Name _____ Partner(s) _____ Date _____

III-1 IT'S ALL UPHILL

Exploration

Purpose

To find a relationship between force and distance when moving an object up an incline.

Materials

Part A: board to use as an inclined plane, masses, spring scale, meter stick, ring stand, clamp and cart.

Part B: car, bathroom scales, rugs and tape measure.

Procedure

Introduction: Consider the following situation: You want to pedal a bike to the top of a hill (point D). Notice the path lengths AD, BD, and CD are all different with AD being the steepest, then CD and BD being the least steep. Which path do you think would require the most work to pedal up? Which path would require the most force?

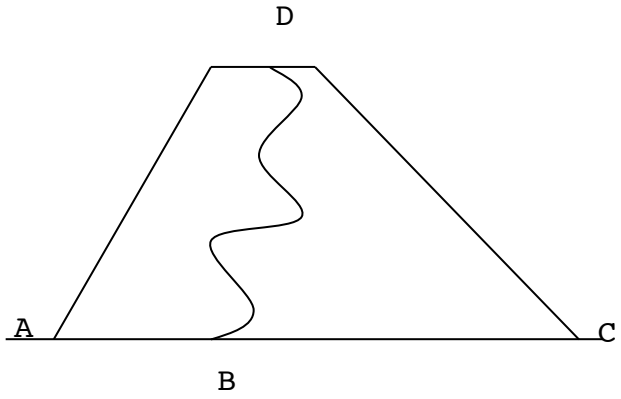

Figure 1

_____ Explain your answer.

Part A

You can simulate the experiment in the introduction by using a skate cart and an inclined plane. Set up an inclined plane as shown in Figure 2 using books or other materials to support the plane. Pull the skate cart up the plane with a spring balance by pulling parallel to the plane. Add enough weight to the cart to make sure the scale you are using is at ¾ of it's capacity. For this activity you do not need to take friction into account. You can change the distance (d) by changing the angle of the incline **but keep the height the same.** Do this by sliding the board up or down the stack of books. Repeat for at least 4 different angles. Record the data in the table. The distance "d" will always be the distance from the bottom of the incline to the stack of books. **Repeat for two more heights.**

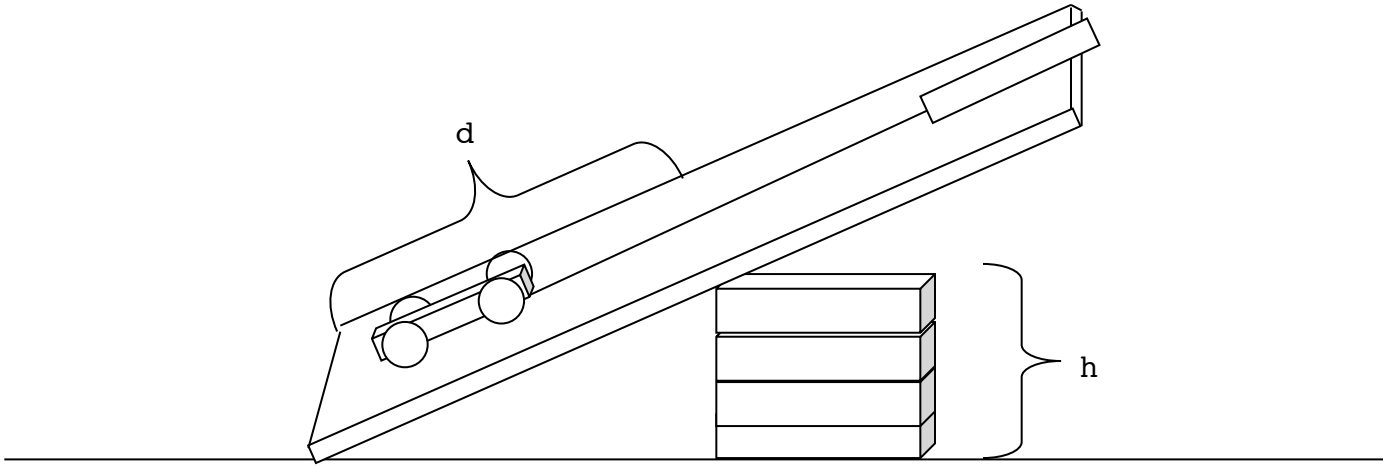

Figure 2

Data

weight	height	distance	force	work

Summing Up

1. What pattern or relationship do you find between the forces and distances "d"?

2. How does friction affect the above relationship?

3. What are the source and size of errors?