

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Dr. Croom's Physics

Lab 05-4

## Weight on an Elevator [NOTEBOOK LAB]

(To be done in groups of 2)

### Purpose

In this experiment, students will use a force sensor to discover the relationship between a mass and its weight on an elevator

### Equipment

- Force Sensor
- Computer Interface
- 500g hanging mass
- Motion Sensors

### Procedure

1. Attached a motion sensor and a force sensor to the computer. Open capstone and create a graph of force, a graph of velocity, and digits of force
2. Start collecting data. Hold the Force Sensor vertically with no mass on it and then push the zero (tare) button.
3. Place a 500-gram mass on the mass hanger. Record the weight shown on the digits display in the data table. Also record the amount of mass hanging from the Force Sensor in the data table. Don't forget to add the mass of the hanger.

READ THE FOLLOWING PROCEDURE BEFORE YOU START YOU SPEED UP MOVE AT A CONSTANT SPEED AND THEN SLOW DOWN ALL IN THE SAME TRIAL.

1. Hold the mass on the force sensor over the motion sensor. Stop your measurements and then restart it. (1)Now begin to accelerate the object upward over about 20cm. (2)Then move at a uniform velocity for about 0.25 meters. (3)Then slow down to a stop for about another 20 cm. Take note of the change in weight.
2. Analyze the data by determining the average acceleration and weight during the 3 intervals and record your data in a table.
3. Repeat step 4 and 5 going down in the elevator. Accelerate down for a distance, move at a constant rate for a distance and then stop your elevator before you hit the floor.

### Calculations

- Using the acceleration from the velocity time graph for the 6 measurements to calculate the weight of the objects during the ranges.
- Calculate the percent error between the experimental [measured with the force sensor] and theoretical [calculated from the acceleration] weights.

### Lab Report (in groups of no more than 3)

1. Heading
2. Data
3. Calculations
4. Results
  - a. Explaining when the weight increases, decreases, remains the same.
5. Conclusion