

Scientific Method: Identifying Variables and Constants

For an experiment to be **controlled**, it must have constants and one independent variable. It must also have a **control group** and an **experimental group**.

Vocabulary Word	Meaning	How can I remember this?
Constant	<i>The variables are not changed in an experiment.</i>	
Independent Variable	<i>The variable that is changed in the experiment. This variable is being tested.</i>	
Dependent Variable	<i>The variable that changes as a result of change in the independent variable. This is what you are observing.</i>	
Control Group	<i>Only one condition is being changed at a time.</i>	
Experimental Group	<i>The test group. All conditions are the same except for the single condition being tested.</i>	

Example:

An electromagnet will pick up more nails if more batteries are put in the circuit.

The number of batteries can be changed to determine its effect on the electromagnet.

- **Independent Variable**-number of batteries in a circuit

Why? _____

- **Dependent Variable**-number of nails the electromagnet picks up

Why? _____

- **Constants**-type of battery, size and amount of wire, type of connection, type of circuit, size and type of paper clips, procedure for picking up the clips

Why? _____

- **Control**—number of nails picked up with 1 battery

- **Why?** _____

Practice:

1. What is the effect of the amount of salt on the height an egg floats?

a. **Constants-**

b. **Control—**

2. What is the effect different liquids have on an object floating in liquid? The liquids used are corn oil, milk, soda pop, water, orange juice, and tomato juice.

a. **Constants-**

b. **Control—**

Let's add on:

1. Apple trees that receive the most water will produce the largest apples.

The amount of water can be changed to determine its effect on the size of the apples grown.

a. **Independent Variable-**

b. **Dependent Variable-**

c. **Constants-**

2. Students will score better on spelling tests by increasing the number of minutes each student studies.

The amount of time can be changed to determine its effect on the spelling scores.

a. **Independent Variable-**

b. **Dependent Variable-**

c. **Constants-**age of student, gender of student, time of test, test giver, study method

d. **Control—**

Experimental Design Practice - Skateboarding

A student goes skateboarding a few times a week. The student notices that she can go faster while skating on some level surfaces than on others. She hypothesizes that speed has something to do with the surface she is skating on. The student wants to design an experiment to test this hypothesis.

a. Identify the independent (changed) variable in the experiment.

b. Identify the dependent (responding) variable in the experiment.

c. Identify two factors that will need to be held constant in the experiment.



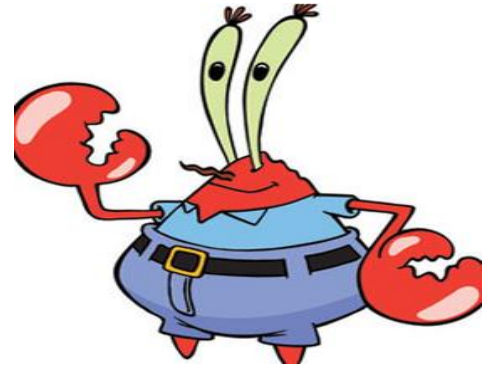
(1) _____

(2) _____

Station 1

GROUP MEMBERS:

Krusty Krab's Breath Mints



Mr. Krabs created a secret ingredient for a breath mint that he thinks will “cure” the bad breath people get from eating crabby patties at the Krusty Krab. He asked 100 customers with a history of bad breath to try his new breath mint. He had **50 customers (group A)** eat a breath mint **with the secret ingredient** after they finished eating a crabby patty. The other 50 **customers (Group B)** also received a breath mint after they finished the sandwich; however, it **was just a regular breath mint and did not have the secret ingredient**. Both groups were told that they were getting the breath mint that would cure bad breath. Two hours after eating the crabby patties, 30 customers in Group A and 10 customers in Group B reported having better breath than they normally had after eating crabby patties.

1. Which set of people are in the control group?

2. Which set of people are in the experimental group?

3. Explain how you were able to distinguish between the control and experimental groups.

4. What is the independent variable? (What is being tested?)

5. What is the dependent variable? (What is being measured?)

6. Explain why there must be a control group in this experiment.

STATION 2

GROUP MEMBERS: _____

Homer Simpson and the Shower Slime

Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to check this claim out by **spraying half of his shower with the coconut juice**. He sprays **the other half of his shower with plain water**. After 3 days of “treatment” there **is no change in appearance of the green slime on either side of the shower**.



1. What is the independent variable in this experiment (What is being tested)? Support your answer with evidence from the text.

2. What is the dependent variable in this experiment (What is being measured)? Support your answer with evidence from the text.

3. Explain why Homer only used the coconut juice on one half of his shower.

4. What should Homer’s conclusion be? Support your answer.

STATION 3

GROUP MEMBERS: _____

Mr. Burns and his Special Juice

Mr. Burns thinks that a special juice will increase productivity of workers. He creates 2 groups of 50 workers and assigns each group the same task (in this case they are to staple a set of papers). **Group A is given the special juice to drink while Group B is not given the special juice.** After an hour, Mr. Burns counts how many stacks of papers each group has made. **Group A made 1,587 stacks while Group B made 2,113 stacks.**



1. What is the independent variable in this experiment (What is being tested)? Support your answer with evidence from the text.

2. What is the dependent variable in this experiment (What is being measured)? Support your answer with evidence from the text.

3. Identify the control group in this experiment. Justify your answer.

4. What should Mr. Burn's conclusion be? Justify your answer.
