

Class: Biology, Zoology

Date: September 3, 2003

Unit: Introduction

Lesson Topic: Black Box: The Scientific Method

Objectives

1. The student will improve observational skills.
2. The student will learn how to apply the Scientific Method.
3. The student will learn the essential components of a hypothesis, and experiment

Instructional techniques

Lecture, group work, hands-on activity

Instructional material

Powerpoint projector/computer, Black boxes (made of VHS film boxes, duct tape, wooden dowling, and marbles or balls).

Content

Instructor will introduce the scientific method using example: the discovery of DNA.

The Scientific Method

1. Make observations
2. Construct a hypothesis (or several)
3. Make a prediction from the hypotheses
4. Test the prediction with an experiment
5. Set up a control for the experiment
6. Interpret results (go back to step 1 or 3 if necessary); Formulate conclusions

Students will participate in black box activity in groups (see handout). At the end, the instructor will draw the student's hypotheses up on the board for group discussion. Instructor will discuss how the scientific method was applied, and broaden the discussion to other possible black boxes in science.

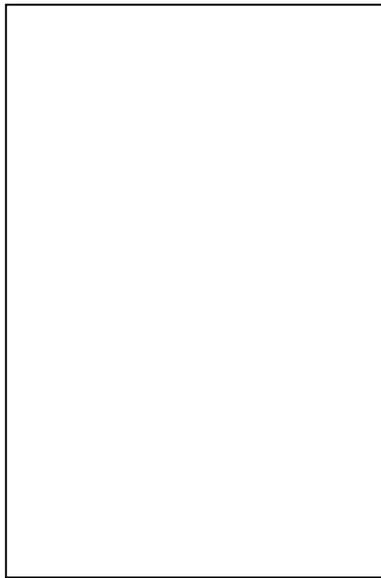
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The Black Box

To find out what is in the black box, you must integrate observation with formulating a hypothesis. Within each Black Box is a ball and a pattern of barriers that prevent the ball from moving freely. By listening to [observing] the sound of the ball rolling in the box, you should be able to predict [from a hypothesis about] the pattern of barriers inside. Once you have a hypothesis about the pattern, make a diagram of it. An empty box with a marble is available as a control for any experiments you do.

My hypothesis:



Q1: Given your hypothesis, what predictions can you make about the ball's behavior?

Q2: What experiment (or series of experiments) could you do to test those predictions?

Q3: Given the results of your experiment, are you happy with your hypothesis? Why or why not? What could you do to improve your hypothesis and get a better idea of what is in the box?