HU GK-12 Program 10-9-07

Activity: The fellow will demonstrate and allow kids to understand the basic concepts of friction and gravity.

Title: "I Believe I Can Fly"

Prepared By: Rowland Webb and Vic Boddie

DCPS Standards:

8.7.1, 8.1.12, 8.1.3., 8.1.9

SWBAT:

*Investigate air resistance and its effects on the rate of acceleration (P.H. 370 BSS)

*Identify the different types of forces (contact, gravity, friction).

* Distinguish between all parts of the Scientific method (observation, hypothesis, independent variable, dependent variable, analysis and conclusion)

Goals :

Activity 1:

1) The student will understand concepts of friction, in particular the concept of air friction, also known as air resistance.
2) The students will understand the concept of writing a hypothesis

Objectives:

Activity 1:

1) Given the concepts of air resistance, the students will hypothesize what will happen to a paper airplane with different wing spans when dropped from the same position. Which plane will have the longest and shortest "in air" flight time.
2) Given the results of the paper airplane experiment, the students will explain why the planes fell slow to the ground or fell to the ground at a fast rate.

Background

Air is known as a fluid. Fluid friction acting on an object moving through the air is referred to as air resistance. Friction due to air is known as air resistance, and at extremely high speeds this resistance can become an enormous force. This friction in fluids such as air also depends on the shape of the object moving through the air. Objects are designed to either increase or decrease friction caused by air. If an object is designed in a manner that reduces air friction, it will essentially optimize speed of object in the air. Furthermore, objects are also designed to use air resistance to make objects slower while in the air. Gravity also plays an important role in air resistance. Gravity causes objects to accelerate downward, whereas air resistance acts in the direction opposite to the motion and reduces acceleration. Therefore, when a person is skydiving and the force of the air resistance equals the force of gravity, this allows the skydiver to fall at a constant speed. When the skydiver opens the parachute, this increases the air resistance to a point where the jumper is able to slow down and land safely.

*Resources available upon request

Materials

1) Paper (or already made paper airplanes)
2) Stopwatches

Procedure

1) Organize into groups of three or four.
2) Hypothesize which planes will have the longest “in air” flight time and the shortest “in air” flight time.

3) Assign which group member will fly the paper airplane, work the stopwatch and record the data.
4) One member of the group will drop each different paper airplane from the same height.
5) The other student will use the stopwatch to time the paper airplane's flight to the floor.
6) After all trials are finished, record the data and explain whether or not your results are similar to the hypothesis written in the beginning of lab.

Information for the teacher:

Before the lab, construct two-four different paper airplanes with different designs and wing patterns. This way, the students will be able to start the lab immediately instead of exhausting time on paper airplane designing. After the lab, make sure the students turn in their hypothesis and results. Also, it may be good to have pictures or videos to serve as visuals to further demonstrate the concept of air resistance.