IDENTIFYING THE COMPONENTS OF THE SCIENTIFIC METHOD **Name _____**

For each item below, specify the independent and dependent variables, as well as the constants.

1. A study was done to find if different tire treads affect the braking distance of a car.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

2. The time it takes to run a mile depends on the person's running speed.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

3. The height of bean plants depends on the amount of water they receive.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

4. The higher the temperature of the air in the oven, the faster a cake will bake.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

5. Lemon trees receiving the most water produced the most lemons.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

6. An investigation found that more bushels of potatoes were produced when the soil as fertilized more.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

7. Students measured the temperature of the water at different depths in Lake Skywalker and found that the temperature varied.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

8. The amount of pollution produced by cars was measured for cars using gasoline containing different amounts of lead.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

9. Four groups of rats are first massed and then fed identical diets except for the amount of vitamin A they receive. Each group gets a different amount. After 3 weeks on the diet, the rats' masses are measured again to see if there has been a decrease.

Independent variable: _____ Dependent variable: _____ Constant factor(s): _____

For each experiment below, specify the independent variable, dependent variable, control group, and any constants.

1. A student wanted to test how the mass of a paper airplane affected the distance it would fly. Paper clips were added before each test flight. As each paper clip was added, the plane was tested to determine how far it would fly.

   Independent variable: _____

   Dependent variable: _____

   Control group: _____

   Constant factors: _____

2. Two groups of students were tested to compare their speed working math problems. Each group was given the same problems. One group used calculators and the other group computed without calculators.

   Independent variable: _____

   Dependent variable: _____

   Control group: _____

   Constant factors: _____

3. Students of different ages were given the same puzzle to assemble. The puzzle assembly time was measured.

   Independent variable: _____

   Dependent variable: _____

   Control group: _____

   Constant factors: _____

There can be several controlled variables. If an experiment is to be useful, only one variable at a time can be manipulated intentionally. All other variables must be controlled throughout all parts of the experiment. If more than one variable is altered (changed), the results of an experiment cannot be interpreted with any validity.

4. An experiment was performed to determine how the amount of coffee grounds could affect the taste of coffee. The same kind of coffee, the same percolator, the same amount and type of water, the same perking time, and the same electrical sources were used.

   Independent variable: _____

   Dependent variable: _____

   Control group: _____

   Constant factors: _____

SpongeBob and his Bikini Bottom pals have been busy doing a little research. Read the description for each experiment and answer the questions.

1 – Patty Power

Mr. Krabs wants to make Bikini Bottoms a nicer place to live. He has created a new sauce that he thinks will reduce the production of body gas associated with eating crabby patties from the Krusty Crab. He recruits 100 customers with a history of gas problems. He has 50 of them (Group A) eat crabby patties with the new sauce. The other 50 (Group B) eat crabby patties with sauce that looks just like the new sauce but is really just a mixture of mayonnaise and food coloring. Both groups were told that they were getting the sauce that would reduce gas production. Two hours after eating the crabby patties, 30 customers in Group A reported having fewer gas problems and 8 customers in Group B reported having fewer gas problems.

Which people are in the control group?

What is the independent variable?

What is the dependent variable?

What should Mr. Krabs' conclusion be?

Why do you think 8 people in Group B reported feeling better?

2 – Slimotosis

SpongeBob notices that his pal Gary is suffering from slimotosis, which occurs when the shell develops a nasty slime and gives off a horrible odor. His friend Patrick tells him that rubbing seaweed on the shell is the perfect cure, while Sandy says that drinking Dr. Kelp will be a better cure. SpongeBob decides to test this cure by rubbing Gary with seaweed for 1 week and having him drink Dr. Kelp. After a week of treatment, the slime is gone and Gary's shell smells better.

What was the initial observation?

What is the independent variable?

What is the dependent variable?

What should SpongeBob's conclusion be?

3 – Marshmallow Muscles

Larry was told that a certain muscle cream was the newest, best thing on the market and claims to double a person's muscle power when used as part of a muscle-building workout. Interested in this product, he buys the special muscle cream and recruits Patrick and SpongeBob to help him with an experiment. Larry develops a special marshmallow weight-lifting program for Patrick and SpongeBob. He meets with them once every day for a period of 2 weeks and keeps track of their results. Before each session Patrick's arms and back are lathered in the muscle cream, while SpongeBob's arms and back are lathered with the regular lotion.

Which person is in the control group?

What is the independent variable?

What is the dependent variable?

Time	Patrick	SpongeBob
Initial amount	18	5
After 1 week	24	9
After 2 weeks	33	17

What should Larry's conclusion be?

4 – Microwave Miracle

Patrick believes that fish that eat food exposed to microwaves will become smarter and would be able to swim through a maze faster. He decides to perform an experiment by placing fish food in a microwave for 20 seconds. He has the fish swim through a maze and records the time it takes for each one to make it to the end. He feeds the special food to 10 fish and gives regular food to 10 others. After 1 week, he has the fish swim through the maze again and records the times for each.

What was Patrick's hypothesis?

Which fish are in the control group?

What is the independent variable?

What is the dependent variable?

Special food group			Regular food group		
Fish	Before	After	Fish	Before	After
1	1:06	1:00	1	1:00	1:06
2	1:54	1:29	2	1:46	1:30
3	2:04	1:57	3	2:06	2:05
4	2:15	2:20	4	1:30	1:23
5	1:27	1:20	5	1:26	1:24
6	1:45	1:40	6	2:09	2:00
7	1:00	1:15	7	1:25	1:19
8	1:25	1:24	8	1:00	1:15
9	1:09	1:00	9	2:04	1:57
10	2:00	1:43	10	1:34	1:30

Look at the results in the charts. What should Patrick's conclusion be?

Identify the controls and variables

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

Control group:

Independent variable:

Dependent variable:

What should Smithers' conclusion be?

How could this experiment be improved?

 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 out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.

What was the initial observation?

Control group:

Independent variable:

Dependent variable:

What should Homer's conclusion be?


Bart believes that mice exposed to microwaves will become extra strong (maybe he's been reading too much Radioactive Man). He decides to perform this experiment by placing 10 mice in a microwave for 10 seconds. He compared these 10 mice to another 10 mice that had not been exposed. His test consisted of a heavy block of wood that blocked the mouse food. He found that 8 out of the 10 of the microwaved mice were able to push the block away. 7 out of 10 of the non-microwaved mice were able to do the same.

Control group:

Independent variable:

Dependent variable:

What should Bart's conclusion be?

How could Bart's experiment be improved?


Krusty was told that a certain itching powder was the newest, best thing on the market; it even claims to cause 50% longer-lasting itches. Interested in this product, he buys the itching powder and compares it to his usual product. One test subject (A) is sprinkled with the original itching powder, and another test subject (B) was sprinkled with the experimental itching powder. Subject A reported having itches for 30 minutes; subject B reported to have itches for 45 minutes.

Control group:

Independent variable:

Dependent variable:

Explain whether the data supports the advertisement's claims about its product:

Lisa is working on a science project. Her task is to answer the question: "Does Rogooti (which is a commercial hair product) affect the speed of hair growth?". Her family is willing to volunteer for the experiment.

Describe how Lisa would perform this experiment. Identify the control group along with the independent and dependent variables in your description.