

THE NATURE OF SCIENCE – EXPERIMENTAL DESIGN

Lab design tips from CVHS Oregon

Examples by Bauck and <http://www.accessexcellence.org/LC/TL/filson/writhypo.php>

If a question asks for **lab design**, include the following:

- a. Your **hypothesis** and/or predictions and expected results
- b. The **independent variable** - what treatments will you apply
- c. The **dependent variable** - what will you measure (it changes as a result of the manipulation of the independent variable)
- d. The **variables to be controlled** (important)
- e. Identify the **experimental group** and the **control group**
- f. The **organisms/materials/apparatus to be used**
- g. Describe what you will **actually do**
- h. Describe how you will actually **take and record data**
- i. Describe how the data will be **graphed and analyzed**
- j. State how you will draw a **conclusion** (compare results to hypothesis and predictions)

Note: Your experimental design **needs to be at least theoretically possible** and it is very important that your conclusions/predictions be consistent with the principles involved and with the way you set up the experiment.

Questions #1-5:

For each hypothesis, identify the **independent variable** and **dependent variable**.

Choose two questions from #1-5 and set up a detailed experiment for each (see box above) to test each hypothesis.

- 1) If you eat breakfast instead of skipping breakfast, you may have more energy throughout the day.
- 2) If I give my gerbils bottled water instead of tap water, then their fur may be smoother and shinier.
- 3) If a teacher washes the tops of the student desks with rubbing alcohol daily, the spread of germs in the classroom may be diminished.
- 4) If excessive chocolate is consumed, pimples may be caused.
- 5) If a person increases the size of their hand weights used in a workout, their muscles will grow larger.

Questions # 6-10:

Rewrite the following hypotheses as if-then statements.

- 6) Salt in soil may affect plant growth.
- 7) Plant growth may be affected by the color of the light.
- 8) Bacterial growth may be affected by temperature.
- 9) Ultra-violet light may cause skin cancer.
- 10) Temperature may cause leaves to change color.

Questions #11-15:

Write five original if-then hypotheses of your own. They can be about a variety of topics.