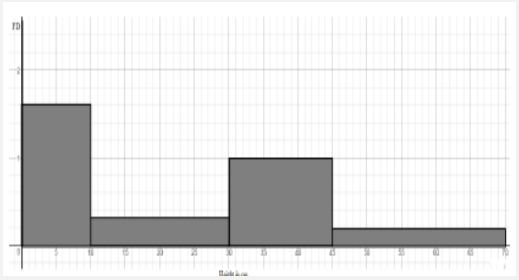
Topic: Histograms and Cumulative Frequency

<table>
<tr><th>Topic/Skill</th><th>Definition/Tips</th><th>Example</th></tr>
<tr><td>1. Histograms</td><td>A visual way to display frequency data using bars.

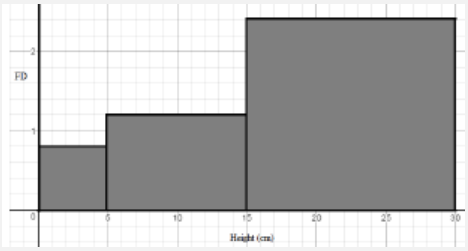
Bars can be unequal in width.

Histograms show frequency density on the y-axis, not frequency.

$$\boldsymbol{Frequency\ Density} = \frac{\boldsymbol{Frequency}}{\boldsymbol{Class\ Width}}$$

<table><tr><th>Height(cm)</th><th>Frequency</th></tr><tr><td>$0 < h \leq 10$</td><td>8</td></tr><tr><td>$10 < h \leq 30$</td><td>6</td></tr><tr><td>$30 < h \leq 45$</td><td>15</td></tr><tr><td>$45 < h \leq 70$</td><td>5</td></tr></table></td><td><table><tr><th>Frequency Density (FD)</th></tr><tr><td>$8 \div 5 = 1.6$</td></tr><tr><td>$6 \div 20 = 0.3$</td></tr><tr><td>$15 \div 15 = 1$</td></tr><tr><td>$5 \div 25 = 0.2$</td></tr></table>
  </td></tr>
<tr><td>2. Interpreting Histograms</td><td>The area of the bar is proportional to the frequency of that class interval.

$$\boldsymbol{Frequency} = \boldsymbol{Freq\ Density} \times \boldsymbol{Class\ Width}$$</td><td>A histogram shows information about the heights of a number of plants. 4 plants were less than 5cm tall. Find the number of plants more than 5cm tall.

Above 5cm:
1.2 x 10 + 2.4 x 15 = 12 + 36 = 48</td></tr>
<tr><td>3. Cumulative Frequency</td><td>Cumulative Frequency is a running total.

<table><tr><th>Age</th><th>Frequency</th></tr><tr><td>$0 < a \leq 10$</td><td>15</td></tr><tr><td>$10 < a \leq 40$</td><td>35</td></tr><tr><td>$40 < a \leq 50$</td><td>10</td></tr></table></td><td><table><tr><th>Cumulative Frequency</th></tr><tr><td>15</td></tr><tr><td>$15 + 35 = 50$</td></tr><tr><td>$50 + 10 = 60$</td></tr></table></td></tr>
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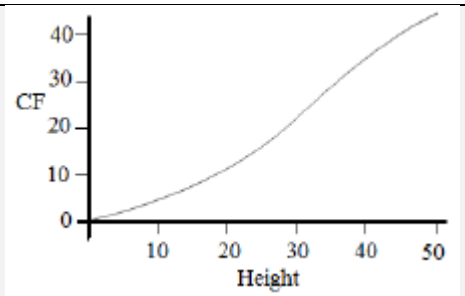
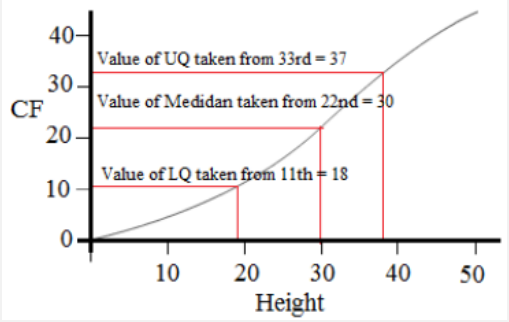
4. Cumulative Frequency Diagram	A cumulative frequency diagram is a **curve that goes up**. It looks a little like a stretched-out **S shape**. Plot the cumulative frequencies at the **end-point** of each interval.	
5. Quartiles from Cumulative Frequency Diagram	**Lower Quartile** (Q1): **25%** of the data is less than the lower quartile. **Median** (Q2): **50%** of the data is less than the median. **Upper Quartile** (Q3): **75%** of the data is less than the upper quartile. **Interquartile Range (IQR)**: represents the **middle 50%** of the data.	 $IQR = 37 - 18 = 19$
6. Hypothesis	**A statement that might be true, which can be tested.**	Hypothesis: 'Large dogs are better at catching tennis balls than small dogs'. We can test this hypothesis by having hundreds of different sized dogs try to catch tennis balls.