

# Variables

Details also help to control variables in your experiment. Before you can begin writing the procedure, you need to decide on your independent variable. There are three types of variables to consider:

## Independent Variable

The independent variable is the one that YOU choose to help you answer your question. A well designed experiment has only one independent variable. That means you can only change one condition in each experiment. This type of variable is something that you do differently in each trial (i.e. the type of liquid you give each plant changes, the weight of the ball you throw is different each time). Nothing else should change but this one variable.

## Controlled Variables

These are all the materials, measurements, and methods that you want to stay exactly the same so that the only thing responsible for change is the independent variable you chose. Every experiment has many controlled variables. These variables should be exactly the same for every trial (i.e. the type of plant used should be exactly the same; the target for the ball is always the same distance away).

## Dependent Variable

The dependent variable is the thing that changes as a result of your independent variable, or the one thing that you intentionally changed. This is like cause and effect. What happened (the dependent variable) because of what you changed (independent variable)?

If there's more than one independent variable, the experiment becomes flawed because you can't be sure what caused the changes you observed. It can be hard to figure out what other conditions must stay the same, but it is important to think it through before you start your experiment.

## **Activity #1: Start Thinking!**

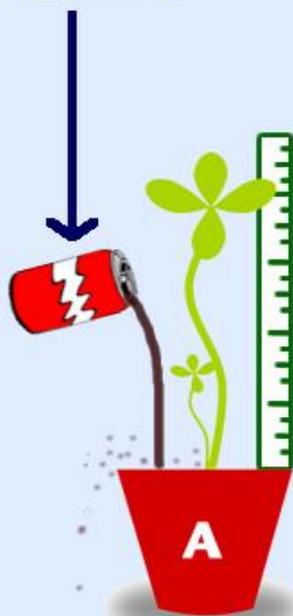
# Types of Variables

## Independent

The one thing you change.  
Limit to only one in an experiment.

**Example:**  
The liquid used to water each plant.

## Independent Variable



## Dependent

The change that happens because of the independent variable.

**Example:**  
The height or health of the plant.

## Dependent Variable



## Controlled

Everything you want to remain constant and unchanging.

**Example:**  
Type of plant used, pot size, amount of liquid, soil type, etc.

## Controlled Variables



Look at the image to the right. This is Paul's experiment, asking which liquid will help plants grow tallest. The student hypothesized that the plant given soda will grow tallest because plants need  $\text{CO}_2$ , and soda has plenty of that! There are many things this student needs to consider so that the liquid type is the only thing that can affect the growth of the plant.

Take some time to think about how this student might write the procedure for this experiment:

- What are the controlled variables?
- What details can the student include to make sure these variables are controlled throughout the experiment?
- What is the dependent variable?
- How can the student measure change?
- What might this student's procedure look like?

Did you think about it? Do you think you know what all the variables are? [Click here](#) to see if you found all of them.