

The Instruction for the Lab of Acceleration of Free-Fall Motion

Objectives:

To analyze the time-dependent motion of a freely-falling object

To determine the acceleration of free-fall experimentally

Methods and Devices:

Use the video-clip of a metal ball dropping from a height in the Physics Lab. A metal ball was placed at the zero of a two-meter ruler. The video of the free-fall motion is taken with a Canon Powershot A 560 digital camera. The frame frequency of the clip is 30 frames per second.

Lab Procedure:

1. Watch the video clip to make sure how the experiment is conducted.
2. Look into a picture folder to see each frame of the movie clip.
3. Seek the very first frame (zero frame) before recording the displacement. (Find a frame right before he releases the ball.)
4. The measurer is contrasted by white and red colors. Each measures 10 cm (0.1 m).
5. The time for one frame is $1/30$ seconds.
6. Record the displacement of the object corresponding to the frame number indicated. (Read it by using the center of the object.)
7. For a blurred picture of the object, try to take the middle of it.
8. Take two sets of data with two different video clips.
9. Take the average to plot y vs. t and y vs. $t^2/2$.
10. Make sure if the result is correct with your instructor. (Have instructor's signature before you leave.)

For the Lab Report:

① Write your introduction (from a half page to one page). ② Print out the data and graphs from the Excel file. ③ Print out a word file in this package, Question Sheet for Acceleration of Free Fall Motion, to answer all of the questions. ④ Put all together to turn in as a lab report.

Do not attach this instruction page to your report. Do not copy the sentences on this page. This page cannot be used for your lab report.