

Making a Mockery of Work: an experiment

Hypothesis: (You will be lifting and pulling the sandwich bag of marbles up the slope of the books. Which way of lifting the marbles will take less effort – lifting the bag straight up or pulling the bag up the inclined plane?)

Equipment & Materials:

Ziploc bag
35 marbles (or other compact material weighing about 2 lbs.)
string (30 cm long)
5-6 books
long smooth board or cookie sheet
rubber band scale (assemble during previous class period if necessary)

Method:

1. Put the marbles into the Ziploc bag. This is the load.
2. Tie one end of the string to the paper clip on the scale.
3. Tie the other end of the string to the neck of the sandwich bag.
4. Stack the books on one end of the table.
5. Place the load on the table and slowly lift it to the height of the stack of books by lifting the ruler (the rubber band will stretch down the front of the ruler)
6. Record how far the rubber band stretches. Find the number by the bottom tip of the paper clip on the scale and record it.
7. Place one end of the board on the books to make a ramp. The other end of the board rests on the table top.
8. Place the load at the bottom on the ramp and slowly move it up the ramp by pulling the scale up the ramp (the rubber band will stretch down the ruler)
9. Observe how far the rubber band stretches. Find the number at the bottom tip of the paper clip and record it.

Tidbits for Thought:

(Place your answers on a separate sheet of paper.)

1. On the rubber band scale, how does the amount of stretch in the rubber band indicate the amount of effort being used to move the load?
2. Try each of these variations:
 - a. How would the numbers change if more books were added to the stack?
 - b. How would the numbers change if several books were taken out of the stack?
 - c. How would the numbers change if more marbles were added to the bag?
 - d. How would the numbers change if marbles taken out of the bag?

3. The inclined plane is a simple machine. Why do we use simple machines?
4. What is an inclined plane?
5. Who might use an inclined plane to move furniture?
6. Most playgrounds have an inclined plane. Can you name it?
7. Why did ancient Egyptians use inclined planes? What did they build?
8. Which is easier – riding a bike up a steep hill or up a gentle slope?
9. Which is easier – lifting a bike up over steps or pushing it up a ramp?
10. Why do roads going up mountains usually wind around instead of going straight up the side of the mountain?
11. How do inclined planes affect your life?

