Lab #3

Acceleration Due to Gravity

Mayer Adelman

12/14/2015

Mayer Adelman

Lab 3

Purpose

To find the value of acceleration caused by gravity.

Theory

The mass of an object and the gravitational pull on that object will always be proportional. Galileo discovered that all objects will fall at the same rate no matter the mass. Every object has a different constant acceleration due to gravity depending on the object's mass. Therefore, on different planets, objects will fall at different rates than they would on planet earth. A free falling object on the moon will not accelerate towards the ground as rapidly as that same object would on earth.

Since it is known that acceleration due to gravity is 9.81 m/sec^2, that is the answer we are targeting.

This lab uses a free fall timer which calculates the time it takes for an object to fall from a measured elevation to the ground. A steel ball is lodged in a release mechanism which is set up above a pressure pad. The release mechanism and the pressure pad are connected to a timer by two wires. When the steel ball is dropped it causes a circuit which is connected to the timer to be broken which prompts the timer to start. When the ball hits the pressure pad, it completes the electrical circuit again, and causes the timer to stop. This process by which the timer works is called "relay." A relay is an electrical device that is activated by a current or signal in one circuit to open or close another circuit which in our case causes the timer to start.

Materials

1. Digital timer
2. Release mechanism
3. Pressure pad
4. Meter stick
5. Ring stand
6. Right angle clamp
7. Steel ball

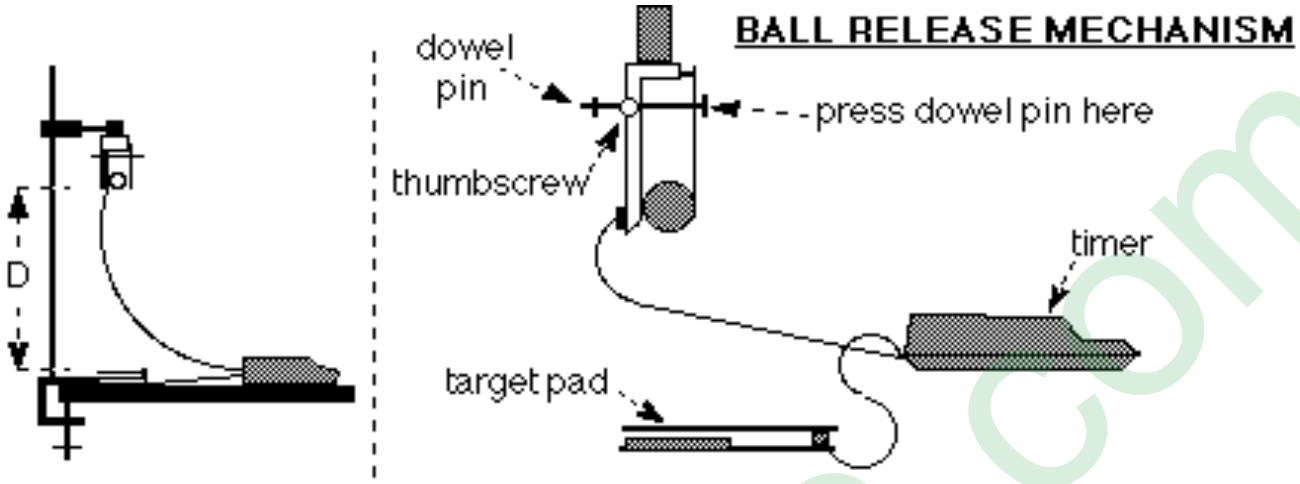
Procedure

1. Set up the appropriate apparatus. (Attach a right angle clamp to the ring stand, which will hold the release mechanism. Place the pressure pad directly underneath. Place the steel ball into the release mechanism to begin the circuit. Make sure they are connected by wires to a digital timer.)
2. Measure the height of the ring stand from the pressure pad to the right angle clamp with a meter stick. Record measurements.
3. Release the steel ball from the release mechanism.
4. When the steel ball hits the pressure pad record the time from the timer. That is how much time it took for the ball to fall and hit the pad.
5. Repeat the process to make sure all data is accurate.

Mayer Adelman

Lab 3

Diagram



Data

Distance= 1.598 meters

Time= .567 seconds

Formula: $a = \frac{2d}{t^2}$

a=$\frac{2(1.598)}{.567^2}$=9.94

Known value of acceleration=9.81 $\frac{\text{m}}{\text{s}^2}$

Percent Error= $\frac{9.94-9.81}{9.81}$x 100=1.33%

Conclusions and Discussion of Results

We calculated the approximate value of acceleration using the formula $a = \frac{2d}{t^2}$. This approximated value was off by 1.33% from the real value.