

# Scientific Method

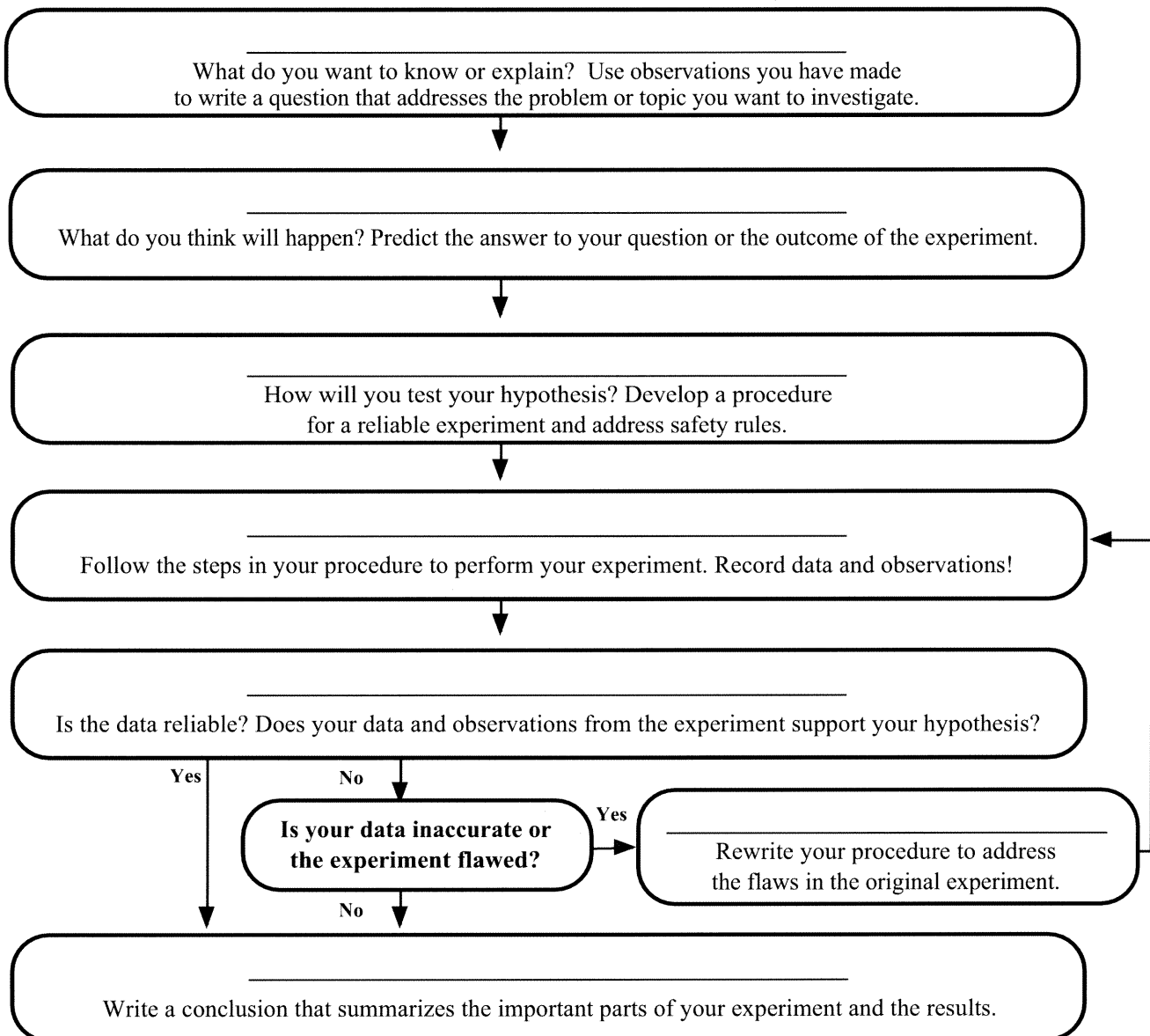
Name \_\_\_\_\_

**What is the scientific method?** It is a \_\_\_\_\_ that is used to find \_\_\_\_\_ to questions about the world around us.

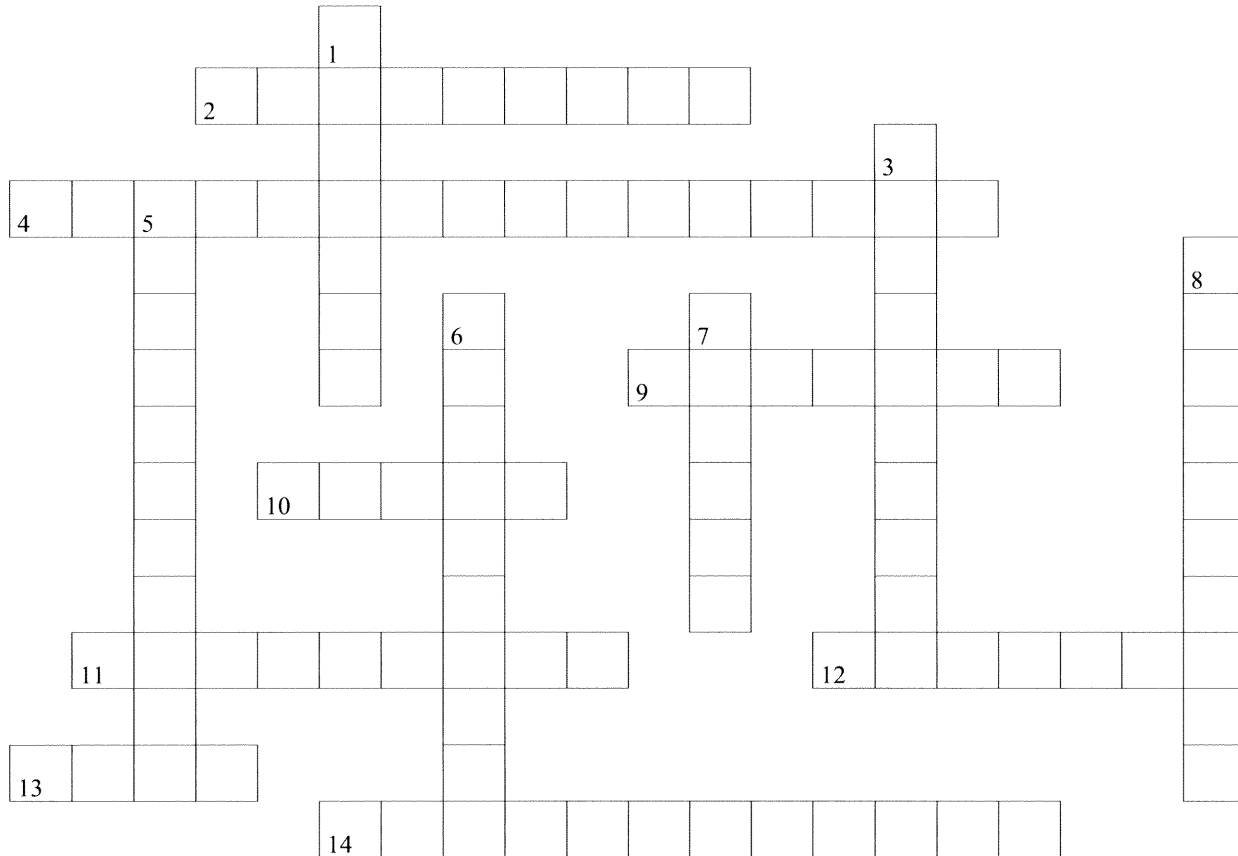
**Is there only one “scientific method”?** No, there are several versions of the scientific method. Some versions have more \_\_\_\_\_, while others may have only a few. However, they all begin with the identification of a \_\_\_\_\_ or a \_\_\_\_\_ to be answered based on observations of the world around us and provide an \_\_\_\_\_ method for conducting and analyzing an experiment.

**What is a hypothesis?** It is an \_\_\_\_\_ based on observations and your knowledge of the topic.

**What is data?** It is \_\_\_\_\_ gathered during an experiment.



Use the clues to help you fill in the puzzle.



**Clues:**

1. The ? is the part of an experiment that is not being tested and is used for comparison.
2. The ? describes the steps you use during an experiment.
3. After an experiment, scientists write a ? which summarizes their experiment and results.
4. The ? ? is a process used by scientists to find answers to questions or solve a problem.
5. The ? variable is the part of the experiment that is being tested or the part that is changed by the person doing the experiment.
6. The ? is an educated guess.
7. Scientists use their data to make charts and ? to communicate the results of an experiment.
8. After the scientist makes a hypothesis, they perform an ? to collect data.
9. The first step of the scientific method is to define or identify the ?.
10. Sometimes scientists make a mistake, or ?, and need to do an experiment again.
11. The ? variable is the part of the experiment that is affected by the independent variable.
12. After the experiment, scientists organize and ? the data.
13. The information collected during an experiment is called ?.
14. Scientists make ? to help them make a hypothesis or collect data during an experiment.

Name \_\_\_\_\_

### SCIENTIFIC METHOD

C	Y	D	E	L	B	A	I	R	A	V	S	U	E	P	S	A	I
D	H	R	A	F	O	X	L	Q	I	T	S	R	R	E	C	X	N
A	O	A	O	T	E	C	L	Y	E	N	A	O	J	Q	I	E	D
N	O	H	R	E	A	W	M	P	O	P	B	M	S	U	E	U	E
A	Q	H	T	T	H	X	S	I	M	L	N	L	E	I	N	O	P
L	M	V	J	E	S	T	T	O	E	M	O	D	L	P	T	N	E
Y	W	B	O	S	M	A	C	M	W	I	L	C	B	M	I	O	N
S	K	K	Y	Q	V	C	I	K	B	T	H	Z	A	E	S	I	D
I	P	O	V	R	G	E	I	H	E	A	O	P	I	N	T	S	E
S	J	P	E	R	C	U	Q	F	Z	A	O	Y	L	T	S	U	N
U	S	S	A	N	E	N	R	G	I	X	S	Z	E	Z	Y	L	T
X	B	P	E	N	O	Q	E	E	R	T	L	S	R	R	A	C	X
O	H	I	K	C	N	I	K	H	H	Y	N	O	E	F	H	N	A
S	C	I	N	F	E	R	E	N	C	E	K	E	R	C	R	O	I
S	S	C	Y	T	N	E	D	N	E	P	E	D	I	T	O	C	S
I	N	Q	R	S	I	S	E	H	T	O	P	Y	H	C	N	R	M
H	S	X	N	S	E	L	U	R	Y	T	E	F	A	S	S	O	P
W	J	Z	S	I	X	S	T	N	E	M	I	R	E	P	X	E	C

ANALYSIS  
CHARTS  
COMPARE  
CONCLUSION  
CONTROL  
DATA  
DEPENDENT  
EQUIPMENT  
EXPERIMENTS  
GRAPHS  
HYPOTHESIS  
INDEPENDENT  
INFERENCE  
OBSERVATIONS  
PROBLEM  
PROCESS  
RELIABLE  
SAFETY RULES  
SCIENCE  
SCIENTIFIC METHOD  
SCIENTISTS  
STEPS  
THEORY  
VARIABLE

**How many words can you make out of the letters in "Scientific Method"?**

**Scientific Method**  
**Science Safety Rules**

Name \_\_\_\_\_

**The Bikini Bottom gang has been learning safety rules during science class. Read the paragraphs below to find the broken safety rules and underline each one. How many can you find?**

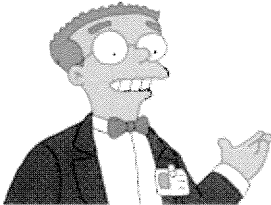

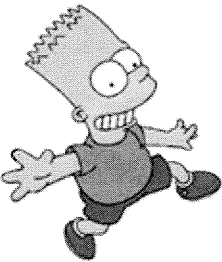
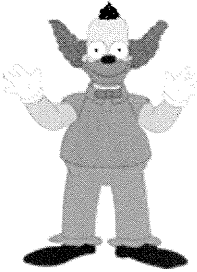
SpongeBob, Patrick, and Gary were thrilled when Mr. Krabbs gave their teacher a chemistry set! Mr. Krabbs warned them to be careful and reminded them to follow the safety rules they had learned in science class. The teacher passed out the materials and provided each person with an experiment book.

SpongeBob and Gary flipped through the book and decided to test the properties of a mystery substance. Since the teacher did not tell them to wear the safety goggles, they left them on the table. SpongeBob lit the Bunsen burner and then reached across the flame to get a test tube from Gary. In the process, he knocked over a bottle of the mystery substance and a little bit splashed on Gary. SpongeBob poured some of the substance into a test tube and began to heat it. When it started to bubble he looked into the test tube to see what was happening and pointed it towards Gary so he could see. Gary thought it smelled weird so he took a deep whiff of it. He didn't think it smelled poisonous and tasted a little bit of the substance. They were worried about running out of time, so they left the test tube and materials on the table and moved to a different station to try another experiment.

Patrick didn't want to waste any time reading the directions, so he put on some safety goggles and picked a couple different substances. He tested them with vinegar (a weak acid) to see what would happen even though he didn't have permission to experiment on his own. He noticed that one of the substances did not do anything, but the other one fizzed. He also mixed two substances together to see what would happen, but didn't notice anything. He saw SpongeBob and Gary heating something in a test tube and decided to do that test. He ran over to that station and knocked over a couple bottles that SpongeBob had left open. After cleaning up the spills, he read the directions and found the materials he needed. The only test tube he could find had a small crack in it, but he decided to use it anyway. He lit the Bunsen burner and used tongs to hold the test tube over the flame. He forgot to move his notebook away from the flame and almost caught it on fire.

Before they could do another experiment, the bell rang and they rushed to put everything away. Since they didn't have much time, Patrick didn't clean out his test tube before putting it in the cabinet. SpongeBob noticed that he had a small cut on his finger, but decided he didn't have time to tell the teacher about it. Since they were late, they skipped washing their hands and hurried to the next class.

## Identify the Controls and Variables

 <p>Smithers thinks that a special juice will increase the productivity of 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.</p>	<p>Identify the:</p> <ol style="list-style-type: none"> <li>Control Group</li> <li>Independent Variable</li> <li>Dependent Variable</li> <li>What should Smithers' conclusion be?</li> <li>How could this experiment be improved?</li> </ol>
 <p>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.</p>	<ol style="list-style-type: none"> <li>What was the initial observation?</li> </ol> <p>Identify the-</p> <ol style="list-style-type: none"> <li>Control Group</li> <li>Independent Variable</li> <li>Dependent Variable</li> <li>What should Homer's conclusion be?</li> </ol>
<p>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 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.</p>	 <p>Identify the-</p> <ol style="list-style-type: none"> <li>Control Group</li> <li>Independent Variable</li> <li>Dependent Variable</li> <li>What should Bart's conclusion be?</li> <li>How could Bart's experiment be improved?</li> </ol>
 <p>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</p>	<p>Identify the-</p> <ol style="list-style-type: none"> <li>Control Group</li> <li>Independent Variable</li> <li>Dependent Variable</li> <li>Explain whether the data supports</li> </ol>

<p>powder. Subject A reported having itches for 30 minutes. Subject B reported to have itches for 45 minutes.</p>	<p>the advertisements claims about its product.</p>
<p>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.</p>	<p>20. Describe how Lisa would perform this experiment. Identify the control group, and the independent and dependent variables in your description.</p>



**Scientific Method**  
**Bikini Bottom Experiments**

Name \_\_\_\_\_

**The Bikini Bottom gang loves science class and wanted to do a little research. Read the description for each experiment and use your knowledge of the scientific method to answer the questions.**

**(1) Flower Power**

SpongeBob loves to garden and wants to grow lots of pink flowers for his pal Sandy. He bought a special Flower Power fertilizer to see if will help plants produce more flowers. He plants two plants of the same size in separate containers with the same amount of potting soil. He places one plant in a sunny window and waters it every day with fertilized water. He places the other plant on a shelf in a closet and waters it with plain water every other day.

What did SpongeBob do wrong in this experiment? Explain.

What should SpongeBob do to test the effectiveness of Flower Power fertilizer? Write an experiment.

**(2) Super Snails**

Gary is not the smartest snail in Bikini Bottom and believes he can improve his brain power by eating Super Snail Snacks. In order to test this hypothesis, he recruits SpongeBob and several snail friends to help him with the experiment. The snails ate one snack with each meal every day for three weeks. SpongeBob created a test and gave it to the snails before they started eating the snacks as well as after three weeks.

Based on the data provided, do the Super Snail Snacks work? Explain your answer.

Test Results		
Snail	Before	After
Gary	64%	80%
Larry	78%	78%
Barry	82%	84%
Terry	72%	70%

### **(3) Bubble Time**

Patrick loves bubble gum and would like to be able to blow bigger bubbles than anyone else in Bikini Bottom. To prepare for the Bikini Bottom Big Bubble Contest, he bought five different brands of bubble gum and needs your help to find the brand that creates the biggest bubbles. Write an experiment to test the bubble power of the bubble gum brands and help Patrick win the contest.

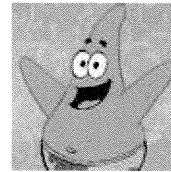




**Bikini Bottom Olympics**  
**Skill: Best Value and Uncertainty**

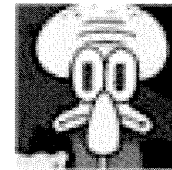
Name \_\_\_\_\_

- 1) Patrick wants to run the mile in the Bikini Bottom Olympics. He must have a best value (average) between the coach's range of uncertainty. The range to be accepted is 6.0 min to 7.3 min. Patrick ran 3 different times with scores of 6.8 min., 7.6 min., & 7.5 min. Does Patrick get to be on the team?



- Find Patrick's best value. (average of his 3 scores)
- Find Patrick's uncertainty( (Highest Value – Lowest Value) ÷ 2)
- Compare Patrick's result to the coach's range. Does his score fall between the 2 numbers?

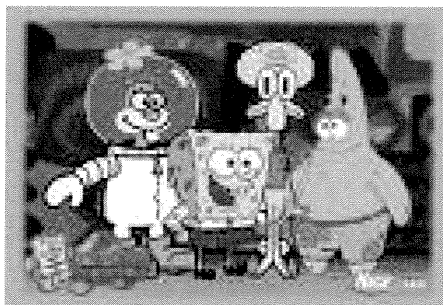
- 2) There are 4 long jump athletes already on the Bikini Bottom Olympics team. Squidward wants to be the fifth. The only way he can do that is to have his jump fall in the range of uncertainty of the other 4 jumpers' scores.



Jumper 1	6.2 ft
Jumper 2	7.3 ft
Jumper 3	7.0 ft
Jumper 4	6.1 ft

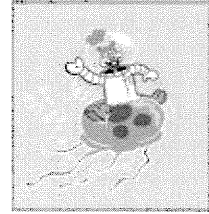
- Find the best value (average the scores together) of the jumpers' scores.
- Find the uncertainty of their scores. [(HV-LV) ÷ 2]
- Find the range of uncertainty for the jumpers' scores.  
(Best Value – Uncertainty) to (Best Value + Uncertainty)

Now that he has the range, Squidward can see what range his jump must fall between.



*Faith Cohen, 2008*

- 3) Sandy the Squirrel loves to ice skate. She has been practicing her figure skating routines. She tries out for the team but the coach won't let her skate until she can show him a range of her scores. If her range is high enough her will let her be on the team.



Score 1	9.2
Score 2	8.4
Score 3	8.9
Score 4	9.5

- Find Sandy's best value.
- Find the uncertainty of her scores.
- Find her range of uncertainty. (Best Value – Uncertainty) to (Best Value + Uncertainty)

If Sandy's top range number falls between 9.2 to 9.9 Sandy will get to be on the team. Does Sandy get to go to the Olympics?

- 4) Gary the Snail is an excellent diver. Gary's scores usually have a range of uncertainty of .30 to .60. His latest round of dives were scored as follows: 9.2, 8.9, 9.9. Figure out the uncertainty of his latest scores. Does his uncertainty fall within his normal range?

