01-06 Acceleration of Gravity   *Name: _____*

Objectives

- Find the acceleration due to gravity.

Materials

- Small rubber ball
- Meter stick
- PASCO Wireless Smartgate
- iPad with SPARKvue

Distance	Speed 1	Speed 2	Speed 3	Average Final Velocity	Acceleration
2.00 m					

Observe:

1. All object fall towards the ground with an acceleration.
2. Drop a pen and the rubber ball from the same height at the same time. Do they hit the ground at the same time? _____
3. All object in freefall seem to accelerate towards the ground at the same rate.

Hypothesis:

4. What is the acceleration due to gravity? (Look it up if you need to.) _____

Test:

5. Open the SPARKvue app on the iPad and select **Build Experiment** from the main screen.
   a. Select the top **1 window layout** from the right.
   b. Select the **1.23** to get a display.
   c. Turn on your smartgate and tap the Bluetooth icon in the SPARKvue app. Connect to your smartgate.
   d. Select **Smart Gate Only**.
   e. Select **Smart Gate Timer** from the drop down menu and tap **OK**. Then tap **Done**.
   f. You should now be back at your screen reading 0.00. In the top right, tap **Select Measurement** and tap **Speed Between Gates**.
6. Set it on the ground so that you can drop the ball between the ends of the arms. There are 2 laser switches between the arms of the smartgate that can be used to measure speed of on object passing between the arms.
7. Drop the ball from 2 m three times and record the speeds. Then find the average final speed.
   a. Each time you record data press the **start** button. **Stop** it after it records the data.
8. We already learned the formula $v^2 = v_0^2 + 2a(x - x_0)$. Use it to calculate the acceleration of the ball.
9. Repeat steps 7-8 dropping the ball from another height.
10. What is the percent difference between your measurement and the theoretical for the 2m fall? _____

    $\% \, diff = \frac{theoretical - experimental}{theoretical} \times 100\%$

    What is the percent difference between your measurement and the theoretical for the other fall? _____

Conclusion:

11. What is the acceleration due to gravity near the earth? _____
12. What is the biggest source of error in this lab? _____