Physical Science (PHSC 100) Virtual Lab Expt. #2: Linear Motion

Name: _____Section: _____ Date: _____

Note on this virtual experiment

Read the introductory principle, procedure and experimental materials outlined below, and understand as to how this virtual experiment would be conducted under real lab condition to generate the theoretical data supplied in **Table 1** below. After understanding the procedure and the formulae for the calculations, enter calculated values in the last two blank columns, draw a graph and write brief discussions as per the guideline given under assignment paragraph below, and **Submit it back in the Drop Box.**

Introduction

The greater the slope of an incline, the greater will be the acceleration of a ball rolled down the inclined plane. As the slope increases, friction and support force decrease and net gravitational force increases. When the incline is vertical the acceleration is equal to **"g"** (gravitational acceleration), and the ball will fall freely at an acceleration rate of **"g",** which applies for a **free-falling object**. The objective of this virtual experiment is to compare the velocities of two types of balls running down an inclined plane of a ramp, released from different distance marks.

Materials and Procedure

Materials Required

- Ramp (2m)
- Stopwatch
- Stand with support clamps
- Steel and fiberglass/wood balls
- Meter stick

Procedure

The ramp is measured and marked starting from the bottom at 20 cm, 40 cm, 60 cm, 80 cm, and 100 cm using a measuring tape and chalk or marker.

The ramp is set at inclined position at an angle of about 10^0 (30 cm high at clamp support).

The balls (steel and fiberglass balls) are rolled one at a time, along the inclined plane from the different measured and marked distances on the ramp, starting from the lowest part (20 cm mark). The stopwatch is used to measure the time (**in seconds**) taken by the ball to cover each distance. The stop watches' on and off is synchronized with the release of the ball during each measurement.

The ball is rolled from each mark three times and the time data are recorded on the blank

data table (Table 1).

Assignment

Theoretical measurement data on the run distance (cm) and three replications for the various run-time (seconds) for both the steel and the fiber balls are given on Table 1. **Calculate** the average **time (in seconds**) and the **velocity** (**distance/time**) of the balls for the various runs and enter values in the appropriate column.

Plot a Line Graph on Excel for the two balls (fiber and steel), with the **distance on the x-axis** and **the average velocity on the y-axis**. Copy the graph and paste on or attach to file and **submit in the drop box**.

Table 1: Theoretical data on running time and velocity of two types of balls rolled down an inclined plane. **(v = d/t)**

Type of Ball	**Distance (d) (cm)**	**Running Time (t) in seconds**				**Average velocity (v=d/t) cm/s**
		Trial 1 (s)	**Trial 2 (s)**	**Trial 3 (s)**	**Average time (s)**	
Steel	20	0.50	0.53	0.52		
	40	0.66	0.65	0.70		
	60	0.81	0.84	0.83		
	80	1.06	1.08	1.06		
	100	1.12	1.18	1.12		
Fiberglass	20	0.52	0.59	0.50		
	40	0.76	0.79	0.79		
	60	0.89	0.80	0.84		
	80	0.94	0.99	1.09		
	100	1.07	0.95	0.99		

Discussions

Based on the velocity data and the trend on the graph, discuss your observation on the **average velocity** of the **steel** and **fiberglass balls**, with respect to **change in speed with distance**, and **differences** or **similarities** in the **average velocities** of the two types of ball. **Give explanations to justify your findings.** (Use the blank lined space below for discussion).

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