
Section 1.4**Name:****Section Title: The Scientific Method****Period:**

QOD:

Activity:

Complete the attached activity in your group. **MAKE SURE EVERYONE UNDERSTAND WHAT IS GOING ON!** You are responsible for yourself and everyone else in your group.

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. Krabb's 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.

- a. Which people are in the control group?
- b. What is the independent variable?
- c. What is the dependent variable?
- d. What should Mr. Krabbs' conclusion be?
- e. 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.

- a. What was the initial observation?
- b. What is the independent variable?
- c. What is the dependent variable?
- d. 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.

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

- a. Which person is in the control group?
- b. What is the independent variable?
- c. What is the dependent variable?
- d. What should Larry's conclusion be?

Question #4 – Microwave Miracles

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

- a. What was Patrick's hypothesis?

- b. Which fish are in the control group?

- c. What is the independent variable?

- d. What is the dependent variable?

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

Question #5:

You are conducting an experiment to determine if increased ultraviolet radiation from the decrease in the ozone layer is killing off frog tadpoles. After examining all of the data available in the library, you decide to go with a hypothesis that increased ultraviolet radiation from the sun is killing off the tadpoles.

You design an experiment with a control and an experimental group. Your control group (group 1) involves 100 tadpoles in a five gallon container of water, which is covered by glass (knowing that the glass will filter out the ultraviolet radiation). The experimental group (group 2) will be set up exactly like group 1, except that instead of being covered with glass, it is covered with an acrylic plexi-glass, which will not filter out the U.V. radiation. You then place the groups outside for a period of a month, and observe the results.

	Results	
	Group 1	Group 2
Number of tadpoles started with	100	100
Number finished with	96	96

Using the information and answer the following questions.

- a. What is the independent variable and what is the dependant variable?

- b. Does the information from this experiment support the hypothesis?

- c. If no, then what might be causing the decrease in frog populations?

- d. Which is the control group, and which is the experimental group?

- e. What is the difference between the two groups? Should they be different in any other way?

EXTRA CREDIT

Niko Tinbergen (1907-1988) was a Swedish Ethologist (animal behaviorist) famous for studying animals in their native habitats. One of his classic experiments involved a bird called the black-headed gull (*Larus ridibundus*). Black-headed gulls build nests of twigs on the ground and lay light brown eggs that are covered with dark brown spots. However, the inside of the egg is white in color. Tinbergen noticed that adult gulls pick up the eggshells shortly after a chick has hatched, and fly them to a location far from the nest, where they are left. Since this behavior required expending energy and time that could have been spent feeding and protecting the chicks, Tinbergen wanted to know why the birds did this.

Problem: Why do black-headed gulls remove eggshells from the nest?

Hypothesis: The white interior of the shell is not camouflaged and attracts predators to the nest. Therefore, the gulls remove the shells to decrease predation.

Test: Tinbergen and his co-workers collected gull eggs and painted 69 of them white and left 68 of them with their natural color. (Statistically, these numbers are close enough to be considered equal.) The researchers then scattered the eggs next to a gull breeding area and observed from a nearby blind. Predation rates were recorded for white versus natural colored eggs.

Data	Original Number of Eggs	Eggs Taken by Predators	Eggs Not Taken
White Eggs	69	43	26
Natural Egg	68	13	55

- a. Do the results of this experiment support the hypothesis? Why, Why not?

- b. Are you 100% sure (without a doubt) that your hypothesis is correct? (Is it proven?)

- c. If you were working with Tinbergen, what would you suggest be done next?

- d. Identify the independent and dependent variables