**LAB #1 Electric Charge**

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**Section: 1 Date:10/28/25**

“**Question #1 (5pts)”**

“Complete **Table 1** – Please note that the value for the distance ***r*** will be measured using photo distance tool in LoggerPro;

NOTE: The two trials refer to two measurements of the quantities in Table 1 below. You will take ONLY ONE picture of the charged balloons”

**Table 1: Experimental Data**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Trial** | **M1(kg)** | **M2(kg)** | **mav(kg)** | **δm,kg** | **l. m** | **δl, m** | **r, m** | **δr,m** | **Q, C** | **δQ, C** | **n of e-** |
| *Trial 1* | .0029 | .0029 | .0029 | .0001 | 0.043 | 0.001 | 0.252 | 0.001 |  |  |  |
| *Trial 2* | .0029 | .0029 | .0029 | .0001 | 0.043 | 0.001 | 0.238 | 0.001 |  |  |  |

***“Please insert a picture of your experiment here”***

**“Question #2 (3pts)“**

“Draw a FBD for one balloon. Make sure all forces are labeled. Do not forget that the forces are vector quantities. Make sure the electrostatic force (Coulomb’s force) is represented by a vector with the correct direction based on your observations. **Note:** You can insert a picture of your work here”

**“Question#3 (5pts)”**

“Derive an equation using the corresponding symbols for each physical quantity (see the sketch below) for the charge and the number of electrons on each balloon in terms of mass ***m***, distance between the balloons ***r***, length of the string ***l*** and other fundamental constants. That is . Note that **the angle should not be in the final equation for the number of electrons**. Show ALL work including sketches as needed and the coordinate system you have used. (**Note:** You can insert a picture of your handwritten work here; Make sure the picture is clear and we can read your handwriting” )

A diagram of a triangle with circles and arrows

AI-generated content may be incorrect.

Assuming Q1 ~= Q2

F(T)

**“Question#4 (5pts)”**

“Discuss how the balloons get charged by friction, what is the possible charge sign on each balloon, are they the same sign and/or amount and why. Based on your observations and your understanding of Coulomb’s law, discuss what assumption(s) you must make to calculate the charge on the balloons; What property of charges you need to use to determine the number of electrons on each balloon. (3-5 sentences)

If your balloons can’t charge and you don’t observe separation due to electrostatic force, please discuss the possible reason(s). “

“**Question#5** (**2pts)**”

Determine the percent error as described in the handout; Review the ‘Propagation of Uncertainty Example’ posted on Canvas and try to derive a formula for the uncertainty of the charge Q. Discuss what other type(s) of error need to be considered in this experiment (***Hint:*** Consider the assumptions we have made to calculate the magnitude of the balloon charge) .”