

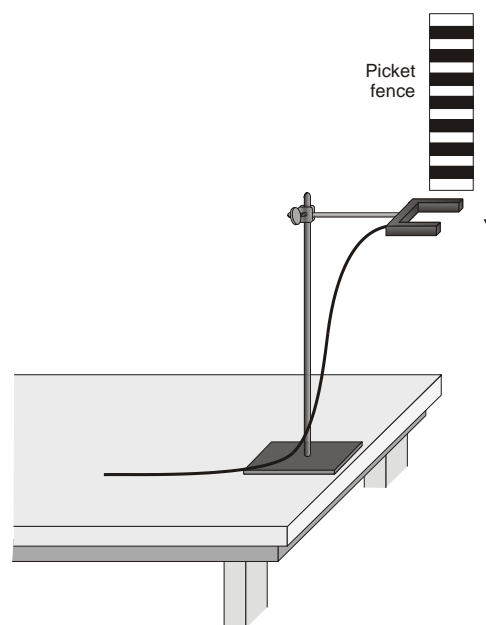
PHYSICS LABORATORY: Measuring Freefall

Adapted from Vernier Physics

BACKGROUND INFORMATION AND PURPOSE

We say an object is in *free fall* when the only force acting on it is the Earth's gravitational force. No other forces can be acting; in particular, air resistance must be either absent or so small as to be ignored. When the object in free fall is near the surface of the earth, the gravitational force on it is nearly constant. As a result, an object in free fall accelerates downward at a constant rate. This acceleration is usually represented with the symbol g . In this experiment, your goal is to find a value for g near the surface of the Earth.

You will have the advantage of using a very precise timer connected to the computer and a Photogate. The Photogate has a beam of infrared light that travels from one side to the other. It can detect whenever this beam is blocked. You will drop a piece of clear plastic with evenly spaced black bars on it, called a Picket Fence. As the Picket Fence passes through the Photogate, the computer will measure the time from the leading edge of one bar blocking the beam until the leading edge of the next bar blocks the beam. This timing continues as all eight bars pass through the Photogate. From these measured times, the program will calculate the velocities and accelerations for this motion and graphs will be plotted.



DATA COLLECTION AND PROCESSING (DCP)

1. Think very carefully about how you are going to collect and process the data. Remember that you must take at least 3 trials of data
2. Think very carefully about your independent, dependent, and controlled variables.
3. A full error analysis with proper treatment of uncertainties is required.
4. You are required to come up with a conclusion based on the gradient of a graph of your experimental data (aspect 3 of DCP).

CONCLUSION AND EVALUATION (CE)

1. Interpret your results.
2. Compare your experimental value of g to the accepted value at this location.

Remember:

1. Refer to the 'Physics Lab Report Guide' before submitting your report.
2. Attach the 'Physics Lab Report Rubric' as a cover page to your paper copy.

You will be marked on Data Collection and Processing (DCP) and Conclusion and Evaluation (CE) for this lab.