Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Newton’s 2nd Law (Lab)**

**Objective**: To find the acceleration, force, and mass of different objects using Newton’s 2nd law, also to find your pressure on the ground using force & area, & free fall / air resistance.

**Materials**: mass, ball, small spring scale, large scale, meter stick, stopwatch, calculator.

**Procedure**:

1. Choose one person to measure things and the other to be the recorder.

2. Go to any of stations # 1-2 (marked by a sticky note). Attach the weight(small then large) to the small spring scale and drag it across the table to read its force(weight) in Newtons then record it. (Note: Drag with the same force both weights).

3. Use the big scale in the back of the room and measure the mass of each weight in grams(g) then convert to Kg by (dividing by 1000), because 1kg=1000g.

4. Use the formula a=F/m to find the acceleration (show all work)

**Station: Force (N) Mass (Kg) Acceleration (m/s2)**

**1**

**2**

5. Go to any of stations # 4 or 5 (marked by a sticky note). Measure your weight & your partners weight in pounds(lb) then convert to Newtons(N) by (multiplying by 4.5x) because 1lb=4.5N then record on the table below for both you & your partner.

6. Now grab the meter stick and measure the length and width of your shoe and your partner’s shoe in cm then convert them to meter by (dividing by 100) because 1m=100cm.

7. To find the area of 1foot multiply the length by the width (A=L\*W), and to find the area of 2feet multiplythe area of 1foot by 2.

8. Use the formula P=F/A to find the pressure (show all work).

**Station: Force(N) 1ft Area(m2) 2ft Area(m2) 1ft Pressure(Pa) 2ft Pressure(Pa)**

**4 or 5 (you)**

**4 or 5 (partner)**

9. Go to any of stations # 6 or 9 (marked by a sticky note). Station #6 or 9 drop both the paper & the ball at the same time and record both times in seconds(s).

10. Station #6 or 9drop both the crumbled paper & the ball at the same time and record both times in seconds(s).

**Station: Paper drop time (s) crumbled paper drop time (s) ball drop time (s)**

**6 or 9** N/A

**6 or 9** N/A

Questions:

1. What happened to the acceleration as we increased the mass?
2. What would have happened to the acceleration if you dragged it harder?
3. Draw a force vs. mass graph for stations # 1-2.
4. If you stand on 1 foot on a scale, would it read any different than standing on 2 feet? Explain.
5. If you stand on 1 foot on the ground, would the pressure be any different standing on 2 feet? Explain.
6. Draw a force vs. (1ft area) graph for station # 4 or 5
7. Does the non-crumbled paper and the ball land at the same time? Explain.
8. Explain using the formula a=F/m, why the crumbled paper & the ball both land at the same time.