MATHEMATICS

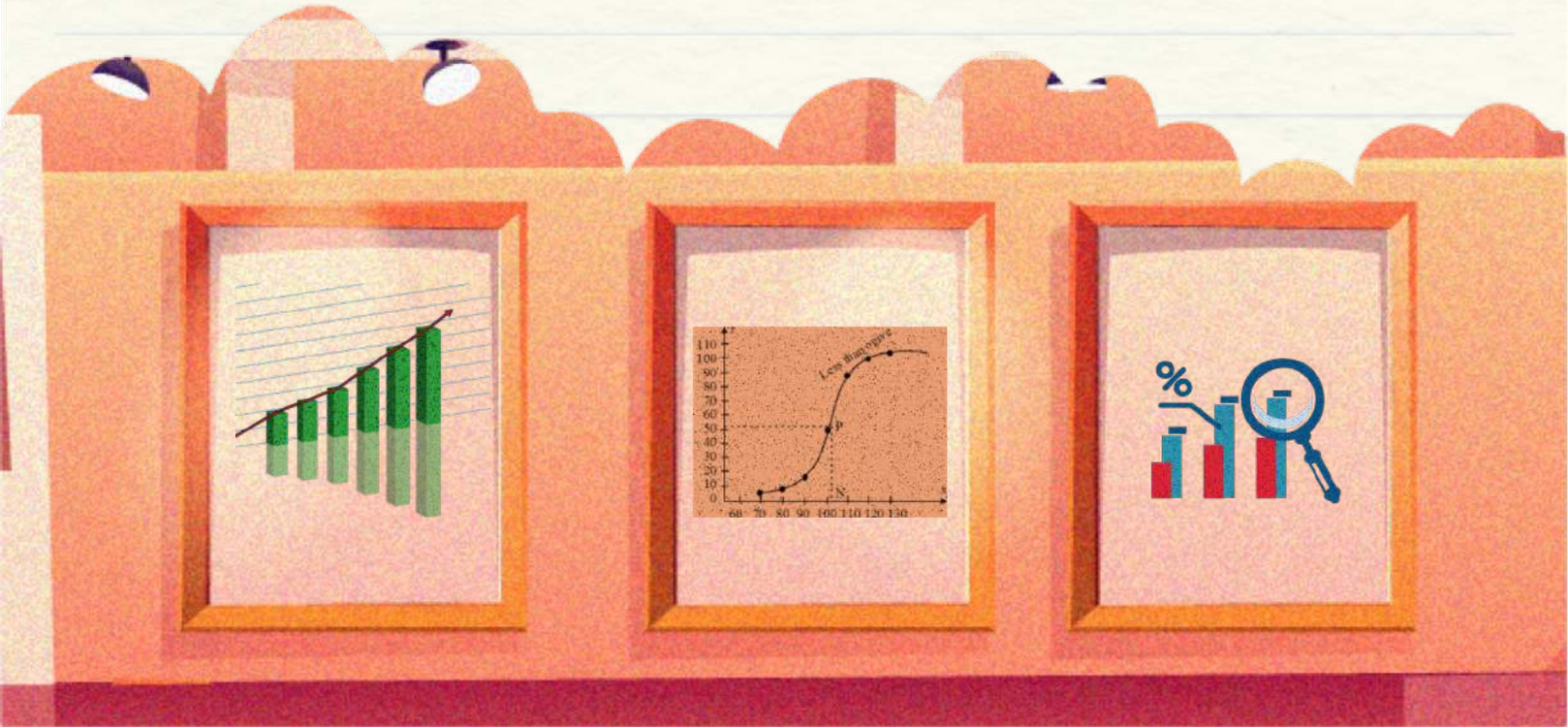
BYJU'S

POST CLASS NOTES

Statistics

Topics

1. Mean
2. Cumulative Frequency
3. Median
4. Mode



Mean of Grouped Data

Mean

Mean is a measure of central tendency which gives the average of a data.

Direct Method

$$\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$\text{Class mark } (x_i) = \frac{\text{Upper Class Limit} + \text{Lower Class Limit}}{2}$$

Assumed Mean Method

An arbitrary mean 'a' is chosen which is called 'assumed mean', somewhere in the middle of all the values of x.

$$\bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i}$$

Where $d_i = (x_i - a)$

Step Deviation Method

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

Where $u_i = \frac{d_i}{h}$ and h is class size of class interval

Cumulative Frequency

Cumulative frequency is the sum of all the frequencies up to the current point.

Less-than type cumulative frequency table

Marks	Number of students
0–10	5
10–20	3
20–30	4
30–40	3

Marks	Cumulative frequency
Less than 10	5
Less than 20	5 + 3 = 8
Less than 30	8 + 4 = 12
Less than 40	12 + 3 = 15

More-than type cumulative frequency table

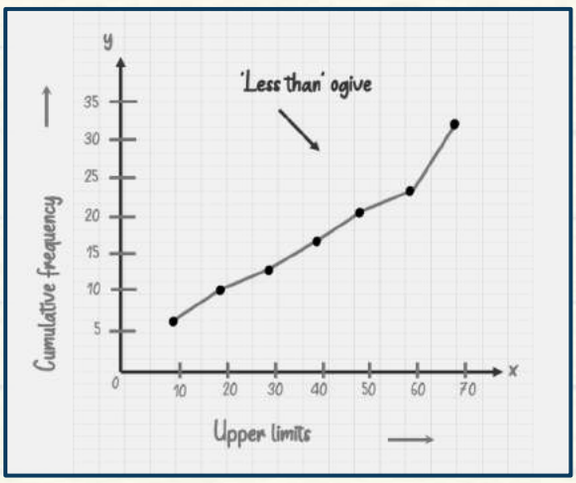
Marks	Number of students
0–10	5
10–20	3
20–30	4
30–40	3

Marks	Cumulative frequency
More than or equal to 0	5
More than or equal to 10	15 – 5 = 10
More than or equal to 20	10 – 3 = 7
More than or equal to 30	7 – 4 = 3

Graphical Representation of Cumulative Frequency Distribution

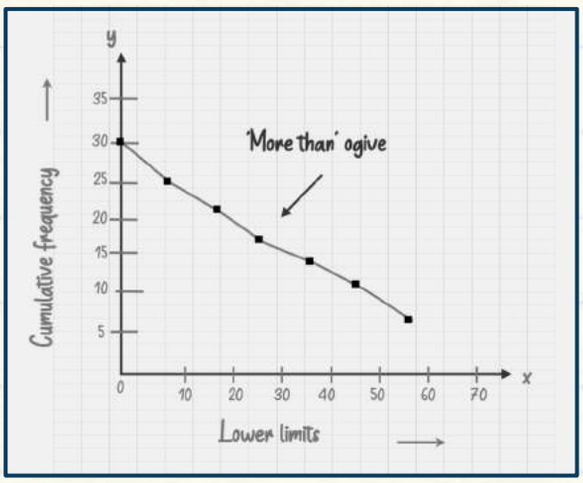
Less than Ogive

To draw the graph of less than ogive, take the upper limits of the class interval and mark the respective less than frequency. Then, join the dots by a smooth curve.



More than Ogive

To draw the graph of more than ogive, take the lower limits of the class interval on the x-axis and mark the respective more than frequency. Then, join the dots by a smooth curve.



Let's say class interval 70 – 80, the frequencies included in this interval are from $70 \leq f < 80$, which means the frequencies corresponding to 80 do not belong to this class interval.

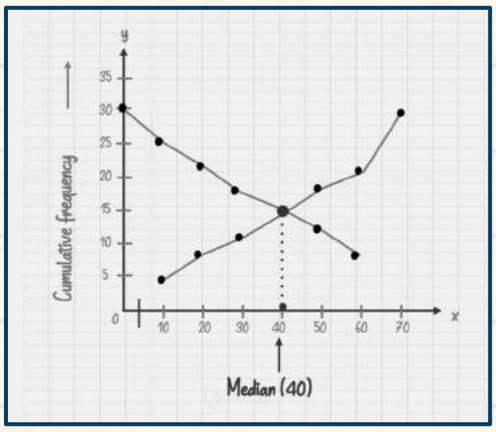
Median of Grouped Data

Algebraic Method

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

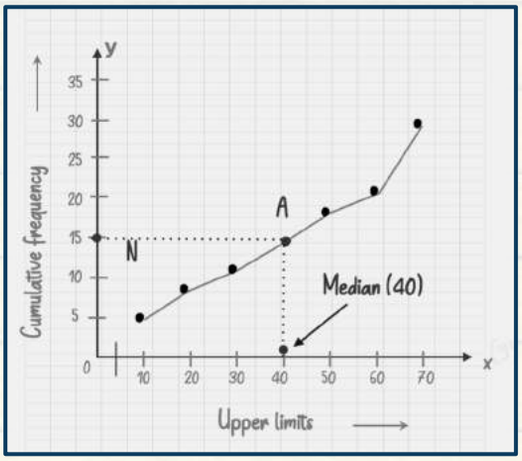
l = Lower limit of median class
n = Number of observations
f = Frequency of median class
cf = Cumulative frequency of preceding class
h = Class size

Graphical Method



Median can be obtained by either the less than type or more than type ogive. The given methodology is applicable for both, i.e., less than or more than ogive.

1. Find the middle point of total number of cumulative frequency of the given dataset and mark it as N on the y-axis.
2. From N, draw a line parallel to X axis to intersect the ogive at point A.
3. Drop a perpendicular from A on X axis. This value will represent the median.



Mode of Grouped Data

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

l = lower class limit of the modal class

h = class interval size

f_1 = frequency of the modal class

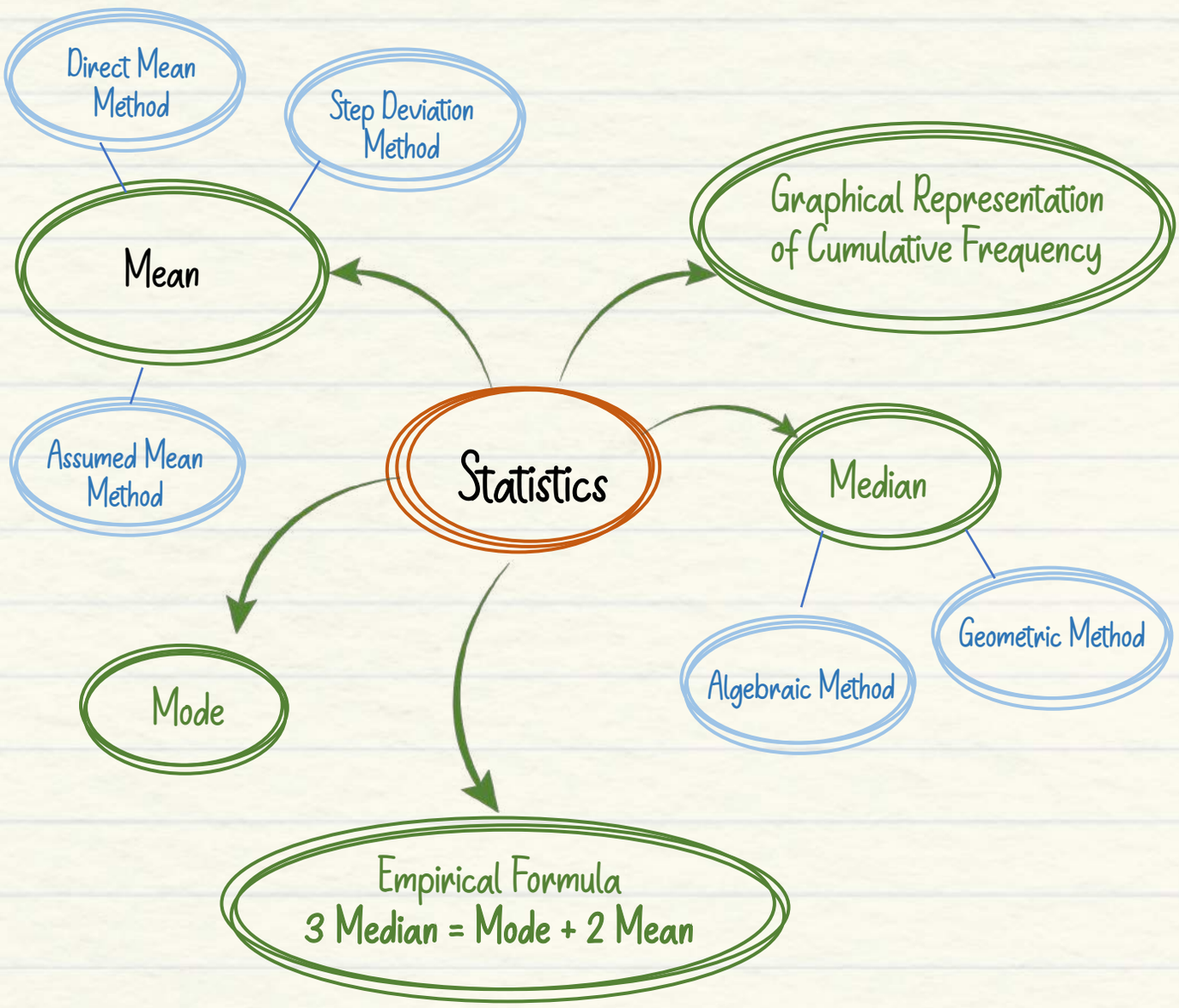
f_0 = frequency of the preceding class

f_2 = frequency of the succeeding class

Empirical Formula

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

Mind Map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