

7

Science

Quarter 1 – Module 1: Scientific Ways of Acquiring Knowledge and Solving Problems



Science – Grade 7

Alternative Delivery Mode

**Quarter 1 – Module 1: Scientific Ways of Acquiring Knowledge and Solving Problems
First Edition, 2020**

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Science

**Quarter 1 - Module 1:
Scientific Ways of Acquiring
Knowledge and Solving Problems**

Introductory Message

For the facilitator:

Welcome to the **Science 7** Alternative Delivery Mode (ADM) Module on **Scientific Ways of Acquiring Knowledge and Solving Problems**.

This module was collaboratively designed, developed and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the **Science 7** Alternative Delivery Mode (ADM) Module on **Scientific Ways of Acquiring Knowledge and Solving Problems**.

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action, and purpose. Through our hands we may learn, create, and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:



What I Need to Know

This will give you an idea of the skills or competencies you are expected to learn in the module.



What I Know

This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.



What's In

This is a brief drill or review to help you link the current lesson with the previous one.



What's New

In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity, or a situation.



What is It

This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.



What's More

This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.



What I Have Learned

This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.



What I Can Do

This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.



Assessment

This is a task which aims to evaluate your level of mastery in achieving the learning competency.



Additional Activities

In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.



Answer Key

This contains answers to all activities in the module.

At the end of this module you will also find:

References

This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!



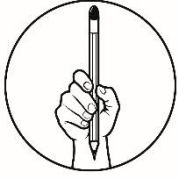
What I Need to Know

Hello! How are you? Have you ever had a question about the world, like what plants need to grow? Or why sugar dissolves faster in hot water? There is a way to find the answer to these questions used by scientists. It is called the Scientific Method. If you will use it, you can be a scientist too.

This module will expose you to the world of scientists. How do scientists work? How do they solve problems? In most cases, scientists solve problems by making thorough investigations. This process seeks to answer questions that are essential in science guided by the scientific method.

After going through this module, you are expected to:

1. identify the steps of a scientific method;
2. use the scientific method in solving problem through an experiment;
and
3. relate scientific method in daily life.



What I Know

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet for your answers.

1. What is the correct order of steps in the scientific method?
 - A. Ask a question, make a hypothesis, test the hypothesis, draw conclusions, and analyze results.
 - B. Ask a question, make a hypothesis, test the hypothesis, analyze results, and draw conclusions.
 - C. Ask a question, analyze results, make a hypothesis, test the hypothesis, and draw conclusions.
 - D. Make a hypothesis, test the hypothesis, analyze results, ask a question, and draw conclusions.

2. Which of the following questions is best considered as scientific?
 - A. Who invented electricity?
 - B. How long did dinosaurs live on Earth?
 - C. How many koalas are there in Australia?
 - D. Does the amount of salt in water affect the temperature at which it boils?

3. What is the process of obtaining information using your senses?
 - A. Inquiry
 - B. Conclusion
 - C. Observation
 - D. Scientific Method

4. What variable can be changed or manipulated?
 - A. Dependent variable
 - B. Experimental variable
 - C. Independent variable
 - D. Uncontrolled variable

5. A scientist hypothesizes that the temperature at which an ostrich's egg is incubated will determine whether the ostrich will be male or female. What is the independent variable of this experiment?
 - A. Scientist
 - B. Incubator
 - C. Temperature
 - D. gender of the ostrich

6. Please refer to situation in number 5, what is the dependent variable?
 - A. Scientist
 - B. Incubator
 - C. Temperature
 - D. gender of the ostrich

7. What do you call an idea or explanation that you test through study and experimentation?
 - A. Question
 - B. Hypothesis
 - C. Conclusion
 - D. Observation

8. What do you call the things in an experiment that must be the same to make it fair?
 - A. Controlled variables
 - B. Dependent variables
 - C. Independent variables
 - D. Uncontrolled variables

9. A scientist is already contemplating whether the data of his experiments support his hypothesis. At this point the scientist is _____.
 - A. asking a question
 - B. making observations
 - C. drawing a conclusion
 - D. forming a hypothesis

10. Which refers to scientific procedure undertaken by scientists to test a hypothesis and make a discovery or demonstrate a known fact?
 - A. Theory
 - B. Inference
 - C. Conclusion
 - D. Experiment

11. When a scientist shares her findings with other scientists, she is _____.
 - A. experimenting
 - B. analyzing data
 - C. making a hypothesis
 - D. communicating results

12. In which step of the scientific method do we want to use graphs?
 - A. Analyze data
 - B. Asking questions
 - C. Make hypothesis
 - D. Communicate results

13. Why is the Scientific Method an important process in doing experiments?
- A. It takes more work but it's worth it.
 - B. It helps the experiment to take longer and be better.
 - C. It ensures that the results can be trusted and repeated.
 - D. It ensures that the people doing the experiments are scientific.
14. What is the purpose of doing multiple trials in an experiment?
- A. To get as much data as possible.
 - B. To make sure the procedure is done correctly every time.
 - C. Eliminate observations that are not typical and reduce errors.
 - D. To double-check the results so they are the same each time.
15. A series of steps designed to help you solve problems and answer questions.
- A. Experiment
 - B. Hypothesis
 - C. Observation
 - D. Scientific method



What's In

There you go! Now may I ask you, when you are curious about a certain happening, like what breakfast that gives you more energy or what is the fastest route from your house to school, what will you do?



What's New

Hello there! I need your help. I want to find out the series of steps of a scientific method to become a scientist. Can you help me? All we have to do is read and understand the context below to find these steps. Are you ready? Let's start!

Activity 1.1

Science is a way of thinking and a way of gathering knowledge about the world that is both accurate and reliable. It is the quest to understand and improve our knowledge of the world around us, and how the things in it work or why they work the way they do.

The scientific method is like the road map that you follow to get to that destination. It is the process by which science is carried out, as in other areas of inquiry; science through scientific method can build on previous knowledge and develop a more sophisticated understanding of its topics of study over time.

When using scientific method to carry out your own investigation, the first thing you need to do is observe then ask questions. Just look at all the things around you. Does something make you curious? Does something seem strange to you? Do you wonder what causes something or why something happens? Have you asked yourself; why is the sky blue? What makes soda fizzy? The possibilities for observations and questions are endless.

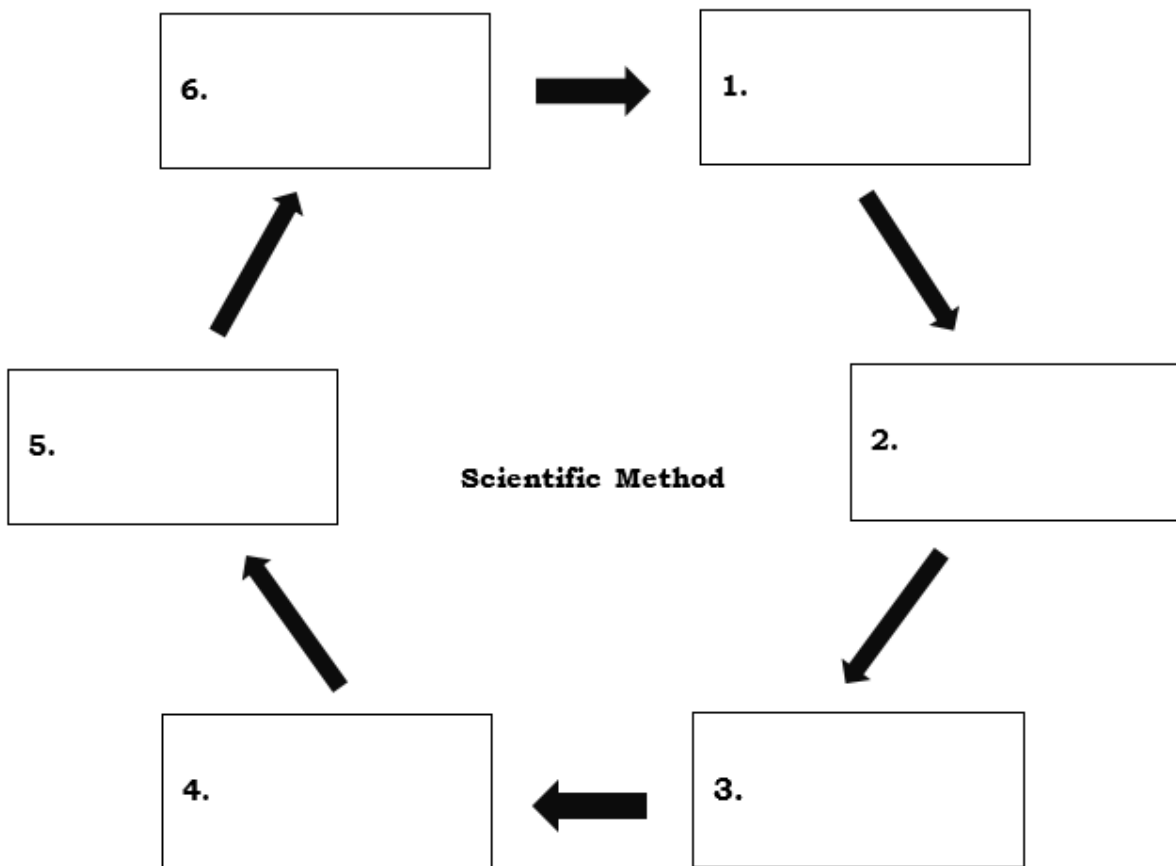
The next scientific method will involve you to test hypothesis. Hypothesis is an educated guess. It is a preliminary answer to the question you have asked that you will test to see if it seems to be true. Keep in mind that it does not matter whether your hypothesis is "right" or "wrong." The next step is to test your hypothesis wherein you will design and conduct an experiment. After your experiment, make sure to record the observations and data so you will be able to analyze the results.

Finally, you need to draw conclusions. The main aim is to summarize the findings of your experiment and determine whether your hypothesis is accepted or rejected.



What is It

Did you understand the context? You can now write the six basic steps of a scientific method below inside the box.



BASIC STEPS OF SCIENTIFIC METHOD

1. MAKE OBSERVATIONS

There are tons of everyday activities that would make cool science experiments using the scientific method. A student noticed that ice melted fast in water.

2. COME UP WITH A QUESTION

The students' observations should lead to some sort of questions. Does ice melt faster in different liquids? Curiosity on what happens to the ice in liquids is a simple science experiment perfect for using the scientific method.

3. DEVELOP A HYPOTHESIS OR PREDICTION

You have made your observations and you have your questions. Now you need to make a prediction about what you think will happen next.

A hypothesis is not simply a guess! A hypothesis is an educated guess or tentative answer to a problem. The student thinks that ice will melt faster in juice than it will in water. Maybe he just wants to get a drink of juice out of it.

- Example:
1. What happens to the growth of mongo seeds if table salt was added to the soil?
 2. Tomato seeds may grow faster in colder temperature.

- Hypothesis:
1. If the amount of salt added to the soil increases, then the growth of mongo seeds decreases.
 2. If tomato seeds were planted in colder temperature, then the seeds will grow at a faster rate.

Let's Try This

1. What effect does temperature have on the dissolution rate of sugar in water?
Hypothesis: _____
2. Eating chocolates may cause pimples.
Hypothesis: _____

Variables

Identifying and controlling variables involve the process of deciding which variables or factors will influence the outcome of an experiment, situation or event and deliberately control all recognized variables in a systematic manner.

Variables in an experiment may be independent or dependent. The variable that is being manipulated or controlled is called **independent variable**. The **dependent variable** changes because of a test. It is the effect that arises from the changes in the independent variable.

Quick Check:

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 a 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 weightlifting 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 SpongeBob's arm and back are lathered with the regular lotion.

(Source: www.kent.edu)

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

Directions: Answer the following questions. Write your answer in a separate sheet.

1. What is the independent variable?
2. What is the dependent variable?
3. What should Larry's conclusion be?

4. CONDUCT AN EXPERIMENT OR TEST THE HYPOTHESIS

We made a prediction that ice will melt faster in juice than in water, and now we must test our hypothesis. We set up an experiment with a glass of juice, a glass of water and an ice cube for each.

For the best experiments, only one thing should change! Here, we are changing the type of liquid we use but keeping the ice cube, the temperature, and measurements of the liquid the same. If too many factors change at once, you cannot accurately state what the results are.

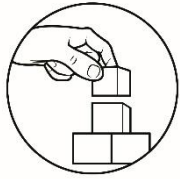
The liquids should be roughly the same temperature (as close as possible) and measured to the same amount, so we left them out to come to room temperature. This could also be tested right out of the fridge! Set up a stopwatch or set a time limit to observe the changes!

5. RECORD AND ANALYZE THE RESULTS

Make sure to record what is happening as well as the results. Note changes at specific time intervals or after one set time interval. When each ice cube is completely melted, add drawings if you wish at the end results. Was your prediction accurate? If it is not accurate, state the reason/s.









6. DRAW CONCLUSIONS

This is the opportunity to talk about your hypothesis, your experiment, your results, and your conclusion which is the final answer to your problem or experiment!



What's More

Directions: Use the scientific method in solving problem through an experiment.

scientific method					
Observe 	The apple slices turns brown.				
Ask a Question 	What can you put on an apple slice to keep it from turning brown?				
Make a Prediction 	<table border="1" data-bbox="518 907 1348 952"><tr><td>Water</td><td>Milk</td><td>Lemon</td><td>Soda</td></tr></table> 	Water	Milk	Lemon	Soda
Water	Milk	Lemon	Soda		
Make a Plan and Follow it 	<ol style="list-style-type: none">1. observe what happens to an apple after it has been sliced.2. put one of these things on each slice: water, milk, lemon juice, soda3. watch what happens to each.4. do they all turn brown? which one turns brown first? which turns brown last?				
Record the results 	<table border="1" data-bbox="518 1355 1348 1400"><tr><td>Water</td><td>Milk</td><td>Lemon</td><td>soda</td></tr></table> 	Water	Milk	Lemon	soda
Water	Milk	Lemon	soda		
Draw a Conclusion 	If you put _____ on an apple, it will not turn brown as fast.				

Answer the following questions.

1. What is the problem in this activity?
2. Formulate your hypothesis. (List down at least 3 hypotheses)
3. What is the dependent variable?
4. What is the independent variable?
5. Analyze your results. Which type of liquid will prevent the apple from turning brown?
 - a. lemon
 - b. milk
 - c. soda
 - d. water

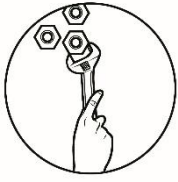


What I Have Learned

Directions: Read the paragraph carefully and identify the correct words that fit in the given sentences inside the box. Write your answer on a separate sheet.

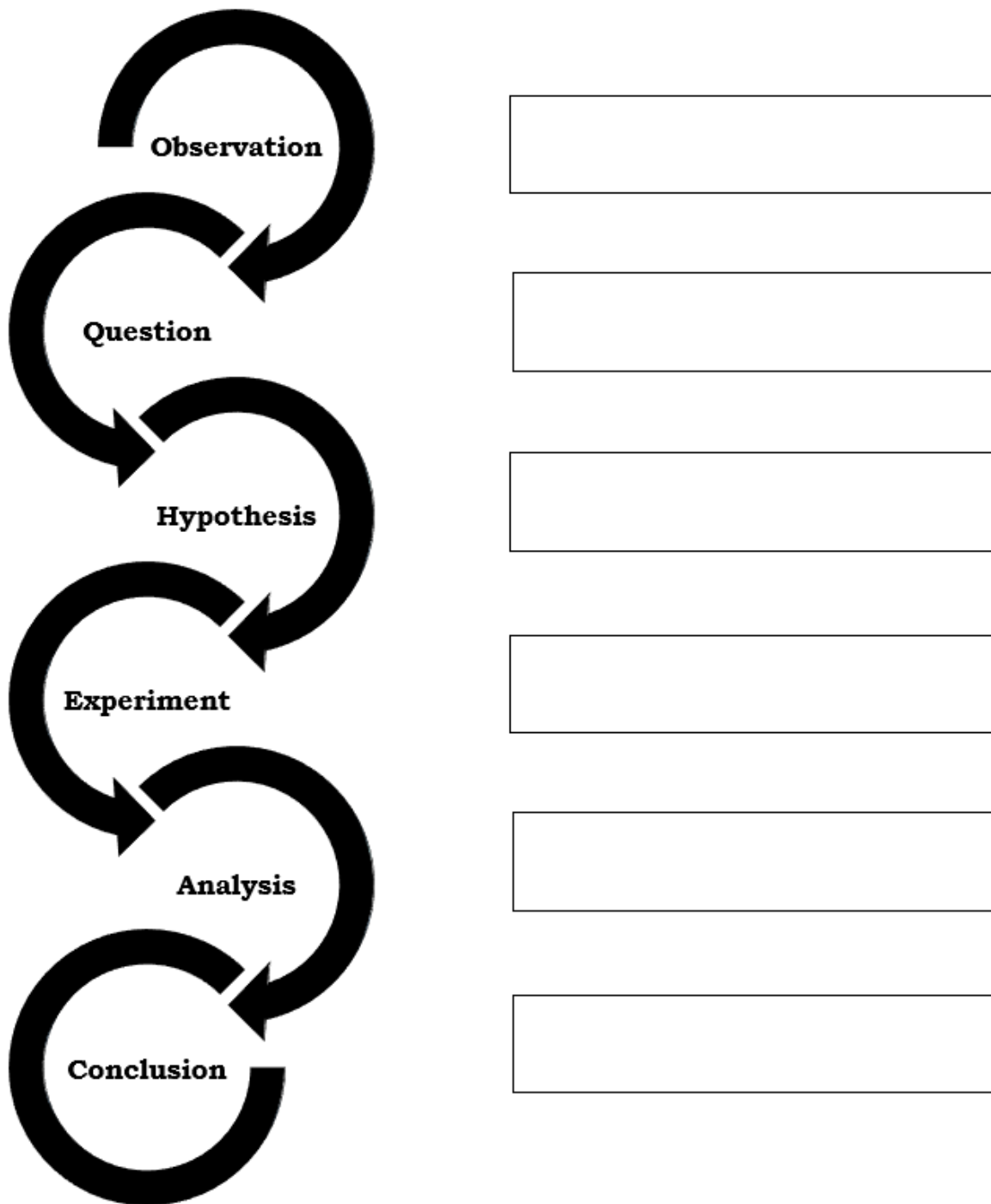
Analyze the results	Draw a conclusion	Six
Dependent	Question/Problem	Scientific Method
Hypothesis	Observation	Independent
Test the hypothesis		

(1)_____ is a process that involves observation, data gathering, experimentation and analysis. This method is composed of (2)_____ steps. By making a detailed (3)_____ of the world around you through your senses, you can be able to formulate a (4)_____. This step will lead you to an educated guess called (5)_____, where you can have tentative answer to your question. In order for you to prove your educated guess you need to (6)_____ by designing and conducting an experiment. In the experiment you need to identify the variables present and these are the (7)_____ and (8)_____ variables. The data from the experiment will be collected to (9)_____. The summarized results from the experiment will determine whether the hypothesis is accepted or rejected and that is where you (10)_____.



What I Can Do

Directions: Design a simple scientific investigation on a specific problem in your area or at home, write it on your science notebook. For example, you turn the light switch ON and the bulb does not light inside your room. Use scientific method in your investigation. Describe each step that you will do to solve the problem.





Assessment

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet for your answers.

1. What skill is used by a scientist when he/she listens to the sounds that are produced by whales?
 - A. Interpreting data
 - B. Drawing conclusions
 - C. Making a hypothesis
 - D. Making observations
2. What is the correct order of the steps in the scientific method?
 - A. Ask a question, analyze results, make a hypothesis, test the hypothesis, draw conclusions, communicate results.
 - B. Ask questions, make a hypothesis, test the hypothesis, analyze results, draw conclusions, communicate results.
 - C. Ask a question, make a hypothesis, test hypothesis, draw conclusions, analyze results, communicate results.
 - D. Make a hypothesis, test the hypothesis, analyze the results, ask a question, draw conclusions, communicate results.
3. Which of the following hypotheses is written correctly?
 - A. If frozen tennis balls will not bounce as high.
 - B. If I heat up a tennis ball it will bounce high.
 - C. If I freeze a tennis ball, then it will not bounce as high.
 - D. If a tennis ball is frozen, it will not bounce as high as one that is not frozen.
4. A scientist conducted an experiment to determine how the amount of salt in a body of water affects the number of plants that can live in the water. Which is the independent variable?
 - A. Water
 - B. Temperature of the water
 - C. Amount of salt in the water
 - D. Number of plants in the water
5. A scientist conducted an experiment to determine how the amount of salt in a body of water affects the number of plants that can live in the water. In this experiment, which is the dependent variable?
 - A. Water
 - B. Temperature of the water
 - C. Amount of salt in the water
 - D. Number of plants in the water

6. What is the last step in scientific method?
 - A. Writing report
 - B. Collecting data
 - C. Analyzing data
 - D. Drawing conclusions

7. Why is experiment important?
 - A. helps create jobs for scientists.
 - B. creates more questions to be answered.
 - C. ensures that many tools are used safely and accurately.
 - D. allows for new discoveries and knowledge in science.

8. Why is Scientific Method an important process in doing experiments?
 - A. It takes more work but it is worth it.
 - B. It helps the experiment to take longer and be better.
 - C. It ensures that the results can be trusted and repeated.
 - D. It ensures that the people doing the experiments are scientific.

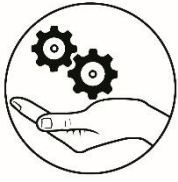
9. What skill is involved when you use fine senses to gather information?
 - A. Observing
 - B. Posing questions
 - C. Developing hypothesis
 - D. Designing experiments

10. Which step that follows formulating and objectively testing hypotheses?
 - A. Interpreting results
 - B. Stating conclusions
 - C. Conducting experiments
 - D. Making observations and collecting data

11. What do you call a series of logical steps that is followed in order to solve a problem?
 - A. Model method
 - B. Scientific theory
 - C. Scientific method
 - D. Experimental process

12. How do scientists test their hypothesis?
 - A. Designing models
 - B. Doing experiments
 - C. Drawing conclusions
 - D. Formulating questions

13. What do you call the information gathered during experiments?
- A. Data
 - B. Theory
 - C. Conclusion
 - D. Hypothesis
14. What step should be completed first to solve a problem?
- A. Analyzing data
 - B. Drawing conclusions
 - C. Testing a hypothesis
 - D. Recognizing and identifying the problem
15. Which of the following steps to solve a problem must be completed *last*?
- A. Analyzing data
 - B. Drawing conclusions
 - C. Testing a hypothesis
 - D. Recognizing and identifying the problem



Additional Activities

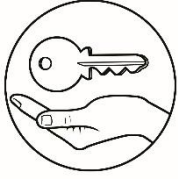
Yes, you have made it! Consider yourself a scientist. Below are the steps of scientific method. Match Column A with their description in Column B. Write the letter only.

Column A

- ___1. Identify a problem based on your observation.
- ___2. Summarizes the results of the experiment, either accepts or rejects the hypothesis.
- ___3. Getting information with the use of our senses.
- ___4. The data from the experiment will be collected and analyzed.
- ___5. Educated guess.
- ___6. Is a step that is used to test the hypothesis.

Column B

- A. Observation
- B. Ask a Question
- C. Hypothesis
- D. Conduct an experiment
- E. Analyze the results
- F. Draw Conclusion
- G. Writing result
- H. Classifying



Answer Key

- 1. B
- 2. D
- 3. C
- 4. C
- 5. C
- 6. D
- 7. B
- 8. A
- 9. C
- 10. D
- 11. D
- 12. A
- 13. C
- 14. C
- 15. D

What I Know

- 1. D
- 2. B
- 3. C
- 4. C
- 5. D
- 6. D
- 7. D
- 8. C
- 9. A
- 10. C
- 11. C
- 12. B
- 13. A
- 14. D
- 15. B

Assessment

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