**Graph Checklist**

* The correct type of graph is made for the type of data presented (i.e. bar, line, histogram, pie, etc…)
* Graph is neatly constructed, organized, and makes good use of space. If used, colors make the graph more readable.
* For pie graphs, the wedges are clearly labeled, or color coded with a key
* For X-Y axis graphs…
  + the Y axis is labeled with the Responding Variable and the X axis is labeled with the Manipulated Variable
  + Units are clearly and correctly identified along the X and Y axis
  + The graph axes are proportional to the data (meaning the data is spread over the span of the axis, not clumped)
  + X and Y axis intervals are consistent and correct
  + All points are plotted clearly and correctly. In most cases, the mean of the data is graphed (not each individual trial).
  + When the mean is graphed, the standard deviation of each mean in included and labeled
  + If needed, best fit lines or curves are added to the graph to show trends or relationships
* Specific title is included. The title indicates what data is presented, including scientific name if relevant.
* A labeled legend is provided when the graph. Legends identify the different groups of data on the graph.

**How do I know which type of graph to use?** Follow this key…

1. Is the data a percent that sums to 100% or a total amount of time?

a. If yes.………………………………… Pie chart (not commonly used in biology)

b. If no………………………………….... Go to #2

2. Are both your manipulated and responding variables quantitative (qualitative data) ?

a. If no………………………………….... Bar graph

b. If yes …………………………………. Go to #3

3. Is your manipulated variable levels continuous (i.e. time in years) or clumped into ranges (i.e. 0-5 years, 6-10 years)?

a. Continuous…………………………... Scatter plot/line (most used in biology)

b. Clumped .....…………………………. Histogram

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| **Pie Chart** | Picture | Designed to show a percent of a whole, where the whole equals 100%. Pie charts are used to compare data, but cannot be used to see how a manipulated variable affects a responding variable. Pie charts do not show change with respect to another variable.  *Ex: Percent of time the cell spends in each phase of the cell cycle* |

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| **Bar Graph** | Picture | Designed to make comparisons of data. The data represented in bar graphs are not necessarily dependent on any other variables and the groupings are usually *qualitative* (i.e. grouped into categories, like blood types or color). The bars do NOT touch.  *Ex: Comparison of the mean reaction rate for five different enzymes* |

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| **Histogram** | Picture | Histograms are similar to bar graphs except the data represented in histogram is usually in groups of continuous numerical (*quantitative*) data. In this case, the bars do touch. Histograms are often used to show frequency data.  *Ex: Minimum Decibels (dBA) of sound heard by 20 people* |

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| **Line Graph** | Picture | A line graph consists of a series of points plotted on the grid and then connected point to point by a line. Line graphs are only used when both variables are quantitative. Line graphs show trends, such as how things change over time.  *Ex: Average mean temperature between the years 1900 and 2000* |

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| **Scatter Plot** | Picture | The points are plotted on the grid, but they are not joined point to point. A best fit line may be added to a scatter plot to show a trend. Line graphs are only used when both variables are quantitative. These graphs are useful for showing if a correlation exists between two variables, especially when it is not possible to alter either of the variables (i.e. in descriptive studies).  *Ex: Reaction rate at various enzyme concentrations* |