



Variables, Constants, and Controls

When it comes to conducting a scientific experiment there are three components that are very important. They are variables, constants, and controls. Let's take a look at each:

- Variables – These are the aspects of the experiment that change. There are two types of variables: dependent and independent.
 - Dependent Variables – These are the variables that will change as a result of your tests. You will not be changing these but you will be keeping track of them as they will often times indicate the results you are looking for.
 - Independent Variables – These are the variables that YOU will change in your experiment. You should try to have only one independent variable at a time in your tests so you know for certain that the results you are seeing are caused by the one change you made.
- Constants – These are the conditions that will remain the same during your experiment. It's important to note what stayed the same in your experiment so you know that the results you are seeing are not caused by these factors.
- Controls – Many times people confuse “controls” and “constants.” This is for several reasons: they both start with the letter “c” and they both deal with something staying the same. But in the case of a control, this is a group that you are exposing to “normal” conditions. In your experimental group you are changing an independent variable, but in the control group you are making no such change. That way you can compare your experimental group and control group and know that the results you are seeing are actually caused by the change in the independent variable. If you didn't have a control group you might think that something changed because of the independent variable when in fact it was just because of other factors you hadn't even noticed that were affecting everything.

Just so you remember: variables and constants are part of your experimental group (the group on which you are testing). And the control is a separate group that is not being tested on but is still being observed. If you see the same changes in your experimental and control groups it means that the changes were not a result of your independent variable.



Variables, Constants, and Controls Worksheet

Read the given scenarios below. Identify each required component.

Scenario 1:

A student is studying how far room temperature water would squirt out of a plastic milk carton when 4mm holes are punched at different heights from the bottom of the container.

Independent variable: _____

Dependent variable: _____

Constants: _____

Scenario 2:

A student is studying how long it takes a cat to react to different sounds played at the same volume each time.

Independent variable: _____

Dependent variable: _____

Constants: _____

Scenario 3:

A student is trying to find out which type of fertilizer is the best for getting a plant to grow as tall as possible. She is planning to keep all of the plants she is testing indoors, on the window sill of her classroom.

Independent variable: _____

Dependent variable: _____

Constants: _____

What could the student use as a control for this experiment? _____



Scenario 4:

A student wanted to find out if different mixtures would result in an ice cube floating at a different height than only using water. He created solutions of salt water, sugar water, and water with potassium added to it. He used an ice cube tray to create ice cubes that were all the same volume and mass.

Independent variable: _____

Dependent variable: _____

Constants: _____

What could the student use as a control for this experiment? _____



Variables, Constants, and Controls Worksheet

Read the given scenarios below. Identify each required component.

Scenario 1:

A student is studying how far room temperature water would squirt out of a plastic milk carton when 4mm holes are punched at different heights from the bottom of the container.

Independent variable: HEIGHT OF HOLE

Dependent variable: DISTANCE OF WATER

Constants: TEMP. OF WATER, MILK CARTON, SIZE OF HOLES

Scenario 2:

A student is studying how long it takes a cat to react to different sounds played at the same volume each time.

Independent variable: TYPES OF SOUNDS

Dependent variable: REACTION TIME

Constants: CAT, VOLUME OF SOUND

Scenario 3:

A student is trying to find out which type of fertilizer is the best for getting a plant to grow as tall as possible. She is planning to keep all of the plants she is testing indoors, on the window sill of her classroom.

Independent variable: TYPE OF FERTILIZER

Dependent variable: HEIGHT OF PLANT

Constants: LOCATION, TEMPERATURE, SUN, WATER, POTS, RULER

What could the student use as a control for this experiment? A PLANT WITH NO FERTILIZER



Scenario 4:

A student wanted to find out if different mixtures would result in an ice cube floating at a different height than only using water. He created solutions of salt water, sugar water, and water with potassium added to it. He used an ice cube tray to create ice cubes that were all the same volume and mass.

Independent variable: HEIGHT OF FLOATING CUBE

Dependent variable: TYPE OF SOLUTION

Constants: ICE CUBES, GLASSES, LOCATION OF MEASUREMENTS, RULER

What could the student use as a control for this experiment? AN ICE CUBE IN A GLASS OF PLAIN WATER