Batty About Science

Bats are not blind, but for most bats, their sense of hearing is better than their sense of sight. Bats use echolocation (a type of sonar that allows them to emit a very loud, high-pitched sound and then interpret the echoes) to locate their prey and capture it.

Bats are not "mice with wings." They belong to their own group, called chiroptera, which means *hand-wing*. They are the only mammals that really fly! (Flying squirrels don't fly; they glide.)

Bats are not our enemies. Of the 900+ species of bats, only three species are vampire bats, and they are limited to Latin America. Vampire bats do not like the taste of human blood. They prefer the blood of cattle and other livestock.

Bats are important to humans. They contribute to a healthy ecosystem. In areas where bats have been wiped out, insects increase rapidly and cause agricultural problems. Bats are also important as pollinators and seed distributors.

Bats remain the most endangered land mammal in the United States.

OBJECTIVES

In this activity, you will

- You will lean how bats sense their prey by pretending that the Go! Motion is a bat and that you are its prey.
- Discover how this movement is graphically represented.

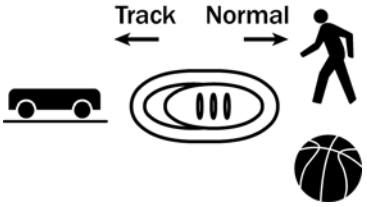
MATERIALS

computer with Logger Lite installed
Go! Motion motion detector

PROCEDURE

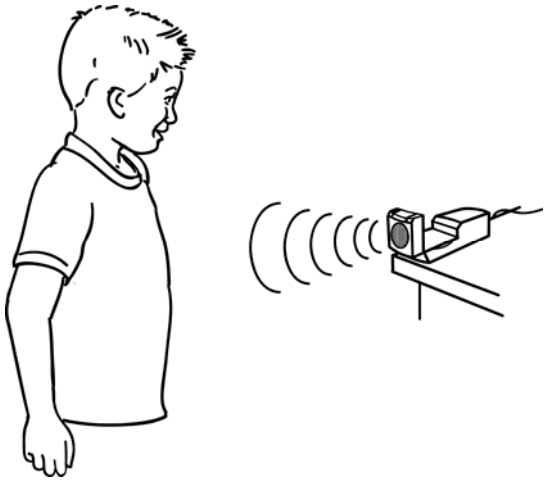
Part I You as an Insect

1. Do the following to set up the Go! Motion for data collection:
   a. Make sure the Go! Motion is connected to the computer.
   b. Set the switch on the Go! Motion to the Normal setting as shown here.



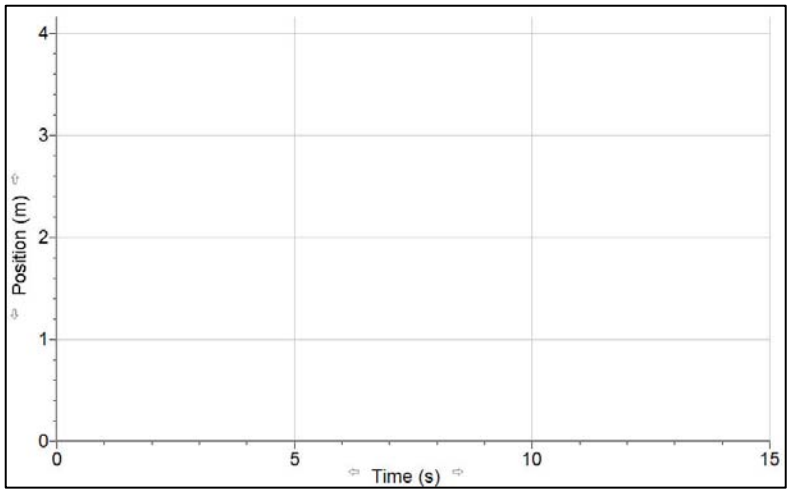
2. Start Logger Lite on your computer.

3. Open the file for this activity by doing the following:
   a. Click the Open button, .
   b. Open the folder called "Elementary Science."
   c. Open the file called "22a Batty About Science."



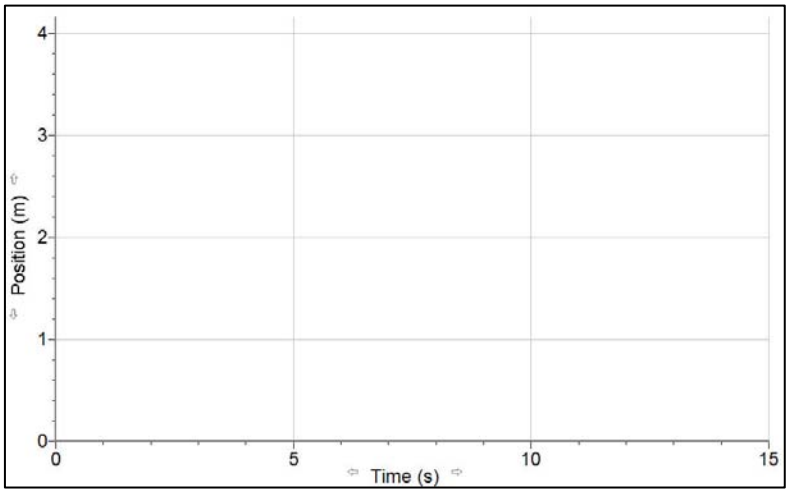
4. Lift up the head of the Go! Motion and rotate it so it is open at a right angle. Set it on the edge of your desk, just like the drawing at the right. Make sure there is an open path at least 1 meter wide and 4 meters long in front of the Go! Motion. When you are in front of the Go! Motion, you should be able to see the gold circle of the sensor and the computer screen at the same time.

5. Pretend that the Go! Motion is a bat hanging from a branch and that you are an insect, something the bat wants to eat. You will collect several runs of data to learn what the bat sees when you (the insect) do different things. Each time you will carefully copy the graph from the computer screen onto one of the blank graphs below.
   a. For the first graph, you will stand in front of the Go! Motion without moving. Stand 0.5 meters from the Go! Motion and don't move. Have another student click Collect.
   b. Draw the data on the blank graph below.
   c. Stand at 2 meters in front of the Go! Motion and have your teammate click Collect.
   d. Draw the data on the graph below. This graph will now have data from the 0.5 m and 2 m runs.



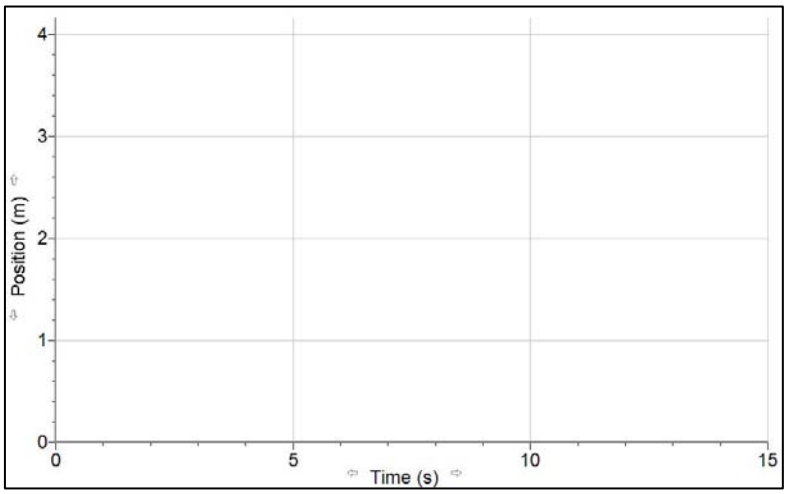
Standing still 0.5 and 2 meters in front of the bat (Go! Motion)

6. Now, follow these steps to graph what the bat (Go! Motion) senses as you move away from it at different speeds.
   a. For this graph, you will stand facing the Go! Motion and slowly walk backwards away from it. Stand still 0.5 meters in front of the Go! Motion and have another student click ▸ Collect.
   b. When you hear fast clicking, slowly back away from the Go! Motion.
   c. Draw the data on the blank graph below.
   d. Now, you will quickly move away from the Go! Motion. Again, stand 0.5 meters in front of the Go! Motion and have another student click ▸ Collect. When you hear fast clicking, quickly walk away from the Go! Motion.
   e. Draw this data on the graph below. The graph will now have data from when you were walking away slowly and when you were walking away quickly.



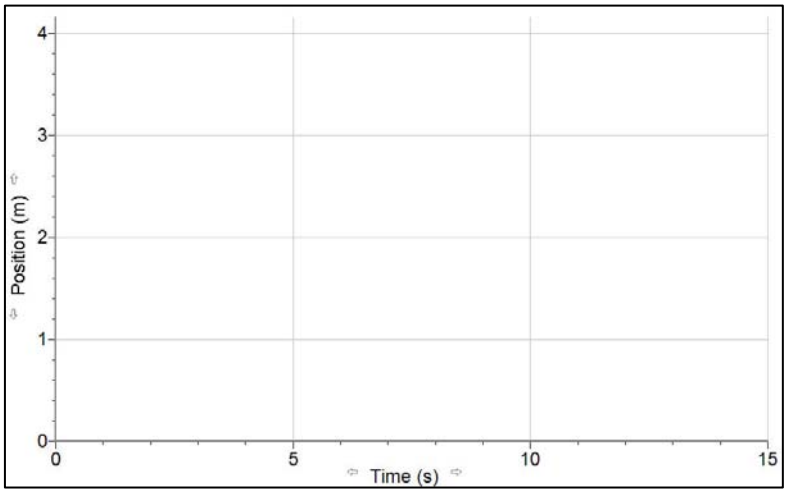
Walking slowly and quickly away from the bat (Go! Motion)

7. Now, follow these steps to graph what the bat sees when you move towards it at different speeds.
   a. First, you will slowly move towards the Go! Motion. Stand 3 meters in front of the Go! Motion and have another student click ▸ Collect.
   b. When you hear fast clicking, slowly walk towards the Go! Motion.
   c. Draw the data on the blank graph on the next page.
   d. Now, you will quickly move towards the Go! Motion. Again, stand 3 meters in front of the Go! Motion and have another student click ▸ Collect. When you hear fast clicking, walk quickly toward the Go! Motion.
   e. Draw this data on the same graph. The graph will now have data from when you were walking toward it slowly and when you were walking toward it quickly.



Walking slowly and quickly toward the bat (Go!Motion)

8. Now you will collect data one more time.
   a. For this graph, you will jump up and down in front of the Go!Motion. Stand 2 meters in front of the Go!Motion and have another student click ▶ Collect.
   b. When you hear fast clicking, jump up and down, trying to land at the 2-meter mark each time you jump.
   c. Draw the data on the blank graph below.



Jumping up and down in front of the bat (Go!Motion)

9. Answer the Part I questions in the Analyze Your Data section at the end of this activity.

Part II Following the Path of Other Insects

In this part of the activity, you will open files and be able to see the path of other insects that flew in front of the bat and were able to escape. Because you also want to stay away from the bat, you will try to follow their paths!

10. View the flight path of the first insect by doing the following:
    a. Click the Open button,  .
    b. Open the file called "22b Insect 1."

11. You will now match the graph on the screen by following these steps:
    a. Look at the flight path of the first insect and think about what you did in Part I to make similar lines on the graph.
    b. Fill in the blanks below based on what you think you need to do to match the flight path.
       1. Stand _____ meters in front of the bat (Go!Motion).
       2. Stand still for _____ seconds.
       3. Then, for _____ seconds, move _____ (towards or away from) the bat _____ (quickly or slowly).
       4. Then, for _____ seconds, move _____ (towards or away from) the bat _____ (quickly or slowly).
       5. Stand still for _____ seconds _____ meters from the bat.
    c. Now, get ready to try to follow the path. Stand where you want to and have your teammate click ▶ Collect. When you hear fast clicking, follow the steps you wrote.
    d. Were you able to follow the path of the other insect? What would you do differently next time?

_____

_____

_____

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_____

12. Now, try to match the flight path of the second insect by following these steps:
    a. Click the Open button,  .
    b. Open the file called "22c Insect 2."
    c. Look at the flight path of the second insect and think about what you would do to match the flight path.
    d. Write down what you will do to match the flight path on the lines below. Use the directions you filled out in Step 11 as an example of what to write.

    e. Now, get ready to try to follow the path. Stand where you want to and have your teammate click Collect. When you hear fast clicking, follow the steps you wrote.
    f. How did you do? If you want to try again, click Collect.

13. Answer the Part II questions in the Analyze Your Data section.

ANALYZE YOUR DATA

Part I You as an Insect

1. What does the graph line look like when you, the insect, do not move?

2. When the insect moves farther away from the bat, Go! Motion, which way does the line on your graph go?

3. When the insect moves closer to the bat, which way does the line on your graph go?

4. Describe the slope of your graph line when the insect moves quickly towards the bat. (Is it sloping upwards or downwards? Is it a steep or gentle slope?)

5. Describe the slope of your graph when the insect moves very slowly away from the bat.

6. When you stand in front of the bat in one place and jump up and down, what does the graph do? Why doesn't the graph line go up and down like you?

Part II Following the Path of Other Insects

7. Imagine a graph where the path of an insect slopes downward gently for five seconds, then stays flat. Describe what the insect was doing when this graph was made.

8. Imagine a graph where the path of an insect stays flat for seven seconds, then slopes steeply upward. Describe what the insect was doing when this graph was made.

Good job!!