Accelerated Motion Lab

/13

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

Problem: Determine the acceleration of a ball in free fall.

Materials:

* Baseball
* Ticker Timer
* Ticker Tape

Procedure:

1. Thread the ticker tape through the timer.
2. Tape the ticker tape to the baseball and set the timer to 1/60 s.
3. Hold the baseball above your head and release being careful not to twist the tape.
4. Turn the timer on and release the ball.
5. Measure the distances between the dots on the tape and record in the table.

Observations: (2)

|  |  |  |
| --- | --- | --- |
| Dot | Time (s) | Displacement (cm) |
| 1 | 0 |  |
| 2 | 0.0167 |  |
| 3 | 0.0333 |  |
| 4 | 0.0500 |  |
| 5 | 0.0667 |  |
| 6 | 0.0833 |  |
| 7 | 0.100 |  |
| 8 | 0.117 |  |
| 9 | 0.133 |  |
| 10 | 0.150 |  |

1. Sketch a graph of position vs time and identify the shape of the graph. (2)

X: [ , , ]

Y: [ , , ]

Analysis:

1. What function of *t* would have to be graphed to produce a linear position time graph? (1)
2. Using your initial table of values, create a second table of values that will allow you to create a linear graph. (2)

|  |  |  |
| --- | --- | --- |
| Dot |  | Displacement (cm) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |

1. Sketch a graph of the data from the table. (2)

X: [ , , ]

Y: [ , , ]

1. Determine the slope of the line of best fit. *Be sure to include the units of the slope*. (1)
2. Using your line of best fit determine the acceleration of the ball. *Be sure to include the units!* (3)

Conclusion:

1. The accepted value for the acceleration of an object falling due to gravity is -9.81 m/s2.
2. Using the equation below, determine the percent error in your measurement. (1)
3. What is a reasonable explanation for any discrepancies between your answer and the accepted value? (1)

