

Real World Science: Scientific Method

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AIMS Multimedia



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Congratulations!

You have chosen a learning program that will actively motivate your students AND provide you with easily accessible and easily manageable instructional guidelines designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module provides you with a video program keyed to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.

RATIONALE

In today's classrooms, educational pedagogy is often founded on Benjamin S. Bloom's "Six Levels of Cognitive Complexity." The practical application of Bloom's Taxonomy is to evaluate students' thinking skills on these levels, from the simple to the complex: Knowledge (rote memory skills), Comprehension (the ability to relate or retell), Application (the ability to apply knowledge outside its origin), Analysis (relating and differentiating parts of a whole), Synthesis (relating parts to a whole), and Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, AND to integrate classroom experiences and assimilation of learning with the students' life experiences, realities, and expectations. AIMS' learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today's classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.

ORGANIZATION AND MANAGEMENT

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in four sections. You are reading Section 1, Introduction to the Aims Teaching Module (ATM).

SECTION 2,

INTRODUCING THIS ATM

will give you the specific information you need to integrate the program into your classroom curriculum.

SECTION 3,

PREPARATION FOR VIEWING

provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

SECTION 4,

AFTER VIEWING THE PROGRAM

provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.

FEATURES

INTRODUCING EACH ATM

SECTION 2

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world's most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom, your AIMS Teaching Module features these components:

Themes

The Major Theme tells how this AIMS Teaching Module is keyed into the curriculum. Related Themes offer suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

Overview

The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

Objectives

The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.

PREPARATION FOR VIEWING

SECTION 3

In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

Introduction To The Program

Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

Introduction To Vocabulary

Introduction to Vocabulary is a review of language used in the program: words, phrases, usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

Discussion Ideas

Discussion Ideas are designed to help you assess students' prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students' ideas and opinions.

Focus

Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

Jump Right In

Jump Right In provides abbreviated instructions for quick management of the program.

AFTER VIEWING THE PROGRAM

SECTION 4

After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.

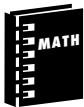
SUGGESTED ACTIVITIES

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:



Meeting Individual Needs

These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.



Curriculum Connections

Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.



Critical Thinking

Critical Thinking activities are designed to stimulate learners' own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.



Cultural Diversity

Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.



Hands On

These are experimental or tactile activities that relate directly to the material taught in the program. Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.



Writing

Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.



In The Newsroom

Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.



Extended Activities

These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.



Link to the World

These activities offer ideas for connecting learners' classroom activities to their community and the rest of the world.



Culminating Activity

To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their world view.

VOCABULARY

Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will either read or find the definition of each vocabulary word, then use the word in a written sentence.

CHECKING COMPREHENSION

Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students' needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

CONSUMABLE ACTIVITIES

The AIMS Teaching Module provides a selection of consumable activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

CHECKING VOCABULARY

The Checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

TEST

The AIMS Teaching Module Test permits you to assess students' understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

ADDITIONAL READING SUGGESTIONS

AIMS offers a carefully researched list of other resources that you and your students may find rewarding.

ANSWER KEY

Reproduces tests and work pages with answers marked.

Real World Science: Scientific Method

THEMES

Real World Science: Scientific Method explores the steps of the scientific method, from defining the problem to drawing a conclusion. It discusses various ways to gather information, as well the importance of forming a clear hypothesis. It also helps students understand how to analyze data, conduct valid experiments and state their conclusions.

OVERVIEW

We solve problems everyday. We also ask questions. In order to solve our problems and come up with answers to our questions, we must use a process called the scientific method. It is important to use this step-by-step process to ensure that our solutions and answers are reliable. Scientists have been using the method for hundreds of years. In addition to helping us find answers to problems, the method also helps us organize and compare information in an orderly way.

OBJECTIVES

- ▶ To learn the basic steps in the scientific method.
- ▶ To use the scientific method to solve problems and answer questions.
- ▶ To understand the guidelines for conducting reliable experiments.
- ▶ To explore various ways of gathering information.

Use this page for your individual notes about planning and/or effective ways to manage this
AIMS Teaching Module in your classroom.

Our AIMS Multimedia Educational Department welcomes your observations and comments.
Please feel free to address your correspondence to:

AIMS Multimedia
Editorial Department
9710 DeSoto Avenue
Chatsworth, California 91311-4409

INTRODUCTION TO THE PROGRAM

One of the best ways to learn more about the world is to be a good observer. An even better way to is to ask questions about what you observe. To find the answers to these questions, you can use the scientific method. It's a step-by-step process that helps scientists and other people sort information and evaluate the results.

INTRODUCTION TO VOCABULARY

Before starting the program, write the following words on the board. Ask the class to discuss the meaning of each word, and review the terms that are unfamiliar to students.

hypothesis - educated guess

data - recorded observations

procedure - steps taken to reach a conclusion

FOCUS

Ask students to think about questions they have asked themselves. Examples could include, "Why is the sky blue?", "Why can I see my breath when it's cold, but not when it's warm?" or "Why can't I find the end of a rainbow?" Encourage them to understand that science is not limited to laboratories, test tubes and microscopes. The scientific method can be used to help us learn more about many things. Ask students to keep this in mind as they begin the unit.

DISCUSSION IDEAS

Scientists know a lot of information about a lot of things. How do they get all that information? Sure, they read it in books. But who wrote the books? How did *they* get the information? Encourage students to understand that the basis of science is asking questions and searching for the answers. Without questions, there would be no science. What kind of questions do students have about the world?

JUMP RIGHT IN

HOW TO USE THE *REAL WORLD SCIENCE: SCIENTIFIC METHOD* AIMS TEACHING MODULE

Preparation

- ▶ Read *Real World Science: Scientific Method* **Themes**, **Overview**, and **Objectives** to become familiar with program content and expectations.
- ▶ Use **Preparation for Viewing** suggestions to introduce the topic to students.

Viewing *REAL WORLD SCIENCE: SCIENTIFIC METHOD*

- ▶ Set up viewing monitor so that all students have a clear view.
 - ▶ Depending on your classroom size and learning range, you may choose to have students view *Real World Science: Scientific Method* together or in small groups.
- Some students may benefit from
- ▶ viewing the video more than one time.

After Viewing *REAL WORLD SCIENCE: SCIENTIFIC METHOD*

- ▶ Select **Suggested Activities** that integrate into your classroom curriculum. If applicable, gather materials or resources.
- ▶ Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.
- ▶ Duplicate the appropriate number of **Vocabulary**, **Checking Comprehension**, and consumable activity pages for your students.
- ▶ You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.
- ▶ Administer the Test to assess students' comprehension of what they have learned, and to provide them with practice in test-taking procedures.
- ▶ Use the **Culminating Activity** as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.

SUGGESTED ACTIVITIES

Writing

The scientific method has been used for hundreds of years by scientists in many different fields. The method has led to many great scientific discoveries throughout history. Ask students to choose a scientist from the list below. Have each student write a one-page summary of their chosen person's contributions to science. What discovery or discoveries did the person make using the scientific method? Encourage students to use library books and encyclopedia articles to learn more about their chosen scientists.

Nicolaus Copernicus
Johannes Kepler
Sir Issac Newton
Carolus Linnaeus
Gregor Mendel
Louis Pasteur
Marie Curie
George Washington Carver
Jane Goodall



60 Minutes

Meeting Individual Needs

Ask students to summarize each step of the scientific method in their own words. Make sure they demonstrate a thorough knowledge of each step and its importance in the overall process.

- 1) Define the problem.
- 2) Gather information.
- 3) Form a hypothesis.
- 4) Experiment.
- 5) Make observations and analyze data.
- 6) State a conclusion.



20 Minutes

Connection to Science

In science, nothing can be assumed or taken for granted. Everything must be carefully tested and results must be checked by repeating tests or experiments. This is the only way to get reliable answers. Ask students to use the scientific method to answer the question, "Why is paper the best material to use for writing?" There are many hypotheses and experiments that can be performed to find conclusions. Encourage students to try various approaches. They should keep careful notes during each step of the scientific process.



60 Minutes

Critical Thinking

The tools we use in science are very important. They don't have to be complicated machines or lab equipment. Ask students to consider each hypothesis below. What tool or tools could they use to prove each hypothesis?

It's warmer on the west side of my house than on the east side. (thermometer)

Plants in the sun grow faster than plants in the shade. (ruler, calendar)

Taking a shower is quicker than taking a bath. (stopwatch or clock)

My bedroom is longer than it is wide. (tape measure)

I weigh more in the morning than I do at night. (scale)

I use more milk on my cereal than my brother does. (measuring cup)



15 Minutes

In the Newsroom

There are many stories in newspapers and magazines about people who are using the scientific method to learn about the world. Examples include doctors who are trying to cure diseases, environmentalists who are trying to preserve the earth's resources, and astronomers who are trying to answer questions about the universe.

Ask each student to locate an article related to science. How is the scientific method involved in the pursuit of knowledge or in the solving of a problem? Have students present a summary of their articles to the class, along with their own thoughts on the importance of the information.



30 Minutes

Extended Activity

Science has many branches, each with its own particular field of study. Many sciences combine various fields. For example, a paleontologist is a scientist who studies prehistoric life, while a botanist studies plants. What do students think a paleobotanist studies? (prehistoric plant life)

Arrange for a scientist to speak to the class about his or her particular field of study. Ask them to talk about what they do on a daily basis. Discuss how the scientific method is used to help the scientist do his or her job. After the presentation, allow students to ask questions about the speaker's job, education and training.



Extended Time

Hands On

Ask each student to bring three small items to class. The items should be made of various materials, including wood, paper, plastic, steel, iron, tin, etc. Provide the class with a magnet. Allow them to test their items by touching each one with the magnet. Ask them to record their observations. Next, they should compare their observations with other students. Remind them that this is what real scientists do.

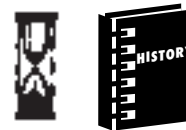


30 Minutes

After analyzing the data, ask each student to formulate a hypothesis about magnets. Discuss the various hypotheses. How can they be thoroughly tested?

Connection to History

Ancient people believed many strange things about the earth and its place in the universe. For instance, ancient Greeks believed that the earth rested on the shoulders of Atlas. Later, people believed that the earth was flat and that humans could fall off the edge. Most people also believed that the earth was at the center of the universe.



20 Minutes

Ask students to investigate and learn more about the scientists who discovered the true nature of the earth. What was the major discovery of Nicholas Copernicus? Johannes Kepler? What tools did these men use to test their hypotheses?

(Copernicus debated the belief that the earth was the center of the universe. He believed that the earth and other planets were moving around the sun. Kepler supported the theories of Copernicus. Kepler also discovered the laws of planetary motion, describing the way planets orbit the sun. The early astronomers tested their hypotheses by using telescopes. In fact, Kepler did important work on improving the lens systems of early telescopes.)

Culminating Activity

Discuss social attitudes about science and scientists. For instance, how are scientists often portrayed in movies? Are they clumsy men with wild ideas, nerdy social outcasts, or evil villains intent on destroying the world? How accurate are these caricatures?



15 Minutes

Next, ask students if they have read any science fiction books. If so, encourage them to discuss the books with their classmates. Why do think people are so interested in science fiction books, television shows and movies?

VOCABULARY

The following terms are from *Real World Science: Scientific Method*. Fill in the number of each term next to its closest definition.

- | | |
|----------------------|---------------|
| 1. scientific method | 5. experiment |
| 2. single variable | 6. data |
| 3. control | 7. theory |
| 4. hypothesis | 8. conclusion |

- ___ an educated guess
- ___ factor in an experiment that is missing the variable but is the same as other factors in every other way
- ___ written or recorded observations made while using the scientific method
- ___ step-by-step process that scientists have developed to help them solve problems and test new ideas
- ___ a hypothesis that has been tested many times and is supported by data
- ___ factor being tested; the one factor that is different from all others in an experiment
- ___ an activity or group of activities performed to test a hypothesis
- ___ final statement made after an experiment to prove or disprove the hypothesis

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

The ___1___ method is a process that scientists use to help them test new ideas . The first step in the process is defining the ___2___. Next, information must be gathered using one of more of the five ___3___. The scientist then makes an educated guess or a ___4___. This is tested by performing one or more activities called ___5___. Observations are made and recorded. The recorded observations are known as ___6___. Afterward, the scientist comes to a ___7___ that either proves or disproves the hypothesis. When a hypothesis is tested many times and supported by data, it becomes known as a ___8___ .

- | | |
|--|---|
| 1. A. variable
B. scientific
C. control
D. biological | 5. A. theories
B. experiments
C. properties
D. none of the above |
| 2. A. conclusion
B. data
C. experiment
D. problem | 6. A. data
B. hypotheses
C. structures
D. expressions |
| 3. A. senses
B. controls
C. solutions
D. solvents | 7. A. meeting
B. consideration
C. laboratory
D. conclusion |
| 4. A. variable
B. factor
C. hypothesis
D. conclusion | 8. A. solvent
B. control
C. deduction
D. theory |

USING THE SCIENTIFIC METHOD

Think of a problem or an unanswered question you have had during the last few weeks. Use the scientific method to work through the problem or to find an answer to the question. The steps below will help.

1) Define the problem or question.

2) Gather information using one or more of the five senses. Some ways to gather information include interviewing people, observing things, or reading books and articles. Summarize your findings below.

3) Form a hypothesis. Using the information you have gathered, make an educated guess about how to solve the problem or answer the question.

USING THE SCIENTIFIC METHOD, continued

4) Perform one or more experiments to test your hypothesis. Describe your experiment or experiments below.

5) Make observations and record the data below.

6) State a conclusion. Did your findings prove or disprove the hypothesis?

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. ___ The first step of the scientific process is testing the hypothesis.
2. ___ Sometimes, steps of the scientific process must be repeated.
3. ___ Every experiment should have at least three experimental factors or variables.
4. ___ A control is a factor that is missing the variable, but is the same as other factors in every other way.
5. ___ Written observations made while using the scientific process are known as data.
6. ___ A theory is a hypothesis that has not yet been tested.
7. ___ Measurements must be made carefully to make sure all factors, except the variable, are the same.
8. ___ In the salt water experiment performed in the video, salt was the single variable.
9. ___ Recording data keeps other scientists from repeating our experiments.
10. ___ A hypothesis is an educated guess.

TYPES OF SCIENTISTS

There are many different kinds of scientists in the world. Use library resources or an encyclopedia to find out what each scientist below studies. The first one has been done for you.

1. A paleontologist studies _____ .
Paleontologists might answer questions by observing _____ .
2. A geologist studies _____ .
Geologists might answer questions by observing _____ .
3. A botanist studies _____ .
Botanists might answer questions by observing _____ .
4. A biologist studies _____ .
Biologists might answer questions by observing _____ .
5. A geneticist studies _____ .
Geneticists might answer questions by observing _____ .
6. A zoologist studies _____ .
Zoologists might answer questions by observing _____ .
7. An astronomer studies _____ .
Astronomers might answer questions by observing _____ .
8. An anthropologist studies _____ .
Anthropologists might answer questions by observing _____ .
9. A sociologist studies _____ .
Sociologists might answer questions by observing _____ .
10. A meteorologist studies _____ .
Meteorologists might answer questions by observing _____ .

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

scientific
variable
control
hypothesis
experiment
data
theory
conclusion
factor

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

TEST

Circle the phrase which best answers each question.

1. The first step in the scientific method is:
 - making observations.
 - conducting experiments.
 - analyzing data.
 - defining the problem.

2. To gather information, we can:
 - read books.
 - ask questions.
 - use our senses to study things.
 - all of the above

3. When we make an educated guess, we are forming:
 - data.
 - a hypothesis.
 - variables.
 - a factor.

4. Our recorded observations are called:
 - data.
 - control factors.
 - hypotheses.
 - experiments.

5. At the end of the scientific method, we must state a:
 - purpose.
 - question.
 - hypothesis.
 - conclusion.

TEST (CONTINUED)

6. Every experiment must have only one:

- variable.
- step.
- measurement.
- object.

7. Measurements must be made carefully so that all variables are:

- unique.
- the same.
- different.
- control factors.

8. A control factor is missing the _____ of the experiment.

- hypothesis
- conclusion
- data
- variable

9. A hypothesis that has been tested many times and supported by data becomes a:

- fact.
- law.
- theory.
- conclusion.

10. The scientific method is a good way to help scientists:

- come to conclusions about the world.
- learn from each other.
- compare information.
- all of the above

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

You and your students might also enjoy these other AIMS Multimedia programs:

2570-EN-VID-NR: "Real World Science: Electricity"

2569-EN-VID-NR: "Real World Science: Matter: Solids, Liquids, and Gases"

2572-EN-VID-NR: "Real World Science: Magnetism"

2287-EN-VID-NR: "Real World Science: Rocks and Minerals"

2290-EN-VID-NR: "Real World Science: Dinosaurs"

ANSWER KEY for page 18

VOCABULARY

The following terms are from *Real World Science: Scientific Method*. Fill in the number of each term next to its closest definition.

- | | |
|----------------------|---------------|
| 1. scientific method | 5. experiment |
| 2. single variable | 6. data |
| 3. control | 7. theory |
| 4. hypothesis | 8. conclusion |

- 4 an educated guess
- 3 factor in an experiment that is missing the variable but is the same as other factors in every other way
- 6 written or recorded observations made while using the scientific method
- 1 step-by-step process that scientists have developed to help them solve problems and test new ideas
- 7 a hypothesis that has been tested many times and is supported by data
- 2 factor being tested; the one factor that is different from all others in an experiment
- 5 an activity or group of activities performed to test a hypothesis
- 8 final statement made after an experiment to prove or disprove the hypothesis

ANSWER KEY for page 19

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

The ___1___ method is a process that scientists use to help them test new ideas . The first step in the process is defining the ___2___ . Next, information must be gathered using one of more of the five ___3___ . The scientist then makes an educated guess or a ___4___ . This is tested by performing one or more activities called ___5___ . Observations are made and recorded. The recorded observations are known as ___6___ . Afterward, the scientist comes to a ___7___ that either proves or disproves the hypothesis. When a hypothesis is tested many times and supported by data, it becomes known as a ___8___ .

1. A. variable
 B. scientific
C. control
D. biological
2. A. conclusion
B. data
C. experiment
 D. problem
3. A. senses
B. controls
C. solutions
D. solvents
4. A. variable
B. factor
 C. hypothesis
D. conclusion
5. A. theories
 B. experiments
C. properties
D. none of the above
6. A. data
B. hypotheses
C. structures
D. expressions
7. A. meeting
B. consideration
C. laboratory
 D. conclusion
8. A. solvent
B. control
C. deduction
 D. theory

ANSWER KEY for page 22

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. F The first step of the scientific process is testing the hypothesis.
2. T Sometimes, steps of the scientific process must be repeated.
3. F Every experiment should have at least three experimental factors or variables.
4. T A control is a factor that is missing the variable, but is the same as other factors in every other way.
5. T Written observations made while using the scientific process are known as data.
6. F A theory is a hypothesis that has not yet been tested.
7. T Measurements must be made carefully to make sure all factors, except the variable, are the same.
8. T In the salt water experiment performed in the video, salt was the single variable.
9. F Recording data keeps other scientists from repeating our experiments.
10. T A hypothesis is an educated guess.

ANSWER KEY for page 23

TYPES OF SCIENTISTS

There are many different kinds of scientists in the world. Use library resources or an encyclopedia to find out what each scientist below studies. The first one has been done for you.

1. A paleontologist studies prehistoric animals .
Paleontologists might answer questions by observing fossils of prehistoric animals .
2. A geologist studies the history of the earth .
Geologists might answer questions by observing rocks and minerals .
3. A botanist studies plant life .
Botanists might answer questions by observing trees, flowers and other plants .
4. A biologist studies living things .
Biologists might answer questions by observing plants, animals and other life .
5. A geneticist studies genes and heredity .
Geneticists might answer questions by observing differences among living things .
6. A zoologist studies animals .
Zoologists might answer questions by observing different species of animals .
7. An astronomer studies the movement and properties of celestial bodies .
Astronomers might answer questions by observing stars, planets and moons .
8. An anthropologist studies human beings .
Anthropologists might answer questions by observing people and what they do .
9. A sociologist studies society and relationships .
Sociologists might answer questions by observing groups of people .
10. A meteorologist studies weather .
Meteorologists might answer questions by observing wind, rain and snow .

ANSWER KEY for page 24

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally, or backward.

- scientific
- variable
- control
- hypothesis
- experiment
- data
- theory
- conclusion
- factor

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

ANSWER KEY for page 25

TEST

Circle the phrase which best answers each question.

1. The first step in the scientific method is:

- making observations.
- conducting experiments.
- analyzing data.
- defining the problem.

2. To gather information, we can:

- read books.
- ask questions.
- use our senses to study things.
- all of the above

3. When we make an educated guess, we are forming:

- data.
- a hypothesis.
- variables.
- a factor.

4. Our recorded observations are called:

- data.
- control factors.
- hypotheses.
- experiments.

5. At the end of the scientific method, we must state a:

- purpose.
- question.
- hypothesis.
- conclusion.

ANSWER KEY for page 26

TEST (CONTINUED)

6. Every experiment must have only one:
- variable.
 - step.
 - measurement.
 - object.
7. Measurements must be made carefully so that all variables are:
- unique.
 - the same.
 - different.
 - control factors.
8. A control factor is missing the _____ of the experiment.
- hypothesis
 - conclusion
 - data
 - variable
9. A hypothesis that has been tested many times and supported by data becomes a:
- fact.
 - law.
 - theory.
 - conclusion.
10. The scientific method is a good way to help scientists:
- come to conclusions about the world.
 - learn from each other.
 - compare information.
 - all of the above