

Capitalizing on Curiosity: Linear, Exponential & Quadratic Models from Observing a Ball in Motion.

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Experiment Design

- You need to plan for data in ordered pairs.
- Time is a possible input. Bounce number is another possible input.
- Distance and height are two good choices for output.
- Meter sticks, marked ramps, or grid paper are good choices to make distances and heights visible on a video.

Data Gathering

- Select a good angle of view for making your video.
- Try recording video several times until you get a good quality video.
- If you are using time as your input, know the number of frames per second that your phone records.
- If you are using time as your input, import the video to a computer and use the arrow keys to forward the video one frame at a time to get the intervals you desire. For example, 3 frames at 30 fps forwards the video 0.1 seconds.

Data Analysis

- Enter your data carefully into a graphing utility.
- Set the minimum on the window for both axes slightly into the negative in order to make the axes visible in the graph.
- Use guessed values, a slider, or a regression tool to find parameters that give a close match between your data and your model equation.

Complete the Ball in Motion Project documentation page or go to www.student.desmos.com and enter class code 7KB6R5

Link for Google Drive with Videos and Word Documents

<https://drive.google.com/open?id=1Z1kysqHEZzlYWxDswdSs26rxU2xkm1EO>

Links for Desmos Graphs for the 4 videos

Rubber Band Spring <https://www.desmos.com/calculator/8gwq80fpcq>

Flat Roll <https://www.desmos.com/calculator/uixosa3unx>

Ramp Roll <https://www.desmos.com/calculator/c4ic5ip14x>

100 cm Drop <https://www.desmos.com/calculator/aw391soytm>

Link for Desmos Classroom Activity for Ball in Motion Project

<https://teacher.desmos.com/activitybuilder/custom/5c9901bc43d75d2251e2a086>

Link to a description of Galileo's acceleration experiment

http://galileoandeinstein.physics.virginia.edu/lectures/gal_accn96.htm

Link to short Galileo video.

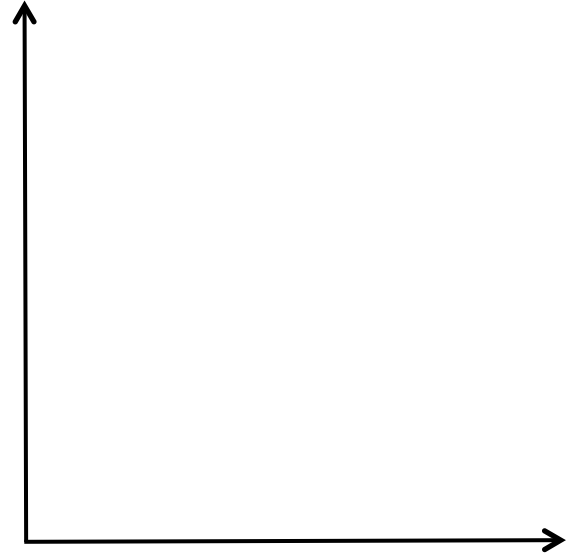
https://ca.pbslearningmedia.org/asset/phy03_vid_galileoplane/

Ball in Motion Project Documentation Page

Name _____

Briefly describe your experiment and what data you will collect. State what type of function you believe your data will follow. Some possibilities might be linear, quadratic, exponential or sinusoidal.

On the coordinate plane below, make a sketch to show what you expect from your data. Be sure to label the axes.



[illegible]

A blank coordinate system with a vertical y-axis and a horizontal x-axis, both ending in arrows. The axes are black lines on a white background.

[illegible]