Seals In-depth

OBJECTIVE

Given data, students will use math skills to organize, analyze, and interpret the results from a research project tracking elephant seals.

MATERIALS

per student:

- ❑ graph paper
- ❑ pencil
- ❑ pens or markers
- ❑ copy of ***Seals In-Depth*** funsheet on page 11

BACKGROUND

Recent research on the diving patterns of male elephant seals has revealed amazing data. In 1989, a small microprocessor-based time-depth recorder attached to a male elephant seal recorded a dive of 1,800 m (6,000 ft.). Male elephant seal dives can last as long as 80 minutes.

ACTION

1. Divide students into cooperative learning groups. Distribute materials and ***Seals In-Depth*** funsheet.
2. Ask each group to select one data set (dive depth, dive duration, or surface time). They complete the blanks on the funsheet; then design graphs or charts to represent the information. Groups should determine how to use the data in their graphs or charts (percentages, averages, frequency, or other). Groups then create two to three questions and two to three statements about the data and their work. (For example: does the data clump?)
3. After the groups have completed their data organization and analysis, have them present their work to other "scientists" in the class. Class scientists compare and contrast their work. Which graphs or charts represent the data? Are there other ways to show the information?
4. When review is completed, ask the class, "Why do scientists want to know this information?" *Scientists seek to understand natural history, behavior such as diving and migrating, feeding strategies, habitat use, and to determine if competition exists between humans and the animals for natural resources. Research like this helps people make decisions on fishery management, land use, water recreation use, and other policies.*

ANSWERS

1. diving depth: about 389 meters
2. dive duration: about 23 minutes
3. surface time: about 3:08 minutes

Name _____

Seals In-Depth

Note: Treat each data box separately; numbers do not correlate. Numbers represent only a portion of data collected.

DIVE DEPTH (m)
75
410
118
379
210
105
362
978
402
357
382
713
541
349
451

DIVE DURATION (min)
77
8
12
19
24
49
9
28
18
23
10
22
6
20
14

SURFACE TIME (min:sec)
1:56
2:25
3:30
3:45
7:21
0:30
5:47
2:19
2:31
3:22
2:56
0:41
3:31
5:02
1:18

ESTIMATE AVERAGES

1. diving depth: _____ meters
2. dive duration: _____ minutes
3. surface time: _____ minutes: seconds

CALCULATE AVERAGES

1. diving depth: _____meters
2. dive duration: _____minutes
3. surface time: _____minutes: seconds

What scientists learned from the diving patterns of six male elephant seals.

- Seals were at sea for an average of 130 days. They made a total of 36,233 dives. Seal one: 7,137 dives. Seal two: 4,292. Seal three: 5,961. Seal four: 3,812. Seal five: 7,714. Seal six: 7,317.
- Seals were submerged 21 hours out of the day. They spent 15 hours either ascending or descending and 6 hours at the bottom.
- Bottom time (time spent at the bottom of a dive) accounted for about 29% of the durations of each seal's dive. Only 140 dives exceeded 1,000 m and of these, 73% had bottom times of 1 minute or longer. Of the 40 dives that lasted 40 minutes or more, bottom time accounted for about 25%.
- The seals shared a diving depth mode of 350 to 450 m. An average of 41% of dives were to this depth. About 30% of dives were shallower. About 6% of dives were greater than 700 m.

This information is only a portion of the data obtained.

Hypothesize This!

OBJECTIVE

Students will be able to predict, measure, collect, and analyze data to investigate heat loss in water.

BACKGROUND

Scientists explore our world by objectively testing hypotheses using the scientific method: define the problem/ ask a question, collect background information, formulate a hypothesis, test the hypothesis, make and record observations, and draw conclusions. In this exercise, students will act as laboratory scientists trying to determine if walruses stay warmer in water or in air. In other words, in which environment might walruses lose less body heat? (Heat loss occurs about 22 times faster in water than in air.

MATERIALS

per class:

- ❑ smooth peanut butter
- ❑ crockpot or microwave
- ❑ large spoon
- ❑ tape

per student group:

- ❑ 1 pan or bowl of room-temperature water
- ❑ 2 beverage cups
- ❑ 2 thermometers
- ❑ 2 popsicle sticks
- ❑ pencil
- ❑ copy of ***Hypothesize This!*** funsheet on page 13

ACTION

1. Before beginning activity, heat peanut butter in crockpot or microwave to between 80° and 90°F.
2. Tell students that for this exercise they are laboratory scientists. They are trying to solve the question, "Do walruses stay warmer in water or in air?" Explain the scientific method of stating a testable hypothesis, then devising an experiment to confirm or disprove the statement.
3. Divide class into student groups and distribute copies of ***Hypothesize This!*** funsheets and pencils. Ask students to state their hypothesis and write their team members' names. One possible hypothesis would be "Heat loss occurs at the same rate in water and in air."
4. Distribute pans or bowls of water, thermometers, popsicle sticks, cups, and tape. Students tape a popsicle stick to each thermometer so that one end of the stick extends slightly past the thermometer bulb (don't tape the bulb). This technique will help students stir without the thermometer bulb touching the bottom or sides of the cup or pan.
5. Students record the temperature of the water in the pan or bowl.
6. Fill the cups half-full with peanut butter. Each student group has two half-full cups of peanut butter.