Calculating Fox Skull Size Change

5th Grade

DURATION
Pre-activity (optional): 5-20 minutes
Activity: 15 minutes
Post-activity: 5-15 minutes

SUPPLIES
- Pencils
- Scratch paper

STANDARDS
CCSS Math Practices
Practice 1, 2, 6

CCSS Math Content
Grade 5: NBT.A.3-4; NBT.B.7

NGSS
3-LS3-2, 3-LS4-2

NGSS Science and Engineering Practices
4, 5, 6

VOCABULARY
- Average
- Percentage
- Percent change
- Island dwarfism

Overview

The Channel Island fox (*Urocyon littoralis*) is an example of "island dwarfism", where animals evolve a smaller body size compared to their mainland relatives due to the environmental pressures and conditions on islands. In this math activity, you will use measurements of the skull length in the mainland gray fox and the island fox to quantify that change!

Concepts

- Island dwarfism or insular dwarfism is a natural process where animals evolve a smaller body size compared to their mainland relatives due to the environmental pressures and conditions on the islands.
- Taking accurate measurements helps scientists support their claims with evidence.
- Recording multiple measurements and calculating averages is important because it can improve accuracy and account for variation within a species or population.
- Measurements like body size can help scientists learn about the ecology of different species.

Objectives

- Students will practice finding an average and calculating percent change.
- Students think about why animals might evolve to become smaller on islands.

Outline

1. (Optional) Introduce the gray fox and island fox to students by looking at pictures or videos.
2. Before the activity, review calculating averages, percentages, and finding percent change.
3. Print worksheets or project onto the board. Provide scratch paper for student work.
4. Review answers and have students discuss question #4.
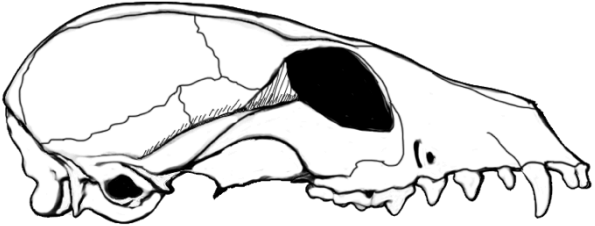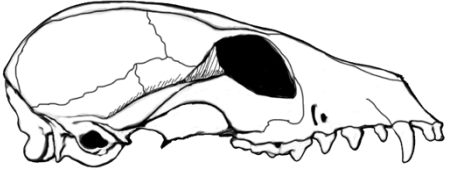
Extensions

- Have students write a research report on the gray fox or island fox.
- Have students research other examples of island dwarfism.
- Connect to the Pygmy Mammoth and find it at the Tar Pits during a museum visit!

Answer Key

1. Gray: (118 + 123 + 121 + 119 + 117) / 5 = 598 / 5 = 119.6 mm
   Island: (101 + 103 + 99 + 101 + 104) / 5 = 508 / 5 = 101.6 mm
2. (101.6 / 119.6) x 100 = 84.95 %
3. ((101.6 − 119.6) / 119.6) x 100 = −15.05 %

Gray fox ⬜ Island fox

Gray fox Skull #	Skull length (mm)	Island fox Skull #	Skull length (mm)
1	118	1	101
2	123	2	103
3	121	3	99
4	119	4	101
5	117	5	104

1. **Find the average** of each species (gray fox and island fox) by adding up all of that group's measurements and dividing by the number of skulls measured (to the nearest decimal).

2. Calculate the average **percent size the island fox is compared to the gray fox** by dividing the value you calculated for the island fox by the value you calculated for the gray fox in Part 1 and multiplying by 100. Give your answer to the nearest 2 decimal points.

3. Calculate the **percent change of the island fox compared to the gray fox** by subtracting the gray fox average from the island fox average, then dividing that number by the gray fox average. Multiply this value by 100 to obtain the percent change. Give your answer to the nearest 2 decimal points.

4. [Bonus thought question] Why do you think that animals evolve to be smaller on islands?