

Objective: *To compare anatomy and physiology of bats and humans*

Grades: 3-5

Type of Activity: *Taking measurements*

Materials:

- *Copies of page 43*
- *Pencils*
- *Clock with seconds*
- *Weight scale for humans*
- *Gram scale*
- *Tape measures*

Background Information

Children can learn a great deal about bats and themselves by comparing various aspects of their anatomy, physiology, and behavior. In this activity, children take their own measurements and compare them to those of bats.

Mammals

Even though bats fly and people walk on the ground, bats and people are similar in many ways. That's because both people and bats are mammals. With few exceptions, all mammals give birth to live young, nurse babies with milk, and have hair. Other mammals include dogs, cats, chipmunks, raccoons, elephants, monkeys, and whales.

Wingspan

Bat wingspans vary from about seven inches to nearly six feet. Most bats are small mammals, although the flying fox bats achieve a large size. The world's largest bat is a flying fox from Southeast Asia. The mask on page 28 illustrates why this bat is

page 42

called a flying fox. Its face is very similar to a fox or dog. It feeds entirely on fruit. Have children outstretch their arms and measure the distance between finger tips.

Number of Fingers

A bat's wing is actually a modified hand. Refer to the diagram on page 37 and explain how the wing bones are actually greatly elongated fingers. Also point out the thumb. The thumb has a small claw which aids the bat in crawling around on rough surfaces.

Weight

Have children get on a scale and take their own weight. The world's smallest bat (the bumblebee bat from Thailand) weighs only two grams, less than a penny. The majority of bats weigh less than 50 grams, about two ounces.

Resting Heart Rate

Using a clock with a seconds indicator, demonstrate to students how to find their pulse (by putting your fingers against the carotid artery in the neck). Sitting down, students should take a resting pulse by counting the number of heart beats in a 15 second period and multiplying this by four to determine the total for one minute.

Active Heart Rate

Before taking this rate, have children simulate flight by doing one minute of jumping jacks. Immediately following this, they take their pulse again using the method described above. The bat's heart rate is high because flight is hard work. Its heart must

pump rapidly to provide lots of oxygen, which is carried to flight muscles by blood. During hibernation, the opposite extreme, a bat's heart rate slows to only 20 heart beats per minute.

Wing Beats

To determine wing beats per second, have the children flap their arms like wings and count the number they can do in five seconds. The teacher then divides that number by five to find the rate per second. To support a body in the air and overcome the force of gravity, a flying animal must beat its wings very quickly (perhaps 12 times a second) to maintain altitude. How does the children's rate compare to the bat's? Some very large bats are capable of soaring on the wind, just like hawks and eagles.

Food Consumption

The teacher will need to help students determine this number ($\frac{1}{2}$ of child's weight). Flying fox bats eat about two and a half times their own body weight in fruit in a night. Have the children weigh themselves, and with the help of the teacher, calculate how many pounds of food they would have to eat if they ate like a fruit bat. Insectivorous bats eat about half their weight in insects each night.

Lifespan

The average lifespan for a human is 74 years. Banding records have shown that some insectivorous bats live up to 32 years or more. For their size, bats are among the longest lived animals. For comparison, most mice have a lifespan of only about two years.



HOW A BAT COMPARES TO ME

	Student	Bats
Kind of Animal	_____	mammal
Wingspan (armspan)	_____	6 ½ inches, bumblebee bat from Thailand; almost six feet for the great flying fox from Java
Number of Fingers	_____	four fingers, and one thumb
Weight	_____	most bats weigh less than two ounces or 56 grams
Heart Beats/Minute Resting	_____	less than 100
Heart Beats/Minute Active	_____	as many as 900
Wing Beats/Second	_____	12 for a little brown bat
Food Consumption	_____	flying fox bats can eat 2 ½ times their body weight in one night
Lifespan	_____	some bats live 30 years or more

