## About the Lesson

In this activity, students will collect data from members of their class, produce a graph using the data, and draw some conclusions based on the data and the graph.

## Vocabulary

- Biological variation
- Natural selection

## Teacher Preparation and Notes

- Students should know how to input data into lists and graph scatter plots.

- You may want to further explain the terms biological variation and natural selection.

- You need to decide which data students should collect. Using their bodies to, some ideas would be to measure the length of their forearms, hand span from thumb to little finger, their height, …etc.

## Activity Materials
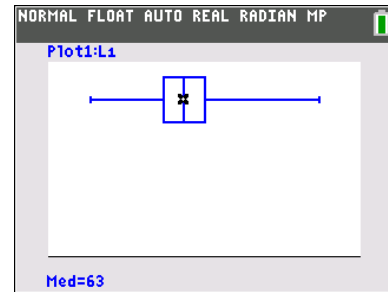
- Compatible TI Technologies:

  TI-84 Plus*
  TI-84 Plus Silver Edition*
  🌀TI-84 Plus C Silver Edition
  🌀TI-84 Plus CE

*\* with the latest operating system (2.55MP) featuring MathPrint™ functionality.*

**Tech Tips:**
- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

**Lesson Files:**
- Variety_is_the_Spice_of_Life_Student.pdf
- Variety_is_the_Spice_of_Life_Student.doc

**Introduction**

What is the function of biological variation? What is the relationship between natural selection and reproduction? What is meant by survival of the fittest? In this activity, you will collect data on the members of your class and make note of the variation in your class.

If you and a friend were sitting in the African Savannah looking at a herd of zebras, you would probably have a tough time telling one zebra from another. To us, all zebras look pretty much alike, but every zebra is unique. In fact, in most populations of organisms, each individual is unique—different from any other individual in that population. This is called biological variation, and it is critical to the survival of a species. Populations of organisms depend on variations among their individuals. A population with little or no variation is at huge risk of being wiped out. Variation encourages natural selection, or survival of the fittest in a population. The fittest individuals in a population are more likely to survive, breed, and have offspring. Variation helps to ensure that at least some individuals in a population will be well-suited for survival in their environment.

**Collecting the Data**

*First, Decide which type of data your students will measure and collect. Some possible data to collect can include forearm length, hand span from the thumb to the little finger, height of students, and so forth. This information is not specified on the student document.*

1.  Your teacher will describe the data that will be collected and how you will collect it.

2.  Press [stat] [enter]. Enter all of your class data into **L1**. Press [2nd] [quit] to go back to the **Home** Screen.

3.  Determine the average for all of the data. Press [2nd] [list]. Press [▶] [▶] to go to **Math**, and then press **3:mean(.** Press [2nd] [L1] [)] and then press [enter].

    a.  Record the Mean Value: _____

    b.  In mathematics, what is meant by the mean?

    ***Student Answers will vary.***
    Sample Response: The mean is the average of the data

4.  Determine the median of the class data. Press [2nd] [list]. Press [▶] [▶] to **Math** and then press **4:median(.** Press [2nd] [L1] [)] and then press [enter].

    a.  Record the median value: _____

    b.  What is meant by the median of the data?

    ***Student Answers will vary.***
    Sample Response: The median is the middle data point.

5. Arrange the data in ascending order in **L1**. Press [stat], **2:SortA(.** Press [2nd] [L1] [)] and then press [enter]. Press [stat] [enter] to go back to the list screen.
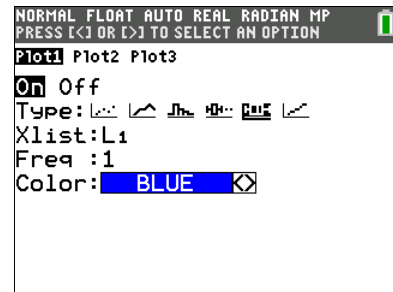
   a. Record the smallest and largest entries from L1. Remember to include the appropriate units with all of your measurements.

      Smallest: _____

      Largest: _____

   *Student Answers will vary*, depending on the data collected.

6. Represent your data graphically by producing a Boxplot. Press [2nd] [stat plot]. Press [enter] to select **1:Plot1**. Set your TI-84 Plus CE as shown at the right.
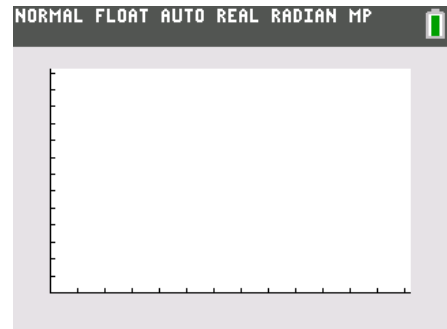
7. Press [window]. Enter these settings:

   - **Xmin**: slightly smaller than your smallest data value from #5 above

   - **Xmax**: slightly larger than your largest data value

   - **Xscl**: 0          **Ymin**: 0

   - **Ymax**: 1          **Yscl**: 0          **Xres**: 1

   Then, Press [graph].

   a. Sketch your graph on the grid to the right.

   *Student answers will vary.*

8.  Press [trace]. The cursor will be at the median value for the data. Does this value match the value you recorded in #4 above? Press ◄ and ► to locate the five-number summary of your data.

a.  Record the five-number summary of your data here, and then describe what these values mean.

***Student answers will vary for the values.***

*   MinX: ***Answers will vary.***


    What does this mean? *It is the smallest measurement.*


*   Q1: ***Answers will vary.***


    What does this mean? *Q1 means 25% of data is less than or equal to this value.*


*   Median: ***Answers will vary.***


    What does this mean? *Median means 50% of data is less than or equal to this value.*


*   Q3: ***Answers will vary.***


    What does this mean? *Q3 means 75% of data is less than or equal to this value.*


*   MaxX: ***Answers will vary.***


    What does this mean? *MaxX is the largest measurement.*

**Going Further: Questions for Discussion and Writing**

1.  How was variation shown in your class?

    ***Student Answers will vary.***

    Sample Response: Measurements varied among the group.


2.  What is meant by survival of the fittest?

    ***Student Answers will vary.***

    Sample Response: Organisms that are best suited to live in their environment at that time are more likely to survive and reproduce.


3.  Fitness does not always mean bigger, stronger, or faster. Think of some examples where being best fit may not mean being the biggest, strongest, or fastest.

    ***Student Answers will vary.***

    Sample Response: Suggestions include camouflage, being smarter, preparing for climatic changes, and so on.


4.  Describe the relationship between natural selection and reproduction.

    ***Student Answers will vary.***

    Sample Response: Being selected generally leads to the opportunity of mating.


5.  Describe the relationship between fitness and natural selection.

    ***Student Answers will vary.***

    Sample Response: The best fit to survive normally do survive.

6. In the wild, natural selection plays the key role in the maintenance of the gene pool in a population. When predators, such as lions, pursue a prey species, such as zebra, which zebras in the herd are most likely to fall prey to the lions? Explain.

   ***Student Answers will vary.***

   Sample Response: The zebras most likely to fall prey to the herd are the slowest, youngest, lame, and old.

7. When humans hunt big game species such as deer, elk, caribou, or moose, which animals in the population do they seek? Compare this situation to your explanation in #6.

   ***Student Answers will vary.***

   Sample Response: The best fit males are normally sought by hunters.

8. Why is variation so important to a population?

   ***Student Answers will vary.***

   Sample Response: We need a broad variety in the gene pool to increase the chance of species survival. Variation is important to the species, not to the individual.

9. Describe some forms of variation that may be present, but not obvious, in a zebra herd. Sexual reproduction is probably the most important factor in maintaining variation in a population. Describe how sexual reproduction contributes to variation.

   ***Student Answers will vary.***

   Sample Response: Internal variations, eyesight, hearing, intelligence, and so on.