Nature of Science

Name_____

Bubble Tube Hypotheses

SAFETY: Use care handling the tubes; they will break!

Purpose: To practice making hypotheses using *If…, Then… statements*.

Background Information: Sometimes scientists use a ***HYPOTHESIS*** to help guide an experimental investigation. *A hypothesis is an educated guess about the relationship between the independent and dependent variable*. A hypothesis is testable; an experimental investigation can be done based on the hypothesis. This is frequently called a ***RESEARACH HYPOTHESIS*** or an ***ALTERNATIVE HYPOTHESIS***.

In professional investigations, scientists often use a ***NULL HYPOTHESIS***. *A null hypothesis is a statement that the independent variable will have **no** effect on the dependent variable in an experiment*. It is used in statistics to determine ***SIGNIFICANCE***. Significance refers to the probability that the observed results (data) was a result of the independent variable and not chance.

A research hypothesis is true if the null hypothesis is false.

One way to write a hypothesis is to use an "If…, Then…." statement. An If, Then statement shows cause and effect. In other words, what effect does the independent variable have on the dependent variable? Or what does the independent variable cause the dependent variable to do?

Write a research hypothesis using this format:
IF the *independent variable* changes, **THEN** the *dependent variable* will change.

Write a null hypothesis using this format:
IF the *independent variable* changes, **THEN** there will be no change in the *dependent variable*.

Of course, in a real hypothesis, you will state the actual variables and describe the type of changes you expect.

Materials:

Set of 3 tubes	Meter stick	Stopwatch

Procedure:

1. Work with your partner
2. Pick one of the experimental questions and re-write it if necessary, using the word **affect** or **effect**.
   For example: Does the color of the liquid ***affect*** the speed at which the bubble moves?
   Or: What is the ***effect*** of the color of the liquid on the speed of the bubble in the tube?

   AFFECT – verb – to act upon, to change or to cause a change

   EFFECT – noun – result; consequence

   When you *affect* something, you produce an *effect* on it.

3. After you have written your question, write a hypothesis using an If,…Then… statement.

Question:

_____

_____

Research Hypothesis:

If

_____

_____

then

_____

_____

Null Hypothesis:

If

_____

_____

then

_____

_____