A Cumulative Frequency Graph is a graph plotted from a cumulative frequency table. A cumulative frequency graph is also called an **ogive** or cumulative frequency curve..

**Example 1**
Draw a cumulative frequency graph for the frequency table below.

|  |  |
| --- | --- |
| **Length (*x* mm)** | **Frequency** |
| 11 – 15 | 2 |
| 16 – 20 | 4 |
| 21 – 25 | 8 |
| 25 – 30 | 14 |
| 31 – 35 | 6 |
| 36 – 40 | 4 |
| 41 – 45 | 2 |

**Solution**

We need to add a class with 0 frequency before the first class and then find the upper boundary for each class interval.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Length** **(*x* mm)** | **Frequency** | **Upper Class Boundary** | **Length****(*x* mm)** | **Cumulative****Frequency** |
| 6 – 10 | 0 | 10.5 | *x* ≤ 10.5 | 0 |
| 11 – 15 | 2 | 15.5 | *x* ≤ 15.5 | 2 |
| 16 – 20 | 4 | 20.5 | *x* ≤ 20.5 | 6 |
| 21 – 25 | 8 | 25.5 | *x* ≤ 25.5 | 14 |
| 25 – 30 | 14 | 30.5 | *x* ≤ 30.5 | 28 |
| 31 – 35 | 6 | 35.5 | *x* ≤ 35.5 | 34 |
| 36 – 40 | 4 | 40.5 | *x* ≤ 40.5 | 38 |
| 41 – 45 | 2 | 45.5 | *x* ≤ 45.5 | 40 |

And then plot the cumulative frequency against the upper class boundary of each interval and join the points with a smooth curve.



**Example 2**

|  |  |
| --- | --- |
| **Age (years)** | **Frequency** |
| **10** | **5** |
| **11** | **10** |
| **12** | **27** |
| **13** | **18** |
| **14** | **6** |
| **15** | **16** |
| **16** | **38** |
| **17** | **9** |

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|  |  |  |
| --- | --- | --- |
| **Age (years)** | **Frequency** | **Cumulative Frequency** |
| **10** | **5** | **5** |
| **11** | **10** | **5+10 = 15** |
| **12** | **27** | **15+27 = 42** |
| **13** | **18** | **42+18 = 60** |
| **14** | **6** | **60+6 = 66** |
| **15** | **16** | **66+16 = 82** |
| **16** | **38** | **82+38 = 120** |
| **17** | **9** | **120+9 = 129** |

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**Exam Results Example** - Cumulative Frequency Curve (Ogive)



**Percentile**

A percentile is a certain percentage of a set of data.

**Median**

The median corresponds to the 50th percentile i.e. 50% of the total frequency.



From the graph, 20 on the vertical axis corresponds to 44 on the horizontal axis. The median mark is 44.

**Upper Quartile**

The upper quartile corresponds to the 75th percentile i.e. 75% of the total frequency.



From the graph, 30 on the vertical axis corresponds to 52 on the horizontal axis. The upper quartile is 52.

**Lower Quartile**

The lower quartile corresponds to the 25th percentile i.e. 25% of the total frequency.



From the graph, 10 on the vertical axis corresponds to 36 on the horizontal axis. The lower quartile is 36.

**Inter Quartile Range**

Upper - Lower Quartile = 52 - 36 = 16