**The Mass-Dependence of Friction**

**Name and section number:**

**Partner’s name and section number:**

1. Make free-body diagrams of a cart moving up and down the track. Label the forces.

Up

Down

**j**

**i**

FA on B

2. Based on the above, write out Newton’s Second Law for each direction for both situations.

Up: Σ Fx = mau = Down: Σ Fx = mad =

Σ Fy = 0 = Σ Fy = 0 =

3. Solve the above equations for N, f, and μ. Answers must be in terms of m, g, au, ad, and θ.

N = f = μ =

4. Insert into the box the vx(t) graphs for the three measurements, with data and boxes readable.

a)

b)

c)

5. Fill in this table, stating the units within the square brackets, and using four significant figures. If you are pressed for time, collect data now (yellow boxes) and calculate later (green).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Trial | θ [] | m [] | au [] | ad [] | N [] | f [] | μ [] |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
|  |  |  |  | Average: |  |  |  |
|  |  |  |  | Std dev: |  |  |  |
|  |  |  |  | Sd/ave: |  |  |  |

6. *In your own words,* summarize your results for N, f, and μ, using the standard form that you learned in Experiment 0. Explain why the fractional uncertainty, sd/ave, for one variable is so much different than for the other two.