Raw Data Sheet

Student Name: _____

Team members:
1.- _____ 2.- _____

3.- _____ 4.- _____

Instructor: _____

Velocity and Acceleration of Students

How does your motion correspond to the readings on the graph? Does the motion sensor read negative when you approach or when you walk away?

Acceleration Along an Air Track

Record the mass of the car and of the weight as instructed in the manual. Record the slope of the velocity plot. Make one printout per group to be handed in, and note down the section title. Include units.

m_1 (mass of the cart): _____

m_2 (mass of the hanging weight): _____

Slope: _____

Plot(v vs. t): ☐

String Tension Along an Air Track

Record the mass of the car and of the weight as instructed in the manual. Record the slope of the velocity plot and the value of the tension. Make one printout (per plot) per group to be handed in, and note down the section title. Be sure to write down the units.

m_1 (mass of the cart with the force sensor): _____

m_2 (mass of the hanging weight): _____

Slope: _____

Tension: _____

Plot (v vs. t): ☐
Plot (F vs. t): ☐

Work Sheet

Introduction[1]

Analysis

Acceleration Along an Air Track

1. Draw the free body diagram for this experiment. Be sure to label the masses and the forces.

2. Use $a_{\text{ideal}} = g\left(\frac{m_2}{m_1 + m_2}\right)$ to calculate the theoretical acceleration.

3. Find the error percentage. This quantity is caused by the frictional force.

[1]This is an adaption from S. Sugaya's original version

4. Use $f = (m_1 + m_2)(a_{\text{ideal}} - a_{\text{measured}})$ to calculate the frictional force. Explain what can cause this frictional force in this experiment.

String Tension Along an Air Track

1. Draw the free body diagram for this experiment. Be sure to label the masses and the forces.

2. Use $a_{\text{ideal}} = g\left(\dfrac{m_2}{m_1 + m_2}\right)$ to calculate the theoretical acceleration.

3. Find the error percentage. This quantity is caused by the frictional force.

4. Use $f = (m_1 + m_2)(a_{\text{ideal}} - a_{\text{measured}})$ to calculate the frictional force. Explain what can cause this frictional force in this experiment. How is it different compared to the previous experiment?

5. Use $T = m_2(g - a_{\text{measured}})$ to calculate the tension in the string.

6. Find the error percentage for the tension. Why is it different? Explain.

Conclusion