LESSON PLAN - 14

Class: **X**   Subject: **Mathematics**

Name of the teacher: School:

Name of the chapter	Topic	Number of periods required (20)	Timeline for teaching		Any specific information
			From	**To**	
14. STATIS TICS	**14.1** introduction	1			Historical note about Father of statistics
	14.2 Mean of ungrouped data - Grouped data	8			Collection of data from different sources
	14.3 Mode	3			
	14.4 Median of grouped Data	4			
	14.5 Which value of central tendency				
	14.6 Graphical representation of cumulative frequency distribution	2			
	14.6.1 Obtaining Median from Ogive curve.	2			

Prior Concept / Skills:	
1. Collection of information, Organization of data 2. Difference between Ungrouped and grouped data 3. Classes, class height, upper and lower limits and boundaries 4. Presentation of data into grouped data 5. Finding range of ungrouped data 6. Calculation of Mean, Median and Mode of ungrouped data 7. Historical information about Father of Indian Statistics	FATH Pras
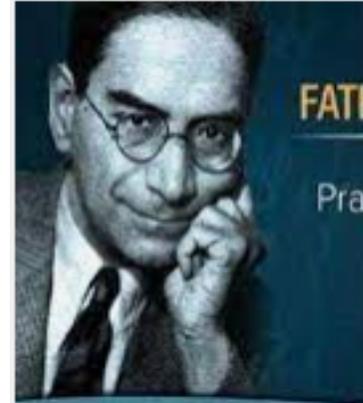
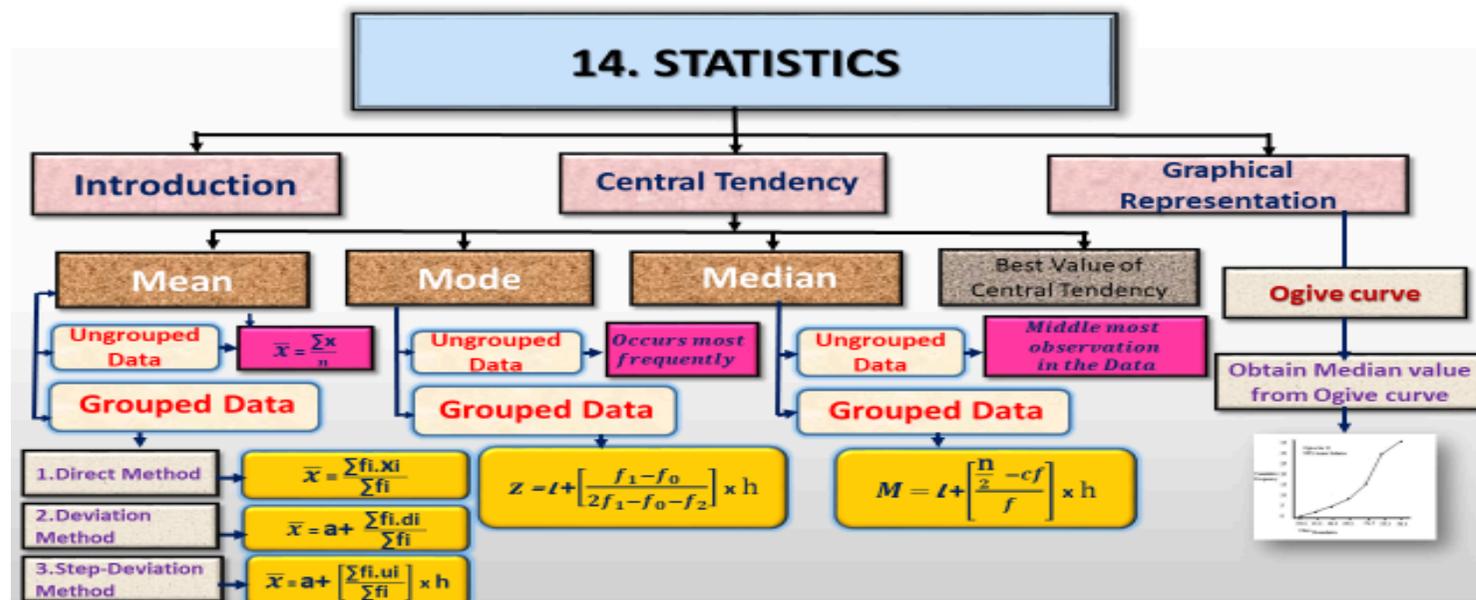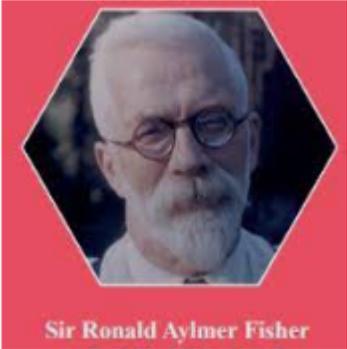| Learning outcomes	Number of Periods
Students are able to: 1. Explain the need to convert ungrouped data into grouped data	2
2. Compare Mean values of given data by using different methods	10
3. Explicit when it is more convenient to use grouped data for analysis	2
4. Searched for more real life situations and tried to elicit those to propose new problems. 5. Represent a cumulative frequency distribution curves (Ogive curves) graphically	2 4

TEACHING LEARNING PROCESS

Induction/Introduction(Generating interest, informing students about the outcomes and expectations for the lesson)

- concept was introduced by organizing the marks of some students in a test
- Giving ungrouped data and ask the students to convert it into grouped data
- Explain the need for measures of central tendency in real life situations
- The mean value can be calculated from both grouped and ungrouped data, there by explain which method is more accurate
- Comparing the values of mean and median in different methods there by explain which methods are appropriate to use.

Experience and Reflection(Task/question that helps students explore the concept and connect with their life)

- Understand and write the terms in the formulas of finding mean, median and mode
- If mid values of classes and frequencies are sufficiently small, then which method is an appropriate choice?
- Explicit that, if mid values of classes and frequencies are numerically large, then which method is an appropriate choice?
- Represent the whole chapter in a flow chart.
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14. STATISTICS

Introduction

Central Tendency

Graphical Representation

Mean

Mode — Occurs most frequently

Median — Middle most observation in the Data

Best Value of Central Tendency

Ogive curve

Ungrouped Data — $\bar{x} = \frac{\Sigma x}{n}$

Grouped Data

Ungrouped Data

Grouped Data

Ungrouped Data

Grouped Data

Obtain Median value from Ogive curve

1. Direct Method — $\bar{x} = \frac{\Sigma fi.xi}{\Sigma fi}$

2. Deviation Method — $\bar{x} = a + \frac{\Sigma fi.di}{\Sigma fi}$

3. Step-Deviation Method — $\bar{x} = a + \left[\frac{\Sigma fi.ui}{\Sigma fi}\right] \times h$

$z = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$

$M = l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h$

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)	Notes /TLM
14.1 Introduction: (1) Conduct an Activity of recording the list of marks of students in a test and convert it into grouped data	From this grouped data students are able to tell how many student have got marks between 51-75, range that is used	Convert ungrouped data into grouped data	**Activity:** Historical information about Father of Statistics Sir Ronald. A Fisher Sir Ronald Aylmer Fisher Information about
14.2 MEAN OF UNGROUPED DATA- GROUPED DATA: (8) Explain that Mean (average) of ungrouped data is the sum of the values of all the observations divided by the total number of observations. $$\bar{x} = \frac{f_1 x_1 + f_2 x_2 + \cdots + f_n x_n}{f_1 + f_2 + \cdots + f_n}$$	Convert the ungrouped data of example.1 into grouped data by forming class intervals of different width and compare the values of Mean in each case.	Write and explain each term of formula for mean $$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$ x_1, x_2, x_3... are observation with frequencies f_1, f_2, f_3,...	- Exclusive and Inclusive classes, - Boundaries and Limits of classes - Class height or width or interval

Mean of Grouped Data:		Σ means summation	
Explain different methods of finding Mean , such as			
• Direct Method	• Understand and explain that finding mean in ungrouped data is more accurate with reasons	Understand that this method is more appropriate when there are small numbers in the data	
• Deviation Method			
• Step deviation Method			
(i)Direct Method of finding Mean:			
In this method, mid values (x_i) are calculated by assuming that the frequency of each class-interval is centered around its mid-point.	Class mark = $\dfrac{Upper\ class\ limit + Lower\ class\ limit}{2}$		• This method is also called as Assumed Mean Method.
• The formula for mean in direct method is $$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$	• **Think and Discuss (page.327**)		
(ii) Deviation method of finding Mean:			
When data consists numerically large numbers, then Deviation method is more appropriate to find Mean.	• **Activity(page.328):** Consider the data given in example.1 and calculate the arithmetic mean by deviation method by taking successive values of x_i	Write and explain each term of formula for mean in deviation method. a = Assumed mean d = deviation, $(x_i - a)$	Step-deviation method is convenient to apply if all the d's have a common factor.
• The formula for mean in Deviation method is $$\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$			**Classroom Project: (page.332)**

Explain the method of finding mean in Deviation method of example.1 **(iii) Step-Deviation Method of finding Mean:** Deviation method is further simplified to find mean by considering the size of the class. ● The formula for mean in step-deviation method is $$\bar{x} = A + h\left(\frac{\Sigma(f_i u_i)}{\Sigma f_i}\right).$$ ● Explain the method of finding mean in Step-Deviation method of example.1 ● Explain example.3 where the class sizes varies. ● Explain the problem.3 of Exercise.14.1 **14.3 MODE: (3)**	Write and express each term in the formula of finding mean in step-deviation method. A = assumed mean h = class height f_i = frequencies $u_i = (x_i - a)$ ● **Think – Discuss (page.331)** ● Solve problems 7, 8, 9 of **Exercise.14.1** Recall how to find mode of ungrouped data. ● Find mode of Example.4	Solve example.2 in all the three methods and Understand that the mean obtained by all the three methods is the same. ● Solve the problems of **Exercise.14.1**	-Collect marks of students in mathematics in the recent test - Collect daily temperatures recorded for a period of 30 days - Measure the heights of all the students of your class students Chart showing formulae: Direct method : $$\bar{x} = \frac{\Sigma fx}{\Sigma f}$$ Assumed mean method : $$\bar{x} = A + \frac{\Sigma fd}{\Sigma f}$$ $$d = x - A$$ Step deviation method : $$\bar{x} = A + \left[\frac{\Sigma fd}{\Sigma f} \times c\right], \text{ where } d = \frac{x-A}{c}$$

A mode is a value among the observations which occurs most frequently. In a grouped frequency distribution, we can locate a class with the maximum frequency, called the Modal class. It is not possible to determine the mode by looking at frequencies. • The formula for Mode in grouped frequency distribution • Explain examples 5 and 6	Explain the terms in the formula for Mode, L = lower boundary of the modal class h = size of the modal class f_1 = frequency of modal class f_0 = frequency of the class preceding the modal class f_2 = frequency of the class succeeding the modal class • **Think – Discuss (page.336)** Recall that if there are n observations, • If n is odd, the median is the $\frac{(n+1)}{2}^{th}$ observation • If n is even, then median will be the average of $\frac{n}{2}^{th}$ and $\left[\frac{n}{2} + 1\right]^{th}$ observations	• **Do This** (page.334) Convert Limit into boundary in finding lower boundary of modal class Solve the problems of Exercise.14.2 Explain each term in the formula for finding Median :	Prepare some model problems and find mode using formula.
14.4 MEDIAN OF GROUPED DATA: Median is a measure of central tendency which gives the value of the			

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

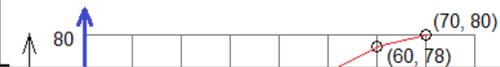|			
middle most observation when the data is arranged in ascending order • The formula for finding Median $$Median = l + [\frac{\frac{n}{2}-cf}{f}]\times h$$ Explain the method of finding Median for grouped data by taking one example. Explain examples. 7 and 8	• Explain with reason why we use cumulative frequencies for finding median. Construct Cumulative frequency tables less than and more than type with help of teacher. (i) Mean enable us to compare two or more quantities	l = lower boundary of median class n = number of observations cf = cumulative frequency of class preceding median class f= frequency of median class h = class size of median class -Understand the need of using these two type of distribution	- To find Median, find $\frac{n}{2}$ and then locate the class whose cumulative frequency exceeds $\frac{n}{2}$ for the first time.
14.5 WHICH VALUE OF CENTRAL TENDENCY: (i) Explain the uses and limitations of Mean (ii) In some cases, where individual observations are not important especially extreme values, and wish to find out a typical observation, Median is more appropriate.	(ii) Finding the typical productivity rate of workers, Median is a better measure of tendency than Mean. (iii) The consumer item in greatest demand, the colour of vehicles used by most of the people.	- comparing average results of different schools -Finding median weight of students in a class	**Lab Activity:** Collect some Applications of Mean, median and mode in real life situation, compare and discuss which measure of tendency is better in which situation.

(iii) In situations which require establishing the most frequent value or most popular item, the Mode is the best choice. Explain problems 2, 4 and 5 of Exercise.14.3	● Solve the problems 6 and 7 of Exercise.14.3	- finding modal monthly expenditure of family	
14.6 GRAPHICAL REPRESENTATION OF CUMULATIVE FREQUENCY DISTRIBUTION: (2) Picture speaks better than words.	Construct Ogive curves with the help of teacher. **(i)Ogive Less than type:** To represent data graphically, upper boundaries are taken on X-axis and their corresponding less than cumulative frequencies on Y-axis	Solve the problems 1 and 3 of **Exercise.14.3**	Historical information: **Francis Galton** (UK)coined the term ogive to describe the shape of the normal cumulative distribution function, as it has a form similar to the S-shaped Gothic Ogival arch
● Explain the process of constructing cumulative frequency distribution curves. ● For drawing ogives, the class intervals are continuous, because cumulative frequencies are linked with boundaries but not with limits. ● Draw ogive greater than curve by taking one example.			
	(ii) Ogive greater than type: To represent data graphically, lower		

14.6.1 OBTAINING MEDIAN FROM OGIVE CURVE: (2)

Explain two methods of finding median of a data graphically.

    (i)   Using single ogive curve:
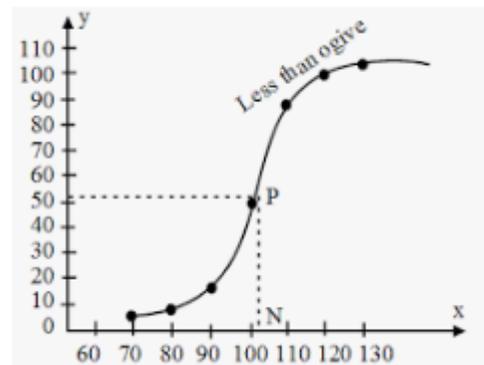
*Locate $\frac{n}{2}$ on Y-axis.

* From this point draw a parallel line to X-axis cutting the curve at a point.
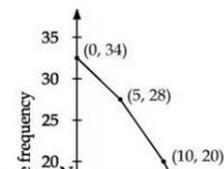
*From this draw a perpendicular to the X –axis.

*Foot of this perpendicular gives the median of that data

boundaries are taken on X-axis and their corresponding greater than cumulative frequencies on Y-axis

    (i)   **Less than ogive curve:**

    (ii)   **Greater than ogive curve;**

Draw ogive curve for the problem given in Example.9

SIGNATURE OF THE TEACHER   SIGNATURE OF THE HEAD MASTER

VISITING OFFICER WITH REMARKS