Physics 12

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Equilibrium Lab

Purpose: To calculate the **mass** of an object using equilibrium methods.

Materials:

- Clinometer app downloaded to phone
- Spring scale
- String
- Mass (with actual mass written on it)

Procedure:

1. Hang a mass from a string on a nail in the classroom
2. Pull the mass horizontally out from the wall using a spring scale. (**Hold scale horizontal**.)
   - Draw a diagram of the situation and label the forces and angle involved.
   - Create a table of θ and resulting F_{spring}.
3. Repeat procedure #2 for 5 different angles between 10° and 80°. (Only one drawing though.)
4. Plot a graph of F_{spring} vs θ.
5. The graph is not linear. Draw an equilibrium triangle and explain why using tan θ, instead of θ, should yield a straight line. Add a tan θ column to your table and plot a graph of F_{spring} vs tan θ.
6. Calculate the slope of the straight-line graph and determine what physical quantity it represents.
7. Calculate the **mass** from your experimental results to 3 sig figs.
8. Calculate the percent difference between your measured mass and the actual mass (as recorded on the mass itself):

$$percent\ difference = \frac{|\ measured - actual\ |}{actual} \times 100\%$$

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Marking guide:

• Lab organized, all required sections (with diagram in procedure)	5 marks
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Purpose: To calculate the **mass** of an object using equilibrium methods.

Materials:

- Clinometer app downloaded to phone
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Procedure:

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2. Pull the mass horizontally out from the wall using a spring scale. (**Hold scale horizontal**.)
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Physics 12

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Purpose: To calculate the **mass** of an object using equilibrium methods.

Materials:

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Procedure:

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3. Repeat procedure #2 for 5 different angles between 10° and 80°. (Only one drawing though.)
4. Plot a graph of F_{spring} vs θ.
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