 

**MIDDLE SCHOOL**

**Math & Engineering**

**Leave Only Footprints**

**Goals:** For students to consider how their everyday decisions have an impact, not only their own futures, but the future of generations to come. This will lay the foundation for the decisions that they will make regarding building materials for their own home.

**Objectives:** Students will…..

* Differentiate between physical and eco-logical footprints.
* Gain understanding that costs of goods includes more than just the economic.
* Gain an understanding of how our consumption patterns and habits affect others.
* Calculate their own eco-logical footprints.
* Compare & contrast their data and statistics from around the world.

**Standards met:**

Data Analysis

* Select and use appropriate statistical methods to analyze data
* Develop and evaluate inferences and predictions that are based on data

**Time required:** 45 minutes

**Materials: (for class of 30)**

* Sticky notes
* Graph Headings
* Masking tape and blue tack
* LCD projector or overhead projector
* Ecological Footprint Calculator
* Mean Demo-For reference
* 30 copies of “Leave Only Footprints – Student Quiz”

**Prep:**

* Create ‘Heading sheets’
* Ensure that you have enough stickies and space for human graph

**Procedure:**

* Put the warm-up question on the board: Respond to the quote, “*Take only memories; leave only footprints*.” ~Chief Seattle
  + Brainstorm ideas and confirm that this phrase is basically reminding us to try to have as little negative impact as possible on the earth.
* Define ecological footprint.
  + How much land and how many resources it takes to sustain the way we live.
* Issue the “Leave Only Footprints – Student Quiz” and have students answer questions and assign the appropriate value to their responses. Have students add-up their response scores to determine their Ecological Footprint. (Note: The weights of the footprints are loosely based on actual statistics and are not designed to be completely accurate.)
* After students have determined their Footprints, have them record their scores on a sticky note.
* Share Information through 4 Corners or a Human Graph
  + Four Corners: Place the following headings in each corner of the room:

(12-18) (19-25) (26-32) (33-39)

Have students stand in the corner that represents their score.

* + Human Graph:

Place categories in front of the class/space either on the board or on the floor:

(12-18) (19-25) (26-32) (33-39)

* + - Have students travel with their groups, bring their sticky notes to the front of the class, and stand in front of the value range that represents their score.(Straight line representing a bar on a graph)
* Analyze Data through these potential questions:(May be answered orally or recorded in math journals)
  + Which category/range represents a more sustainable way of living?
  + Which category has the most/least representation? Why do you think this is?
  + Do you wish to make any changes? If so, what could they be? What are the environmental and economic implications of your choices?
* Calculate Central Tendency:
* As a group, we are going to calculate the mode, median and mean.

Median- Have students use their stickies to create a line across the room from least to greatest. Establish the middle number. For example: For 23 students the middle number will be 12. The **median** will be the value of the 12th number.

Mode- While remaining in their line, students use their stickies to determine the most common/frequent value. The **most** common value is the **mode.**

Mean- The mean is a type of average that determines a value when everything is distributed equally. To calculate the mean, you simply find the sum of all of the values and divide this number by the number of samples. For example:

3 + 4 + 9 + 6 + 8 = 30 ÷ 5 = 6

For Discussion: Which type of average best represents our class sample? (Mean, Median, Mode) *Explain.*

**Assessment:**

* Student responses in math journals
* Quality of discussion in individual, small group and whole group contexts
* Mean, median, mode calculations

**Leave Only Footprints - Student Quiz**

An *ecological footprint* has to do with how much land and how many resources it takes to sustain the way we live.

Answer the following questions to determine your own ecological footprint:

**1,** **Which describes your house?**

A. Multi-family dwelling (apartment/condo) (1)

B. Freestanding house on small lot (2)

C. Freestanding house with large lot covered with lawn (3) Score: \_\_\_\_\_\_\_\_\_

**2,** **How big is your house?**

A. 0-800 sq ft (2)

B. Up to 2,000 sq ft (4)

C. Larger than 2,000 sq ft (6)

**3, Do you use lots of energy conservation at your house (lights, water, etc)?**

A. Yes (1)

B. No (2) Score: \_\_\_\_\_\_\_\_\_

**4, What’s your primary mode of transportation?**

A. Walk/ bicycle (2)

B. Bus/ public transportation (4)

C. Car (6) Score: \_\_\_\_\_\_\_\_\_

**5, What kind of car does your family drive?**

A. Compact (2)

B. Family-sized (4)

C. SUV (6) Score: \_\_\_\_\_\_\_\_\_

**6, How much trash does your family generate?**

A. Maybe one small bag a week (1)

B. 1 X 30 gal. bag a week (2)

C. More than 1 30 gal. bag a week (3) Score: \_\_\_\_\_\_\_\_\_

**7, How often do you eat animal-based foods (meat, dairy, eggs, etc)?**

A. Never (2)

B. Sometimes (4)

C. Always (6) Score: \_\_\_\_\_\_\_\_\_

**8, How much fresh and locally grown (within 250 miles) food do you eat?**

A. Most of what I eat (1)

B. About half (2) Score: \_\_\_\_\_\_\_\_\_

C. Very little (3)

**Total \_\_\_\_\_\_\_**