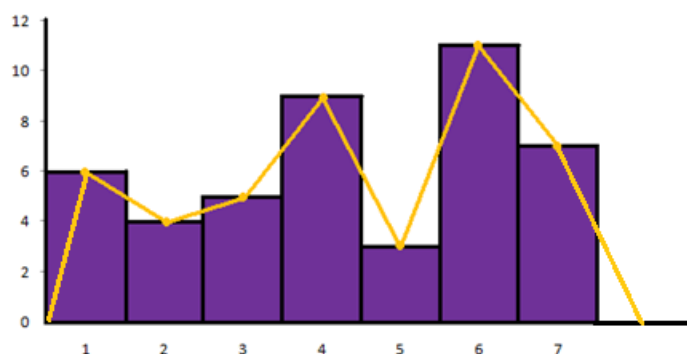


## Frequency Polygons

**Definition:** A frequency polygon is a graph that displays the data using lines to connect points plotted for the frequencies. The frequencies represent the heights of the vertical bars in the histograms.

A frequency polygon provides an estimate of the shape of the distribution of the population.



Observe that the distribution is mound-shaped, with more of the values to the left of the peak. If this were a truly representative sample from the population, then one would expect that the distribution of the population of weights would have a similar shape. Also, observe that the line segments pass through the midpoints at the top of the rectangles and that the polygon is “**tied down**” to the horizontal axis at both ends. The points where the polygon is tied down correspond to the midpoints of the classes with zero frequency. In this case, the midpoints are 80 and 160. Midpoints of classes are called class marks.

Frequency Polygons are the preferred way to graph the frequency distribution of ungrouped (raw) interval data. They represent the frequency of each class of data points as a line connecting the midpoints of the bars of a histogram. The normal (bell) curve is the most common type of frequency polygon. Frequency polygons can describe the behavior of the same interval variable under different circumstances, as in before-after situations, if superimposed on each other.

**Advantages:** Frequency polygons can:

- begin to show central tendency, dispersion, and clustering/modality
- estimate key values, especially the mean, and show skew
- summarize a large data set in visual form
- clarify trends better than do tables, arrays, and most other graphs
- show the behavior and distribution of a variable
- become more smooth as classes or data points are added
- be easily understood due to widespread use in business and the media

**Disadvantages:** Frequency polygons can:

- fail to delineate each interval in a frequency distribution
- lose details on relative numbers and proportions
- require additional written or verbal explanation
- be inadequate to describe the attribute, behavior, or condition of interest
- fail to reveal key assumptions, norms, causes, effects, or patterns
- be easily manipulated to yield false impressions
- fail as a visual check of the accuracy or reasonableness of calculations

### How to create a Frequency Polygon (Line Graph)?

**Step 1:** Create a frequency table.

**Step 2:** Plot the frequency over the class midpoint.

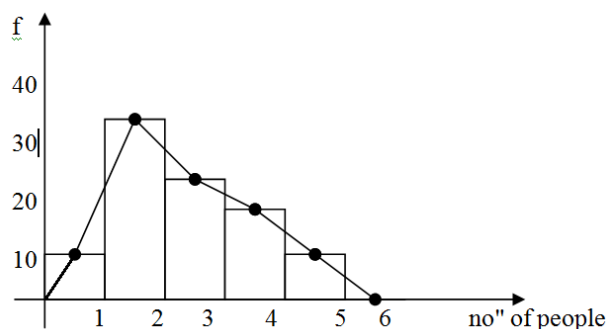
**Step 3:** Extend one class width to the left of the first midpoint and to the right of the last midpoint.

**Step 4:** Connect the dots by straight lines in order so that the polygon begins and ends with a frequency of zero.

**Example 1:** In a survey, the number of people in 100 cars passing a set of traffic lights was counted. Here are the results:

Number of people in car	Frequency
1	10
2	35
3	25
4	20
5	10
6	0

Draw a histogram and a frequency polygon to illustrate this data.



**Ogive**

**Ogive** - a cumulative frequency graph

**Cumulative frequency distribution:** a frequency distribution in which the frequencies replaced with cumulative frequencies.

The **cumulative frequency** for any given class is the sum of the frequency for that class and the frequencies of all classes of smaller values.

**Components of an Ogive**

1. A title, which identifies the population.
2. A vertical scale, which identifies the cumulative frequencies
3. A horizontal scale, which identifies the upper class boundaries. Until the upper boundary of a class has been reached, you cannot be sure you have accumulated all the data in that class. Therefore, *the horizontal scale for an ogive is always based on the upper class boundaries.*

Every ogive starts on the left with a relative frequency of zero at the lower class boundary of the first class and ends on the right with a relative frequency of 100% at the upper class boundary of the last class.

**How to create a Cumulative Frequency Ogive?**

**Step 1:** Create a cumulative frequency table.

**Step 2:** Label the horizontal scale starting with the lower class boundary of the first class and then upper class boundary for each class.

**Step 3:** Plot the cumulative frequency over the upper class boundary for each class and assign 0 to the first label.

**Step 4:** Connect the dots with straight lines.

**How to create a Relative Cumulative Frequency Ogive?**

**Step 1:** Create a relative cumulative frequency table.

**Step 2:** Label the horizontal scale starting with the lower class boundary of the first class and then upper class boundary for each class.

**Step 3:** Plot the relative cumulative frequency over the upper class boundary for each class and assign 0 to the first label.

**Step 4:** Connect the dots with straight lines.