Lab 1 - Acceleration of an Object

**Station 1**

Release the cart from rest at the top of the ramp.

Record the time the cart took to go from the upper photogate to the lower photogate.

Record the time the wing of the cart was in each photogate.

Repeat two more times for a total of three trials.

**The “speed of cart in gate” = length of cart wing in meters**

**time in photogate**

length of the cart wing \_\_\_\_\_ cm 🡪 \_\_\_\_\_\_ meters

time between gates: trial 1 \_\_\_\_\_\_ s

trial 2 \_\_\_\_\_\_ s

trial 3 \_\_\_\_\_\_ s ave. time between gates \_\_\_\_\_\_ seconds

time in upper photogate, P: trial 1 \_\_\_\_\_\_ s speed of cart in upper gate \_\_\_\_\_\_ m/s

trial 2 \_\_\_\_\_\_ s speed of cart in upper gate \_\_\_\_\_\_ m/s

trial 3 \_\_\_\_\_\_ s speed of cart in upper gate \_\_\_\_\_\_ m/s

ave speed in upper gate \_\_\_\_\_\_\_ m/s

time in lower photogate, Q: trial 1 \_\_\_\_\_\_ s speed of cart in lower gate \_\_\_\_\_\_ m/s

trial 2 \_\_\_\_\_\_ s speed of cart in lower gate \_\_\_\_\_\_ m/s

trial 3 \_\_\_\_\_\_ s speed of cart in lower gate \_\_\_\_\_\_ m/s

ave speed in lower gate \_\_\_\_\_\_\_ m/s

**Station 2**

Record the distance between the two photogates.

Pull the glider back to the zero mark. Release the glider.

Record the speed of the glider through the first photogate, *P*, and the time for the glider to go from the first photogate to the second photogate, *Q*..

Repeat two more times for a total of three trials.

distance between photogates: \_\_\_\_\_\_ cm 🡪 \_\_\_\_\_\_ meters

speed through photogate P time between gates P and Q

trial 1 \_\_\_\_\_\_ m/s trial 1 \_\_\_\_\_\_ s ave. speed: \_\_\_\_\_\_ m/s

trial 2 \_\_\_\_\_\_ m/s trial 2 \_\_\_\_\_\_ s

trial 3 \_\_\_\_\_\_ m/s trial 3 \_\_\_\_\_\_ s ave. time: \_\_\_\_\_\_ s

**Station 3**

Record the length of the tube. Release the ball from rest at the top of the tube.

Record the speed of the ball as it leaves the tube. Repeat two more times for a total of three trials.

length of tube: \_\_\_\_\_\_ cm 🡪 \_\_\_\_\_\_ meters

speed at the bottom of the tube: trial 1 \_\_\_\_\_\_ m/s

trial 2 \_\_\_\_\_\_ m/s

trial 3 \_\_\_\_\_\_ m/s

ave. speed \_\_\_\_\_\_ m/s

**Station 4**

Measure and record the distance between the two photogates.

Release the ball from rest at the top of the tube.

Record the speed of the ball through each photogate.

Repeat two more times for a total of three trials.

distance between photogates P & Q: \_\_\_\_\_\_ cm 🡪 \_\_\_\_\_\_ meters

speed through upper gate, P speed through lower gate, Q

trial 1 \_\_\_\_\_\_ m/s trial 1 \_\_\_\_\_\_ m/s

trial 2 \_\_\_\_\_\_ m/s trial 2 \_\_\_\_\_\_ m/s

trial 3 \_\_\_\_\_\_ m/s trial 3 \_\_\_\_\_\_ m/s

ave. speed \_\_\_\_\_\_ m/s ave. speed \_\_\_\_\_\_ m/s

**Station 5**

Start the ball rolling up the table. Release contact with the ball before the ball reaches the start line.

With the stopwatch, time how long it takes the ball to go from the start line to the highest point the ball reaches up the table. Mark this highest point. Measure and record the distance from the start line to the highest point. Record the time. You need only do one trial at this station.

time to highest point: \_\_\_\_\_\_ seconds

distance from start to highest point: \_\_\_\_\_\_ cm 🡪 \_\_\_\_\_\_ meters

**Station 6**

Push in the plunger of the cart until the plunger locks into place. Put the cart at the lower end of the ramp with the plunger against the endstop. Release the plunger. Allow the cart to travel up the ramp and return to its starting point. Record the speed of the cart through the photogate on the way up and on the way down. Record the time the cart took to go from the photogate back to the photogate.

upward speed downward speed

through photogate P through photogate P time between photogates

trial 1: \_\_\_\_\_\_ m/s trial 1: \_\_\_\_\_\_ m/s trial 1: \_\_\_\_\_\_ seconds

trial 2: \_\_\_\_\_\_ m/s trial 2: \_\_\_\_\_\_ m/s trial 2: \_\_\_\_\_\_ seconds

trial 3: \_\_\_\_\_\_ m/s trial 3: \_\_\_\_\_\_ m/s trial 3: \_\_\_\_\_\_ seconds

ave: \_\_\_\_\_\_ m/s ave: \_\_\_\_\_\_ m/s ave: \_\_\_\_\_\_ seconds