



**variable:** something that changes or can change

**independent variable:** a variable that you change during an experiment

**dependent variable:** a variable you observe and measure to see how it changes but one you do not alter directly

## Mars Rover Model Celebration – Lesson Plan

### Introduction:

One of the new vocabulary words for this unit is “variable”. A variable is “something that changes or can change”. In science, there are two kinds of variables we talk about during experiments: independent variables and dependent variables. It is very easy to remember the difference between the two. Think of the independent variable as the one that you are changing. By contrast, the dependent variable is the change that happens after you alter the independent variable. You do not change it directly (the independent variable does that) but you can observe any change that occurs and measure it.

Let’s look at some pictures that will help us understand these different meanings of “variable”. The weather at the beach at the top of the page is VARIABLE. A storm is about to bring rain to the beach. In the bottom picture, you see an experiment in progress. The students are adding a clear liquid to the container with a chemical. The liquid they are adding is the variable they control, the INDEPENDENT variable. The students determine how much of the liquid to add. You can also see a white smoke or mist coming out of the other side of the container. The mist is a result of the chemical reaction between the chemical in the container and the liquid that the students added. The students did not change the mist in any way but they can observe and measure it. This is the DEPENDENT variable.

### Example:

Do you remember when we discussed selecting missions? When I was explaining that to you, I gave you an example about Saturn in which I decided to find out whether an object could orbit Saturn outside the rings. The experiment would be to use a satellite to pull a rock away from the rings and see what happened to it. In this experiment, my INDEPENDENT variable is pulling the rock outside the ring. This is what I am changing. The DEPENDENT variable is what will happen to the rock once I release it in the new orbit. The rock might orbit Saturn. Saturn’s gravity might pull the rock into the planet or it might pull it back into the ring. Whatever happens to the rock will be the DEPENDENT variable.

### Reflection:

I am going to read some sentences. If what I am describing is the variable YOU can change and we control this part of the experiment, I want you to flex your muscle (*demonstrate this for students*) and say INDEPENDENT VARIABLE. If we do not control the variable, but we can only observe it, pretend to hold a magnifying glass like you are observing (*demonstrate this for students*) and say DEPENDENT VARIABLE.

- A student adds fertilizer to one of several plants on his desk. (independent variable)
- Students measure how tall plants get in different parts of a room. (dependent variable)
- A student puts bricks in the center of a popsicle stick bridge. (independent variable)
- The popsicle stick bridge collapses when the third brick is added. (dependent variable)

### Make it personal:

## **Mars Rover Model Celebration – Lesson Plan**

Think about your Mars Rover project. What are your independent and dependent variables? Share your thinking with your neighbor. Be sure to use the terms “independent and dependent variables”. Then I will ask some of you to share your ideas.