Know Your Scientific Vocabulary - The Difference Between a Variable and a Trial

This does not apply to *Engineering, Math, Computer,* or *Robotics and Intelligent Machine projects*.

This is a big one! It's the most common confusion we see in finished traditional science projects! Confusing *variables* and *trials* is the most common disqualification from competition.

INDEPENDENT VARIABLES are the different ways you test. For example, if you are testing the effects of different fertilizers on plants, you could test with a **control group** (only water, no fertilizer) and four different fertilizers. This means there are five **INDEPENDENT VARIABLES**. When presenting, you would say that the **INDEPENDENT VARIABLE** is the type of fertilizer and the **DEPENDENT VARIABLE** is the growth of the plants that results. The **DEPENDENT VARIABLE** *DEPENDS* on the Independent Variable). ***These five variables are NOT the number of trials!***

TRIALS are best defined as the number of times you test EACH INDEPENDENT variable. Your handbook states the number of trials required. If the handbook requires three trials, this would mean that there would be a minimum of FIFTEEN plants grown for the experiment above - three plants tested (trials) for each **INDEPENDENT VARIABLE**.

Be sure that you are recording EVERYTHING in your logbook, as you conduct the experiment. You probably will want to create an easy-to-read table where you can record your data over time. The table below is an example of recorded data - at the end of the experiment.

Recorded Measure 3 - Growth Measured at the End of the Experiment

Variable ⬇	Trial 1 (Plant 1 of 3)	Trial 2 (Plant 2 of 3)	Trial 3 (Plant 3 of 3)
Control Group - Water	(Plant 1) - 15 cm	(Plant 2) - 14 cm	(Plant 3) - 13 cm
Fertilizer A	(Plant 4) - 17 cm	(Plant 5) - 18 cm	(Plant 6) - 17.5 cm
Fertilizer B	(Plant 7) - 22 cm	(Plant 8) - 21 cm	(Plant 9) - 23 cm
Fertilizer C	(Plant 10) - 14 cm	(Plant 11) - 16 cm	(Plant 12) - 15 cm
Fertilizer D	(Plant 13) - 29 cm	(Plant 14) - 28 cm	(Plant 15) - 30 cm

A **CONTROL GROUP** is a test group that has no changes from what is normal.
CONTROLLED VARIABLES are factors that are kept the same for every test or measurement in order to make sure that the results can be compared fairly. When you are asked how you CONTROLLED other VARIABLES in this experiment, you would likely say that you grew the same type of plant; you applied the same amount of liquid to each plant; the plants had the same amount of sunlight; no rain watered the plants; the same person measured the plants; all plants in each trial were grown at the same time; etc.
Be sure you know the difference between a *Control Group* and *Controlled Variables,* too.