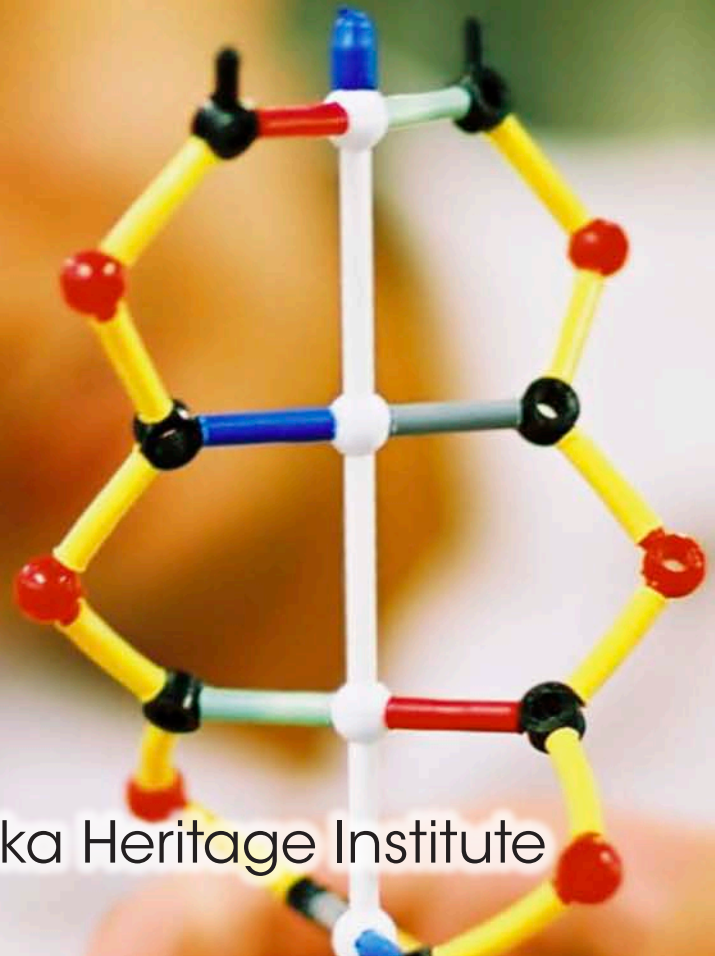


- **Concepts of Earth Science**
- **Science and Technology**
- **Cultural, Social, Personal Perspectives, and Science**

Units D-1, E-1, F-1

Based on the Alaska Science Standards
SD1.1,2; SD2.1,2; SD3.1,2;SD4.1,2,4
SE1.1-SE3.1
SF1.1-SF3.1



Sealaska Heritage Institute

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Integrating Culturally Responsive, Place-Based Content with Language Skills Development for Curriculum Enrichment

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Table of Contents

| | |
|--|----|
| Introduction | 5 |
| The Developmental Language Process | 7 |
| Alaska Standards for Science | 9 |
| Unit D-1 | 11 |
| Units E-1 & F-1 | 79 |

INTRODUCTION

Over the years, much has been written about the successes and failures of students in schools. There is no end to the solutions offered, particularly for those students who are struggling with academics. There have been efforts to bring local cultures into the classroom, thus providing the students with familiar points of departure for learning. However, most often such instruction has been limited to segregated activities such as arts and crafts or Native dancing rather than integrating Native culture into the overall learning process. Two core cultural values, *Haa Aaní*, the reference for and usage of the land, and *Haa Shagóon*, the tying of the present with the past and future, are known by both students and parents, and can be included in a curriculum that simultaneously provides a basis for self-identity and cultural pride, within the educational setting. This will provide a valuable foundation for improved academic achievement.

While the inclusion of Native concepts, values, and traditions into a curriculum provides a valuable foundation for self-identity and cultural pride, it may not, on its own, fully address improved *academic* achievement.

This program is designed to meet the academic realities, faced by high school students every day, using a developmental process that integrates *culture* with *skills* development. The values of *Haa Aaní* and *Haa Shagóon* are reinforced through the various activities in the program.

During science lessons, the students are exposed to new information and to key vocabulary that represent that information. While the students may acquire, through various processes, the scientific information, the vocabulary is often left at an exposure level and not internalized by them. Over time, this leads to *language-delay* that impacts negatively on a student's on-going academic achievement.

Due to *language delay*, many Native Alaskan high school students struggle with texts that are beyond their comprehension levels and writing assignments that call for language they do not have.

To this end, in this resource program, each key vocabulary word in science is viewed as a *concept*. The words are introduced concretely, using place-based information and contexts. Whenever possible, the concepts are viewed through the Native heritage cultural perspectives, thus reinforcing the value of *Haa Shagóon* and *Haa Aaní*. Using this approach, the students have the opportunity to acquire new information in manageable chunks; the sum total of which, represent the body of information to be learned in the science program.

When the key vocabulary/concepts have been introduced, the students are then taken through a sequence of listening, speaking, reading, and writing activities, designed to instill the vocabulary into their long term memories.

Finally, at the end of each unit, the students will participate in enrichment activities based on recognized and research-based *best practices*. By this time, the science information and vocabulary will be familiar, adding to the students' feelings of confidence and success. These activities will include *place-based* and *heritage culture* perspectives of the information learned.

The Integration of Place-Based, Culturally Responsive Science Content and Language Development

Introduction of Key Science Vocabulary



Science, Vocabulary Development

Listening, speaking, reading & writing



Science Application Reinforcement Activities

The Developmental Language Process

The Developmental Language Process is designed to instill language into long term memory. The origin of the Process is rooted in the struggles faced by language-delayed students, particularly when they first enter school.

The Process takes the students/children through developmental steps that reflect the natural acquisition of language in the home and community. Initially, once key language items have been introduced concretely to the students, the vocabulary are used in the first of the language skills, Basic Listening. This stage in the process represents *input* and is a critical venue for language acquisition and retention. A baby hears many different things in the home, gradually the baby begins to *listen* to what he/she hears. As a result of the *input* provided through Basic Listening, the baby tries to repeat some of the language heard – this is represented by the second phase of the Process, Basic Speaking - the oral *output* stage of language acquisition.

As more language goes into a child's long-term memory, he/she begins to understand simple commands and phrases. This is a higher level of listening represented by the stage, Listening Comprehension. With the increase in vocabulary and sentence development, the child begins to explore the use of language through the next stage in the Process, Creative Speaking. All of these steps in the Process reflect the natural sequence of language development.

The listening and speaking skill areas represent *true* language skills; most cultures, including Alaska Native cultures, never went beyond them to develop written forms. Oral traditions are inherent in the listening and speaking skills.

However, English does have abstract forms of language in reading and writing. Many Native children entering kindergarten come from homes where language is used differently than in classic Western homes. This is not a value judgment of child rearing practices but a definite cross-cultural reality. Therefore, it is critical that the Native child be introduced to the concepts of reading and writing before ever dealing with them as skills areas. It is vital for the children to understand that reading and writing are *talk in print*.

The Developmental Language Process integrates the *real* language skills of listening and speaking with the related skills of reading and writing. At this stage in the Process, the students are introduced to the printed words for the first time. These abstract representations are now familiar, through the listening and speaking activities, and the relationship is formed between the words and language, beginning with Basic Reading.

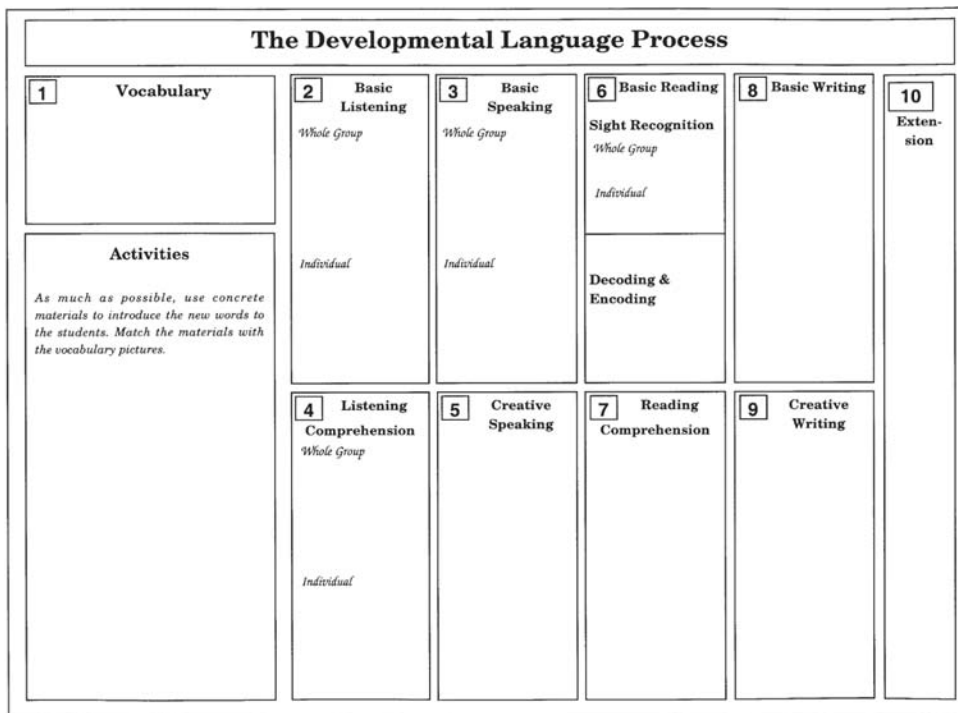
As more language goes into the children's long-term memories, they begin to comprehend more of what they read, in Reading Comprehension.

Many Alaskan school attics are filled with reading programs that didn't work – in reality, any of the programs would have worked had they been implemented through a language development process. For many Native children, the printed word creates angst, particularly if they are struggling with the reading process. Often, children are asked to read language they have never heard.

Next in the Process is Basic Writing, where the students are asked to write the key words. Finally, the most difficult of all the language skills, Creative Writing, asks the students to write sentences of their own, using the key words and language from their long-term memories. This high level skill area calls upon the students to not only retrieve language, but to put the words in their correct order within the sentences, to spell the words correctly and to sequence their thoughts in the narrative.

A student's ability to comprehend well in listening and reading, and to be creatively expressive in speaking and writing, is dependent upon how much language he/she has in long-term memory.

The Developmental Language Process is represented in this chart:



It should be understood that these materials are not a *curriculum* - rather, they are resource materials designed to encourage academic achievement through intensive language development in the content areas.

These resource materials are *culturally responsive* in that they utilize teaching and learning styles effective with Native students. As the students progress through the steps of the Process, they move from a concrete introduction of the key vocabulary, to a symbolic representation of the vocabulary, and finally, to their abstract forms - reading and writing. This provides a format for the students to develop language and skills that ultimately lead to improved academic performance.

Alaska Content Standards for Science

A. Science as Inquiry and Process

A student should understand and be able to apply the processes and applications of scientific inquiry. A student who meets the content standard should:

1. develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments;
2. develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review; and
3. develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.

B. Concepts of Physical Science

A student should understand and be able to apply the concepts, models, theories, universal principals, and facts that explain the physical world. A student who meets the content standard should:

1. develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior;
2. develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved;
3. develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems; and
4. develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

C. Concepts of Life Science

A student should understand and be able to apply the concepts, models, theories, facts, evidence, systems, and processes of life science. A student who meets the content standard should:

1. develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution;
2. develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms; and
3. develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

D. Concepts of Earth Science

A student should understand and be able to apply the concepts, processes, theories, models, evidence, and systems of earth and space sciences. A student who meets the content standard should:

1. develop an understanding of Earth's geochemical cycles;
2. develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth;
3. develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system; and
4. develop an understanding of the theories regarding the origin and evolution of the universe.

E. Science and Technology

A student should understand the relationships among science, technology, and society. A student who meets the content standard should:

1. develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events;
2. develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits; and
3. develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

F. Cultural, Social, Personal Perspectives and Sciences

A student should understand the dynamic relationships among scientific, cultural, social, and personal perspectives. A student who meets the content standard should:

1. develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology;
2. develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world; and
3. develop an understanding of the importance of recording and validating cultural knowledge.

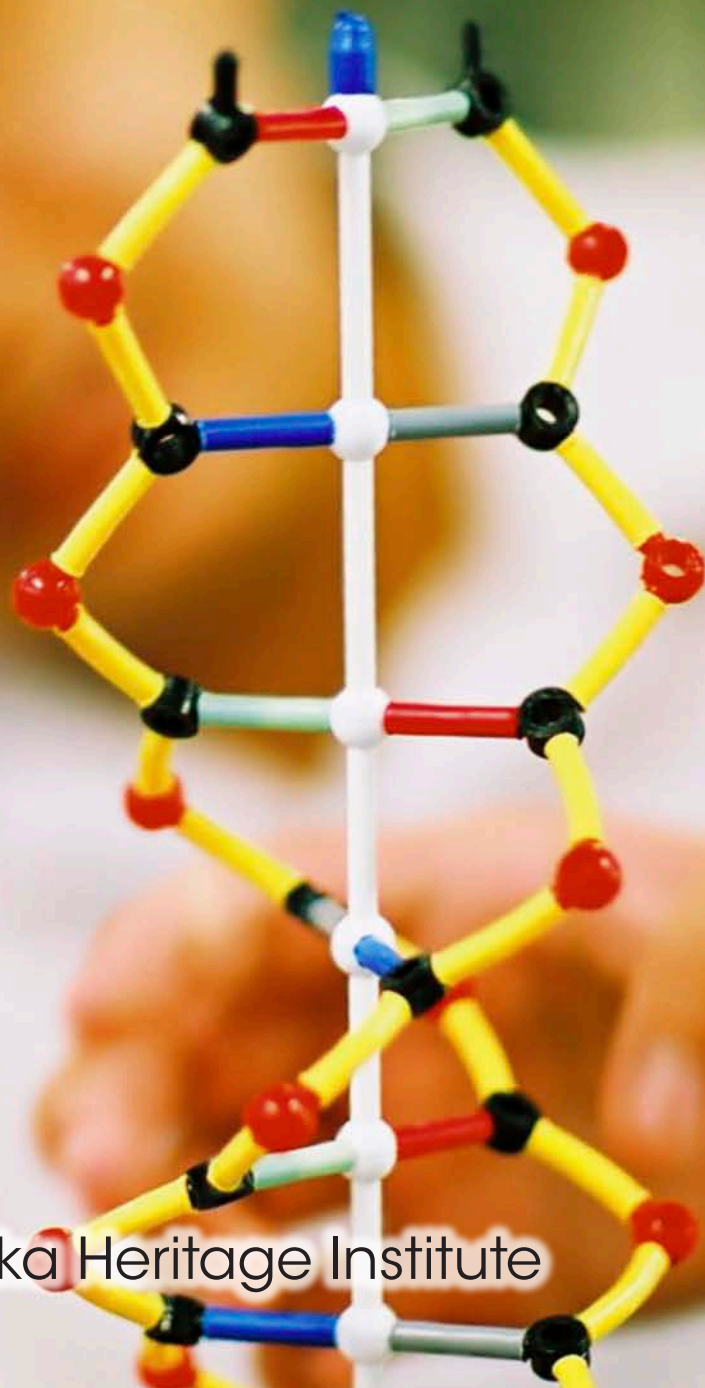
G. History and Nature of Science

A student should understand the history and nature of science. A student who meets the content standard should:

1. develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge;
2. develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world;
3. develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s); and
4. develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

<http://www.educ.state.ak.us/ContentStandards/Science.html>

UNIT D-1



Sealaska Heritage Institute



INTRODUCTION OF

Key Vocabulary



Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Rock Cycle

PLACE-BASED PERSPECTIVE

Show a picture of the *rock cycle*. Discuss with students that there are no new rocks today than there were when the Earth was formed. There are just old rocks that have been changed into different forms: sedimentary, igneous, and metamorphic.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Evidence of *rock cycles* can be found along the beaches of Southeast Alaska in the form of composite rocks.

Integrating

PLACE-BASED PERSPECTIVE

Show the students a piece of marble or granite and discuss how there are different types of crystals *integrated* into the rock.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Southeast Alaska has metamorphic rocks which are formed by the *integration* of different rocks.

Biogeochemical

PLACE-BASED PERSPECTIVE

Using a R.I.P. tombstone as a symbol, discuss with students how life is a biogeochemical process. Like the saying goes from dust to dust.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Erosion

PLACE-BASED PERSPECTIVE

Show the students a picture of a mountain and discuss the power of *erosion* that breaks down huge rocks through freeze/thaw, water, and wind erosion.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Southeast Alaska has many good examples of the impact of *erosion* created by glacial and water action.

Phenomena

PLACE-BASED PERSPECTIVE

Show the students pictures of a sun dog and pictures of the “rings” that form around the moon. Discuss these *phenomena* and the unique circumstances in which they are created.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

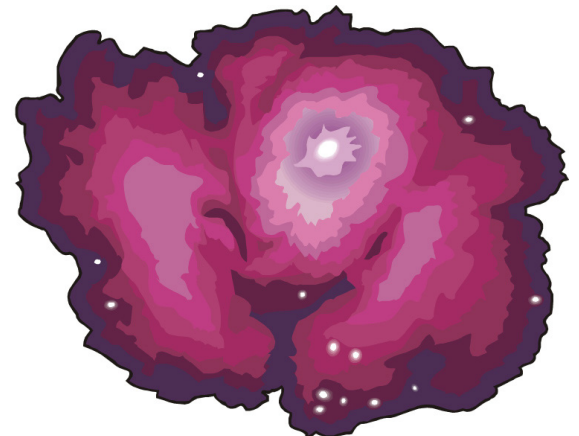
There are different natural *phenomena* in Southeast Alaska, including the spectacular northern lights, sun dogs, rainbows, and moon rings.

Nebula

PLACE-BASED PERSPECTIVE

Show a picture of a *nebula* and discuss the theories supporting their functions in the universe.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.

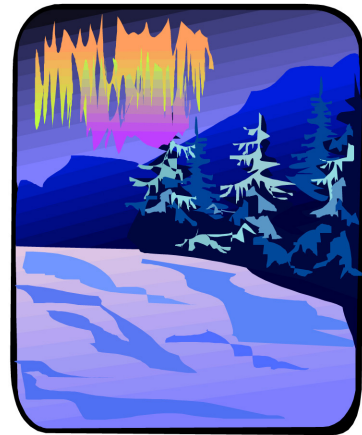


Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Coriolis Effect

PLACE-BASED PERSPECTIVE

Discuss with the students the fact that hurricanes occur in part because the Earth is spinning on a rotational axis. This factor is called the Coriolis effect. The Coriolis effect prompts currents and winds to flow to the right in the northern hemisphere and to the left in the southern hemisphere. The Coriolis effect does not affect the direction that water flushes, as some falsely claim.



Aurora

PLACE-BASED PERSPECTIVE

Ask the students if they recall any occurrences with radio static or poor cell phone service, even when the weather was good. Discuss how the same conditions that cause the *aurora* can cause interference in communication equipment.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

The *aurora* can be seen in Southeast Alaska at different times of the year.



Language Skills

Language & Skills Development

LISTENING

Use the activity pages from the Student Support Materials.



Nod and Clap

Mount the vocabulary illustrations on the chalkboard. Point to one of the illustrations and say its name. The students should nod their heads to indicate that you said the correct vocabulary word for the illustration. However, when you point to an illustration and say an incorrect name for it, the students should clap their hands ONCE. Repeat this process until all of the vocabulary illustrations have been used a number of times in this way.

SPEAKING



Calendar Bingo

Before the activity begins, prepare a page that contains a calendar page (complete with days and dates). Provide each student with a copy of the calendar page. Also, provide each student with 10 small markers. Each student should place the markers on different dates on his/her calendar page. Mount the vocabulary illustrations on the chalkboard. Call a student's name and say a date in the month. If a marker is not on the date you named, he/she should say a complete sentence about a vocabulary illustration you point to. However, if a marker is on the date you called, he/she may "pass" to the next player. Repeat this process until all students have participated. You may wish to provide each student with more than one marker for this activity.

READING

Use the activity pages from the Student Support Materials.



Who's Next?

Provide each student with a blank flashcard. Each student should write his/her name on the blank flashcard. When the students' name cards are ready, collect them and mix them together. Redistribute the name cards to the students (so that each student has a name card from another student). Mount the sight words on the chalkboard. Show a cloze sentence and call a student's name. That student should then read the name on the name card he/she has. It is that student who must read the cloze sentence and then point to the sight word that best completes it. Repeat this process until all of the students have responded. The exciting aspect of this activity is that a student never knows when his/her name will be called.

WRITING

Use the activity pages from the Student Support Materials.



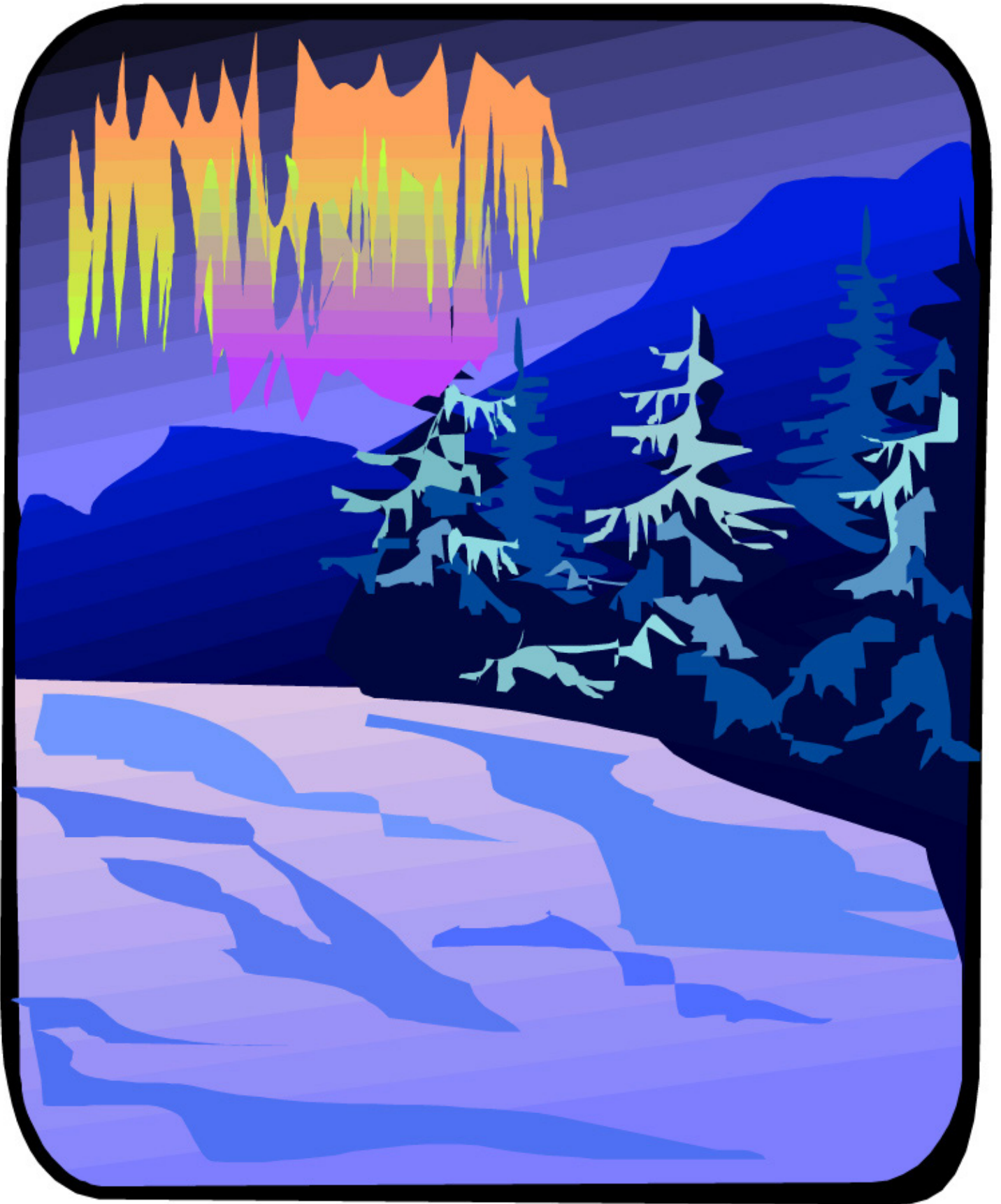
Sentence Build

Group the students into two teams. Give each team a long strip of writing paper and a felt pen. When you say "Go," the first player in each team must write the first word of a sentence (any word), for example, "The." The second player must add another word, for example, "dog." The players should continue in this way until a complete sentence has been created, word by word. Repeat.



Vocabulary Images



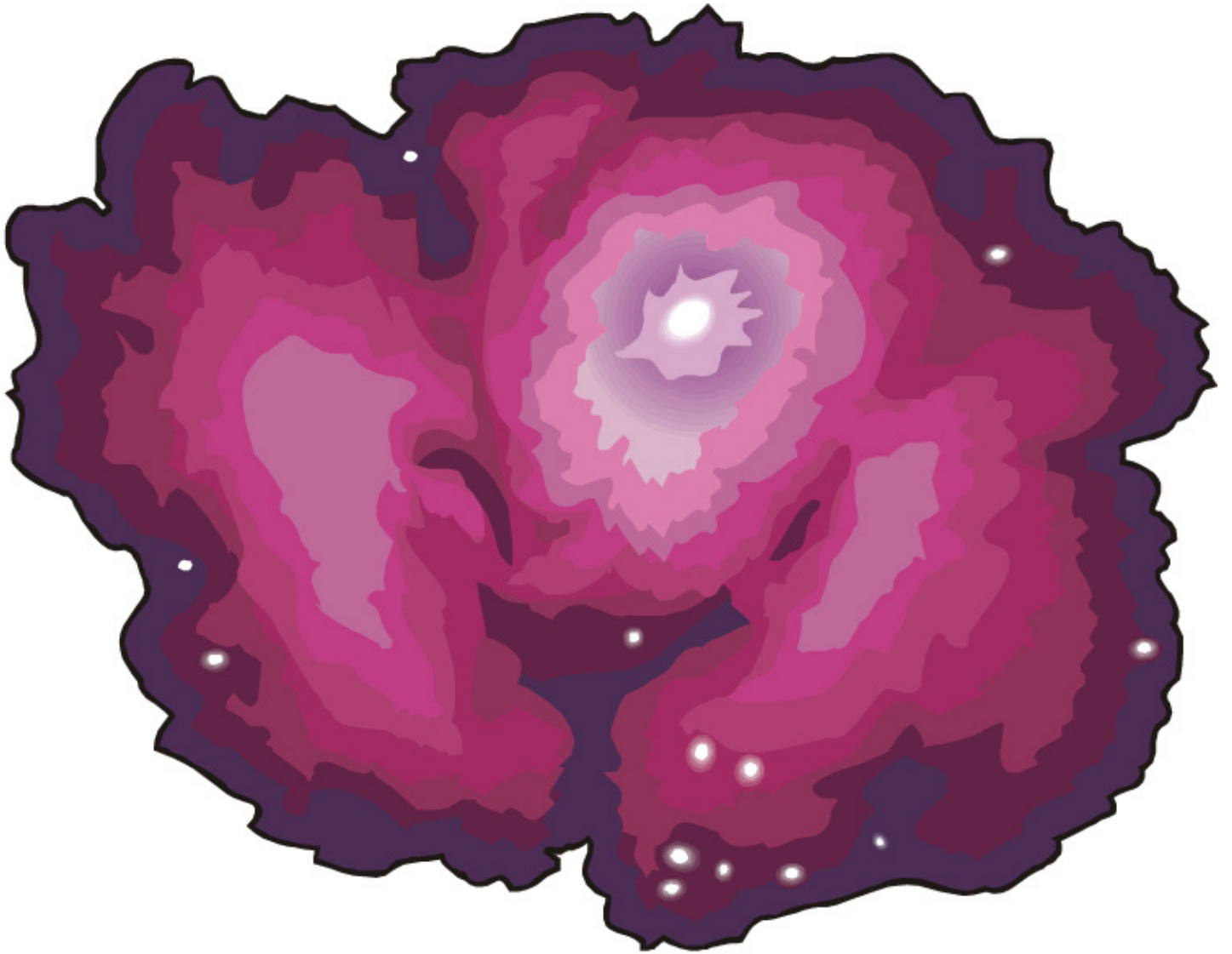


















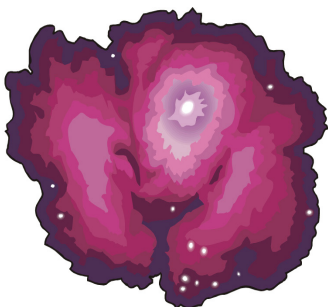
STUDENT SUPPORT MATERIALS

Listening



Say these words to the students - they write the numbers of the words under the pictures.

1. rock cycle, 2. integrating, 3. biogeochemical, 4. erosion, 5. phenomena, 6. Coriolis effect, 7. aurora, 8. nebula



True Or False?

Read the following sentences to the students. The students should write "true" or "false" for each of the sentences.

- 1) **Rock Cycle**
 - a) Subduction results in material returning to the mantle in the rock cycle.
- 2) **Integrating**
 - a) Loose rock on a mountain slope is integrated.
- 3) **Biogeochemical**
 - a) A number of biogeochemical cycles have been influenced by humans because of our mining practices.
- 4) **Erosion**
 - a) Diamonds are formed by erosion of other minerals.
- 5) **Phenomenon**
 - a) One phenomena of outer space is that it is warm.
- 6) **Coriolis effect**
 - a) Wind and surface ocean currents are influenced by the Coriolis effect.
- 7) **Aurora**
 - a) Auroras are most often seen in polar latitudes.
- 8) **Nebula**
 - a) Sometimes, the captain of the Enterprise in the television series Star Trek used the dust present in a nebula to hide from the Romulans.

ANSWERS

1.t, 2. f, 3. t, 4. f, 5. f, 6. t, 7. t, 8. t



STUDENT SUPPORT MATERIALS

Sight Words



**rock
cycle**

integrating

biogeochemical

erosion

phenomena

Coriolis

effect

aurora



STUDENT SUPPORT MATERIALS

Reading



nebula

Word Find

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

www.WordSearchMaker.com

Aurora

Biochemical

Coriolis Effect

Erosion

Integrating

Nebula

Phenomena

Rock Cycle

Word Find Solution

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

Sight Words Activity Page

Have the students highlight or circle the words for the pictures.



rock cycle
integrating
biogeochemical
erosion
phenomena
Coriolis-effect
aurora
nebula



rock cycle
integrating
biogeochemical
erosion
phenomena
Coriolis-effect
aurora
nebula



rock cycle
integrating
biogeochemical
erosion
phenomena
Coriolis-effect
aurora
nebula



rock cycle
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erosion
phenomena
Coriolis-effect
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nebula



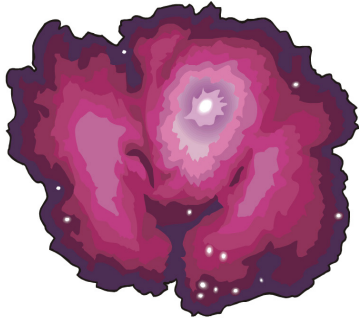
rock cycle
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aurora
nebula



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Sight Words Activity Page

Have the students highlight or circle the words for the pictures.



rock cycle
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erosion
phenomena
Coriolis-effect
aurora
nebula



rock cycle
integrating
biogeochemical
erosion
phenomena
Coriolis-effect
aurora
nebula

Sentence Halves

Have the students write the numbers/letters for sentence halves that match.

- | | |
|--|--|
| 1) The process that begins in a spreading center, and includes subduction, | A. To be the most prevalent colors visible in the aurora. |
| 2) Ions in the ocean are always attaching themselves, | B. A nebula is the birthplace of a star |
| 3) A familiar biogeochemical cycle that involves water is called | C. The hydrologic cycle. |
| 4) The slow destruction of mineral material | D. And finally re-emergence as igneous or basaltic rock, is called the rock cycle. |
| 5) Hypotheses are initial explanations | E. Is called erosion. |
| 6) The trade winds blow in an easterly direction | F. And not just from north to south, because of the Coriolis Effect. |
| 7) Red, green, and white seem | G. of phenomena observed by scientists. |
| 8) Consisting of dust and stellar matter, | H. And thus integrating with sediment on the ocean floor. |

ANSWERS

1/D 2/H 3/C 4/E 5/G 6/F 7/A 8/B

Word & Definition Match

Have the students write the word numbers on their matching definitions.

*example:
carbon cycle*

*where new
stars and
planetary
bodies form*

*the slow
destruction of
mineral mate-
rial by climatic
and physical
forces*

*process
by which
compounds
become
fused togeth-
er*

*apparent
deflection of a
body in motion
with respect to
the earth*

*process by which
rocks are altered,
eventually turn into
magma, then turn
to rock again and
so on.*

*a radiant
emission
from the
upper atmo-
sphere*

*a natural
occurrence
observed*

1. rock cycle
2. integrating
3. biogeochemi-
cal
4. erosion
5. phenomenon
6. Coriolis effect
7. aurora
8. nebula

Which Belongs?

Have the students circle/identify the word that is correct for each sentence.

1. Stars are formed in a aurora/nebula.
2. The rock cycles/biogeochemical cycles, are the ones that are out of natural balance the most.
3. “The aurora/nebula displays were beautiful last night,” the astronomer said.
4. Aware of the rock cycle/Coriolis effect, the oil companies explore for oil by drilling.
5. The Coriolis effect/phenomenon occurs because a point on the Earth at the pole travels less distance than a point at the equator as the Earth rotates.
6. It was dangerous to walk on the mountain slope due to the possibility of slipping on the loose sediment caused by rock cycle/erosion.
7. When put under pressure, sand and other sediment become erosion/integrated into forms of rock.
8. There are numerous phenomena/rock cycles that have not been explained yet.

ANSWERS

1. nebula, 2. biogeochemical, 3. aurora, 4. rock cycle, 5. Coriolis effect, 6. erosion, 7. integrated
8. phenomena

What's The Answer?

Have the students read the questions and then select the correct answer for them. They should fill-in the appropriate circles, beside the answers of their choice.

- 1) Which is not a major part of the rock cycle?
 - (a) mining;
 - (b) subduction;
 - (c) divergence of tectonic plates.

- 2) Shale is an example of rock formed by
 - (a) Processes of subduction;
 - (b) Volcanoes;
 - (c) Integration of sediment.

- 3) The biogeochemical cycle of an element nutrient refers to
 - (a) Its movement through the atmosphere, ocean, and biological organisms;
 - (b) Its movement through the atmosphere, rocks, and ocean and biological organisms;
 - (c) Its movement through biological organisms only.

- 4) The reduction of mountains and hillsides
 - (a) Is referred to as erosion;
 - (b) Is referred to as landscaping change;
 - (c) Is primarily the result of construction.

- 5) Phenomena
 - (a) That can't be observed are what science attempts to explain;
 - (b) Are any observed events;
 - (c) Are any observed events for which there are no explanations.

- 6) Missiles veer to the right in the northern hemisphere because of:
 - (a) Centripetal force;
 - (b) Faulty computer guidance;
 - (c) The Coriolis effect.

- 7) The aurora is caused by
 - (a) The collision of charged solar particles with atoms and molecules in the atmosphere
 - (b) Collision of our atmosphere and small meteors;
 - (c) Light reflecting off the moon and scattering in the upper atmosphere.

- 8) Stars
 - (a) Were all formed during the Big Bang;
 - (b) Are formed in black holes;
 - (c) Are formed in nebulas.

ANSWERS

1. a, 2. c, 3. b, 4. a, 5. b, 6. c, 7. a, 8. c



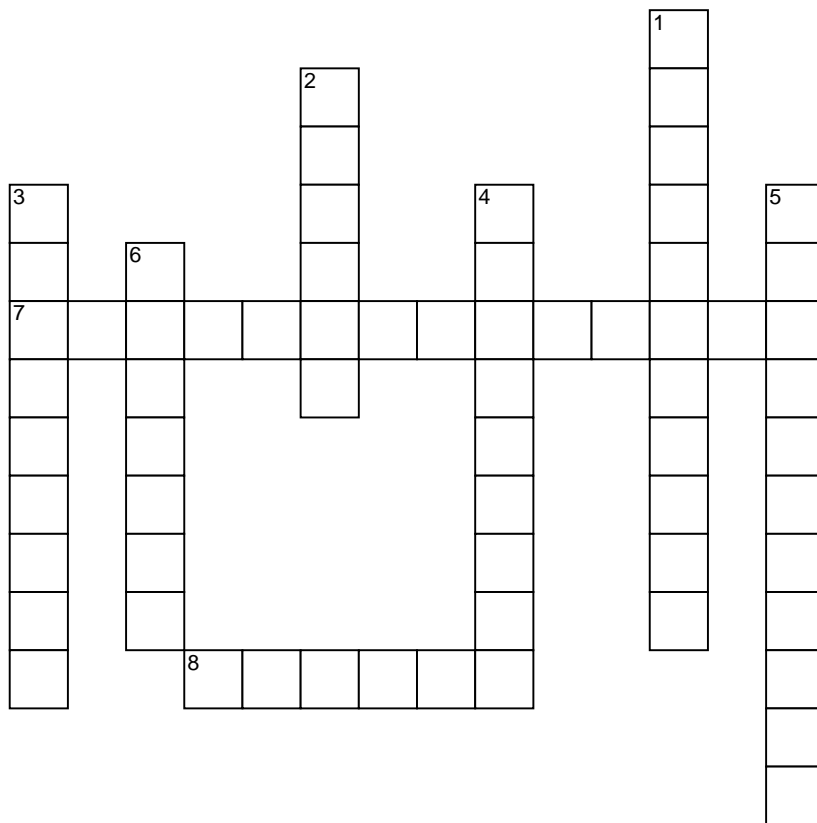
STUDENT SUPPORT MATERIALS

Writing



D-1 Concepts of Earth Science

11th Grade



www.CrosswordWeaver.com

ACROSS

- 7** the apparent deflection of a body in motion with respect to the earth, as seen by an observer on the earth, attributed to a fictitious force but actually caused by the rotation of the earth
- 8** a radiant emission from the upper atmosphere that occurs sporadically over the middle and high latitudes of both hemispheres in the form of luminous bands, streamers, or the like, caused by bombardment of the atmosphere

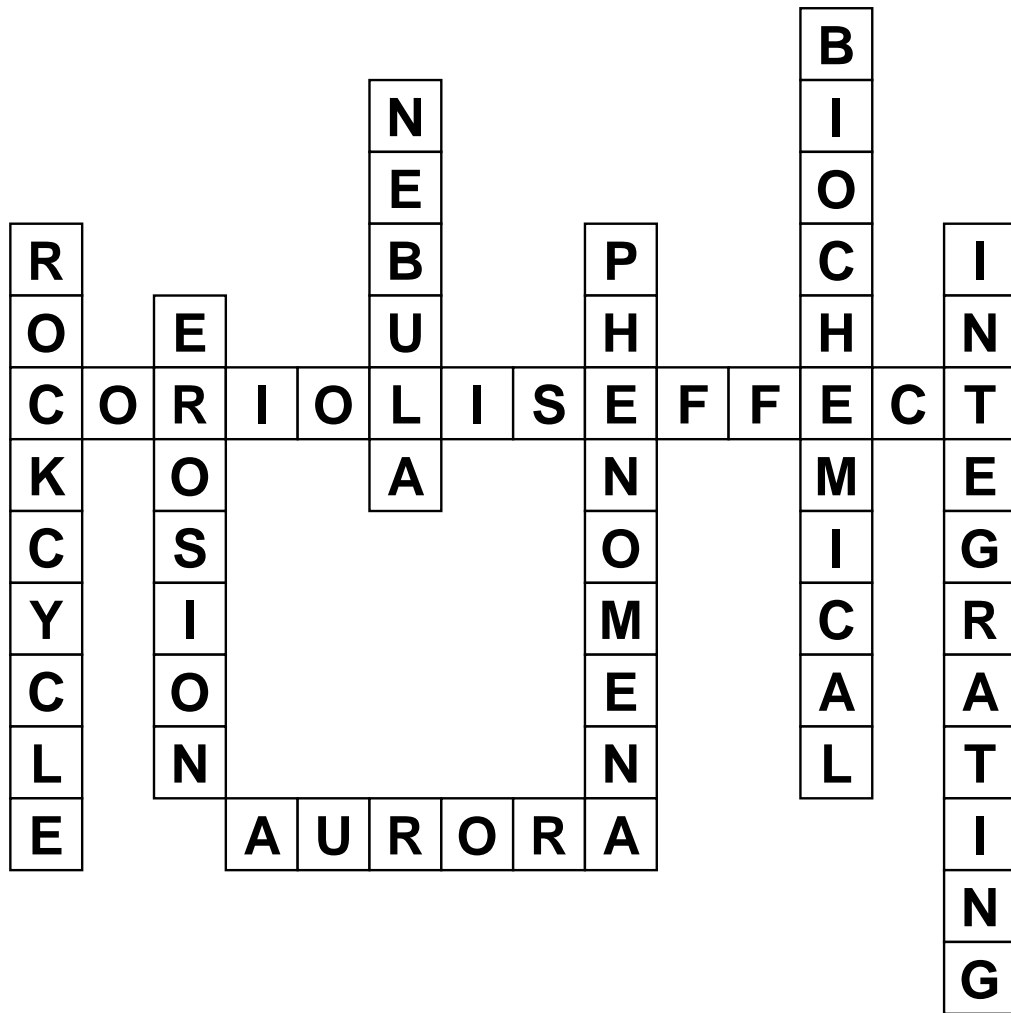
DOWN

- 1** refers to the cycle of any element through the atmosphere, ocean, organisms, and the Earth
- 2** a cloud of dust and stellar matter in which new stars and planetary bodies form
- 3** the process by which rocks are formed, altered, destroyed, and reformed by geochemical processes and which is recurrent, returning to a starting point
- 4** any observed natural occurrence
- 5** process by which compounds, or different rocks, become fused together
- 6** the slow destruction of mineral material by climatic and physical forces including rain, wind, water, waves, etc.

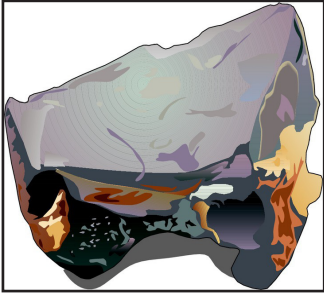
D-1 Concepts of Earth Science

11th Grade

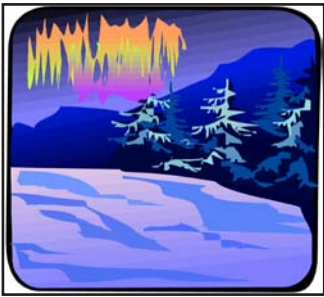
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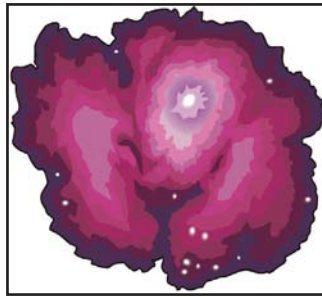


Write The Words!

















Complete The Sentence

Have the students write the key words in the blanks.

Oceanography textbooks include observations of geological, physical, biological, and chemical aspects of the ocean and the planet Earth. Nearly all Oceanography text books begin with the formation of our solar system in a ____1____. It is the sun that provides the energy to the planet to sustain life in the ocean or anywhere else on the planet. Coincidentally, it is also the sun, via the bombardment of cosmic rays on our atmosphere, that creates the ____2____. A discussion of the ____3____ known as the ____4____ – the apparent deviation of wind or other moving objects over the Earth's surface – is also discussed early in Oceanography textbooks.

A basic concept in Oceanography is that of the ____5____. This cycle consists of the formation of rock, its subsequent ____6____ and washout into the ocean as sediment, and then its ____7____ into rock again. Many important (to life) compounds, like phosphate, are part of the rock cycle. These compounds move through the atmosphere, oceans, land, and life in what are referred to as ____8____.

ANSWERS

1. nebula, 2. aurora, 3. phenomenon, 4. Coriolis effect, 5. rock cycle, 6. erosion, 7. integration
8. biogeochemical cycles

Creative Writing Activity Page

Have the students write sentences of their own, using the key words from this unit. When the students' sentences are finished, have them take turns reading their sentences orally. The students should say "Blank," for the key words; the other students must name the "missing" words. You may wish to have the students write the "definitions" for the key words.

rock cycle

integrating

biogeochemical

erosion

phenomena

Coriolis effect

aurora

nebula



Reinforcement Activities



Countering the Coriolis Effect Misunderstanding

There is a long-held, false belief that due to the Coriolis effect, water drains in a clockwise direction in the southern hemisphere and in a counter-clockwise direction in the northern hemisphere. This is untrue, and in this exercise, you'll see how people fake this unnatural event.

What you will need:

Two plastic containers: a pan to be drained and a bucket for the storage of water. The draining pan should be non-circular (like a square plastic container). Drill a hole (1/4 inch or 3/8 inch) through the center of the bottom. Use your finger as a stopper.

The other container can be any small plastic bucket that your pan should be able to sit on top of so the bucket can catch the water as it drains.

Fill the pan

Choose the spot to pretend is the equator (the center of your classroom will do). Fill the pan from the bucket and let the motion from filling stop. (You can insert and then gently remove a vertical object, such as index card, into the water to dampen the motion.) You can then show that there is little or no circulation by floating a match stick (or sprinkling pepper) on the water.

Simulate the northern hemisphere

If you are pretending to be going to the north side of the equator, turn in a circle to your left several times. As you have a non-circular pan, you have now introduced counter-clockwise rotation (which is cyclonic in the northern hemisphere) into the water. Add a tracer (such as matches or pepper). Remove your finger and let the water drain. Note the direction that the water drains.

Simulate the southern hemisphere

Fill the pan with water. Go back to the equator (center of the room) but this time turn in a circle to your right several times. As you have a non-circular pan, you have now introduced a clockwise direction (which is cyclonic rotation in the southern hemisphere). Add a tracer (such as matches or pepper). Remove your finger and let the water drain. Note the direction that the water drains.

The equator

This is the hardest demonstration because it is actually very difficult indeed to eliminate all rotation from a pan of water. The pan should sit for a very long time (and your finger might get tired). You may want to use a cork stopper for this demonstration.



Unit Assessment

Unit Quiz



Grade 11: Concepts of Earth Science D1 Quiz

Name: _____

Date: _____

Multiple Choice: Select the word or words that best fit the definition. Circle the correct answer.

- 1) When a solar wind reaches Earth's atmosphere, it can produce spectacular atmospheric displays that are best seen at night, and are known as
 - a) coriolis effects
 - b) auroras
 - c) erosion's
- 2) The cycle of any element through the atmosphere, ocean, organisms, and the Earth (e.g. the carbon cycle) is _____ .
 - a) biogeochemical
 - b) geochemical
 - c) biochemical
- 3) The curving of the path of a moving object from an otherwise straight path due to the Earth's rotation is known as _____ .
 - a) the coriolis effect.
 - b) an aurora.
 - c) a nebula.

Fill in the Bank: Select the word that best completes each of the following sentences. Choose the word from the Word Bank.

Word Bank

aurora

Biogeochemical

coriolis effect

coriolis effect

Erosion

Integrating

nebula

phenomena

rock cycle

- 4) _____ occurs with the destruction of mineral matter by wind, water, waves, ice and other climatic or physical forces.
- 5) An observed natural occurrence is a _____ .

- 6) A _____ is a cloud of dust and stellar matter in which new stars and planetary bodies are formed.
- 7) _____ refers to the cycle of any element through the atmosphere, ocean, organisms, and the Earth; the cycling of chemical elements and compounds between the living and nonliving parts of an ecosystem.
- 8) _____ is a process by which compounds, or different rocks, become fused together. (e.g. sediments form sedimentary rock)
- 9) The _____ is the apparent deflection of a body in motion with respect to the earth, as seen by an observer on the earth, attributed to a fictitious force but actually caused by the rotation of the earth. This deflection appears as a deflection to the right in the Northern Hemisphere and a deflection to the left in the Southern Hemisphere. T
- 10) The process where rocks change into other kinds of rocks, and are formed, altered, destroyed and reformed by recurring geological processes is the _____.

Grade 11: Concepts of Earth Science D1 Quiz

Name: _____

Date: _____

Multiple Choice: Select the word or words that best fit the definition. Circle the correct answer.

- 1) When a solar wind reaches Earth's atmosphere, it can produce spectacular atmospheric displays that are best seen at night, and are known as

a) coriolis effects

b) auroras

c) erosion's

- 2) The cycle of any element through the atmosphere, ocean, organisms, and the Earth (e.g. the carbon cycle) is _____.

a) biogeochemical

b) geochemical

c) biochemical

- 3) The curving of the path of a moving object from an otherwise straight path due to Earth's rotation is known as _____.

a) the coriolis effect.

b) an aurora.

c) a nebula.

Fill in the Bank: Select the word that best completes each of the following sentences. Choose the word from the Word Bank.

Word Bank

aurora

coriolis effect

nebula

Biogeochemical

Erosion

phenomena

coriolis effect

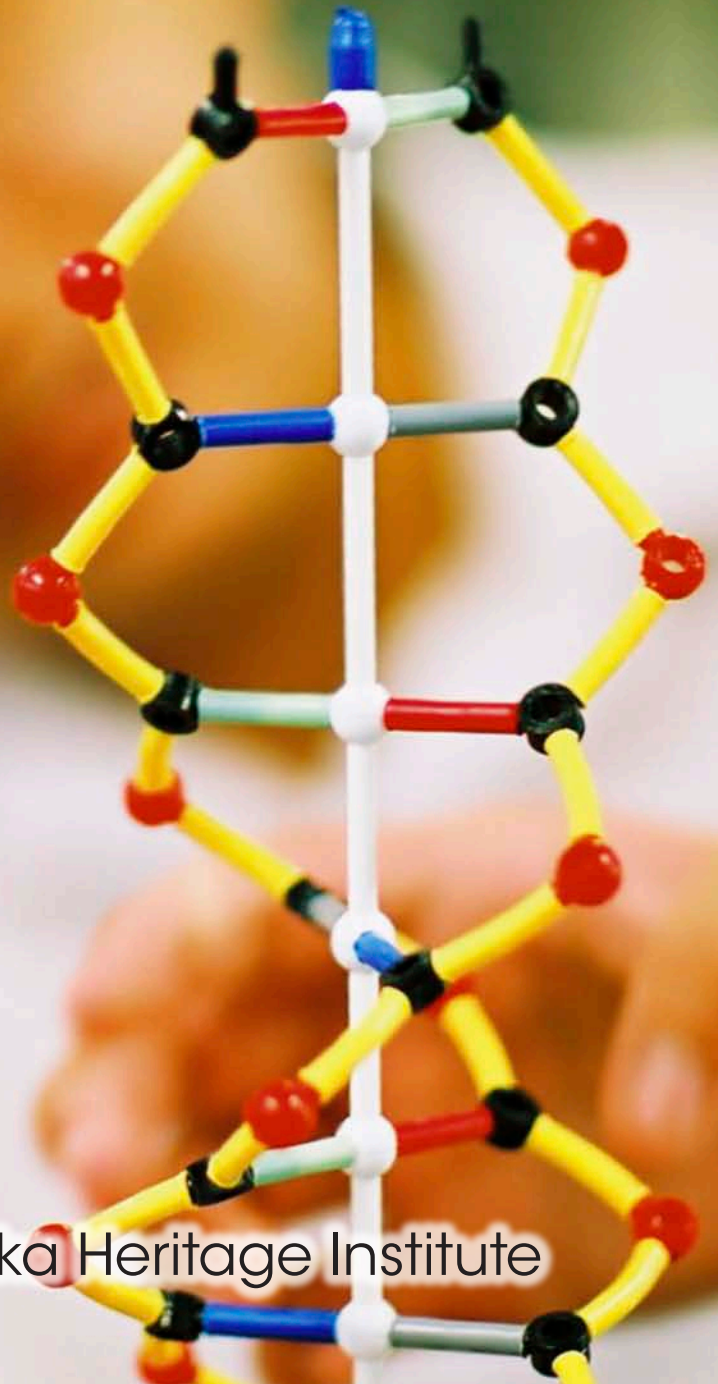
Integrating

rock cycle

- 4) **Erosion** occurs with the destruction of mineral matter by wind, water, waves, ice and other climatic or physical forces.

- 5) An observed natural occurrence is a phenomena.
- 6) A nebula is a cloud of dust and stellar matter in which new stars and planetary bodies are formed.
- 7) Biogeochemical refers to the cycle of any element through the atmosphere, ocean, organisms, and the Earth; the cycling of chemical elements and compounds between the living and nonliving parts of an ecosystem.
- 8) Integrating is a process by which compounds, or different rocks, become fused together. (e.g. sediments form sedimentary rock)
- 9) The coriolis effect is the apparent deflection of a body in motion with respect to the earth, as seen by an observer on the earth, attributed to a fictitious force but actually caused by the rotation of the earth. This deflection appears as a deflection to the right in the Northern Hemisphere and a deflection to the left in the Southern Hemisphere. T
- 10) The process where rocks change into other kinds of rocks, and are formed, altered, destroyed and reformed by recurring geological processes is the rock cycle.

UNITS E-1, F-1



Sealaska Heritage Institute



INTRODUCTION OF

Key Vocabulary



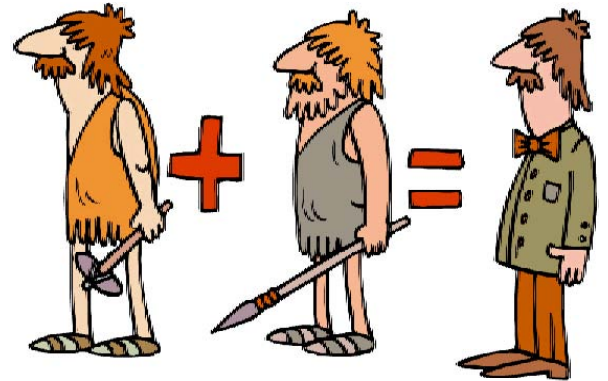
Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Social

PLACE-BASED PERSPECTIVE

Discuss how students' actions and reactions at school dances are often based on *social* perceptions.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



Economic

PLACE-BASED PERSPECTIVE

Show a picture of a bank and discuss how banks borrow and lend money based on *economic* trends.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

In Southeast Alaska, Native peoples combined modern technology, such as purse seines, with traditional fishing knowledge to establish *economic* bases.

Technology

PLACE-BASED PERSPECTIVE

Show the students pictures of a pencil and a computer. Reinforce that inventions such as a pencil are technology, as well as computers and newer *technology*.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Southeast Alaska Natives developed a variety of *technological* innovations. This included items for weaponry, fishing, hunting and trapping.

Culturally Responsive & Place-based Perspective

Introduction of Science Vocabulary

Political

PLACE-BASED PERSPECTIVE

Discuss with students how voting is a *political* decision that shapes the way a democratic country is run.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

There are *political* groups in Southeast Alaska that address a variety of issues relating to natural resources, health, education, and welfare. These include Tlingit-Haida Central Council, Tlingit-Haida Community Councils, village IRA Councils, the Alaska Native Brotherhood and the Alaska Native Sisterhood.

Simulations

PLACE-BASED PERSPECTIVE

Show the class a picture of a flight *simulator* and discuss the importance of flight simulation on a computer as a safety precaution for new pilots.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Simulations of clan houses and canoes provided insight into the development and use of the actual structures.

Current

PLACE-BASED PERSPECTIVE

Draw a picture of a dam with water behind it and demonstrate to students that electric *current* is similar to a hole in the dam. The larger the hole, the more water (or electrons for this example) can go through. In the case of *current*, the amount of electrons are measured in amperes.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Current lifestyles in Southeast Alaska appear to mirror lifestyles in other parts of the country. However, Native peoples currently are revitalizing traditional cultures and languages.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Solution

PLACE-BASED PERSPECTIVE

Show a picture of a refrigerator. Discuss how refrigerators were solutions for food preservation. Discuss the advantages to this *solution*.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Traditional life in Southeast Alaska involved a variety of *solutions* to everyday needs. This included solutions in transportation, clothing, tools, weapons, communications, and food.

Impact

PLACE-BASED PERSPECTIVE

Explain how Isaac Newton had an *impact* on the studies of science.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Many factors have *impacted* the traditional lifestyles of Native peoples. These factors included included laws, schools, religion, tools, economics, harvesting, and social interactions with one another.

Influences

PLACE-BASED PERSPECTIVE

Discuss how moving the capital or closing saw mills can have major *influences* on Southeast Alaska communities.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

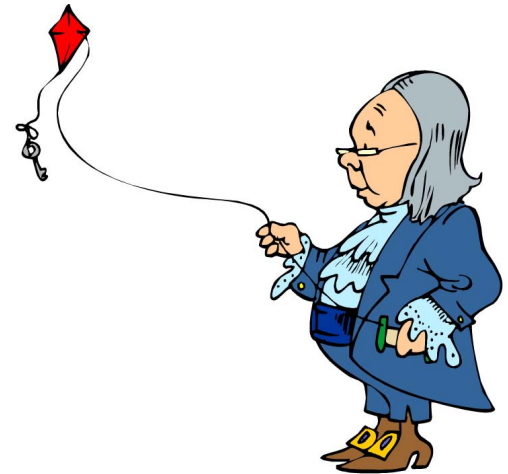
The settling of other peoples and cultures had a great *influence* on the Native peoples. This included learning a new language, a new educational system, new laws, and new religions.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Society

PLACE-BASED PERSPECTIVE

Show students pictures of a traditional Clan House. Discuss with the students how large groups of people and other animals gather together in an organized group. Individuals in societies usually have more in common with each other than they have with others outside their society. For example, Eagle Clan society usually mixed with Eagle Clan society.



Beliefs

PLACE-BASED PERSPECTIVE

Show students a picture of a totem pole. Discuss how beliefs do not need to be supported by facts.

Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

Native cultures of Southeast Alaska contain many important *beliefs*. Among these is the belief that if people are not respectful of animals, there will be negative consequences.

Cross-referenced

PLACE-BASED PERSPECTIVE

Show a picture of Sir Isaac Newton and discuss with students how calculations for everything from GPS to the arc of a basketball are cross-referenced from his original work, the *Philosophiæ Naturalis Principia Mathematica* (Latin: “mathematical principles of natural philosophy”) in 1687. Show the students the picture from this unit for this key word. Have them determine how the picture relates to the word.



HERITAGE CULTURAL PERSPECTIVE

There is a wealth of oral narratives up and down the west coast of Alaska that *cross-reference* each other. This is especially true of stories about the salmon.



Language Skills

Language & Skills Development

LISTENING

Use the activity pages from the Student Support Materials.



Funnel Vision

Before the activity begins, collect a large funnel. Have a student stand at the front of the classroom, with his/her back to the other students. Give the student the funnel. Give the vocabulary illustrations to the other students in the class. The students should hold their illustrations up, facing the front of the classroom. Say a vocabulary word. When you say “Go,” the student with the funnel should place the funnel over his/her eyes and turn to face the other students. The student must then look through the funnel to find the illustration for the vocabulary word you said. This activity may be conducted with two players (each player having a funnel). The winner of each round is the student who

SPEAKING



Half Time

Prepare a photocopy of each of the vocabulary illustrations. Cut each of the photocopied illustrations in half. Keep half of each illustration for yourself. Give the remaining illustration halves to the students. Hold up one of your halves and the student who has the other half of the illustration should show it and then say a complete sentence using the vocabulary word for that illustration. Repeat this process until all students have had an opportunity to respond in this way.

READING

Use the activity pages from the Student Support Materials.



Bottle of Fortune

Before the activity begins, have each student prepare a name card for himself/herself. Collect the students’ name cards and lay them on your desk in a large circle. Mount the vocabulary illustrations on the chalkboard and number each illustration. Place a bottle in the center of the circle of name cards. Spin the bottle. When the bottle stops and is pointing at a name card, call that student’s name. Then, show a cloze sentence, related to the concept being studied. The student should read the sentence and then identify the illustration (by its number) for it. Repeat this process until all name cards have been removed in this way.

WRITING

Use the activity pages from the Student Support Materials.



Treasure Hunt

Provide each student with illustrating materials and supplies and a blank sentence strip. Each student should then create an illustration related to a concept being studied. When a student has completed his illustration, he/she should then write a sentence about it on the sentence strip. When the students’ illustrations and sentences are completed, collect all of the illustrations and mount them on the walls around the classroom. Collect and mix the sentence strips. Group the students into two teams. Give the first player in each team one of the sentence strips. When you say “Go,” each player must read his/her sentence and then attempt to find the picture for it. The first player to correctly match the sentence with its illustration wins the round. Repeat until all players in each team have participated.



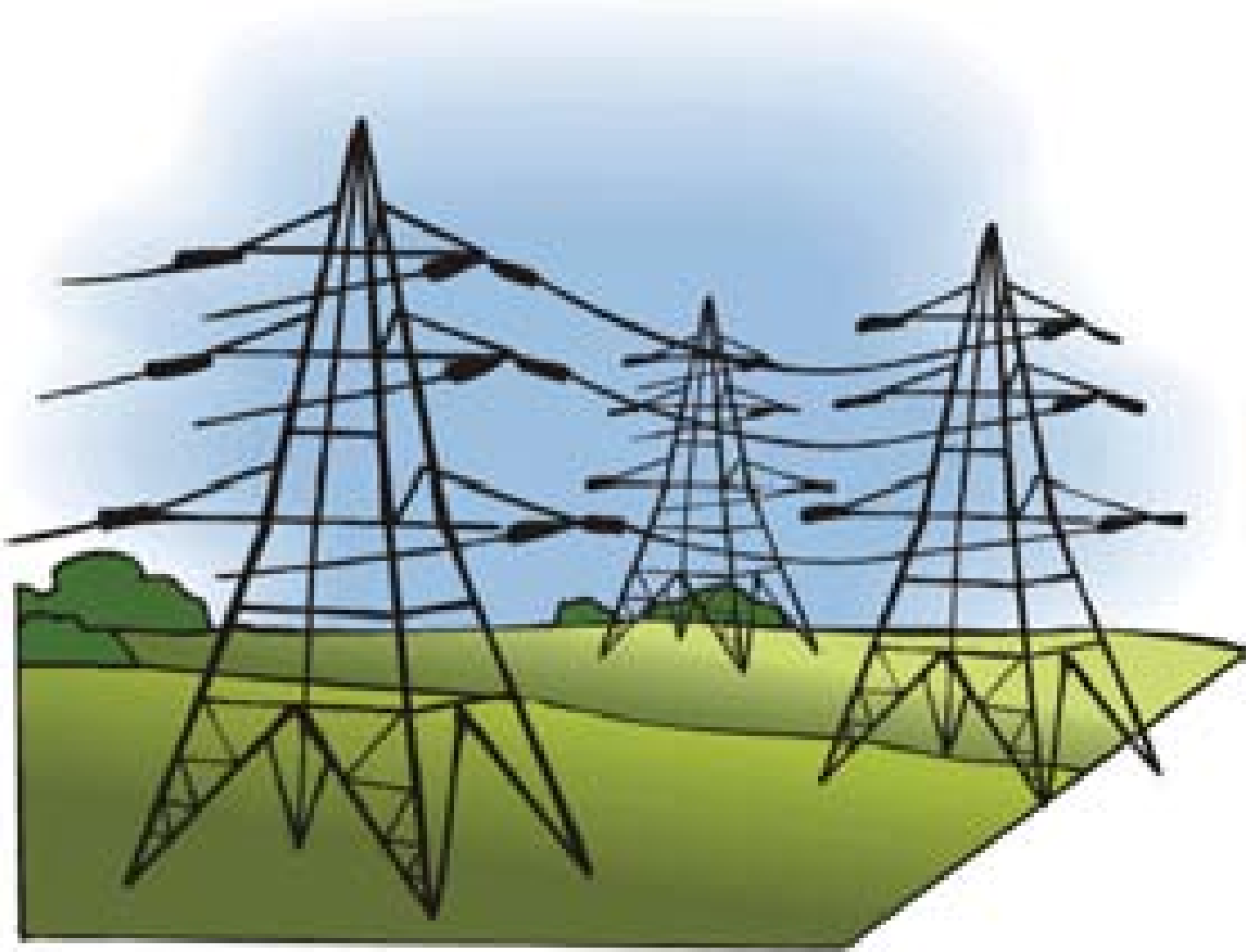
Vocabulary Images



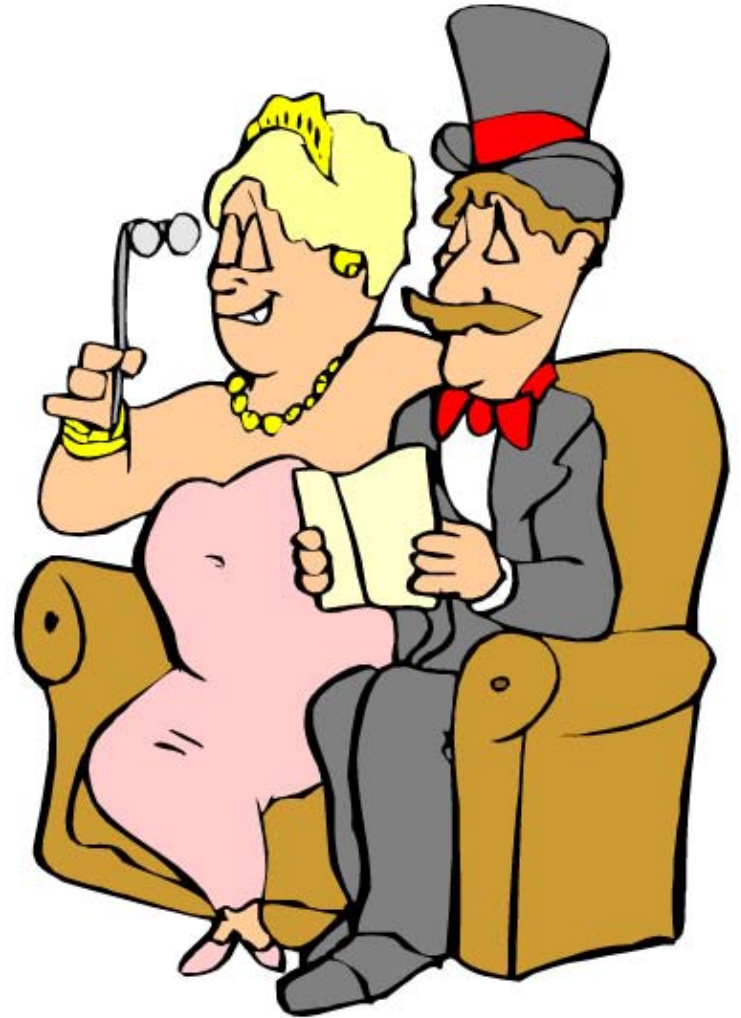
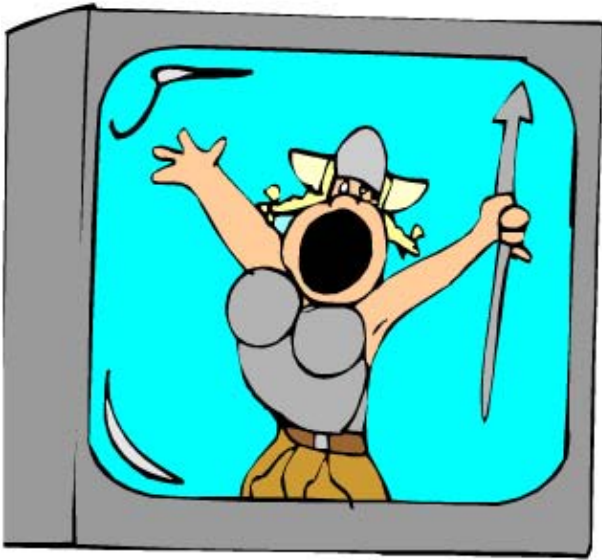


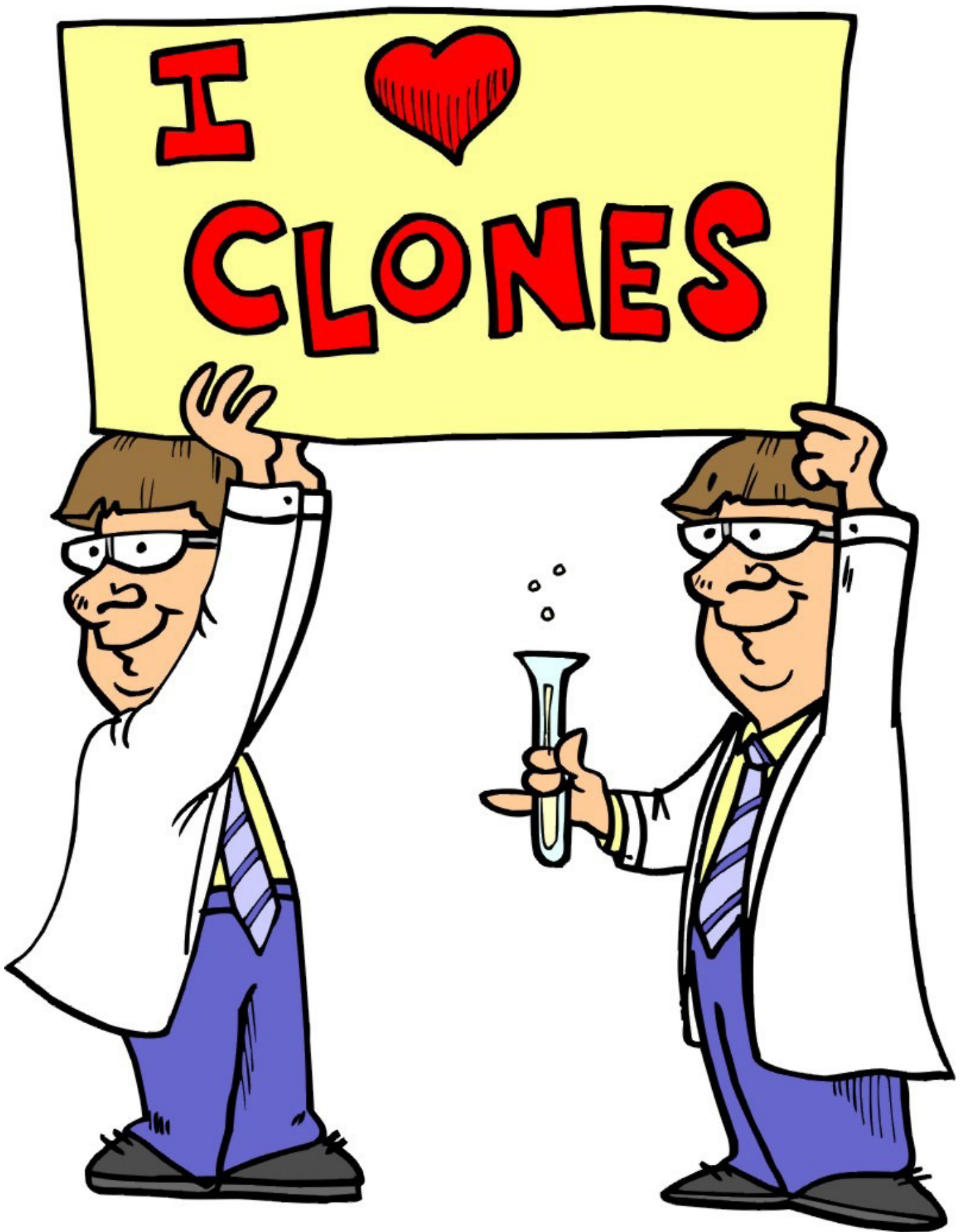


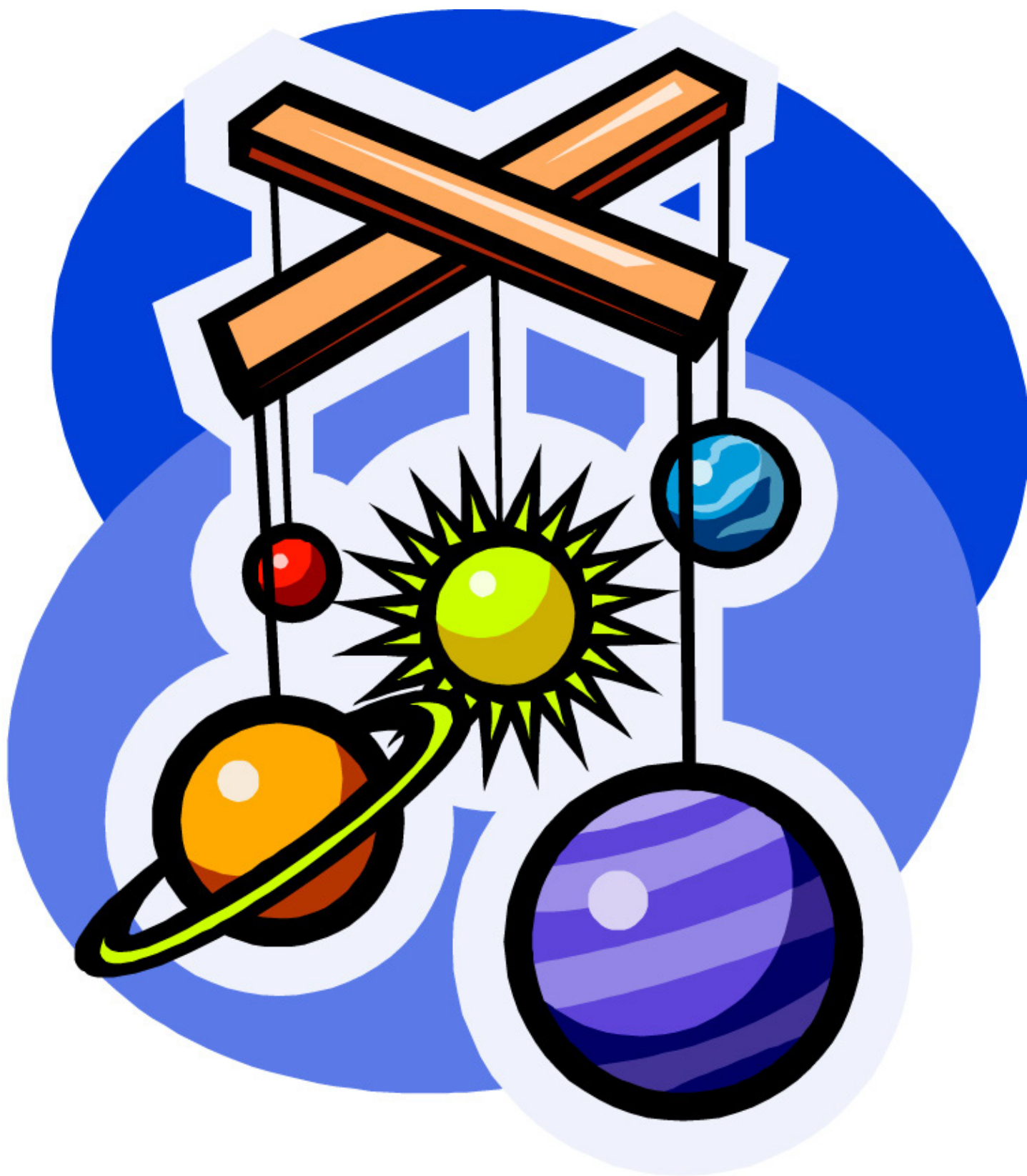


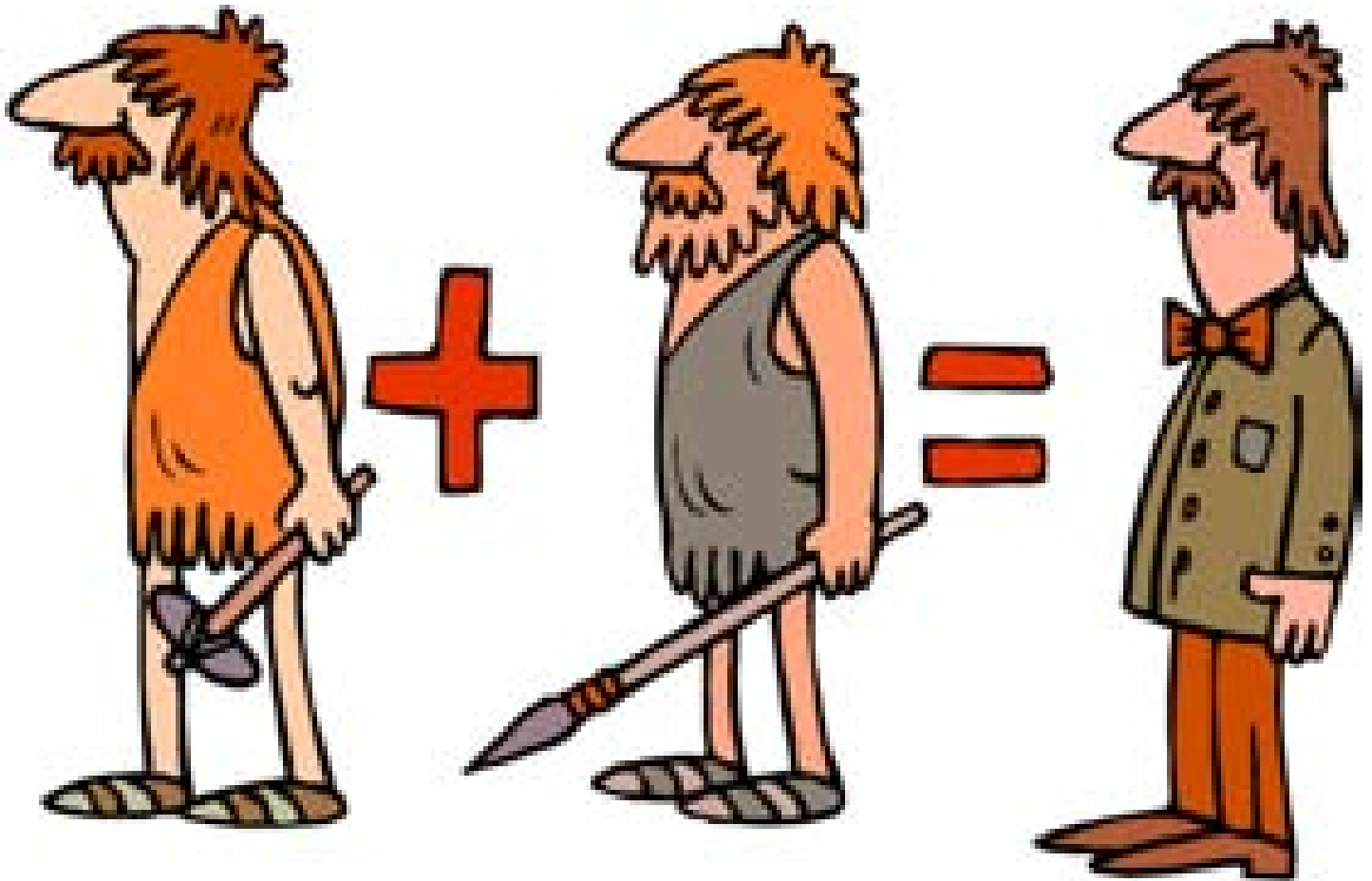


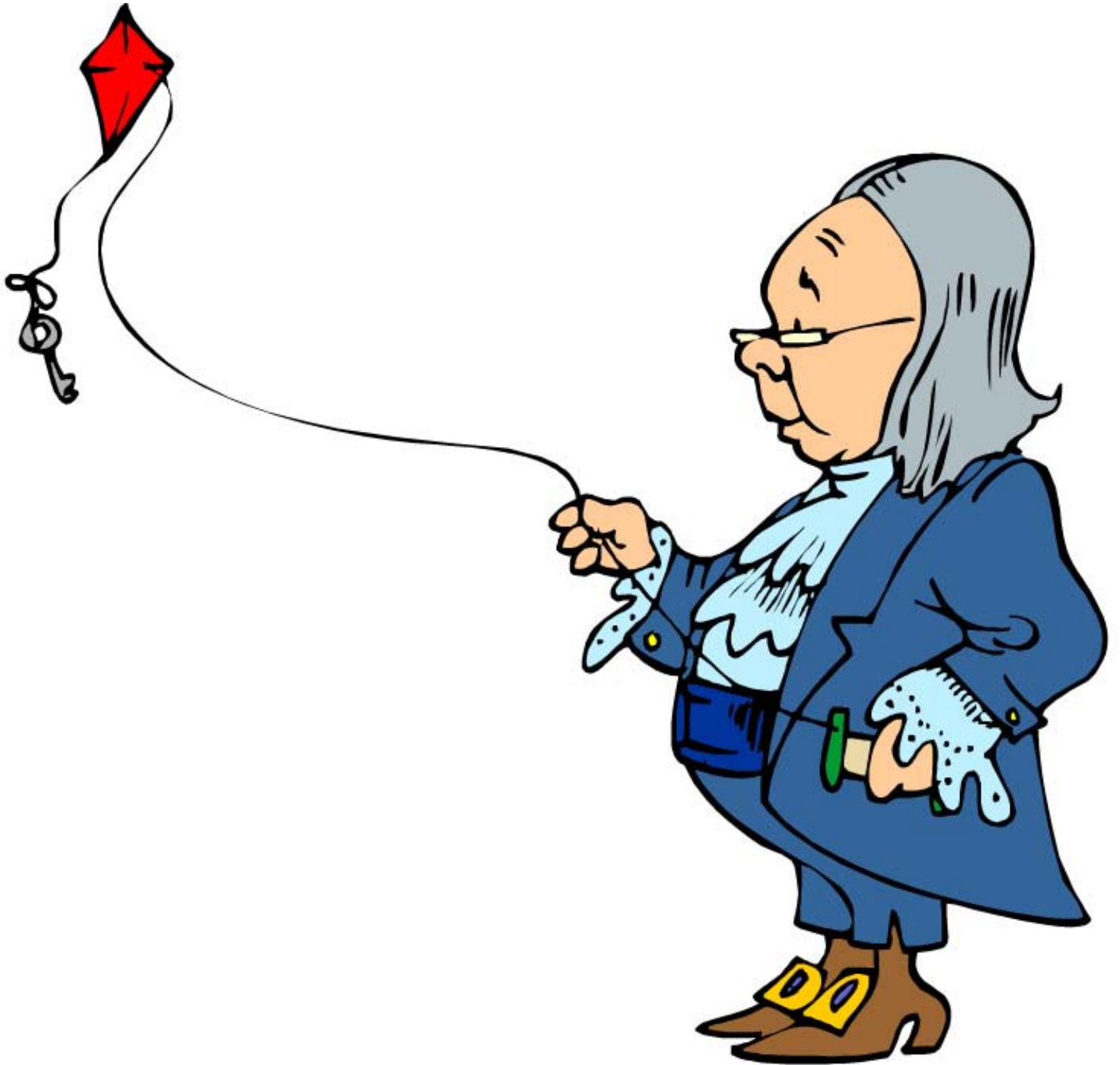


















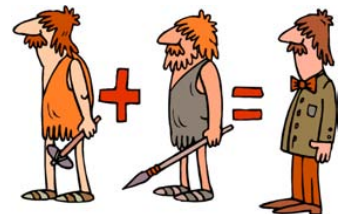
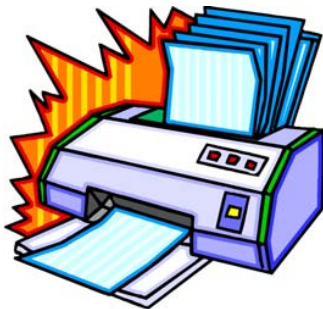
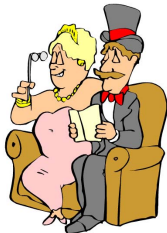
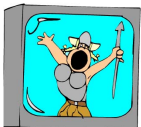
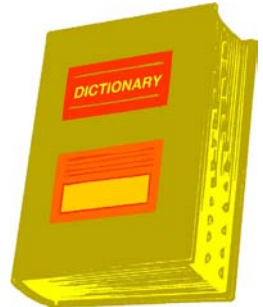
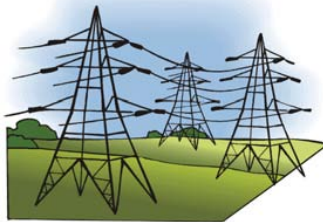
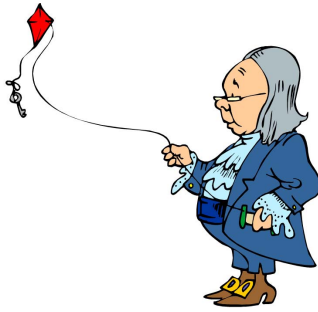
STUDENT SUPPORT MATERIALS

Listening



Say these words to the students - they write the numbers of the words under the pictures.

1. social, 2. economic, 3. technology, 4. political, 5. simulations, 6. current, 7. solution, 8. impact
9. influences, 10. society, 11. beliefs, 12. cross-referenced



Fill-in The Blanks

Read the sentences to the students. The students should name the "missing words."

1. _____ are not based on scientific evidence.
2. Understanding of principles through science has, unfortunately, led to the development of _____ used to kill many humans.
3. Historical events are often _____ with the development of certain advents in technology.
4. The funding of certain scientific research projects is often subject to _____ considerations – an example is stem cell research.
5. Computer technology has had a great _____ on how daily life is conducted.
6. Many _____ have led scientists to conclude the oceans are becoming increasingly acidic as carbon dioxide is released into the atmosphere.
7. _____ U.S. law does not allow research on new stem cell lines.
8. One of the _____ impacts of science is the technologies that emerge from it.
9. The only _____ to global warming is to reduce carbon emissions.
10. The influence of _____ on the direction of scientific research is especially evident during wartime.
11. To a certain extent, the funding of scientific research is based on the _____ effect of the research.
12. Dropping the atomic bomb on Hiroshima had a huge _____ on the war.

ANSWERS

1. beliefs, 2. technology, 3. cross referenced, 4. political, 5. influence, 6. simulations, 7. current
8. social, 9. solution, 10. society, 11. economic, 12. impact

True Or False?

Read the following sentences to the students. The students should write "true" or "false" for each of the sentences.

- 1) Social
 - a) The social view of research on animals has resulted in a booming business for those who raise rats.
- 2) Economic
 - a) Sending people to Mars, while a noble goal, may be economically prohibitive.
- 3) Technology
 - a) The technology of computers is about as advanced as it is going to get.
- 4) Political
 - a) There have been few political arguments about the Endangered Species Act.
- 5) Simulations
 - a) Computer simulations regarding the pH of the oceans all predict a dramatic decrease of alkalinity in the next century.
- 6) Current
 - a) Current refers to the potential difference between two charges.
- 7) Solution
 - a) A practical solution regarding global climate change is to stop using any fossil fuel.
- 8) Impact
 - a) One impact of oil drilling has been oiled beaches.
- 9) Influences
 - a) Television influences how people vote.
- 10) Society
 - a) Our society views cars in a positive way.
- 11) Beliefs
 - a) Beliefs are used by scientists when designing experiments.
- 12) Cross-referenced
 - a) Cross-referencing sources is a vital part of a research project.

ANSWERS

1. f, 2. t, 3. f, 4. f, 5. t, 6. f, 7. f, 8. t, 9. t, 10. t, 11. f, 12. t



STUDENT SUPPORT MATERIALS

Sight Words



social

economic

technology

political

simulations

current

solution

impact

influences

society

beliefs

cross-

referenced



STUDENT SUPPORT MATERIALS

Reading



Word Find

Find the words in the grid. Words can go horizontally, vertically and diagonally in all eight directions.

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

www.WordSearchMaker.com

Beliefs
Current
Economic
Impact
Influences
Political
Simulations
Social
Society
Solution
Technology

Word Find Solution

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

Sight Words Activity Page

Have the students highlight or circle the words for the pictures.



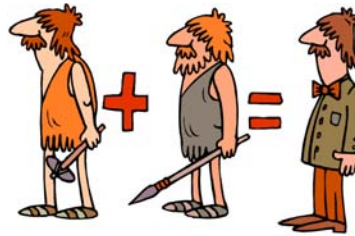
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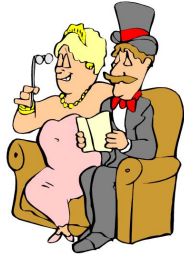
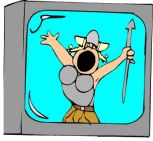
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Sight Words Activity Page

Have the students highlight or circle the words for the pictures.



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beliefs
cross reference



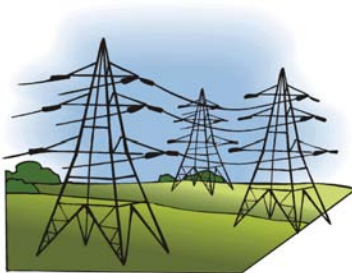
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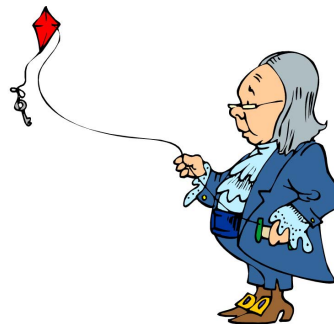
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cross reference

Sentence Halves

Have the students write the numbers/letters for sentence halves that match.

- | | |
|--|--|
| 1) Progress in science is linked to social | A. Inappropriate use of technology by thieves. |
| 2) Recently, and due to high gas prices, there has been a | B. Is probably the computer. |
| 3) The best known technology today | C. The publication of scientific findings regarding global climate change, and continues to impact policy. |
| 4) Some individuals are interested in stalling the publication of scientific | D. Findings for their own interests. |
| 5) Recently, investigators have developed computer simulations | E. You will find multiple explanations for volcanic eruptions. |
| 6) Current events often reflect the | F. Research that has no regard for the environment. |
| 7) There are two solutions | G. that analyze patterns of robberies to predict future targets. |
| 8) Effects on society from technology are called | H. Strong economic incentive to develop alternative sources of energy. |
| 9) Sadly, big business has influenced | I. Science is not a belief system. |
| 10) Society takes a dim view of | J. Feelings about types of research in the time period it is being conducted. |
| 11) It is important to recognize that | K. Sociotechnological impacts. |
| 12) By cross-referencing ancient cultures, | L. To every quadratic equation. |

ANSWERS

1/J 2/H 3/B 4/D 5/G 6/A 7/L 8/K 9/C 10/F 11/I 12/E

Word & Definition Match

Have the students write the word numbers on their matching definitions.

*example:
explanations
of phenom-
ena*

*how political
organizations
view technolo-
gies associ-
ated with sci-
entific findings*

*the influ-
ence of how
science is
presented*

*the way
in which a
technology
is used to
earn money*

*explanations
that address
a problem*

*the man-
ner in which
society views
a scientific
finding*

*the rela-
tion of find-
ings among
investigators*

*where elec-
trons move
through a
conductor*

*scientific find-
ings as a fac-
tor to change
the direction
of research*

*example:
a global
warming
model*

*this is the
manner in
which society
views a sci-
entific finding*

*the appli-
cation of
scientific
findings in
machines*

1. social

2. economic

3. technology

4. political

5. simulation

6. current

7. solution

8. impact

9. influences

10. society

11. beliefs

12. cross referenced

Which Belongs?

Have the students circle/identify the word that is correct for each sentence.

1. Every scientific paper constitutes an influence/impact on our understanding of the world.
2. Dr. Hand hoped to obtain funding through social/political means.
3. The works of Sir Isaac Newton are cross-referenced/influence in many works of science and mathematics.
4. The current/social thinking is that humans originated in Africa.
5. The researcher couched his words carefully so as to avoid creating any social/influence unrest regarding his findings of an alien species.
6. Multiple simulations/solutions based on climatological data reveal that humans are indeed altering the global climate.
7. Science is not based on beliefs/society, but rather on direct observation and experimentation.
8. The solution/technology for removing stuck screws is to spray with a penetrant before turning.
9. It is important not to let personal bias simulate/influence scientific work.
10. The current/economic outlook for a research grant was grim, there would probably be no funding this year.
11. Society/political sometimes puts the brakes on a particular line of scientific research.
12. Technology/political is the application of scientific principles.

ANSWERS

1. impact, 2. political, 3. cross-referenced, 4. current, 5. social, 6. simulations, 7. beliefs
8. solution, 9. influence, 10. economic, 11. society, 12. technology

What's The Answer?

Have the students read the questions and then select the correct answer for them. They should fill-in the appropriate circles, beside the answers of their choice.

- Scientific theories are often met with resistance because
- (a) Of how society views them;
 - (b) Scientists are unconvinced they are correct;
 - (c) There is little evidence supporting them.
- 2) Scientific research is linked with economics in that
- (a) There is often more money for research that is seen as leading to a practical solution to a problem;
 - (b) Those scientists who get paid more do the best research;
 - (c) All money used for research is appropriated by the U.S. Congress or by similar institutions in other countries.
- 3) Which of the following is not true regarding science and technology?
- (a) Science centers around understanding phenomena; technology centers around applying an understanding towards problems;
 - (b) Science and technology are the same thing;
 - (c) The scientific methodology is sometimes applied with the goal of developing a technology for a particular problem.
- 4) Which of the following does not illustrate how political action affects research?
- (a) The U.S. Congress passes a law that regulates how animals are treated and/or protected;
 - (b) Those opposed to the research are interviewed on the evening news;
 - (c) A hypothesis is rejected in an individual's experimentation.
- 5) Computer simulations are not used to
- (a) Predict the weather;
 - (b) Predict changes to the ocean as a result of global warming;
 - (c) Perform calculations for salaries.
- 6) Current events are those things that
- (a) Are happening at the moment and that are of interest to humans;
 - (b) Have happened in the past and were of interest to humans;
 - (c) May happen in a few years.
- 7) The only long-term solution to reduce global climate change is
- (a) Use more solar energy;
 - (b) Reduce global emissions of carbon dioxide and methane;
 - (c) Use nuclear energy.
- 8) Which of the following is not likely to be an impact of changing climate on the earth?
- (a) Reduction of coral reefs;
 - (b) Higher sea level;
 - (c) Greater abundance of fish.

What's The Answer?

Have the students read the questions and then select the correct answer for them. They should fill-in the appropriate circles, beside the answers of their choice.

- 9) Any factor that changes the direction of scientific research is referred to as a(n):
- (a) Influence;
 - (b) Belief;
 - (c) Society.
- 10) Televisions
- (a) Were considered a detriment initially by society;
 - (b) Were hailed as a revolutionary means of communication when first developed;
 - (c) Have remained unchanged since their initial development.
- 11) The evangelical movement in the U.S. seeks to change what is taught in the classroom based on
- (a) Empirical evidence;
 - (b) A belief system;
 - (c) Scientific research.
- 12) All scientists, if they hope to be published
- (a) Must focus solely on their own work to the exclusion of all else;
 - (b) Must relate their work in an interesting way;
 - (c) Must cross-reference their work with that of others well before they begin experimentation.

ANSWERS

1. a, 2. a, 3. b, 4. c, 5. c, 6. a, 7. b, 8. c, 9. a, 10. b, 11. b, 12. c



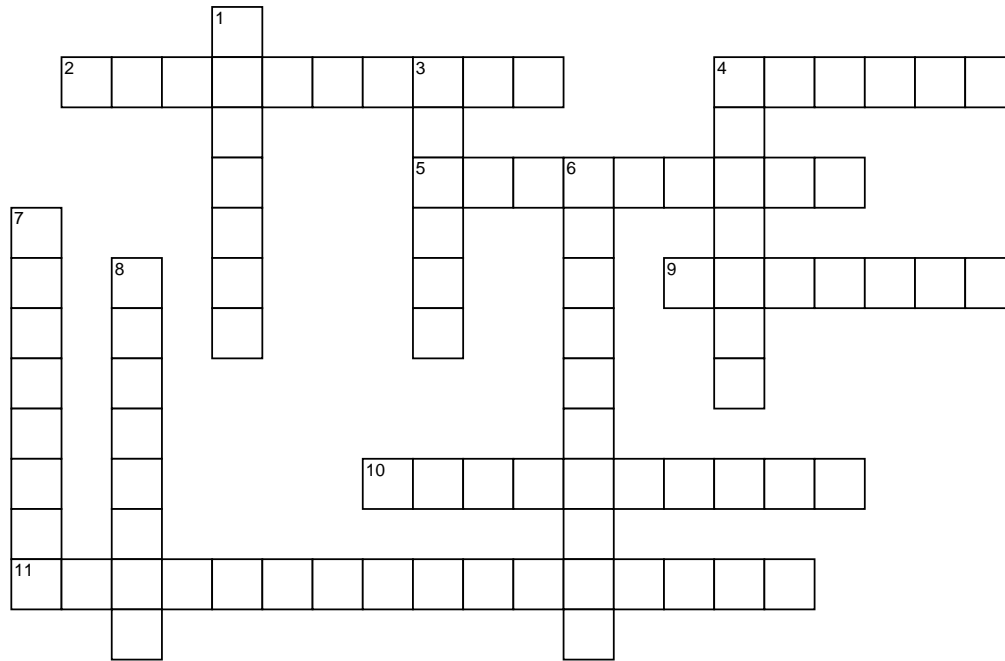
STUDENT SUPPORT MATERIALS

Writing



E-1 Science and Technology

F-1 Cultural, Social, Personal Perspectives and Science



www.CrosswordWeaver.com

ACROSS

- 2** individual trials of models in which variables are changed in an effort to generate an understanding of a natural cycle or process
- 4** refers to the manner in which society views a scientific finding or technology based on scientific findings
- 5** refers to how political organizations view, and seek to promote or stall, technologies associated with scientific findings
- 9** the way in which beliefs that are not based on scientific methodologies, influences how science is presented or conducted
- 10** the application of scientific findings and principles in machines/devices
- 11** relation of scientific findings among investigators; referencing the works of others in published scientific works

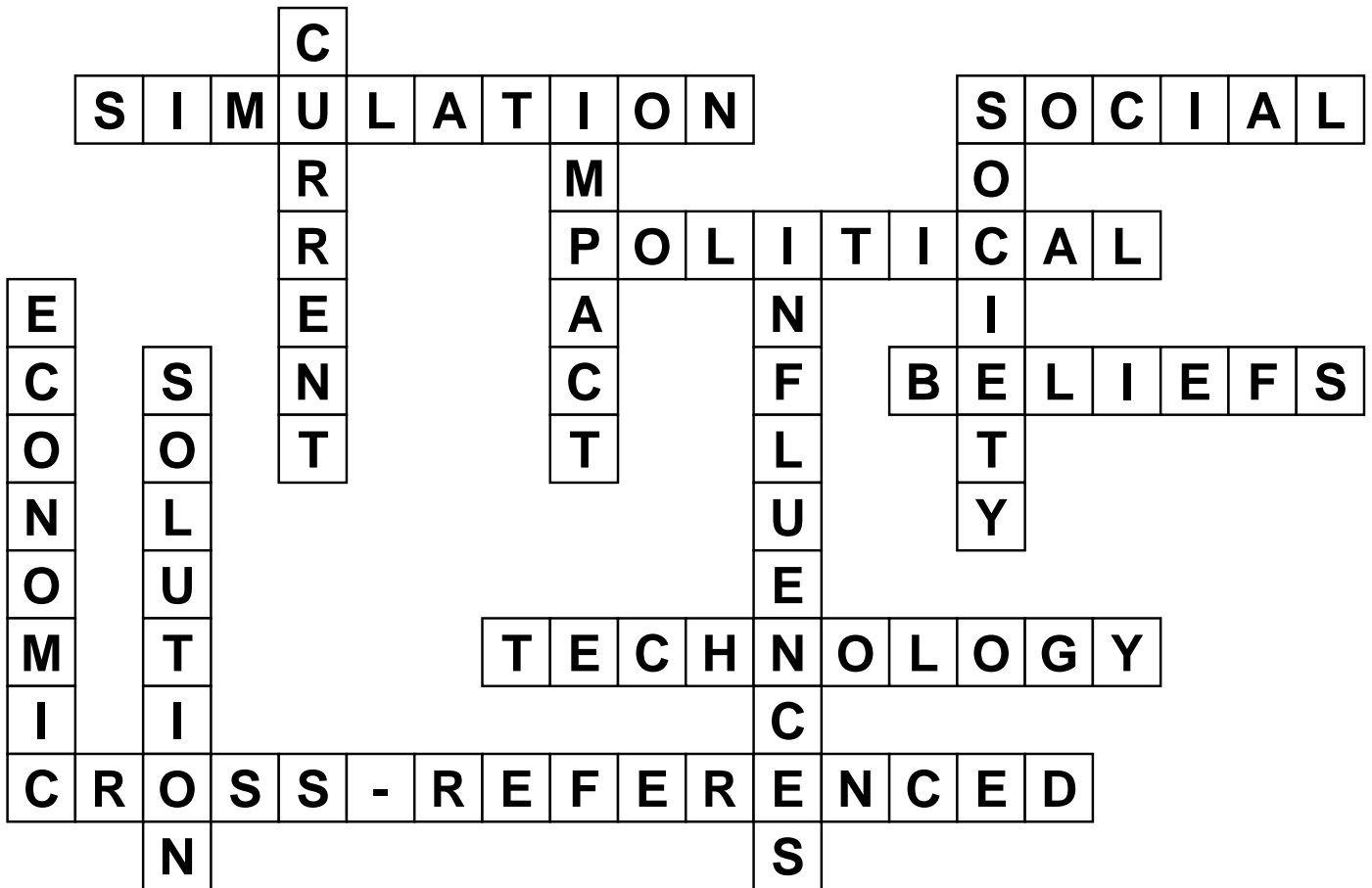
DOWN

- 1** in which electrons flow through a conductor
- 3** refers to the amount of change that a finding instigates in current thinking or devices constructed
- 4** refers to the manner in which society views a scientific finding or technology based on scientific findings
- 6** political, society, cultural, or other findings, or an other factor that changes the direction of scientific research and/or development of specific technologies
- 7** refers to the way in which a technology is used to earn money, or which has a cost associated with its use
- 8** explanations that addresses a problem, or a method of approaching a problem that yields an effect that is agreeable

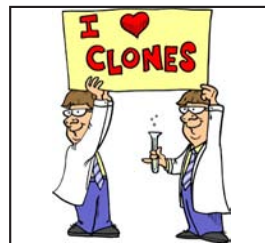
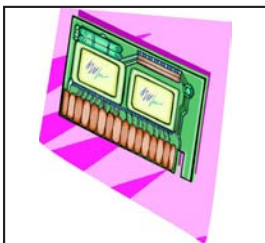
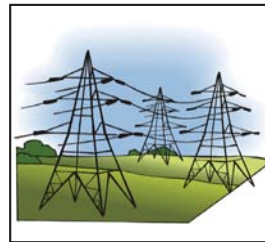
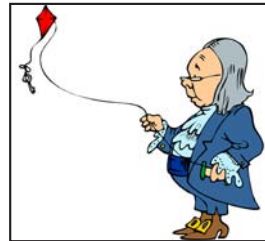
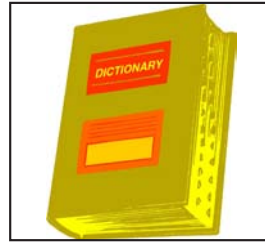
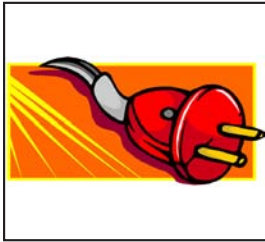
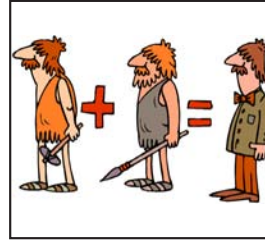
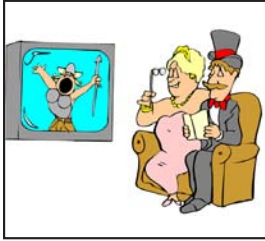
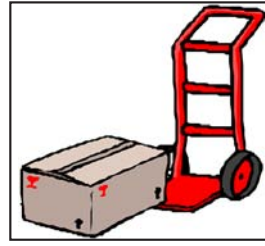
E-1 Science and Technology

F-1 Cultural, Social, Personal Perspectives and Science

Solution:



Write The Words!



Complete The Sentence

Have the students write the key words in the blanks.

____1____. People often point to atrocities such as weapons used to kill, or personal ____2____ associated with certain medical procedures that would not have been possible if scientific research hadn't been conducted. However, what is often overlooked is that it isn't the scientific knowledge that is the problem, but rather it is the application of this knowledge – the ____3____ that arises from this knowledge. Ironically, technologies always develop as a ____4____ to certain problems. Computers, used in many ____5____ to address global climate change, are an example of how useful technology can be.

The ____6____ costs associated with certain technologies are numerous -- death being the most significant of course. Those attempting to gain office must gauge the ____7____ feeling among voters when speaking on an issue, or suffer a ____8____ defeat. Technology itself also ____9____ the outcome of a political contest in other ways; adverse can ____10____ a candidate's chances. Technology allows rapid ____11____ of voter opinions and tabulation of standings and candidates make widespread use of polling when seeking office to gauge how they, and opponents, are doing. Social impacts of technology may be purely ____12____; continuing the example above, all of this advertising comes at a monetary cost.

ANSWERS

1. society, 2. beliefs, 3. technology, 4. solution, 5. simulation(s), 6. social, 7. current, 8. political, 9. influences, 10. impact, 11. cross-referencing, 12. economic

Creative Writing Activity Page

Have the students write sentences of their own, using the key words from this unit. When the students' sentences are finished, have them take turns reading their sentences orally. The students should say "Blank," for the key words; the other students must name the "missing" words. You may wish to have the students write the "definitions" for the key words.

social

economic

technology

political

simulations

current

solution

impact

influences

Creative Writing Activity Page

Have the students write sentences of their own, using the key words from this unit. When the students' sentences are finished, have them take turns reading their sentences orally. The students should say "Blank," for the key words; the other students must name the "missing" words. You may wish to have the students write the "definitions" for the key words.

society

beliefs

cross referenced



STUDENT SUPPORT MATERIALS

Reinforcement Activities



Obtain numerous periodicals such as Time, Newsweek, Popular Mechanics, and Popular Science and provide them to students. Students should peruse the publications for articles that interest them regarding developing technologies. The students should then review the technology and analyze how it is viewed (society, conflicts with belief systems, etc.). They should write a short paragraph detailing how the technology came to be (cross-referencing past), and speculate (or report) on economic, etc. impacts and influences.

Students need to use the Internet to access a wikis and/or blogs to research the following topics:

- Current social problems in the United States.
- Current economic problems in the United States.
- Influences on world political problems.

Students should create a digital one page summary using pictures and words to explain the information that they found.

Rubric:

- ___/3 Covers all three topics
- ___/3 Uses pictures to describe requested information
- ___/3 Uses words to describe requested information
- ___/3 Cites links for pictures and information



Unit Assessment

Unit Quiz and Test

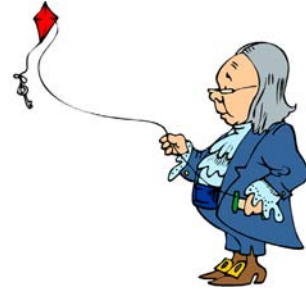


Grade 11 Science: Cultural, Social, Personal Perspectives and Science Quiz

Name: _____

Date: _____

- 1) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



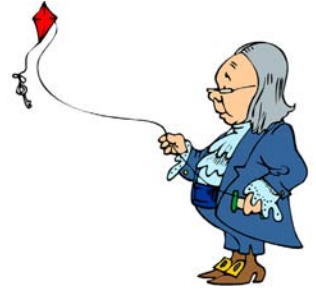
- 2) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



- 3) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



- 4) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.



- 5) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.



- 6) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.

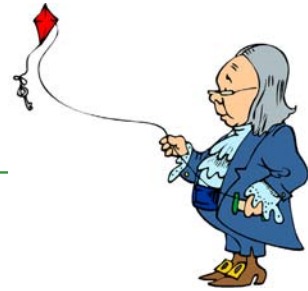


Grade 11 Science: Cultural, Social, Personal Perspectives and Science Quiz

Name: _____

Date: _____

- 1) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



Society

- 2) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



Cross-referenced

- 3) Look at the at the illustrations below. Write one of the three vocabulary words below that matches the illustration (society, beliefs, cross-referenced)



Belief

- 4) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.



conviction of the truth of some statement or the reality of some being or phenomenon especially when based on examination of evidence

- 5) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.



relation of scientific findings among investigators; referencing the works of others in published scientific works.

- 6) Look at the following illustration. Write the key vocabulary that matches the illustration, and write a definition for the word and illustration.



Society refers to the manner in which society (national or otherwise) views a scientific finding or technology based on scientific findings.

**Grade 11 Science:
D1/E1/Cultural Perspectives Test**

Name: _____

Date: _____

Illustrations: In the following three items, there are 2 parts..1) identifying the illustration and labeling it; and 2) writing out a definition that describes the concept of the word and the illustration.

- 1) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



- 2) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



- 3) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



Matching: Match the key vocabulary word on the left with the illustration on the right. Place the letter from the illustration in front of the word it matches.

- | | |
|--------------------------|------------------------------------|
| 4) _____ nebula | a. illustration of phenomena |
| 5) _____ coriolis effect | b. illustration of integrating |
| 6) _____ phenomena | c. illustration of biogeochemical |
| 7) _____ biogeochemical | d. illustration of nebula |
| 8) _____ influences | e. illustration of coriolis effect |
| 9) _____ integrating | f. illustration of influences |

Matching: Match the key vocabulary terms on the left with the correct definition on the right. Place the letter of the definition in front of the word it matches.

- | | |
|---|--|
| 10) _____ technology & social issues | a. the way in which technology is used to earn money or has a cost associated with it |
| 11) _____ technology & political issues | b. the application of scientific findings and principles to machines and devices |
| 12) _____ technology issues | c. the manner in which society views scientific findings that deal with technology |
| 13) _____ technology & economics | d. how political organizations view, seek to promote or stall technology associated with scientific findings |

Word Bank

| | | |
|-------------|----------|------------------|
| beliefs | convert | cross-referenced |
| simulations | societal | solution |

- 14) Individual trials of models in which variables are changed in an effort to generate an understanding of a natural cycle or process are _____.
- 15) When scientific findings are _____ the work of others is referred to in published scientific works.
- 16) _____ perspectives refers to the manner in which society views a scientific finding or technology based on scientific finding.

- 17) _____ are not based on scientific methodologies, but on personal choices and ideas, but will often influences how science is presented or conducted.
- 18) A _____ is an explanation that addresses a problem, or is a method of approaching a problem that brings about an agreeable effect.

**Grade 11 Science:
D1/E1/Cultural Perspectives Test**

Name: _____

Date: _____

Illustrations: In the following three items, there are 2 parts..1) identifying the illustration and labeling it; and 2) writing out a definition that describes the concept of the word and the illustration.

- 1) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



Illustration of Aurora

Student has labeled the illustration- Aurora, AND has written a definition that means the same as "a radiant emission from the upper atmosphere that occurs sporadically over the middle and high latitudes of both hemispheres in the form of luminous bands, streamers, or something similar caused by the bombardment of the atmosphere with charged solar particles that are being guided along the earth's magnetic lines of force."

- 2) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



Illustration of Erosion

Student has labeled the illustration- Erosion AND has written a definition that means the same thing as, "the slow destruction of mineral material by climactic and physical forces including rain, wind, water, waves, etc."

- 3) **Label** the illustration below with the correct key vocabulary word, and **write** the definition that best explains the concept.



Illustration of Rock Cycle

Student has labeled the illustration-Rock Cycle AND has written a definition that means the same thing as, "the process by which rocks are formed, altered, destroyed and reformed by geological processes; a process which is recurrent, returning to a starting point."

Matching: Match the key vocabulary word on the left with the illustration on the right. Place the letter from the illustration in front of the word it matches.

- | | |
|---------------------------------|------------------------------------|
| 4) <u> d </u> nebula | a. illustration of phenomena |
| 5) <u> e </u> coriolis effect | b. illustration of integrating |
| 6) <u> a </u> phenomena | c. illustration of biogeochemical |
| 7) <u> c </u> biogeochemical | d. illustration of nebula |
| 8) <u> f </u> influences | e. illustration of coriolis effect |
| 9) <u> b </u> integrating | f. illustration of influences |

Matching: Match the key vocabulary terms on the left with the correct definition on the right. Place the letter of the definition in front of the word it matches.

- | | |
|--|--|
| 10) <u> c </u> technology & social issues | a. the way in which technology is used to earn money or has a cost associated with it |
| 11) <u> d </u> technology & political issues | b. the application of scientific findings and principles to machines and devices |
| 12) <u> b </u> technology issues | c. the manner in which society views scientific findings that deal with technology |
| 13) <u> a </u> technology & economics | d. how political organizations view, seek to promote or stall technology associated with scientific findings |

Word Bank

beliefs

convert

cross-referenced

simulations

societal

solution

- 14) Individual trials of models in which variables are changed in an effort to generate an understanding of a natural cycle or process are simulations.
- 15) When scientific findings are cross-referenced the work of others is referred to in published scientific works.

- 16) societal perspectives refers to the manner in which society views a scientific finding or technology based on scientific finding.
- 17) beliefs are not based on scientific methodologies, but on personal choices and ideas, but will often influences how science is presented or conducted.
- 18) A solution is an explanation that addresses a problem, or is a method of approaching a problem that brings about an agreeable effect.

