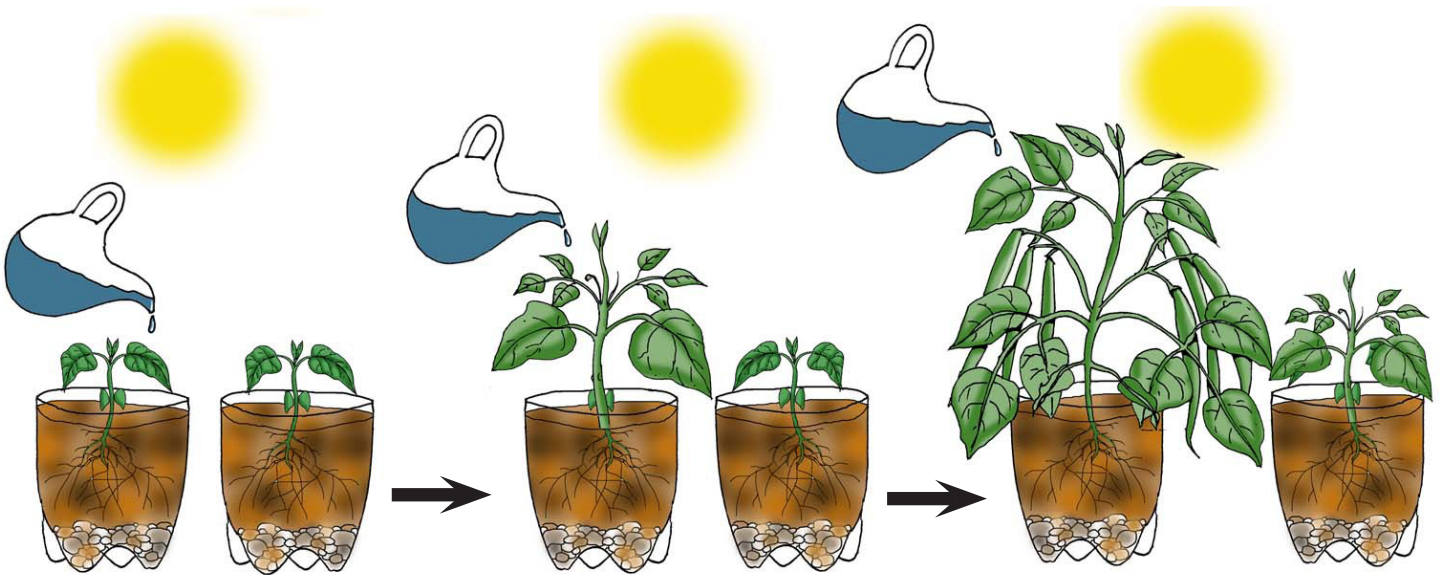


## Experiment Design - Independent, Dependent, and Controlled Variables

Scientific experiments are meant to show **cause and effect** of a phenomena (relationships in nature). The “**variables**” are any factor, trait, or condition that can be changed in the experiment and that can have an effect on the outcome of the experiment. An experiment can have three kinds of variables: **independent, dependent, and controlled**. The **independent variable** is one single factor that is changed by the scientist followed by observation to watch for changes. It is important that there is just one independent variable, so that results are not confusing. The **dependent variable** is the factor that changes as a result of the change to the independent variable. The **controlled variables** (or **constant variables**) are factors that the scientist wants to remain constant if the experiment is to show accurate results. To be able to measure results, each of the variables must be able to be measured.

For example, let’s design an experiment with two plants sitting in the sun side by side. The **controlled variables** (or constants) are that at the beginning of the experiment, the plants are the same size, get the same amount of sunlight, experience the same ambient temperature and are in the same amount and consistency of soil (the weight of the soil and container should be measured before the plants are added). The **independent variable** is that one plant is getting watered (1 cup of water) every day and one plant is getting watered (1 cup of water) once a week. The **dependent variables** are the changes in the two plants that the scientist observes over time.



*Can you describe the dependent variable that may result from this experiment?*

After four weeks, the dependent variable may be that one plant is taller, heavier and more developed than the other. These results can be recorded and graphed by measuring and comparing both plants’ height, weight (removing the weight of the soil and container recorded beforehand) and a comparison of observable foliage.

### Using What You Learned:

Design another experiment using the two plants, but change the independent variable. Can you describe the dependent variable that may result from this new experiment?

Think of another simple experiment and name the **independent, dependent, and controlled** variables.

**Experiment Name:**

**Controlled Variables:**

**Independent Variable:**

**Dependent Variables:**