Experiments in Physics
SPH4C

The Question that prompts an experiment should question the _____ between variables. It should be <u>specific</u>.

For example:

NO: “What affects the period of a pendulum?”

YES: _____

YES: _____

The Hypothesis or Prediction should then state the believed relationship between the variables in the question.

Hypothesis: If _____,

then _____.

A **variable** is _____.

Most experiments change only two:

the **independent variable**, which is the one changed _____

the dependent variable, which is the one for which the experimenter measures _____

For, “What effect does the mass of a pendulum have on the period of the pendulum?”

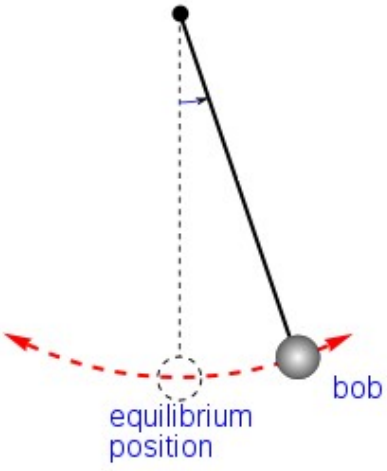
What is the independent variable? _____

What is the dependent variable? _____

All other variables are _____ and are known

as _____ because they do not change.

What would need to be kept the same each time when measuring the period of the pendulum?



It is not possible to conduct a _____ experiment without experimental _____.

These errors are _____;

a better term for them might be **experimental** _____, which may be due to

either the _____ (instrumental uncertainties)

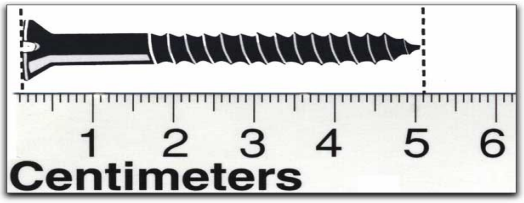
or _____ (procedural uncertainties).

Instrumental uncertainty: in the case of an instrument with divisions marked on it, the

uncertainty is _____ of a division if the divisions are _____ and

_____ of a division if there is _____ between the divisions to allow an accurate estimate.

Practice: Determine the length of the screw in the diagram at right, including an estimate of experimental uncertainty.



For digital readouts, the uncertainty is provided by _____.

Procedural uncertainty varies with the details of the procedure and must be estimated by:

_____.

For example, if a 30-cm ruler were used to measure the length of a field by lifting with ruler and placing it back down repeatedly, an uncertainty associated with the repositioning of the ruler is introduced and may be estimated by the experimenter at _____.

_____ falls into this category. Even though a stop watch can indicate hundredths of a second, human reflexes are good to only _____.

In cases where a comparison is made between an experimental value and an _____ value, the **percent error** should be calculated:

percent error =

Example: The speed of sound in air was determined to be 334. The accepted value for the speed of sound at that temperature is 344 m/s. What was the percent error?

More Practice

Match each term to its definition at right.

____ variable	A. something for which the experimenter measures the response
____ independent variable	B. a limitation on the accuracy and precision of a measurement
____ dependent variable	C. things in an experiment that are kept constant
____ controlled variable	D. something changed by the experimenter
____ experimental uncertainty	E. anything in an experiment that may be changed

1. Write a correctly worded hypothesis in response to each of the following Questions.

   (a) "What effect does the mass of an object have on the frictional force that exists between the object and a surface?"

   If _____,

   then _____.

   (b) "How does the time it takes an object to fall change as the height from which the object is dropped changes?"

   If _____,

   then _____.

   (c) "What happens to the current through a circuit when the resistance of the circuit is changed?"

   If _____,

   then _____.

2. For each of the Questions above, identify the independent and dependent variables and three variables that would have to be kept constant.

   (a) Independent: _____ Dependent: _____

   Constants: _____

   (b) Independent: _____ Dependent: _____

   Constants: _____

   (c) Independent: _____ Dependent: _____

   Constants: _____