Group _____   Name _____

Motion of a Ball Rolling Down an Incline
Measurement and Graphing

In this exercise, you and your partners will record the motion of a ball rolling on a smooth inclined ramp. This data will then be graphed and analyzed.

To perform this exercise, you will need: a ball, stopwatches, a board with marked distances, and something to support one end of the board.

Procedure: 1. Support one end of the plank approximately 15 to 20 centimeters above the lab table. This can be done using an equipment box or a stack of books. The exact height does not matter.
2. One member of the group will release the ball from the zero centimeter mark, the others will record the time for the ball to travel each distance (20 cm, 50 cm, 90 cm, 150 cm, and 225 cm). The timers will all start their stopwatches when the ball is released and stop them when it rolls past their particular distance.
3. Record at least five sets of data in Data Table 1. If at least four of the times at each distance are reasonably close, use the average of these four times as the time to roll that distance. (What are reasonably close times?) If you do not have four reasonably close times you should continue recording more data until you have enough close data points to feel confident which values should be averaged.
4. Record the average times for each distance in Data Table 2. You should include the time for the ball to roll a distance of zero centimeters in your data table.

Distance (cm)	Trial 1 Time(s)	Trial 2 Time(s)	Trial 3 Time(s)	Trial 4 Time(s)	Trial 5 Time(s)	Trial 6 Time(s)	Trial 7 Time(s)	Trial 8 Time(s)
20.0								
50.0								
90.0								
150.0								
225.0								

Data Table 2

Trials Used to Calculate Average Time _____

Distance (cm)	Average Time (s)
0	
20	
50	
90	
150	
225	

Plot your data points on graph paper. Follow the rules of graphing as discussed previously.
Consider time to be the independent variable.
   Scale graph axes so data covers a large portion of the graph.
   Be sure graph will allow you to answer the questions below.

Draw in a smooth curve that best fits your data points. Does this look like the type of smooth
curve that best fit the data for the ball rolling on a horizontal surface?

How does the distance traveled for each case depend on the elapsed time? (Does the distance
increase or decrease with time? Does the distance seem to be changing uniformly with time?)

From your graph, estimate the time it took for the ball to travel 100 centimeters.

From your graph, determine the distance traveled by the ball in the first second.

From your graph, determine the distance traveled by the ball in the second second.

Does the distance traveled in one second depend on which one second interval is chosen?