

Title: Ball Drop Lab

Purpose: To find the acceleration due to gravity on the surface of the Earth, $g(9.81 \text{ m/s}^2)$. To investigate the d vs t graphs of a small and large ball.

Procedure:

1. Setup free fall adapter at a high height.
2. Open Data Studio and enter the program by selecting create your own experiment.
3. Unclick acceleration and display only the time graph.
4. Measure the height of the adapter from the ground up.
5. Begin with the small ball and secure it firmly in the top of the adapter.
6. Release the ball over the sensor on the ground.
7. Record the time measured in the graph on data studio at the specific height.
8. Repeat steps 6 and 7 with the large ball
9. Use Interactive Physics Demos to confirm the data, record.
10. After the first trial decrease the height by 20 cm for each proceeding trial.
11. On excel, input the data for small ball, large ball, and interactive physics. Create three $2d$ vs t^2 graphs using the trails from the small ball, large ball, and interactive physics.

Data:

Small Ball:

| Trial | 1 | 2 | 3 | 4 | 5 |
|-------------------|---|---|---|---|---|
| d(m) | | | | | |
| t(s) | | | | | |
| $t^2(\text{s}^2)$ | | | | | |
| 2d(m) | | | | | |

Large Ball:

| Trial | 1 | 2 | 3 | 4 | 5 |
|-------------------|---|---|---|---|---|
| d(m) | | | | | |
| t(s) | | | | | |
| $t^2(\text{s}^2)$ | | | | | |
| 2d(m) | | | | | |

Interactive Physics:

| Trial | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|---|---|---|---|---|
| d(m) | | | | | |
| t(s) | | | | | |
| t ² (s ²) | | | | | |
| 2d(m) | | | | | |

Calculations: Calculate the t^2 and $2d$ for each trial from the measurements in each data table. Using the line of best fit, the graphs calculated the average acceleration of the small ball, large ball, and interactive physics trials. Calculate your percent error of acceleration of the small ball, large ball, and interactive physics compared to 9.81 m/s^2 .

Results:

What is your percent error of acceleration for the small ball, large ball, and interactive physics knowing acceleration due to gravity on Earth is 9.81 m/s^2 .

| Known | Small Ball | Large Ball | Interactive Physics |
|----------------------|------------|------------|---------------------|
| 9.81 m/s^2 | | | |

Conclusion:

What are the sources of error for this lab? How accurate was interactive physics and the free fall adapter?