

Roll the Ball

Purpose

Find a relationship between speed, distance and time

Procedure

Part A: Simple Ramp

Set up a starting ramp for your ball. Make sure you always start the ball from the same place and in the same manner so that it will always have the same speed at the bottom of the ramp. Use meter sticks to form a path for the ball on a level table and use a stopwatch to measure the time it takes the ball to go the indicated distances. Repeat each time measurement at least three times and use the average for your final calculations. Copy the data table below onto the back of the page. Please use distances longer than 1.20 m if possible and in between those listed if time permits. More data is always useful.

Position (m)	t ₁ (s)	t ₂ (s)	t ₃ (s)	t _{avg} (s)	v _{avg} (m/s)
0.00	0.00	0.00	0.00	0.00	-----
0.20					
0.40					
0.60					
0.80					
1.00					
1.20					

Part B: Large Sloping Ramp

Place your ramp at the top of shelves on your lab bench. Use the same “race course” and repeat what you did in Part A. Record your data in a second copy of the above data table.

Graphs

Use your data from Part A to construct a graph. Place the average times along the horizontal axis and the distance measurements up the vertical axis. Add a trendline that creates a straight line or smooth curve through your data points. Your graph should reflect the motion of the ball. Remember, Mother Nature is beautiful, so if your graph accurately represents her, it, too, will be beautiful.

Construct a second graph from your data in Part B.

Questions

1. Compare your graph for Part A with those of your classmates. How are your graphs alike and how are they different? What could be causing these differences? If time permits, test your hypothesis.
2. Compare your two graphs. What is happening to the ball that makes the two graphs have different shapes?
3. How or where is the average speed of the ball reflected in your graphs? Explain.
4. Can you write an equation to represent the line or curve on each of your graphs? If yes, do so, and explain the physical significance of each term. If not, explain why not.