

$$a = \frac{m_w g}{m_c + m_w}$$

$$65.98 \div 1.2 = 54.98$$

Data table for acceleration of a lab cart on a horizontal surface.

$$m_c + m_w = 312g + 65g =$$

| $m_c$ | $m_w$ | Applied Force to the system = $m_w g$ | $a$ theoretical $m/s^2$ | $a$ measured $m/s^2$ | percent difference |
|-------|-------|---------------------------------------|-------------------------|----------------------|--------------------|
| 313   | 64g   | 0.63 N                                | 1.66                    | 1.55                 | 6.85%              |
| 320   | 57g   | 0.56 N                                | 1.5                     | 1.35                 | 7.83%              |
| 328   | 49g   | 0.48 N                                | 1.3                     | 1.16                 | 8.26%              |
| 336   | 41g   | 0.40 N                                | 1.1                     | 1.04                 | 1.90%              |
| 344   | 33g   | 0.32 N                                | 1.86                    | 0.88                 | 2.30%              |

4. Construct a graph of Force vs. acceleration. (y vs. x) in Graphical Analysis. Include the graph and relevant analysis with your lab report.

5. Interpret the slope and y-intercept (if applicable) using your pre-lab work.

$$m_w g = (m_c + m_w) a + f_f \approx 0$$

$$y = mx + b$$

The slope is the acceleration  
The y intercept is the force of friction.

6. Include a sample error calculation. What are possible sources of error?

$$\% \text{ error} = \frac{(1.66 - 1.55)}{1.66} \times 100\% = 6.63\%$$

Sources of error increase weighing of system compared and not rounding correctly.

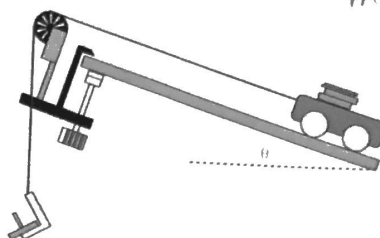
7. State briefly and precisely - what did you explore in this portion of the lab and what did you find and learn.

We explored the acceleration of a cart on a horizontal frictionless track. As the weight of the cart increases, the weight pulling downward decreased, the acceleration of the cart decreases.

## Part 2: Inclined plane.

### Theory 2:

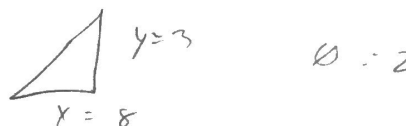
A light string connects a cart and weight. The weight falls under the influence of gravity, pulling the cart over a frictionless pulley. Now the cart is moving on an inclined plane.



(See Pre-lab Question 6)

### Procedure 2:

Set the plane on a stack of books and measure the inclination angle, which will remain the same throughout Part 2. *Don't even think about using a protractor.* Use trig. Record your work:



Use the computer program to measure the acceleration of the cart on the incline. Do this for two different combinations of some angle,  $m_c$  and  $m_w$ . You should find the percent difference between the measured and theoretical accelerations as before.

Data table for acceleration of a lab cart on an inclined surface.

$$m_c + m_w =$$

| $m_c$ | $m_w$ | Applied Force to the system = $m_w g$ | $a$ theoretical $m/s^2$ | $a$ measured $m/s^2$ | percent difference |
|-------|-------|---------------------------------------|-------------------------|----------------------|--------------------|
| 313g  | 64g   | 0.63 N                                | 1.41                    | 1.28                 | 8.30%              |
| 320.7 | 56.1  | 0.55 N                                | 1.19                    | 1.07                 | 8.07%              |

$$a = \frac{m_w g - m_c g \sin \theta}{m_w + m_c}$$

$$143 - 32$$

$$111 \sin 3.5$$



As you did before, construct a graph of Force vs. acceleration. (y vs. x) in Graphical Analysis. Include the graph and relevant analysis with your lab report.

1. Interpret the slope and y-intercept (if applicable) using your pre-lab work.

OK The slope would be the acceleration of the cart & the y-intercept would be the force of friction.

2. Include a sample error calculation. What are possible sources of error?

$$\% \text{ error} = \frac{1.41 - 1.28}{1.19} \times 100 = 10\%$$

sources of error include not rounding up correctly and the angle shifting accidentally.

OK

3. State briefly and precisely - what did you explore in this portion of the lab and what did you find and learn.

OK We explored the acceleration of a cart on an inclined plane. The acceleration of the cart, in the absence of friction should be the same both up and down the inclined plane. The acceleration is not expected to depend on the mass of the cart.