CUMULATIVE FREQUENCY CURVE (OGIVE)

Cumulative frequency distribution is the successive additions of data which shows how many of the items in each class interval are less than or greater than the values in the next class. For example, the West African Examination Council (WAEC) makes use of cumulative frequency distribution scores in the final grade of students who sat for the Senior Secondary Certificate Examination (SSCE). The results of these students are compiled on yearly basis by the school and are added up. So the performance of students from SS1 and SS2 contribute to their final result in SSCE.

The Cumulative Frequency curve (or ogive) is obtained by plotting the cumulative frequencies against the upper limit of the class intervals. The frequencies are always plotted on the y-axis.

Estimating Median, Quartile, and Percentile from an Ogive Curve

The cumulative frequency curve (ogive) can be used to estimate the median, quartile and percentile of a grouped data.

To find the mean, quartiles, and percentiles, one ought to first draw the ogive curve. Thereafter, formulas to use are:

For median: $\frac{N}{2}$; where N = total frequency

For 1st Quartile, Q_1: $\frac{N}{4}$

For 3rd Quartile, Q_3: $\frac{3}{4}.N$

For any percentile: $\frac{aN}{100}$ where a is the position of the percentile

For interquartile range: $Q_3 - Q_3$

Example: From the table given below:

a. Draw a cumulative frequency curve
b. Use the curve to estimate
   i. The median
   ii. The lower (Q_1) and the upper (Q_3) quartile

iii. The 40^{th} (P_{40}) and the 60^{th} (P_{60}) percentiles.

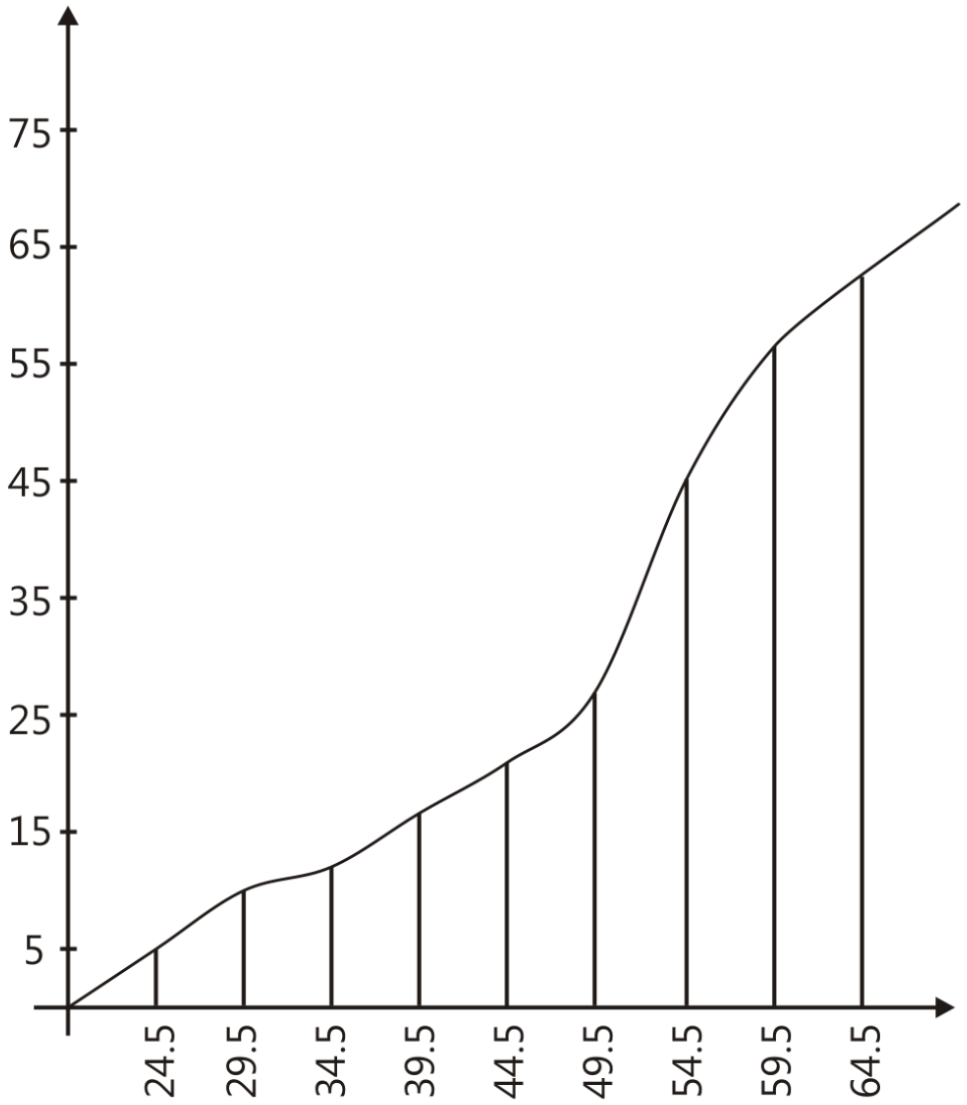
iv. The interquartile range (Q).

Weights (kg)	Frequency
20 – 24	5
25 – 29	4
30 – 34	3
35 – 39	5
40 – 44	5
45 – 49	5
50 – 54	18
55 – 59	12
60 – 64	3

Solving

Weights (kg)	Frequency	Cum Frequency	Upper boundary
20 – 24	5	5	24.5
25 – 29	4	9	29.5
30 – 34	3	12	34.5
35 – 39	5	17	39.5
40 – 44	5	22	44.5
45 – 49	5	27	49.5
50 – 54	18	45	54.5
55 – 59	12	57	59.5
60 – 64	3	60	64.5

a.



b.i. Median, $Q_2 = \frac{1}{2} \times f = \frac{60}{2} = 30^{th}$ mark

Look at the graph above to find the 30^{th} mark

ii. Lower Quartile, $Q_1 = \frac{1}{4} \times f = \frac{60}{4} = 15^{th}$ mark

Look at the graph above to find the 15^{th} mark

Upper Quartile, $Q_3 = \frac{3}{4} \times f = \frac{3}{4} \times 60 = 3 \times 15 = 45^{th}$ mark

Look at the graph above to find the 45^{th} mark

iii. 40^{th} percentile $= \frac{40}{100} \times 60 = 24^{th}$ mark

60^{th} percentile $= \frac{60}{100} \times 60 = 36^{th}$ mark

iv. $Q = Q3 - Q1 = 54.5 - 38.5 = 16.$