

Bats

The Movie:

Bats are an essential and fascinating part of the ecology of many environments. Featured: Bert Grantges, bat expert. (Movie length: 1:47)



Background:

As night creatures, bats are perhaps not as popular a subject for wildlife photographers and videographers as lions, tigers and bears. And yet they are the most diverse form of mammal on the planet—in fact, one quarter of all species of mammals are species of bats.

This diversity of species represents a terrifically important role in many ecosystems. Bats control insect populations, and are important pollen carriers for many species of plants.

As mammals, bats might be considered to be at a disadvantage in the business of flight. And yet some species are known to migrate at altitudes well above that of birds' flight. There is something about the unique structure of their wings, it seems, that gives bats an edge. Add an ability to "see" in the dark by means of a sonar system far more sophisticated than anything humankind has yet developed, and you have one of Earth's most intriguing denizens.

Curriculum Connections:

Decimals

1

Insectivorous (insect-eating) bats can eat as much as half of their own weight of insects during a night. If a moth weighs 0.35 grams and a bat weighs 20 grams, how many insects would that be?

Decimals, Speed

2

Bats measure the distance to an object by the amount of time required for a sound wave to bounce off the object and back. If an insect is 18 inches away from the bat, how much time would this be? (The speed of sound is about 1100 feet per second.)



Ratios

3

In order to get an estimate of the bat population in a certain region, the region was divided into a grid, and observers were sent to some sections of the grid and asked to observe during two hours of the night and count the bats seen.

These grids show the results of observation in two different years. An "X" indicates a section of the grid where no observations were made; a number indicates how many bats were observed in a section. Does this data indicate that the bat population is increasing, staying about the same, or decreasing?

| Year 1 | | | | | Year 2 | | | | |
|--------|---|----|---|----|--------|---|---|----|---|
| 2 | x | x | 5 | x | x | x | 0 | x | 4 |
| x | 3 | x | x | 15 | 1 | x | x | 16 | x |
| 0 | x | 12 | 1 | x | 3 | x | x | x | 2 |
| x | x | 0 | 2 | x | x | 4 | x | 12 | x |
| 7 | x | x | x | 19 | x | x | 2 | 0 | x |

Ratios, Statistics

4

This table gives body length and wingspan averages for several species of bats and a few birds. Use this information to identify the profiles of the winged creatures below it. If the creature seems to be a bat, is it possible to tell what kind of bat it is? Why or why not?

| Animal | Average body length | Average wingspan |
|--------------------------|---------------------|------------------|
| Hoary Bat | 140 cm | 400 cm |
| Big Brown Bat | 115 cm | 340 cm |
| Townsend Bat | 100 cm | 280 cm |
| Eastern Small-footed Bat | 82 cm | 250 cm |
| American Bald Eagle | 24 inches | 60 inches |
| Ornate Hawk Eagle | 25 inches | 42 inches |
| Sparrow | 15 cm | 15 cm |



(a)



(b)



(c)



(d)

Statistics, Percents

5

This table gives the weights of 10 Indiana bats which were captured and released for the purpose of migration study. Suppose that you want to attach a transmitter to the bats in order to track their motion. If the transmitter must be no more than 5% of the bat's body weight, and you want to be able to attach the transmitter to half of the bats that you capture, what should the weight of the transmitter be? What statistical measure did you use to solve this problem: mean, mode, median, or range? Why?

| Sex | Weight |
|-----|--------|
| M | 5.6 g |
| F | 4.8 g |
| M | 5.4 g |
| F | 6.1 g |
| M | 5.6 g |
| F | 5.7 g |
| M | 5.4 g |
| F | 4.7 g |
| M | 6.1 g |
| F | 5.1 g |
| M | 4.6 g |
| F | 5.9 g |

Measurement (area), Ratios

6

The map at right shows the North American population distribution of a bat species called the Pallid Bat.

The state of Arizona, near the center of the populated region, is 395 miles tall and 340 miles across. Use that fact to estimate the total area of population of the Pallid Bat in North America.



Percents, Exponents

7

The colony of Mexican Free-tailed Bats at Carlsbad Cavern declined from an estimated 8.7 million in 1936 to approximately 200,000 in 1973, thirty-seven years later.

- a) If the bats declined by the same percentage each year, what is that percentage?
- b) If the bat population now increases at the rate of 5% a year, how many years will it take to reach its 1936 level?

Geometry (cylinders)

8

The bats in Carlsbad Caverns cluster together on the ceiling so tightly that there might be as many as 300 bats per square foot. Suppose that such bats cover $\frac{1}{5}$ of the ceiling of a cave which has the shape of a semi-cylinder with radius 20 feet and length 100 feet. How many bats would you estimate are in the cave?



If you enjoyed this Futures Channel Movie, you will probably also like these:

| | |
|---|---|
| <i>The Disappearing Call of the Wild, #2001</i> | Archiving and analyzing over 2,000 hours of rainforest sounds, bio-acoustician Bernie Krause measures the decline of species as habitats disappear. |
| <i>Healing Injured Wild Animals, #2002</i> | Veterinarian Mark Pokras assesses, treats and nurses injured wild animals on their road back to health. |
| <i>Life Under the Ocean, #2004</i> | A marine biologist studies the jellyfish-like animals living at 3,000 feet, where it is cold, dark and quiet. |

THE FUTURES CHANNEL • 4801 Wilshire Blvd., Suite 210, Los Angeles, CA 90010 • www.thefutureschannel.com

Copyright © 2004 The Futures Channel, Inc. All Rights Reserved. No portion of this document may be copied or transmitted in any form, physical or electronic, without express written permission from The Futures Channel.