Physics Labs

Labs are due no later than one week after last class day of lab. Feedback is based on accuracy. Grade is based on completion.

- Title (Provided)
- Objective (Provided)
- Diagram(s) of setup/procedure
- Data (tables); minimum* of 5 data points consisting of trials

Physics Labs

- Graph(s)
  - use to show relationships between variables
  - General shape of data: line, curve, none
  - Best fit of shape; determine slope if linear
- Calculations – must show work for one, record all results
- Written Discussion
  - What, why, how
  - Results: “answer” to objective using data, calculations, and graphs to support
  - Experimental error: procedural difficulties, “human error”?, never calculations

Unit 3: Newton's Laws of motion labs

1. 2^{nd} Law (Parts 1 and 2)
2. Friction on flat surface
3. Friction on an incline
4. Circular Motion

Lab: May the Mass times Acceleration be with you

Sept 10

- Obj: Experimentally verify the relationship between acceleration and: (1) mass (2) unbalanced (net) force:
  - Part 1: Mass is the independent variable
  - Part 2: Unbalanced (net) force is the independent variable
- Graphs: One graph for each Part.
- The discussion should include, but not limited to: the shape & meaning of each graph; the meaning & value of the slope of the Part 2 graph. Did your results verify Newton's 2nd Law of motion?

Lab: Friction

September 13

- Copy objective and diagram from the provided lab sheet
- Data: suggested data tables plus…
- Calculations: show one full calculation for a μ
- No discussion, however, answers the Analysis questions at the end of the provided lab sheet in complete thoughts.

Lab: Friction on an Incline

September 21

- Obj: Determine the μ_k of a wooden block dragged up an incline at various angles.
- Data: Copy table from board
- Calculations: For one angle show full calculation set for F_f, F_w, $F_{\parallel}$, $F_{\perp}$, μ_k
- Graph: μ_k v. angle
- The discussion should include: Whether or not the μ_k depends on the angle based on graph.

Friction on an Incline

September 21

- Question: Does the μ_k of a wooden block dragged up an incline increase, decrease, or stay the same as the angle of incline increases?
- Hypothesis: Present your choice with an explanation as to why.
- Test: Design with intent to verify/refute your hypothesis. Collect and analyze data.
- Conclusion: Present final answer to question based on Test. Be sure to include proof/support

Friction on an Incline - extension

September 21

- Question: Does the μ_s of a wooden block at rest on an incline increase, decrease, or stay the same as the angle of incline increases?
- Answer: Mathematically determine the answer with no testing.
- Do not look it up…use the ΣF and F_f equations and do some substitutions to start
- No, this is not a trick question as some (one) might claim.

Lab: Circular Motion

- Obj: Compare the circular motion of an object traveling in 2 circles…r = 0.4 m and r = 0.8 m…with the same angular velocity
- Data: at least 5 rotations is the best way to time this
- Calculations: For each radius: rotational speed, linear speed, centripetal acceleration, and centripetal force. Show full calculation set for one circle.
- The discussion should include but not limited to: how each property relates between circles, identify the actual force that was the centripetal force on the object (gravity, friction, pull of Canada…)

Lab: Round and Round we Go

October 1

- Obj: Compare the circular motion properties of a student walking around a 2 m radius and 4 m radius circles
- Data: the time for each circle should be about 15 s; write observations as to how each walk “feels” and record exact times
- Calculations: For each circle: rotational speed, linear speed, centripetal acceleration, and centripetal force. Show full calculation set for one circle and your mass.
- The discussion should include: compare each calculated value for both circles, identify the actual force that was the centripetal force (e.g. gravity, friction, pull of Canada…)