INTRODUCTION TO THE AIMS TEACHING MODULE (ATM)

Rationale ................................................. 4
Organization and Management ...................... 5
Features .................................................. 6

INTRODUCING SOLAR ACTIVITY

Themes ................................................... 11
Overview ................................................. 11
Objectives ............................................... 11

PREPARATION FOR VIEWING

Introduction to the Program ......................... 13
Introduction to Vocabulary .......................... 13
Discussion Ideas ....................................... 13
Focus ..................................................... 13
Jump Right In ........................................... 14

AFTER VIEWING THE PROGRAM

Suggested Activities .................................. 15
Vocabulary .............................................. 20
Checking Comprehension ............................ 21
The Sun's Gifts ........................................ 22
Solar Eclipse ........................................... 23
Test ....................................................... 24

ADDITIONAL AIMS MULTIMEDIA PROGRAMS .... 27

ANSWER KEYS .......................................... 28
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.
Early scientists also found that sunlight could be split with a prism into many different colors. Today, splitting sunlight into a spectrum of different wavelengths tells scientists much about the physical composition of the sun and its atmosphere. Experiments using a spectroscope illustrate that sodium and hydrogen are present in the sun's atmosphere.

Special filters allow scientists to block out the bright light of the sun's surface, or photosphere, to study the star's lower atmosphere, or chromosphere. The chromosphere stretches 1,000 kilometers above the sun's surface and is viewed in the program during a total eclipse. The corona, the sun's outer atmosphere, is only visible during a total eclipse; even then, visible radiation, just a small part of the electromagnetic spectrum, is all that can be seen of the corona.

The program also explores prominences and solar flares which hurl radiation and particles far into spaces. Prominences are huge arches of gas which shoot as high as one million kilometers above the sun's surface, then flow back into the sun. Solar flares are sudden gigantic explosions which sends electromagnetic waves to earth in just eight minutes. Solar flares emit x-rays and other radiation particles that cause magnetic storms and auroras on earth - often interrupting short-wave radio transmission. Dramatic footage of actual prominences and flares suggest the power of these events. The program concludes with an examination of the use of radio telescopes to study electromagnetic waves from the sun.
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

Ask students to identify the planets in our Solar System (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Pluto, Uranus.) Then ask which star is the center of our Solar System around which all the planets rotate. The answer is the sun, which is the star closest to Earth, about 93 million miles away. Have students suggest why it might be important to study the sun, and create a list of their ideas.

INTRODUCTION TO VOCABULARY

The sun is the center of our Solar System. Review or introduce the components of the Solar System, including the planets, sun, asteroids, meteorites and comets. Ask for definitions of each part of the Solar System. If some words are unfamiliar, have one or two students look up the definitions and present them to the class.

DISCUSSION IDEAS

Discuss the concept that, without the sun, all things on earth would die. Make a list of what the sun provides that is essential for life on earth. The list should include light which allows green plants to make chlorophyll and grow, giving off oxygen breathed in by mammals and providing food for animals, which in turn provide food for people. It should also include the fact that the sun influences our weather, including rain, heat, clouds and light. Even fossil fuels were once living animals which needed the heat and light of the sun. In a real sense, the sun is the foundation of the food chain.

FOCUS

Have students watch for ways in which scientists study the sun, from a tool as simple as a prism, to the most complicated electromagnetic wave monitors.
JUMP RIGHT IN

HOW TO USE THE SOLAR ACTIVITY AIMS TEACHING MODULE

Preparation

- Read *Solar Activity Themes, Overview, and Objectives* to become familiar with program content and expectations.
- Use *Preparation for Viewing* suggestions to introduce the topic to students.

Viewing SOLAR ACTIVITY

- 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 *Solar Activity* together or in small groups.
- Some students may benefit from viewing the video more than one time.

After Viewing SOLAR ACTIVITY

- 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

Meeting Individual Needs

Have each student list the three layers of the sun which were identified in this program (photosphere, chromosphere, corona) and what each layer is. Then have them add a sentence about the composition of the sun (gasses) and how we know which gasses are in the sun (comparing wave lengths to those of known elements on earth).

Curriculum Connection: Science

Galileo's invention of the telescope was the spark which ignited closer study of the sun. Much of today's scientific knowledge is dependent on new tools of study without which we could not investigate phenomena. As a homework assignment, have students research one investigative tool which has been invented in this century and give a short report on it to the class. Suggestions for research can include the computer, carbon dating, particle accelerator and nuclear reactor.

Meeting Individual Needs

The following questions are answered in Solar Activity. First ask the question, then return to the video or CD if students need review. What do dark vertical lines in a spectrum tell us? (Light must have passed through gasses containing the same elements.) What do dark sodium absorption lines seen in the sunlight spectrum tell us about the sun? (It must have an atmosphere which contains sodium.) What do scientists learn by comparing the normal spectrum of sunlight with the reduced spectrum of the chromosphere during an eclipse? (Which wave-lengths are being absorbed by the chromosphere, therefore which elements make up the sun's atmosphere.)

Cultural Diversity/ History

Many cultures, including the ancient Egyptians, Incas and Romans worshipped the sun as a god. Some believed their king was a direct descendent of the sun. The winter solstice, which the Romans dated as December 25th, was a day of celebration to welcome back the sun after a long winter. Have students work in pairs or small groups to research how different cultures worshipped the sun. Evidence of sun worship can be found in myths, coronation ceremonies, the alignment of buildings to the east (to catch the first rays of the sun), state celebrations, religious ceremonies, art, etc.
Curriculum Connection: Science

The photosphere, chromosphere and corona are layers of the sun. However, there are three more layers in the sun. Using a cut away view of the sun (or drawing one on the board), note that the inner layer of the sun is the core, where constant nuclear explosions turn hydrogen gas into X-ray energy. Core temperatures can be as hot as 27 million degree F. Around the core are the radiative zone and the convective zone, where X-rays move out to the sun’s surface. Because of the tightly packed gasses of the sun, these X-rays take millions of years to reach the surface. Now have students draw a cut-away picture of the sun. It will include the core at the center, then the radiative zone, the convection zone, the photosphere, chromosphere and corona.

Curriculum Connections: Language Arts

Many of the words used to describe parts of the sun are combinations of Latin or Greek words. For example, “chromo” comes from the Greek word “kroma,” meaning color, and “sphere” comes from the Middle English to the Greek “sphaira,” meaning ball. Divide the class into groups of three, and provide each group with a dictionary. Have a class discussion about how to find a root word and its origin in the dictionary (sometimes the root, or prefix, stands alone in the dictionary; sometimes it is given before the definition of a word which uses the prefix.) Have groups practice finding words and origins, then ask each group to find the origins of the words “photosphere,” “chromosphere,” “corona,” “spectrograph,” “telescope,” “gas,” “eclipse” and “solar.” For the words “photosphere,” “chromosphere” and “telescope,” Have each group list at least three more words using the same root. For example, the root “photo” can be used in photograph, photosynthesis and photocopier.

Critical Thinking

We know that the sun’s heat is the result of burning gases. We also know that when we burn gas, eventually the supply of gas, or other burning material will run out. Why then, has the sun been able to burn for millions of years, and will continue for millions of years to come, probably about 10 billion years altogether? Hint: the answer concerns the interaction of atoms.

Curriculum Connection: Science

Run the video or CD to the section which shows the scientific abbreviations for the elements which comprise the sun. Divide the class into groups, and have each group identify the elements in one line of the chart. One person from each group can present their findings to the class, so that all elements are identified for all students.
**Curriculum Connection: Math**

We know that the sun provides light and heat for the earth. Over a period of two weeks, have students record the air temperature and note it on a calendar. At the end of the two weeks, have students make a graph such as the one in the program which showed sunspot activity. The graph should show the changes in temperature for each day in the two weeks. Identify the highs, lows, and average temperature for the two weeks span.

**Curriculum Connection: Science**

Ask students what a spectrum is, and how one can see the colors of the spectrum (through a spectroscope, in a rainbow, in standing water, etc.) Have students describe the process by which white light is broken into colors using a spectroscope. Research the wave lengths of each color and tell how studying wave lengths shows scientists which elements are present. Note that the arrangement of the colors in the spectrum never changes, students can remember the color arrangement by using the name Roy G. Biv (red, orange, yellow, green, blue, indigo, violet).

**Curriculum Connection: Science**

Ask students what prominences and solar flares are, and how scientists study them. What are the effects of solar flares and prominences on the Earth?

**Link to the World (extended activity)**

Research facilities in Japan and Australia were highlighted in this program. Have groups of students locate solar research facilities at home and around the world, and try to contact them by letter or e-mail. You might locate facilities by starting at the science department of a local University. As a group, formulate a series of questions to ask scientists at the facilities (for example, what research is currently being carried out at the facility? What techniques are they using? What have they learned? What research do they hope to do?). Students should share their return communication with the class.

**Hands On**

It is possible to observe and chart sunspots with some simple tools and materials. You will need a telescope, two pieces of cardboard about 2X2 feet, scissors and marking pen. NOTE: NEVER LOOK DIRECTLY INTO THE TELESCOPE OR THE SUN. THIS CAN SERIously Damage EYES. Cut a hole in one piece of cardboard and fit it over the small end of the telescope to act as a sunshade. Hold the other piece of cardboard below the eyepiece of the telescope. Focus the telescope and vary the distance of the cardboard until a sharp image of the sun is reflected on the cardboard. You should be able to see dark patches on the cardboard. These are sunspots. With the marking pen, outline the spots on the cardboard. Repeat this procedure every day for a week, or several times a day. Construct of graph of the number of sunspots on each day, and their positions. Is there a pattern to sunspot activities? Make a calendar showing when space missions would be safe from the solar radiation which results from sunspot activity.
Curriculum Connection: History/Science

Review the contribution of Galileo to the study of the sun (invention of the telescope, sketches of sunspots.) Many other scientists contributed to our understanding of the sun. These include Copernicus, Newton (whose law of gravity explained how the solar system holds together), Hermann von Helmholtz and Bernard Lyot. Have pairs of students research one scientist from history or present time and what his or her research and contributions have been to studying the sun. Encourage students to present their research in creative ways, such as skits, poems, songs, interviews, etc.

Writing

This is a creative writing assignment in the science fiction genre. Have students identify what science fiction is, then ask them to think about how dependent the earth is on the sun. Now have them imagine that the sun is dimming, and heat and light are fading. They should write a story from the point of view of a person or animal who is living in fading sunlight, and what happens to him or her. Have them conclude with thoughts about what the protagonist can expect when the sun burns out completely.

Curriculum Connection: Math

In this program, distances are given using the metric system. Have students make a conversion chart of U.S. measurements to metric measurements. If the diameter of the sun is 1,384,000 km, how many miles is it? (865,000) The photosphere is 5,500°C. How hot is that in Fahrenheit? (10,000°). The chromosphere is 9,600 km in depth. How deep is it in miles? (6,000).

In the Newsroom (extended activity)

Tell students to imagine that preparations are being made for a manned space flight around the sun. Divide the class into groups and have each group research one component of the flight: previous unmanned flights from which data is drawn for the manned flight; length of trip and food requirements for it; protective clothing and goggles; what the space ship is made of; what to expect on arrival (heat, radiation, etc.), and other topics the students can think of. Tell them that their answers can be a mixture of real research and their own creative thinking. Each group writes a short essay about its topic, and chooses one person to read the essay during a simulated television news program. Each group should use visual aids as well. Invite another class in to hear the "television report."
Connection to Ecology

Ask the class to define, or look up, the words “ozone layer.” Some scientists believe the ozone layer is being depleted, and this will allow the sun’s harmful ultraviolet rays to reach the earth. Have students research what man is doing to harm the ozone layer, what effects it might have on people, and what is being done about it.

Culminating Activity

On the board, write the words “The sun is the source of...” Have students finish the sentence with various answers, including heat, light, photosynthesis, plant growth, animal food, auroras, ultraviolet radiation, radio waves, X-rays. Using a map of the Solar System, have students estimate how much sunlight each planet would receive based on its distance from the sun, and what each planet (including Earth) would look like given the amount of sun available to sustain life.
**VOCABULARY**

Match the vocabulary word with its definition. Use a dictionary if you need help.

<table>
<thead>
<tr>
<th>Aurora</th>
<th>H Alpha lines</th>
<th>Solar eclipse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromosphere</td>
<td>Photosphere</td>
<td>Solar flare</td>
</tr>
<tr>
<td>Corona</td>
<td>Prism</td>
<td>Spectrum</td>
</tr>
<tr>
<td>Electromagnetic</td>
<td>Prominence</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Solar</td>
<td>Sunspot</td>
</tr>
</tbody>
</table>

1. _____________ A bright cloud of hot gases surrounding the sun; the sun's outer atmosphere.
2. _____________ Relatively dark areas on the surface of the sun which appear in groups and increase and decrease in 11 year cycles.
3. _____________ Huge burst of gas shooting into the chromosphere and falling back to the sun.
4. _____________ Having to do with the sun.
5. _____________ Darkening of the sun which takes place when the moon moves between the sun and the earth.
6. _____________ Luminous bands of light caused by charged particles from the sun entering the Earth's magnetic field.
7. _____________ Very strong lines, especially prominent in the chromosphere, which indicate that there is hydrogen in the sun's atmosphere.
8. _____________ An instrument which disperses white light into colors of the spectrum.
9. _____________ A substance made up of atoms with the same number of protons in each nucleus.
10. ____________ Gigantic explosion emitting X-rays and other radiation particles.
11. ____________ The layer of hot gases covering the photosphere, forming the sun's lower atmosphere.
12. ____________ Distribution of energy emitted by light and arranged by order of wavelength.
13. ____________ A force field with both electric and magnetic currents.
14. ____________ The surface of the sun.
15. ____________ A transparent solid used to produce or analyze a continuous spectrum.
CHECKING COMPREHENSION

Read the paragraph below. Using the word bank, write in the best word to fill in each blank.

When the ____ was invented in about 1600, Galileo was able to see and sketch ____. Today we know that the number of sunspots varies in a _____. We also know that the sun is composed of ____ and has an inner atmosphere called the ____ , and an outer atmosphere called the ____ . The surface of the sun is the ____ . The corona is visible only during a ____ . Experiments with a ____ show different ____ which correspond to the ____ of the sun. When dark lines are seen in a spectrum, we know that the light source must have passed through gasses having the ____ wavelength. To block out unwanted light, scientists use ____ . Scientists also study ____ , which hurl large amount of ____ into space. On the surface of the sun, ____ show up as huge explosions which send electromagnetic waves to earth. This bombardment of radiation from solar flares can produce ____ or ____ and ____ or ____ , and interfere with shortwave radio ____.

Word Bank
1. auroras
2. chromosphere
3. corona
4. elements
5. 11 year cycle
6. filters
7. gasses
8. magnetic storms
9. photosphere
10. radiation
11. same
12. solar flares
13. solar prominences
14. spectroscope
15. sunspots
16. telescope
17. total solar eclipse
18. transmissions
19. wavelengths
THE SUN’S GIFTS

Here are five things which either come from or are dependent on the sun. Write a sentence or two about how each one is essential for life.

1. Heat

2. Light

3. Photosynthesis

4. Energy for growth

5. Fossil fuels
SOLAR ECLIPSE

Draw a picture of a solar eclipse. Describe in words what is happening during the eclipse, and what scientists know about the chromosphere and corona during a total solar eclipse.
1. What invention triggered the study of the sun and sunspots?
   a. spectroscope
   b. short wave radio
   c. incandescent light
   d. telescope
   e. spectrum

2. What did Galileo learn from making sketches of sunspots?
   a. The sun revolves around the earth every 24 hours.
   b. The sun makes a complete revolution every 27 days.
   c. The earth revolves around the sun.
   d. Sunspots increase and decrease in a 11 year cycle.
   e. White light can be broken into colors using a spectroscope.

3. The colors of a spectrum are actually:
   a. a reflection of sunspots
   b. gasses
   c. light bands of different wavelengths
   d. sodium absorption lines
   e. H alpha lines

4. The spectrum of sunlight has many ___ vertically crossing the color bands,
   a. sunspots
   b. dark lines
   c. filters
   d. solar flares
   e. magnetic storms

5. The dark vertical lines in a spectrum tell us that light must have passed through gasses containing the same ___ identified by the wavelength of each of the lines.
   a. colors
   b. sodium crystals
   c. hydrogen atoms
   d. atmosphere
   e. elements
6. Dark sodium absorption lines indicate that:
   a. the sun must have an inner core.
   b. sodium turns dark in the presence of sunlight.
   c. the sun has an atmosphere which contains sodium.
   d. cosmic waves are interfering with sunlight.
   e. electromagnetic waves are producing auroras.

7. The surface of the sun is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

8. The sun’s inner atmosphere is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

9. The sun’s outer atmosphere is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

10. When bright lines of the chromosphere’s spectrum are matched to dark absorption lines of the sun’s spectrum, it indicates:
    a. what wavelengths are being absorbed by the chromosphere
    b. what elements make up the sun’s atmosphere
    c. A only
    d. B only
    e. A and B
TEST (CONTINUED)

11. A solar prominence is:
   a. a sunspot
   b. a sudden, gigantic explosion
   c. a huge burst of gas
   d. a manifestation of visible radiation
   e. the beginning of an aurora

12. Solar flares emit:
   a. X-rays
   b. radiation particles
   c. electromagnetic waves
   d. all of the above
   e. none of the above

13. The corona is visible only during:
   a. an eclipse
   b. sunset
   c. sunrise
   d. sunspot activity
   e. solar flare activity

14. During a total eclipse, bright light from the photosphere is blocked by the:
   a. sun
   b. stars
   c. corona
   d. aurora
   e. moon

15. Filters enable scientists to block out all ___ but the one being studied.
   a. sunspots
   b. wavelengths
   c. prominences
   d. solar flares
   e. magnetic storms
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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

*Exploring Our Solar System*
*Solar Energy*
*Fire from the Sun: The Search for Fusion Energy*
*Solar Cells: Power from the Sun*
*Learning About Solar Energy*
VOCABULARY

Match the vocabulary word with its definition. Use a dictionary if you need help.

1. _______________ A bright cloud of hot gases surrounding the sun; the sun’s outer atmosphere.
2. _______________ Relatively dark areas on the surface of the sun which appear in groups and increase and decrease in 11 year cycles.
3. _______________ Huge burst of gas shooting into the chromosphere and falling back to the sun.
4. _______________ Having to do with the sun.
5. _______________ Darkening of the sun which takes place when the moon moves between the sun and the earth.
6. _______________ Luminous bands of light caused by charged particles from the sun entering the Earth’s magnetic field.
7. _______________ Very strong lines, especially prominent in the chromosphere, which indicate that there is hydrogen in the sun’s atmosphere.
8. _______________ An instrument which disperses white light into colors of the spectrum.
9. _______________ A substance made up of atoms with the same number of protons in each nucleus.
10. _______________ Gigantic explosion emitting X-rays and other radiation particles.
11. _______________ The layer of hot gases covering the photosphere, forming the sun’s lower atmosphere.
12. _______________ Distribution of energy emitted by light and arranged by order of wavelength.
13. _______________ A force field with both electric and magnetic currents.
14. _______________ The surface of the sun.
15. _______________ A transparent solid used to produce or analyze a continuous spectrum.
CHECKING COMPREHENSION

Read the paragraph below. Using the word bank, write in the best word to fill in each blank.

When the __16__ was invented in about 1600, Galileo was able to see and sketch __15__. Today we know that the number of sunspots varies in a __5__. We also know that the sun is composed of __7__ and has an inner atmosphere called the __2__, and an outer atmosphere called the __3__. The surface of the sun is the __9__. The corona is visible only during a __17__. Experiments with a __14__ show different __19__ which correspond to the __4__ of the sun. When dark lines are seen in a spectrum, we know that the light source must have passed through gasses having the __11__ wavelength. To block out unwanted light, scientists use __6__. Scientists also study __13__, which hurl large amount of __10__ into space. On the surface of the sun, __12__ show up as huge explosions which send electromagnetic waves to earth. This bombardment of radiation from solar flares can produce __1__ or __8__ and, and interfere with shortwave radio __18__.

Word Bank
1. auroras
2. chromosphere
3. corona
4. elements
5. 11 year cycle
6. filters
7. gasses
8. magnetic storms
9. photosphere
10. radiation
11. same
12. solar flares
13. solar prominences
14. spectroscope
15. sunspots
16. telescope
17. total solar eclipse
18. transmissions
19. wavelengths
THE SUN’S GIFTS

Here are five things which either come from or are dependent on the sun. Write a sentence or two about how each one is essential for life.

1. Heat  
   warms earth’s atmosphere and produces climate compatible with life

2. Light  
   gives off rays which are essential for green plant growth

3. Photosynthesis  
   green plant process of food production which in turn produces oxygen and allows growth of plants which animals need for food

4. Energy for growth  
   animals need sunlight to grow

5. Fossil fuels  
   originally animals which required sunlight
SOLAR ECLIPSE

Draw a picture of a solar eclipse. Describe in words what is happening during the eclipse, and what scientists know about the chromosphere and corona during a total solar eclipse.
TEST

Underline the correct answer.

1. What invention triggered the study of the sun and sunspots?
   a. spectroscope
   b. short wave radio
   c. incandescent light
   d. telescope
   e. spectrum

2. What did Galileo learn from making sketches of sunspots?
   a. The sun revolves around the earth every 24 hours.
   b. The sun makes a complete revolution every 27 days.
   c. The earth revolves around the sun.
   d. Sunspots increase and decrease in a 11 year cycle.
   e. White light can be broken into colors using a spectroscope.

3. The colors of a spectrum are actually:
   a. a reflection of sunspots
   b. gasses
   c. light bands of different wavelengths
   d. sodium absorption lines
   e. H alpha lines

4. The spectrum of sunlight has many ___ vertically crossing the color bands,
   a. sunspots
   b. dark lines
   c. filters
   d. solar flares
   e. magnetic storms

5. The dark vertical lines in a spectrum tell us that light must have passed through gasses containing the same ___ identified by the wavelength of each of the lines.
   a. colors
   b. sodium crystals
   c. hydrogen atoms
   d. atmosphere
   e. elements
TEST (CONTINUED)

6. Dark sodium absorption lines indicate that:
   a. the sun must have an inner core.
   b. sodium turns dark in the presence of sunlight.
   c. the sun has an atmosphere which contains sodium.
   d. cosmic waves are interfering with sunlight.
   e. electromagnetic waves are producing auroras.

7. The surface of the sun is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

8. The sun's inner atmosphere is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

9. The sun's outer atmosphere is the:
   a. photosphere
   b. chromosphere
   c. core
   d. corona
   e. prominence

10. When bright lines of the chromosphere's spectrum are matched to dark absorption lines of the sun's spectrum, it indicates:
    a. what wavelengths are being absorbed by the chromosphere
    b. what elements make up the sun's atmosphere
    c. A only
    d. B only
    e. A and B
TEST (CONTINUED)

11. A solar prominence is:
   a. a sunspot
   b. a sudden, gigantic explosion
   c. a huge burst of gas
   d. a manifestation of visible radiation
   e. the beginning of an aurora

12. Solar flares emit:
   a. X-rays
   b. radiation particles
   c. electromagnetic waves
   d. all of the above
   e. none of the above

13. The corona is visible only during:
   a. an eclipse
   b. sunset
   c. sunrise
   d. sunspot activity
   e. solar flare activity

14. During a total eclipse, bright light from the photosphere is blocked by the:
   a. sun
   b. stars
   c. corona
   d. aurora
   e. moon

15. Filters enable scientists to block out all ___ but the one being studied.
   a. sunspots
   b. wavelengths
   c. prominences
   d. solar flares
   e. magnetic storms