**Rolling Ball[[1]](#footnote-1)\***

**Background**

Imagine a pool ball rolling briskly along a flat, level track for a distance of less than one meter.

**Goal:** To predict what the motion graphs will look like for the pool ball and to use video analysis to test your predictions and find the speed of the ball as a function of time.

**Part I - Predictions**

Think about that pool ball described above

* How would it move? Would you expect to see it speeding up, moving at a constant speed, or slowing down? Explain your reasoning.

* If you were to play a movie of the ball rolling on a level table and/or replay it on a frame-by-frame basis, how could you test your predictions about its motion? Explain.
* Sketch the graphs of the location of the ball along an x-axis when it is speeding up, moving at a constant velocity, and slowing down. Assume timing starts when the ball’s leading edge is at the origin.

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| Speeding Up | Constant Velocity | Slowing Down |
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**Part II - Video Analysis**

* Open the file *Galileo’sProjectile\_Pt1.mov* in the QuickTimePlayer. (The file is located in the “Logger Files” folder on the Desktop under “Rolling Ball.”) Play the movie or advance it frame-by-frame using the right arrow key on your keyboard. Can you tell whether it is speeding up, slowing down, or moving at a constant speed? If so, explain how you know.
* Open the Logger Pro experiment file *RollingBall.cmbl* to open a video analysis file with the rolling ball move inserted. Click the *Add Point* tool near the top right side of the movie window. Then click **on the front of the ball** in each frame to record the position in the picture elements or *pixels* for short. Note: if you mess up, just close and re-open the movie and start over. What does the graph’s shape tell you about the nature of the ball’s motion?
* Your next task it to scale the movie using the 1-meter calibration stick shown in the movie. This allows you to determine the ball’s location in meters, rather than in pixels, in each frame. To scale, click on the *Set Scale* tool that looks like a little ruler. Then place the cursor at one end of the calibration stick and hold down the mouse button as you drag it to the other end of the stick and release it. Your scale object is 1m, so click on the OK button in the dialog box. Sketch the graph.

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0.8

0.2

0.0

0.4

0.6

0.4

0.2

0.0

**Summary Questions**

1. Comment on the nature of the motion and what evidence was most convincing in arriving at your conclusion.
2. How did your prediction in the first question compare with your final conclusion?

1. \* Adapted from a *Physics with Video Analysis LivePhoto Physics Activity 1* by Priscilla Laws *et al.* [↑](#footnote-ref-1)