

1.3.5.6: Using Ogives to find Percentiles

The table of cumulative relative frequencies can be used to find percentiles for the endpoints. One method of estimating other percentiles of the data is by creating a special graph of cumulative relative frequencies, called an **Ogive**.

An Ogive is a line graph where the vertical axis is cumulative relative frequency and the horizontal axis is the value of the data, specifically the endpoints of the class intervals. The left end point of the first class interval will have a cumulative relative frequency of zero. All other endpoints are given the right endpoint of the corresponding class interval. The points are then connected by line segments.

The graph can then be read to find any percentile desired. For example, the 25th, 50th and 75th percentiles break the data into equal fourths and are called **quartiles**.

Definition: Percentile

Percentile - the value of the data below which a given percentage of the data fall.

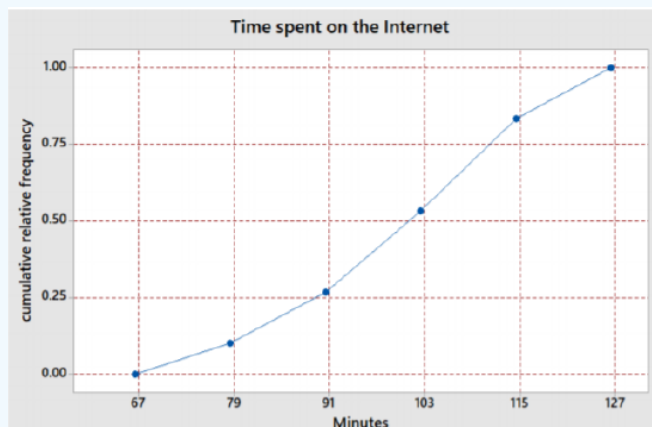
The 25th percentile is also known as the 1st **Quartile**.

The 50th percentile is also known as the 2nd **Quartile** or **median**.

The 75th percentile is also known as the 3rd **Quartile**

Example: Students browsing the web

We can refer to the cumulative relative frequency graph shown in the prior example to make the Ogive shown here.



Using the graph, we can estimate the quartiles of the distributions by where the line graph crosses cumulative relative frequency values of 0.25, 0.50 and 0.75.

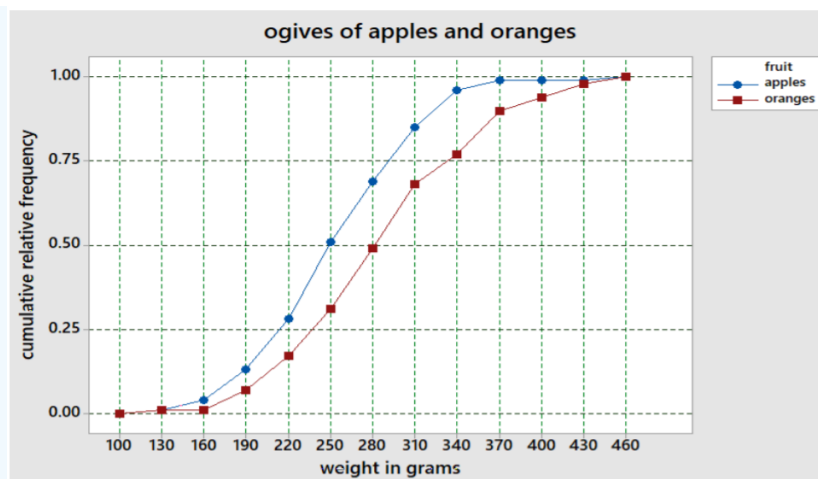
The 1st Quartile is about 87 minutes.

The median is about 100 minutes.

The 3rd Quartile is about 108 minutes.

Example: Comparing weights of apples and oranges

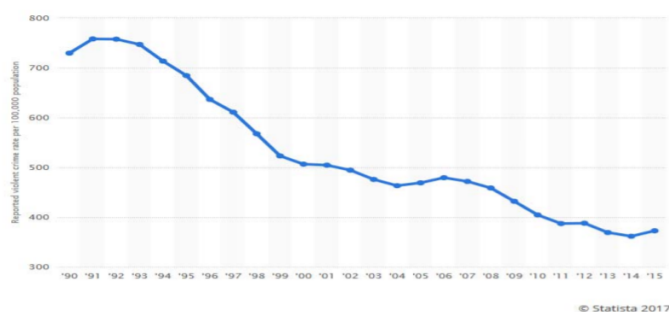
For the cumulative relative frequencies of the weights of apples and oranges, we can put both ogives on a single graph and estimate the quartiles.



Fruit	1 st Quartile	Median	3rd Quartile
Apples	210 grams	250 grams	295 grams
Oranges	235 grams	280 grams	335 grams

Line Graphs with time

The ogive is an example of a line graph. A very useful line graph is one in which time is the horizontal axis. An early example from Section 1.1 of this type of line graphs is the historical crime rates. The line graph shows that violent crime has decreased over time.

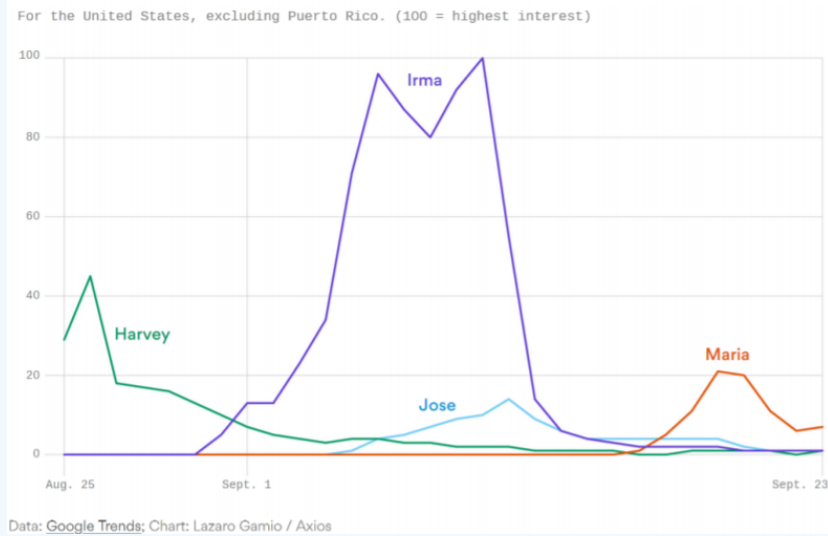


Line graph of Report

Example: Major Hurricanes in the Atlantic Ocean

In a one month period in 2017, four major hurricanes (category 3 or higher) formed in the Atlantic Ocean. Three of these hurricanes did devastating and costly damage to regions of the United States: Hurricane Harvey in Texas, Hurricane Irma in Florida and Hurricane Maria in Puerto Rico and the Virgin Islands. There was also catastrophic damage from these storms in Cuba, Dominica and other Caribbean countries, islands, and territories.

A Google Analytic graph shows that much more attention was paid to Hurricane Irma throughout the days it was threatening Florida.²²



However, Google Analytics excludes Puerto Rico which took a direct hit from Hurricane Maria. It could also be that after Harvey caused massive flooding in and near Houston, more people became interested in all hurricane activity.

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