

AP Statistics: Graphical Displays

From Simple Studies, <https://simplestudies.edublogs.org> & @simplestudiesinc on Instagram

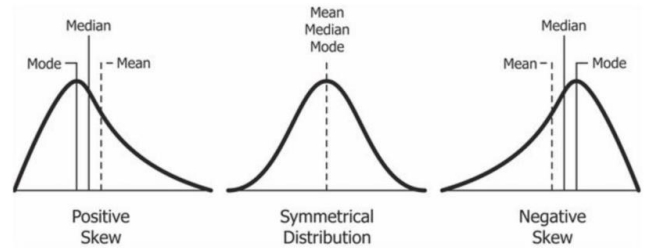
Definitions

- **Parameter:** A numerical descriptive measure of a population (μ , σ)
 - Population: The variable is from every individual of interest
- **Statistic:** A numerical descriptive measure of a sample (\bar{x} , S)
 - Sample: The variable is from only some of the individuals of interest

Distribution

- **Center:** Mean, Median, Mode
 - Mean (μ and \bar{x}): Average of the data
 - Median: Value in the middle after arranging the numbers in order
 - Use the formula $(n+1)/2$ to find which value the median is, where n is the amount of numbers you have
 - Mode: Number that repeats the most
 - The mean is not resistant to outliers but the median is
 - Outlier: A value that seems to fall outside the data (see boxplots)
- **Spread (Variability):** Standard Deviation, Variance, Range, Interquartile Range
 - Standard Deviation (σ and S): How far one data point is from the mean
 - The larger the standard deviation, the more spread out the data is (vice versa)
 - Variance (σ^2 and S^2): Standard deviation squared (used in other formulas)
 - Range: Highest value minus lowest value (max - min)
 - Interquartile Range (IQR): Third quartile minus first quartile ($Q_3 - Q_1$)

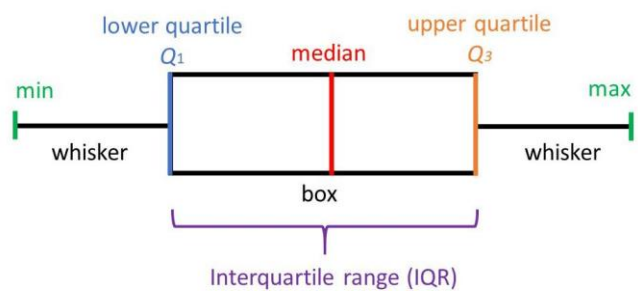
- **Shape:** Approximately Normal, Skewed to the Right, Skewed to the Left
 - Approximately Normal: Mean = Median
 - Skewed to the Right (Positively Skewed): Mean > Median
 - Skewed to the Left (Negatively Skewed): Mean < Median



From [HYPERLINK](#)

Box Plots

- Show a brief summary of the data
- When drawing boxplots:
 - Ensure your scale is consistent
 - For one variable, only the x-axis must be labeled. For two variables, the x-axis and y-axis must be labeled
 - Parallel box plots are displayed in the same graph, one above the other (this is where you must label the y-axis)
 - Each section represents 25% of the data
 - The distribution is skewed towards the longer box/whisker
 - Outliers are marked with asterisks (*)
 - Find outliers using the formula $h = 1.5(Q_3 - Q_1)$. Any number outside the range $Q_1 - h$ and $Q_3 + h$ is considered an outlier
 - The modified minimum and maximum are the smallest and largest numbers that are not outliers

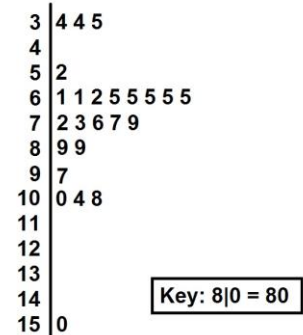


From [HYPERLINK](#)

Stemplots

- Used to display quantitative data, generally from small data sets
- Give exact data
- Shows outliers, gaps, and clusters
- The 'ones' place is always on the right
- Do not put any commas (spaces only)
- Always include a key at the side or bottom

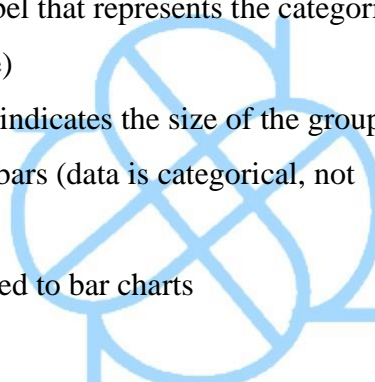
Final Sale Price (to nearest dollar)



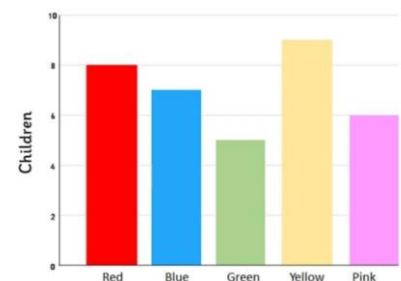
From [HYPERLINK](https://www.mathbootcamps.com/how)
"https://www.mathbootcamps.com/how"

Bar Chart

- Consists of columns plotted on a graph
- The columns sit over a label that represents the categorical value (qualitative variable)
- The height of the column indicates the size of the group
- Leave space between the bars (data is categorical, not continuous)
- Skewness cannot be applied to bar charts



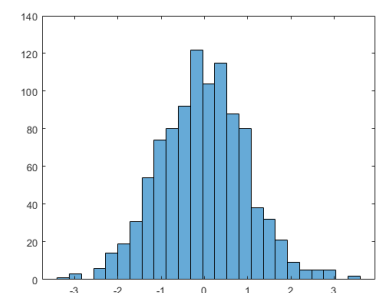
Favourite Colour



From [HYPERLINK](https://www.twinkl.com/teaching-)
"https://www.twinkl.com/teaching-"

Histogram

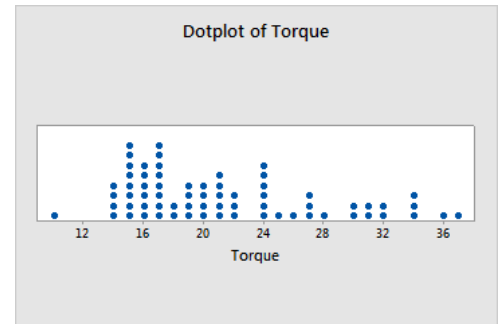
- Consists of columns plotted on a graph
- Usually no space between adjacent columns
- The columns sit over a label that represents the numerical value (quantitative variable)
- The columns are placed in the middle of each number on the graph
- The height of the column indicates the size of the group
- When histograms are large on opposite ends, the standard deviation is larger than if it were symmetric or larger in the middle
- Histograms may be approximately normal or skewed



From [HYPERLINK](https://www.mathworks.com/help/matlab/ref/matlab.graphics.chart.primitive.histogram.html)
"https://www.mathworks.com/help/matlab/ref/matlab.graphics.chart.primitive.histogram.html" "https://www.mathworks.com/help/matlab/ref/matlab.graphics.chart.primitive.histogram.html"

Dot Plot

- Consists of dots plotted on a graph
 - Each dot represents a specific number of observations from a set of data
 - The dots are stacked in a column over a category.
 - The height of the column represents the relative or absolute frequency of observations in that category
- Dot plots may be qualitative or quantitative. Dot plots may only be described in terms of skewness if they represent quantitative data



From [HYPERLINK](https://support.minitab.com/en-us/minitab/19/help-and-how-to/analyze-data/summarize-data/summarize-quantitative-data/summarize-quantitative-data-tutorial/summarize-quantitative-data-tutorial-how-to-interpret-a-dotplot)
"https://support.minitab.com/en-us/minitab/19/help-and-how-to/analyze-data/summarize-data/summarize-quantitative-data/summarize-quantitative-data-tutorial/summarize-quantitative-data-tutorial-how-to-interpret-a-dotplot"

