distribution can be calculated by

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

Where

l = lower limit of median class

n = number of observations

cf = cumulative frequency of class preceding the median class

f = frequency of median class

h = class size of the median class.

- Mode of grouped data can be calculated by the following formula.

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

Where

l = lower limit of modal class

h = size of class interval

f_1 = Frequency of the modal class

f_0 = frequency of class preceding the modal class

f_2 = frequency of class succeeding the modal class

- Empirical relationship between the three measures of central tendency.

$$3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$$

$$\text{Or, Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

- Ogive

Ogive is the graphical representation of the cumulative frequency distribution. It is of two types:

(i) Less than type ogive.

(ii) More than type ogive.

- Median by graphical method

The x-coordinated of the point of intersection of 'less than ogive' and 'more than ogive' gives the median.

LEVEL – 1

Slno	Question	Ans																
1	What is the mean of 1 st ten prime numbers ?	12.9																
2	What measure of central tendency is represented by the abscissa of the point where less than ogive and more than ogive intersect?	Median																
3	If the mode of a data is 45 and mean is 27, then median is _____.	33																
4	Find the mode of the following <table><tr><td>X_i</td><td>35</td><td>38</td><td>40</td><td>42</td><td>44</td><td></td></tr><tr><td>f_i</td><td>5</td><td>9</td><td>10</td><td>7</td><td>2</td><td></td></tr></table>	X _i	35	38	40	42	44		f _i	5	9	10	7	2		Mode =40		
X _i	35	38	40	42	44													
f _i	5	9	10	7	2													
5	Write the median class of the following distribution. <table><tr><td>Class</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td></tr><tr><td>Frequency</td><td>4</td><td>4</td><td>8</td><td>10</td><td>12</td><td>8</td><td>4</td></tr></table>	Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Frequency	4	4	8	10	12	8	4	30-40
Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70											
Frequency	4	4	8	10	12	8	4											

LEVEL – 2

S/no	Question	Ans																
1	Calculate the mean of the following distribution	78																
	<table><tr><td>Class interval</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td><td>90-100</td></tr><tr><td>Frequency</td><td>8</td><td>6</td><td>12</td><td>11</td><td>13</td></tr></table>		Class interval	50-60	60-70	70-80	80-90	90-100	Frequency	8	6	12	11	13				
	Class interval		50-60	60-70	70-80	80-90	90-100											
Frequency	8	6	12	11	13													
2	Find the mode of the following frequency distribution	33.33																
	<table><tr><td>Marks</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td></tr><tr><td>No. of students</td><td>12</td><td>35</td><td>45</td><td>25</td><td>13</td></tr></table>		Marks	10-20	20-30	30-40	40-50	50-60	No. of students	12	35	45	25	13				
	Marks		10-20	20-30	30-40	40-50	50-60											
No. of students	12	35	45	25	13													
3	Find the median of the following distribution	28.5																
	<table><tr><td>Class interval</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td></tr><tr><td>Frequency</td><td>5</td><td>8</td><td>20</td><td>15</td><td>7</td><td>5</td></tr></table>		Class interval	0-10	10-20	20-30	30-40	40-50	50-60	Frequency	5	8	20	15	7	5		
	Class interval		0-10	10-20	20-30	30-40	40-50	50-60										
Frequency	5	8	20	15	7	5												
4	A class teacher has the following absentee record of 40 students of a class for the whole term.																	
	<table><tr><td>No. of days</td><td>0-6</td><td>6-10</td><td>10-14</td><td>14-20</td><td>20-28</td><td>28-38</td><td>38-40</td></tr><tr><td>No. of students</td><td>11</td><td>10</td><td>7</td><td>4</td><td>4</td><td>3</td><td>1</td></tr></table>		No. of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40	No. of students	11	10	7	4	4	3	1
	No. of days		0-6	6-10	10-14	14-20	20-28	28-38	38-40									
No. of students	11	10	7	4	4	3	1											
Write the above distribution as less than type cumulative frequency distribution.																		
	Answer :																	
	<table><tr><td>No. of days</td><td>Less Than 6</td><td>Less Than 10</td><td>Less Than 14</td><td>Less Than 20</td><td>Less Than 28</td><td>Less Than 38</td><td>Less Than 40</td></tr><tr><td>No. of students</td><td>11</td><td>21</td><td>28</td><td>32</td><td>36</td><td>39</td><td>40</td></tr></table>		No. of days	Less Than 6	Less Than 10	Less Than 14	Less Than 20	Less Than 28	Less Than 38	Less Than 40	No. of students	11	21	28	32	36	39	40
	No. of days		Less Than 6	Less Than 10	Less Than 14	Less Than 20	Less Than 28	Less Than 38	Less Than 40									
No. of students	11	21	28	32	36	39	40											

LEVEL – 3

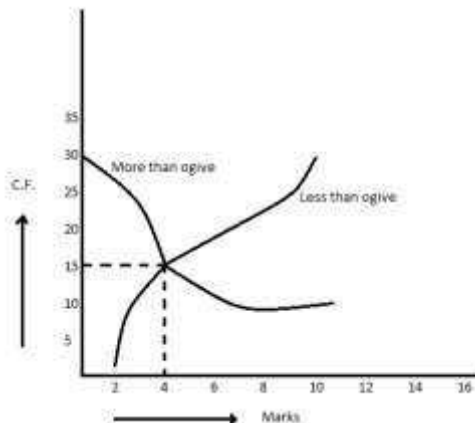
Slno	Question	Ans																		
1	<p>If the mean distribution is 25</p> <table><tr><td>Class</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequency</td><td>5</td><td>18</td><td>15</td><td>P</td><td>6</td></tr></table> <p>Then find p.</p>	Class	0-10	10-20	20-30	30-40	40-50	Frequency	5	18	15	P	6	P=16						
Class	0-10	10-20	20-30	30-40	40-50															
Frequency	5	18	15	P	6															
2	<p>Find the mean of the following frequency distribution using step deviation method</p> <table><tr><td>Class</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequency</td><td>7</td><td>12</td><td>13</td><td>10</td><td>8</td></tr></table>	Class	0-10	10-20	20-30	30-40	40-50	Frequency	7	12	13	10	8	25						
Class	0-10	10-20	20-30	30-40	40-50															
Frequency	7	12	13	10	8															
3	<p>Find the value of p if the median of the following frequency distribution is 50</p> <table><tr><td>Class</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td></tr><tr><td>Frequency</td><td>25</td><td>15</td><td>P</td><td>6</td><td>24</td><td>12</td><td>8</td></tr></table>	Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90	Frequency	25	15	P	6	24	12	8	P=10		
Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90													
Frequency	25	15	P	6	24	12	8													
4	<p>Find the median of the following data</p> <table><tr><td>Marks</td><td>Less Than 10</td><td>Less Than 30</td><td>Less Than 50</td><td>Less Than 70</td><td>Less Than 90</td><td>Less Than 110</td><td>Less Than 130</td><td>Less than 150</td></tr><tr><td>Frequency</td><td>0</td><td>10</td><td>25</td><td>43</td><td>65</td><td>87</td><td>96</td><td>100</td></tr></table>	Marks	Less Than 10	Less Than 30	Less Than 50	Less Than 70	Less Than 90	Less Than 110	Less Than 130	Less than 150	Frequency	0	10	25	43	65	87	96	100	76.36
Marks	Less Than 10	Less Than 30	Less Than 50	Less Than 70	Less Than 90	Less Than 110	Less Than 130	Less than 150												
Frequency	0	10	25	43	65	87	96	100												

LEVEL – 4

Slno	Question	Ans																
1	<p>The mean of the following frequency distribution is 57.6 and the sum of the observations is 50. Find the missing frequencies f_1 and f_2.</p> <table><tr><td>Class</td><td>0-20</td><td>20-40</td><td>40-60</td><td>60-80</td><td>80-100</td><td>100-120</td><td>Total</td></tr><tr><td>Frequency</td><td>7</td><td>f_1</td><td>12</td><td>f_2</td><td>8</td><td>5</td><td>50</td></tr></table>	Class	0-20	20-40	40-60	60-80	80-100	100-120	Total	Frequency	7	f_1	12	f_2	8	5	50	$f_1 = 8$ and $f_2 = 10$
Class	0-20	20-40	40-60	60-80	80-100	100-120	Total											
Frequency	7	f_1	12	f_2	8	5	50											
2	<p>The following distribution give the daily income of 65 workers of a factory</p> <table><tr><td>Daily income (in Rs)</td><td>100-120</td><td>120-140</td><td>140-160</td><td>160-180</td><td>180-200</td></tr><tr><td>No. of workers</td><td>14</td><td>16</td><td>10</td><td>16</td><td>9</td></tr></table> <p>Convert the above to a more than type cumulative frequency distribution and draw its ogive.</p>	Daily income (in Rs)	100-120	120-140	140-160	160-180	180-200	No. of workers	14	16	10	16	9					
Daily income (in Rs)	100-120	120-140	140-160	160-180	180-200													
No. of workers	14	16	10	16	9													
3	<p>Draw a less than type and more than type ogives for the following distribution on the same graph. Also find the median from the graph.</p> <table><tr><td>Marks</td><td>30-39</td><td>40-49</td><td>50-59</td><td>60-69</td><td>70-79</td><td>80-89</td><td>90-99</td></tr><tr><td>No. of students</td><td>14</td><td>6</td><td>10</td><td>20</td><td>30</td><td>8</td><td>12</td></tr></table>	Marks	30-39	40-49	50-59	60-69	70-79	80-89	90-99	No. of students	14	6	10	20	30	8	12	
Marks	30-39	40-49	50-59	60-69	70-79	80-89	90-99											
No. of students	14	6	10	20	30	8	12											

SELF – EVALUATION

1. What is the value of the median of the data using the graph in figure of less than ogive and more than ogive?



2. If mean = 60 and median = 50, then find mode using empirical relationship.
 3. Find the value of p , if the mean of the following distribution is 18.

Variate (x_i)	13	15	17	19	$20+p$	23
Frequency (f_i)	8	2	3	4	$5p$	6

4. Find the mean, mode and median for the following data.

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70
frequency	5	8	15	20	14	8	5

5. The median of the following data is 52.5. find the value of x and y , if the total frequency is 100.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
frequency	2	5	x	12	17	20	y	9	7	4

6. Draw 'less than ogive' and 'more than ogive' for the following distribution and hence find its median.

Classes	20-30	30-40	40-50	50-60	60-70	70-80	80-90
frequency	10	8	12	24	6	25	15

7. Find the mean marks for the following data.

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60	Below 70	Below 80	Below 90	Below 100
No. of students	5	9	17	29	45	60	70	78	83	85

8. The following table shows age distribution of persons in a particular region. Calculate the median age.

Age in	Below	Below	Below	Below	Below	Below	Below	Below
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years	10	20	30	40	50	60	70	80
No. of persons	200	500	900	1200	1400	1500	1550	1560

9. If the median of the following data is 32.5. Find the value of x and y.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
frequency	x	5	9	12	y	3	2	40