Lab 4 Exploring Newton‟s first Law

Objective:

The purpose of this lab is to explore the factors that cause a change in motion of an object, make conclusions about the relationship between mass and acceleration, graph data and investigate the acceleration of two objects acting on one another.

Background: Using Newton's three laws of motion, we can describe the relationship between the motion of objects found in our everyday world and the forces acting on them. The three laws of motion are simple and sensible:

a. The first law states that a force must be applied to an object in order to change its state of motion.

b. The second law states that the acceleration varies inversely proportional with mass. The equation that describe this law is net force on an object equals the object's mass times its acceleration.

c. The third law states that whenever we push on something, it pushes back with equal force in the opposite direction.

Newton's laws, together with his invention of calculus, opened avenues of inquiry and discovery that are used routinely today in virtually all areas of mathematics, science, engineering, and technology. These accomplishments are considered among the greatest achievements of the human mind.

Prerequisite: Prior to this activity, the student needs to know

Newton's Law and Acceleration

Materials (individual or per group):

3 masses, 1 kg each ;Beaker ;Coin, such as a quarter ;Cord ;Dynamics cart ;Dynamics cart with spring mechanism ;Human-figure toy or doll ;Water ;Index card ;

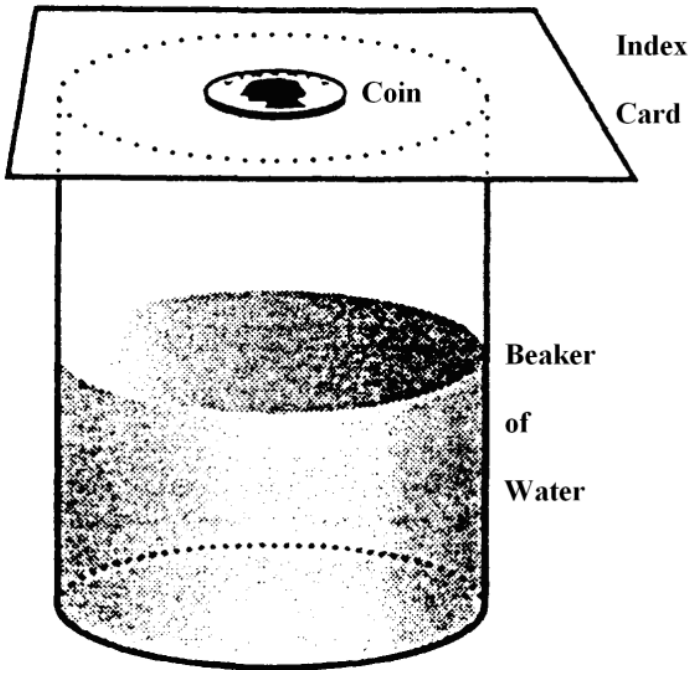
An Object at Rest

Procedures:

1. Carefully fill the beaker about half-full with water. Wipe the lip and the outside of the beaker with a paper towel.

2. Place an index card on top of the beaker so that the card covers the opening of the beaker. Place the quarter on top of the card.

3. Remove the index card by pulling it quickly away. Make sure you pull the card perfectly horizontally.



Answer the following questions:

1. What happened to the coin when the card was pulled out from underneath?

2. Is this what you expected to happen? Explain why or why not.

3. What would happen to the coin if the card were pulled out very slowly? Try it, and compare your results.