

**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. Krabbs 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?

**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?

### 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

### 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.

*Special Food Group*  
(Time in minutes/seconds)

Fish	Before	After
1	1:06	1:00
2	1:54	1:20
3	2:04	1:57
4	2:15	2:20
5	1:27	1:20
6	1:45	1:40
7	1:00	1:15
8	1:28	1:26
9	1:09	1:00
10	2:00	1:43

*Regular Food Group*  
(Time in minutes/seconds)

Fish	Before	After
1	1:09	1:08
2	1:45	1:30
3	2:00	2:05
4	1:30	1:23
5	1:28	1:24
6	2:09	2:00
7	1:25	1:19
8	1:00	1:15
9	2:04	1:57
10	1:34	1:30

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?

## Answer Key

### 1 - Patty Power

Which people are in the control group? *Group B*

What is the independent variable? *New sauce*

What is the dependent variable? *Amount of gas*

What should Mr. Krabs' conclusion be? *The new sauce appears to work as it reduced the amount of gas produced in 60% of the people tested.*

Why do you think 10 people in group B reported feeling better? *They thought they were getting the new sauce as a result thought that they didn't have as much gas. (Placebo effect)*

### 2 – Slimotosis

What was the initial observation? *Slimotosis on Gary's shell*

What is the independent variable? *Cures (Seaweed and Dr. Kelp)*

What is the dependent variable? *Slime and odor*

What should Sponge Bob's conclusion be? *Although Gary's symptoms have disappeared, it is not known which cure was the one that worked. He should redo the experiment and include a control group as well as two other testing groups for each of the proposed cures.*

### 3 – Marshmallow Muscles

Which person is in the control group? *SpongeBob*

What is the independent variable? *Muscle cream*

What is the dependent variable? *Amount of marshmallows lifted (strength)*

What should Larry's conclusion be? *Since both Patrick and SpongeBob improved their results by the end of two weeks, it does not appear that the claims for the special muscle cream are true. If the claims were correct, we should have seen Patrick's amount double, but not SpongeBob's amount. The improvements were likely a result of Larry's special workout.*

### 4 – Microwave Miracle

What was Patrick's hypothesis? *He hypothesized that feeding fish microwaved food would make them become smarter.*

Which fish are in the control group? *The fish that eat regular food*

What is the independent variable? *Microwaved food*

What is the dependent variable? *Time required to complete the maze*

Look at the results in the charts. What should Patrick's conclusion be? *According to the data, all but two fish in each group decreased their time through the maze. The special food does not appear to be a big factor in helping fish become smarter.*

*Note: Of the fish that did improve their times, the fish that were fed the special food averaged a 9.625 seconds decrease in their times compared to an average decrease of 6.625 seconds in the fish group that received the regular food. This does show a slight improvement for the microwaved food group, but not enough to prove that his hypothesis was correct. More testing would need to be done.*