HU GK-12 Program 10-4-07

Activity:

Title: “Life is like a Box of Marbles”

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DCPS Standards:

8.1.12, 8.7.7

Calculate the acceleration of an object rolling down two ramps on different slopes.

Determine how the slope of the ramp affects the acceleration of the object.

Goals:

1) The students will calculate acceleration using distance and time.
2) The students will learn by first-hand account how the steepness of an incline can affect acceleration of a marble rolling down that incline.
3) The students will refresh knowledge of taking averages.
4) The students will gain knowledge of jobs in this same field of science.

Objectives:

With data the Scholars get from this experiment they will create and record data on a table.

The scholars will answer questions based on information they receive from the lab experiment.

Prerequisite Knowledge/Background:

Acceleration can be calculated from velocity and time. If one knows the starting velocity of an object, the final velocity, and the time interval during which the object changed velocity one can calculate the acceleration of an object. Previously the students have learned that velocity is a speed in a specific direction. Also, the students should have a good background in calculating averages. This will be very important in calculating acceleration. The background knowledge that the scholars have learned, will help them understand concepts such as calculating acceleration when there is an average time and an initial and final velocity.

Essential Questions:

1) How does one calculate final velocity?
2) How does one calculate acceleration when they have final velocity and initial velocity when average time from release of marble from bottom of ramp?

Laboratory Materials:

1) 3 rulers
2) marble
3) 2 books (for slope)
4) stopwatch
5) masking tape
6) calculator

Differentiating Instruction:

N/A

Rationale:

The activity is designed to help the students gain knowledge of calculating acceleration using a final velocity and an initial velocity. This activity also allows students to refresh their knowledge of taking averages of numbers.

Research Activity:

Make data table like the one shown on worksheet given out

Make a ramp by laying two meter sticks side by side. Leave a small gap between the meter sticks.

Use masking tape as shown in the photograph to join the meter sticks. The marble should be able to roll freely along the groove.

Set up your ramp on a smooth, even surface, such as a tabletop. Raise one end of the ramp on top of one of the books. The other end of the ramp should remain on the table.

Make a finish line by putting a piece of tape on the tabletop 30cm from the bottom of the ramp. Place a ruler just beyond the finish line to keep your marble from rolling beyond your work area.

Test your ramp by releasing the marble from the top of the ramp. Make sure that the marble rolls freely. Do not push the marble down the incline.

Release the marble and measure the time it takes for it to roll from the release point to the end of the ramp. Record this time under Column A for trial 1.

Release the marble again from the same point, and record the time it takes the marble to roll from the end of the ramp to the finish line. Record this time in Column B for trial 1. Repeat and record three more trials.

Raise the height of the ramp by propping it up with both paperback books. Repeat steps 7 and 8.

<u>Evaluation and Assessment</u>:

Ask students to calculate average time it took for the marble to travel from the end of the ramp to the finish line for both ramps 1 and 2.

Ask the students to calculate the final velocity for both ramps 1 and 2 using the formula,

V (final) = distance from end of ramp to finish line/ Avg distance from end of ramp to finish line.

Ask students to calculate acceleration for ramps 1 and 2 using formula,

A = V(final) – V(initial)/Avg. time from release to bottom of ramp.