

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

### **Unit 3: Newtonian Mechanics – Mass, Force, and Newton's Laws**

#### **LAB: Newton's Second Law**

##### **Objective:**

- Determine the mass of an object on a table top track using a modified Atwood's machine.

##### **Background:**

- Identify the system:
- To the right draw a free body diagram for the system identifying only external forces. Assume friction is negligible.
- Generate two expressions for the net external force on the system.
- Use those expressions to derive an equation for the unknown mass. Show all steps in the derivation in a logical, coherent manner.
- Write no more than three sentences putting the physics you've just done into prose form in order to justify how you can use a modified Atwood's machine to determine an unknown mass.

**Equipment:**

- Triple-beam balance
- PASCO track, car, motion sensor
- Super pulley, cord, known mass
- Unknown mass

**Procedure:** Briefly state the steps in your procedure. Include a sketch of the setup. Be sure to identify the steps you will take to assess how well you met the objective. This could include measurements and/or quantitative analyses.

**Data:**

- Be sure to include the uncertainty of every measurement when possible
- If graphs are used, they must be created using a spreadsheet program and printed.

**Conclusion:**

- Claim:
- Evidence:
- Reasoning:
- Possible sources of error: