

**Scientific Method
Controls and Variables - Part 1**

Name _____

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 Krab. 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 new sauce but is really just 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?

What are the constants?

2 - Slimotosis

Sponge Bob 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. Sponge Bob 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 Sponge Bob's conclusion be?

What are the constants?

Is there a control?

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 Sponge Bob'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?

What should Larry's conclusion be?

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

What are the constants?

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?

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

What are the constants?

Special Food Group (Time in minutes/seconds)				Regular Food Group (Time in minutes/seconds)			
Fish	Before	After	Fish	Before	After		
1	1:06	1:30	1	1:52	1:08		
2	1:04	1:20	2	1:45	1:30		
3	2:04	1:57	3	2:00	2:05		
4	2:15	2:30	4	1:30	1:23		
5	1:27	1:20	5	1:28	1:24		
6	1:45	1:40	6	2:09	2:03		
7	1:00	1:15	7	1:25	1:18		
8	1:28	1:25	8	1:50	1:15		
9	1:09	1:00	9	2:04	1:57		
10	2:00	1:43	10	1:34	1:30		

SpongeBob and his Bikini Bottom pals have continued doing a little research to solve some problems. Read the description for each experiment and answer the questions.

Krusty Krabs 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 fifty customers (Group A) eat a breath mint after they finished eating a crabby patty. The other fifty (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 their bad breath. Two hours after eating the crabby patties, thirty customers in Group A and ten customers in Group B reported having better breath than they normally had after eating crabby patties.

1. Which people are in the control group?
2. What is the independent variable?
3. What is the dependent variable?
4. What should Mr. Krabs' conclusion be?
5. Why do you think 10 people in group B reported fresher breath?

5b. What are the constants?

SpongeBob Clean Pants
SpongeBob noticed that his favorite pants were not as clean as they used to be. His friend Sandy told him that he should try using Clean-O detergent, a new brand of laundry soap she found at Sail-Mart. SpongeBob made sure to wash one pair of pants in plain water and another pair in water with the Clean-O detergent. After washing both pairs of pants a total of three times, the pants washed in the Clean-O detergent did not appear to be any cleaner than the pants washed in plain water.

6. What was the problem SpongeBob wanted to investigate?
7. What is the independent variable?
8. What is the dependent variable?
9. What should Sponge Bob's conclusion be?

9b. Is there a control?

9c. What are the constants?

Squidward's Symphony

Squidward loves playing his clarinet and believes it attracts more jellyfish than any other instrument he has played. In order to test his hypothesis, Squidward played a song in his front yard. He played the song a total of 3 times on his clarinet and repeated the experiment using a flute and a guitar. He also recorded the number of jellyfish he observed when he was not playing an instrument. The results are shown in the chart.

Number of Jellyfish/Instrument				
Trials	No. Jellyfish Observed	Flute	Guitar	Clarinet
1	5	15	5	12
2	3	10	8	18
3	1	12	9	7

10. What is the independent variable?
11. What is the dependent variable?
12. What should Squidward's conclusion be?
13. Are the results reliable? Why or why not?

13b. What are the constants?

Super Bubbles
Patrick and SpongeBob love to blow bubbles! Patrick found some Super Bubble Soap at Sail-Mart. The ads claim that Super Bubble Soap will produce bubbles that are twice as big as bubbles made with regular bubble soap. Patrick and SpongeBob made up two samples of bubble solution. One sample was made with 5 oz. of Super Bubble Soap and 5 oz. of water, while the other was made with the same amount of water and 5 oz. of regular bubble soap. Patrick and SpongeBob used their favorite bubble wand to blow 10 different bubbles and did their best to measure the diameter of each one. The results are shown in the chart.

Bubbles			
(Diameter in centimeters)			
Bubble	Super Bubble	Regular Soap	
1	15	8	10
2	10	5	6
3	12	16	16
4	18	14	14
5	22	11	11
6	15	12	12
7	18	11	11
8	19	15	15
9	18	15	15
10	12	8	8

14. What did the Super Bubble ads claim?
15. What is the independent variable?
16. What is the dependent variable?
17. Look at the results in the chart.
 - a. Calculate the average diameter for each bubble solution.

Super Bubble = _____ cm Regular Soap = _____ cm
 - b. What should their conclusion be?

18. Are the results reliable? Why or why not?

18b. What are the constants?

18c. Is there a control?