

CLASS: X

SUBJECT: MATHEMATICS

TOPIC	STATISTICS
PREREQUISITE KNOWLEDGE	Knowledge of Central tendencies.
OBJECTIVES	Children will be able to: • Define various terminologies. • Find mean of grouped data by a) direct method (b) assumed mean method (c) step deviation method. • Calculate Median of ungrouped and grouped data. • Calculate mode of grouped data. • Express mean, median and mode by empirical formula. • Draw less than and more than cumulative frequency curve. • Find out median from cumulative frequency curve and its verification.
THE HISTORY OF STATISTICS	<i>Statistics:</i> The branch of Mathematics in which we study to extract meaningful information from the collected data. It is the area of study dealing with the presentation, analysis and interpretation of the data. It seems to have been derived from the Latin word ‘status’ or German word ‘statistik’ or Italian word ‘statista’. • DATA: The facts or figures, which are numerical or otherwise, collected with a definite purpose are called data. Data is the plural form of the word ‘datum’. • OBSERVATION: Every factor figure of the data is called an observation. • FREQUENCY: The number of times the particular observation occurs is called the frequency of the observation. • GROUPED FREQUENCY DISTRIBUTION: If the data are very large and the range is large, we put the data in groups of suitable size and mention the frequency of each group. Such a distribution is called grouped frequency distribution. • AN INCLUSIVE FREQUENCY DISTRIBUTION: If the upper limit of the class does not coincide with the lower limit of the next class. Such as 1-10, 11-20 ...is known as an inclusive frequency distribution. • AN EXCLUSIVE FREQUENCY DISTRIBUTION: If the upper limit of one class coincides with the lower limit of the next class, such as 1-10, 10-20....., it is known as an exclusive frequency distribution. • Measures of central tendency The numerical expressions which represent the characteristic of a group are called Measures of Central Tendency or Average. Mean, Median and Mode are three measures of central tendency (averages). • Class Interval:

	Each group into which the raw data is condensed is called a class interval. Each class is bounded by two figures, which are called the class limits. The figures on the left side of the classes are called lower limits while figures on the right are known as upper limits. • Class size: The difference between the true upper limit and true lower limit of a class is called its class size. • Class Mark: The class mark of the class interval is the value midway between its true lower limit and true upper limit <i>Class mark of a class =</i> $\frac{\text{upper limit} + \text{lower limit}}{2}$ Cumulative frequency: The cumulative frequency of a class interval is the sum of frequencies of all classes up to that class (including the frequency of that particular class).
SUMMARY OF THE CHAPTER	1) DIRECT METHOD $\bar{x} = \frac{\sum x_i f_i}{\sum f_i}$ 2) ASSUMED MEAN METHOD $\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$ 3) STEP DEVIATION METHOD $\bar{x} = a + \left(\frac{\sum f_i u_i}{f_i} \right) \times h$ $\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$ $\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$ 3Median = Mode + 2 Mean Following steps are to be followed to draw less than ogive - Prepare a less than cumulative frequency distribution from the given frequency distribution - Mark the upper class limits along the x-axis choosing a suitable scale - Mark the cumulative frequencies along the y-axis choosing a suitable scale. - On joining these points successively by a free hand smooth curve, we get a cumulative frequency curve or an ogive of less than type. Following steps are to be followed to draw more than ogive - Prepare a more than cumulative frequency distribution from the given frequency distribution - Mark the lower class limits along the x-axis choosing a suitable scale - Mark the cumulative frequencies along the y-axis choosing a suitable scale.

	On joining these points successively by a free hand smooth curve, we get a cumulative frequency curve or an ogive of more than type.																																		
TRANSACTION METHODOLOGY	INTERACTIVE SESSION: 1) Children will recall the central tendencies i.e. mean, median and mode. They will also be asked about the formulae which they have studied in lower classes related to these topics. 2) SURVEY ACTIVITY Children will be divided into different groups and each group will be told to make a list of students who have got marks from 10-20,20-30,30-40and then arrange it in ascending order in a tabular form 3) Once the activity is done they will be told to apply these values in the formulae taught to calculate mean by different methods, median and mode.																																		
EXPECTED LEARNING OUTCOMES	Children will be able to: 1) Understand the difference between mean, median and mode. 2) Apply the values in the given formula and calculate mean, median and mode. 3) Draw less than type and more than type ogive and find out median from the ogive. 4) Express mean, median and mode with the empirical formula.																																		
PRACTICE QUESTIONS	1) The mean of 1,3,4,5,7 and 4 is m.The numbers 3,2,2,4,3,3 and p have mean m-1 and median q.Find the value of p+q. 2) Which central tendency cannot be determined graphically? 3) For a data consisting of 50 observations distributed into class intervals of width 10, is the assumed mean is 25 and $\sum f_{iu_i}$ is 11 then find the mean of the data. 4) The following table gives the cumulative frequency of the age of a group of 199 teachers. Draw the ‘less than ogive’ and ‘greater than ogive’ and find the median. <table><tr><td>Age(in yrs)</td><td>25-30</td><td>30-35</td><td>35-40</td><td>40-45</td><td>45-50</td><td>50-55</td><td>55-60</td><td>60-65</td><td>65-70</td></tr><tr><td>Cumulative frequency</td><td>40</td><td>90</td><td>130</td><td>146</td><td>166</td><td>176</td><td>186</td><td>195</td><td>199</td></tr></table> 5) Find the mode: <table><tr><td>Height (in cm)</td><td>Above 30</td><td>Above 40</td><td>Above 50</td><td>Above 60</td><td>Above 70</td><td>Above 80</td></tr><tr><td>Number of plants</td><td>34</td><td>30</td><td>27</td><td>19</td><td>8</td><td>2</td></tr></table> 6) Find the median if the mode of some data is 7 and their mean is also 7.	Age(in yrs)	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	Cumulative frequency	40	90	130	146	166	176	186	195	199	Height (in cm)	Above 30	Above 40	Above 50	Above 60	Above 70	Above 80	Number of plants	34	30	27	19	8	2
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	7) The mean of the following distribution is 48.7. Evaluate the missing frequencies corresponding to classes 40-50, 50-60 resp. When the total frequency is 100. <table><tr><td>Class interval</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></tr><tr><td>Frequency</td><td>13</td><td>18</td><td>$3x+2$</td><td>$2y+3$</td><td>12</td><td>10</td></tr></table>	Class interval	20-30	30-40	40-50	50-60	60-70	70-80	Frequency	13	18	$3x+2$	$2y+3$	12	10								
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	8) If the median of the following data is 52.5, find x and y when the total frequency is 100. <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><td>60-70</td><td>70-80</td><td>80-90</td><td>90-100</td></tr><tr><td>frequency</td><td>2</td><td>5</td><td>x</td><td>12</td><td>17</td><td>20</td><td>y</td><td>9</td><td>7</td><td>4</td></tr></table>	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
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EVALUATION	Pen paper test, Verbal interaction, Extra questions , Lab Activity																						