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01-07 Acceleration of Gravity

Objectives

• Find the acceleration due to gravity.

Materials

Small rubber ballMeter stick

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

- PASCO Wireless Smartgate
- iPad with SPARKvue

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?