

PERCENTILES (P)

These are values that divide a given set of data into one hundred equal parts.

Thus

20th percentile is represented by 20% of data = P_{20}

50th percentile is represented by 50% of data = P_{50} = Mean value of the data

25th percentile is represented by 25% of data = P_{25} = Lower quartile value

75th percentile is represented by 75% of data = P_{75} = Upper quartile value

QUARTILES (Q)

These are values that divide a given set of data into four equal parts.

They are

Lower quartile value = Q_1 is represented by $\frac{1}{4}$ of the data

Median quartile value = Q_2 is represented by $\frac{1}{2}$ of the data = Median of the data

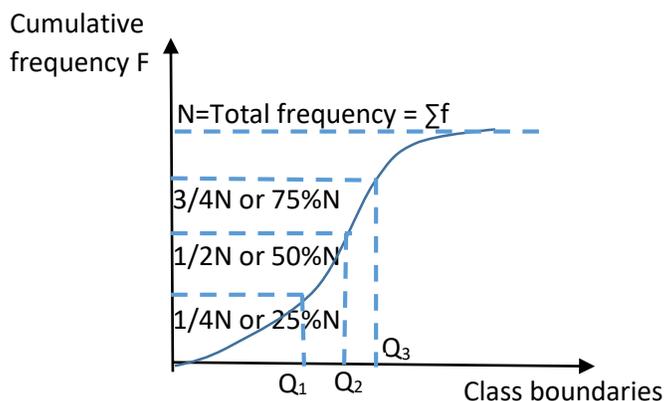
Upper quartile value = Q_3 is represented by $\frac{3}{4}$ of the data

Quartile range = Upper quartile – Lower quartile = $Q_3 - Q_1$

Interquartile range = $\frac{Q_3 - Q_1}{2}$

Both Quartiles and Percentiles values can be estimated from an Ogive or cumulative frequency curve.

Ogive is a graph obtained by plotting cumulative frequency against class boundaries.

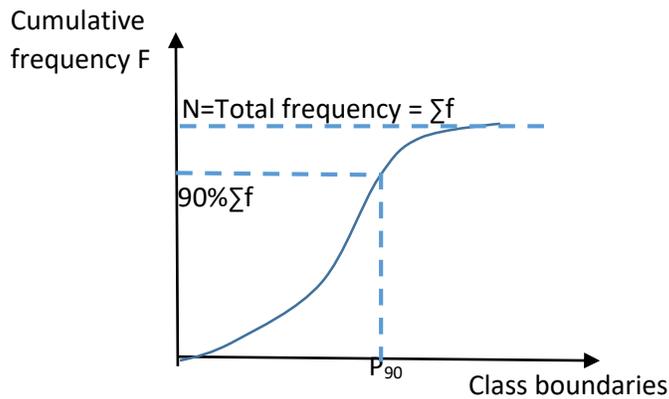


So percentiles are got in the same way as quartiles. Just multiply the percentage given by total frequency. Draw a horizontal line through the frequency you have obtained up to the curve followed by a vertical line to class boundaries. The value on which the vertical line lands on the class boundaries axis is the percentile or quartile required.

e.g. 90th percentile means get 90% of total frequency and the value from the graph is P_{90} estimated from class boundary axis.

$$P_{90} = 90\% \sum f$$

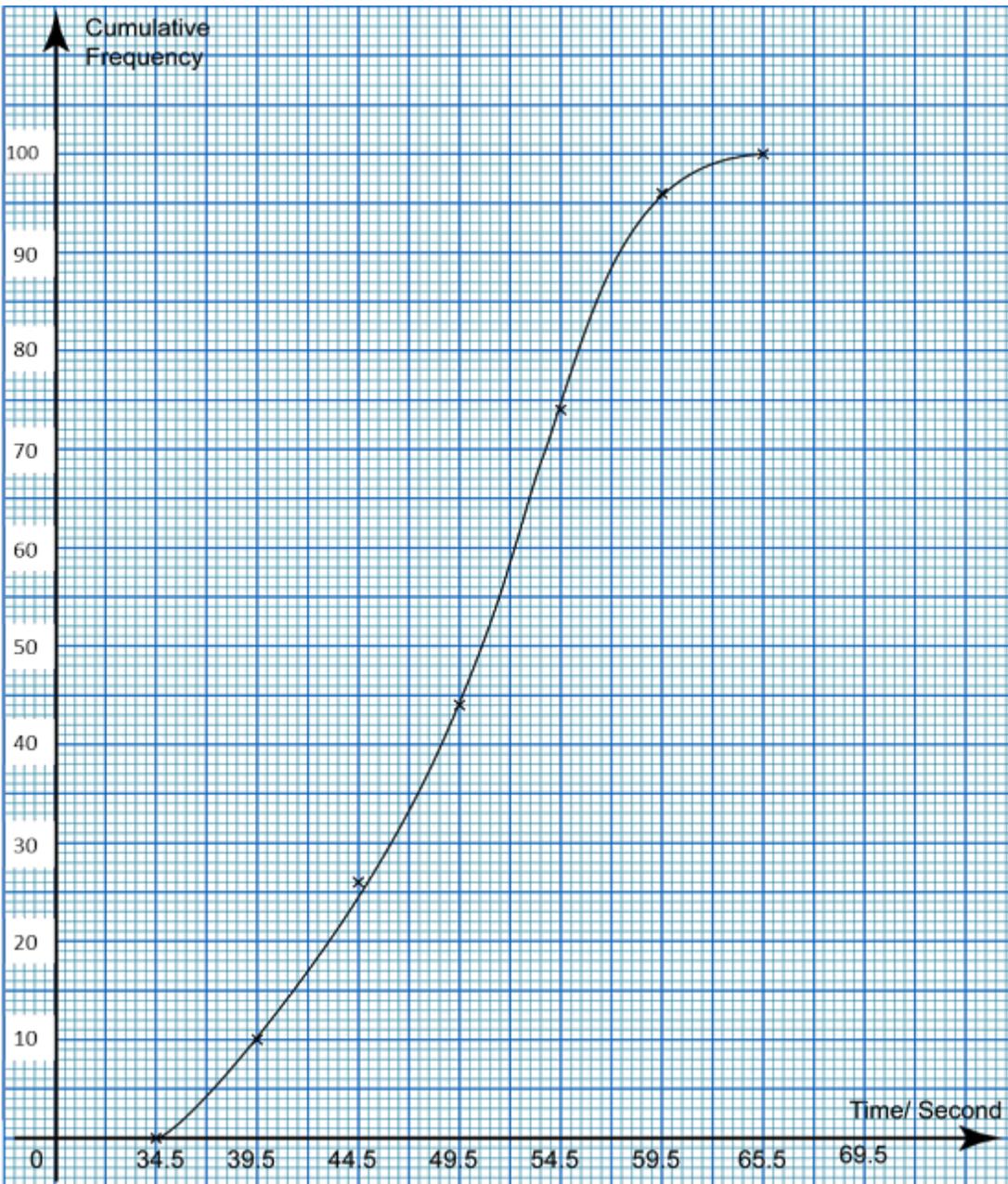
P_{90} = 90th percentile value = value on class boundary axis



So percentiles are got in the same way as quartiles. Just multiply the percentage given by total frequency. Draw a horizontal line through the frequency you have obtained up to the curve

TRIAL QUESTION

1. The Ogive below shows the distribution of marks obtained by students in a Math test.
 - (a) Use the graph to estimate the
 - (i) median mark
 - (ii) upper quartile
 - (iii) lower quartile
 - (iv) 80th percentile value
 - (b) Find the interquartile range
 - (c) Draw a frequency distribution table from the Ogive.
 - (d) Calculate the
 - (i) average mark using 52 as the working mean.
 - (ii) Calculate the modal mark.



2. The table below shows marks scored by 50 students in a mathematical test.

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Number of students	3	7	16	14	6	3	1

- a) (i) State the class width.
(ii) Use the table to estimate the mean mark using a working mean of 54.5
- b) Calculate the cumulative frequency.
- c) Draw a cumulative frequency curve and hence estimate the
 - (i) Median
 - (ii) Upper and lower quartiles

- (iii) 40th percentile (12 marks)
 3. The marks scored by 60 students in a math test are shown below.

45	80	67	75	56	45	30	25	40	50
40	62	90	19	45	60	52	81	55	80
69	43	20	31	21	50	54	31	30	40
49	40	32	70	25	39	40	72	50	49
47	39	60	53	45	71	89	47	56	82
31	30	56	73	60	69	51	41	66	70

- (a) Construct a grouped frequency table having class intervals 10 marks, beginning with 15–24 class group.
 (b) Using your grouped frequency table to calculate the mean mark of the candidates.
 (c) Represent the above results on a histogram. Use the histogram to estimate the mode.
 (d) Plot an ogive and use it to estimate
 (i) Median mark
 (ii) Upper and lower quartiles
 (iii) 90th percentile
4. The table below shows the weight (**kg**) of **40** students of **S.3** and their corresponding cumulative frequencies (*c.f*)

Weight (kg)	<i>c.f</i>
30 – 34	2
35 – 39	7
40 – 44	12
45 – 49	21
50 – 54	28
55 – 59	34
60 – 64	38
65 – 69	40

- a) Calculate the
 (i) mean weight of the students using an assumed mean of 47 kg.
 (ii) median weight
 (b) Draw a cumulative frequency curve and use it to estimate:
 i. The semi-interquartile range.
 ii. 70th percentile
 (c) Plot a histogram and use it to estimate the modal weight. (12mks)