Why do scientists use Charts and Graphs?

- visual representation of their results
- influence the public
  a. visually driven society
  b. when looking at a graph of experimental results, always ask yourself if the researchers have an ulterior motive

An Overview

Before conducting a meaningful investigation, it's important to organize the data you collected.

- By organizing data, a scientist can more easily interpret what has been observed.
- Making sense of data is called interpretation.

Data Tables and charts

Since most of the data scientist collect is quantitative, data tables and charts are usually used to organize the information

- Graphs are created from data tables
- They allow the investigator to get a visual image of the observations, which simplifies interpretation and drawing conclusions
- Valid conclusions depend on organization and clear interpretation of data.

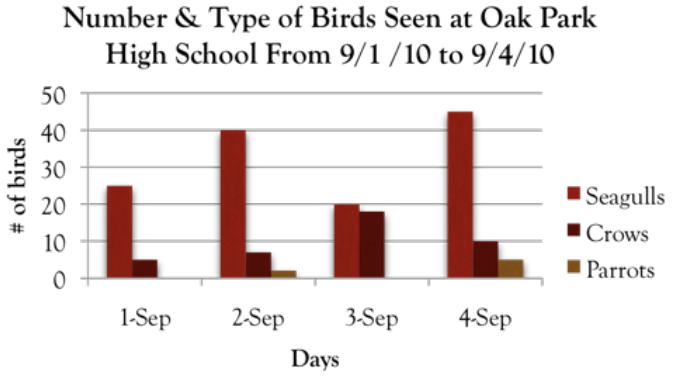
Data Tables

When creating data tables, place the manipulated variable in the left column and the responding variable in the right column.

- Create a table with the following information

week number	weight lifted
1	150 pounds
2	168 pounds
3	172 pounds
4	183 pounds

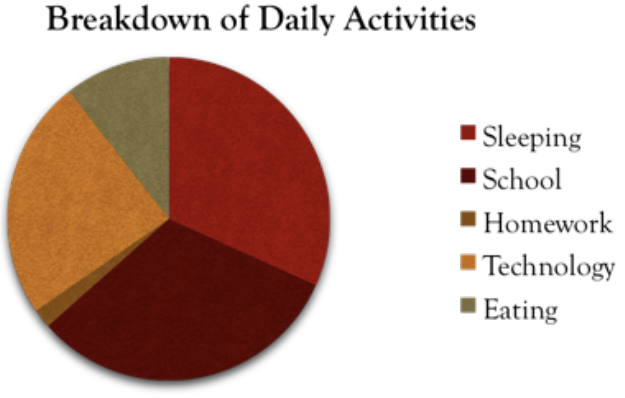
Column (Bar) Charts



- used to compare amounts
- NEVER use horizontal bars...ALWAYS vertical
- ex. show the # and type of birds seen at Oak Park

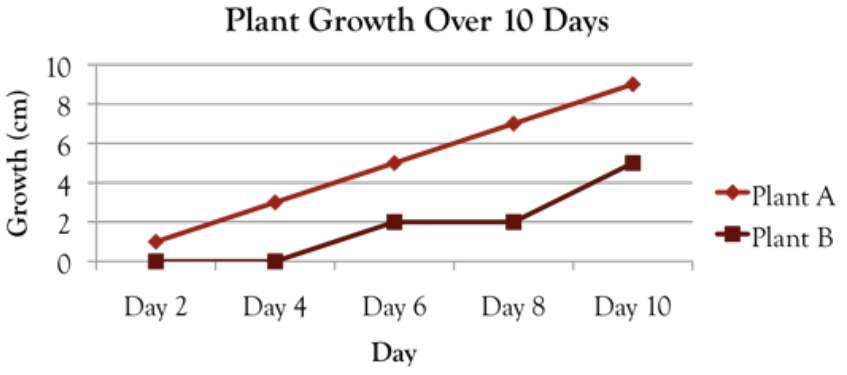
Circle (Pie) Charts

- always adds up to 100%
- used to show how some fixed amount/quantity is broken down
- ex. how students spend their day



Line Graphs

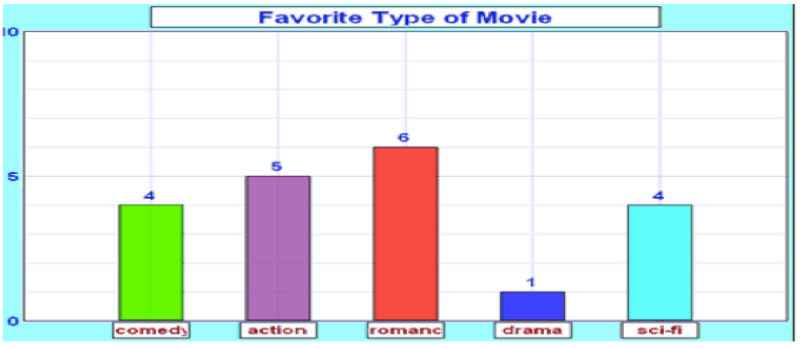
- used to show trends or how data changes over time
- ex. growth of plant A over 10 days compared to the growth of plant B over the same time period



Types of graphs

Two types of graphs are typically used when organizing scientific data...

- Descriptive data requires a bar chart or pie chart and has data that comes from research questions asking variables that will be counted.

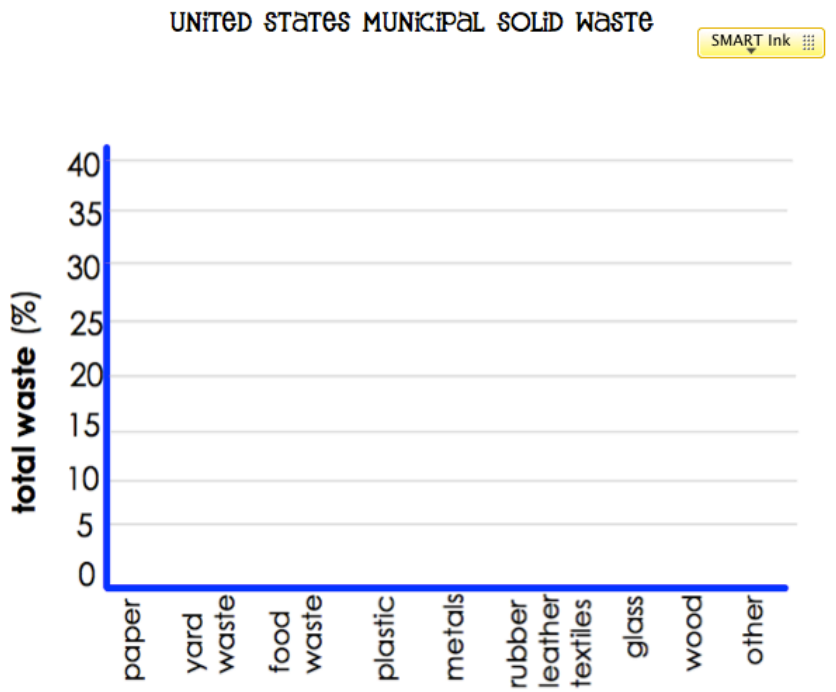


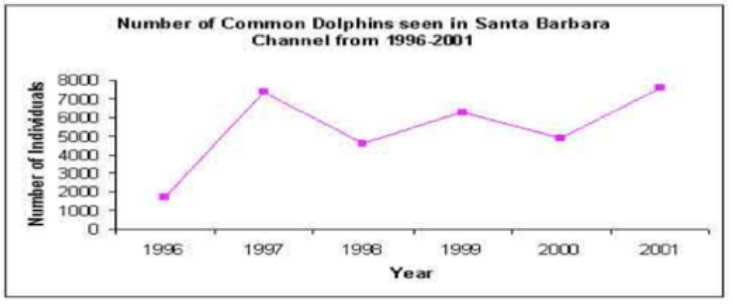
How to make a bar graph:

1. Use an appropriate scale and a reasonable starting point for each axis.
2. Label the axes, and plot the data
3. Choose a title that accurately represents the data.

Use the data below to create a bar graph

Material	Percentage of Solid Waste
Paper	38.1
Yard Waste	12.1
Food Waste	10.9
Plastics	10.5
Metals	7.8
Rubber, Leather, Textiles	6.6
Glass	5.5
Wood	5.3
Other	3.2





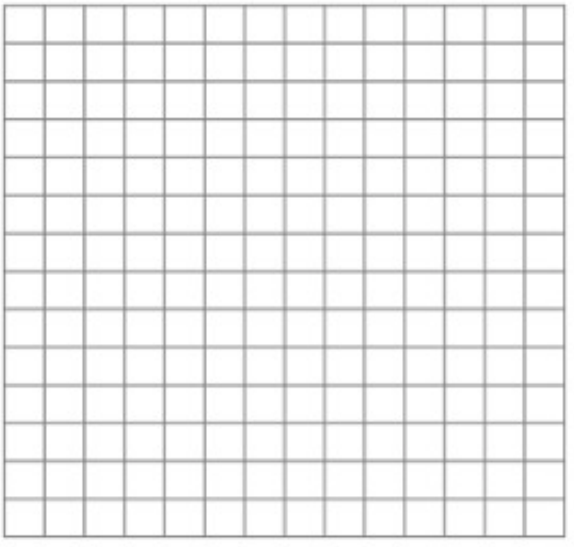
Continuous data requires a line graph. This type of data comes from research questions that ask about variables being investigated over time.

- Because the year and the population change, they are the **variables.** The population is determined by, or dependent on, the year. So population is the **dependent variable**, and the year is the **independent variable**.
- Each set of data is called a data pair. Data pairs are easily organized into data tables.

How to make a line graph

1. Label the x axis (horizontal axis) with the independent variable.
2. Label the y-axis (vertical axis) with the dependent variable.
3. Determine the range of your data that must fit on each axis. The range will set the scale.
4. Number each axis division (line). Each division should be equally spaced.
5. Plot each data pair accurately as a point on the graph.
6. Choose a title that describes the graph.

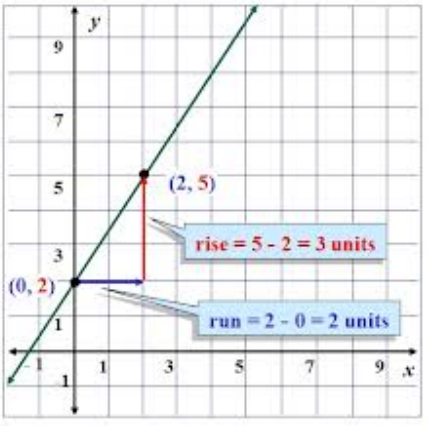
Distance from the sun (AU)	Surface Temperature (℃)
0.39	327
0.72	482
1.0	14
1.5	-23
5.2	-151
9.6	-184
19.2	-207
30.1	-223



How to determine slope.

Slope is the ratio of the change in the y-value to the change in the x-value. It is sometimes called the rise over the run.

1. Choose two points (A and B) on the line graph.
2. Find the change in the y value (Y_B-Y_A).
3. Find the change in the x value. (X_B-X_A).
4. Divide the change in x by the change in y.



Interpreting data

The final step of the investigation is to draw conclusions and interpret the data.

- A conclusion is a factual summary of data. Usually more than one conclusion statement is required to summarize a data set.
- An interpretation is a generalization that explains or interprets the data set.

Below is data from an investigation that measured the absorbancy of three types of paper towels.

Towel Type	towel size	trial 1	trial 2	trial 3	trail 4	Average
A	225 cm^2	25	28	24	31	27
B	225 cm^2	26	27	23	22	24.5
C		18	20	23	21	20.5

conclusion: Towel A absorbed an average of 27 mL of water. Towel B absorbed an average of 24.5 mL of water while towel C absorbed an average of 20.5 mL of water

interpretation:

~~**inference:**~~ Towel A is the most absorbent and towel C the least absorbent.

For homework 1.6 graphing data

Make a data table

Make a chart/graph

Use color in your charts and graphs

SULTAN