Scientific Method

Glue the note worksheet on page 23 FAF RIGHT.

7th Grade Science Unit T.Tomm http://sciencespot.net/

1. What is the scientific method?

It is a **PROCESS** that is used to find **ANSWERS** to questions about the world around us.

2. Is there only one "scientific method"?

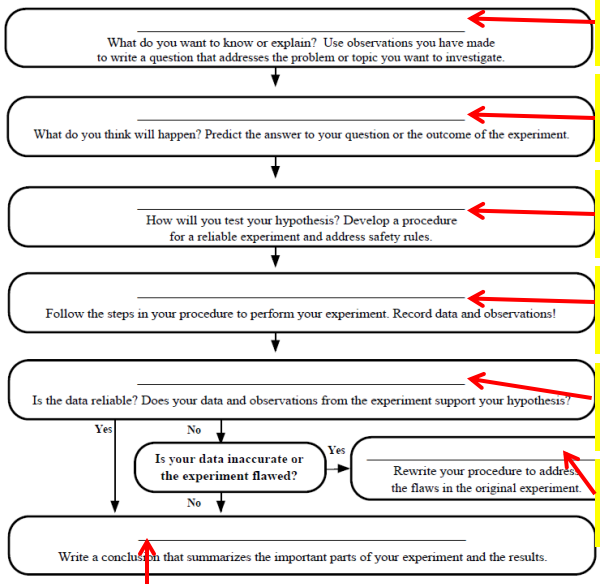
No, there are several **VERSIONS** of the scientific method. Some versions have more **STEPS**, while others may have only a few. However, they all begin with the identification of a **PROBLEM** or a **QUESTION** to be answered based on observations of the world around us and provide an **ORGANIZED** method for conducting and analyzing an experiment.

3. What is a hypothesis?

It is an **EDUCATED GUESS** based on observations and your knowledge of the topic.

4. What is data? It is **INFORMATION** gathered during an experiment.

5.



IDENTIFY THE PROBLEM

FORM A HYPOTHESIS

CREATE AN EXPERIMENT

PERFORM AN EXPERIMENT

ANALYZE THE DATA

MODIFY THE EXPERIMENT

COMMUNICATE THE RESULTS

Sinkin' Lincoln Lab

(back of notes)

Prediction:
How many drops of water can you fit on one side of a penny? ____

Things to think about …
(1) Would it matter if it's heads up or tails up?
(2) Would the age of the penny make a difference?

Part A: Perform a CONTROL test for comparison with later results.

Step 1: Rinse a penny in tap water and dry completely.

Step 2: Place the penny on paper towel.

Step 3: Use an eye dropper to place drops of **WATER** on the penny (one at a time) until ANY amount of water runs over the edge of the penny.

Step 4: Record the number of drops for that trial in the table.

Repeat Steps 1 - 4 three more times before calculating your average.

Trial 1	Trial 2	Trial 3	Trial 4	Average

Average: Add all #s and divide by 4 (Round to one decimal place!)

Sinkin' Lincoln Lab (back of notes)

What were the results of your first experiment?

Were you close to your prediction?

If we coated the penny with soapy water, would it hold more or less drops?

Side	Average
Heads	
Heads	
Heads	
Heads	
Heads	
Heads	
Tails	
Tails	
Tails	
Tails	
Tails	
Tails	
Class Total →	

Part B: Perform tests with the TESTING LIQUID.

Step 1: Start with a "clean" penny. Rinse the penny in tap water and dry completely. Be sure to remove as much residue as possible - without using soap!

Step 2: Hold the penny with the tweezers provided, then dip it into the **TESTING LIQUID**. Allow extra liquid to drip off the penny into the container before proceeding to the next step.

Step 3: Place penny on dry spot on a paper towel. Place drops of **WATER** on the penny (one at a time) until ANY amount of water runs over the edge of the penny.

Step 4: Record your observations and the number of drops for that trial in the table.

Repeat Steps 1 - 4 three more times before calculating the average.

Trial 1	Trial 2	Trial 3	Trial 4	Average

Average: Add all #s and divide by 4 (Round to one decimal place!)

Part C: Answer each question related to the experiment.

1. Write a definition for each term.

Cohesion - **Force of attraction between water molecules**

Surface Tension - **The tension on the surface of a liquid caused by the attraction of the particles, such as the "skin"**

2. Explain your results from both parts of the experiment in terms of cohesion and surface tension.

.

Part C (cont'd)

3. How do your results compare to the other groups in your class? Provide at least 2 possible reasons for any similarities and differences you identified.

4. What other liquids could you use? What would happen? Give 2 examples.

Scientifically Speaking

Glue the worksheet on page 20 FAF

1. What does each of these words mean?

Control The part of the experiment that is not tested; used for comparison

Independent Variable The variable that is changed or tested

Dependent Variable The variable that is affected by the independent variable or the part that we measure.

Reliability Consistently good in quality or performance; able to be trusted.

Accuracy Correct in all details; exact

2. Does reliability and accuracy mean the same thing? Explain.

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.

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.

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.

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. 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 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	Sponge Bob
Initial	18	5
After 1 week	24	9
After 2 weeks	33	17

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	Sponge Bob
Initial	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

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?

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

4. Bikini Bottom Experiments

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.

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.

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.

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

What is the independent variable?

What is the dependent variable?

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

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.

Things to think about …

How many people should you include in your experiment?

How long should you chew the gum before you try to blow bubbles?

How will you measure the bubbles?

How many times should you blow bubbles?

What will you do if someone has a "blow out" or you can't measure it?

Bubble Time Experiment – Write your experiment on the page under your worksheet. Be sure to include all the info from the previous slide!