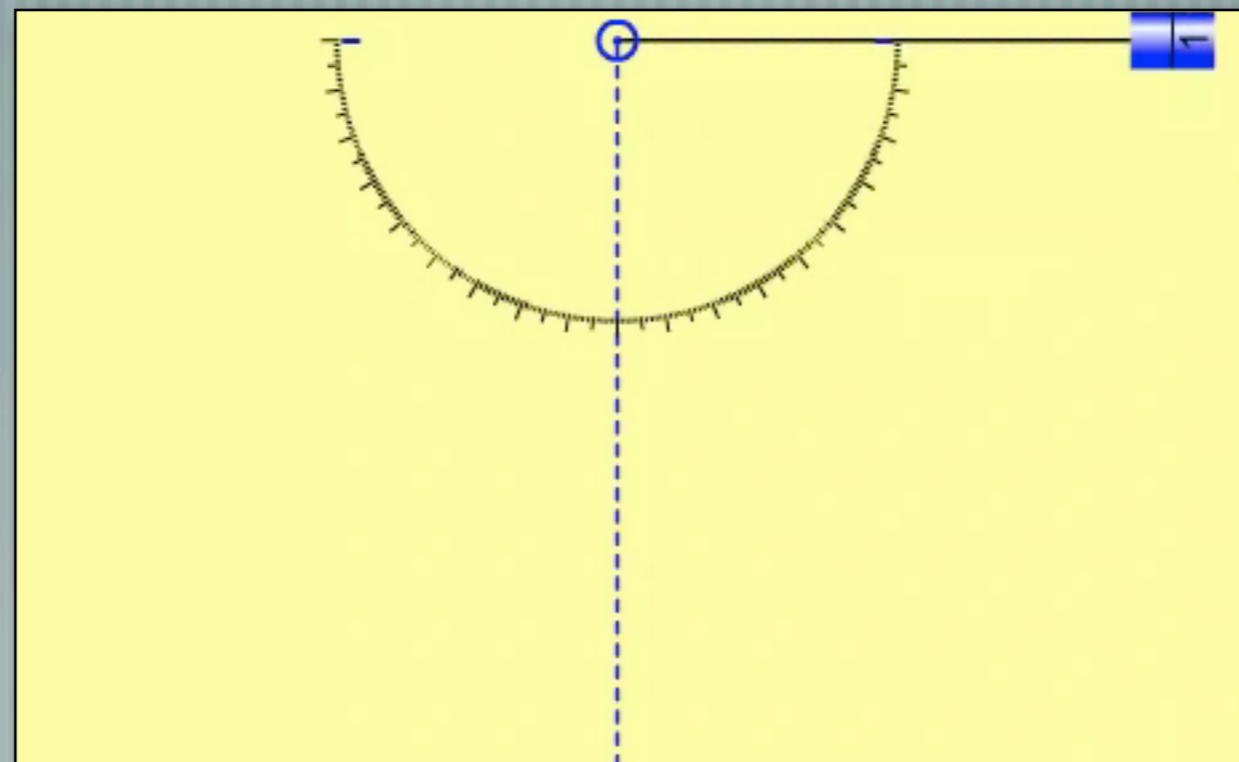


Scientific Problem Solving: What Factor(s) Determine the Period of a Pendulum?





The 6 Steps of Scientific Problem Solving

Define the Problem : Be specific when defining the problem.

Gather Information: Find out what you can about the problem before you begin to experiment.

Form one or more hypotheses: Using information you have gathered, predict a solution to the problem.

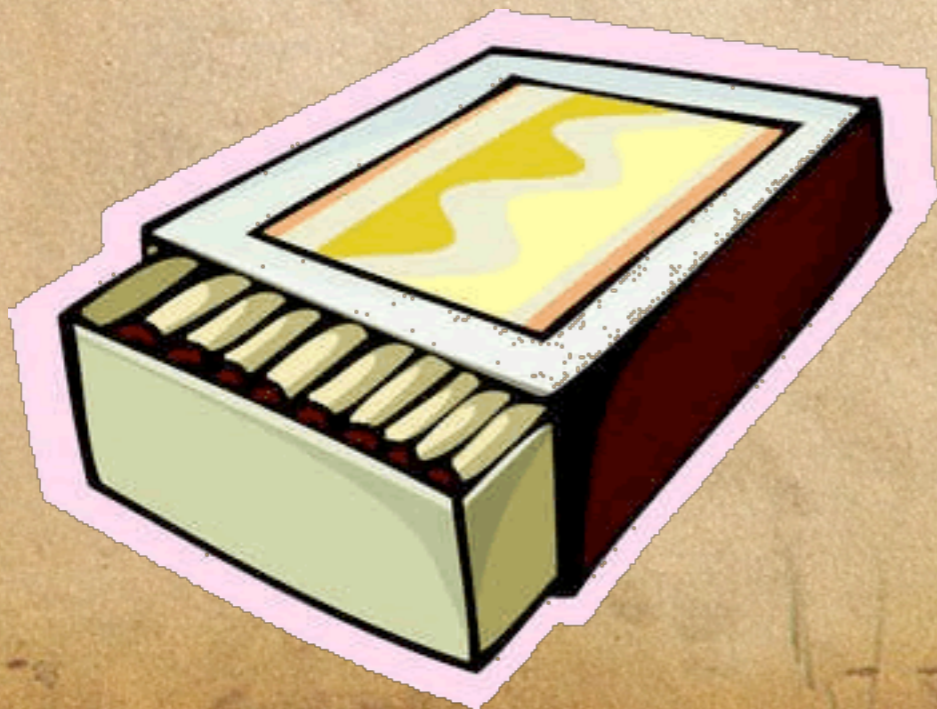
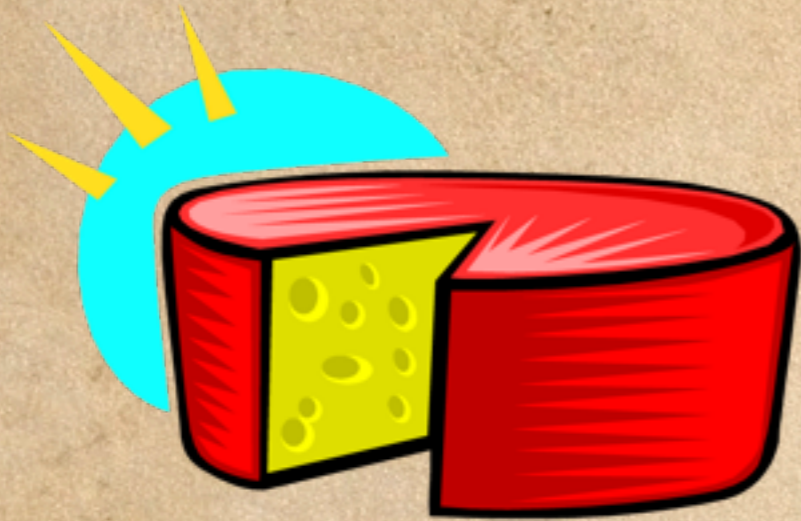
Perform experiments: Test each hypothesis by testing one variable at a time while keeping the others constant.

Record & Analyze your data: Write down data as soon as it occurs - otherwise you may forget it.

State a conclusion: What does your data mean? Does it support your hypothesis?

Two General Types of Energy

Potential = Stored Energy



Kinetic = Moving Energy



Transfer of Energy in a Pendulum

Potential Energy is stored energy. Kinetic Energy is moving energy.

100 % Potential
0 % Kinetic



P_e converted to K_e



K_e converted to P_e



100 % Potential
0 % Kinetic



0 % Potential, 100 % Kinetic

Energy cannot be created or destroyed,
it can only converted from one form to another.



How could you get the ball to return to its original height?

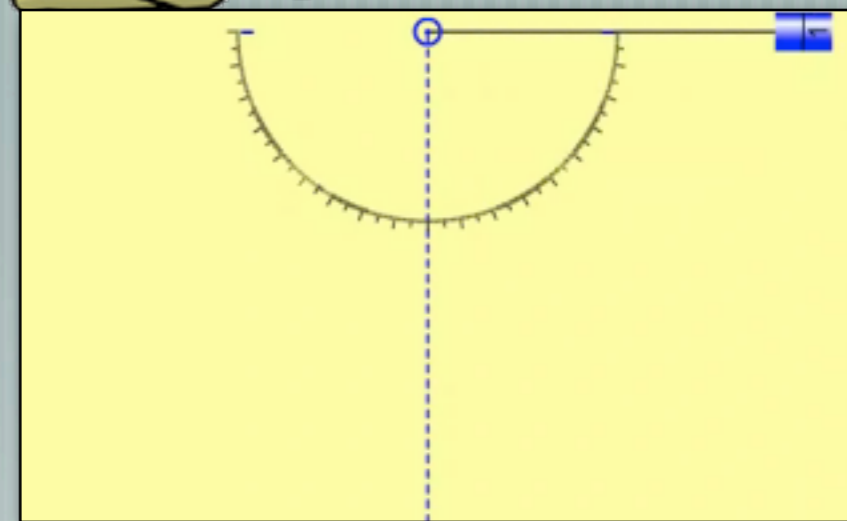
Law of Conservation of Energy

We will now use the 6 steps of scientific problem solving to solve a problem:

What factor(s) determine the period of a pendulum?

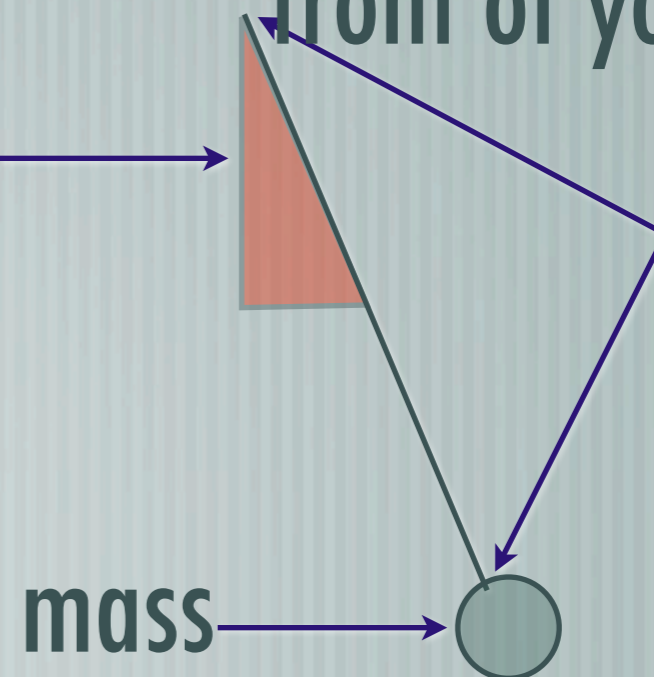
Our pendulum is a simple mass, connected to a string, that is able to swing back and forth under the influence of gravity.

The 3 variables of a pendulum are:



List these on the front of your lab.

angle



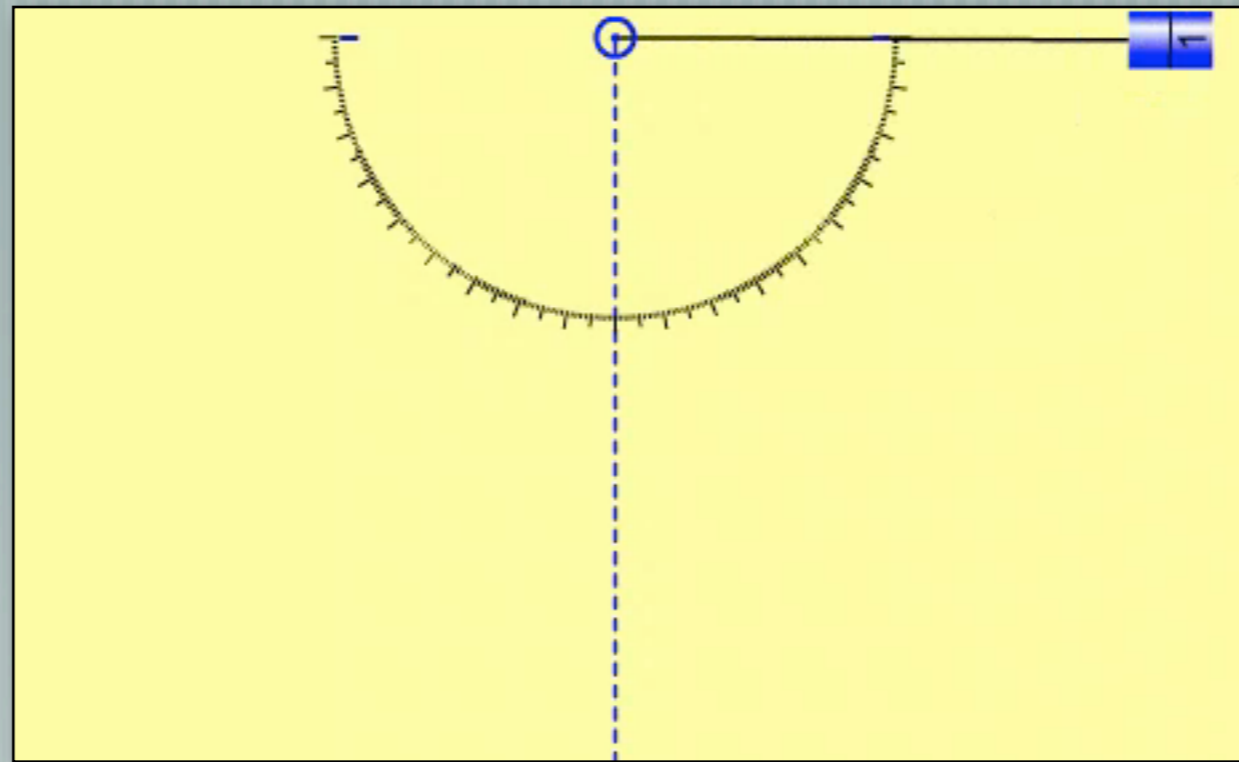
length

mass



**In 1656 the Dutch scientist
Christian Huygens invented the
pendulum clock.
It was the mankind's first
accurate clock.**

But for a pendulum to be useful in keeping time you must be able to regulate its period.



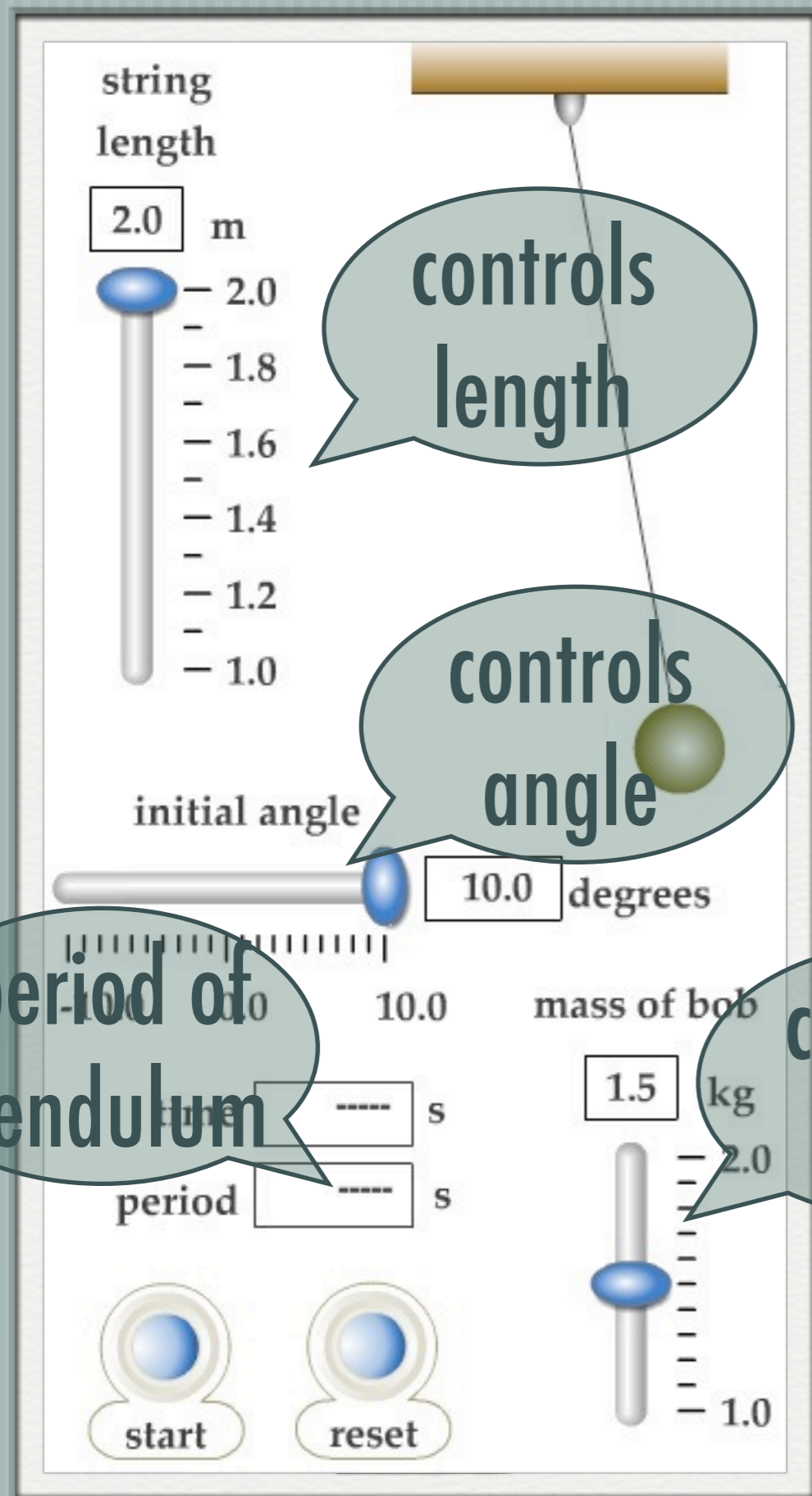
If it took 9.34 s for this pendulum to swing back to its original position then the period of the pendulum is 9.34 s.

The period of a pendulum is the time it takes to make a complete swing to and fro to make it back to where it began.

In this lab you will use the process of scientific problem solving to determine what regulates the period of a pendulum.

In other words, what causes a pendulum to swing at a certain speed and how can you change that speed?

You will use a virtual pendulum on the computer to test your hypotheses and solve this problem.



Make your Hypotheses

Before you experiment you will make three hypotheses as to how you predict each of the factors (angle, mass & length) will affect, or will not effect, the period of the pendulum.

If you predict a factor will effect the period be sure to explain how.
Example: I predict that the greater the angle the longer the period.

Longer period = takes more time to come back.

Shorter period = takes less time to come back.

Go ahead and write down you 3 hypotheses now.

You will have 4 minutes to do so.

Pendulum Lab Instructions

5) Record your data. The 3 data tables are provided. Change each variable 4 times. Be sure to record the other two variables in the space provided under the data table. Also be sure to include units ($^{\circ}$, S., kg., m.)

Angle	Period
$^{\circ}$	s.
$^{\circ}$	s.
$^{\circ}$	s.
$^{\circ}$	s.

Mass: ___ kg Length ___ m

Mass	Period
kg.	s.
kg.	s.
kg.	s.
kg.	s.

Angle: ___ $^{\circ}$ Length ___ m

Length	Period
m	s.
m	s.
m	s.
m	s.

Angle: ___ $^{\circ}$ Mass ___ kg.

Pendulum Lab:

Be sure to have units in all your measurements!

Once you finish collecting your data raise your hand and have Mr. Gilliland stamp your paper.

Take out a sheet of paper and answer the 4 conclusion questions at the bottom of the lab handout.

Answers must be in complete sentences and in ink

Lab is due tomorrow (Xerox sheet & answers stapled to back).

