

Adapted from Take-Home Physics by Michael Horton

Objectives

- Create a distance vs. time graph and use it to find the velocity.

Materials

- Grooved metric ruler
- Marble
- Stopwatch
- Paper scale with marks at 0 cm, 15 cm, 30 cm, 45 cm, and 60 cm
- Device capable of doing regressions (Vernier Graphical App or graphing calculator)

Procedure

1. Make a low ramp with the ruler and a book. You will roll the marble down the groove on the ruler later.
2. Lay the paper scale on your desk so that the marble will roll across the scale starting at the start side.
3. Start the marble at the top of the ramp and let it go. Time the marble from the start line to the 15 cm line. Repeat this three times and record the times in the table. Make sure to always start the marble at the same point on the ramp.
4. Roll the marble down the ramp more times to fill out the table always starting the marble at the same place and starting the timer at the start line.

Distance	Time 1	Time 2	Time 3	Average Time
15 cm				
30 cm				
45 cm				
60 cm				

5. Draw a graph with the average time on the x-axis and the distance on the y-axis. The points should form a straight line. Use a ruler to draw the best fitting line.
6. Use a regression device to find the linear regression.

$$x = \text{_____} t + \text{_____}$$
7. What is the slope of the graph? _____
8. From algebra, what is the slope formula? _____
9. What are the units for this slope? _____
10. What is the velocity of your marble? _____

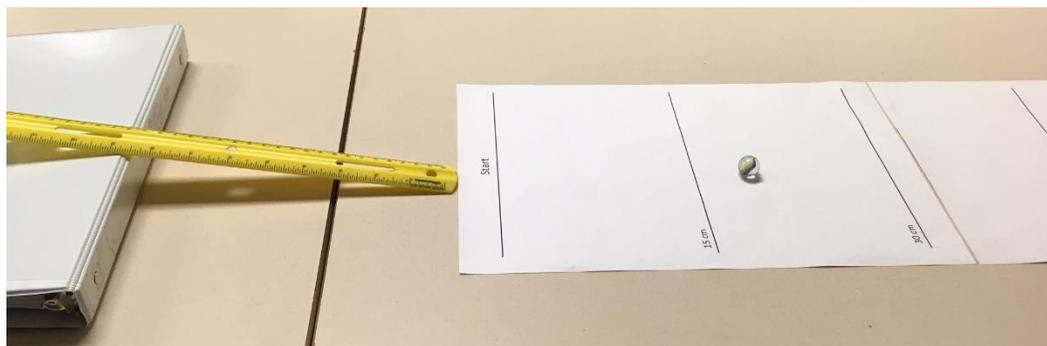


Figure 1: Setup