Activity 8.3—Variation everywhere, so what?

What Will We Do?

We will identify traits in organisms that have more than one variation and then analyze data about the frequency of occurrence of those traits.

Part 1: Identifying Traits

Use the following photos and tables to describe the traits and variations that can be observed for each organism. For each trait identify whether you would describe it ***qualitatively*** (e.g. color, texture, pattern) or ***quantitatively*** meaning with a measurement or a count (e.g. height in inches, counting stripes)

Part 2: Review of Data Representations

When it comes to comparing traits in a population (group) of organisms, it can be helpful to display data about traits in a variety of graphs including:

- Bar Graphs
- Pie Charts
- Line Graphs
- Histograms

Part 1: Identifying Traits Example:

An example is completed for how to describe variations of traits. Refer to this as needed.

Monarch Butterfly Larva

Trait	Variations	Quantitative or Qualitative
Intensity of Yellow	Deep, medium, and light	Qualitative
Proportion of yellow, black, white	Relatively even to more black	Quantitative--percent of each
Width of bands	Thinner to thicker	Quantitative--millimeters

Now it's your turn!

Snails

Trait	Variations	Quantitative or Qualitative

Reflection

1. What are some traits that you think would be most helpful in telling snails apart? Why?

2. Which of the traits do you think are probably mostly inherited? Why?

3. What factors other than DNA might be influencing these traits? How?

Guppies

Trait	Variations	Quantitative or Qualitative

1. What are some traits that you think would be most helpful in telling guppies apart? Why?

2. Which of the traits do you think are probably mostly inherited? Why?

3. What factors other than DNA might be influencing these traits? How?

Orchids

Trait	Variations	Quantitative or Qualitative

1. What are some traits that you think would be most helpful in telling orchids apart? Why?

2. Which of the traits do you think are probably mostly inherited? Why?

3. What factors other than DNA might be influencing these traits? How?

Data Representations

On the next page, you will skim through 4 different ways to represent data.

PIE CHART WITH 2 VALUES

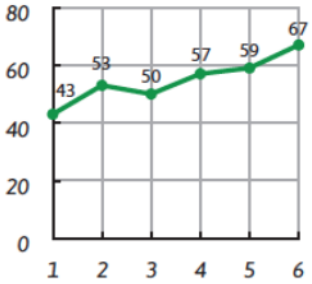
- Data is organized as percentages of the whole.
- Add the total number of what's being represented. Calculate the percent in each category. Find the angle by converting one of the percents to a decimal (move the decimal point two places to the left).
- Multiply the decimal by 360°
- Draw a circle with a compass. Draw the radius from the center of the circle to the edge.
- Use a protractor and draw the angle.

Example—The percent of people in my class who play baseball
Count the number of people in the class.
Count how many of them play baseball.
Baseball players/class
12/30 = .40 = 40% 18/30 = .60 = 6-%
.40 × 360 = 144°

Do not forget to label sections.

LINE GRAPH

- Line graphs can show how something changes over time.
- Two values can be plotted on the axes.
- The Y-axis usually has the numbers or what is being measured.
- The X-axis usually has continuous data of time.

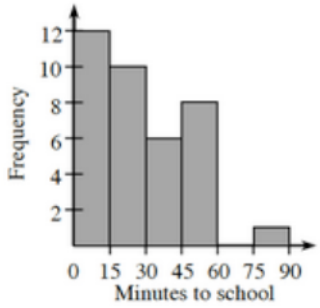


Example—Temperature for a 12-hour period
Y-axis = Temperature (continuous)
X-axis = Day of the week (continuous hours)

Do not forget to label the X and Y axes.

HISTOGRAM

- Histograms display numeric data with an order into intervals called "bins"
- The X-axis show the intervals for the data. The labels represent the **lower end** of each interval
- The Y-axis has the frequency (number of pieces of data in each interval)

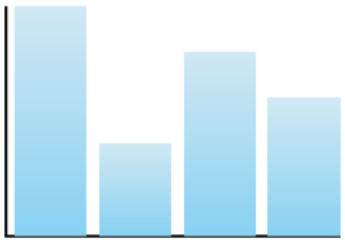


Example—Number of minutes it takes students in my class to get to get to school.
Y-axis = frequency (number of students)
X-axis = Minutes to school (each bin is 15 minutes)

Do not forget to label the X and Y axes

BAR GRAPH

- Data is organized into amount intervals of data shown by bars.
- The bars are of equal widths and equal distances apart
- Usually the Y-axis shows the number of what is being measured. All of the data must fit on the axis
- The X-axis is the **discrete** data such as names, objects, or colors.
- There is one bar per discrete data.



Example—My class's favorite sport
Y-axis = Number of students
X-axis = Sport (baseball, swimming, and so on)

Do not forget to label the X and Y axes.

Choosing a graph type

Imagine that you are going to carefully observe 100 of ONE of the following organisms for the indicated trait. (Snails OR Guppies OR Orchids). Once you make your observations you need to find a way to display your data. For the organism you chose, indicate what graph type would be best for displaying your data. Then explain why you think it would be a good choice.

Trait	Graph Type (choose one)	Why would it be a good choice?
Example: Monarch Butterfly Larva: Width of bands in mm (quantitative)	Pie Line Histogram **X** Bar	A histogram would be a good choice because I could put widths of the bands on the x-axis and then count how many bands were each width--I would be able to see the pattern of widths by how tall the bars were.
Snails: Amount of yellow, brown, and white on shells (qualitative)	Pie Line Histogram Bar	
Guppies: Length in centimeters (quantitative)	Pie Line Histogram Bar	
Orchids: Pattern of veins on petals--circular or branched (qualitative)	Pie Line Histogram Bar	