Name _____

Step 2: Collect Information (Part 1)

After choosing a topic to investigate and writing a testable research question, it's time to find information about your topic. However, some topics are very broad. You must narrow your topic enough to focus on the most important parts relating to your experiment and research only those parts.

The most important parts of your experiment are the variables. **Variables are all the factors that can change in an experiment, possibly affecting the results.** It's important that you test only one variable at a time; this way, you can be sure it's the one thing that caused the results.

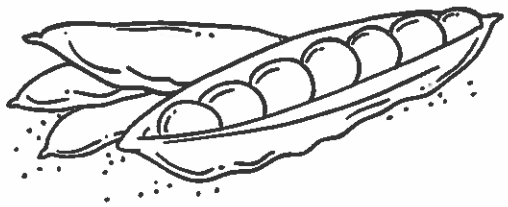
In any scientific investigation, there are three kinds of variables:

1. The Independent (or manipulated) Variable is the ONE factor or condition that is intentionally changed by the experimenter.
2. The Dependent (or responding) Variable is the factor or condition that may be affected as a result of changing the independent variable. The dependent variable is what you measure or observe to obtain your results.
3. The Constant Variables are all the factors or conditions that must be kept the same in an experiment.

Imagine that you are investigating this research question: *Will M&M color dissolve faster in water or in another clear liquid?* The three types of variables in the experiment are identified below.

Independent Variable (IV): Type of clear liquid
Dependent Variable (DV): Time it takes for color to dissolve
Constant Variables (CV): Color of M&M, amount of liquid, type of M&M (e.g., plain, peanut), time at which M&M's are dropped into liquid, etc.

Read each research question below. Identify the IV, DV, and CV of each experiment.



1. What amount of sunlight makes pea plants grow tallest?

   IV: _____

   DV: _____

   CV: _____

2. Which type of soda has more sugar: Brand X, Brand Y, or Brand Z?

   IV: _____ DV: _____

   CV: _____

3. Is the height of a ball's bounce affected by the height from which the ball is dropped?

   IV: _____ DV: _____

   CV: _____

4. Which battery will last the longest: Superlast or Energy Star?

   IV: _____ DV: _____

   CV: _____

5. Is the water temperature of Lake Michigan affected by the depth of the water?

   IV: _____ DV: _____

   CV: _____

Name _____

Step 2: Collect Information (Part 2)

Write IV, DV, or CV in the blank after each description below to identify which type of variable is described.

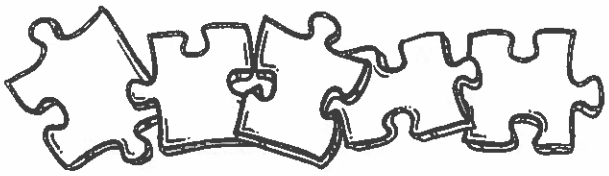
IV = Independent Variable	DV = Dependent Variable	CV = Constant Variable

1. The factors that are kept the same in an experiment. _____
2. This is also known as the responding variable. _____
3. This is the one thing that is changed by the experimenter. _____
4. This is also called the manipulated variable. _____
5. This is the factor that is affected as a result of changing the manipulated variable. _____
6. This variable must be measurable to obtain results. _____
7. There may be many of this type of variable in an experiment. _____

Carefully read each of the experiments below. Then examine the independent variable (IV), dependent variable (DV), and constant variables (CV) that are listed. ONE of these variables is incorrect. Identify which variable is incorrect AND write the correct description of that variable on the line provided. Be careful! Only ONE variable is wrong in each experiment!

8. Two groups of students were timed to compare how fast they could complete a set of math problems. Each group was given the same problems. One group used calculators. The other group did not use calculators.
   IV: Using or not using calculators
   DV: Amount of problems solved correctly
   CV: Same math problems
   The ____ is wrong. Here is what it should be: _____

9. Students of different ages were given the same puzzle to put together. The time it took each student to complete the puzzle was compared.
   IV: Boy or girl students
   DV: Time to complete the puzzle
   CV: Same puzzle



   The ____ is wrong. Here is what it should be: _____

10. Amy wants to find out if Retro nail polish will last longer than Viva nail polish. She put one coat of Viva on the nails on her left hand and one coat of Retro on the nails on her right hand.
    IV: Brand of nail polish
    DV: Time the nail polish lasts
    CV: Which hand she puts the nail polish on
    The ____ is wrong. Here is what it should be: _____

11. Jason thinks that a heavier paper airplane will fly farther. He is adding small paper clips to his paper airplane to decide what amount of weight makes the airplane fly the farthest.
    IV: Type of paper airplane
    DV: Distance the airplane flies
    CV: Size of paper clips
    The _____ is wrong. Here is what it should be: _____