INTRODUCTION TO THE AIMS TEACHING MODULE (ATM)

INTRODUCING OCEANS: CHARTING THE VASTNESS

PREPARATION FOR VIEWING

AFTER VIEWING THE PROGRAM

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

ANSWER KEYS
AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM and CD-i formats.

Persons or schools interested in obtaining additional copies of this AIMS Teaching Module, please contact:

AIMS Multimedia

1-800-FOR-AIMS
1-800-367-2467
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 stu-
dents may find rewarding.

ANSWER KEY

Reproduces tests and work pages with
answers marked.
Oceans: Charting the Vastness

THEMES

Oceans: Charting the Vastness introduces students to the nature and makeup of the Earth’s oceans. The program covers the five oceans, their unique temperatures, chemical compositions and currents, their biology and geology, and the forces involved in their creation. The program also discusses the biology and geology of coastline life.

OVERVIEW

The study of the ocean is important for many reasons. Each major ocean on planet Earth holds important secrets about early life, changing animal and plant populations, and the future of the world’s marine ecosystems. In addition, each major body of water has its own physical properties, including animal and plant life, currents and underwater landscapes that include large mountains and valleys. The more we learn about these amazing environments, the more we learn about the delicate balance of life on Earth.

OBJECTIVES

- To understand the importance of the ocean’s temperature and chemical composition.
- To see the role that currents play in the movement of the oceans and sea life.
- To examine the origins of the Earth and the geology of the ocean.
- To explore the coral reefs and the life that surrounds them.
- To study the biology and geology surrounding the oceans and coastlines.
Use this page for your individual notes about planning and/or effective ways to manage this AIMS Teaching Module in your classroom.
INTRODUCTION TO THE PROGRAM

Nearly three-quarters of the planet is covered by oceans, and since the very beginning of human existence, people have been challenged by the mysteries of the sea. Until late in the nineteenth century, very little was known about the oceans. Many people used to think that the oceans had no life at all, and that the sea floor was flat and sandy. Using modern sonar and satellite data, scientists have been able to explode these old myths. The oceans are vast ecosystems teeming with life and varied geological structures. As the Earth’s population increases and its natural resources decrease, the study of the oceans will continue to be important to the future of humanity.

INTRODUCTION TO VOCABULARY

Write the words “oceanography,” “geology,” and “biology” on the board. Ask students to identify each word and then discuss the importance of each when examining the seas.

(Oceanography is the study of the oceans—though by its nature, it includes the other two sciences. Geology is the study of the Earth’s rocks and chemical makeup, both on land and in the oceans. Biology is the study of the processes of life, both plant and animal.)

DISCUSSION IDEAS

What are some ways that people use the oceans? How is the climate of the world affected by oceans? How has ocean exploration changed the world?

(People use the oceans for transportation, recreation, and the harvesting of food, among many other uses. Many areas, such as California and Great Britain, have mild climates in spite of their geographic location, due to the ocean currents that surround them. Early explorers took to the oceans to find new worlds and expand human possibilities.)

FOCUS

The ocean affects our lives in many ways, even if we live many miles from any shore. Ask students to think for a moment about some ways that the Earth’s oceans impact our lives. Tell students to keep these things in mind as they begin the program.
JUMP RIGHT IN

HOW TO USE THE OCEANS: CHARTING THE VASTNESS AIMS TEACHING MODULE

Preparation

▷ Read Oceans: Charting the Vastness Themes, Overview, and Objectives to become familiar with program content and expectations.

▷ Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing OCEANS: CHARTING THE VASTNESS

▷ 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 Oceans: Charting the Vastness together or in small groups.

▷ Some students may benefit from viewing the video more than one time.

After Viewing OCEANS: CHARTING THE VASTNESS

▷ 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

Link to the World

There are dozens of conservation organizations who dedicate their efforts to the protection of the ocean. Ask students to name some reasons for protecting the ocean. Do they know of any conservation groups involved with ocean preservation?

(Some ocean conservation groups protect species like whales and dolphins. Others regulate the amount of fish taken from the sea, or protect the ocean from pollution. In some areas, people dump trash and industrial waste into the sea, polluting it for many years and harming marine life. In other places, people deplete animal populations by overfishing.)

Connection to Nature Studies

Many people consider the French oceanographer Jacques Cousteau to be the most influential scientist ever to study the ocean. Obtain a Cousteau video from the library and ask students to discuss their impressions about Cousteau and his mission. Why might he be more influential now than if he had lived 100 years earlier?

(Cousteau was a great proponent of not only preserving the oceans, but also of educating people. Television and film helped him reach an enormous number of people.)

Critical Thinking

As people continue to explore the oceans, many questions arise. How is the exploration of the ocean similar to that of outer space? Why would ownership of the oceans matter? How might the ocean be considered valuable?

(Just like outer space, the oceans seem to be the collective property of everyone on Earth. However, as the resources of the ocean, including petroleum, become more accessible, the question of who owns the oceans becomes trickier. Also in question are fishing rights and the right to hunt whales or other endangered species in international waters.)
Connection to Literature

Encourage students to read a book that has the ocean as a major component. Some examples include Moby Dick by Herman Melville, Into The Storm by Sebastian Junger, the Kon Tiki by Thor Heyerdahl, or a number of books concerning Jacques Cousteau or Bob Ballard. After students read the books, ask them to prepare a one-page paper describing the new things they learned about the ocean. Encourage them to include their interpretations about the dangers, myths and power of the sea.

Meeting Individual Needs

Write the following words on the board and ask students to define each one. Also, ask them to explain what each word has to do with the study of the ocean.

- **Plankton** - the small floating plant and animal life that begins the food chain of the ocean
- **Tsunami** - a giant tidal wave; often caused by an earthquake
- **Breakwater** - a wall built to check the force of waves

Writing

Have students imagine they are taking a submarine deeper into the ocean than anyone ever has before. What creatures do they see? How long would it take them to descend to the bottom of the ocean? What dangers do people face in going to these depths?

(Many bacteria-feeding creatures, like tube worms, have been found at great depths—they are usually virtually colorless and frequently eyeless, as vision would do them no good in the dark depths. Descending to the ocean’s floor has many dangers, but the pressure on an underwater vessel is the primary concern. It would take several hours for a vessel to reach the lowest depths of the ocean.)
Connection to Science

Oil spills are one of the most deadly man-made affronts to life in the ocean. Do a science experiment to show students the effects that oil can have on an ecosystem. Obtain a small aquarium and fill it half-way with water. Dump in half a dozen or so random objects, like pieces of fruit, a sponge, small pieces of plastic, coins and a piece of cloth. Now pour in two courts of motor oil, preferably used. Let the mixture sit for a day and then retrieve the objects. Have students try to clean off the oil. How successful are they? Explain the connection between organic materials, like the fruit, sponge and cloth, and inorganic things like the plastic and coins. Which things were hardest to clean?

(organic materials will be harder to clean. Animals coated with oil die of many causes: birds are unable to fly because of the added weight, many mammals coated with oil can no longer swim or breathe, and other animals starve because of damaged or killed food supplies. In addition, oil prevents the feathers of marine birds from insulating their bodies. As a result, many birds freeze.)

Connection to History

Humans have been exploring the ocean for thousands of years, from early sailing expeditions to modern undersea laboratories. Ask students to choose a topic dealing with ocean exploration. Some examples are listed below. Have them research the topic using library books and other texts. When they are done, ask them to summarize their findings and present them to the class.

Phytheas, Greek explorer
James Cook, British explorer
Challenger, research ship
Henri Milne-Edwards, French undersea explorer
Jacques Costeau, inventor of the aqualung and an ocean explorer
William Beebe, American naturalist
Scripps Institute of Oceanography, research group

Culminating Activity

Ask students to choose one of the Earth’s oceans: Atlantic, Pacific, Indian, Arctic or Antarctic. Have them collect 10 facts about their chosen ocean. The facts can be physical, geological, chemical—even mythical. Tell them to write their facts on an Ocean Fact Sheet. Display the Ocean Fact Sheets on a wall labeled, “Ocean Facts From Around the World.”
VOCABULARY

The following terms are from *Oceans: Charting the Vastness*. Fill in the number of each term next to its closest definition.

1. Abyssal Plains
2. Continental Shelf
3. Great Barrier Reef
4. guyouts
5. Mariana Trench
6. Peru-Chili Trench
7. seamounts
8. tide pools
9. undertow
10. spits

___ pools of sea water near coastal shores that are teaming with various life forms
___ the lowest point in the ocean
___ water that flows back underneath oncoming waves
___ the submerged shelf of land that slopes gradually from the edge of a continent
___ the largest group of coral reefs in the world
___ the flat parts of the ocean floor
___ sandbars that don't completely cross a bay
___ the longest of the submarine trenches
___ cone-shaped formations that jet out from the abyssal plains
___ flat-topped peaks believed to be seamounts that have eroded
CHECKING COMPREHENSION

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

Small photosynthetic organisms called diatoms and huge forests of algae produce much of our atmosphere's ___1___. The study of the ocean is important for many reasons. For instance, many scientists believe that life began in ___2___. The salt in the ocean is a result of ___3__ released by ancient volcanoes. The majority of sea life is found along the slopes of ___4___. Ocean currents are the result of ___5__ , but the shape of the continents and the density and temperature of the water affect them as well. The plates of Earth's crust spread apart along ___6___. Coral reefs are formed by plants and animals that remove ___7__ from the ocean. A(n)___8__ is a circular or elliptical-shaped coral island with a lagoon in the middle. Tides are the result of the gravitational pull of ___9___. Scientists called __10__ work to maintain populations of fish and other sea mammals.

1. A. nitrogen  
   B. carbon dioxide  
   C. oxygen  
   D. sulfur

2. A. lagoons  
   B. the Mariana Trench  
   C. barrier reefs  
   D. tide pools

3. A. chlorine gas  
   B. methane gas  
   C. lava  
   D. igneous rocks

4. A. barrier reefs  
   B. continental shelves  
   C. tectonic plates  
   D. trenches

5. A. ice caps  
   B. gravity  
   C. prevailing winds  
   D. oceanic volcanoes

6. A. abyssal plains  
   B. fringing reefs  
   C. continental shelves  
   D. mid-oceanic ridges

7. A. oxygen  
   B. calcium carbonate  
   C. sodium  
   D. hydrogen

8. A. barrier reef  
   B. fringing reef  
   C. atoll reef  
   D. Mariana reef

9. A. the moon  
   B. the sun  
   C. the Earth  
   D. A and B

10. A. geologists  
    B. marine chemists  
    C. marine biologists  
    D. physicists
GEOGRAPHY REVIEW

Each of the following numbered clues is a geographical example of a definition below. Place the number of each clue next to the correct definition.

1. Ocean Floor
2. 1000 meters below ocean’s surface
3. Californian Coast
4. Hawaii
5. Florida Coast
6. Australian Coast
7. 100 meters below ocean’s surface
8. Iceland

______ largest coral reef in the world is found here
______ fringing reef, or a reef that grows close to the shore, is found here
______ example of a trench coast; a sharp slope of a continental shelf
______ photosynthesis begins to occur here
______ trench; the deepest area of the ocean
______ Atlantic Ridge, or mid-oceanic ridge creating mountains of igneous rock, found here
______ seamount; cone shaped, volcanic islands are located here
______ at this depth, ocean currents are nearly freezing at all times
TRUE OR FALSE

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

1. ___ The five oceans cover about 30% of the Earth’s surface.
2. ___ Many scientists believe that life on Earth began in tide pools.
3. ___ The deepest points of the world’s oceans usually have temperatures of about 2° to 5° C.
4. ___ At a certain point, the ocean is deeper than Mount Everest is high.
5. ___ Warm ocean currents flow toward the equator.
6. ___ The Mississippi River moves more water per second than the Gulf Stream.
7. ___ Currents can change the air temperature of a region.
8. ___ The California coast is not an example of trench coast.
9. ___ Coral reefs are only found in warmer climates.
10. ___ Areas protected by baymouth bars and spits are called tide pools.
OCEANS OF THE WORLD

Fill in the blanks below to complete the information about each ocean.

1. **Pacific Ocean**
   - How many square miles does it cover? _________________________
   - What are some continents that border it? _________________________
   - What is its greatest depth? _________________________

2. **Atlantic Ocean**
   - How many square miles does it cover? _________________________
   - What are some continents that border it? _________________________
   - What is its greatest depth? _________________________

3. **Indian Ocean**
   - How many square miles does it cover? _________________________
   - What are some continents that border it? _________________________
   - What is its greatest depth? _________________________

4. **Arctic Ocean**
   - How many square miles does it cover? _________________________
   - What are some continents that border it? _________________________
   - What is its greatest depth? _________________________

5. **Antarctic Ocean**
   - How many square miles does it cover? _________________________
   - What are some continents that border it? _________________________
   - What is its greatest depth? _________________________
OCEAN LIFE

Both fish and mammals swim in the ocean. Although they appear similar, they are actually quite different. Use encyclopedias and library texts to fill in the chart below.

<table>
<thead>
<tr>
<th>FISH</th>
<th>MAMMALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does it breathe?</td>
<td></td>
</tr>
<tr>
<td>How does it propel itself through water?</td>
<td></td>
</tr>
<tr>
<td>How does it reproduce offspring?</td>
<td></td>
</tr>
<tr>
<td>What type of body covering does it have?</td>
<td></td>
</tr>
<tr>
<td>Is it warm-blooded or cold-blooded?</td>
<td></td>
</tr>
</tbody>
</table>
WORD SEARCH

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

Lagoon
Biologist
Spits
Abyssal
Tides
Trench
Guyout
Waves
Ocean
Undertow
Circle the phrase which best answers each question.

1. The ocean surface is warmest because:
   - it receives the most solar energy.
   - it has the largest amount of mineral and salt changes.
   - the tides are more active near the surface.
   - more animals live near the surface.

2. At what depths are the world’s oceans near freezing?
   - below 1,000 meters
   - below 100 meters
   - below 500 meters
   - below 10,000 meters

3. Where is the lowest point in the ocean?
   - the Gulf Stream
   - the Peru-Chili Trench
   - the Mariana Trench
   - the Great Barrier Reef

4. Cold currents flow:
   - toward the poles.
   - on the eastern coast of a continent.
   - away from the equator.
   - toward the equator.

5. Spreading ridges underneath the ocean create:
   - warm and cold ocean currents.
   - prevailing wind patterns.
   - coral reefs.
   - mountains of igneous rock.
6. Seamounts:
   • occur mostly in the Pacific Ocean.
   • are typically cone-shaped and occasionally stick out above the ocean’s surface to form islands.
   • are volcanic in origin.
   • all of the above.

7. Coral reefs:
   • can only be found in shallow waters no more than 100 meters deep.
   • are formed by animals and plants that remove calcium carbonate from the ocean water.
   • are found only in warm water where water temperature is at least 10 degrees centigrade.
   • B and C.

8. When are tides at their highest?
   • when the moon and the sun are lined up together opposite the Earth
   • during spring tides
   • when the moon is farthest from the Earth
   • A and B

9. Which of the following statements is false?
   • Ocean waves are largely created by the wind.
   • In the open ocean, waves are called swells.
   • As a wave’s trough begins to touch bottom, the wave accelerates.
   • Incoming waves create off-shore sand bars and baymouth bars.

10. The seas have billions of tons of _____ that can be combined to create helium in a fusion reaction.
    • magnesium
    • petroleum
    • deuterium
    • copper
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

Earth Science Essentials Series
  The Universe: The Vast Frontier
  The Solar System: Our Neighbors in Space
  Geology of the Earth: Of Forces, Rocks, & Time
  Weather: The Chaos Which Surrounds Us
  The History of the Earth: Over the Eons
VOCABULARY

The following terms are from Oceans: Charting the Vastness. Fill in the number of each term next to its closest definition.

1. Abyssal Plains
2. Continental Shelf
3. Great Barrier Reef
4. guyouts
5. Mariana Trench
6. Peru-Chili Trench
7. seamounts
8. tide pools
9. undertow
10. spits

8. pools of sea water near coastal shores that are teaming with various life forms
5. the lowest point in the ocean
9. water that flows back underneath oncoming waves
2. the submerged shelf of land that slopes gradually from the edge of a continent
3. the largest group of coral reefs in the world
1. the flat parts of the ocean floor
10. sandbars that don’t completely cross a bay
6. the longest of the submarine trenches
7. cone-shaped formations that jet out from the abyssal plains
4. flat-topped peaks believed to be seamounts that have eroded
CHECKING COMPREHENSION

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

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1. A. nitrogen  
   B. carbon dioxide  
   C. oxygen  
   D. sulfur

2. A. lagoons  
   B. the Mariana Trench  
   C. barrier reefs  
   D. tide pools

3. A. chlorine gas  
   B. methane gas  
   C. lava  
   D. igneous rocks

4. A. barrier reefs  
   B. continental shelves  
   C. tectonic plates  
   D. trenches

5. A. ice caps  
   B. gravity  
   C. prevailing winds  
   D. oceanic volcanoes

6. A. abyssal plains  
   B. fringing reefs  
   C. continental shelves  
   D. mid-oceanic ridges

7. A. oxygen  
   B. calcium carbonate  
   C. sodium  
   D. hydrogen

8. A. barrier reef  
   B. fringing reef  
   C. atoll reef  
   D. Mariana reef

9. A. the moon  
   B. the sun  
   C. the Earth  
   D. A and B

10. A. geologists  
     B. marine chemists  
     C. marine biologists  
     D. physicists
Each of the following numbered clues is a geographical example of a definition below. Place the number of each clue next to the correct definition.

1. Ocean Floor
2. 1000 meters below ocean’s surface
3. Californian Coast
4. Hawaii
5. Florida Coast
6. Australian Coast
7. 100 meters below ocean’s surface
8. Iceland

6                      largest coral reef in the world is found here
5                      fringing reef, or a reef that grows close to the shore, is found here
3                      example of a trench coast; a sharp slope of a continental shelf
7                      photosynthesis begins to occur here
1                      trench; the deepest area of the ocean
8                      Atlantic Ridge, or mid-oceanic ridge creating mountains of igneous rock, found here
4                      seamount; cone shaped, volcanic islands are located here
2                      at this depth, ocean currents are nearly freezing at all times
TRUE OR FALSE

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

1. F  The five oceans cover about 30% of the Earth’s surface.

2. T  Many scientists believe that life on Earth began in tide pools.

3. T  The deepest points of the world’s oceans usually have temperatures of about 2° to 5° C.

4. T  At a certain point, the ocean is deeper than Mount Everest is high.

5. F  Warm ocean currents flow toward the equator.

6. F  The Mississippi River moves more water per second than the Gulf Stream.

7. T  Currents can change the air temperature of a region.

8. F  The California coast is not an example of a trench coast.

9. T  Coral reefs are only found in warmer climates.

10. F  Areas protected by baymouth bars and spits are called tide pools.
OCEANS OF THE WORLD

Fill in the blanks below to complete the information about each ocean.

1. **Pacific Ocean**
   - How many squares miles does it cover? **63,800,000 square miles**
   - What are some continents that border it? **North America, South America, Australia, Asia**
   - What is its greatest depth? **36,198 feet**

2. **Atlantic Ocean**
   - How many squares miles does it cover? **31,530,000 square miles**
   - What are some continents that border it? **North America, South America, Europe, Africa**
   - What is its greatest depth? **14,000 feet**

3. **Indian Ocean**
   - How many squares miles does it cover? **28,356,000 square miles**
   - What are some continents that border it? **Africa, Australia**
   - What is its greatest depth? **25,344 feet**

4. **Arctic Ocean**
   - How many squares miles does it cover? **5,440,000 square miles**
   - What are some continents that border it? **North America, Europe, Asia**
   - What is its greatest depth? **17,880 feet**

5. **Antarctic Ocean**
   - How many squares miles does it cover? **opinions vary**
   - What are some continents that border it? **Antarctica**
   - What is its greatest depth? **not known for certain**
OCEAN LIFE

Both fish and mammals swim in the ocean. Although they appear similar, they are actually quite different. Use encyclopedias and library texts to fill in the chart below.

<table>
<thead>
<tr>
<th>How does it breathe?</th>
<th>through gills</th>
<th>through lungs</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does it propel itself through water?</td>
<td>with a tail fin attached vertically that moves side to side</td>
<td>with a wide tail fin that moves up and down</td>
</tr>
<tr>
<td>How does it reproduce offspring?</td>
<td>by laying eggs</td>
<td>by giving birth to live young</td>
</tr>
<tr>
<td>What type of body covering does it have?</td>
<td>scales</td>
<td>hair and soft skin</td>
</tr>
<tr>
<td>Is it warm-blooded or cold-blooded?</td>
<td>cold-blooded</td>
<td>warm-blooded</td>
</tr>
</tbody>
</table>
WORD SEARCH

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

Lagoon
Biologist
Spits
Abyssal
Tides
Trench
Guyout
Waves
Ocean
Undertow
Circle the phrase which best answers each question.

1. The ocean surface is warmest because:
   - it receives the most solar energy.
   - it has the largest amount of mineral and salt changes.
   - the tides are more active near the surface.
   - more animals live near the surface.

2. At what depths are the world's oceans near freezing?
   - below 1,000 meters
   - below 100 meters
   - below 500 meters
   - below 10,000 meters

3. Where is the lowest point in the ocean?
   - the Gulf Stream
   - the Peru-Chili Trench
   - the Mariana Trench
   - the Great Barrier Reef

4. Cold currents flow:
   - toward the poles.
   - on the eastern coast of a continent.
   - away from the equator.
   - toward the equator.

5. Spreading ridges underneath the ocean create:
   - warm and cold ocean currents.
   - prevailing wind patterns.
   - coral reefs.
   - mountains of igneous rock.
6. Seamounts:
   • occur mostly in the Pacific Ocean.
   • are typically cone-shaped and occasionally stick out above the ocean's surface to form islands.
   • are volcanic in origin.
   • all of the above.

7. Coral reefs:
   • can only be found in shallow waters no more than 100 meters deep.
   • are formed by animals and plants that remove calcium carbonate from the ocean water.
   • are found only in warm water where water temperature is at least 10 degrees centigrade.
   • B and C.

8. When are tides at their highest?
   • when the moon and the sun are lined up together opposite the Earth
   • during spring tides
   • when the moon is farthest from the Earth
   • A and B

9. Which of the following statements is false?
   • Ocean waves are largely created by the wind.
   • In the open ocean, waves are called swells.
   • As a wave's trough begins to touch bottom, the wave accelerates.
   • Incoming waves create off-shore sand bars and baymouth bars.

10. The seas have billions of tons of _____ that can be combined to create helium in a fusion reaction.
    • magnesium
    • petroleum
    • deuterium
    • copper
AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM and CD-i formats.

Persons or schools interested in obtaining additional copies of this AIMS Teaching Module, please contact:

AIMS Multimedia

1-800-FOR-AIMS
1-800-367-2467
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.
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.
The Geology of the Earth: Of Forces, Rocks, and Time

**THEMES**

*Geology of the Earth: Of Forces, Rocks, & Time* discusses the physical makeup of the planet Earth, including the three major types of rocks—sedimentary, igneous, and metamorphic. It also discusses the major influences on the topographic geology of the Earth, including the weathering of rocks through wind, water, and gravity. In addition, the program covers major geologic events like earthquakes, volcanoes, and glacial movement.

**OVERVIEW**

The Earth hasn’t always looked the way it does today. In fact, the process of weathering is constantly changing the face of Earth. The movement of wind and water plays an important role in the changing landscape. All of the rocks on Earth originated as magma. There are various types of sedimentary rocks, like sandstone, shale, and conglomerates. The three major types of rocks, igneous, metamorphic, and sedimentary, represent different stages of the rock cycle. Humanity has also played a role in the geology of the Earth by burning fossil fuels which have caused acid rain, a particularly bad kind of chemical weathering. The geology of Earth is dynamic and varied.

**OBJECTIVES**

- To better understand the rock cycle and the makeup of different types of rocks.
- To examine different types of weathering and their effects on the topology of the Earth.
- To explore the effects of gravity on different types of rocks and different regions of the planet.
- To look at different climates and their geologic makeup.
- To determine the effect that glacial movement has had on the Earth.
Use this page for your individual notes about planning and/or effective ways to manage this AIMS Teaching Module in your classroom.
INTRODUCTION TO THE PROGRAM

The study of geology, or “earth science,” encompasses many different sciences—mineralogy, meteorology, paleontology, volcanology and countless others. But in one manner or another, all of these fields are concerned with the structure and composition of the Earth. Traditionally, the study of the Earth has been broken down into two major areas: physical geology, the study of the materials and forces that make up the Earth, and historical geology, the history of the Earth. Some geology can be tedious and minute, like determining the chemical composition of rocks, while other areas, like studying earthquakes, volcanoes, and glaciers can be dramatic and exciting.

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.

geology - the study of the Earth
fossil - evidence of plant or animal life found on the surface of rocks or minerals
rock - solid mineral matter found in or on the ground or the ocean’s surface

DISCUSSION IDEAS

Geology can be broken down into two major branches: physical geology and historical geology. Ask students what some possible differences between the two could be. What might a physical geologist do that a historical geologist would not do, and vice versa? (Physical geology is the study of materials that make up the Earth and forces that shape the Earth. Historical geology is the study of the Earth’s history.)

FOCUS

Ask students to consider the importance of studying the history, formation and behavior of the Earth. How can learning about the Earth make our lives better and safer? How can we use geology to help future generations of humans, plants and animals?
JUMP RIGHT IN

HOW TO USE THE GEOLOGY OF THE EARTH: OF FORCES, ROCKS, AND TIME AIMS TEACHING MODULE

Preparation

- Read The Geology of the Earth: Of Forces, Rocks, and Time Themes, Overview, and Objectives to become familiar with program content and expectations.

- Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing THE GEOLOGY OF THE EARTH: OF FORCES, ROCKS, AND TIME

- 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 The Geology of the Earth: Of Forces, Rocks, and Time together or in small groups.

- Some students may benefit from viewing the video more than one time.

After Viewing THE GEOLOGY OF THE EARTH: OF FORCES, ROCKS, AND TIME

- 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

Connection to Geography

Write the words “volcano” and “earthquake” on the board and ask students to list several places on the planet where each exists. Is there some pattern? What do volcanoes and earthquakes have in common?

(Many earthquakes and volcanoes take place on what is known as the “ring of fire,” an area that borders the Pacific tectonic plate. Areas where volcanoes and earthquakes exist border active tectonic plates, and the eruption of lava or the movement of the earth are both common occurrences for these areas.)

Hands On

Ice wedges are an important part of mechanical weathering. Allow students to watch as you perform the following experiment. Fill a shoebox with soil, then firmly pack down the soil. Make a small crack with a knife and line the crack with plastic so it will hold water. Place water in the lined crack. Freeze the box. Did the soil move? Melt the ice, add more water to fill the plastic lining, and then refreeze the water. What happened?

(The size of the space will increase, as it does in the case of an ice wedge.)

Connection to Language Arts

Ask students to explain the literal meaning of the word “geology.” What is the origin of the word? Ask students if they know other words that contain the prefix geo- or the suffix -ology. What do these words mean?

(The word geology literally means the study of the earth. It comes from the Greek words ge, meaning Earth, and logos, meaning study. Other terms originating from the word ge include geography, or the study of Earth as it relates to life; geometry, or the branch of mathematics concerned with measuring various elements; and geomorphic, or that which relates to the form of the Earth. Words originating from the word logos include psychology, or the study of human behavior; sociology, or the study of human relationships and interaction; and biology, or the study of life.)
Link to the World

Geology can be divided into two basic subgroups: physical geology and historical geology. Within these two subgroups, there are many different branches of geological study. Ask students to discover as many of these branches as they can. What does each branch study? Is it a branch of physical or historical geology, or both?

(Branches of physical geology include meteorology, or the study of weather; limnology, or the study of inland bodies of water; oceanography, or the study of the oceans; climatology, or the study of Earth’s climate; geophysics, or the study of the structure and development of the Earth; mineralogy, or the study of rocks. Branches of historical geology include paleontology, or the study of fossils; and stratigraphy, or the study of the layers of rock in the Earth’s crust. Branches that cover both physical and historical geology include sedimentology, or the study of sediment; and geochronology, or the study of geologic time.)

Connection to History

Humans have always been curious about the Earth. Since the time of the ancient Greeks, they have wondered about the behavior of rocks, minerals and water. Ask each student to learn more about one of the subjects listed below. Using the Internet, library books and other resources, encourage them to write a short paper describing their findings.

The Agassiz Family
Georgius Agricola
Baron Cuvier
James D. Dana
Empedocles
Galileo
James Hall
Adolph Knopf
Sir Charles Lyell
Strabo
Eduard Suess

Writing

Ask students to imagine that they are sent to another universe to meet extraterrestrial beings. How would the students describe Earth? What would they say about its history, its form and its physical behavior. Encourage them to describe Earth as thoroughly as they can in a two-page summary. Remind them to include information about the Earth’s size, weather, atmosphere and surface.
Connection to Science

Much of geology is concerned with the study of rocks. There are three basic types of rock found on Earth: igneous rock, sedimentary rock and metamorphic rock. Ask students to describe how each type of rock was formed. Encourage them to use dictionaries and encyclopedias if they need help. Next, ask them to provide an example of each type of rock.

(Igneous rocks were formed when melted rock deep inside the Earth’s crust cooled and hardened. An example of igneous rock is granite. Sedimentary rocks were formed when pieces of the Earth’s crust were worn away by water and weather. An example of a sedimentary rock is sandstone. Metamorphic rocks were formed when igneous and sedimentary rocks deep inside the Earth’s crust were changed by heat and the weight of the crust.)

Meeting Individual Needs

Ask students to make sentences using the following words. Encourage them to use a dictionary if they are uncertain of the meanings.

• petroleum - deposits of oil found underground or beneath the ocean floor
• gravitation - a force manifested by movement of two objects toward each other
• paleontology - the study of the past geography of the Earth
• mineral - a solid crystalline element or compound that results from the inorganic processes of nature

Culminating Activity

During the late 1700s and early 1800s a great geological debate occurred concerning the formation of rocks. Neptunists, such as Abraham Gottlob Werner, believed that an ocean had once covered the Earth. They believed that chemicals in the water settled to the bottom and formed rocks. Plutonists, such as James Hutton, believed that hot lava from volcanoes formed rocks when it cooled. Since volcanoes continued to occur, Plutonists claimed that the Earth was still changing.

Divide students into two groups, with one group being Plutonists and the other being Neptunists. Using what they have learned in the unit, ask members of each side to continue the great Rock Debate. Wait until after the debate to tell students which side eventually prevailed.
VOCABULARY

The following terms are from *The Geology of the Earth: Of Forces, Rocks, and Time*. Fill in the number of each term next to its closest definition.

1. delta  6. mechanical weathering
2. extrusive rock  7. stalactites
3. intrusive rock  8. stalagmites
4. gorge  9. chemical weathering
5. magma  10. igneous rock

___ stone formations that usually hang from the roofs of limestone caves
___ rock formed by the cooling of magma
___ the breaking down of rock by the effects of chemicals on the rock
___ formed when magma solidifies into rock beneath the Earth's surface
___ a build up of sedimentary particles, usually occurring at the mouth of a river
___ stone formations that usually rise from the floors of some limestone caves
___ the molten material beneath the Earth's crust
___ formed when magma from beneath the Earth's surface flows onto the surface, cools, and hardens into rock
___ the splitting of rocks by the expansion of water in cracks of the rock
___ a narrow cut-out made through hard rock, usually the result of a rapidly descending mountain river
CHECKING COMPREHENSION

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

The Earth hasn’t always looked the way it does today. In fact, the process of __1__ is constantly changing the face of Earth. The movement of __2__ plays an important role in the changing landscape. All of the rocks on Earth originated as __3__. There are various types of __4__ rocks, like sandstone, shale, and conglomerates. Sedimentary rocks are generally formed by __5__. The three major types of rocks—igneous, metamorphic, and sedimentary—represent different stages of the __6__. Humanity has also played a role in the geology of the Earth by burning fossil fuels which have caused __7__, a particularly bad kind of chemical weathering. Landslides, mudslides and __8__ are all caused by gravity. The __9__ capacity of a river refers to the amount of sediment, sand, and rocks it can carry. There are two types of glaciers: valley glaciers, like those in Alaska, and __10__ glaciers, like those in Antarctica.

1. A. gravity  
   B. sedimentation  
   C. weathering  
   D. magma

2. A. wind  
   B. glaciers  
   C. water  
   D. all of the above

3. A. sedimentary rocks  
   B. igneous rocks  
   C. magma  
   D. metamorphic rocks

4. A. sedimentary  
   B. basalt  
   C. igneous  
   D. metamorphic

5. A. glaciers  
   B. lava  
   C. wind and water  
   D. gravity

6. A. Earth’s crust  
   B. rock cycle  
   C. intrusive cycle  
   D. stalactite cycle

7. A. magma  
   B. stalagmites  
   C. acid rain  
   D. erosion

8. A. creep  
   B. sand dunes  
   C. geysers  
   D. extrusive rock formations

9. A. flood bearing  
   B. speed  
   C. discharge  
   D. load carrying

10. A. sedimentary  
    B. continental  
    C. plate  
    D. mountain
GEOLOGY LOCATIONS

Place the letter of each location next to the phrase which best applies to it.

A. Alaska
B. Mississippi delta
C. Grand Canyon
D. Himalayan Mountains
E. Anasazi Indian caves
F. California coast
G. Great Sand Dunes
H. Bridalveil falls

___ formed over thousands of years because of the thawing and freezing of water
___ the sight of frequent mudslides and landslides
___ valley glaciers are located here
___ an area which contains large deposits of river sediment
___ created by wind moving small particles of sediment
___ caused by slow moving glaciers
___ an example of sedimentary rock showing clear lines of stratification
___ the result of colliding plates beneath the Earth’s surface
TRUE OR FALSE

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

1. ___ Rocks formed by the cooling of lava are called sedimentary rocks.
2. ___ Most mountain ranges are made up of intrusive rocks like granite.
3. ___ The rocks of the Grand Canyon show layers of stratification.
4. ___ Coal is an example of metamorphic rock.
5. ___ Mechanical weathering occurs when the roots of a tree invade a rock and break it apart.
6. ___ Mountain rivers typically flow slower than lowland rivers.
7. ___ Glaciers never existed as far south as Yosemite National Park.
8. ___ Sand dunes are caused by wind.
9. ___ Marble is limestone that was heated and pressurized by natural forces.
10. ___ Originally, the only types of rock on Earth were igneous and extrusive.
### NUMBER CODE

Use the code below to read the following facts about Earth.

<table>
<thead>
<tr>
<th>A</th>
<th>H</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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1. The Earth ranks 4-6-4-14-5 in size among the planets.

2. The Earth is not perfectly round, but slightly flattened at the 11-10-8-3-12.

3. Seventy perfect of the Earth’s 13-15-12-4-1-2-3 is comprised of water.

4. All bodies of 16-1-14-3-12 make a portion of the Earth known as the hydrosphere.

5. Almost half of the Earth’s 2-12-15-13-14 is comprised of oxygen.

6. The core of the Earth is probably made of solid iron and 9-6-2-7-8-3.

7. 12-1-6-9 is one of the most common forms of chemical weathering.

8. Wind and water are primary causes of 3-12-10-13-6-10-9.
EARTH AT A GLANCE

Use an encyclopedia and other texts to fill in the blanks below.

1. The Earth’s weight in tons:
   _______________________________________________

2. Polar Diameter in miles (distance through the Earth from the North Pole to the South Pole):
   _______________________________________________

3. Equatorial Diameter in miles (distance through the Earth at the equator):
   _______________________________________________

4. Polar Circumference in miles (distance around the Earth through the poles):
   _______________________________________________

5. Equatorial Circumference in miles (distance around the Earth at the equator):
   _______________________________________________

6. Total Surface Area in square miles:
   _______________________________________________

7. Land Area in square miles:
   _______________________________________________

8. Water Area in square miles:
   _______________________________________________

9. Highest Point on Land in feet:
   _______________________________________________

10. Deepest Part of the Ocean in feet:
    _______________________________________________
WORD SEARCH

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

Mantle
Polar
Diamond
Basalt
Glacier
Limestone
Fossil
Acid rain
Himalaya
Crust

© Copyright 1999  AIMS Multimedia  The Geology of the Earth: Of Forces, Rocks, and Time
Circle the phrase which best answers each question.

1. Oxidation is an example of:
   - mechanical weathering.
   - chemical weathering.
   - wind action.
   - erosion.

2. The point at which a glacier's rate of movement is equal to its rate of melting is the:
   - ice front.
   - terminal moraine.
   - lateral moraine.
   - medial moraine.

3. Which of these does not shape the Earth's surface?
   - glaciers
   - forces below the Earth’s crust
   - waves
   - basalt

4. Conglomerates, sandstone, and shale are examples of:
   - intrusive rocks.
   - lava.
   - igneous rocks.
   - sedimentary rocks.

5. The areas where plates come together and move apart are prone to:
   - wind and rain storms.
   - glacial movement and melting.
   - high waves and tides.
   - the most geologic activity on Earth.
6. The sand dunes at Death Valley are an example of shaping the Earth through:
   - earthquakes.
   - wind.
   - volcanic activity.
   - chemical weathering.

7. “Acid Rain” is an example of:
   - chemical weathering.
   - industrial pollution.
   - a threat to plants and animals.
   - all of the above.

8. Igneous rocks are formed by:
   - blowing wind.
   - erosion of the Earth’s crust.
   - cooling of the Earth’s crust.
   - cooling of magma.

9. Diamond is an example of:
   - sedimentary rock.
   - igneous rock.
   - metamorphic rock.
   - a moraine.

10. Landslides, mudslides, and creep are caused by:
    - wind.
    - gravity.
    - volcanic activity.
    - glacial moraines.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

Earth Science Essentials Series
   The Universe: The Vast Frontier
   The Solar System: Our Neighbors in Space
   Oceans: Charting the Vastness
   Weather: The Chaos Which Surrounds Us
   The History of the Earth: Over the Eons
VOCABULARY

The following terms are from *The Geology of the Earth: Of Forces, Rocks, and Time*. Fill in the number of each term next to its closest definition.

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<tr>
<td>9</td>
<td>chemical weathering</td>
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<tr>
<td>10</td>
<td>igneous rock</td>
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</table>

7. stone formations that usually hang from the roofs of limestone caves
10. rock formed by the cooling of magma
9. the breaking down of rock by the effects of chemicals on the rock
3. formed when magma solidifies into rock beneath the Earth’s surface
1. a build up of sedimentary particles, usually occurring at the mouth of a river
8. stone formations that usually rise from the floors of some limestone caves
5. the molten material beneath the Earth’s crust
2. formed when magma from beneath the Earth’s surface flows onto the surface, cools, and hardens into rock
6. the splitting of rocks by the expansion of water in cracks of the rock
4. a narrow cut-out made through hard rock, usually the result of a rapidly descending mountain river
CHECKING COMPREHENSION

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

The Earth hasn’t always looked the way it does today. In fact, the process of __1__ is constantly changing the face of Earth. The movement of __2__ plays an important role in the changing landscape. All of the rocks on Earth originated as __3__. There are various types of __4__ rocks, like sandstone, shale, and conglomerates. Sedimentary rocks are generally formed by __5__. The three major types of rocks—igneous, metamorphic, and sedimentary—represent different stages of the __6__. Humanity has also played a role in the geology of the Earth by burning fossil fuels which have caused __7__, a particularly bad kind of chemical weathering. Landslides, mudslides and __8__ are all caused by gravity. The __9__ capacity of a river refers to the amount of sediment, sand, and rocks it can carry. There are two types of glaciers: valley glaciers, like those in Alaska, and __10__ glaciers, like those in Antarctica.

1. A. gravity  
   B. sedimentation  
   C. weathering  
   D. magma

2. A. wind  
   B. glaciers  
   C. water  
   D. all of the above

3. A. sedimentary rocks  
   B. igneous rocks  
   C. magma  
   D. metamorphic rocks

4. A. sedimentary  
   B. basalt  
   C. igneous  
   D. metamorphic

5. A. glaciers  
   B. lava  
   C. wind and water  
   D. gravity

6. A. Earth's crust  
   B. rock cycle  
   C. intrusive cycle  
   D. stalactite cycle

7. A. magma  
   B. stalagmites  
   C. acid rain  
   D. erosion

8. A. creep  
   B. sand dunes  
   C. geysers  
   D. extrusive rock formations

9. A. flood bearing  
   B. speed  
   C. discharge  
   D. load carrying

10. A. sedimentary  
    B. continental  
    C. plate  
    D. mountain
GEOLOGY LOCATIONS

Place the letter of each location next to the phrase which best applies to it.

A. Alaska
B. Mississippi delta
C. Grand Canyon
D. Himalayan Mountains
E. Anasazi Indian caves
F. California coast
G. Great Sand Dunes
H. Bridalveil falls

E ___ formed over thousands of years because of the thawing and freezing of water
F ___ the sight of frequent mudslides and landslides
A ___ valley glaciers are located here
B ___ an area which contains large deposits of river sediment
G ___ created by wind moving small particles of sediment
H ___ caused by slow moving glaciers
C ___ an example of sedimentary rock showing clear lines of stratification
D ___ the result of colliding plates beneath the Earth’s surface
TRUE OR FALSE

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

1. F  Rocks formed by the cooling of lava are called sedimentary rocks.
2. T  Most mountain ranges are made up of intrusive rocks like granite.
3. T  The rocks of the Grand Canyon show layers of stratification.
4. F  Coal is an example of metamorphic rock.
5. T  Mechanical weathering occurs when the roots of a tree invade a rock and break it apart.
6. F  Mountain rivers typically flow slower than lowland rivers.
7. F  Glaciers never existed as far south as Yosemite National Park.
8. T  Sand dunes are caused by wind.
9. T  Marble is limestone that was heated and pressurized by natural forces.
10. F  Originally, the only types of rock on Earth were igneous and extrusive.
ANSWER KEY for page 22

NUMBER CODE

Use the code below to read the following facts about Earth.

A = 1  H = 5  N = 9
C = 2  I = 6  O = 10
E = 3  K = 7  P = 11
F = 4  L = 8  R = 12

1. The Earth ranks 4-6-4-14-5 in size among the planets.
   fifth
   __________________________

2. The Earth is not perfectly round, but slightly flattened at the 11-10-8-3-12.
   poles
   __________________________

3. Seventy perfect of the Earth's 13-15-12-4-1-2-3 is comprised of water.
   surface
   __________________________

4. All bodies of 16-1-14-3-12 make a portion of the Earth known as the hydrosphere.
   water
   __________________________

5. Almost half of the Earth's 2-12-15-13-14 is comprised of oxygen.
   crust
   __________________________

6. The core of the Earth is probably made of solid iron and 9-6-2-7-8-3.
   nickel
   __________________________

7. 12-1-6-9 is one of the most common forms of chemical weathering.
   Rain
   __________________________

8. Wind and water are primary causes of 3-12-10-13-6-10-9.
   erosion
   __________________________
EARTH AT A GLANCE

Use an encyclopedia and other texts to fill in the blanks below.

1. The Earth’s weight in tons: 
   6,600,000,000,000,000,000,000

2. Polar Diameter in miles (distance through the Earth from the North Pole to the South Pole): 
   7,899.83 miles

3. Equatorial Diameter in miles (distance through the Earth at the equator): 
   7,926.41

4. Polar Circumference in miles (distance around the Earth through the poles): 
   24,859.82

5. Equatorial Circumference in miles (distance around the Earth at the equator): 
   24,901.55

6. Total Surface Area in square miles: 
   196,940,400

7. Land Area in square miles: 
   57,280,000

8. Water Area in square miles: 
   139,660,400

9. Highest Point on Land in feet: 
   29,028 - Mt. Everest

10. Deepest Part of the Ocean in feet: 
    36,198 - Challenger Deep in the Pacific Ocean
WORD SEARCH

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

Mantle  
Polar  
Diamond  
Basalt  
Glacier  
Limestone  
Fossil  
Acid rain  
Himalaya  
Crust

© Copyright 1999 AIMS Multimedia The Geology of the Earth: Of Forces, Rocks, and Time
Circle the phrase which best answers each question.

1. Oxidation is an example of:
   - mechanical weathering.
   - chemical weathering. 
   - wind action.
   - erosion.
   - chemical weathering.

2. The point at which a glacier’s rate of movement is equal to its rate of melting is the:
   - ice front.
   - terminal moraine.
   - lateral moraine.
   - medial moraine.
   - ice front.

3. Which of these does not shape the Earth’s surface?
   - glaciers
   - forces below the Earth’s crust
   - waves
   - basalt
   - basalt

4. Conglomerates, sandstone, and shale are examples of:
   - intrusive rocks.
   - lava.
   - igneous rocks.
   - sedimentary rocks.
   - sedimentary rocks.

5. The areas where plates come together and move apart are prone to:
   - wind and rain storms.
   - glacial movement and melting.
   - high waves and tides.
   - the most geologic activity on Earth.
   - the most geologic activity on Earth.
6. The sand dunes at Death Valley are an example of shaping the Earth through:

- earthquakes.
  - **wind.**
- volcanic activity.
- chemical weathering.

7. “Acid Rain” is an example of:

- chemical weathering.
- industrial pollution.
- a threat to plants and animals.
  - **all of the above.**

8. Igneous rocks are formed by:

- blowing wind.
- erosion of the Earth’s crust.
- cooling of the Earth’s crust.
  - **cooling of magma.**

9. Diamond is an example of:

- sedimentary rock.
- igneous rock.
- **metamorphic rock.**
- a moraine.

10. Landslides, mudslides, and creep are caused by:

- wind.
  - **gravity.**
- volcanic activity.
- glacial moraines.
AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM and CD-i formats.

Persons or schools interested in obtaining additional copies of this AIMS Teaching Module, please contact:
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.
**THEMES**

*The History of the Earth: Over the Eons* is a complete media program designed to teach students about the history and evolution of the earth. This program covers the four major blocks of Earth's history: Precambrian, Paleozoic, Mesozoic, and Cenozoic, with special emphasis on fossils, biology and the changes in Earth's geology.

**OVERVIEW**

Scientists theorize that the Earth began over 4 billion years ago as a mass of condensed dust particles and gasses. From the earliest formation of the planet to the modern era, *The History of the Earth: Over the Eons* motivates viewers see the enormous changes that have taken place on Earth. Students see life from the emergence of microorganisms in hot springs to modern humans. The changing geography and climate of Earth are evaluated in the larger context of an evolving planet.

**OBJECTIVES**

- To understand the forces responsible for the creation and evolution of the earth.
- To categorize and interpret the periods of earth's history.
- To see the relationship between species and organisms throughout time.
- To demonstrate the ongoing changes in the earth's geography and climate.
- To study the keys for unlocking ancient geologic history.
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

The History of the Earth: Over the Eons will help students to better understand the long and diverse history of the planet. The program offers a comprehensive look at the geologic and biologic history of Earth. Students will examine the structural makeup of the planet, including the very composition of the Earth’s layers. They will see the growth, and sometimes the extinction, of diverse life forms. Students will also examine each of the major periods in Earth’s history and examine the geology and biology particular to that era. This program encourages students to see themselves as part of a long history of the ever-changing life on Earth.

INTRODUCTION TO VOCABULARY

Write the words “fossil,” “Paleozoic,” and “Pangea” on the board. Ask students to look up the meaning of each word. How is each word important to understanding the evolution of the planet?

(A “fossil” is any hardened remains, impressions or traces of plant or animal life of some previous geological period. “Paleozoic” refers to one of four blocks of time dealing with the history of Earth. It began 560 million years ago and ended 240 million years ago. “Pangea” was a supercontinent that existed in the early Mesozoic Era. Starting about 180 million years ago, faulting and igneous activity in Europe, North America, South America, and Africa split Pangea into two parts, called Gondwana and Laurasia.)

FOCUS

Tell students they are embarking on a journey through time, beginning with the formation of the Earth, traveling through the land of the dinosaurs, and winding up with the domination of humans and our modern world. Throughout all of time, the geology and geography of the planet has been changing, and it’s changing even now. Students should learn to see the vast and ongoing metamorphosis in Earth’s history and understand their place on Earth’s timeline.

DISCUSSION IDEAS

Ask students to think about the relatively short amount of time humans have been on the planet. Despite this short period of time, the impact that humans have had on the Earth is as great as anything in the past 4 billion years. What are some positive and negative things that humankind has done for the planet? Are humans, like dinosaurs, facing inevitable extinction? Why or why not?
JUMP RIGHT IN

HOW TO USE THE THE HISTORY OF THE EARTH: OVER THE EONS AIMS TEACHING MODULE

Preparation

› Read The History of the Earth: Over the Eons Themes, Overview, and Objectives to become familiar with program content and expectations.

› Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing THE HISTORY OF THE EARTH: OVER THE EONS

› 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 The History of the Earth: Over the Eons together or in small groups.

› Some students may benefit from viewing the video more than one time.

After Viewing THE HISTORY OF THE EARTH: OVER THE EONS

› 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

Ask students to imagine for a minute that they have been transported back to the very first days of Earth's existence. They have an hour to write a report about what they saw, then they've got to come back to the present and convince everyone that they were really there. What would the Earth look like? What smells would be present? Are there any animals to see? How about plants? Is it hot or cold? What does the sky look like? Students can write their essays any way they choose—like a newspaper article or a short story, for example. Encourage them to be creative.

(The early Earth would have been very inhospitable, with immense heat and no life. The atmosphere probably contained very little oxygen. It took millions of years for the Earth's crust to take a final shape. During the early years of formation, the crust was still changing.)

Connection to Nature Sciences

From dinosaurs to mammoths, animals have had to either adapt to changing climates or die. Ask students to choose an animal that is currently endangered. Encourage them to learn more about how the animal is threatened and what is being done to save it. Is the animal threatened by nature, human hunting, or some other human activity? What are some things people are doing to keep the endangered animal from extinction? Have students present their findings to the class.

Meeting Individual Needs

The history of the planet is divided into four major eras: Precambrian, Paleozoic, Mesozoic, and Cenozoic. Each of these eras also contains smaller periods. Use a dictionary to label each era's sub-periods.

(Precambrian isn't generally broken down any further; Paleozoic: Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian; Mesozoic: Triassic, Jurassic, Cretaceous; Cenozoic: Paleocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene, Holocene.)
**Connection to Science**

When the Earth was first formed, the heavier materials sank to the middle of the planet while the lighter elements floated to the top. Students can recreate this geologic principle with a simple experiment. Get a glass jar with a lid, and fill it half way with soil, small pebbles and bigger rocks—use an equal amount of each. Then put water in the jar so it is half full. Shake up the jar and let it sit for one week. Did any layers form? What is the bottom layer? What is the top layer? Why is there a difference between the two layers?

(The heavier rocks should sink to the bottom due to gravitational pull.)

**Extended Activity**

A major theory explaining the extinction of the dinosaurs involves a meteorite striking the Earth and changing the climate. In recent years, Hollywood has put out a handful of movies about the possibility of a meteorite hitting Earth. How much truth is in these films? What effect would a meteorite have on humans? How have meteor impacts affected the moon and planets in our solar system?

(Small fragments of meteors have hit the Earth in the past. A large meteor could hit the Earth and cause extensive damage. With no atmosphere to protect it, the moon is constantly bombarded with meteors—the visible craters and pock marks on the moon are the result.)

**Critical Thinking**

During the late 19th and early 20th century, many geologists put forth the idea that the continents may have begun as one land mass, Pangea. This “super-continent” later broke up and drifted across the Earth’s surface, creating the modern continents. This theory, known as plate tectonics, is now widely accepted as correct. How does plate tectonics affect life on Earth now? How are volcanoes related to the movement of the continents?

(Plate tectonics affect us because they often result in earthquakes and volcanic eruptions. The plates are still in motion today and are fueled with magma from the Earth’s core—similar to the lava of volcanoes.)
**Connection to Language Arts**

The mighty Sequoia, which first appeared during the Cretaceous Period, is bigger than dinosaurs or whales and is older than almost any living thing on Earth. Many people have respect for these ancient creatures, but others want to cut them down and use them for wood. Think about the following quote from Edwin Way Teal, “Any fine morning a power saw can fell a tree that took a thousand years to grow.” How does this reflect humanity’s ability to alter an ecosystem? Ask students to write a paragraph describing their feelings on this subject.

(This question should open a debate about economy versus ecology and man’s responsibility as caretaker of the planet.)

**Connection to History**

Radiocarbon dating, discovered in 1947 by a chemist, Willard Libby, determines the age of organic matter such as dinosaur bones. Ask students to go to the library and see what they can find on Libby and radiocarbon dating. What was the effect of Libby’s discovery on the scientific community? How effective is radiocarbon dating? What are more recent ways of dating fossils?

(Libby’s discovery was revolutionary and won him a Nobel prize. Most scientists agree that radiocarbon dating is useful for dating items back to at least 50,000 years. But the ratio of carbon in an organism older than that isn’t know, and therefore may be inaccurately measured using radiocarbon dating. By the early 1950’s, better systems of measurement had been devised, including a gas counter and a liquid scintillation system. Even now scientists are working on more accurate methods of carbon dating.)

**Culminating Activity**

Provide students with a long sheet of art paper and colored markers. Ask them to make a timeline of the Earth’s history, dividing the line into the four major eras. Within each era, have them add details about the Earth’s history, such as written facts, or illustrations of plants and animals that lived during that era. Display the timeline on a classroom wall or in a nearby hallway.
# VOCABULARY

The following terms are from *The History of the Earth: Over the Eons*. Fill in the number of each term next to its closest definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
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<td>the first vertebrates, as well as the first fish on Earth</td>
</tr>
<tr>
<td>2. Brachiopods</td>
<td>the northern part of Pangea</td>
</tr>
<tr>
<td>3. Laurasia</td>
<td>began over 11,000 years ago; a period of the Cenozoic Era</td>
</tr>
<tr>
<td>4. Sedimentary Rock</td>
<td>organisms having a backbone or skeletal column</td>
</tr>
<tr>
<td>5. Trilobite</td>
<td>believed to be the first living organisms on Earth</td>
</tr>
<tr>
<td>6. Blue-green algae</td>
<td>sea animals with bivalve shells (like clams)</td>
</tr>
<tr>
<td>7. Ostracoderms</td>
<td>formed when minerals or plant and animal remains settle and are eventually</td>
</tr>
<tr>
<td></td>
<td>compressed into rock</td>
</tr>
<tr>
<td>8. Jurassic Period</td>
<td>the second period of the Mesozoic Era, marked by the reign of dinosaurs</td>
</tr>
<tr>
<td>9. Shields</td>
<td>hard-shelled animal life which began during the Cambrian Period</td>
</tr>
<tr>
<td>10. Vertebrates</td>
<td>mountain ranges formed during the Precambrian Era</td>
</tr>
</tbody>
</table>

© Copyright 1999  AIMS Multimedia  *The History of the Earth: Over the Eons*
CHECKING COMPREHENSION

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

The ___1___ Period makes up nearly 4 billion years, or 85%, of geologic time. Many fossils, like ___2___ , are from the ___3___ Period. By the end of the Ordovician Period, the ancestors of nearly all ___4___ had appeared. Another period of Earth’s history, the ___5___ Period, is known as the period of the fishes. Dinosaurs are another exciting part of Earth’s history, with the largest plant-eaters, ___6___ , weighing about 45 metric tons. Despite all the millions of years that came before, it wasn’t until the Cenozoic Era that ___7___ first appeared. In any study of the Earth, it’s also important to look at the early geography of the Earth, especially the single super-continent ___8___ . The most recent major event in Earth’s history is the ___9___ , which ended only ___10___ years ago.

1. A. Precambrian  
   B. Mesozoic  
   C. Cambrian  
   D. Jurassic

2. A. spores  
   B. igneous rocks  
   C. trilobites  
   D. mammals

3. A. Carboniferous  
   B. Mesozoic  
   C. Cambrian  
   D. Cenozoic

4. A. humans  
   B. hard-shelled sea life  
   C. plants  
   D. elephants

5. A. Cretaceous  
   B. Devonian  
   C. Mesozoic  
   D. Silurian

6. A. T-Rex  
   B. Brachiopod  
   C. Archeopteryx  
   D. Brachiosaurus

7. A. mammals  
   B. plants  
   C. humans  
   D. vertebrates

8. A. Laurasia  
   B. Antarctica  
   C. Pangea  
   D. Africa

9. A. Ice Age  
   B. Cenozoic Age  
   C. Mammalian Age  
   D. Jurassic Period

10. A. 5,000  
    B. 11,000  
    C. 100,000  
    D. 1,000
MATTER MATCH-UP

Match each term on the left with the best group of words on the right.

1. Mammoth  means of reproduction for some plants
2. Igneous  sinking area of what became North America
4. Appalachian Geosyncline  the first rocks created during Precambrian time; shaped by lava
5. Mesabi Range  hard-shelled animal which began during the Cambrian Period
6. Reptiles  ancestor of giant redwood trees; appeared during Cretaceous Period
7. Trilobite  a large, hairy mammal that lived during the Cenozoic Period
8. Sequoia  a chain of hills that formed on Precambrian shields
TRUE OR FALSE

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

1. ___ The longest period of time in the Earth's history is the Precambrian era.
2. ___ Pangea is believed to be the first living organism on Earth.
3. ___ Trilobites and brachiopods lived during the Cambrian Period.
4. ___ The Ostracoderm is a period of the Paleozoic Era.
5. ___ The Silurian Period was unique because it had no land plants.
6. ___ Reptiles first appeared during the Carboniferous Period.
7. ___ During the Carboniferous Period, much of what is now the Eastern U.S. was under water.
8. ___ The smallest adult dinosaurs were only a few centimeters long.
9. ___ During the Jurassic Period, all of the dinosaurs and mammals of the time were wiped out by a meteor.
10. ___ The ice-age took place during the Cenozoic Era.
Unscramble the bolded word or words in each sentence below.

1. Heavy metals like **noir** and **cenlki** sank to the Earth’s core as the planet formed.  
   ____________________________________________

2. The earliest forms of life on Earth were found in **tho rpnissg**.  
   ____________________________________________

3. **Sroneio** has worn down the Earth’s earliest mountains.  
   ____________________________________________

4. Scientists can better understand early life forms by studying **slfsios**.  
   ____________________________________________

5. Scientists think that all of the Earth’s land was once joined. They called this land **eapnag**.  
   ____________________________________________

6. The **Ordovician** Period is marked by an increase in organisms and by heavy **sdfolo**.  
   ____________________________________________

7. The cap of the famous Niagara Falls was formed during the **uaisrinl** Period.  
   ____________________________________________

8. It was during the **scoemoiz** Era that the continents began to split up into their current form.  
   ____________________________________________

9. About 11,000 years ago marked the end of the last great **eic gea**.  
   ____________________________________________

10. Human beings have **peatdda** to various climate and geographic changes throughout their history.  
    ____________________________________________
EARTH'S HISTORY

Each fact below corresponds with one of the four major periods of Earth’s history. Next to each fact, write the period that it describes: Precambrian, Paleozoic, Mesozoic or Cenozoic.

1. ___________________________ Occurred 560 to 240 million years ago.
2. ___________________________ The first algae and bacteria formed during this age.
3. ___________________________ Dinosaurs appeared and died out during this era.
4. ___________________________ Occurred 65 million years ago to present.
5. ___________________________ The Carboniferous Period took place during this era.
6. ___________________________ Primitive apes, cats and dogs first appeared during this period.
7. ___________________________ Occurred 230 to 65 million years ago.
8. ___________________________ Occurred 4.5 billion to 560 million years ago.
**WORD SEARCH**

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

- Spores
- Sequoia
- Mammoth
- Clams
- Cenozoic
- Igneous
- Fossil
- Dinosaur
- Mesozoic
- Reptile

```
S R R S D O F I L O S D
P D E D I L O Z I C I I
R I T P F N S S P O G N
E S N S T C S M S O N O
P C E N A I I I E S Z E S
C E L A M S L Z C I O A
L N G A T C R E L T U U
Q O M A M M O T H Z S R
U Z I R R S P O R E S E
A O M E M A T R P J Q T
I I Z C S E Q U O I A Z
T C M E S O Z I C R T C
```
Circle the phrase which best answers each question.

1. Which of these is not a division of the Paleozoic Era?
   - Cambrian
   - Mesozoic
   - Ordovician
   - Carboniferous

2. Which of these is not a theory about why there was mass extinction during the Cretaceous Period?
   - disease
   - climate change
   - low ratio of males to females
   - meteor hit

3. The first dinosaurs and small, primitive mammals appeared during the _____ Period.
   - Jurassic
   - Devonian
   - Mesozoic
   - Triassic

4. The main key to unlocking the history of our planet lies in the Earth’s:
   - atmosphere.
   - volcanoes.
   - crust.
   - rivers.

5. Ice sheets formed during the _____ Era.
   - Paleozoic
   - Devonian
   - Precambrian
   - Cenozoic
6. Which of these is a division of the Mesozoic Era?
   • Triassic
   • Jurassic
   • Cretaceous
   • all of these

7. In the Mesozoic Era, Pangea split into:
   • North Pangea and South Pangea.
   • Arctic and Antarctic.
   • Africa and Australia.
   • Gondwana and Laurasia.

8. Humans appeared during the _____ Era.
   • Cenozoic
   • Carboniferous
   • Mesozoic
   • Cambrian
   • Permian

9. The earliest geologic period was the _____, in which _____ appeared.
   • Paleolithic...trilobites
   • Ordovician...geosynclines
   • Silurian...land animals
   • Mesozoic...cone-bearing fruit trees
   • Precambrian...primitive invertebrates

10. The coal fields of Pennsylvania and West Virginia come from peat deposited during the _____ Period.
    • Cretaceous
    • Cambrian
    • Cenozoic
    • Carboniferous
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

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  The Universe: The Vast Frontier
  Geology of the Earth: Of Forces, Rocks, & Time
  Weather: The Chaos Which Surrounds Us
  The Solar System: Our Neighbors in Space
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   B. Mesozoic  
   C. Cambrian  
   D. Jurassic  

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   B. Brachiopod  
   C. Archeopteryx  
   D. Brachiosaurus  

2. A. spores  
   B. igneous rocks  
   C. trilobites  
   D. mammals  

7. A. mammals  
   B. plants  
   C. humans  
   D. vertebrates  

3. A. Carboniferous  
   B. Mesozoic  
   C. Cambrian  
   D. Cenozoic  

8. A. Laurasia  
   B. Antarctica  
   C. Pangea  
   D. Africa  

4. A. humans  
   B. hard-shelled sea life  
   C. plants  
   D. elephants  

9. A. Ice Age  
   B. Cenozoic Age  
   C. Mammalian Age  
   D. Jurassic Period  

5. A. Cretaceous  
   B. Devonian  
   C. Mesozoic  
   D. Silurian  

10. A. 5,000  
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Match each term on the left with the best group of words on the right.

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   - a large, hairy mammal that lived during the Cenozoic Period

2. Igneous
   - the first rocks created during Precambrian time; shaped by lava

3. Spores
   - means of reproduction for some plants

4. Appalachian Geosyncline
   - sinking area of what became North America

5. Mesabi Range
   - ancestor of giant redwood trees; appeared during Cretaceous Period

6. Reptiles
   - appeared during Paleozoic Era; looked like lizards.

7. Trilobite
   - hard-shelled animal which began during the Cambrian Period

8. Sequoia
   - a chain of hills that formed on Precambrian shields
TRUE OR FALSE

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

1. **T**  The longest period of time in the Earth’s history is the Precambrian era.

2. **F**  Pangea is believed to be the first living organism on Earth.

3. **T**  Trilobites and brachiopods lived during the Cambrian Period.

4. **F**  The Ostracoderm is a period of the Paleozoic Era.

5. **F**  The Silurian Period was unique because it had no land plants.

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8. **T**  The smallest adult dinosaurs were only a few centimeters long.

9. **F**  During the Jurassic Period, all of the dinosaurs and mammals of the time were wiped out by a meteor.

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WORD SCRAMBLE

Unscramble the bolded word or words in each sentence below.

1. Heavy metals like noir and cenlki sank to the Earth’s core as the planet formed.
   ___________________________________
   iron, nickel

2. The earliest forms of life on Earth were found in tho rpnissg.
   ___________________________________
   hot springs

3. Sroneio has worn down the Earth’s earliest mountains.
   ___________________________________
   Erosion

4. Scientists can better understand early life forms by studying sifsios.
   ___________________________________
   fossils

5. Scientists think that all of the Earth’s land was once joined. They called this land eapnag.
   ___________________________________
   Pangea

6. The Ordovician Period is marked by an increase in organisms and by heavy sdfolo.
   ___________________________________
   floods

7. The cap of the famous Niagara Falls was formed during the uaisrinl Period.
   ___________________________________
   Silurian

8. It was during the scoemoiz Era that the continents began to split up into their current form.
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9. About 11,000 years ago marked the end of the last great eic gea.
   ___________________________________
   ice age

10. Human beings have peatdda to various climate and geographic changes throughout their history.
    ___________________________________
    adapted
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2. ___________________________  
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3. ___________________________  
   Dinosaurs appeared and died out during this era.

4. ___________________________  
   Occurred 65 million years ago to present.

5. ___________________________  
   The Carboniferous Period took place during this era.

6. ___________________________  
   Primitive apes, cats and dogs first appeared during this period.

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   Occurred 230 to 65 million years ago.

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Spores
Sequoia
Mammoth
Clams
Cenozoic
Igneous
Fossil
Dinosaur
Mesozoic
Reptile
TEST

Circle the phrase which best answers each question.

1. Which of these is not a division of the Paleozoic Era?
   - Cambrian
   - Mesozoic
   • Ordovician
   • Carboniferous

2. Which of these is not a theory about why there was mass extinction during the Cretaceous Period?
   • disease
   • climate change
   • low ratio of males to females
   • meteor hit

3. The first dinosaurs and small, primitive mammals appeared during the _____ Period.
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   • Devonian
   • Mesozoic
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4. The main key to unlocking the history of our planet lies in the Earth’s:
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   • Precambrian
   • Cenozoic
6. Which of these is a division of the Mesozoic Era?
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   - Jurassic
   - Cretaceous
   - All of these

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10. The coal fields of Pennsylvania and West Virginia come from peat deposited during the _____ Period.
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    - Cambrian
    - Cenozoic
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AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM and CD-I formats.

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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.
The Solar System: Our Neighbors in Space

THEMES

The Solar System: Our Neighbors in Space explores our solar system from its inception over 5 billion years ago. The program covers the nebula theory, the idea that the universe began as swirling matter that formed the planets. It also discusses asteroids, meteors, and the differences between terrestrial and Jovian planets. In addition, students will see the similarities and differences in the chemical makeup of each planet.

OVERVIEW

The nebula theory is the most prevalent theory about the creation of the solar system. Several of the planets in the solar system are terrestrial planets, which means that they are rocky and Earth-like, while others are called Jovian planets—these are mostly gaseous. An asteroid belt between Mars and Jupiter separates the terrestrial and Jovian planets, though Pluto doesn’t really fit into either category. Students will examine the composition of each planet, including its surface, atmosphere and satellites.

OBJECTIVES

- To understand the origins of the solar system.
- To examine the types of bodies in the solar system, including planets, asteroids, meteors, and satellites.
- To see the difference between terrestrial and Jovian planets.
- To explore the individual planets, paying particular attention to their physical and chemical makeup.
- To understand Earth’s history and future.
Use this page for your individual notes about planning and/or effective ways to manage this AIMS Teaching Module in your classroom.
INTRODUCTION TO THE PROGRAM

The Solar System: Our Neighbors in Space discusses the origins of the solar system and the physical and chemical makeup of the planets. The program details the different types of planets and discusses the other objects in space, like asteroids and satellites. Students are given a complete overview of the composition of the planets, their relationship to the sun, and their orbits. In addition, the program also helps students understand the unique qualities of Earth while examining the many similarities it shares with its neighbors.

INTRODUCTION TO VOCABULARY

Write the words “terrestrial” and “solar” on the board and ask students to write down as many related words as they can. How many examples can they come up with? What do all of these new words have in common? (A few examples include extra-terrestrial, terrain, terrarium, solarium, solarize. Words derived from “terrestrial” deal with the Earth. Words derived from “solar” deal with the sun.)

DISCUSSION IDEAS

The Solar System: Our Neighbors in Space discusses the origins of the solar system. Even today, we are constantly learning about how our solar system formed and how it continues to change. What recent space exploration missions have occurred? Why is it important to understand the other planets and asteroids in our solar system? (Recent missions include the Hubble telescope and the Sojourner exploration of Mars. The more we learn about our solar system, the better we can understand Earth and its delicate ecology.)

FOCUS

This program teaches students the history and evolution of the solar system. Encourage students to consider the countless advances made in astronomy in recent years, as well as the long history of people studying the heavens. Why are we so curious about the mysteries that space might hold?
JUMP RIGHT IN

HOW TO USE THE THE SOLAR SYSTEM: OUR NEIGHBORS IN SPACE AIMS TEACHING MODULE

Preparation

▷ Read The Solar System: Our Neighbors in Space Themes, Overview, and Objectives to become familiar with program content and expectations.

▷ Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing THE SOLAR SYSTEM: OUR NEIGHBORS IN SPACE

▷ 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 The Solar System: Our Neighbors in Space together or in small groups.

▷ Some students may benefit from viewing the video more than one time.

After Viewing THE SOLAR SYSTEM: OUR NEIGHBORS IN SPACE

▷ 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

Write a short report on a famous scientist who studied the universe and solar system. Examples include Pythagoras, Ptolemy, Galileo, Kepler, Copernicus, Sir Issac Newton, Albert Einstein, and Stephen Hawking. What was his or her contribution to science? How was the person viewed by contemporaries? Did other scientists embrace the person’s theories?

Connection to Science

If possible, take students on a field trip to a nearby planetarium. Ask each student to use a notebook to record what they learn during the trip. After the trip, facilitate a discussion with students. Did they enjoy what they saw? What new facts did they learn about our solar system? Would they enjoy taking up star gazing as a hobby?

Critical Thinking

In the late 1700’s a French scientist named Comte de Buffon put forth a theory about the beginning of the solar system. Buffon believed that a giant passing comet passed by the sun and pulled out the matter that became the solar system. Later, other theories about the origin of the solar system emerged. Ask students research some of these theories to learn more about them.

After their preliminary research, organize a class debate. Give each student a chance to discuss the theory that he or she supports. Encourage students to provide scientific evidence for their choices.

Connection to Technology

Ask students to explore the Internet to find as many web sites as they can dealing with the solar system. Encourage them to begin with the NASA web site. What information is available on the web? How is this information similar or different from what you would find in a book or magazine? If you were doing a report on the solar system, would the Internet be a good place to look? Why or why not?

(The Internet is an excellent place to do research, especially on scientific topics, because it is frequently more up-to-date than any other medium.)
Extended Activity

The Greeks were some of the earliest astronomers. Starting around 600 BC, Greek philosophers and scientists developed a number of important astronomical ideas. Create a timeline of the major Greek astronomers and their accomplishments. Where do other people, like the Egyptians or Babylonians fit on the timeline? Place an asterisk next to any of the ancient theories that are still thought to be true.

(Many believe that the ancient Greeks, Egyptians, and Babylonians were studying the stars at about the same time. The Greeks are credited with such discoveries as the shape of heavenly bodies, the shape and rotation of the Earth, and the precise length of a year.)

Critical Thinking

Many people believe that as our planet becomes more populated, people will be forced to live in space. Ask students to imagine that living in space is a viable option in the future. Which planet would people be most likely to live on? Why? What are the immediate problems with living on another planet? Weather? Atmosphere?

(If planetary colonization did occur, Mars would probably be the most likely choice because of its location and its Earth-like terrain. The differences in climate and atmosphere would be the most problematic issues to overcome. The same is true of the moon. However, the moon is much closer than Mars and, therefore, would be faster and cheaper to travel to.)

In the Newsroom

In 1998, NASA sent an unmanned spacecraft to Mars. Ask students if they observed this mission on television or on the Internet. What was the purpose of this visit? What information did NASA gain? How was the Internet used in relaying that information? Are there any future visits planned to Mars?

( NASA has been exploring Mars for many reasons, one of which is to search for past or current life on the planet. This information helps scientists to better understand the history of the Earth. NASA sent live updates from the Sojourner over the Internet. The exploration of Mars will continue into the 21st century.)
Meeting Individual Needs

Use an encyclopedia or other resource book to look up the following words. What is the origin of each word? How does each word relate to the study of the solar system?

astronomy
geocentric
satellite
comet

(“Astronomy” is the study of the heavens. “Geocentric” is the belief that the Earth, and not the sun, is the center of the universe. A “satellite” is an object that revolves around a star or a sun. There are man-made satellites and natural satellites (like the moon). A “comet” is a heavenly body that moves through space in a regular orbit. Comets have long tails and can sometimes be seen from Earth.)

Connection to History

In the 1600s, German astronomer Johannes Kepler published three laws describing planetary motions. Ask students to find out what these laws are. Have them list an example of each law.

(Kepler’s First Law states that planets move in elliptical orbits. This means that the planets are closer to the sun at some times than at others. For example, the Earth is 91,400,000 miles from the sun at its closest point and 94,500,000 miles from the sun at its farthest point.

Kepler’s Second Law states that an imaginary line between the sun and a planet sweeps across equal areas in equal periods of time. In other words, when a planet is near the sun, the line sweeps across a wide, short area. When the planet is far from the sun, the line sweeps a large, narrow area in the same amount of time.

Kepler’s Third Law states that a planet’s orbital period depends on its average distance from the sun. For example, a planet that is four times as far from the sun as Earth takes eight times longer to orbit the sun.)

Culminating Activity

Divide students into nine small groups, and ask each group to do some research on one planet. Encourage them to include the planet’s history, climate, makeup, satellites, and relationship to the sun. Have each group do a live presentation about their planet. Encourage students to use visual or multimedia aids in their presentations.
## VOCABULARY

The following terms are from *The Solar System: Our Neighbors in Space*. Fill in the number of each term next to its closest definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. asteroid</td>
<td>vents on a planet that spew molten rock and gas</td>
</tr>
<tr>
<td>2. Copernicus</td>
<td>type of planet that is largely gaseous and much less dense than terrestrial planets</td>
</tr>
<tr>
<td>3. Ganymede</td>
<td>a small irregular planet-like object that rarely exceeds one kilometer in diameter</td>
</tr>
<tr>
<td>4. Jovian</td>
<td>one of the largest known asteroids</td>
</tr>
<tr>
<td>5. Nebula theory</td>
<td>the largest known volcano in the universe</td>
</tr>
<tr>
<td>6. Pallas</td>
<td>Polish astronomer who developed a heliocentric model of the universe</td>
</tr>
<tr>
<td>7. terrestrial</td>
<td>states that the solar system formed from a rotating cloud of interstellar gas</td>
</tr>
<tr>
<td>8. volcanic</td>
<td>one of the moons orbiting Jupiter</td>
</tr>
<tr>
<td>9. Valles Marineris</td>
<td>a series of huge canyons on Mars</td>
</tr>
<tr>
<td>10. Olympus Mons</td>
<td>Earth-like; made of rocky material like that on Earth</td>
</tr>
</tbody>
</table>
CHECKING COMPREHENSION

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

The ___1__ theory is the most prevalent theory about the creation of the solar system. ___2__ takes the shortest amount of time to circle the sun, only 88 days. The asteroid belt in our solar system lies between Mars and ___3__ . Several of the planets in the solar system are terrestrial planets, which means that they are ___4__ . The planet Mercury has no ___5__ because its gravitational pull is too weak. Unlike Mercury and Venus, Earth has a(n) ___6__ . The Barringer Crater in Arizona is the result of ___7__ . Unlike Earth and Venus, Mars has no ___8__ . The Martian atmosphere is composed mostly of ___9__ . The rings of Saturn are brighter than those of Jupiter because they contain billions of ___10__ .

1. A. Gravitational  
   B. Nebula  
   C. Copernicus  
   D. Elliptical

2. A. Venus  
   B. Mercury  
   C. Mars  
   D. Pluto

3. A. Saturn  
   B. Jupiter  
   C. Earth  
   D. Venus

4. A. Earth-like  
   B. gaseous  
   C. outside the asteroid belt  
   D. stormy

5. A. core  
   B. volcanoes  
   C. oceans  
   D. atmosphere

6. A. atmosphere  
   B. moon  
   C. belt of asteroids  
   D. terrestrial center

7. A. a volcano  
   B. erosion  
   C. a meteor  
   D. solar rays

8. A. atmosphere  
   B. moon  
   C. cloud cover  
   D. surface

9. A. carbon dioxide  
   B. oxygen  
   C. hydrogen  
   D. helium

10. A. radioactive rocks  
    B. icy snowballs  
    C. hydrogen clouds  
    D. rocky meteorites
MATCHING

Match each term on the left with the best group of words on the right.

1. Titan  
   planet that rotates from east to west.

2. Kepler  
   came up with the first heliocentric theory of the solar system.

3. Voyager  
   an asteroid located between Mars and Jupiter.

4. Ceres  
   Saturn's largest moon.

5. Red Spot  
   solar system's largest planet.

6. Uranus  
   spacecraft sent from Earth to explore the solar system.

7. Jupiter  
   discovered that the planets move in an elliptical rather than oval orbit.

8. Copernicus  
   a gigantic area on Jupiter that appears to consist of swirling gases.
TRUE OR FALSE

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

1. ____ All of the planets rotate from East to West.

2. ____ Jupiter is the solar system's largest planet.

3. ____ Planets inside the solar system's asteroid belt are commonly called inner planets.

4. ____ Pluto is neither a terrestrial nor a Jovian planet.

5. ____ The planet Mercury most closely resembles Jupiter in appearance.

6. ____ Temperatures on Mercury are higher than those on Venus because Mercury is closer to the sun.

7. ____ Jupiter has twice the total mass of the other 8 planets combined.

8. ____ Jupiter has at least 16 moons.

9. ____ The planet Pluto wasn’t discovered until 1781.

10. ____ Because of its orbit, Pluto is sometimes closer to the sun than Neptune.
FILL IN THE BLANKS

Use the following words to fill in the blanks below.

- asteroids
- geocentric
- gravitational
- Jovian
- planets
- Pluto
- satellites
- sulfuric acid
- temperatures
- water

1. Radioactive elements are believed to have heated the matter that would form the _________________.

2. Mars has two ________________ or moons.

3. Early astronomers believed that the sun and planets revolved around the earth. This was known as a ________________ theory.

4. The planet Mercury has no atmosphere because its ________________ pull is too weak.

5. The ________________ planets are largely gaseous and much less dense than the terrestrial planets.

6. The yellow clouds around Venus are made up of ________________.

7. Venus’ atmosphere would be much like that of Earth if it had similar ________________.

8. There is evidence that indicates that Mars once had ________________.

9. Some scientists believe that ________________ were left-overs from the solar systems planet-forming period.

10. For many years, ________________ was referred to as Planet X.
**SOLAR SYSTEM CHART**

Complete the chart below by researching each of planet of the solar system.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Average distance from sun</th>
<th>Year (in Earth days)</th>
<th>Diameter at equator</th>
<th>Rotation Period</th>
<th>Average Daytime Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mars</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jupiter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturn</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Uranus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neptune</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pluto</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WORD SEARCH

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

Neptune
Titan
Nebula
Pallas
Venus
Europa
Ceres
Asteroid
Earth
Pluto

c e S E R E C e u o t l
r a t v s T e t i a t n
n r e c p E s a c m c p
e P b r N U d y i V r L
t A S T E R O I D E w U
p L u c P O l t n N d T
E L a y T P a i u U s O
e A l n U A s n s S c e
a S R i N s y a t c i v
s d s T E d o n o e u o
t s t d H T I T A N p c
y p N E B U L A e u r s
TEST

Circle the phrase which best answers each question.

1. The position of the planets from nearest to furthest from the sun is:
   - Mars, Venus, Earth, Mercury, Pluto, Saturn, Uranus, Jupiter.
   - Earth, Venus, Mars, Saturn, Pluto, Jupiter, Neptune, Uranus, Mercury.
   - Saturn, Earth, Venus, Mars, Jupiter, Pluto, Uranus, Neptune, Mercury.
   - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto.

2. The inner planets are the _____ planets and the outer planets are the _____ planets.
   - asteroid...meteor
   - solar...lunar
   - terrestrial...Jovian
   - nuclear...electromagnetic

3. The asteroid belt _____ the inner and outer planets.
   - separates
   - joins
   - increases the gravitational pull of
   - increases the heat of

4. _____ is one explanation of how our solar system was created.
   - Solar expansion
   - The Asteroid Belt
   - The Nebula theory
   - Meteor activity

5. The inner planets are largely made up of:
   - asteroids.
   - meteors.
   - gases.
   - rocky materials.
6. The two smallest planets in the solar system are:
   • Venus and Mars.
   • Earth and Venus.
   • Mercury and Earth.
   • Pluto and Mercury.

7. All nine planets in our solar system move in elliptical orbits around:
   • the asteroid belt.
   • the sun.
   • the moon.
   • the solar system.

8. The rocky materials on Earth’s surface are the _____ of those on any planet.
   • densest
   • most eroded
   • most porous
   • lightest

9. The rings of Saturn consist of:
   • asteroids.
   • moons.
   • snowballs of ice.
   • solar dust

10. The farther away a planet is from the sun, the _____ it becomes.
    • denser
    • larger
    • hotter
    • colder
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

Earth Science Essentials Series
   Oceans: Charting the Vastness
   The Universe: The Vast Frontier
   Geology of the Earth: Of Forces, Rocks, & Time
   Weather: The Chaos Which Surrounds Us
   The History of the Earth: Over the Eons
VOCABULARY

The following terms are from *The Solar System: Our Neighbors in Space*. Fill in the number of each term next to its closest definition.

1. asteroid
2. Copernicus
3. Ganymede
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5. Nebula theory
6. Pallas
7. terrestrial
8. volcanic
9. Valles Marineris
10. Olympus Mons

8. __ vents on a planet that spew molten rock and gas
4. __ type of planet that is largely gaseous and much less dense than terrestrial planets
1. __ a small irregular planet-like object that rarely exceeds one kilometer in diameter
6. __ one of the largest known asteroids
10. __ the largest known volcano in the universe
2. __ Polish astronomer who developed a heliocentric model of the universe
5. __ states that the solar system formed from a rotating cloud of interstellar gas
3. __ one of the moons orbiting Jupiter
9. __ a series of huge canyons on Mars
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ANSWER KEY for page 19

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   C. Mars
   D. Pluto

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   C. Earth
   D. Venus

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   C. outside the asteroid belt
   D. stormy

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   B. volcanoes
   C. oceans
   D. atmosphere

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   B. moon
   C. belt of asteroids
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   C. a meteor
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Match each term on the left with the best group of words on the right.

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2. Kepler - came up with the first heliocentric theory of the solar system
3. Voyager - spacecraft sent from Earth to explore the solar system
4. Ceres  - an asteroid located between Mars and Jupiter
5. Red Spot  - a gigantic area on Jupiter that appears to consist of swirling gases
6. Uranus - solar system's largest planet
7. Jupiter - discovered that the planets move in an elliptical rather than oval orbit
8. Copernicus -
TRUE OR FALSE

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

1. **F** All of the planets rotate from East to West.
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3. **T** Planets inside the solar system’s asteroid belt are commonly called inner planets.
4. **T** Pluto is neither a terrestrial nor a Jovian planet.
5. **F** The planet Mercury most closely resembles Jupiter in appearance.
6. **F** Temperatures on Mercury are higher than those on Venus because Mercury is closer to the sun.
7. **T** Jupiter has twice the total mass of the other 8 planets combined.
8. **T** Jupiter has at least 16 moons.
9. **F** The planet Pluto wasn’t discovered until 1781.
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- satellites
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<th>Diameter at equator</th>
<th>Rotation Period</th>
<th>Average Daytime Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>36,000,000</td>
<td>88 days</td>
<td>3,100 miles</td>
<td>59 Earth days</td>
<td>625° F</td>
</tr>
<tr>
<td>Venus</td>
<td>67,250,000</td>
<td>225 days</td>
<td>7,570 miles</td>
<td>243 Earth days</td>
<td>980° F</td>
</tr>
<tr>
<td>Earth</td>
<td>92,950,000</td>
<td>365 days</td>
<td>7,926 miles</td>
<td>1 Earth day</td>
<td>60° F</td>
</tr>
<tr>
<td>Mars</td>
<td>141,500,000</td>
<td>687 days</td>
<td>4,200 miles</td>
<td>24 hrs. 37 min.</td>
<td>-10° F</td>
</tr>
<tr>
<td>Jupiter</td>
<td>483,500,000</td>
<td>4,333 days</td>
<td>88,700 miles</td>
<td>9 hrs. 55 min.</td>
<td>-229° F</td>
</tr>
<tr>
<td>Saturn</td>
<td>887,500,000</td>
<td>10,759 days</td>
<td>75,100 miles</td>
<td>10 hrs. 14 min.</td>
<td>-240° F</td>
</tr>
<tr>
<td>Uranus</td>
<td>1,785,000,000</td>
<td>30,685 days</td>
<td>29,000 miles</td>
<td>10 hrs. 49 min.</td>
<td>-240° F</td>
</tr>
<tr>
<td>Neptune</td>
<td>2,795,000,000</td>
<td>60,188 days</td>
<td>27,600 miles</td>
<td>15 hrs. 40 min.</td>
<td>-280° F</td>
</tr>
<tr>
<td>Pluto</td>
<td>3,675,000,000</td>
<td>90,700 days</td>
<td>4000 miles</td>
<td>6 Earth days</td>
<td>-300° F</td>
</tr>
</tbody>
</table>
WORD SEARCH

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

Neptune
Titan
Nebula
Pallas
Venus
Europa
Ceres
Asteroid
Earth
Pluto

<table>
<thead>
<tr>
<th>Neptune</th>
<th>Titan</th>
<th>Nebula</th>
<th>Pallas</th>
<th>Venus</th>
<th>Europa</th>
<th>Ceres</th>
<th>Asteroid</th>
<th>Earth</th>
<th>Pluto</th>
</tr>
</thead>
</table>

© Copyright 1999 AIMS Multimedia The Solar System: Our Neighbors in Space
Circle the phrase which best answers each question.

1. The position of the planets from nearest to furthest from the sun is:
   - Mars, Venus, Earth, Mercury, Pluto, Saturn, Uranus, Jupiter.
   - Earth, Venus, Mars, Saturn, Pluto, Jupiter, Neptune, Uranus, Mercury.
   - Saturn, Earth, Venus, Mars, Jupiter, Pluto, Uranus, Neptune, Mercury.
   - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto.
   
2. The inner planets are the _____ planets and the outer planets are the _____ planets.
   - asteroid...meteor
   - solar...lunar
   - terrestrial...Jovian
   - nuclear...electromagnetic

3. The asteroid belt _____ the inner and outer planets.
   - separates
   - joins
   - increases the gravitational pull of
   - increases the heat of

4. _____ is one explanation of how our solar system was created.
   - Solar expansion
   - The Asteroid Belt
   - The Nebula theory
   - Meteor activity

5. The inner planets are largely made up of:
   - asteroids.
   - meteors.
   - gases.
   - rocky materials.
6. The two smallest planets in the solar system are:
   • Venus and Mars.
   • Earth and Venus.
   • Mercury and Earth.
   • Pluto and Mercury.

7. All nine planets in our solar system move in elliptical orbits around:
   • the asteroid belt.
   • the sun.
   • the moon.
   • the solar system.

8. The rocky materials on Earth's surface are the _____ of those on any planet.
   • densest
   • most eroded
   • most porous
   • lightest

9. The rings of Saturn consist of:
   • asteroids.
   • moons.
   • snowballs of ice.
   • solar dust

10. The farther away a planet is from the sun, the _____ it becomes.
    • denser
    • larger
    • hotter
    • colder
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.
THEMES

The Universe: The Vast Frontier explores the universe from its inception to the current state of scientific exploration. The program begins with a description of the Big Bang theory, and continues with theories describing the formation of galaxies, stars, and nebulae. Students are encouraged to discover the scientific, chemical, and physical components of the matter which comprises the universe.

OVERVIEW

There are no definitive answers about the beginning of the universe, only questions. Many scientists believe that the universe is between 10 and 20 billion years old and that it began as a huge mass of matter crammed into one dense sphere. When this sphere exploded, the universe began to form. While the formation of the universe is still under speculation, scientists have learned many facts about the far reaches of space. The Universe: The Vast Frontier gives students an opportunity to examine these facts, including information about galaxies, stars, planets, and other celestial bodies.

OBJECTIVES

- To examine the origins of the universe, including the Big Bang theory.
- To understand the physical and chemical makeup of stars.
- To compare and contrast the types and ages of stars throughout the universe.
- To study the other elements of the universe, including pulsars, quasars, and nebulae.
- To ponder the existence of undiscovered or unproven phenomena, like black holes.
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

© Copyright 1999 AIMS Multimedia The Universe: The Vast Frontier
INTRODUCTION TO THE PROGRAM

The Universe: The Vast Frontier gives students a foundation in the scientific principles of the universe and its composition. The program goes into detail about the types of stars and galaxies in the universe, as well as the mysterious “matter” in-between. At no time since the beginning of space exploration has there been more meaningful activity in the study of the universe, and this program serves as an excellent springboard to get students interested in the study of space.

INTRODUCTION TO VOCABULARY

Write the words “galaxy,” “Big Bang” and “Doppler Effect” on the board. Ask students what each word means. How is each word important to understanding the universe? (A galaxy is a grouping of billions of stars. Our galaxy is The Milky Way. The Big Bang is a theory about the origin of the universe. It contends that all of the universe was at one time a dense, hot sphere that exploded. The Doppler Effect is the apparent change in waves as they move closer or further away from the observer. It helps scientists see if an object is moving closer or further away from earth.)

DISCUSSION IDEAS

Bring in a few articles from recent publications to show students the ongoing research being conducted in our own galaxy and beyond. How might this research affect the citizens of Earth? Other than astronomy, what sciences are commonly used to study the universe? (The more we understand about other planets and how they formed, the better we will understand how the Earth is changing. In the future, humans may be forced to work and live in outer space. The more we know about the environment of the universe, the better prepared we will be for this possibility. Physics, chemistry and geology are often used by scientists studying the Earth.)

FOCUS

Studying the stars and the universe can be very exciting. While much of this program deals with the scientific and chemical composition of the universe, it also hints at larger issues. Encourage the class to see the study of space as the study of themselves. Remind them that many astronomers linked the study of the universe with more philosophical questions, such as “Why am I here?”
**JUMP RIGHT IN**

**HOW TO USE THE UNIVERSE: THE VAST FRONTIER AIMS TEACHING MODULE**

**Preparation**
- Read *The Universe: The Vast Frontier Themes, Overview, and Objectives* to become familiar with program content and expectations.
- Use Preparation for Viewing suggestions to introduce the topic to students.

**Viewing THE UNIVERSE: THE VAST FRONTIER**
- 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 *The Universe: The Vast Frontier* together or in small groups.
- Some students may benefit from viewing the video more than one time.

**After Viewing THE UNIVERSE: THE VAST FRONTIER**
- 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

It is widely believed that humans will set foot on Mars within the next 50 years. Ask students to imagine that they are the first people to do so. Have them write a journal entry about their first day on the Red Planet.

Encourage them to describe their emotions and feelings, as well as general observations. Ask them to include a paragraph or two explaining their reasons for being there. Why did the Earth send them to Mars? Encourage students to be as scientific and accurate as they can.

Connection to Social Science

Who owns space? It may seem like a silly question. However, in years to come, as satellite usage becomes more important to our daily lives, it may not be such a silly question after all. Ask the class to find out about current space laws. Do they exist? Can anyone send a rocket or a satellite into space? Who decides what vessels can go into space? If possible, encourage students to use the internet to find the most up-to-date information available.

Extended Activity

Despite the fact that humans have been looking up at the stars and doing some form of astronomy since the beginning of time, our journeys into space are relatively recent. Ask students to select a major event in recent space exploration history (1950 or later) and write a short paper on its historical significance. Examples can include the first orbit of the Earth, the formation of NASA, the first moon landing, the Space Shuttle program, the recent Mars expeditions, and so on. Remind students to focus on how the event affected, or will affect, future generations.

Critical Thinking

Modern life increasingly relies on machines and computers to complete tasks, including dangerous tasks like space exploration. Encourage the class to discuss the future of technology in space. Do they think that “manned” space exploration is a thing of the past? Will robots replace people in space? What are the benefits and detriments of sending people into space? Is the risk worth the benefits?
**Connection to Science**

From the time of Galileo, people have used telescopes to observe the cosmos. There are two major types of telescope: reflecting and refracting. Ask students to find out the differences between the two. Which is more accurate? Why?

(A refracting telescope consists of a long tube with a small eyepiece made from two lenses. At the other end, a convex lens gathers light and sends an image to the eyepiece. The convex lens is known as the objective lens. By adjusting the length between the two ends, the image can be focused.

A reflecting telescope uses a mirror as its objective lens. Reflecting telescopes can be built much larger than refracting telescopes. In addition, reflecting telescopes have greater light-gathering power. For these reasons, a reflecting telescope is more powerful than a reflexive telescope.)

**Connection to History**

The sun is one of the most powerful and amazing objects found in nature. For centuries, humans have worshiped the sun and used it in many myths about the formation of the world. What are some early beliefs about the sun? How did these beliefs affect the lives of early people?

(Many ancient civilizations worshiped the sun, including the Egyptians, the Sumerians, the Greeks, the Maya Indians and the Inca Indians. Some early peoples believed that a solar eclipse was the sun god’s way of expressing his anger. Many ancient peoples also tried to explain the movement of the sun. The Eskimos believed that the sun traveled on a boat at night, and the Greeks believed that the sun was pulled by a great chariot in the sky.)

**Extended Activity**

Help students locate a book that describes the major constellations. Have them diagram one of the constellations on a piece of paper. Encourage them to find the constellation in the night sky. How does the pattern of stars reflect the constellation’s name? Where does the name of the constellation come from?

(Many constellation names come from heroes of Greek mythology.)
Connection to Language Arts

For years, science fiction has been a very popular genre in motion pictures, television and books. Ask students to locate a book, short story or poem dealing with the universe. Have them present a short report on the work to their classmates. What facts mentioned in the work are realistic or scientifically accurate? What facts are pure fantasy? If the work is several years old, ask students to look for inaccurate facts or theories that have been disproved since the work’s publication. Does the work contain any predictions about the future which have proven to be true?

Writing

Many great scientists have devoted their energies to studying the universe. Their contributions, both great and small, have helped to shape our understanding of the cosmos. Ask students to choose one of the people listed below. Have them write a short paper summarizing the person’s contribution to the study of the universe. What specific contributions did the person make? What is the person most remembered for? What other fields or sciences was the person involved in?

- Nicolaus Copernicus
- Rene Descartes
- Pierre Simon de Laplace
- Comte de Buffon
- Albert Einstein
- Harold Urey
- Neil A. Armstrong
- Alan Shepard
- John F. Kennedy

Culminating Activity

The Big Bang is a prevailing theory about the beginning of the universe, but it is a relatively recent idea. Divide the class into several small groups and have each group research another theory concerning the formation of the universe. Then have each group present their theory to the class. Finally, engage the class in a group discussion about the pros and cons of each theory. Remind them that these are all theories. As of yet, there is no concrete answer.
**VOCABULARY**

The following terms are from *The Universe: The Vast Frontier*. Fill in the number of each term next to its closest definition.

1. Big Bang  
2. chromosphere  
3. flares  
4. pulsars  
5. quasars  
6. supernova  
7. Doppler effect  
8. microwave radiation  
9. white dwarf  
10. corona

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Big Bang</td>
<td>theory that the universe began with the explosion of a ball of matter</td>
</tr>
<tr>
<td>2. chromosphere</td>
<td>middle region of the sun's atmosphere</td>
</tr>
<tr>
<td>3. flares</td>
<td>outermost layer of the sun's atmosphere</td>
</tr>
<tr>
<td>4. pulsars</td>
<td>extremely bright object that may be a billion times more luminous than the sun</td>
</tr>
<tr>
<td>5. quasars</td>
<td>objects in space that regularly send out bursts of electromagnetic radiation</td>
</tr>
<tr>
<td>6. supernova</td>
<td>apparent change in waves as they move closer or further away from the observer</td>
</tr>
<tr>
<td>7. Doppler effect</td>
<td>electromagnetic waves coming from the universe around Earth</td>
</tr>
<tr>
<td>8. microwave radiation</td>
<td>heavy bursts of energy on the surface of the sun</td>
</tr>
<tr>
<td>9. white dwarf</td>
<td>star-like objects that emit immense quantities of light and radio waves</td>
</tr>
<tr>
<td>10. corona</td>
<td>a small, white, very dense star that has a low luminosity</td>
</tr>
</tbody>
</table>
CHECKING COMPREHENSION

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

Many scientists believe that the universe began between ___1__ years ago. They also believe that ___2__ was the first force formed after the Big Bang. Just one second after the Big Bang, the universe had a temperature of ___3___. The most convincing case that the Big Bang occurred is the___4__ radiation coming to Earth. In our galaxy, there is/ are ___5___. Sunspots appear to be related to the activity of ___6__ on the sun. Some stars in the universe have as much as ___7__ the mass of our sun. Stars are formed when ___8__ causes gas, atoms and dust in interstellar matter to be drawn together. A ___9__ is what remains after the explosion of a massive red giant. The only black hole believed to have been identified is __10___.

1. A. 4 and 5 billion
   B. 10 and 20 billion
   C. 10 and 20 trillion
   D. 10 and 100 million
   6. A. magnetic fields
      B. radioactive fields
      C. electron fields
      D. surface fields

2. A. gravity
   B. magnetism
   C. entropy
   D. heat
   7. A. 5 times
      B. 10 times
      C. 20 times
      D. 30 times

3. A. 1 million degrees Celsius
   B. 1 million degrees Kelvin
   C. 1 trillion degrees Kelvin
   D. 100 trillion degrees Kelvin
   8. A. heat
      B. gravity
      C. magnetism
      D. radiation

4. A. ultraviolet
   B. nuclear
   C. Beta
   D. microwave
   9. A. supernova
      B. flare
      C. neutron star
      D. quasar

5. A. only one star, the sun
   B. billions of stars
   C. dozens of stars
   D. less than a dozen known stars
   10. A. Signus XI
       B. Crab Nebula
       C. Hubble
       D. Tartus IX
HEAVENLY BODIES

Fill in the number of each heavenly body next to the correct group of words below.

1. Supernova
2. Neutron Star
3. Quasars
4. Pulsar
5. Nebulae
6. Red Giant
7. White Dwarf
8. Planet

_____ a dying star whose surface expands and appears brighter
_____ star-like objects that emit immense quantities of light and radio waves
_____ a concentration of interstellar matter
_____ body that revolves around a star, such as the sun
_____ the result of a red giant collapsing and giving off some light for another billion years
_____ an exploding star that flares into an extremely bright object
_____ objects in space that regularly send out bursts of electromagnetic radiation
_____ the mass that remains after the explosion of a supernova
TRUE OR FALSE

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

1. ___ A second after the Big Bang, the universe was about the size of our solar system.

2. ___ The universe stopped expanding 15 billion years after the Big Bang.

3. ___ The Milky Way is an example of an elliptical galaxy.

4. ___ Quasars are much larger than stars.

5. ___ Interstellar matter is called neutron dust.

6. ___ Some sun spots are larger in diameter than the earth.

7. ___ The aurora lights seen in the Northern sky are caused by highly charged atomic particles released by sun flares.

8. ___ A black hole has no density at all.

9. ___ A prominence is a great flame-like cloud that appears to rise from a sunspot.

10. ___ Chinese astronomers documented a supernova in 1054 AD.
SCRAMBLED WORDS

Unscramble the bolded words in the sentences below to learn important facts about the sun.

1. ___________________________ A solar flare occurs when magnetic energy that has built up in the raols mpeethao is suddenly released.

2. ___________________________ In about 5 billion years, our sun will gradually expand into a dre nitga.

3. ___________________________ The sun’s fusion of ghdrnyoe into uhlmei releases more energy every second than humans have used since the beginning of civilization.

4. ___________________________ The sun’s racono, or outer atmosphere, can be seen during an eclipse.

5. ___________________________ Tuspuos activity fluctuates over an 11-year cycle.

6. ___________________________ The thonnerr gisthl are a direct result of activity on the sun.

7. ___________________________ Many people believe that hotseenegn in England is an ancient sun calendar.

8. ___________________________ In 1543, punrocisec put forth the revolutionary idea that the sun, not the Earth, was the center of the solar system.

9. ___________________________ Plasma continuously ejected into space from a star’s surface is known as a lastel diwn.

10. ___________________________ The sun has a nmea siyetnd of about 1/4 that of the Earth.
FILL IN THE BLANKS

Use the following words to fill in the blanks below.

Big Bang
Black Hole
corona
diameter
electromagnetic
electrons
irregular
gravity
microwave
quasars

1. A pulsar is an object in space that regularly sends out bursts of _________________ radiation.

2. The total estimated _________________ of the Milky Way is 120,000 light years.

3. The Magellanic Cloud is the most famous type of _________________ . galaxy

4. The sun’s outermost layer is known as the _________________ .

5. Some known _________________ are 100 trillion times brighter than the sun.

6. _________________ causes gas, atoms, and dust in interstellar nebulae to form into stars.

7. A neutron star consists entirely of _________________ .

8. The _________________ took place about 20 billion years ago.

9. The gravity in a _________________ is thought to be so great that any light near it would be trapped.

10. The fact that the Earth is being bombarded from space by _________________ radiation is thought to be evidence of the Big Bang.
WORD SEARCH

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

Black Hole
Nebula
Red Giant
Sunspot
Flares
Galaxy
Universe
Astronomy
Electron
Pulsar

G F L A R E S R E D F L
A N E S U S P O T G A S
L F X Y M O N O R T S A
X L U A S T R X E R G R
U A G B U G D R E N A E
N B L A C K H O L E L D
I L C E L T R N C B A G
V A R X T A D I T U C I
E H A B L C X R L E A
R T B A L H F Y O A X N
S U N S P O T A N D Y T
E R E G I P U L S A R R
Circle the phrase which best answers each question.

1. Spiral, irregular, and elliptical are three types of:
   - galaxies.
   - nebulae.
   - quasars.
   - white dwarfs.

2. Concentrations of interstellar matter are called:
   - supernovas.
   - sunspots.
   - galaxies.
   - nebulae.

3. All stars are thought to form from:
   - light disappearing into black holes.
   - gamma rays, x-rays, and visible light.
   - clouds of interstellar matter and gas in nebulae.
   - fusion.

4. The Big Bang is a theory about the:
   - origin of the universe.
   - formation of forces.
   - creation of atomic particles.
   - all of the above.

5. Exploding stars that flare up very brightly are called:
   - nebulae.
   - neutron stars.
   - black holes.
   - supernovas.
6. The Milky Way is an example of:

- an elliptical galaxy.
- a spiral galaxy.
- an irregular galaxy.
- a nebulae galaxy.

7. The sun is composed entirely of:

- photosphere.
- magnetic fields.
- chromosphere.
- gases.

8. Protostars become stars when _____ begins.

- a new galaxy
- a new nebula
- a fission reaction
- a fusion reaction

9. Massive star remnants left after the explosion of a supernova form a:

- white dwarf.
- red giant.
- galaxy.
- black hole.

10. When red giants explode, the dense core mass that remains is a:

- black hole.
- quasar.
- neutron star.
- supernova.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

Earth Science Essentials Series
  Oceans: Charting the Vastness
  The Solar System: Our Neighbors in Space
  Geology of the Earth: Of Forces, Rocks, & Time
  Weather: The Chaos Which Surrounds Us
  The History of the Earth: Over the Eons
**VOCABULARY**

The following terms are from *The Universe: The Vast Frontier*. Fill in the number of each term next to its closest definition.

1. Big Bang
2. chromosphere
3. flares
4. pulsars
5. quasars
6. supernova
7. Doppler effect
8. microwave radiation
9. white dwarf
10. corona

---

4. objects in space that regularly send out bursts of electromagnetic radiation
2. middle region of the sun’s atmosphere
10. outermost layer of the sun’s atmosphere
6. extremely bright object that may be a billion times more luminous than the sun
1. theory that the universe began with the explosion of a ball of matter
7. apparent change in waves as they move closer or further away from the observer
8. electromagnetic waves coming from the universe around Earth
3. heavy bursts of energy on the surface of the sun
5. star-like objects that emit immense quantities of light and radio waves
9. a small, white, very dense star that has a low luminosity
CHECKING COMPREHENSION

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

Many scientists believe that the universe began between ___1__ years ago. They also believe that ___2__ was the first force formed after the Big Bang. Just one second after the Big Bang, the universe had a temperature of ___3__. The most convincing case that the Big Bang occurred is the ___4__ radiation coming to Earth. In our galaxy, there is/are ___5__. Sunspots appear to be related to the activity of ___6__ on the sun. Some stars in the universe have as much as ___7__ the mass of our sun. Stars are formed when ___8__ causes gas, atoms and dust in interstellar matter to be drawn together. A ___9__ is what remains after the explosion of a massive red giant. The only black hole believed to have been identified is ___10__.

1. A. 4 and 5 billion
   B. 10 and 20 billion
   C. 10 and 20 trillion
   D. 10 and 100 million

6. A. magnetic fields
   B. radioactive fields
   C. electron fields
   D. surface fields

2. A. gravity
   B. magnetism
   C. entropy
   D. heat

7. A. 5 times
   B. 10 times
   C. 20 times
   D. 30 times

3. A. 1 million degrees Celsius
   B. 1 million degrees Kelvin
   C. 1 trillion degrees Kelvin
   D. 100 trillion degrees Kelvin

8. A. heat
   B. gravity
   C. magnetism
   D. radiation

4. A. ultraviolet
   B. nuclear
   C. Beta
   D. microwave

9. A. supernova
   B. flare
   C. neutron star
   D. quasar

5. A. only one star, the sun
   B. billions of stars
   C. dozens of stars
   D. less than a dozen known stars

10. A. Signus XI
    B. Crab Nebula
    C. Hubble
    D. Tartus IX
HEAVENLY BODIES

Fill in the number of each heavenly body next to the correct group of words below.

1. Supernova
2. Neutron Star
3. Quasars
4. Pulsar
5. Nebulae
6. Red Giant
7. White Dwarf
8. Planet

6 ______ a dying star whose surface expands and appears brighter
3 ______ star-like objects that emit immense quantities of light and radio waves
5 ______ a concentration of interstellar matter
8 ______ body that revolves around a star, such as the sun
7 ______ the result of a red giant collapsing and giving off some light for another billion years
1 ______ an exploding star that flares into an extremely bright object
4 ______ objects in space that regularly send out bursts of electromagnetic radiation
2 ______ the mass that remains after the explosion of a supernova
TRUE OR FALSE

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

1. T  A second after the Big Bang, the universe was about the size of our solar system.
2. F  The universe stopped expanding 15 billion years after the Big Bang.
3. F  The Milky Way is an example of an elliptical galaxy.
4. T  Quasars are much larger than stars.
5. F  Interstellar matter is called neutron dust.
6. T  Some sun spots are larger in diameter than the earth.
7. T  The aurora lights seen in the Northern sky are caused by highly charged atomic particles released by sun flares.
8. F  A black hole has no density at all.
9. T  A prominence is a great flame-like cloud that appears to rise from a sunspot.
10. T  Chinese astronomers documented a supernova in 1054 A.D.
Unscramble the bolded words in the sentences below to learn important facts about the sun.

1. ___________________________ solar atmosphere A solar flare occurs when magnetic energy that has built up in the raols mpeethao is suddenly released.
2. ___________________________ red giant In about 5 billion years, our sun will gradually expand into a dre nitga.
3. ___________________________ hydrogen, helium The sun’s fusion of ghdrnyoe into uhlmei releases more energy every second than humans have used since the beginning of civilization.
4. ___________________________ corona The sun’s racono, or outer atmosphere, can be seen during an eclipse.
5. ___________________________ sunspot Tuspuos activity fluctuates over an 11-year cycle.
6. ___________________________ northern lights The thonnerr gisgl are a direct result of activity on the sun.
7. ___________________________ Stonehenge Many people believe that hotseenegn in England is an ancient sun calendar.
8. ___________________________ Copernicus In 1543, punrocisec put forth the revolutionary idea that the sun, not the Earth, was the center of the solar system.
9. ___________________________ stellar wind Plasma continuously ejected into space from a star’s surface is known as a lastelr diwn.
10. ___________________________ mean density The sun has a nmea siyetnd of about 1/4 that of the Earth.
FILL IN THE BLANKS

Use the following words to fill in the blanks below.

Big Bang
Black Hole
corona
diameter
electromagnetic
electrons
irregular
gravity
microwave
quasars

1. A pulsar is an object in space that regularly sends out bursts of electromagnetic radiation.

2. The total estimated diameter of the Milky Way is 120,000 light years.

3. The Magellenic Cloud is the most famous type of irregular galaxy.

4. The sun’s outermost layer is known as the corona.

5. Some known quasars are 100 trillion times brighter than the sun.

6. Gravity causes gas, atoms, and dust in interstellar nebulae to form into stars.

7. A neutron star consists entirely of electrons.

8. The Big Bang took place about 20 billion years ago.

9. The gravity in a Black Hole is thought to be so great that any light near it would be trapped.

10. The fact that the Earth is being bombarded from space by microwave radiation is thought to be evidence of the Big Bang.
WORD SEARCH

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

Black Hole
Nebula
Red Giant
Sunspot
Flares
Galaxy
Universe
Astronomy
Electron
Pulsar

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Circle the phrase which best answers each question.

1. Spiral, irregular, and elliptical are three types of:
   - galaxies.
   - nebulae.
   - quasars.
   - white dwarfs.

2. Concentrations of interstellar matter are called:
   - supernovas.
   - sunspots.
   - galaxies.
   - nebulae.

3. All stars are thought to form from:
   - light disappearing into black holes.
   - gamma rays, x-rays, and visible light.
   - clouds of interstellar matter and gas in nebulae.
   - fusion.

4. The Big Bang is a theory about the:
   - origin of the universe.
   - formation of forces.
   - creation of atomic particles.
   - all of the above.

5. Exploding stars that flare up very brightly are called:
   - nebulae.
   - neutron stars.
   - black holes.
   - supernovas.
6. The Milky Way is an example of:

- an elliptical galaxy.
- a spiral galaxy.
- an irregular galaxy.
- a nebulae galaxy.

7. The sun is composed entirely of:

- photosphere.
- magnetic fields.
- chromosphere.
- gases.

8. Protostars become stars when _____ begins.

- a new galaxy
- a new nebula
- a fission reaction
- a fusion reaction

9. Massive star remnants left after the explosion of a supernova form a:

- white dwarf.
- red giant.
- galaxy.
- black hole.

10. When red giants explode, the dense core mass that remains is a:

- black hole.
- quasar.
- neutron star.
- supernova.
Weather: The Chaos Which Surrounds Us

INTRODUCTION TO THE AIMS TEACHING MODULE (ATM)
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AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM, and CD-i formats.

Persons or schools interested in obtaining additional copies of this AIMS Teaching Module, please contact:

AIMS Multimedia

1-800-FOR-AIMS
1-800-367-2467
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.
THEMES

Weather: The Chaos Which Surrounds Us shows students the factors that create the weather around them, including the heat of the sun, the topography of the planet, and the movement of air masses. Students also examine the composition of the atmosphere, specific storms like thunderstorms and tornadoes, and hurricanes. A great deal of attention is also given to the formation and types of clouds and their relationship to weather patterns.

OVERVIEW

All weather phenomena result from the flow of air through the Earth's atmosphere. The sun's energy is the power source behind the motion of this atmosphere. Winds are created as cold, heavy air displaces warm lighter air. Due to the Coriolis effect, winds in the Northern Hemisphere rotate counterclockwise and winds in the Southern Hemisphere rotate clockwise. The types of clouds formed can provide an indication of what kind of weather will result. Some air masses can be big enough to cover half a continent, while thunderstorms and tornadoes are smaller, more localized phenomena. Hurricanes start over open water near the equator between the months of July and November, when the heat energy in the area is at its highest.

OBJECTIVES

- To understand the major factors contributing to Earth's weather.
- To see the changes in seasonal weather and understand the reasons for these changes.
- To recognize different types of clouds and understand their relationship to particular types of weather.
- To examine particular storms, like hurricanes and tornadoes, and determine their origins.
- To identify major types of air masses and their movement.
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

Earth’s weather creates an environment capable of sustaining many forms of life. From farming, to travel and communication, the weather has a tremendous effect on the every-day lives of all people. The study of weather involves physics, chemistry, biology, earth science and mathematics. During this program, students will see how various factors like the position of the Earth and sun, the temperature of the oceans, and the topology of the Earth’s surface affect the weather.

INTRODUCTION TO VOCABULARY

Write the words “meteorology” and “climatology” on the board and ask students to define each word. How are the words different?

(Meteorology is the study of general weather and atmospheric patterns, while climatology is the study of individual climates and their weather phenomena. It takes many years of meteorology records before scientists can determine a region’s climate)

DISCUSSION IDEAS

Ask students to talk about how the weather affects life on Earth. Encourage them to see the larger picture. For example, weather determines where humans can live, what types of houses they build, and the crops they grow. Also, ask students to see how weather affects them personally. What do they do when it’s cold outside? Raining? Sunny?

FOCUS

Before starting the program, ask students to think about the various aspects of weather, including temperature, rainfall and wind patterns. How do each of these aspects transform our world on a daily basis? While studying the program, ask students to pay closer attention to the daily weather patterns that we often ignore.
JUMP RIGHT IN

HOW TO USE THE WEATHER: THE CHAOS WHICH SURROUNDS US AIMS TEACHING MODULE

Preparation

- Read *Weather: The Chaos Which Surrounds Us* Themes, Overview, and Objectives to become familiar with program content and expectations.

- Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing WEATHER: THE CHAOS WHICH SURROUNDS US

- 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 *Weather: The Chaos Which Surrounds Us* together or in small groups.

- Some students may benefit from viewing the video more than one time.

After Viewing WEATHER: THE CHAOS WHICH SURROUNDS US

- 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

Connection to History

Humans have not only tried to understand and predict the weather, they have also tried to control it. Native American tribes attempted to bring or stop rain, or to move the wind. Even into the 20th century, some believed that shooting cannons into the clouds would cause rain. Ask students to do a little research about different civilizations and their particular attempts to control the weather. Encourage each student to orally present at least one interesting story or fact to the class.

Extended Activity

Hurricanes have done a great deal of damage in recent years, from South America to the east coast of the United States. Hurricanes Andrew and Hugo did particular damage to the United States. Bring a video about hurricanes into class and discuss the power of hurricanes shown in the tape.

Ask students if they have ever been through a hurricane. If so, encourage them to share the experience with the class. What do they remember about the hurricane? What preparations did their family have to make before the hurricane? What kind of damage did the hurricane cause?

Connection to Language Arts

The weather is a powerful metaphor in the English language. Phrases such as “cloud an issue” or “be in a fog” are a few examples. Ask students to list as many weather analogies as they can. What weather phenomena are viewed as positive and which are viewed as negative?

(Sun and warmth are typically mentioned in positive expressions, while rainy, cold and stormy weather are mentioned in negative expressions. Some common expressions are “feeling sunny,” “when the storm blows over,” “the calm before the storm,” and “a silver lining to every cloud.”)
**In the Newsroom**

Have students create a weather report summarizing the previous week's weather in their area. Ask them to include changes in precipitation, pressure, wind direction, wind speed, temperature, and cloud cover. Have them explain how the weather in their area was affected by the larger weather in the United States.

**Hands On**

Have students perform the following experiment to see how wind currents move in gusts and uneven lines. Fill a small bowl with a dark liquid (coffee or soda, for example). Pour in some milk and gently stir in a uniform manner for a few seconds. What happens to the milk when you stop stirring? Can you see the liquid still moving? Is it moving in a completely uniform motion? Are there any smaller swirls in the liquid? Does any of the liquid look like it's not moving at all?

(Not all of the liquid moves at a uniform rate. Even when the stirring is completed, the liquid continues to move, though not in a completely uniform motion. Smaller swirls are created in various places, and the area closest to the spoon moves faster than the area furthest away. Explain to students that these “currents” are the same as air currents, and the smaller swirls are similar to eddies or wind gusts).

**Connection to Science**

Throughout time, people have tried to measure the weather. Ask students to learn more about some of the most important weather tools being used today. Has weather forecasting gotten easier in recent years? How can non-meteorologists gauge the weather?

(Typical weather instruments include the thermometer which measures heat, the anemometer which measures wind speed, hygrometer which measures amount of moisture in the air. In addition, radar and satellites are used to detect storm activity.

Computers and other forms of advanced technology have made the prediction of storms and severe weather a more exact science, saving millions of dollars and thousands of lives by giving advance warning of coming weather like hurricanes or tornadoes.

Many instruments, like a thermometer, a weather vane, or a windsock are common and don’t require any special skills to use.)
Critical Thinking

Ask students how many hours and minutes of sunlight occur each day in their area. How does this amount change each day? Is the longest day in Alaska the same as the longest day in Florida? Why or why not?

(The amount of sunlight you get depends on the latitude of your location and the time of year. In the Northern Hemisphere, the amount of sunlight grows longer from December 21 to June 21. Because of its high altitude, Alaska gets even more sunlight in the summer. In fact, some parts of Alaska get sunlight for almost 24 hours a day during the summer. Likewise, the same areas get very little sunlight at all during the winter.)

Connection to Social Sciences

Many folk tales and superstitions have been associated with the weather. Ask students to name as many as they can. How do they think these folk tales became so widely believed?

(People without scientific data find other ways to explain the unknown. In some cases, these explanations have lived on, in spite of technological advances that make them inaccurate. For instance, a ground hog seeing his shadow means more cold weather. Aching bones mean a storm is coming. Crickets chirp faster as the temperature rises. Birds roost and dogs hide before a big storm.)

Meeting Individual Needs

Ask students to make sentences using the following words. Encourage them to use a dictionary if they are uncertain of the meanings. Make sure they demonstrate a knowledge of the words as they apply to the program.

front - long band of changing weather between two different kinds of air masses
humidity - amount of water vapor in the air
precipitation - rain, snow or ice that falls to the Earth
pressure - force produced by air pressing down on the Earth

Culminating Activity

Using what they have learned in the unit, ask each student to write a question related to the program. Collect the questions and use them to write a review quiz. After giving the quiz, ask students if they enjoyed designing the test.
VOCABULARY

The following terms are from *Weather: The Chaos Which Surrounds Us*. Fill in the number of each term next to its closest definition.

1. cirrus clouds
2. front
3. Coriolis effect
4. inversion
5. nimbostratus clouds
6. squall
7. wind
8. surge
9. stratus clouds
10. cyclic flow

___ a flow of air caused by the uneven heating of earth’s surface
___ the circular flow of air produced by the Coriolis effect
___ dark gray clouds that usually form below 8,000 feet and produce rain or snow
___ clouds that appear as layers of sheets
___ a kind of wispy white cloud found at high altitudes
___ when air temperature increases with elevation
___ the movement of large air masses of different temperatures within a cloud formation
___ the effect of earth’s rotation on the paths of winds around the globe
___ a zone formed when a cold air mass and a warm air mass meet
___ a narrow zone of cumulonimbus clouds that develops along a front, producing violent weather
CHECKING COMPREHENSION

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

All weather phenomena result from the __1__ in the atmosphere. The __2__ is the power source behind the motion of the Earth's atmosphere. __3__ are created as cold, heavy air displaces warmer lighter air. Due to the Coriolis effect, winds in the Northern Hemisphere rotate __4__ and winds in the Southern Hemisphere rotate __5__. The types of __6__ formed can provide an indication of what kind of weather will result. __7__ can be big enough to cover half a continent, while __8__ are much smaller, and more localized phenomena. Hurricanes start over open water near __9__ between the months of July and November, when the heat energy in the area is at its highest. The energy source of a hurricane is __10__ .

1. A. dissipation of heat  
   B. flow of moisture  
   C. flow of air  
   D. changes in water pressure

2. A. Coriolis effect  
   B. sun  
   C. ocean  
   D. cyclic flow

3. A. Cyclic flows  
   B. Hurricanes  
   C. Cirrus clouds  
   D. Winds

4. A. counter-clockwise  
   B. clockwise  
   C. vertically  
   D. horizontally

5. A. counter-clockwise  
   B. clockwise  
   C. vertically  
   D. horizontally

6. A. cyclones  
   B. light patterns  
   C. squalls  
   D. clouds

7. A. Thunderstorms  
   B. Tornadoes  
   C. Air masses  
   D. Hurricanes

8. A. Thunderstorms  
   B. Cold fronts  
   C. Air masses  
   D. Warm fronts

9. A. the south pole  
   B. the eastern U.S.  
   C. the Caribbean  
   D. the equator

10. A. cold ocean air  
    B. warm, moist ocean air  
    C. warm, dry air  
    D. cold, moist air
REVERSE ALPHABET

An important word in each sentence below is written in reverse alphabet. Reverse alphabet works like this:


Use Reverse Alphabet to discover the code word or words in each sentence.

1. ________________ The lowest temperature ever recorded on Earth was -127° F in ZMGZIXGRXZ.
2. ________________ In 1900, the worst SFIIRXZMV in U.S. history hit Galveston, Texas.
3. ________________ In Iquique, XSROV, no rain fell during the period from 1899 to 1919.
4. ________________ The hottest temperature ever recorded on Earth was 136° F in Al Aziziyah, ORYBZ.
5. ________________ The hottest, driest place in the U.S. is WVZGS EZOVB, California.
6. ________________ The strongest wind gust ever measured on Earth was 231 mph in Mount Washington, MVD SZN KHSRIV.
7. ________________ The heaviest HMLDUZOO recorded in the U.S. during a 24-hour period was 76 inches.
8. ________________ The foggiest place in the U.S. is Cape WRHZKRLMGNVMG at the mouth of the Columbia River in Washington.
TRUE OR FALSE

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

1. ____ At any moment there are approximately 2000 thunderstorms on the planet.
2. ____ A lack of cloud cover is one of the reasons the desert cools so rapidly at night.
3. ____ The cyclic flow of air caused by the Coriolis effect cannot lead to a tornado.
4. ____ The stronger the vertical movement of air, the higher cumulus clouds will rise.
5. ____ Solar energy is at its peak in the Northern Hemisphere during the winter months.
6. ____ Thunderstorms usually occur during the afternoon because it takes all day to create enough heat energy to power the vertical flow of air necessary to create them.
7. ____ Most tornadoes only last between 2 and 4 hours.
8. ____ The most common place for tornadoes on the planet is the Mississippi Valley and the Great Plains of the United States.
9. ____ The entire United States can be covered by only two or three air masses.
10. ____ As a cold front passes, winds decrease and temperatures rise briefly.
FILL IN THE BLANKS

Use the words below to fill in the blanks.

air pressure
barometer
humidity
mercury
precipitation
tornado
trade winds
trough

1. Water droplets or ice crystals that fall to Earth are called _________________.

2. The force produced by the weight of air pressing down on the Earth is known as _________________.

3. A ________________ is the smallest and most destructive type of violent storm.

4. The amount of water vapor or moisture in the air is called _________________.

5. A low pressure area of an air mass is called a _________________.

6. A ________________ measures air pressure.

7. Northeast and southeast winds are often called _________________.

8. Placing a thermometer in the direct sun gives a falsely high reading because the sun heats the ________________ more than it heats the air around it.
WEATHER PHENOMENA

For each phenomena listed below, describe in a few sentences how it develops and behaves.

1. Tornado

2. Hurricane

3. Hail

4. Lightning

5. Thunder
WORD SEARCH

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

Thunder
Front
Surges
Inversion
Lightning
Tornado
Hail
Squall
Rain
Humidity

S T H U H S L L A U Q S
A F G H T D G T V T R I
Q R U T H U N D E R I G
H O L R O L U L G R N D
U N I G H N G T L U V S
M T G S L A N D T T E U
I T H R U N I V H F R R
D R T T E R H L U H S G
I E N V R F G V N L I E
T S I U T O R N A D O S
Y T N L L N R E G V N V
O R G V G R A I N D E S
TEST

Circle the phrase which best answers each question.

1. Which of these does not affect Earth’s weather?
   - the heat energy of the sun
   - Earth’s orbit around the sun
   - erosion
   - the rotation of the Earth on its axis

2. Atmosphere moving very slowly in huge blocks of air is called:
   - wind.
   - an air mass.
   - a hurricane.
   - a tornado.

3. Air moves:
   - horizontally
   - vertically.
   - electrically.
   - horizontally and vertically.

4. The Coriolis effect makes air move ____ in the Northern Hemisphere.
   - slowly
   - quickly
   - clockwise
   - counterclockwise

5. The type of weather conditions that exist within an air mass after it leaves its area of origin depends on:
   - moisture in the air.
   - solar energy.
   - the temperature of the ground or water it passes over.
   - air masses.
6. When a layer of cold air is trapped beneath warmer air, the result is:
   - temperature inversions.
   - thunderstorms.
   - tornadoes.
   - hurricanes.

7. In a sloping intersection along a front, the cold air mass is always _____ the warm air mass.
   - higher than
   - lower than
   - next to
   - wedged between

8. When low pressure forms along turbulent squall lines, the result is:
   - tornadoes.
   - thunderstorms.
   - hurricanes.
   - temperature inversions.

9. A full-fledged hurricane must have winds of least _____ miles per hour.
   - 54
   - 64
   - 74
   - 84

10. Stratus clouds are associated with:
    - thunderstorms.
    - drizzle.
    - heavy snow.
    - hurricanes.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

Earth Science Essentials Series
- Oceans: Charting the Vastness
- The Solar System: Our Neighbors in Space
- Geology of the Earth: Of Forces, Rocks, & Time
- The Universe: The Vast Frontier
- The History of the Earth: Over the Eons
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7  a flow of air caused by the uneven heating of earth's surface
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4  when air temperature increases with elevation
8  the movement of large air masses of different temperatures within a cloud formation
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   Tornadoes occur when a mass of warm, humid air rises very rapidly. More air rushes in to replace the air that rises. The inrushing air begins to rotate and forms a tornado.

2. Hurricane
   A hurricane is a powerful, massive storm system. Hurricanes form over warm, moist areas. Most hurricanes form over the ocean near the equator. During formation, a massive circulation of clouds begins to rotate around a low-pressure center.

3. Hail
   Small ice crystals strike super-cooled water that is below the freezing point but still liquid. As this water flows over the ice crystals, it freezes. This process may repeat several times, causing the hail stones to become heavy and fall to the ground.

4. Lightning
   The charged particles of water in a storm cloud have great electrical potential. When this cloud gets close to an object with an opposite charge, such as the ground, it creates a huge spark or a lightning bolt.

5. Thunder
   Lightening quickly heats the air, causing it to expand. This expansion produces sound waves that we hear as thunder.
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TEST (CONTINUED)

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