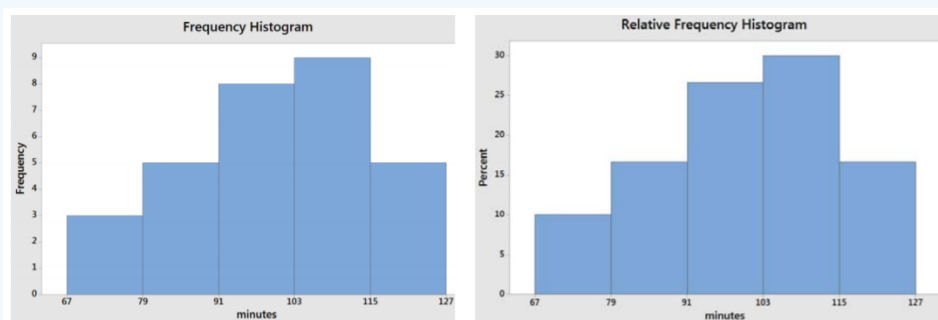


1.3.5.4: Histograms

A histogram is a graph of grouped rectangles where the vertical axis is frequency or relative frequency and the horizontal axis show the endpoints of the class intervals. The area of each rectangle is proportional to the frequency or relative frequency of the class interval represented.

Example: Students browsing the web

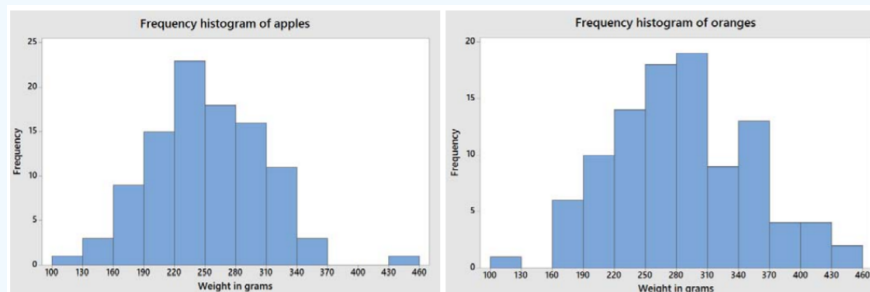
In the earlier example of 30 students browsing the web, we made 5 class intervals of the data. Here histograms represent frequency in the first graph and relative frequency in the second graph. Note that the shape of each graph is identical; all that is different is the scaling of the vertical axis.



Like the stem and leaf diagram, the histogram allows us to interpret and analyze the data. The **center** is around 100 minutes. The **spread** between the highest and lowest numbers is about 60 minutes. The **shape** is slightly **skewed negative**. The data clusters towards the center and there doesn't seem to be any unusual features like outliers.

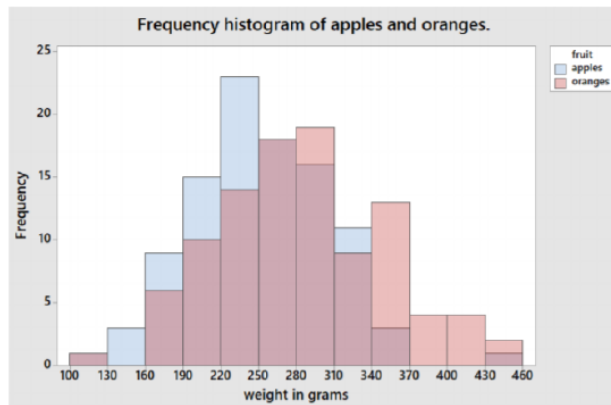
Example: Comparing weights of apples and oranges

First let's make a histogram of apples and oranges separately



For the apples, the center is around 250 grams and for the oranges the center is around 280 grams, meaning the oranges appear slightly heavier. For both apples and oranges, the range is about 360 grams from the minimum to the maximum values. Both graphs seem approximately symmetric. The apples have one value that is unusually high, and the oranges have one value that is unusually low.

Another way of comparing apples and oranges is to combine them into a single graph, also called a **grouped histogram**.



Here, the histograms are laid on top of each other, the light blue and purple match the histogram of apples and the light red and purple match the histogram of the oranges. Here is easier to see that oranges, in general, weigh more than apples.

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