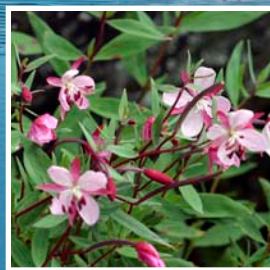


Grade 9

# CONCEPTS OF PHYSICAL SCIENCE

**B-1 • UNITS 1-5**

Based on the Alaska Science Standards SB1.1, SB2.1,2



FOR THE

## Juneau-Douglas High School



Sealaska Heritage Institute

The contents of this program were developed by Sealaska Heritage Institute through the support of a Special Projects Demonstration Grant from the U.S. Department of Education Office of Indian Education (CFDA84.356A). However, the contents do not necessarily represent the policy of the Department of Education and you should not assume endorsement.

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

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# 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.

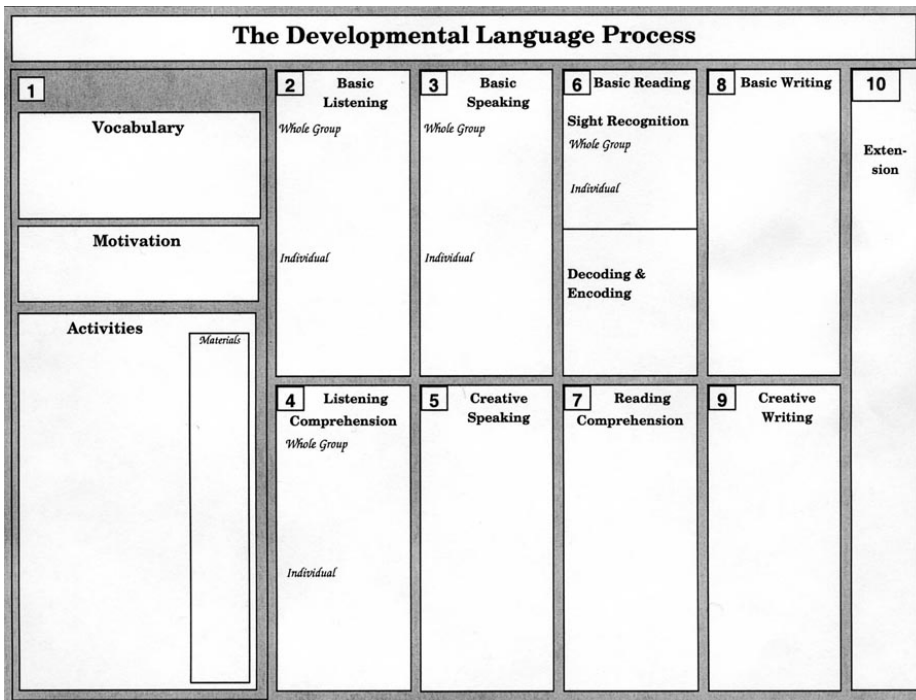
As more language goes into the children's long-term memories, they begin to comprehend more of what they read, in Reading Comprehension.

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 understand 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>

# Concepts of Physical Science 1



Sealaska Heritage Institute





INTRODUCTION OF

# Key Vocabulary





# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Atoms

### PLACED-BASED PERSPECTIVE

Show students a diagram of an atom. Explain that atoms are the smallest component of an element that still has the properties of the element.



## Base

### PLACED-BASED PERSPECTIVE

Show the students a sample of an anti-acid pill or liquid. Use this to introduce a base, as the opposite of an acid. Use litmus paper to demonstrate identifying a base (paper will turn blue).



## Components

### PLACED-BASED PERSPECTIVE

Use a simple ball point pen or pencil that you can take apart. Start by asking the class what it is. As you take the pen apart (you can place the pieces on an overhead projector for effect), explain to them that the pen is made up of components that work together. Put it back together to demonstrate.



### HERITAGE CULTURAL PERSPECTIVE

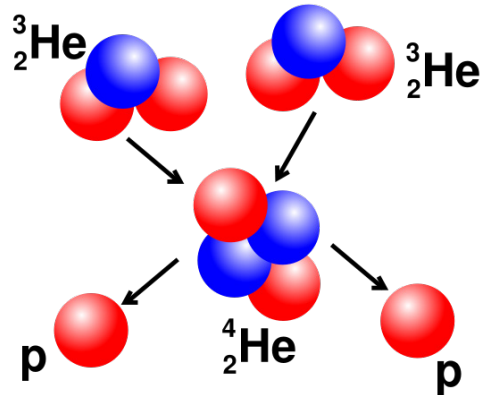
Many aspects of traditional life can be used as examples of “components.” This could include the canoes, baskets, tools, etc. Of course the traditional components were all hand made.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Protons

### PLACED-BASED PERSPECTIVE

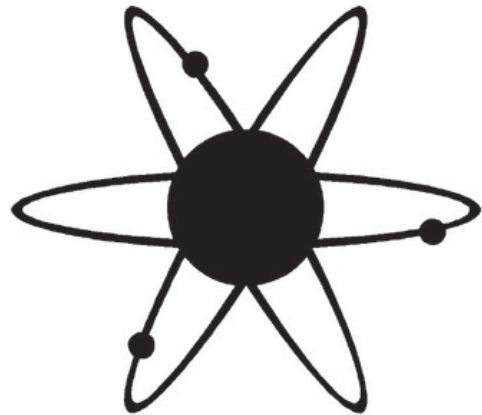
Show a diagram with an arrow pointing to the protons of an atom. Explain that protons are positively charged.



## Neutrons

### PLACED-BASED PERSPECTIVE

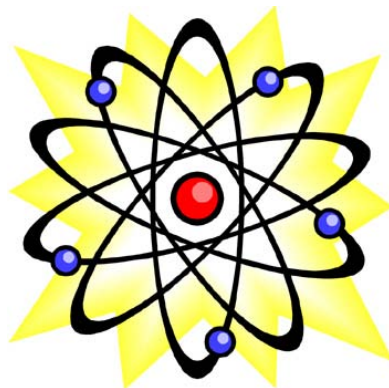
Show a diagram with an arrow pointing to the neutrons of an atom. Explain that neutrons have no charge.



## Electrons

### PLACED-BASED PERSPECTIVE

Show a diagram with an arrow pointing to the electrons of an atom. Explain that electrons are negatively charged.





# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Models

### PLACED-BASED PERSPECTIVE

Show students a globe and explain that it is a model of the Earth.



### HERITAGE CULTURAL PERSPECTIVE

Traditionally, models of canoes and Chilkat blankets were often developed before the actual item was created.

## Theories

### PLACED-BASED PERSPECTIVE

Show a picture of a chainsaw. Discuss the theories about southeast Alaska communities turning into ghost towns if they pass laws banning logging.



### HERITAGE CULTURAL PERSPECTIVE

There were many theories in traditional times. For example, it became clear, over time, that yellow cedar was the best wood to use for making boats.

## Principles

### PLACED-BASED PERSPECTIVE

Show a picture of a preserved food item. Discuss methods of food preservation and how the basic principles for food preservation hold true today as they did in ancient times. Have the students identify how some principles of food preservation are different today from ancient times.



### HERITAGE CULTURAL PERSPECTIVE

There were many traditional principles that developed over time. For example, people knew that if snow did not cover the ice in rivers, the salmon fry would die. They needed the insulation of the snow to survive.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Facts

### PLACED-BASED PERSPECTIVE

Show students a picture of a glacier. The facts are that glaciers are in the process of receding faster now than ever before in recorded history.



### HERITAGE CULTURAL PERSPECTIVE

Heritage cultures developed many facts, particularly related to the environment. For example, they know that the male salmon arrived in the streams before the females so that they could prepare nests in which the female could lay her eggs.

## Properties

### PLACED-BASED PERSPECTIVE

Show a picture of a tongue. Different foods have different properties, like sweet, sour, or salty. If available, show sample food items to reinforce the concept of properties. Have the students identify other properties such as weight, texture, etc.



### HERITAGE CULTURAL PERSPECTIVE

A variety of examples can be used for properties in traditional times. This would include the drying of fish and meat. Occasionally, dry fish was pounded to make it softer, although this was often done to fish that had not been properly dried.

## Matter

### PLACED-BASED PERSPECTIVE

Show the students a picture of a classroom. Explain to students that everything that they see is matter and have them call off what is matter in the room. Ask them if air is matter. Have them take a deep breath and hold it. Explain while they are holding their breath that matter has mass and takes up space. Have them exhale and discuss why air is matter.



### HERITAGE CULTURAL PERSPECTIVE

Everything in the environment represented matter. The environment was and is a vital part of Native life.



# Language Skills





# Language & Skills Development

## LISTENING

Use the activity pages from the Student Support Materials.



### Let's Move

Identify an appropriate body movement for each vocabulary word. This may involve movements of hands, arms, legs, etc. Practice the body movements with the students. When the students are able to perform the body movements well, say a vocabulary word. The students should respond with the appropriate body movement. You may wish to say the vocabulary words in a running story. When a vocabulary word is heard, the students should perform the appropriate body movement. Rather than using body movements or, in addition to the body movements, you may wish to use "sound effects" for identifying vocabulary words. The students should perform the appropriate body movements/sound effects for the words you say.

## SPEAKING



### Right or Wrong?

Mount the vocabulary illustrations on the chalkboard. Point to one of the illustrations and say its vocabulary word. The students should repeat the vocabulary word for that illustration. However, when you point to an illustration and say an incorrect vocabulary word for it, the students should remain silent. Repeat this process until the students have responded a number of times to the different vocabulary illustrations.

## READING

Use the activity pages from the Student Support Materials.



### Half Time

Before the activity begins, cut each of the sight words in half. Keep one half of each sight word and give the remaining halves to the students. Hold up one of your halves and the student who has the other half of that word must show his half and say the sight word. Repeat in this way until all students have responded. An alternative to this approach is to give all of the word halves to the students. Say one of the sight words and the two students who have the halves that make up the sight word must show their halves. Depending upon the number of students in your class, you may wish to prepare extra sight word cards for this activity.

## WRITING

Use the activity pages from the Student Support Materials.



### Watch Your Half

Prepare a photocopy of each of the vocabulary illustrations. Cut the photocopied illustrations in half. Keep the illustration halves in separate piles. Group the students into two teams. Give all of the illustration halves from one pile to the players in Team One. Give the illustration halves from the other pile to the players in Team Two. Say a vocabulary word. When you say "Go," the student from each team who has the illustration half for the vocabulary word you said, should rush to the chalkboard and write the word on the board. The first player to do this correctly wins the round. Repeat until all players have participated. This activity may be played more than once by collecting, mixing and re-distributing the illustration halves to the two teams.





# Vocabulary Images





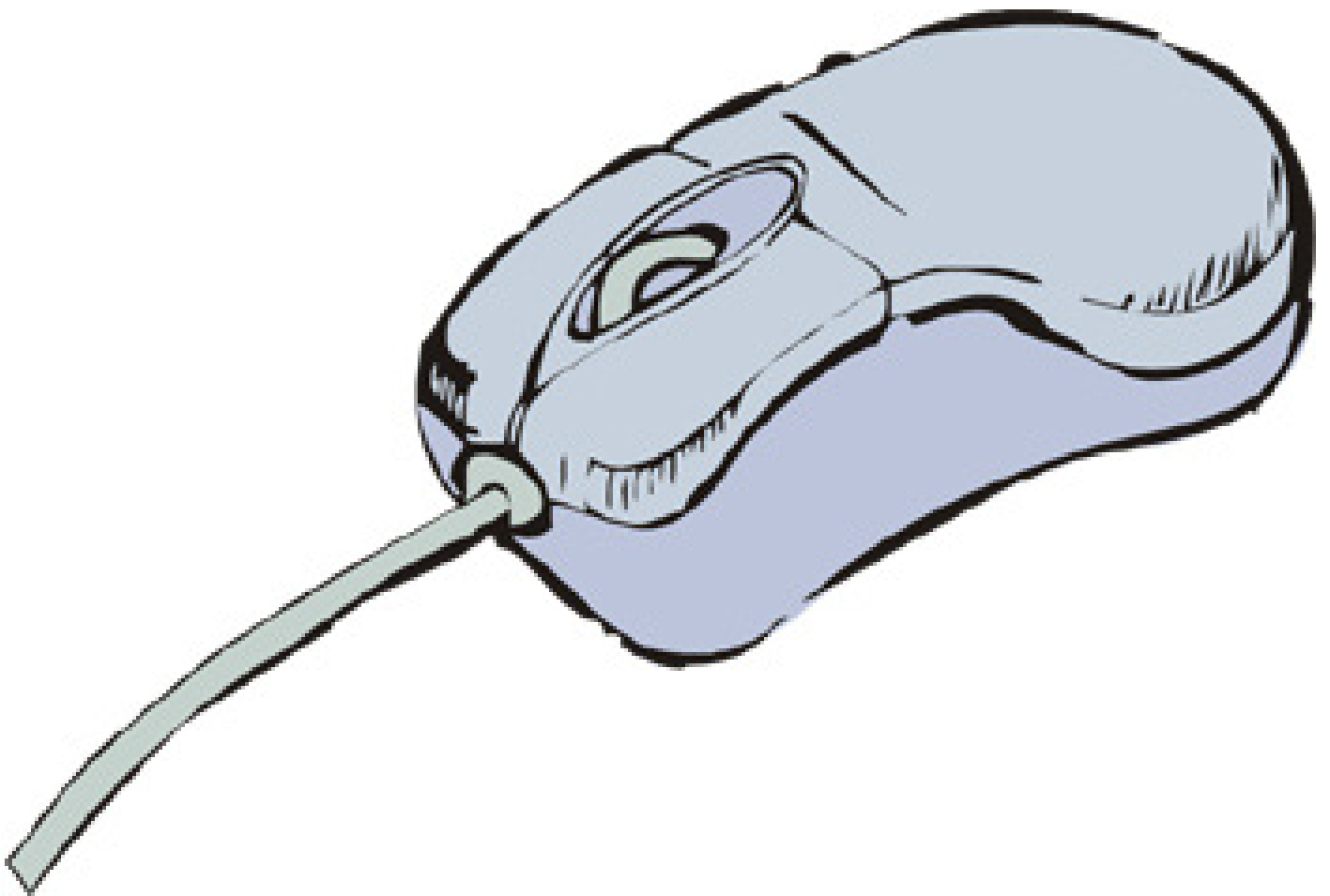




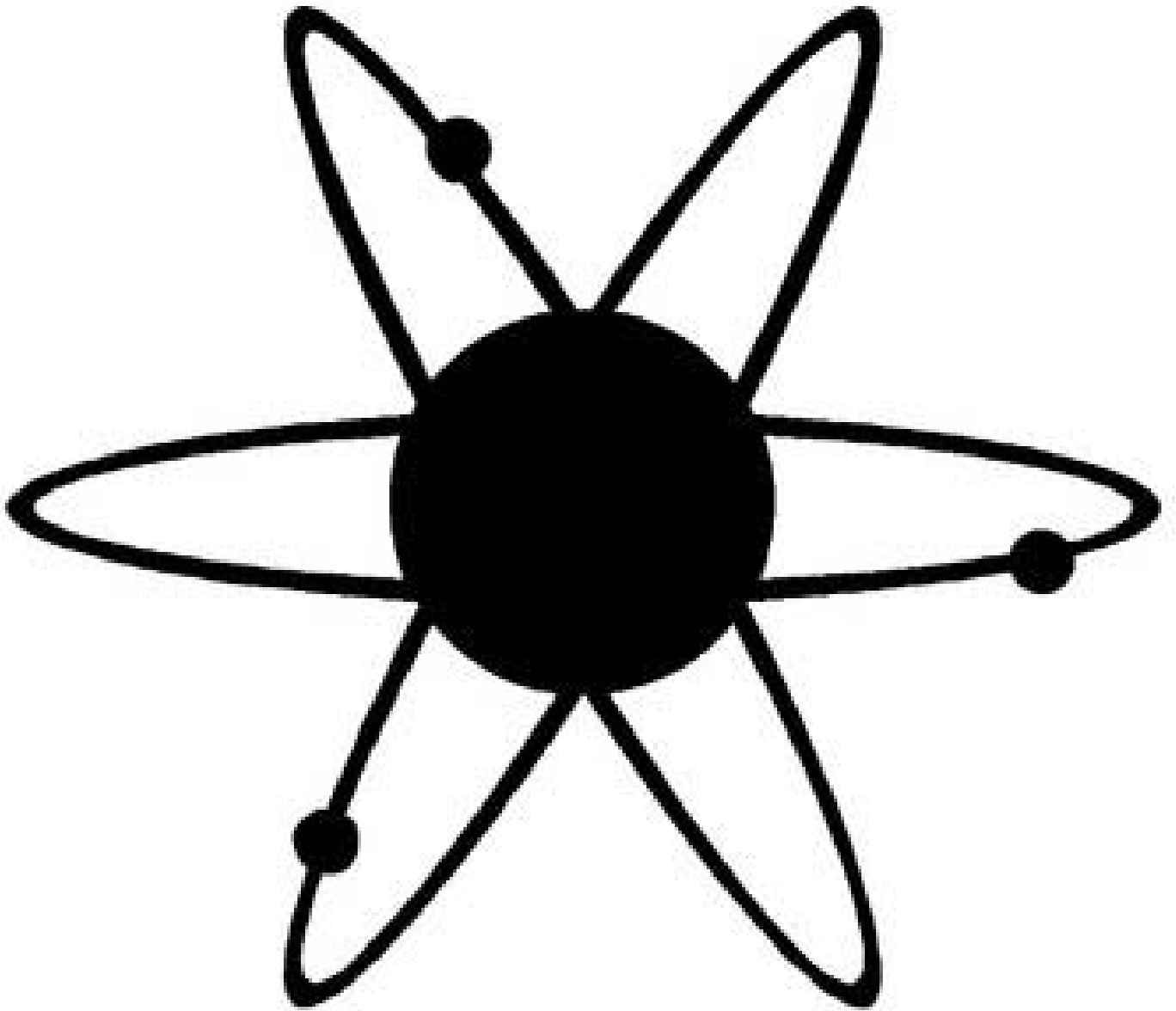




















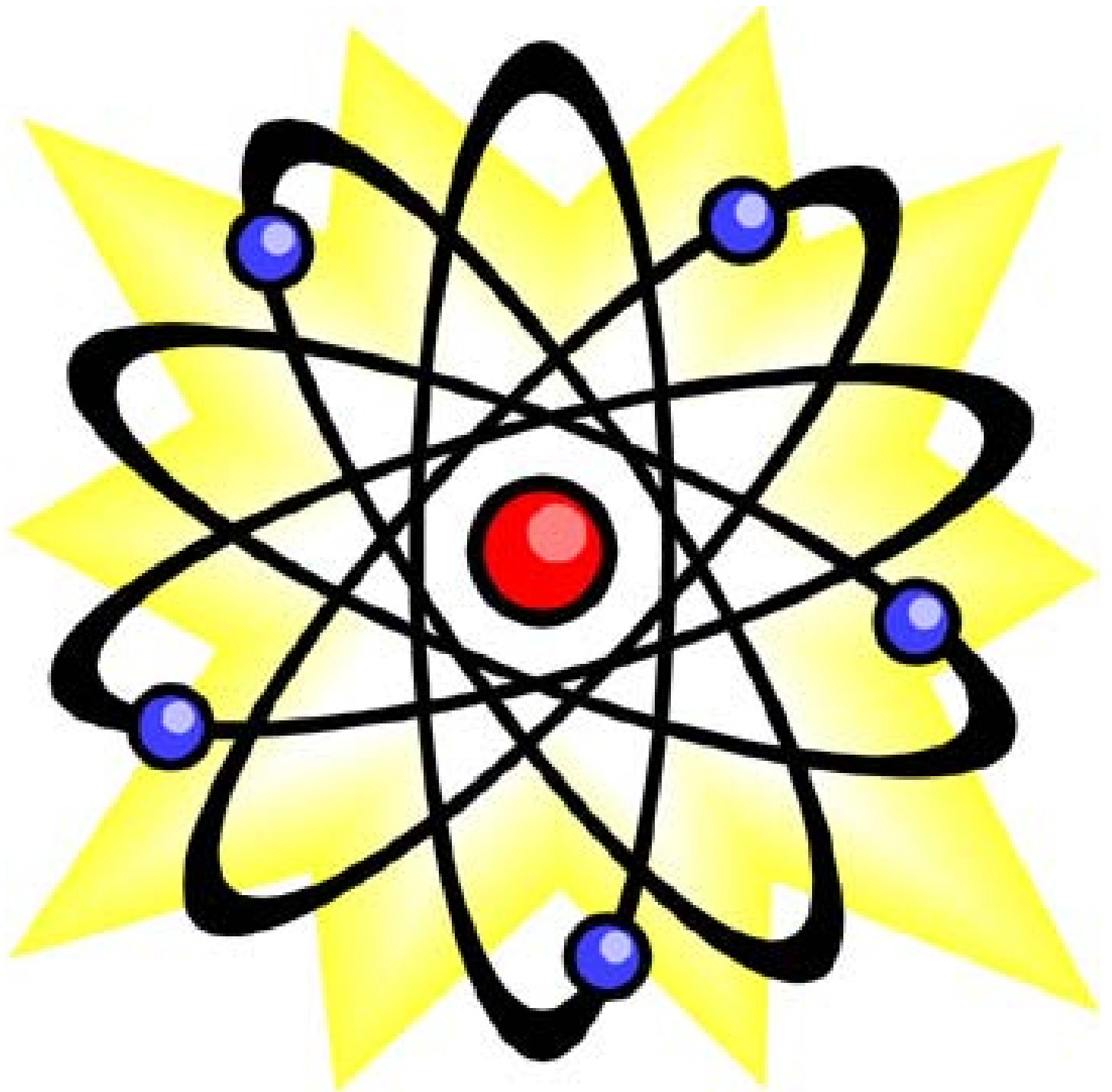








neutron

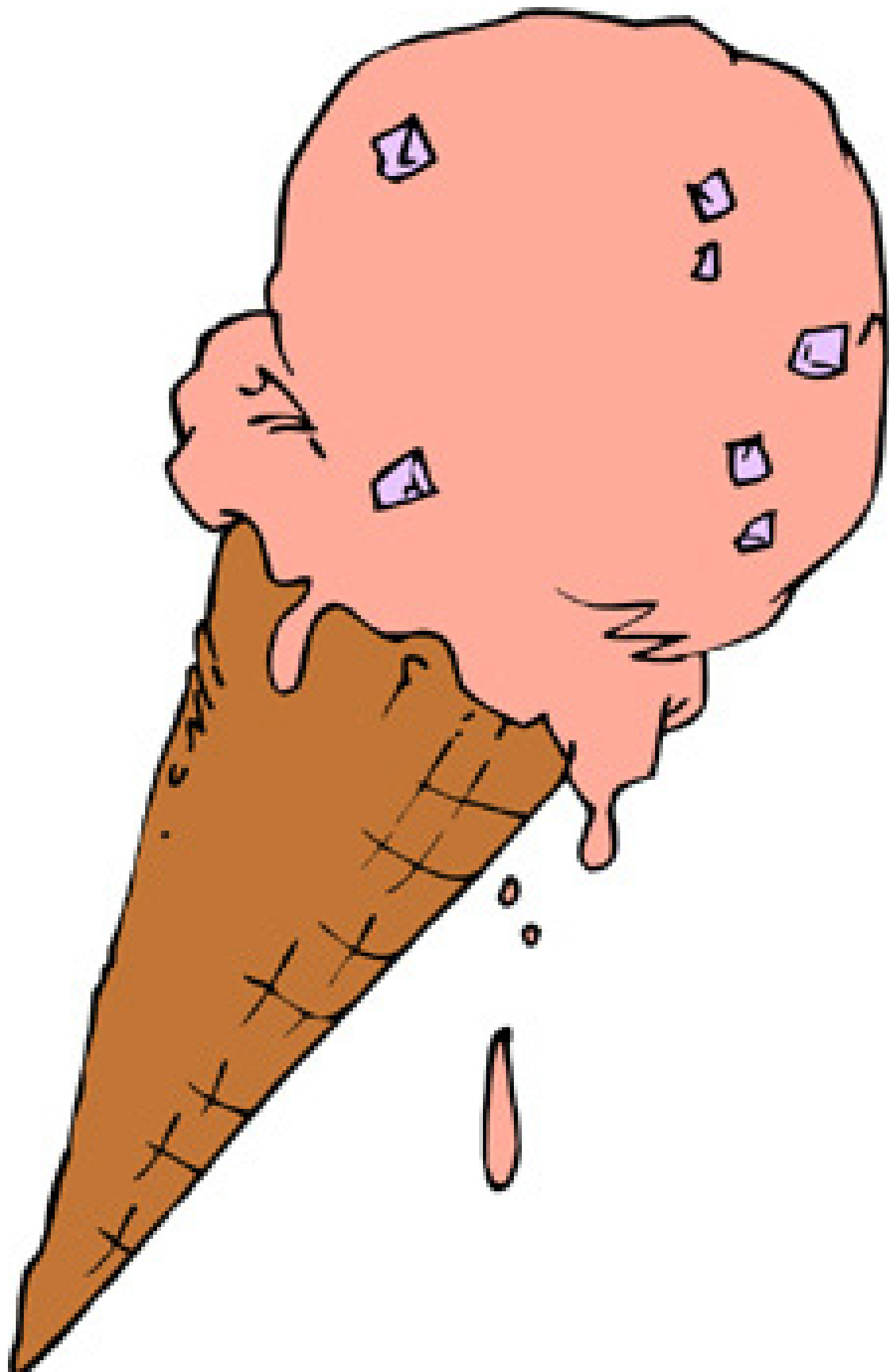




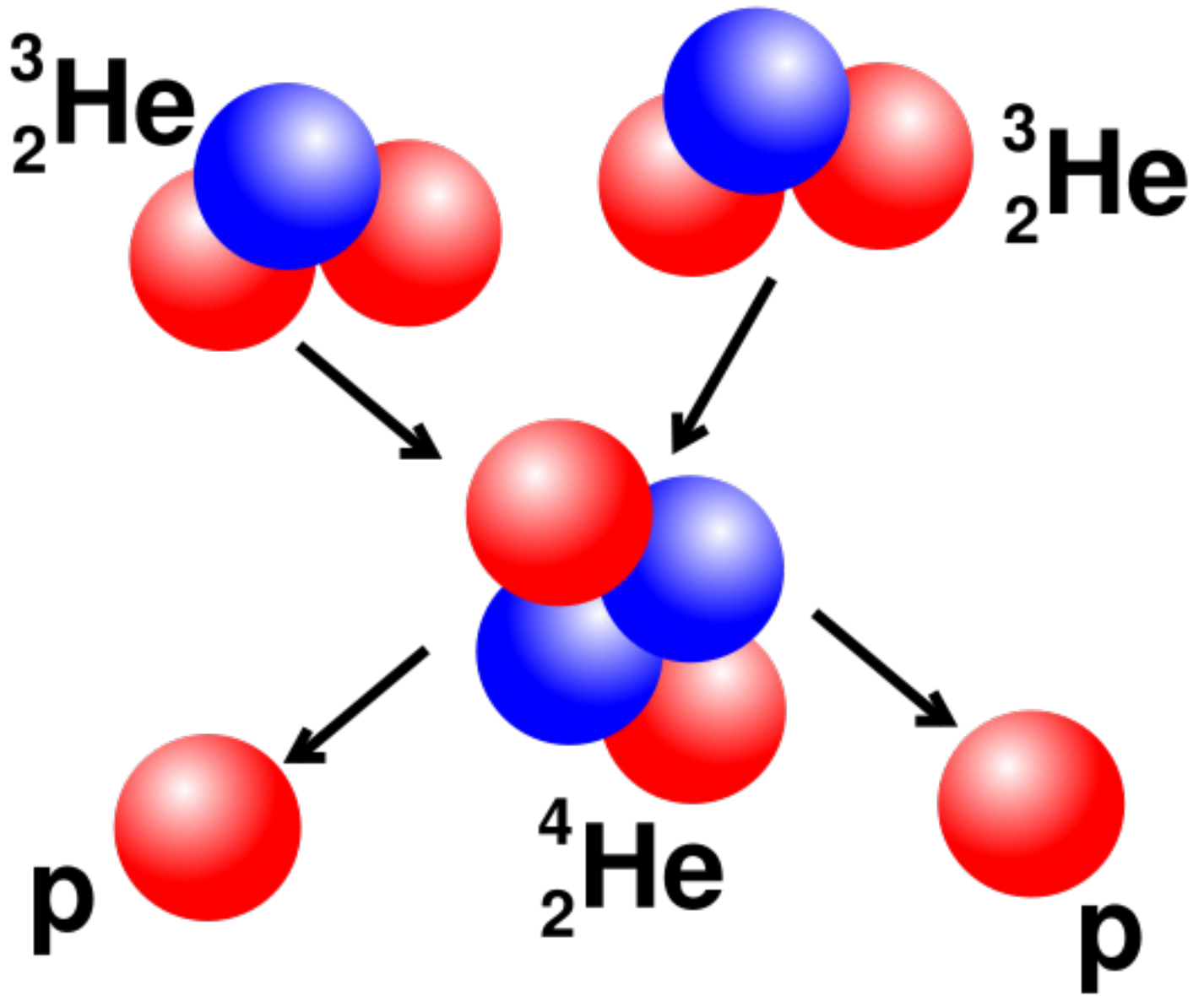




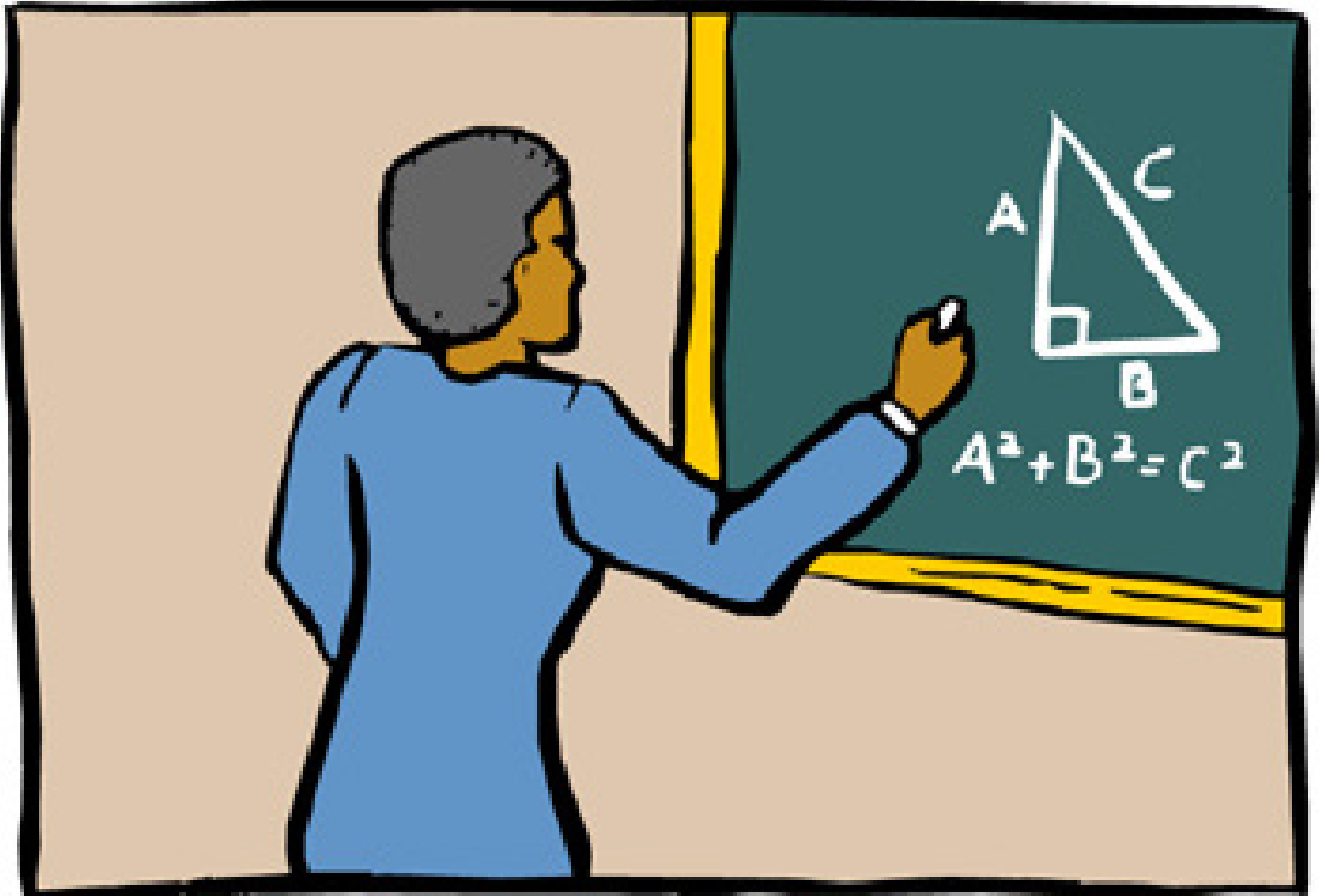


















STUDENT SUPPORT MATERIALS

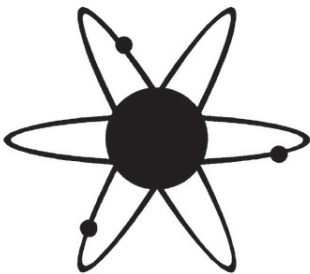
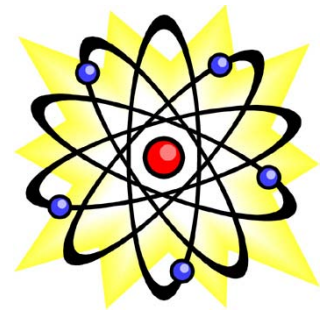
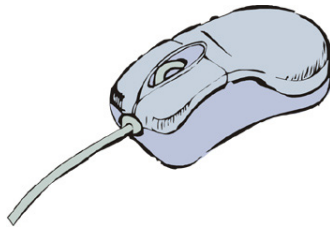
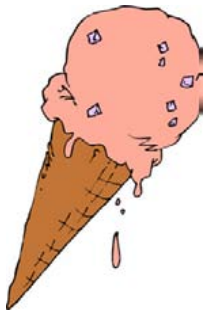
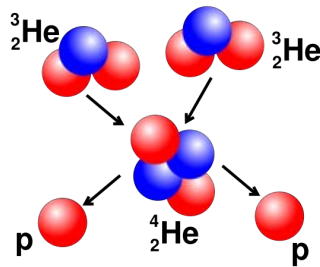
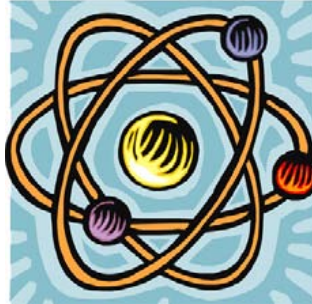
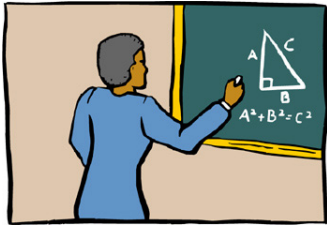
# Listening





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

1. atom, 2. base, 3. components, 4. protons, 5. neutrons, 6. electrons, 7. models, 8. theories, 9. principle, 10. facts, 11. properties, 12. matter.



# True Or False?

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

1. The Periodic Table represents all of the different types of atoms – called elements – known to scientists.
2. As the number of hydrogen ions in a solution increases, the solution becomes more basic.
3. The typical person’s home theater system consists of several components.
4. Protons are energy particles of light that are important in photosynthesis.
5. Neutrons are found in the nucleus of an atom.
6. Electrons are what move through a conductor in an alkaline battery.
7. Many cities in Alaska have used Tsunami models to plan where to evacuate people in the event of a large Tsunami.
8. Theories are a general idea of how something works.
9. The principle of gravity is the attraction between bodies with mass.
10. Observations made by a scientist are facts.
11. It can’t be said that occupying space is a property of matter.
12. All things that we can touch are comprised of matter.

Answers: 1. true, 2. false, 3. true, 4. false, 5. true, 6. true, 7. true, 8. false, 9. true, 10. true, 11. false, 12. true



STUDENT SUPPORT MATERIALS

# Sight Words





**components**

**base**

**atom**

**electrons**

**neutrons**

**protons**



**principles**

**theories**

**models**

**matter**

**properties**

**facts**



STUDENT SUPPORT MATERIALS

# Reading





# Word Find

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

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

[www.WordSearchMaker.com](http://www.WordSearchMaker.com)

Atoms	Models
Base	Neutrons
Components	Principles
Electrons	Properties
Facts	Protons
Matter	Theories

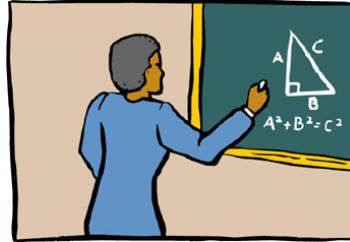
# Word Find Solution

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

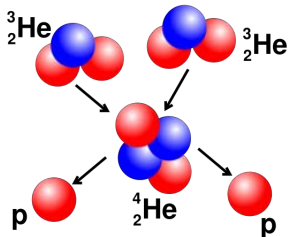
# Find The Word



atom  
base  
component  
protons  
neutrons  
electrons  
models  
theories  
principles  
facts  
properties  
matter



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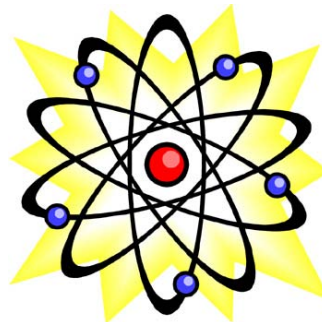
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# Find The Word



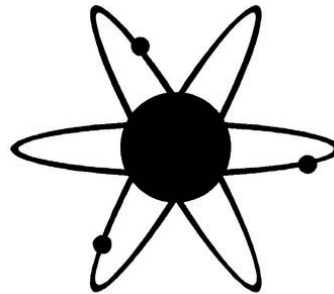
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properties  
matter



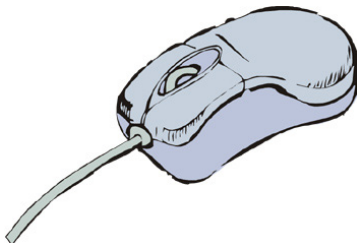
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matter



## Sentence Halves

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

- |   |   |
|---|---|
| 1. Atoms make up                            | A. between objects with mass as the distance between them increases is a principle of gravity.              |
| 2. The opposite of an acid                  | B. is a base.   |
| 3. Salad dressing consists of               | C. continental drift theory, nobody believed him.   |
| 4. Protons are found with neutrons          | D. in the nucleus of an atom.   |
| 5. The heaviest particle of an atom         | E. two properties that all matter shares.   |
| 6. Microscopes that use electrons           | F. several components that taste good together.   |
| 7. Climatologists have been working         | G. spread out after the Big Bang.   |
| 8. When Alfred Wegener proposed his         | H. is the neutron.  |
| 9. The bowling ball continued towards       | I. on facts that he uncovered in his investigations.  |
| 10. The matter of all the universe began to | J. all matter.  |
| 11. Having mass and occupying space are     | K. to develop models that will predict changes to our environment from additional carbon dioxide emissions. |
| 12. Sherlock Holmes based his conclusions   | L. allow scientists to image very small viruses.  |
| 13. That gravitational attraction decreases | M. the pins after being released because of its inertia.  |

### Answers

1/J 2/B 3/F 4/D 5/H 6/L 7/K 8/C 9/M 10/G 11/E 12/I 13/A

## Word & Definition Match

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

*These particles are positive.*

*These are made up of three kinds of particles.*

*This is the smallest existing particle.*

*This is part of a whole.*

*These represent real things.*

*This is the substance that everything is made of.*

*This is a hypothesis that has been tested.*

*These are observations that are made.*

*This is the characteristics of matter.*

*This is like a law.*

*This is the opposite of an acid.*

*These particles have no charge.*

1. atom

2. base

3. component

4. protons

5. neutrons

6. electrons

7. models

8. theories

9. principles

10. facts

11. properties

12. matter

# Which Belongs?

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

1. The smallest unit of an element consists of an atom/neutron.
2. Chemicals that turn litmus paper blue are considered to be bases/acids.
3. One component/model of a computer consists of a CPU (central processing unit).
4. Protons/electrons have a positive charge.
5. The atomic number is not based on the number of neutrons/protons.
6. Protons/electrons are found outside the nucleus of an atom.
7. Fisheries managers base catches on components/models regarding the returning number of salmon.
8. When tested over and over again, and never disproven, hypotheses become theories/facts.
9. Another name for a scientific law is a principle/fact.
10. Theories/facts consist of individual observations regarding natural phenomena.
11. An important property/component of any substance is the occupation of space.
12. The terms gas, liquid and solid refer to various states that properties/matter can exist in.

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## Answers

1. matter, 2. protons, 3. facts, 4. neutrons, 5. atom, 6. principle, 7. base, 8. component, 9. theories, 10. models 11. electron, 12. property

# 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.

## Multiple Choice

- 1) **The smallest existing particle for any element is:**
  - (a) Called an atom and consists of electrons, protons only.
  - (b) Called an atom and consists of electrons, protons and neutrons.
  - (c) Called an atom and consists of protons and neutrons.
  
- 2) **Many cleaners, such as ammonia, and compounds to unclog pipes, such as Drano, rely on:**
  - (a) Bases that increase the number of hydrogens in the water.
  - (b) The property associated with bases – an increased concentration of hydroxides in the water
  - (c) Their property to be either an acid or a base.
  
- 3) **A proper scientific study consists of:**
  - (a) Multiple components including a hypothesis, experiment, analysis, and conclusion;
  - (b) Multiple models that represent multiple viewpoints;
  - (c) Numerous theories that are being tested at once.
  
- 4) **The nucleus of an atom:**
  - (a) Is defined by a positively charged particle called a proton;
  - (b) Is defined by a particle called a neutron that has no charge;
  - (c) Is defined by a negatively charged particle called an electron.
  
- 5) **Neutrons are:**
  - (a) The smallest of the atomic particles;
  - (b) Always found in the same number in an atom;
  - (c) The only atomic particles to not have a charge.
  
- 6) **The hydrogen atom can exist in a form where there are:**
  - (a) No electrons and no neutrons;
  - (b) No electrons and no protons;
  - (c) No protons and no neutrons;
  
- 7) **Wildlife biologists often estimate the number of animals in an area:**
  - (a) Using theories of evolution.
  - (b) Based on facts obtained from hunts in other areas.
  - (c) Based on models that are based on data collected from hunters.

- 8) Theories are unlike hypotheses in that:**
- (a) They have been proven;
  - (b) They have been tested many times and never disproven;
  - (c) They are descriptions, not explanations, of observations.
- 9) Newton's Universal Law of Gravitation is:**
- (a) A principle that describes how objects are attracted to each other;
  - (b) A theory that can't be proven;
  - (c) A property of matter.
- 10) Science is essentially a:**
- (a) Collection of provable facts;
  - (b) Assembly of explanations for observations that are referred to as facts;
  - (c) Series of factual theories and principles.
- 11) Scientists describe matter:**
- (a) Only in terms of its unchanging properties;
  - (b) Only in terms of characteristics that are visible;
  - (c) Based on what they think is true.
- 12) Which of the following is not a property that all substances exhibit at all times:**
- (a) They occupy space;
  - (b) They have inertia;
  - (c) They have weight.

---

Answers:

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





STUDENT SUPPORT MATERIALS

# Writing

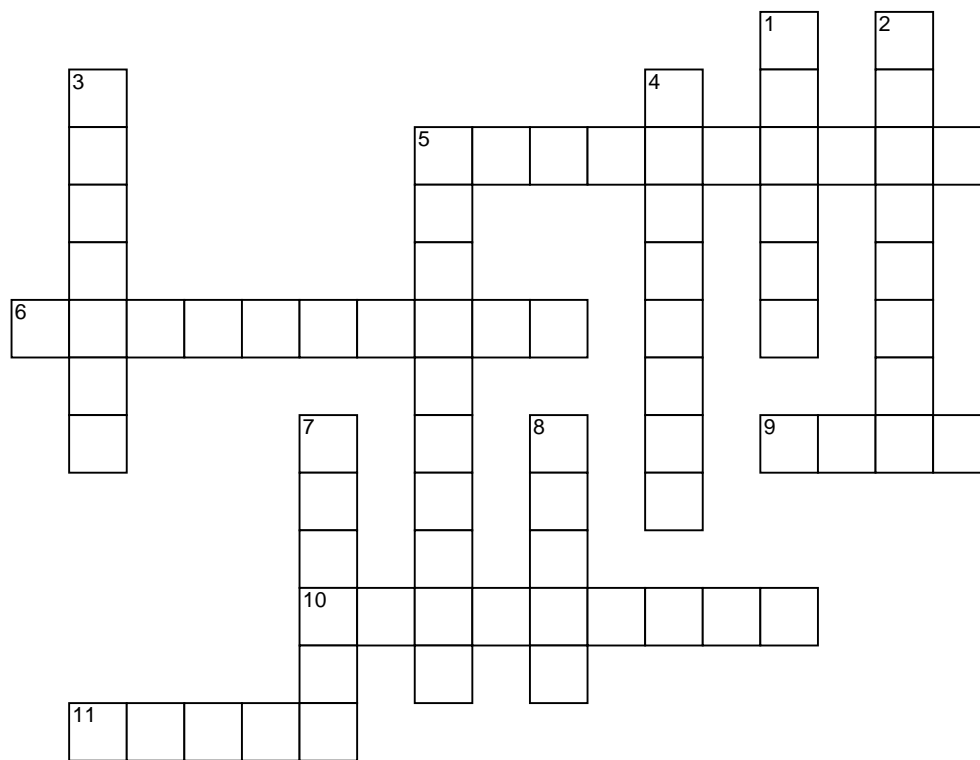






# 9th B-1 Concepts of Physical Science

## Unit 1



www.CrosswordWeaver.com

### ACROSS

- 5** unchanging characteristics of matter.
- 6** refers to a part of the whole that can be separated from or attached to a system.
- 9** are compounds that ionize to form a hydroxid ion (OH<sup>-</sup>) ions in water.
- 10** are made up of three basic kinds of particles: protons, neutrons, and electrons.
- 11** is the smallest existing particle of a pure element that can exist and still maintain the properties of that element.

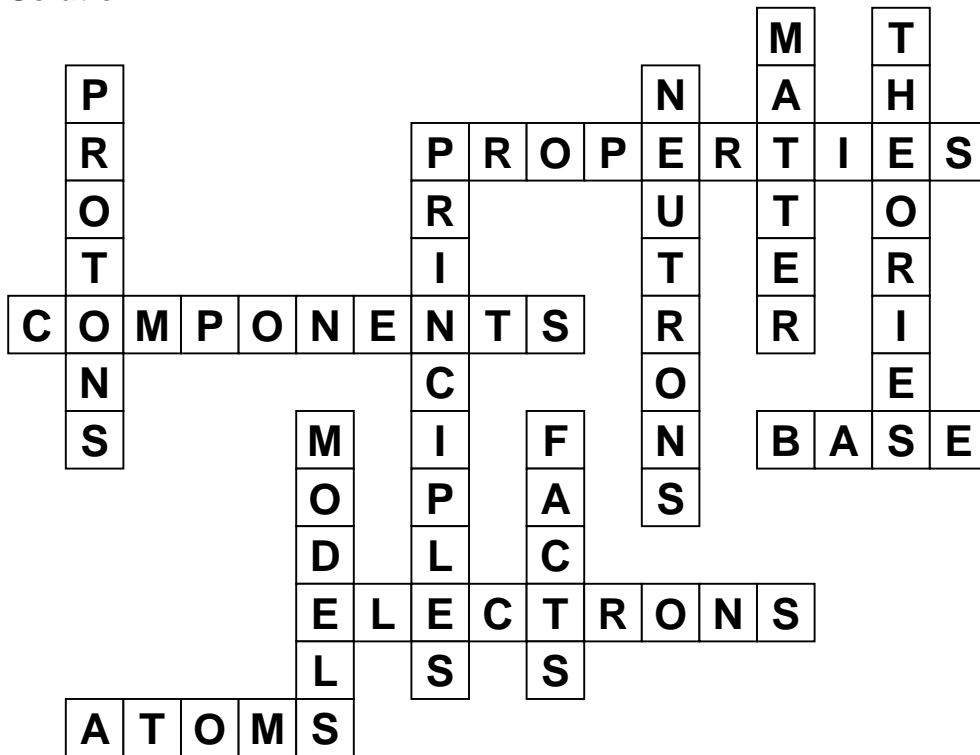
### DOWN

- 1** is the substance that everything is made of.
- 2** a hypothesis that has been tested multiple times and never been disproven.
- 3** are the particles inside the nucleus of an atom that carry a positive charge.
- 4** are a particle in the nucleus of an atom that carries no charge--therefore it is neutral.
- 5** akin to a law- a description of natural phenomena.
- 7** a construct that seeks to mimic natural processes in order to make predictions.
- 8** observations made, and which theories are written to explain and laws written.

# 9th B-1 Concepts of Physical Science

## Unit 1

Solution:



# Write The Words!



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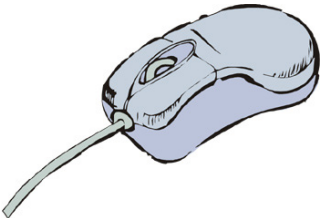
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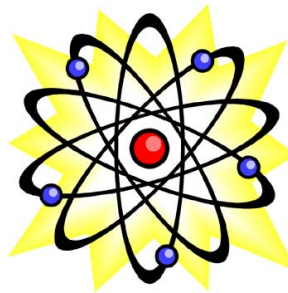
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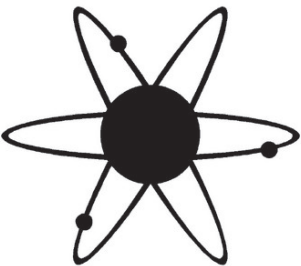
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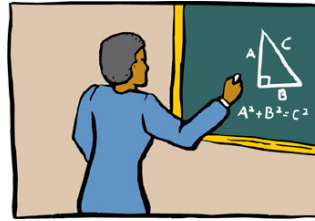
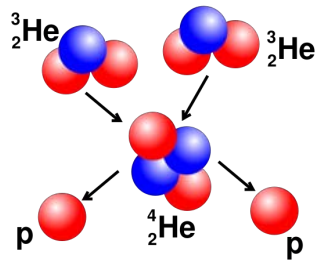


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# Write the Words!



## Fill-in the Blanks!

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

1. World War II came to a close after the Japanese surrendered due to the devastating power of the \_\_\_\_\_ bomb.
2. The ocean has a limited capacity to buffer acid, because of the \_\_\_\_\_ (s) in it.
3. Whereas scientists originally thought that the atom was the smallest physical particle, they have subsequently been able to break the atom up into three \_\_\_\_\_ particles.
4. Always positive, the particles known as \_\_\_\_\_ reside in the nucleus of an atom.
5. The heaviest particles in the atom are known as \_\_\_\_\_.
6. The \_\_\_\_\_ microscope uses beams of these negative particles to investigate cells on a micro level.
7. Multiple scientists have been working to predict how our climate is changing using \_\_\_\_\_; they all show that our planet is warming more rapidly than has occurred naturally in the past.
8. An important aspect of Science is that even \_\_\_\_\_, considered as close to scientific facts as possible, can be altered in light of new evidence.
9. The \_\_\_\_\_ of constant proportion allows us to calculate the amount of sodium in sea water if we know the amount of chloride.
10. Although we are not able to completely explain why it is true, it is a \_\_\_\_\_ that bodies that have mass are attracted to each other by a force we call gravity.
11. One \_\_\_\_\_ of matter is a resistance to motion.
12. Anything that exists physically must consist of some kind of \_\_\_\_\_.

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Answers:

1. Atom, 2. base, 3. component, 4. proton, 5. neutrons, 6. electron 7. models, 8. theories, 9. principle 10. fact, 11. property, 12. matter

# 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.*

**atom**

---

**base**

---

**components**

---

**protons**

---

**neutrons**

---

**electrons**

---

**models**

---

**theories**

---

**principles**

---

## 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.*

**facts**

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**properties**

---

**matter**

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# Creative Writing Activity Page

*Have the students write sentences of their own, based on the picture below. When finished, have each student read his/her sentences to the others.*



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STUDENT SUPPORT MATERIALS

# Reinforcement Activities





Give students a ball of homogenous clay and ask them to describe the look, smell, and feel of it. Walk them through dividing it in half until they have just a tiny piece. Ask them if the look, smell, and feel have changed. Use this to introduce that an atom is what you would have left if you did this with one of the elements on the periodic table.

Borrow a basketball from the gym and wrap purple crepe streamers (like for a birthday party) around it. Draw a + on a white piece of paper. Have the students repeat to you “protons are positive”. The purple will help with remembering that they all begin with the letter “p”. Use with the neutron and electron models.

Borrow a basketball from the gym and wrap it with white crepe streamers (like for a birthday party). Write the word “NO” on a white piece of paper. Have the students repeat to you “neutrons are neutral” and have no charge. Reinforce that the white paper symbolizes no color. Use with proton and electron models.

Use a gumball or a small roll of clay to represent an electron. Write “-“ on a piece of white paper. Explain to the students that electrons are negative, which is why they are also called negatrons.

Use the three models (proton, neutron, and electron) to demonstrate that a model is a representation of something. Use this opportunity to discuss the relative sizes and atomic weights of subatomic particles using a periodic table and the models as a reference.

Invite a resource person to make a presentation to the students about the building of a traditional canoe. If possible, arrange for sample materials/pictures to be used during the presentation. Later, have the students create a “how to” article, outlining how the *components* of the canoe go together.





# Unit Assessment

## Unit 1 Quiz





## B1, Unit 1 Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) When a scientist develops a simulated volcano in an attempt to mimic the natural process of a volcano in order to make a prediction of what it might do, the simulated volcano is called a/an \_\_\_\_\_.
  
  - 2) \_\_\_\_\_ electrons
  - 3) \_\_\_\_\_ protons
  - 4) \_\_\_\_\_ atoms
  - 5) \_\_\_\_\_ neutrons
- a. particles inside the nucleus of an atom that carry a positive charge
  - b. particles inside the nucleus of an atom that a negative electrical charge
  - c. the smallest existing particles of a pure element
  - d. particles that carry no charge
- 
- 6) A hypothesis that has been tested multiple times and never been disproved is called theory.
    - a) True
    - b) False
  
  - 7) Define the word FACT when used in scientific process.
  
  
  - 8) Write a sentence that you think represents a FACT.

- 9) Of the illustrations below, 'write the word MATTER beside the illustration that best defines the concept of MATTER. Write the word PROPERTIES by the illustration that best defines the concept.

**Need two illustrations here. One for Matter. One for Properties.**

- 10) Gravity is an hypothesis that has been proven over and over again. It's not considered to be a fact. It is considered to be a scientific
- a) reason.
  - b) given.
  - c) theory.
  - d) formula.
- 11) Evolution is commonly referred to as a
- a) fact.
  - b) theory.
  - c) principle.
- 12) It is a well known \_\_\_\_\_ that Dallas is a city in Texas.
- a) belief
  - b) idea
  - c) theory
  - d) fact
- 13) Which of the following is not a component?
- a) carburetor in a motor
  - b) window in a house
  - c) a basketball
  - d) sleeve in a shirt
- 14) \_\_\_\_\_ are compounds that ionize ( to form a hydroxid ion (OH-) ions in water and are substances with PH values of seven or higher.



## B1, Unit 1 Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1) When a scientist develops a simulated volcano in an attempt to mimic the natural process of a volcano in order to make a prediction of what it might do, the simulated volcano is called a/an model.

2) b electrons

3) a protons

4) c atoms

5) d neutrons

a. particles inside the nucleus of an atom that carry a positive charge

b. particles inside the nucleus of an atom that a negative electrical charge

c. the smallest existing particles of a pure element

d. particles that carry no charge

6) A hypothesis that has been tested multiple times and never been disproved is called theory.

**a) True**

b) False

7) Define the word FACT when used in scientific process.

Correct answer not entered.

8) Write a sentence that you think represents a FACT.

Correct answer not entered.

- 9) Of the illustrations below, write the word MATTER beside the illustration that best defines the concept of MATTER. Write the word PROPERTIES by the illustration that best defines the concept.

**Need two illustrations here. One for Matter. One for Properties.**

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- 10) Gravity is an hypothesis that has been proven over and over again. It's not considered to be a fact. It is considered to be a scientific

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- 11) Evolution is commonly referred to as a

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- 12) It is a well known \_\_\_\_\_ that Dallas is a city in Texas.

a) belief

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c) theory

**d) fact**

- 13) Which of the following is not a component?

a) carburetor in a motor

b) window in a house

**c) a basketball**

d) sleeve in a shirt

- 14) **Bases** are compounds that ionize ( to form a hydroxid ion (OH-) ions in water and are substances with PH values of seven or higher.

# Concepts of Physical Science 2



Sealaska Heritage Institute





INTRODUCTION OF

# Key Vocabulary





# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Relationships

### PLACED-BASED PERSPECTIVE

Show students diagrams of small groups  
Discuss the relationship between the clothes that we wear and the weather.



### HERITAGE CULTURAL PERSPECTIVE

Being prepared for the weather was and is to this very day important in survival. This meant we were to respect the weather. There was an important relationship between the clothing worn and the weather.

## Structure

### PLACED-BASED PERSPECTIVE

Bring in pictures of buildings being built where the frame is exposed and steel bridges that you can see the girders.  
Explain that a structure is a whole that is made up of cohesive parts.



### HERITAGE CULTURAL PERSPECTIVE

In Native education every part is important. One part is not greater than the other. All works together or it will become unbalanced creating greater troubles. This applied to structures as well.

## Conserve

### PLACED-BASED PERSPECTIVE

Show and discuss the “recycle” symbol.



### HERITAGE CULTURAL PERSPECTIVE

Whatever happens in the environment has an impact on all things. It will return either negative or positive results depending upon the action. What we do always comes back to us.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Heat Transfer

### PLACED-BASED PERSPECTIVE

Show a raw potato - indicate to the students that you want to eat it but it's raw. Have the students suggest what needs to be done to make the potato edible. Use the boiling pot of water as an example of *heat transfer*. Have the students suggest other examples of *heat transfer*.



### HERITAGE CULTURAL PERSPECTIVE

When the earth is breathing it can be seen in the heat waves leaving the earth.

## Conduction

### PLACED-BASED PERSPECTIVE

Ask students what would happen if they picked up a hot metal bar that had been sitting in a campfire. Explain that the contact of two solids allows energy to flow from one to another by conduction.



### HERITAGE CULTURAL PERSPECTIVE

The Shangukeidi Eagle/Thunderbird has a song that is still sung to this very day. It tells of the conduction of electricity when the young man kicked the thunderbird feather. When he kicked the feather, the electricity went through his body which resulted in his demise.

## Circuits

### PLACED-BASED PERSPECTIVE

Show a picture of a light switch and discuss how it turns the lights on when the electrical circuit is completed.



### HERITAGE CULTURAL PERSPECTIVE

For thousands upon thousands of years Native people have known about electricity and its power. They knew this from the Thunderbird story where two young men died from being struck by lightning.



# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Transferred

### PLACED-BASED PERSPECTIVE

Show students a picture of a ferry and discuss how it picks up passengers and transfers them from one place to another.



### HERITAGE CULTURAL PERSPECTIVE

The Native people have travelled over the seas since time immemorial. They migrated from the Duncan Canal area on vessels and they have songs that correspond to their traveling on the seas. Traveling from community to community by ocean going canoes with sails.

## Convections

### PLACED-BASED PERSPECTIVE

Ask students why embers float up and away from bonfires. Explain that due to convection, which is the heating of a liquid or gas, the gas around the bonfire rises and the embers float upwards on thermal pockets.



### HERITAGE CULTURAL PERSPECTIVE

Native people believe that the earth is breathing and this is what the eagles ride on when soaring higher than the mountains.

## Radiation

### PLACED-BASED PERSPECTIVE

Ask students what would happen if they picked up a hot metal bar that had been sitting in a campfire. Explain that the contact of two solids allows energy to flow from one to another by conduction.



### HERITAGE CULTURAL PERSPECTIVE

Warming of hands ceremony is based upon this principal or law. The host of a traditional party would have what is called a hand warming ceremony. In this ceremony, warmth is radiated through words spoken to the guests.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Transformed

### PLACED-BASED PERSPECTIVE

Show students a picture of a seed and discuss with them how a seed transforms into a plant.



### HERITAGE CULTURAL PERSPECTIVE

In the Bear Dance, when the person put the bear blanket on, he transformed into a bear, complete with the movements and characteristics of the animal.

## Energy

### PLACED-BASED PERSPECTIVE

Bring in a can of Red Bull and discuss how it gives the students energy.



### HERITAGE CULTURAL PERSPECTIVE

A very small amount of salmon egg cheese provides more energy than a case of Red Bull. The cheese is made by hanging salmon eggs in a smokehouse; the eggs are smoked until hard and then they are pounded into a paste.

## Form

### PLACED-BASED PERSPECTIVE

Show the students a picture of a totem pole and discuss how the carver gave form to each of the symbols that were carved.



### HERITAGE CULTURAL PERSPECTIVE

Native artists work with their materials to create a variety of forms. The materials determine the forms that carvings will take. In this way, the artist and the materials communicate with one another.



# Language Skills



# Language & Skills Development

## LISTENING

Use the activity pages from the Student Support Materials.



### Three Sentences

Provide each student with three blank flashcards. Each student should then write the numbers 1 to 3 on his/her cards - one number per card. Say three sentences, only one of which contains a vocabulary word. The students should listen carefully to the three sentences that you say. After saying the three sentences, each student should then show his/her number card that represents the number of the sentence which contained the vocabulary word. Repeat with other sets of sentences.

## SPEAKING



### Numbered Boxes

Before the activity begins, prepare a page that contains 20 (or more) boxes. Number each of the boxes. Provide each student with a copy of the numbered boxes. Each student should then shade in half of the boxes with a pencil (any ten boxes). When the students are ready, mount the vocabulary illustrations on the chalkboard and say the number of a box (between 1 and 20) to one of the students. The student should look on his/her form to see if that box number is shaded-in. If that box is shaded in, the student may "pass" to another player. However, if the box is not shaded-in, he/she should say a complete sentence about a vocabulary illustration you point to. The students may exchange pages periodically during this activity. Repeat until many students have responded in this way.

## READING

Use the activity pages from the Student Support Materials.



### Circle of Words

Before the activity begins, prepare a page that contains the sight words. Provide each student with a copy of the page. The students should cut the sight words from their pages. When a student has cut out the sight words, he/she should lay them on his/her desk, in a circle. Then, each student should place a pen or pencil in the center of the circle of sight word cards. Each student should spin the pen/pencil. Say a sight word. Any student or students whose pens/pencils are pointing to the sight word you said, should call "BINGO." The student or students should then remove those sight words from their desks. Continue in this way until a student or students have no sight words left on their desks.

## WRITING

Use the activity pages from the Student Support Materials.



### Every Second Letter

Write a sight word on the chalkboard, omitting every second letter. Provide the students with writing paper and pens. The students should look at the incomplete word on the chalkboard and then write the sight word for it on their papers. Repeat using other sight words.

This activity may also be done in team form. In this case, have the incomplete words prepared on separate flash cards. Mount one of the cards on the chalkboard. When you say "Go," the first player from each team must rush to the chalkboard and write the sight word for it - adding all of the missing letters. Repeat until all players have participated.





# Vocabulary Images





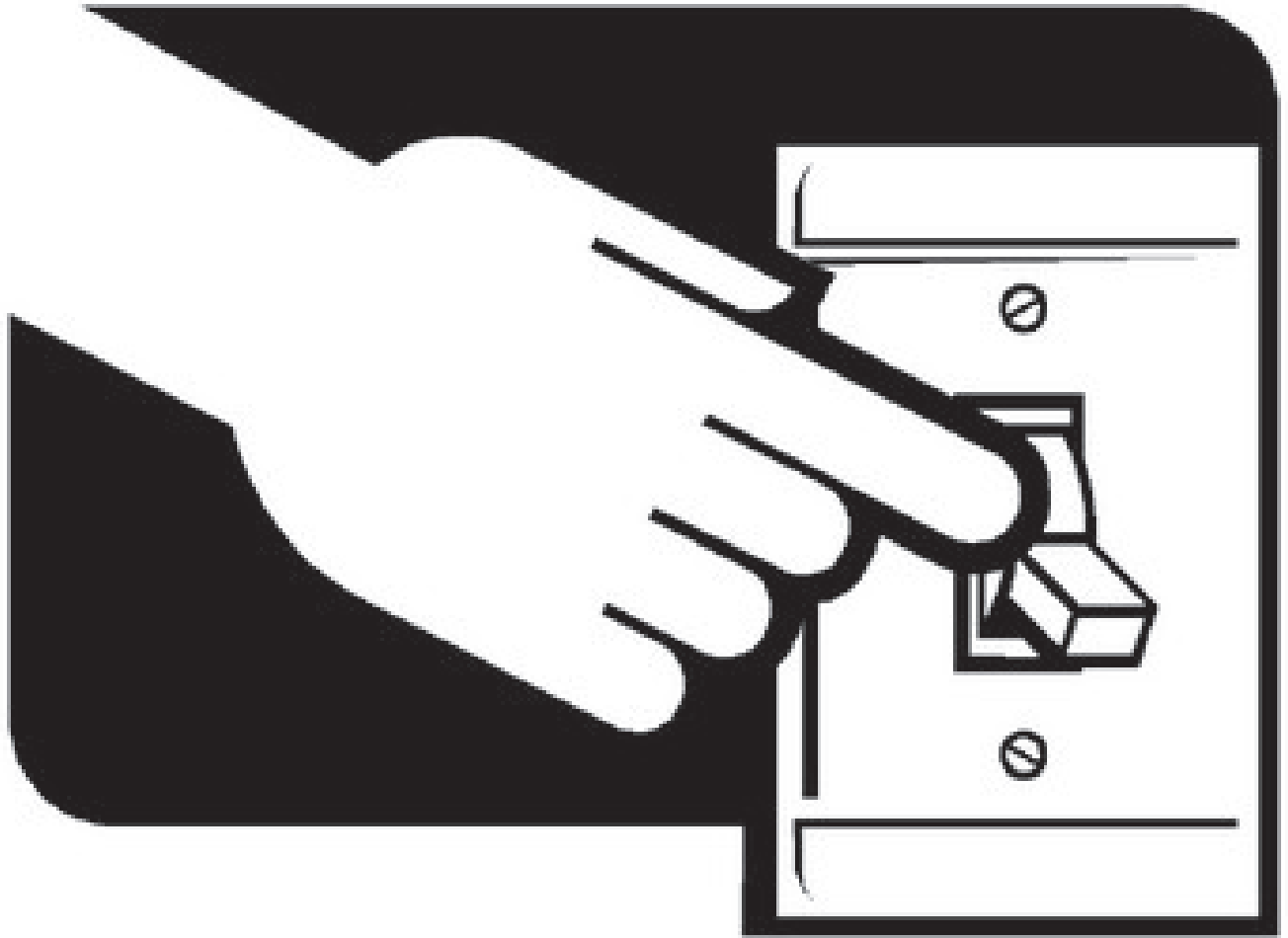




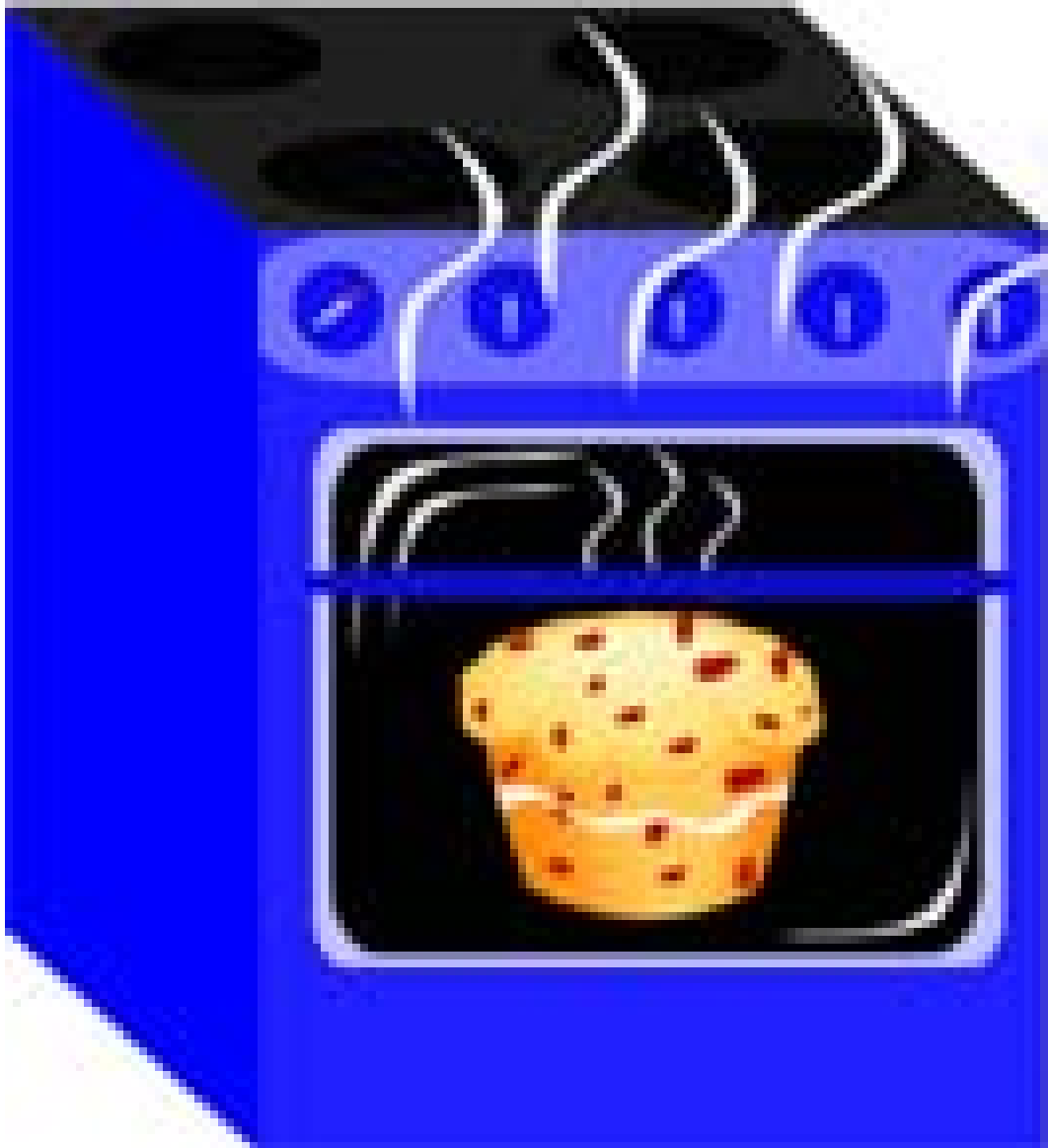










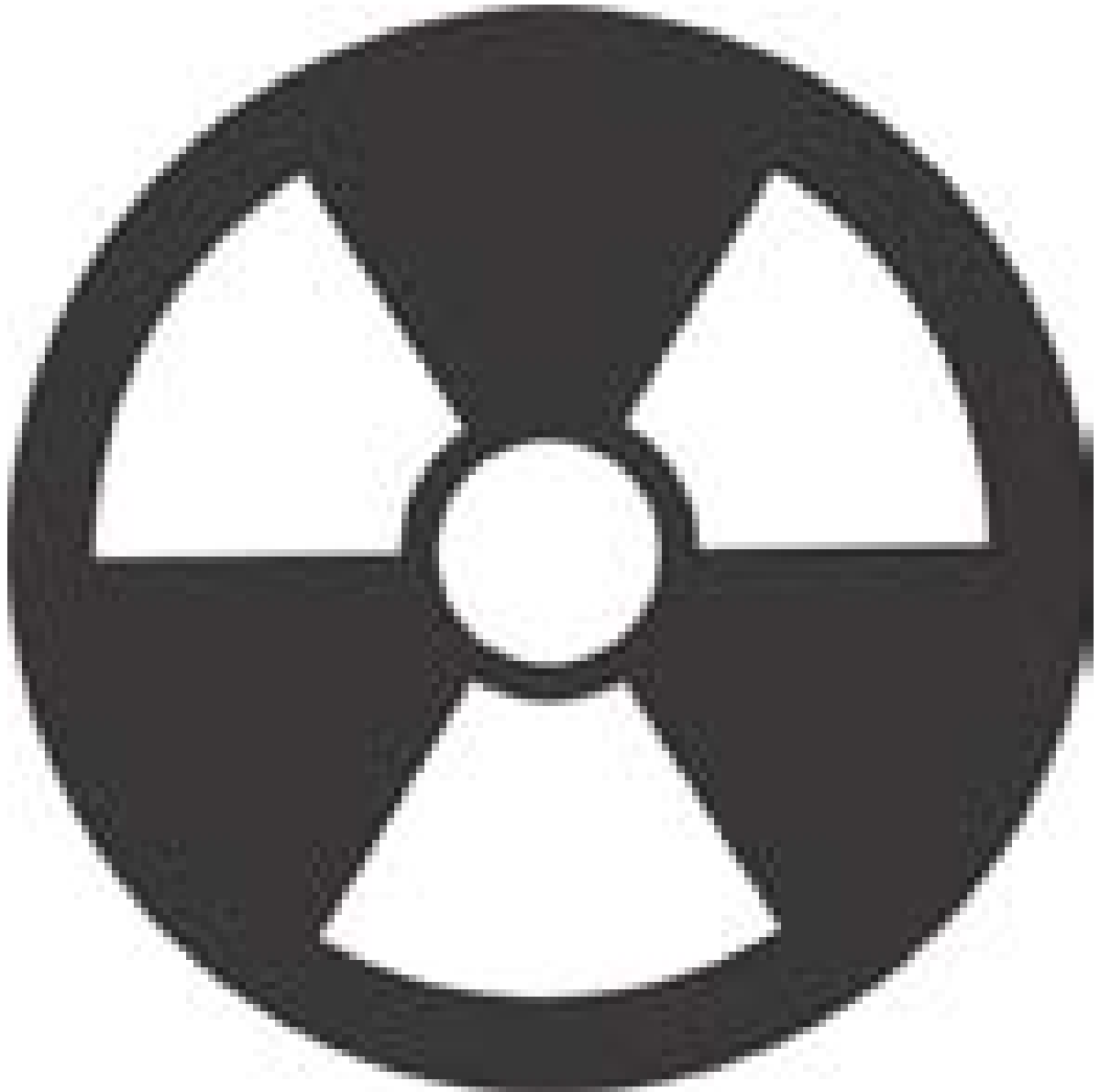














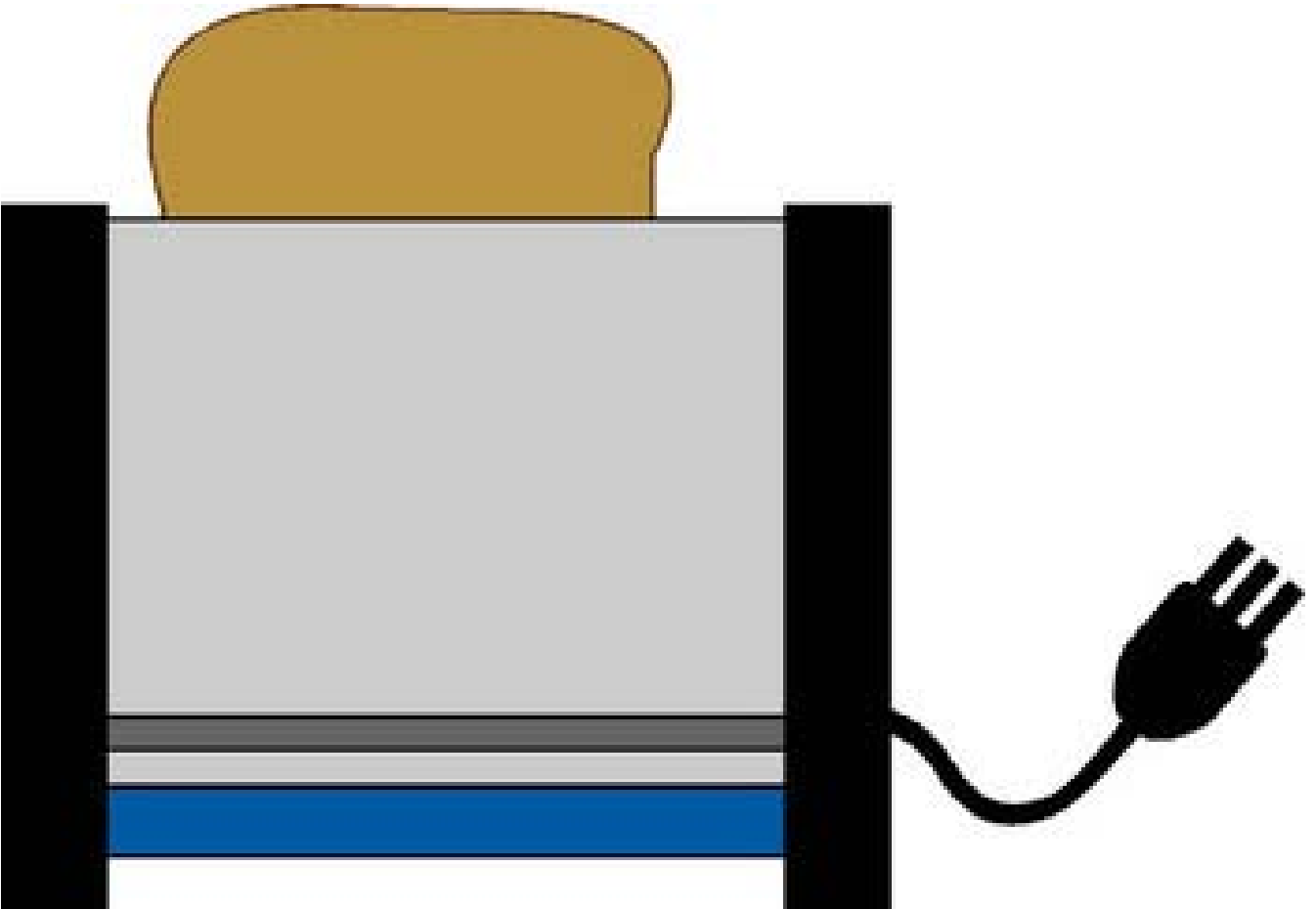






























STUDENT SUPPORT MATERIALS

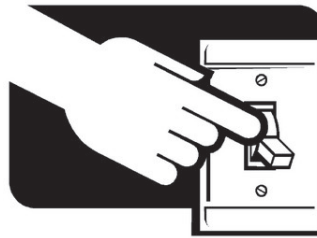
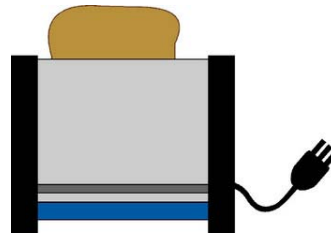
# Listening





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

1. relationships, 2. structure, 3. conserve, 4. heat transfer, 5. conduction, 6. circuits, 7. transferred, 8. convections, 9. radiation, 10. transformed, 11. energy, 12. form
- 



# Fill-in the Blanks

*Read the sentences to the students. The students should provide the “missing words.”*

1. The \_\_\_\_\_ between electrons and protons is similar to that between mothers and fathers – they almost always occur in pairs.
2. The \_\_\_\_\_ of Mr. Carney’s log home consists of many individual logs, arranged in a manner so that they are locked into place in an ordered fashion.
3. It is important to \_\_\_\_\_ wildlife species or they will become extinct. (conserve)
4. If a person stands beside a glass window on a cold day, the \_\_\_\_\_ \_\_\_\_\_ will quickly be felt.
5. Because metal is a much better \_\_\_\_\_ of electricity than rubber, it is not safe to handle live electric wires with bare hands!
6. Electricians work with \_\_\_\_\_, the routing of wires to electric panels, outlets, lights, and appliances in a house.
7. Electric transmission wires \_\_\_\_\_ energy from the generating station to the home.
8. The loss of heat on a cold windy day, by \_\_\_\_\_, is what we call wind chill.
9. Night vision goggles work because they detect infrared heat \_\_\_\_\_ from objects of contrasting temperatures.
10. Iron that has rusted has been \_\_\_\_\_.
11. It takes more \_\_\_\_\_ to run uphill than it does to run downhill.
12. Graphite and coal are two different \_\_\_\_\_ of carbon.

1. relationship, 2. structure, ; 3. conserve, 4. heat transfer, 5. conductor, 6. circuits, 7. transfer, 8. convection, 9. radiation, 10. transformed, 11. energy 12. forms

# True or False?

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

1. The relationship between electrons and neutrons is that they attract each other.
2. The structure of an atom includes the arrangement of protons, neutrons and electrons.
3. Wildlife conservation is based on the principle of maintaining populations of animals.
4. When a system is in equilibrium, heat transfer will occur between two objects.
5. Conduction is the process by which a wood stove heats the air in a house.
6. House electrical systems include circuit breakers that interrupt the flow of electricity when too much energy flows through them.
7. A postman transfers mail from one person to another.
8. A welder’s acetylene torch melts steel by convection.
9. Radiation from the sun is necessary for Vitamin D production in humans.
10. It is not possible to transform electrical energy into heat energy.
11. Dr. Einstein postulated a relationship between energy and the volume of space in his famous equation  $E = mc^2$ .
12. The form of energy that the human body requires is chemical.

1. F, 2. T, 3. T, 4. F, 5. F, 6. T, 7. T, 8. T, 9. T, 10. F, 11. F, 12. T





STUDENT SUPPORT MATERIALS

# Sight Words



**circuits**

**conduction**

**heat transfer**



**conserve**

**structure**

**relationship**

**radiation**

**convection**

**transferred**

**form**

**energy**

**transformed**





STUDENT SUPPORT MATERIALS

# Reading





# Word Find

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

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

[www.WordSearchMaker.com](http://www.WordSearchMaker.com)

Circuits	Heattransfer
Conduction	Raditation
Conserve	Relationships
Conserve	Structure
Convections	Transformed
Energy	Transferred
Form	

# Word Find Solution

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



# Sight Words Activity Page



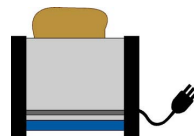
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# Sight Words Activity Page



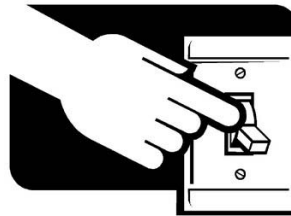
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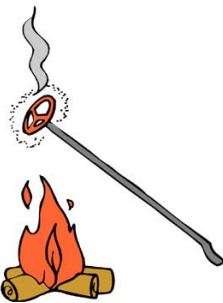
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conserve  
structure  
relationships

## Sentence Halves

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

- |   |   |
|---|---|
| 1. <i>The relationship between electrons</i>                          | A. <i>many structures are destroyed.</i>  |
| 2. <i>During a hurricane</i>  | B. <i>because of the heat transfer from your body.</i>                          |
| 3. <i>The mission of wildlife managers</i>                            | C. <i>completed the circuit.</i>  |
| 4. <i>A metal handrail feels colder than air</i>                      | D. <i>and protons is that for every electron, there is a proton in an atom.</i> |
| 5. <i>Because electric current and heat move through them easily,</i> | E. <i>transfer energy to homes.</i>   |
| 6. <i>When Susan replaced the dead battery in her gameboy, she</i>    | F. <i>metals are said to be good conductors.</i>                                |
| 7. <i>Transmission lines from power stations</i>                      | G. <i>heat by convection.</i>   |
| 8. <i>Ovens that have electrical heating elements</i>                 | H. <i>sunlight energy into electrical energy.</i>                               |
| 9. <i>Many people in Hiroshima became sick</i>                        | I. <i>is to conserve wildlife populations.</i>                                  |
| 10. <i>Solar panels transform</i>                                     | J. <i>heat, electrical, solar, and chemical.</i>                                |
| 11. <i>Energy can take many forms such as</i>                         | K. <i>how well it works in different wind conditions.</i>                       |
| 12. <i>The form of the wing affects</i>                               | L. <i>from radiation poisoning after the bomb was dropped in WWII.</i>          |

### Answers

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

## Word & Definition Match

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

*This can do work. It has many forms.*

*Energy is transformed but not destroyed.*

*This is the way in which matter is put together.*

*This is when things are connected.*

*To change.*

*Transfer of heat without movement.*

*Moving from one place to another.*

*This is the whole made of parts.*

*This means a completed circle.*

*Heat by air movements.*

*Heat flowing from one thing to another.*

*the transfer of energy via electromagnetic waves*

1. relationships

2. structure

3. conserve

4. heat transfer

5. conduction

6. circuits

7. transferred

8. convections

9. radiation

10. transformed

11. energy

12. form

## Which Belongs?

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

1. Sally was sad when her form/relationship with Billy ended.
2. The circuit/structure of carbon dioxide consists of two oxygens and a single carbon atom bonded together.
3. Thermos bottles conduct/conserves heat so that coffee remains at a higher temperature longer than it would if it were in an open cup.
4. Whenever there is a difference in temperature, convection/heat transfer will occur.
5. Because of the rapid conduction/radiation of heat, a moist tongue pressed to a frosty metal handrail will result in a stuck tongue!
6. By flipping the switch in her bedroom, Margaret completed the conduction/circuit and the bedroom light turned on.
7. In ionic bonds, one atom takes an electron from another, thus, it can be said that an electron is transferred/transformed.
8. A ceiling fan improves heat distribution in a room by heat transfer/convection process es.
9. The ultra-violet radiation/form in sunlight is what causes sunburns.
10. A bowstring transfers/transforms potential energy in the bent bow to kinetic energy of the arrow.
11. Humans increase the temperature in their homes by the release of heat transfer/energy often from fossil fuels.
12. A popular form/structure of carbon among fishermen is graphite.

1. relationship, 2. structure, 3. conserve, 4. heat transfer, 5. conduction, 6. circuit, 7. transferred, 8. convection, 9. radiation, 10. transform, 11. energy, 12. form

## 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) **A relationship does not exist when:**
  - a) Two people never interact;
  - b) One compound reacts with another;
  - c) An explosion occurs when two compounds are mixed.
  
- 2) **While being built, the:**
  - a) Structure of the house was hidden;
  - b) Structure of the house was completely visible;
  - c) Structure of the house was complete.
  
- 3) **It is important:**
  - a) To transfer resources so that they are available for future generations;
  - b) To transform resources so that they are available for future generations
  - c) To conserve resources so that they are available for future generations.
  
- 4) **A woodstove heats the house primarily by:**
  - a) Heat transfer via radiation;
  - b) Heat transfer via conduction;
  - c) Heat transfer via convection.
  
- 5) **Metals are said to be good conductors because:**
  - a) They reflect light readily and are thus used in mirrors;
  - b) They transfer heat and electrical energy well;
  - c) They are easily molded into desirable and useful forms – like cars.
  
- 6) **A circuit**
  - a) Is represented by an uninterrupted loop;
  - b) Is best described as an indirect path that energy can flow through;
  - c) Is always composed of poor conductors.
  
- 7) **A wet sauna works:**
  - a) By the transfer of heat from heated stones to air;
  - b) By the transfer of heat from heated stones to water – making steam;
  - c) By the transfer of heat from heated stones to wood – which burns and heats up the sauna.
  
- 8) **Ceiling fans are important in cold climates as they:**
  - a) Increase conduction currents of air in the house – redistributing heat;
  - b) Increase convection, such that warm air is pushed down;
  - c) Increase radiation, such that heat in a house is more evenly distributed.

- 9) **Chernobyl, a nuclear power station in the former Soviet Union, blew up resulting in:**
- (a) Radiation sickness among many inhabitants;
  - (b) Convection sickness among many inhabitants;
  - (c) the conduction of chemicals to many inhabitants.
- 10) **An important reason for energy conservation is that:**
- (a) When too much fuel is consumed, radiation from pollution results;
  - (b) There is a limited amount of fossil fuel that can be transferred into heat, or other useful forms of energy;
  - (c) There is a limited amount of fossil fuel that can be transformed into heat, or other useful forms of energy.
- 11) **Which of the following is not true about energy:**
- (a) Energy can be in the form of heat or radiation;
  - (b) Energy is destroyed after we use it;
  - (c) Energy is related to matter by the equation formulated by Einstein –  $E = mc^2$ .
- 12) **Graphite, diamonds, and coal are:**
- (a) Three forms of the element Carbon;
  - (b) Three compounds that the element Silicon;
  - (c) Three different forms of salt.

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







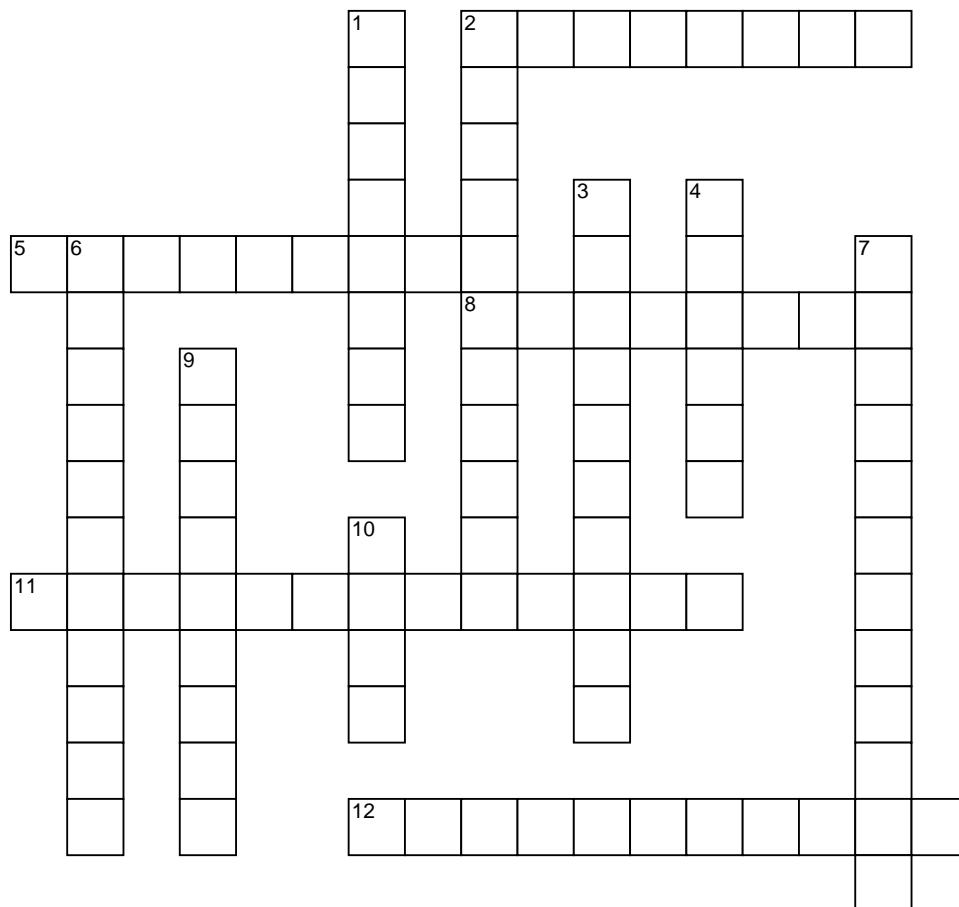
STUDENT SUPPORT MATERIALS

# Writing



# 9th B-1 Concepts of Physical Science

## Unit 2



www.CrosswordWeaver.com

### ACROSS

- 2 in the context of resource use. conservation is to maintain the viability of while still using a resource.
- 5 a cohesive whole built up of distinct parts.
- 8 refers to the preservation and protection of the environment, and the wise use of natural resources.
- 11 connection or association; the condition of being related.
- 12 having undergone a physical change.

### DOWN

- 1 when a current of electrons is released by an electrical power source.
- 2 transfer of heat by air movements.
- 3 is the transfer of heat from one body to another that does not involve movement.
- 4 is matter which is vibrating at an extremely high rate.
- 6 when you transfer something; you take it from one place or one form to another.
- 7 is when heat energy flows from one substance to another.
- 9 transfer of energy via electromagnetic waves (including visible light).
- 10 manner in which matter is assembled.



# Write The Words



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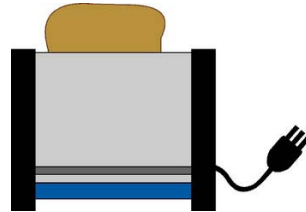
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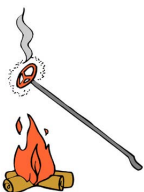
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## Complete The Sentences

*The students should write the missing words in the sentences.*

1. The \_\_\_\_\_ between electrons and protons is similar to that between mothers and fathers – they almost always occur in pairs.
2. The \_\_\_\_\_ of Mr. Carney's log home consists of many individual logs, arranged in a manner so that they are locked into place in an ordered fashion.
3. It is important to \_\_\_\_\_ wildlife species or they will become extinct.
4. If a person stands beside a glass window on a cold day, the \_\_\_\_\_ will quickly be felt.
5. Because metal is a much better \_\_\_\_\_ of electricity than rubber, it is not safe to handle live electric wires with bare hands!
6. Electricians work with \_\_\_\_\_, the routing of wires to electric panels, outlets, lights, and appliances in a house.
7. Electric transmission wires \_\_\_\_\_ energy from the generating station to the home.
8. The loss of heat on a cold windy day, by \_\_\_\_\_, is what we call wind chill.
9. Night vision goggles work because they detect infrared heat \_\_\_\_\_ from objects of contrasting temperatures.
10. Iron that has rusted has been \_\_\_\_\_.
11. It takes more \_\_\_\_\_ to run uphill than it does to run downhill.
12. Graphite and coal are two different \_\_\_\_\_ of carbon.

1. relationship, 2. structure, ; 3. conserve, 4. heat transfer, 5. conductor, 6. circuits, 7. transfer, 8. convection, 9. radiation, 10. transformed, 11. energy 12. forms

# 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.*

**relationships**

---

**structure**

---

**conserve**

---

**heat transfer**

---

**conduction**

---

**circuits**

---

**transferred**

---

**convections**

---

**radiation**

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## Creative Writing Activity Page

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**transformed**

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**energy**

---

**form**

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## Creative Writing Activity Page

Have the students write sentences of their own, based on the picture below. When finished, have each student read his/her sentences to the others.



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STUDENT SUPPORT MATERIALS

# Reinforcement Activities





Students will do a lab to measure heat transfer through various types of metals, other solids (plastic, glass), insulation, the air, and liquids. Students will present their findings to an elementary school class and invite questions about different methods of home construction.

Bring in different colored crayons, different colored marbles, and different colored buttons. Ask the students what the items have in common within the groups and between the groups. Explain that these commonalities are the relationships that the items have with each other.

Give all the students 10 M&M candies. Explain that they can eat 5 now and put the other 5 aside. Discuss with them how recycling aluminum helps the environment by re-using material so we don't have to dig up more aluminum therefore saving it for the future. Let them have the other M&Ms and discuss how they conserved them until now.

Using two pieces of wire, a 9V battery, and a piece of 000 steel wool, show the students what happens when you complete the circuit and explain the movement of electrons from the battery to the steel wool in a closed circuit.

Ask the students to jump up and down in place for 10 seconds. Ask them to put their heads down and be perfectly still for 10 seconds. Repeat a couple of times and then discuss that high energy is when atoms move around quickly like them jumping and low energy is when atoms slow down like when they had their heads down.





# Unit Assessment

## Unit 2 Quiz







## B1, Unit 2, Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Match the vocabulary words on the left with the correct definition of the word on the right.

- |                        |  |
|------------------------|--|
| 1) _____ relationships | a. transfer of heat from one solid to another without movement |
| 2) _____ structure     | b. maintain or preserve  |
| 3) _____ conserve      | c. connections or associations                                 |
| 4) _____ conduction    | d. cohesive whole built up of distinct parts                   |

5) Radiation is the transfer of energy via electromagnetic waves.

- a) True
- b) False

6) When something undergoes a physical change it is said to have...

- a) translated.
- b) transcribed.
- c) transformed.
- d) transfigured.

7) The manner in which matter is assembled is called body.

- a) True
- b) False

8) Choose one of two ways to define ENERGY Write a brief definition OR draw an illustration that clearly defines the term.

Fill in the blank with the fits best. Choose from the words provided below.

**radiation, structure, convection, transfer, conduction, circuit**

- 9) When electricity is conducted from a plug-in through an cord with insulated metal wires, to the lamp by the chair and back to the plug, it has completed a \_\_\_\_\_.
- 10) When heat transfer from one place to another and it doesn't involve movement and it occurs in solids it is \_\_\_\_\_.
- 11) When heat moves from one place to another by air movement, it is called \_\_\_\_\_.
- 12) Another word for the flow of heat energy when it moves from one substance to another would be heat\_\_\_\_\_.
- 13) Every substance that we know of, if it's a gas, a liquid or solid, is called matter.  
a) True  
b) False
- 14) Look at the two illustrations below. Write the word Energy by the appropriate illustration in the space provided. Write the word Radiation by the illustration that represents it in the space provided.
- 15) Explain in your own words what it means To Conserve. What can you do in your life to conserve?
- 16) When a complete physical change has occurred, we say that something has  
a) transferred.  
b) transformed.  
c) translated.  
d) transported.

## B1, Unit 2, Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Match the vocabulary words on the left with the correct definition of the word on the right.

- |                               |  |
|-------------------------------|--|
| 1) <u>  c  </u> relationships | a. transfer of heat from one solid to another without movement |
| 2) <u>  d  </u> structure     | b. maintain or preserve  |
| 3) <u>  b  </u> conserve      | c. connections or associations                                 |
| 4) <u>  a  </u> conduction    | d. cohesive whole built up of distinct parts                   |

- 5) Radiation is the transfer of energy via electromagnetic waves.

**a) True**

b) False

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b) transcribed.

**c) transformed.**

d) transfigured.

- 7) The manner in which matter is assembled is called body.

a) True

**b) False**

- 8) Choose one of two ways to define ENERGY Write a brief definition OR draw an illustration that clearly defines the term.

Correct answer not entered.

Fill in the blank with the fits best. Choose from the words provided below.

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- 12) Another word for the flow of heat energy when it moves from one substance to another would be heat \_\_\_\_\_.
- 13) Every substance that we know of, if it's a gas, a liquid or solid, is called matter.

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b) False

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Correct answer not entered.

- 15) Explain in your own words what it means To Conserve. What can you do in your life to conserve?

Correct answer not entered.

- 16) When a complete physical change has occurred, we say that something has
- a) transferred.
  - b) transformed.
  - c) translated.
  - d) transported.

# Concepts of Physical Science 3



Sealaska Heritage Institute





INTRODUCTION OF

# Key Vocabulary







# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Valence

### PLACED-BASED PERSPECTIVE

Propose the idea of only 4 people on a basketball team or 8 players on a football team. Discuss with the students how valence electrons are similar to missing members that make up a full team.



### HERITAGE CULTURAL PERSPECTIVE

Show students a grilled cheese sandwich and discuss how the cheese that is shared between both pieces of toast is similar to a covalent bond.

## Atomic Numbers

### PLACED-BASED PERSPECTIVE

Show students the symbol from carbon (C) on the periodic table and point out the atomic number (6).



### HERITAGE CULTURAL PERSPECTIVE

Have a student drop a pencil from their desk to the floor. Ask them if the result will change if they continue repeating the experiment. Explain Newton's Law of Gravity, like other scientific laws, is based on repeated observable events.

## Bonds

### PLACED-BASED PERSPECTIVE

Discuss how bonds are like glue for atoms to make molecules.



### HERITAGE CULTURAL PERSPECTIVE

Have the students name opposites (i.e. black/white, up/down, etc). Use these common terms to introduce the mathematical nature of inverse relationships in which one variable decreases as the other increases.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Direct Relationships

### PLACED-BASED PERSPECTIVE

Discuss with students the direct relationship between drinking caffeine drinks and the increasing amount of energy that students get from drinking the drinks.

## Currents

### PLACED-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.





# Language Skills



# Language & Skills Development

## LISTENING

Use the activity pages from the Student Support Materials.



### Illustration Sequence

Before the activity begins, give the students the mini-illustrations from this unit. Say a sequence of vocabulary words (four or five words). After you have said the sequence of words, the students should find the necessary illustrations to represent the sequence you said. Each student should lay the four or five illustrations on his/her desk in the same order as you said the vocabulary words. Repeat this process with other sequences of vocabulary words.

## SPEAKING



### Illustration Jigsaw

Cut each of the vocabulary illustrations into four pieces. Mix the cut out pieces together and distribute them to the students (a student may have more than one illustration section). When you say “Go,” the students should attempt to match the jigsaw sections they have to reproduce the original vocabulary illustrations. When the students put the necessary pieces of an illustration together, they should identify the illustration by its vocabulary word. Continue until all vocabulary illustrations have been put together and named in this way.

## READING

Use the activity pages from the Student Support Materials.



### Half Time

Before the activity begins, cut each of the sight words in half. Keep one half of each sight word and give the remaining halves to the students. Hold up one of your halves and the student who has the other half of that word must show his half and say the sight word. Repeat in this way until all students have responded. An alternative to this approach is to give all of the word halves to the students. Say one of the sight words and the two students who have the halves that make up the sight word must show their halves. Depending upon the number of students in your class, you may wish to prepare extra sight word cards for this activity.

## WRITING

Use the activity pages from the Student Support Materials.



### What’s Your Letter?

Provide each student with writing paper and a pen. Say a sight word. Each student should then write ONE letter from that word (any letter). Review the students’ responses to determine if all letters from the sight word were used. If all letters from the sight word were not used, call upon the students to identify the letters that are “missing.” Repeat with other sight words.



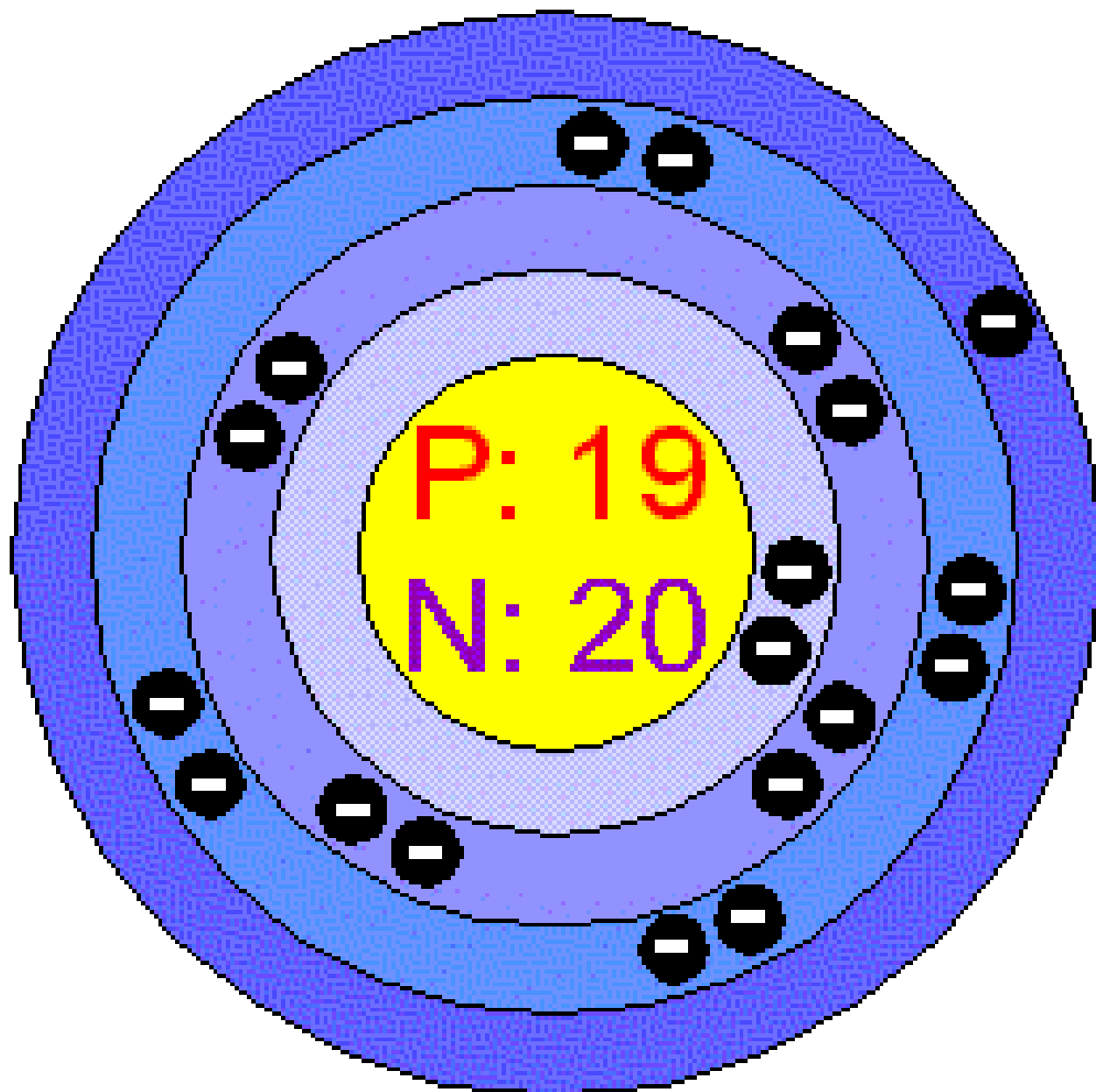


# Vocabulary Images

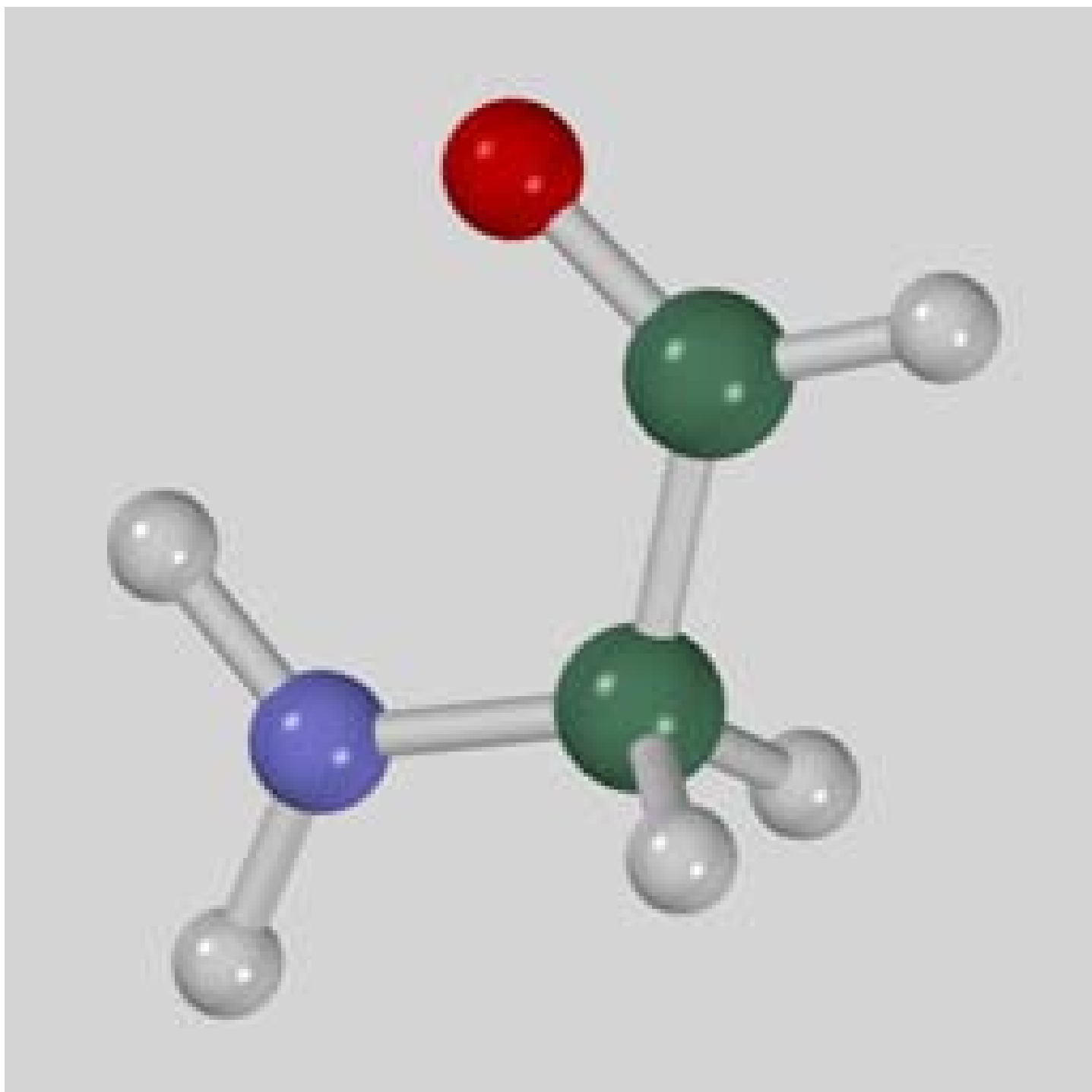




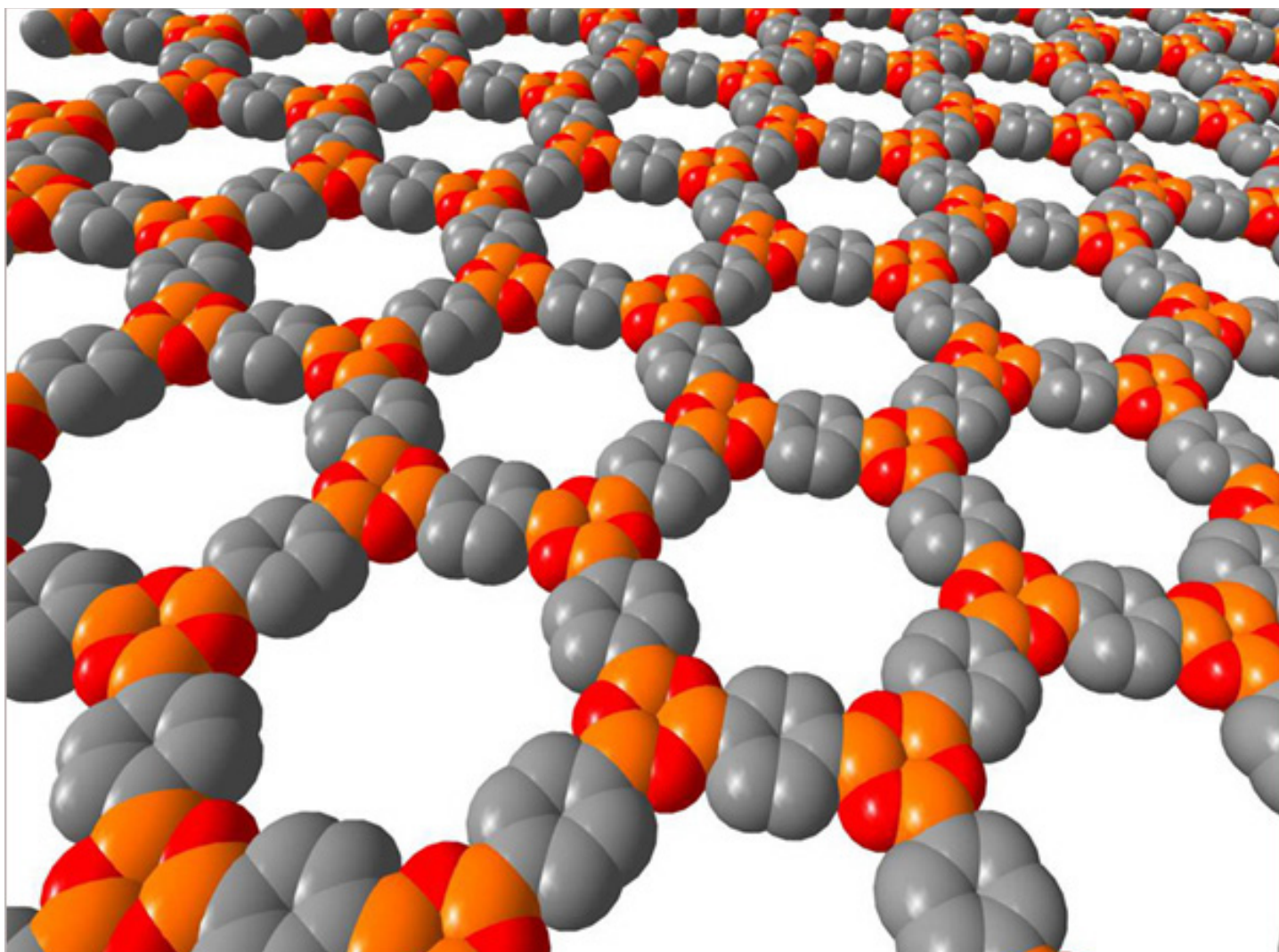














$$41 + 19 = 60$$

$$60 - 41 = 19$$

$$19 + 41 = 60$$

$$60 - 19 = 41$$



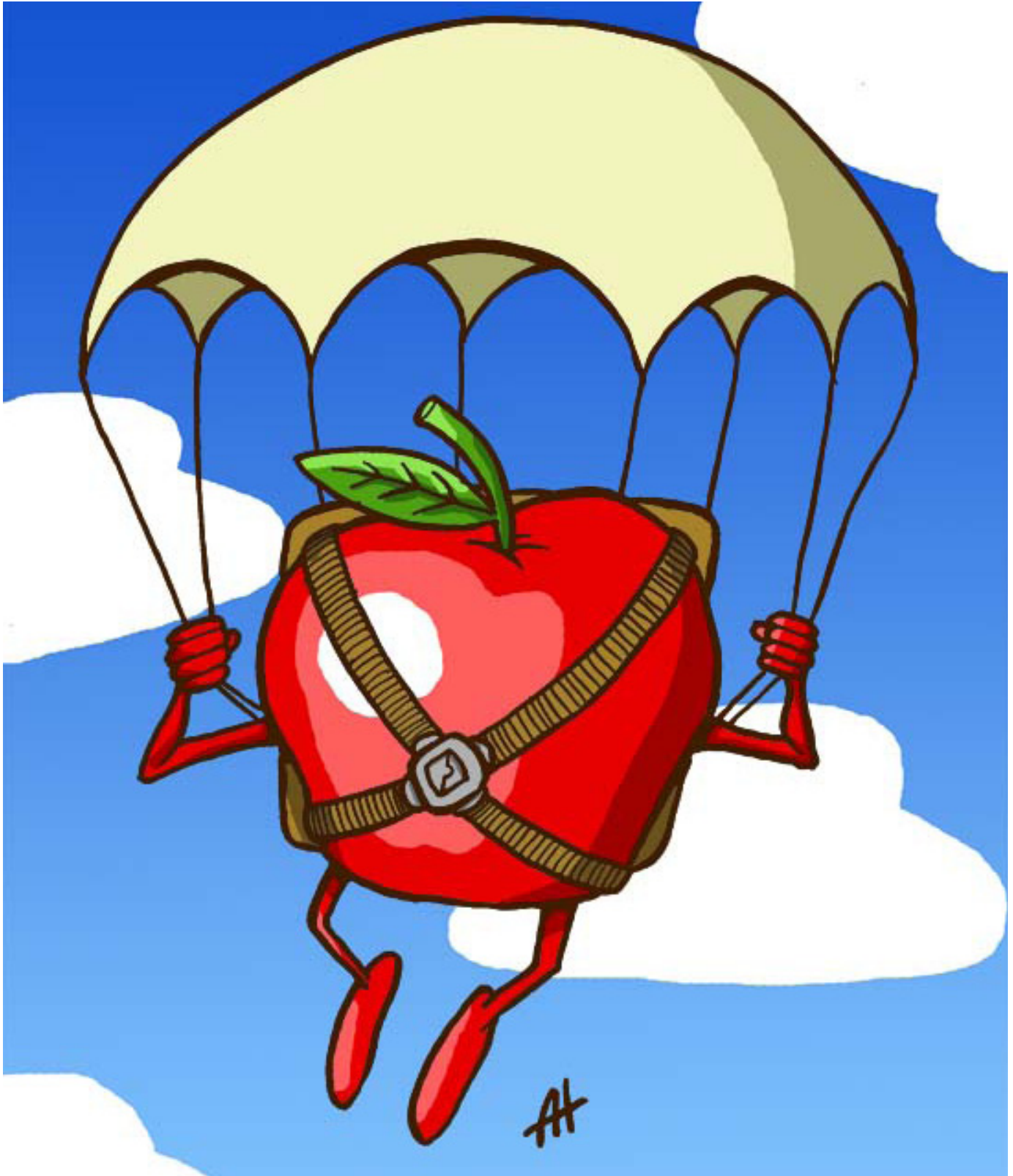




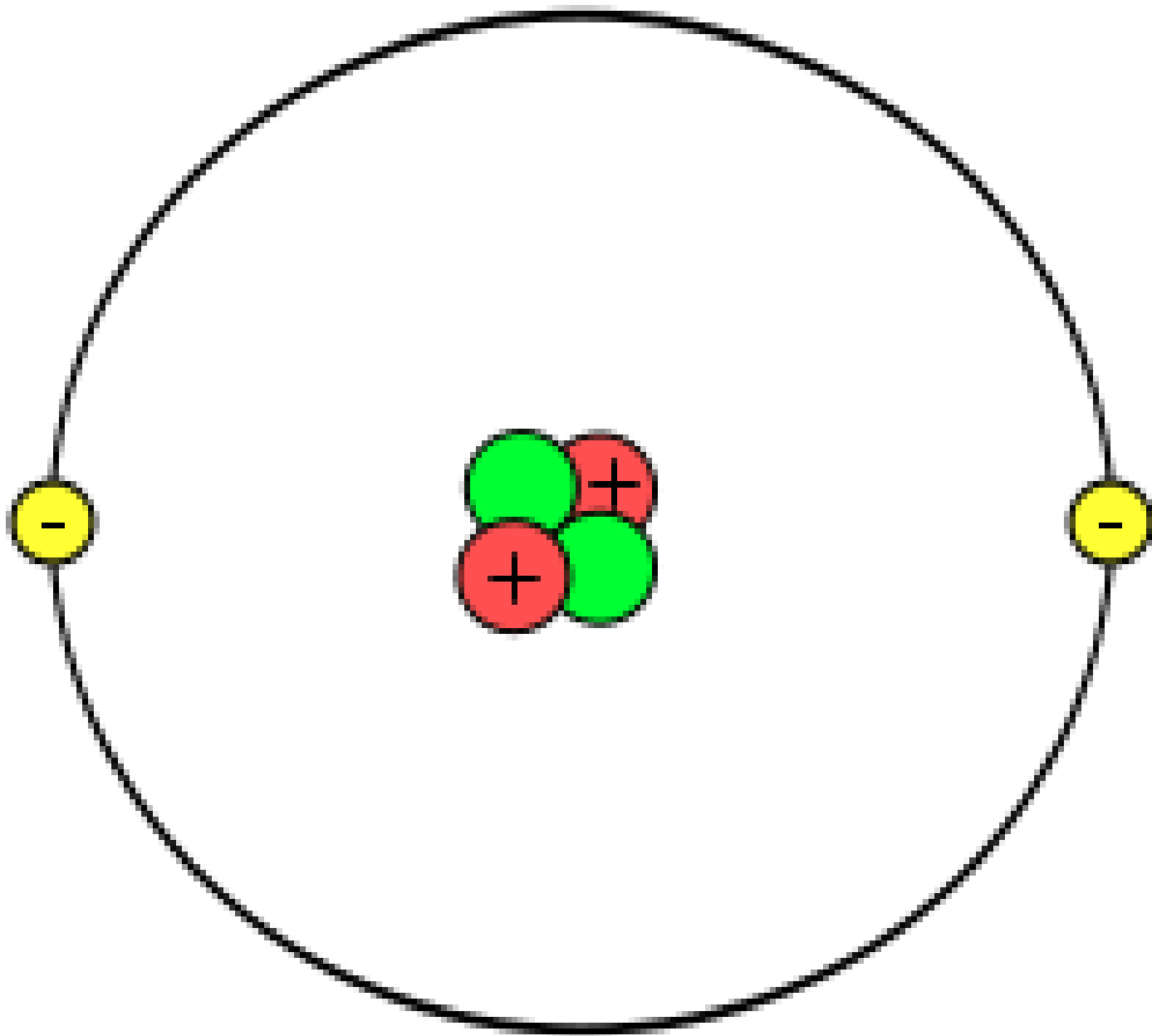


















STUDENT SUPPORT MATERIALS

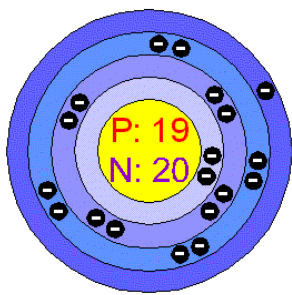
# Listening

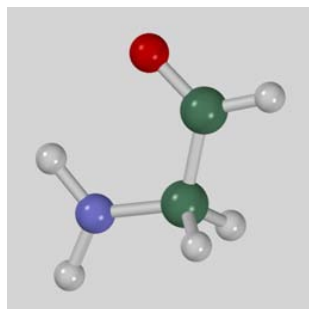


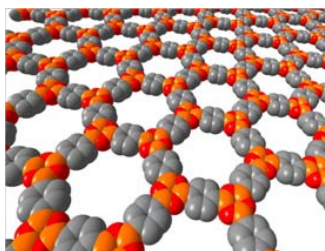


Say these words to the students - they write the numbers of the words under the pictures.  
 1., valence, 2. atomic numbers, 3. bonds, 4. covalent 5. laws, 6. inverse relationships,  
 7. direct relationships, 8. currents.

---











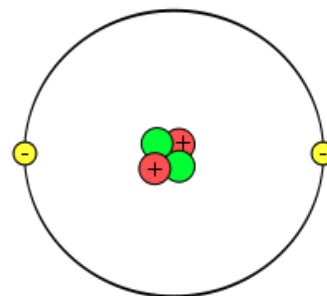

$$41 + 19 = 60$$

$$60 - 41 = 19$$

$$19 + 41 = 60$$

$$60 - 19 = 41$$





# Fill-in the Blanks

*Read the sentences to the students. The students should provide the “missing words.”*

1. The \_\_\_\_\_ between electrons and protons is similar to that between mothers and fathers – they almost always occur in pairs.
2. The \_\_\_\_\_ of Mr. Carney’s log home consists of many individual logs, arranged in a manner so that they are locked into place in an ordered fashion.
3. It is important to \_\_\_\_\_ wildlife species or they will become extinct. (conserve)
4. If a person stands beside a glass window on a cold day, the \_\_\_\_\_ \_\_\_\_\_ will quickly be felt.
5. Because metal is a much better \_\_\_\_\_ of electricity than rubber, it is not safe to handle live electric wires with bare hands!
6. Electricians work with \_\_\_\_\_, the routing of wires to electric panels, outlets, lights, and appliances in a house.
7. Electric transmission wires \_\_\_\_\_ energy from the generating station to the home.
8. The loss of heat on a cold windy day, by \_\_\_\_\_, is what we call wind chill.
9. Night vision goggles work because they detect infrared heat \_\_\_\_\_ from objects of contrasting temperatures.
10. Iron that has rusted has been \_\_\_\_\_.
11. It takes more \_\_\_\_\_ to run uphill than it does to run downhill.
12. Graphite and coal are two different \_\_\_\_\_ of carbon.

1. relationship, 2. structure, ; 3. conserve, 4. heat transfer, 5. conductor, 6. circuits, 7. transfer, 8. convection, 9. radiation, 10. transformed, 11. energy 12. forms

# True or False?

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

1. The number of electrons in an atom determines the atomic number.
2. Bonds between atoms are based on the formation of stable electron configurations.
3. A bond between atoms in which one electron is given up by one atom – to the other – is the basis of a covalent bond.
4. Scientific laws are based on the multiple testings of hypotheses.
5. The supply and demand basis of capitalistic economies is an example of an inverse relationship.
6. Global warming, where temperature and ocean acidification increase with carbon dioxide emissions is an example of a direct relationship.
7. Electronic appliances that are powered by AC power from a hydroelectric plant are based on the transmission of electrons.
8. Valence of a substance is the number of neutrons it needs to form an atomic number.

## Answers

1. F 2. T 3. F 4. F 5. F 6. T 7. F 8. F





STUDENT SUPPORT MATERIALS

# Sight Words







**atomic  
numbers**

**valence**

**laws**

**covalent**

**bonds**

**currents**

**inverse  
relationships**

# direct relationships



STUDENT SUPPORT MATERIALS

# Reading





# Word Find

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

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

[www.WordSearcher.com](http://www.WordSearcher.com)

Atomic numbers

Bonds

Covalent

Currents

Direct relationships

Inverse relationships

Laws

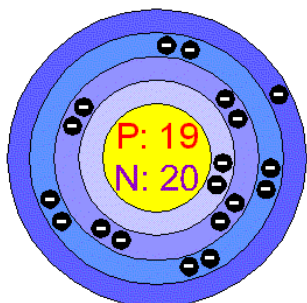
Valence

# Word Find

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



# Sight Words Activity Page

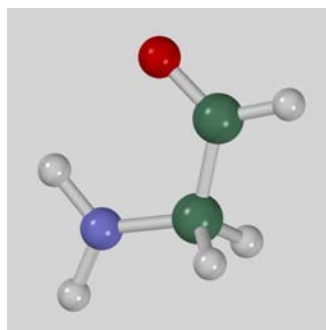


valence  
atomic numbers  
bonds  
covalent  
laws

inverse  
relationships

direct  
relationships

currents

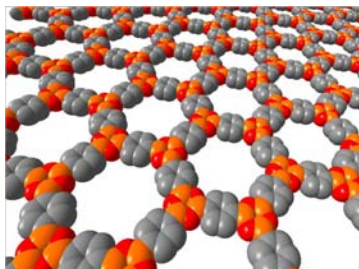


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currents

# Sight Words Activity Page

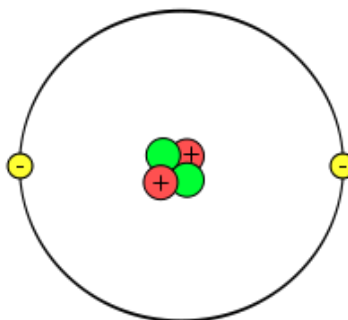


valence  
atomic numbers  
bonds  
covalent  
laws

inverse  
relationships

direct  
relationships

currents



valence  
atomic numbers  
bonds  
covalent  
laws

inverse  
relationships

direct  
relationships

currents

## Sentence Halves

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

- |   |   |
|---|---|
| 1. The number of protons in an atom   | A. covalent.  |
| 2. Hydrogen bonds, between hydrogen of different molecules,                         | B. constitutes its atomic number.   |
| 3. The bonds between the two oxygen atoms are                                       | C. inverse relationship between the number of divorces and marriages.                   |
| 4. Unlike theories, laws are  | D. are what hold water molecules together.  |
| 5. The number of apples available over the winter would likely best be described as | E. an inverse relationship.   |
| 6. There is a direct relationship between how many times a rat will visit           | F. of electrons it needs to gain in forming a chemical bond.                            |
| 7. It is important not to allow a wrench to touch both terminals on a boat battery  | G. so that a current doesn't move rapidly between them – possibly causing an explosion. |
| 8. The valence of a substance is the number   | H. descriptions of observations – not explanations for observations.                    |
|   | I. its food tray and how the food in the tray tastes.                                   |

Answers:

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

## Word & Definition Match

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

This relates to the number of electrons to make a chemical bond.

This is the number of protons found in the nucleus.

This is a statement describing a relationship.

One variable decreases as others increase.

This is an electrostatic bond.

An increase or decrease causes the same on the other condition.

This is the attraction between atoms.

This is the movement of electrons.

1. direct relationships

2. currents

3. bonds

4. laws

5. covalent

6. inverse relationships

7. valence

8. atomic numbers

## Which Belongs?

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

1. Atoms of different elements are held together by the laws/bonds between them.
2. An atom is defined by its law/atomic number.
3. A current/covalent bond between two atoms is formed when they share electrons.
4. Descriptions of physical phenomena are called laws/theories.
5. A relationship in which the dependent variable decreases with the independent variable is an inverse/direct relationship.
6. A relationship in which the dependent variable increases with the independent variable is an inverse/direct relationship.
7. The flow of electrons through a wire is called current/law.
8. The valence/form of a substance is the number of electrons it needs to gain in forming a chemical bond.

Answers:

1. bonds, 2. atomic number, 3. covalent, 4. laws, 5. inverse, 6. direct, 7. current, 8. valence

# 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. The atomic number of an element describes all of the following except**
  - (a) The number of electrons in the element
  - (b) The number of protons in the element
  - (c) The number of neutrons in the element
- 2. It is easy to get duct tape to bond to**
  - (a) wet wood
  - (b) dry plastic
  - (c) oily metal
- 3. Bonds that are not formed by sharing electrons are called**
  - (a) covalent bonds
  - (b) hydrogen bonds
  - (c) metallic bonds
- 4. Obeying the laws of the road will cause you to**
  - (a) drive at reasonable speeds
  - (b) be completely safe
  - (c) avoid all accidents
- 5. The following are examples of inverse relationships except**
  - (a) Number of people in a party and amount paid by each of the "group rate"
  - (b) Distance between two objects and the force of gravity between those two objects
  - (c) Temperature and Volume of a gas held at constant pressure
- 6. All of the following are direct relationships except**
  - (a) The amount of ones yearly salary and the amount one spends on luxury items
  - (b) The growth of ones hair over time
  - (c) The distance between two objects and the force of gravity between those two objects
- 7. You can measure electric current using an**
  - (a) ammeter
  - (b) voltmeter
  - (c) meter stick
- 8. The valence of elements in group one (on the periodic table) is one, which means that these elements**
  - (a) can form one bond with another element.
  - (b) only form bonds with elements with a valence of one.
  - (c) have an atomic mass of one.

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



STUDENT SUPPORT MATERIALS

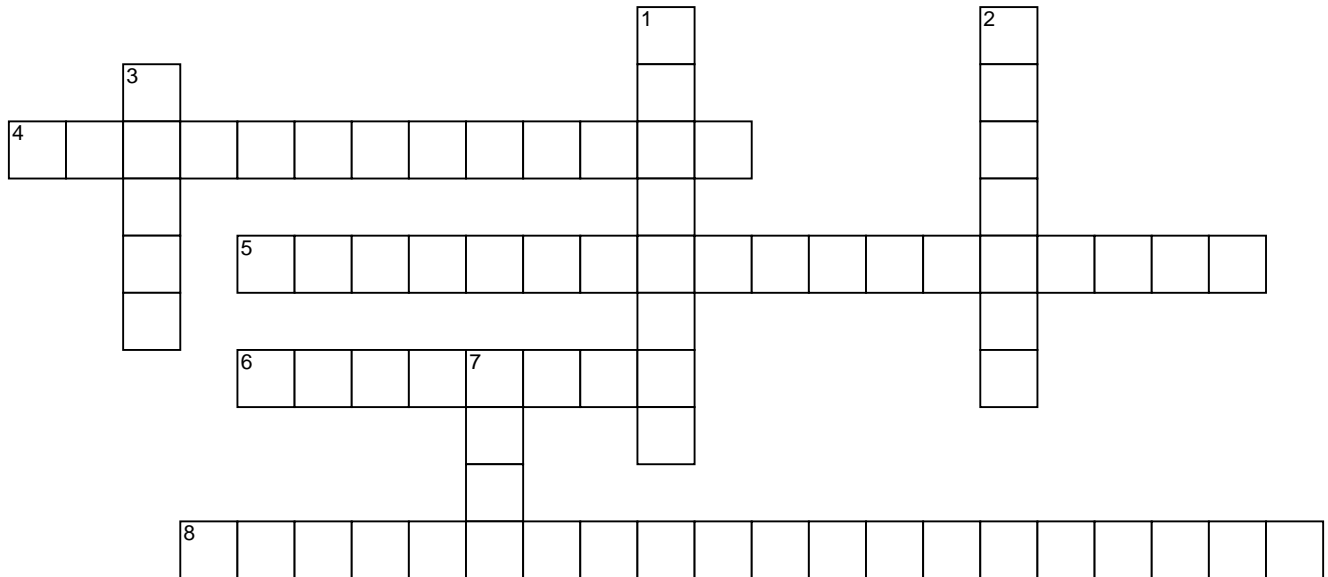
# Writing





# 9th B-1 Concepts of Physical Science

## Unit 3



www.CrosswordWeaver.com

### ACROSS

- 4 the atomic number of an element is the number of protons found in the nucleus of a single atom of that element.
- 5 within an experiment, two or more conditions have a direct relationship if an increase or decrease applied to one condition causes a similar increase or decrease effect on the other condition.
- 6 the electrostatic bond between two ions formed through the transfer of one or more electrons.
- 8 a mathematical relationship in which one variable decreases as other increases.

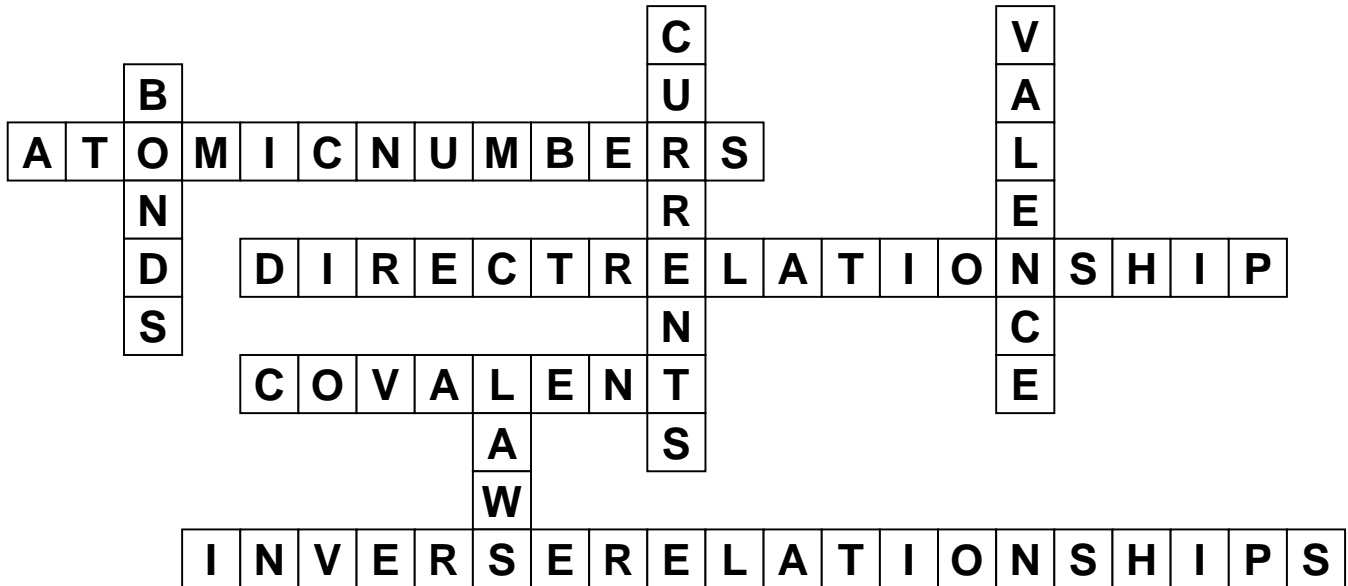
### DOWN

- 1 electric current is the movement of electrons through a wire or other conductor.
- 2 the \_\_\_\_\_ of a substance is the number of electrons it needs to gain in forming a chemical bond.
- 3 the attraction between atoms in a molecule or crystalline structure.
- 7 a statement describing a relationship observed to be invariable between or among phenomena for all cases in which the specified conditions are met.

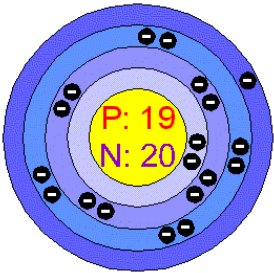
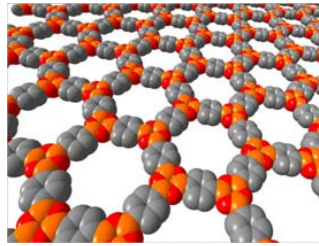
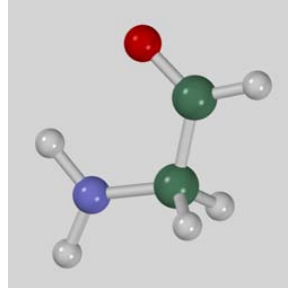
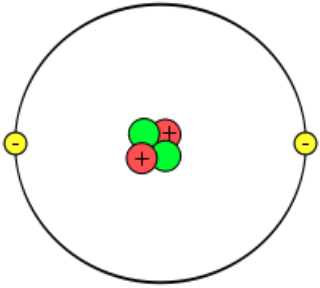
# 9th B-1 Concepts of Physical Science

## Unit 3

Solution:



# Write The Words



$$41 + 19 = 60$$
$$60 - 41 = 19$$
$$19 + 41 = 60$$
$$60 - 19 = 41$$

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## Complete The Sentences

*The students should write the missing words in the sentences.*

1. Each element on the periodic table can be identified by a unique \_\_\_\_\_, which represents the number of protons present in the nucleus of the atom.
2. Some atoms readily form \_\_\_\_\_, while others are inert or less reactive and do not.
3. \_\_\_\_\_ bonds occur when atoms share one or more electrons.
4. It is assumed by scientist that the \_\_\_\_\_ of nature are unchanging and consistent throughout the universe.
5. A mathematical relationship in which one variable decreases and the other increases is called an \_\_\_\_\_.
6. The opposite of an inverse relationship is a \_\_\_\_\_.
7. The amount of \_\_\_\_\_ flowing through an electrical system is measured in amps.
8. The \_\_\_\_\_ of a substance is the number of electrons it needs to gain in forming a chemical bond.

### **Answers**

1. atomic number, 2. bonds, 3. covalent, 4. laws, 5. inverse relationship, 6. direct relationship, 7. current, 8. valence

## 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.*

**valence**

---

**atomic numbers**

---

**covalent**

---

**laws**

---

**inverse relationships**

---

**direct relationships**

---

**currents**

---

**bonds**

---

# Creative Writing Activity Page

*Have the students write sentences of their own, based on the picture below. When finished, have each student read his/her sentences to the others.*



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STUDENT SUPPORT MATERIALS

# Reinforcement Activities







Outside, have students join hands and play a modified version of “Red Rover”, where students link arms to simulate bonds between atoms. Have a larger and a smaller student demonstrate how some bonds are more easily broken than other bonds.

Ask two groups of three students each to form two rings holding hands to simulate the outer shell of an electron. Have the two rings of students come closer together and choose a student from each group to shake hands and hold onto a counterpart in the other ring. This configuration should demonstrate covalent bonds by sharing “electrons”.

Construct a periodic table with student-made squares. Each square could have the atomic number, atomic symbol, and interesting information about the element in question.





# Unit Assessment

Unit Quiz & Test for Units 1 - 3





### B1, Unit 3, Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) When two atoms in a molecule are attracted to each other it is called...
    - a) true love
    - b) magnetism
    - c) attraction
    - d) a bond
  
  - 2) The number of protons found in the nucleus of a single atom of that element are called...
    - a) atomic numbers.
    - b) protonic numbers.
    - c) nucleic numbers.
    - d) elemental numbers.
  
  - 3) The \_\_\_\_\_ of a substance is the number of electrons it needs to gain in forming a chemical bond.
    - a) value
    - b) valence
    - c) essence
    - d) center
  
  - 4) \_\_\_\_\_ covalent
  - 5) \_\_\_\_\_ laws
  - 6) \_\_\_\_\_ electrical currents
- a. the movement of electrons through a wire or other conductor.
  - b. a statement describing a constant, unvarying relationship between and among phenomena
  - c. the electrostatic bond between two ions formed through the transfer of one or more electrons

- 7) Look at the two illustrations below. Put the letter A beside the illustration that represents INVERSE RELATIONSHIPS. Put the letter B beside the illustration that represents DIRECT RELATIONSHIPS.

(PLACE TWO GRAPHICS HERE....ONE FOR INVERSE RELATIONSHIPS; THE OTHER FOR DIRECT RELATIONSHIPS)

- 8) Draw a picture illustrating the concept of CURRENT.

### B1, Unit 3, Concepts of Physical Science Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1) When two atoms in a molecule are attracted to each other it is called...

- a) true love
- b) magnetism
- c) attraction

**d) a bond**

2) The number of protons found in the nucleus of a single atom of that element are called...

- a) atomic numbers.**
- b) protonic numbers.
- c) nucleic numbers.
- d) elemental numbers.

3) The \_\_\_\_\_ of a substance is the number of electrons it needs to gain in forming a chemical bond.

a) value

**b) valence**

- c) essence
- d) center

4)   **c**   covalent

5)   **b**   laws

6)   **a**   electrical currents

a. the movement of electrons through a wire or other conductor.

b. a statement describing a constant, unvarying relationship between and among phenomena

c. the electrostatic bond between two ions formed through the transfer of one or more electrons

- 7) Look at the two illustrations below. Put the letter A beside the illustration that represents INVERSE RELATIONSHIPS. Put the letter B beside the illustration that represents DIRECT RELATIONSHIPS.

(PLACE TWO GRAPHICS HERE....ONE FOR INVERSE RELATIONSHIPS; THE OTHER FOR DIRECT RELATIONSHIPS)

GRAPHIC FOR INVERSE RELATIONSHIPS GRAPHIC FOR DIRECT RELATIONSHIPS.

- 8) Draw a picture illustrating the concept of CURRENT.

Correct answer not entered.



## B1, Units 1-3, Concepts of Physical Science Test

Name: \_\_\_\_\_

Date: \_\_\_\_\_

A. Unscramble the groups of letters to form science words from the Physical Science Units. Write the words in the blanks.

- 1) ntaoidari (transfer of energy through space by electromagnetic waves) \_\_\_\_\_
- 2) rercetun (movement of electrons through a wire or other conductor) \_\_\_\_\_
- 3) utronen (a particle in the nucleus of an atom that does not have a charge) \_\_\_\_\_
- 4) oslmed (a construct that seeks to mimic natural processes in order to make predictions)  
\_\_\_\_\_
- 5) cvlncee (number of electrons in an atom needed to form a chemical bond) \_\_\_\_\_

Match the term in column A with the definition in column B

- |                     |  |
|---------------------|--|
| 6) _____ atoms      | a. a particle that is in the space around the nucleus of an atom and has a negative charge |
| 7) _____ protons    | b. the smallest particle of an element that has all the properties of that element         |
| 8) _____ electrons  | c. characteristics of matter   |
| 9) _____ properties | d. a particle that is the nucleus of an atom and has a positive charge                     |

- 10) Study the illustrations below, then label each of the illustrations.
- a. illustration of Components \_\_\_\_\_
  - b. illustration of Inverse Relationships \_\_\_\_\_
  - c. illustration of Direct Relationships \_\_\_\_\_
  - d. illustration of Transformed \_\_\_\_\_
- 11) Which statement is most likely to be true?
- a) An acid is a substance that gives off hydrogen ions when placed in water; a substance with a pH of less than seven
  - b) A base is a substance that gives off hydrogen ions when placed in water; a substance with a pH of less than seven.
- 12) Explain the difference between a FACT and a THEORY.
- 13) \_\_\_\_\_ is the substance that everything is made of, and can exist in a gas, liquid, or solid state. It's anything that has mass and volume.
- 14) Mass is the measure of how much \_\_\_\_\_ an object contains.
- 15) Heat travels through conduction, convection and radiation.
- a. \_\_\_\_\_ is the movement of heat without the involvement of molecules.
  - b. \_\_\_\_\_ is the movement of heat involving atoms or molecules, and is the way heat is transferred in solids.
  - c. \_\_\_\_\_ is the way heat is transferred by moving air in a circular motion.
- 16) Which statement is most likely to be true?
- a) To be transferred is to undergo a physical change.
  - b) To be transformed is to undergo a physical change.

- 17) A circuit is a complete closed circular path taken by a current.  
a) True  
b) False
- 18) What does it mean "to conserve"?
- 19) In the law of conservation of energy, energy cannot be created or destroyed.  
a) True  
b) False
- 20) What do the following have in common?  
• gasoline to move a car  
• heat to warm an oven  
• wind to turn the blades of a windmill  
They all need \_\_\_\_\_, the ability to do work.

**Complete the following sentences with the words below.**  
Laws, Covalent, Atomic Numbers, Form, Structure, Relationships

- 21) A \_\_\_\_\_ bond is chemical or electrostatic bond in which atoms share one or more electrons.
- 22) \_\_\_\_\_ is a cohesive whole built up of distinct parts.
- 23) The manner in which matter is assembled is called \_\_\_\_\_.
- 24) The connection or association between various elements or beings is called a \_\_\_\_\_.
- 25) The \_\_\_\_\_ is the number of protons found in the nucleus of an atom of that element.
- 26) A scientific explanation that describes how the world or universe acts under certain conditions is called a scientific \_\_\_\_\_.

## B1, Units 1-3, Concepts of Physical Science Test

Name: \_\_\_\_\_

Date: \_\_\_\_\_

A. Unscramble the groups of letters to form science words from the Physical Science Units. Write the words in the blanks.

- 1) ntaoidari (transfer of energy through space by electromagnetic waves) radiation
- 2) rercetun (movement of electrons through a wire or other conductor) currents
- 3) utronen (a particle in the nucleus of an atom that does not have a charge) neutron
- 4) oslmed (a construct that seeks to mimic natural processes in order to make predictions) models
- 5) cvlncee (number of electrons in an atom needed to form a chemical bond) valence

Match the term in column A with the definition in column B

- |                        |  |
|------------------------|--|
| 6) <u>b</u> atoms      | a. a particle that is in the space around the nucleus of an atom and has a negative charge |
| 7) <u>d</u> protons    | b. the smallest particle of an element that has all the properties of that element         |
| 8) <u>a</u> electrons  | c. characteristics of matter   |
| 9) <u>c</u> properties | d. a particle that is the nucleus of an atom and has a positive charge                     |

10) Study the illustrations below, then label each of the illustrations.

- a. illustration of Components \_\_\_\_\_
- b. illustration of Inverse Relationships \_\_\_\_\_
- c. illustration of Direct Relationships \_\_\_\_\_
- d. illustration of Transformed \_\_\_\_\_

11) Which statement is most likely to be true?

a) An acid is a substance that gives off hydrogen ions when placed in water; a substance with a pH of less than seven.

b) A base is a substance that gives off hydrogen ions when placed in water; a substance with a pH of less than seven.

12) Explain the difference between a FACT and a THEORY.

A fact results when observations are made, and theories and laws are based; something that actually exists. A theory is an idea or hypothesis that has been tested multiple times and has never been disproved; helps make predictions.

13) **Matter** is the substance that everything is made of, and can exist in a gas, liquid, or solid state. It's anything that has mass and volume.

14) Mass is the measure of how much **matter** an object contains.

15) Heat travels through conduction, convection and radiation.

a. **Radiation** is the movement of heat without the involvement of molecules.

b. **Conduction** is the movement of heat involving atoms or molecules, and is the way heat is transferred in solids.

c. **Convection** is the way heat is transferred by moving air in a circular motion.

16) Which statement is most likely to be true?

a) To be transferred is to undergo a physical change.

b) To be transformed is to undergo a physical change.

17) A circuit is a complete closed circular path taken by a current.

a) True

b) False

18) What does it mean "to conserve"?

being able to maintain the sustainability of a resource while still using it as a resource...

19) In the law of conservation of energy, energy cannot be created or destroyed.

a) True

b) False

20) What do the following have in common?

- gasoline to move a car
  - heat to warm an oven
  - wind to turn the blades of a windmill
- They all need **energy**, the ability to do work.

**Complete the following sentences with the words below.**

Laws, Covalent, Atomic Numbers, Form, Structure, Relationships

21) A **covalent** bond is chemical or electrostatic bond in which atoms share one or more electrons.

22) **Structure** is a cohesive whole built up of distinct parts.

23) The manner in which matter is assembled is called **form**.

24) The connection or association between various elements or beings is called a **relationship**.

25) The **atomic number** is the number of protons found in the nucleus of an atom of that element.

26) A scientific explanation that describes how the world or universe acts under certain conditions is called a scientific **law**.

# Matter & Energy



Sealaska Heritage Institute







INTRODUCTION OF

# Key Vocabulary





# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Chemical

### PLACED-BASED PERSPECTIVE

Place some cleaners at the front of the room and ask if they contain chemicals. Place some prepared foods and drinks at the front of the room and ask if they contain chemicals. Discuss with the class that chemicals are substances that have been purified or prepared, especially artificially.

## Mechanical Engineering

### PLACED-BASED PERSPECTIVE

Bring in a can opener and explain that mechanical energy in the can opener and other simple machines helps us do work. Have the students name other sources of *mechanical energy*.

## Reaction

### PLACED-BASED PERSPECTIVE

As the students watch, add baking soda to vinegar in a clear container - have the students observe the *reaction*. If available, add sodium to water for another *reaction*. Show a rusty nail or other item - have the students describe the *reaction* related to it.

## Heat Energy

### PLACED-BASED PERSPECTIVE

Heat up a paper clip and then place it on a piece of ice. Heat up a nail and place it on a piece of ice. Discuss how objects with greater mass can store greater amounts of *heat energy*.

## Nuclear

### PLACED-BASED PERSPECTIVE

Show students a picture of a nuclear reactor and a nuclear explosion. Discuss the similarities, differences between the two.

## Light Energy

### PLACED-BASED PERSPECTIVE

Gather pictures or examples: electric heater (with exposed coils), a lamp, a bottle of sunscreen, and an x-ray (or picture). Have the students describe what they all have in common - they all relate to *light energy*.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Electrical Energy

### PLACED-BASED PERSPECTIVE

Hold an unplugged electric hair dryer up and try to turn it on. Ask the students why it does not work. Plug it in and demonstrate that it works. Discuss with the students where electrical energy originates and how it gets to the outlets.

## Absorb

### PLACED-BASED PERSPECTIVE

Place a dry sponge in a bowl of water to demonstrate absorption. Have the students suggest other forms of *absorption* - including a plant absorbing water from the soil.

## System

### PLACED-BASED PERSPECTIVE

Show the students a picture of a stereo system - have them identify the different components of the system. Then, suggest removing a part of the system - the students should determine the affect this would have on the over-all operation of teh system. Relate this to the human body

## Electromagnetic

### PLACED-BASED PERSPECTIVE

Show a picture of a generator. Have the students suggest how the generator functions.

Explain that a simple generator uses *electromagnets* to create electricity by spinning a magnetic core with magnets inside a cylinder with conductive wires.

## Emit

### PLACED-BASED PERSPECTIVE

Show a picture of a car or other form of vehicle. Use the picture to introduce the concept of *emitting* fumes. Have the students suggest other items that *emit* something.

## Radiation

### PLACED-BASED PERSPECTIVE

A microwave uses radiation to cook food. Have the students suggest other forms of radiation that can be used.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Interaction

### PLACED-BASED PERSPECTIVE

Show the students the picture for *interaction* from this unit. Have them suggest what might have caused the person to have a headache - point out the *interactions*, 1. between the cause and the headache, and 2. between the cold pack and the headache.

## Critical

### PLACED-BASED PERSPECTIVE

Discuss with students that water reaches a *critical* temperature when it boils. Have the students identify other critical measurements.

## Spectrum

### PLACED-BASED PERSPECTIVE

Using a drawing of a rainbow to start the discussion, draw the visible spectrum and introduce the order of colors in the spectrum (including the acronym ROYGBV).





# Language Skills





# Language & Skills Development

## LISTENING

Use the activity pages from the Student Support Materials.



### Pencil of Fortune

Before the activity begins, prepare a stencil which contains small versions of the vocabulary illustrations. Provide each student with a copy of the stencil. Each student should cut out his/her illustrations. The students should then lay their illustrations on their desks (around the edges of their desks). When the students have arranged their illustrations in this way, each student should then place a pen or pencil in the center of his/her desk. Say a vocabulary word. The students should then spin their pencils/pens on their desks. When the pencils/pens stop spinning, any student or students whose pencils/pens are pointing to the vocabulary illustration for the word you said win(s) the round. When a student wins in this way, he/she may remove that illustration from his/her desk. The winner or winners of this activity are those students who have no illustrations left on their desks.

## SPEAKING



### Feel the Number

Mount the vocabulary illustrations on the chalkboard and number each one. Have a student stand, facing the illustrations. Stand behind the student and use your index finger to “write” one of the illustration numbers on his/her back. When the student feels the number, he/she should orally identify the illustration with that number. This activity may also be done in team form. In this case, “write” one of the numbers on the back of the last player in each team. When you say “Go,” the last player in each team should write the number on the back of the student in front of him/her, and so on. When the first player in each team feels the number, he must name the illustration with that number. The first team to do this wins the round. The first player in each team should move to the back of the team after each round of the activity.

## READING

Use the activity pages from the Student Support Materials.



### Reflection

Mount the sight word cards on the chalkboard. Group the students into two teams. Have the first player from each team stand in front of the chalkboard, facing the sight word cards. Give each of the two players a small, unbreakable mirror. Stand some distance behind the two players and hold up a vocabulary illustration (for one of the sight words on the chalkboard). The two players must then look over their shoulders with the mirrors to see the illustration you are holding. When a student sees the illustration you are holding, he/she must point to its sight word on the chalkboard. The first player to do this correctly wins the round. Repeat with other pairs of players until all students have participated.

## WRITING

Use the activity pages from the Student Support Materials.



### Numbered Illustrations

Mount the vocabulary illustrations on the chalkboard and number each illustration. Provide each student with writing paper and a pen. Call the number of an illustration. Each student should write the vocabulary word for the illustration represented by that number. Repeat until all vocabulary words for the illustrations have been written. Review the students' responses.





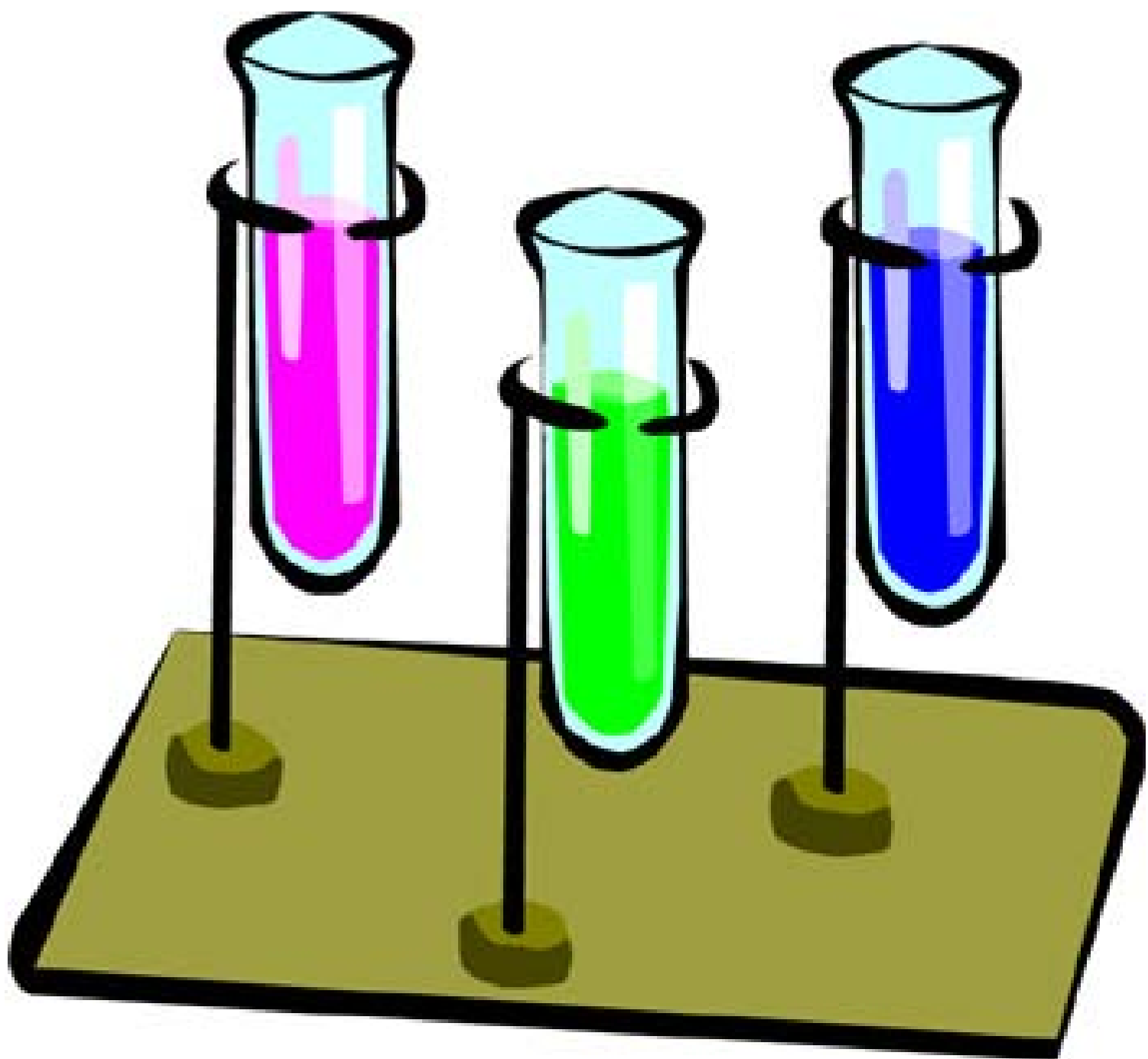
# Vocabulary Images









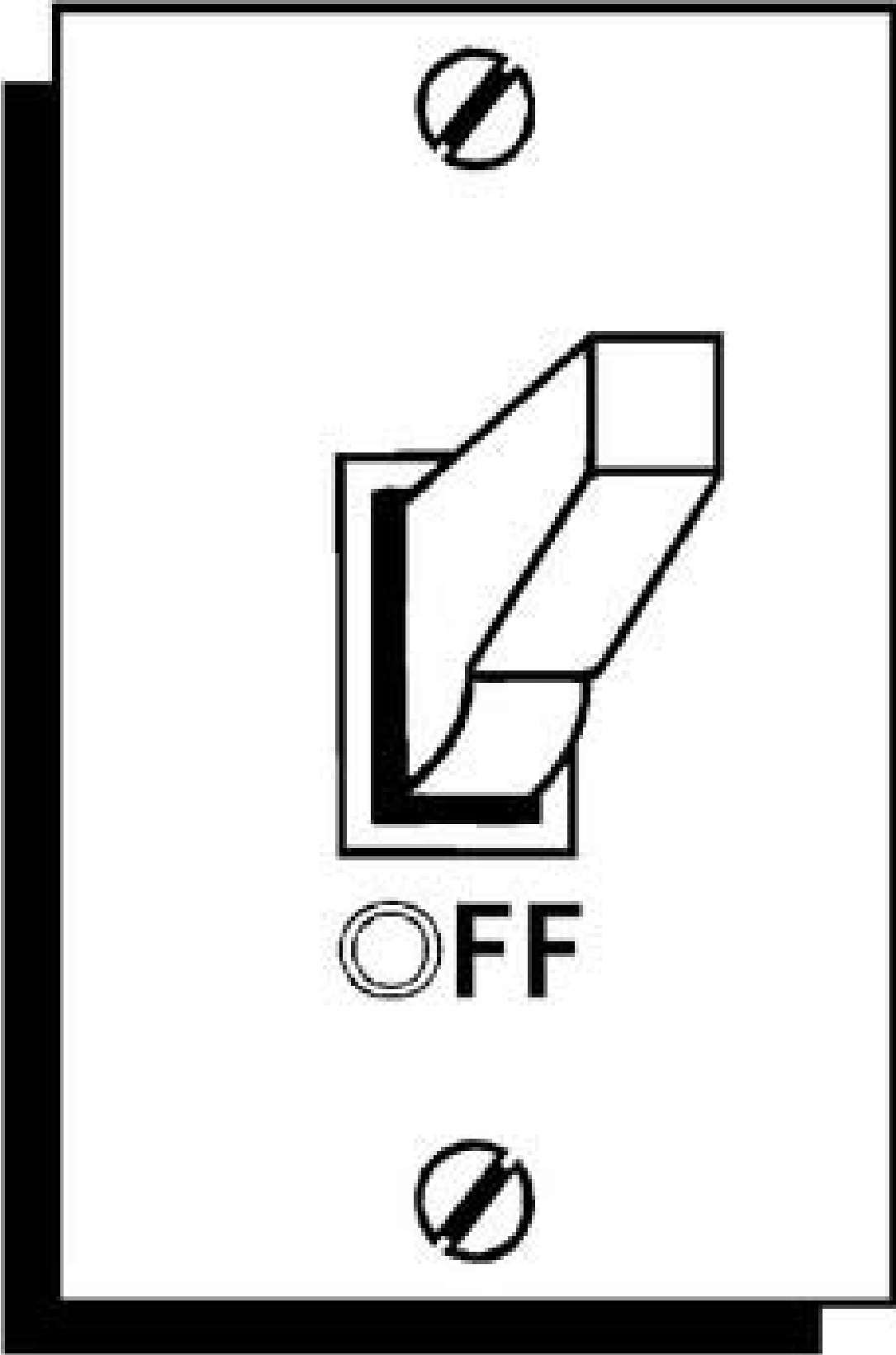




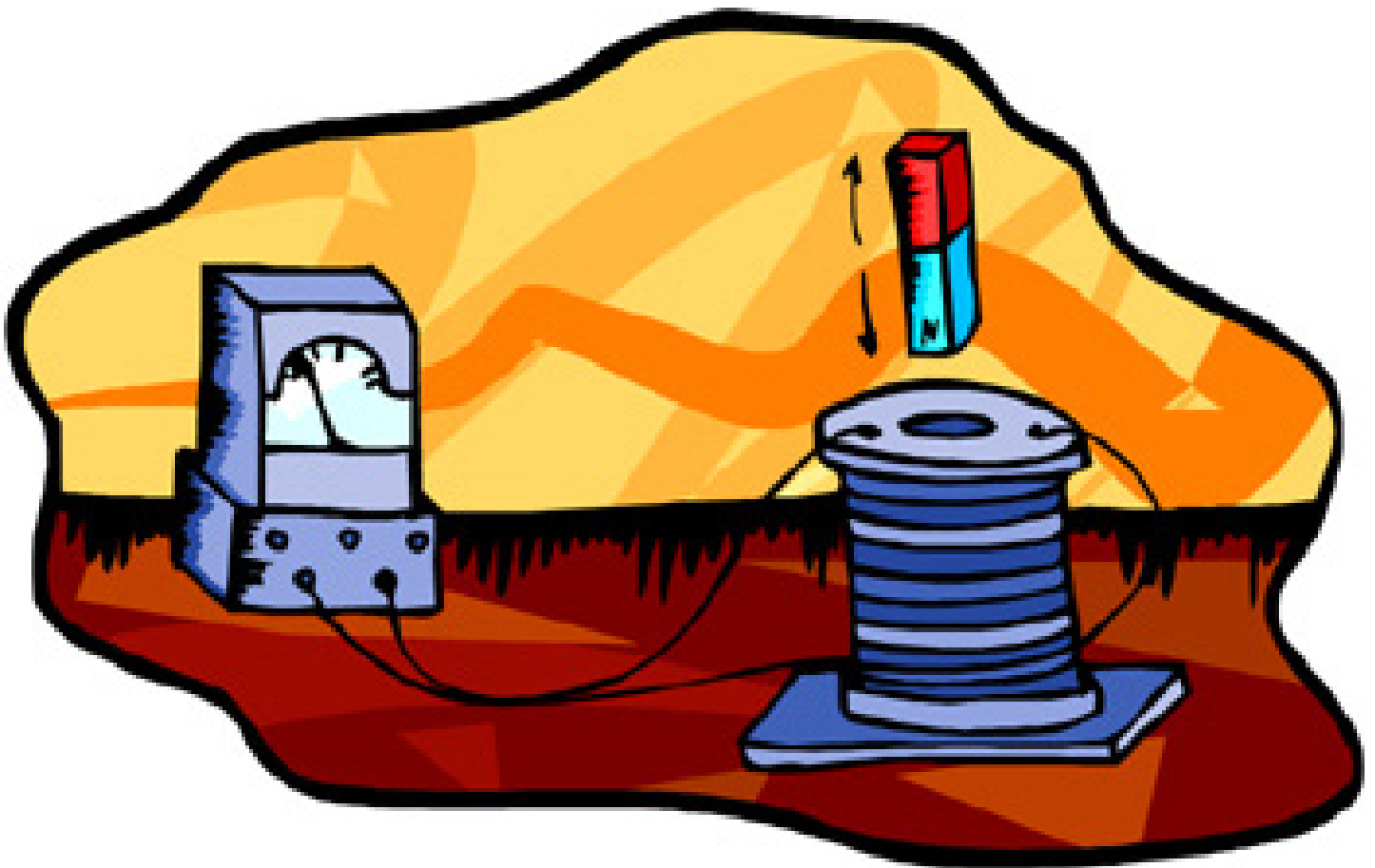














emit





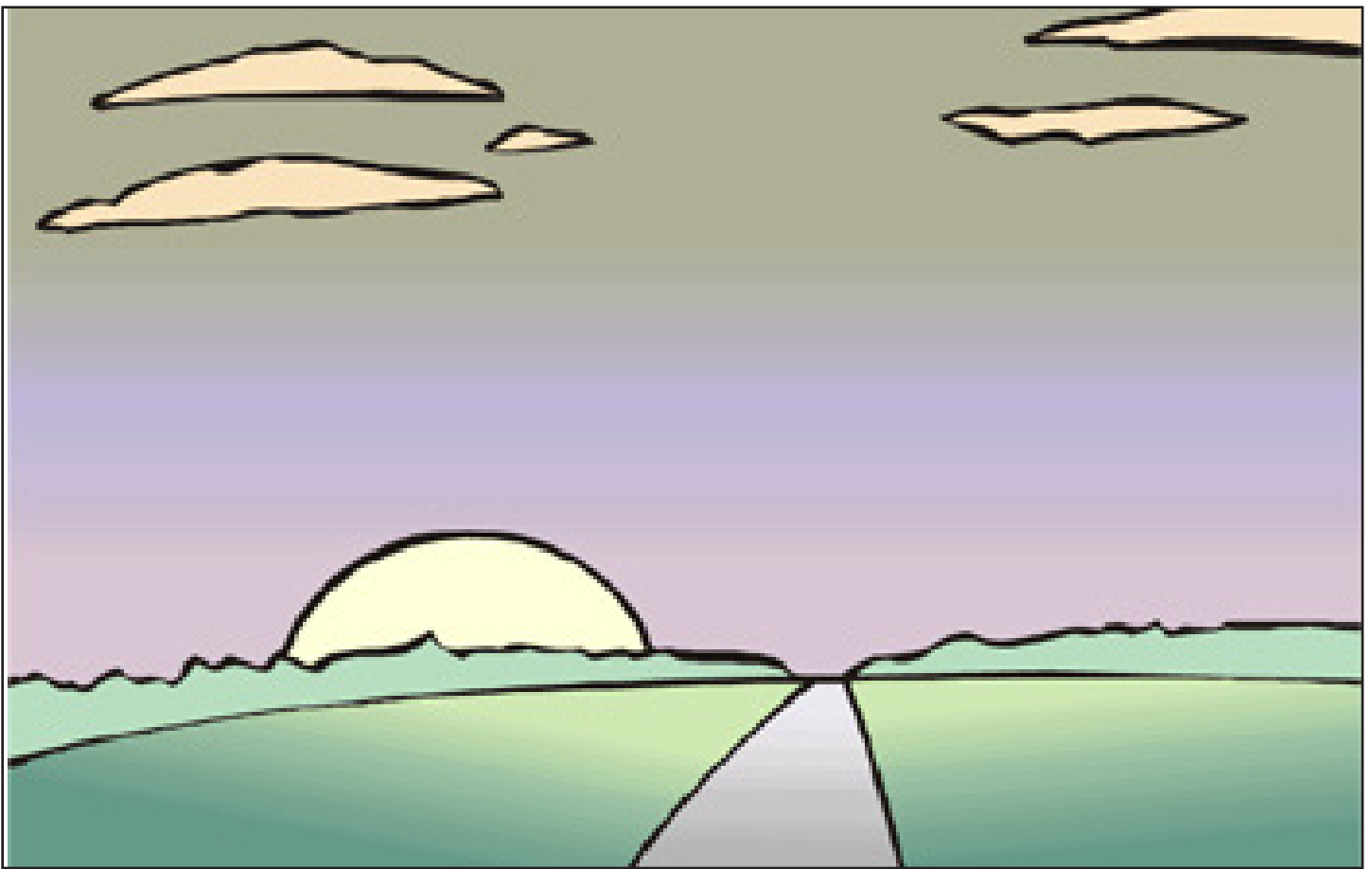












































STUDENT SUPPORT MATERIALS

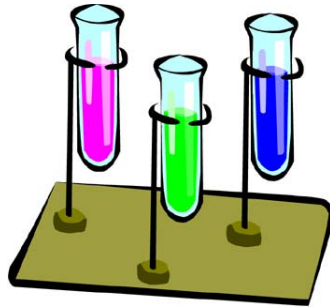
# Listening



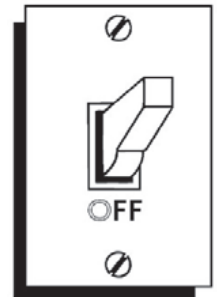


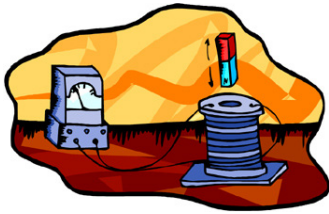
Say these words to the students - they write the numbers of the words under the pictures.  
 1. chemical, 2. reaction, 3. nuclear, 4. mechanical energy, 5. heat energy, 6. light energy,  
 7. electrical energy, 8. system, 9. emit, 10. absorb, 11. electromagnetic, 12. radiation,  
 13. interaction, 14. critical, 15. spectrum







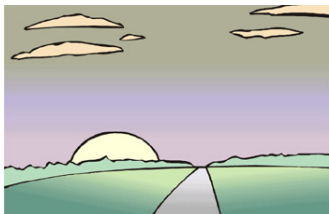


















Say these words to the students - they write the numbers of the words under the pictures.  
1. chemical, 2. reaction, 3. nuclear, 4. mechanical energy, 5. heat energy, 6. light energy,  
7. electrical energy, 8. system, 9. emit, 10. absorb, 11. electromagnetic, 12. radiation,  
13. interaction, 14. critical, 15. spectrum



# True Or False?

1. Chemicals are all toxic.
2. When the Earth acts on a person gravitationally by pulling them down, the reaction of the person is to pull back on the Earth gravitationally.
3. The formation of Helium by putting two Hydrogens together in the sun is a nuclear reaction.
4. A larger hammer has more mechanical energy than a smaller one.
5. A glacier has more heat energy than a boiling kettle of water.
6. Care must be used when handling lasers because the light energy can injure the eyes.
7. Electrical energy consisting of, unlike sound, can travel through a vacuum.
8. A system of equations includes more than one variable.
9. When you are listening, your ears are emitting sounds.
10. A dark colored car is warm on a sunny day because it absorbs heat more readily from the sun than a light colored car.
11. An electromagnetic force can be generated by moving a magnet through a coil of wire.
12. Radiation is the process of moving electric energy from a power plant to the house.
13. The perceived effects of drugs are due to interactions between the drug and the central nervous system.
14. All forms of plutonium are capable of going critical.
15. Radio, microwave, and infrared waves have longer frequencies than visible light on the electromagnetic spectrum.

## Answers

1. F, 2. T, 3. T, 4. F, 5. T, 6. T, 7. F, 8. T, 9. F, 10. T, 11. T, 12. F, 13. T, 14. F, 15. T







STUDENT SUPPORT MATERIALS

# Sight Words





**nuclear**

**reaction**

**chemical**

**system**

**mechanical**

**energy**

**ermit**

**heat energy**

**light energy**

**absorb**

**electrical**

**energy**

**interaction**

**radiation**

**electromagnetic**

**spectrum**

**critical**





STUDENT SUPPORT MATERIALS

# Reading





# Word Find

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

[www.WordSearchMaker.com](http://www.WordSearchMaker.com)

Absorb	Lightenergy
Chemical	Mechanicalenergy
Critical	Nuclear
Electricalenergy	Radiation
Electromagnetic	Reaction
Emit	Spectrum
Heatenergy	System
Interaction	

# Word Find Solution

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

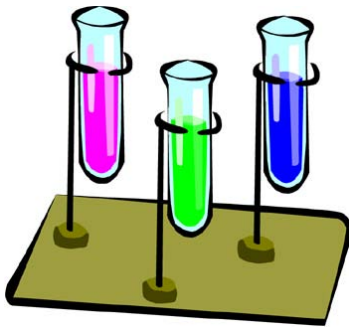
# Sight Words Activity Page



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heat energy  
light energy  
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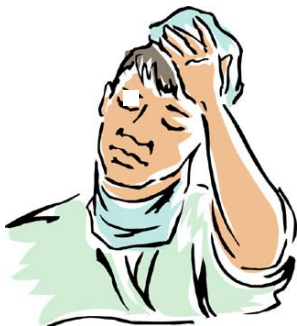
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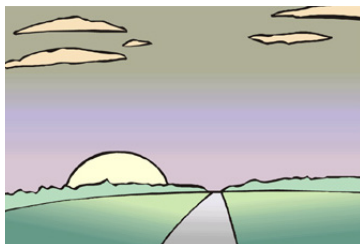


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## Sentence Halves

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

- The chemical composition of water*
  - Mixing sodium and water results in a*
  - Although nuclear power plants are capable of producing vast quantities of energy,*
  - Steam engines moved trains by the release*
  - The greater the light energy received,*
  - Most people today use appliances*
  - Mathematicians often solve complicated problems*
  - Radioactive elements are dangerous because*
  - A black car often feels hotter than a light colored car on a sunny day*
  - Electromagnetic radiation*
  - Interactions between various chemical substances are*
  - Sometimes we say that something is going to go critical*
  - We can only see a tiny sliver of the wavelengths on the spectrum*
- of heat energy released by steam.*
  - that use electrical energy, rather than hand-crank.*
  - includes two hydrogens and one oxygen.*
  - using systems of equations, that each describe several variables.*
  - because it absorbs more light energy than a more lightly colored one.*
  - many people are opposed to them for safety reasons.*
  - includes light, radio waves, and microwaves!*
  - the faster plants will grow.*
  - what we call chemical reactions.*
  - violent explosive reaction.*
  - when an abrupt change is going to occur.*
  - of electromagnetic radiation.*
  - they emit particles or radiation energy.*

### ANSWERS

1/C 2/J 3/F 4/A 5/H 6/B 7/D 8/M 8 9/E 10/G 11/I 12/C 13/K 14/L



## Word & Definition Match

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

*This is an atom, molecule or compound.*

*This is thermal energy.*

*This energy we use when we run.*

*This is electromagnetic radiation.*

*We use this when we plug in our toasters.*

*This is related to atomic energy.*

*This is a group of things that make up a whole.*

*This can happen when we mix compounds.*

*This is when things are released.*

*This is when a substance gains energy it receives as heat.*

*This converts electric current into magnetic force.*

*This is the transfer of waves of heat or energy.*

*This can happen when things are mixed.*

*This relates to the value of a measurement.*

*This is a continuum of color.*

1. electromagnetic

2. spectrum

3. absorb

4. light energy

5. interaction

6. electrical energy

7. emit

8. critical

9. system

10. chemical

11. mechanical energy

12. heat energy

13. nuclear

14. radiation

15. reaction

## Which Belongs?

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

1. A chemical/system refers to any substance that consists of atoms bonded together.
2. Newton's third law of motion states that for every action force, there is an equal and opposite nuclear/reaction force.
3. The reactions in the sun are chemical/nuclear.
4. A car works by the transformation of chemical to heat/mechanical energy.
5. Heat/electrical energy is what allowed the "west to be won".
6. Many small calculators have photovoltaic cells that capture electrical/light energy.
7. Direct current, a form of electrical/nuclear energy, consists of electrons moving through a conductor.
8. A plumbing interaction/system in the home affords the possibility of running tap water.
9. A microwave oven emits/absorbs microwave energy into food to heat it up.
10. Trees absorb/emit light energy during photosynthesis.
11. For a while, there were fears that electromagnetic/radiation emissions from cell phones could ignite fires at gas stations.
12. Mechanical energy/radiation from ultra-violet lamps is used by some people at tanning salons.
13. The interaction/heat energy of electrical currents and your body results in a painful shock.
14. The nuclear experiment went critical/radiation, cutting the meeting short and causing mass panic.
15. Radio waves are the longest waves on the electromagnetic spectrum/system

### Answers

1. chemical, 2. reaction, 3. nuclear, 4. mechanical, 5. heat, 6. light, 7. electrical, 9. emit, 10. absorb, 11. electromagnetic, 12. radiation, 13. interaction, 14. critical, 15. spectrum.

# 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.

What's the Answer

1) **A chemical is:**

- (a) Any compound or substance;
- (b) Any toxic compound;
- (c) A salt or metal.

2) **When the gun powder in a rifle cartridge explodes, the expanding gases:**

- (a) Apply an action force to the bullet only;
- (b) Apply an action force to the bullet and a reaction force to the gun;
- (c) Apply no forces on the gun or the bullet, the bullet moves because of the explosion.

3) **A nuclear reaction**

- (a) Can only occur when atoms are split;
- (b) Occurs only when atoms are joined;
- (c) Occurs when atoms are split, or joined.

4) **There is renewed interest in geothermal energy:**

- (a) Which consists of heat energy in the form of steam;
- (b) Which consists of coal and other combustible materials in the Earth's crust;
- (c) Which consists of radioactive elements that can be used in nuclear power plants.

5) **Crossbows fire arrows when:**

- (a) Mechanical potential energy is converted to kinetic energy of the moving arrow;
- (b) The system of pulleys applies a force to the bow;
- (c) The arrow is emitted from the crossbow.

6) **Unlike plants, fungi:**

- (a) Do not need chemical energy to grow;
- (b) Do not need heat energy to grow;
- (c) Do not need light energy to grow.

7) **Electrical energy is used:**

- (a) To power trains in Europe and to power trolley cars in San Francisco;
- (b) To generate heat in a nuclear power plant;
- (c) In the modern automobile to move.

8) **A system of pulleys**

- (a) Allows a person to decrease the amount of work involved in lifting a heavy object;
- (b) To reduce the force necessary to lift a heavy object;
- (c) Reduces the amount of work and the force necessary to lift a heavy object.

# 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) **Those who work in the X-ray lab at a hospital wear little badges**
- (a) To measure the amount of emitted X-rays they have been exposed to;
  - (b) To measure the strength of X-rays they are using to image bones;
  - (c) That signify danger to all others.
- 10) **The reason sunscreen cream works is because:**
- (a) The cream reflects most of the uv light striking a person;
  - (b) The light energy is refracted when it strikes the cream;
  - (c) The sunscreen absorbs the uv energy prior to reaching the skin.
- 11) **Wrecking yards:**
- (a) Use electromagnets to move junker cars;
  - (b) Convert mechanical energy to radiation so as to move junker cars;
  - (c) Use systems of energy to move cars around.
- 12) **When an element like uranium decays, it is said to be:**
- (a) Electromagnetic;
  - (b) Emitting radiation;
  - (c) Interacting with the environment.
- 13) **Which of the following is not an example of an interaction:**
- (a) A fan using electrical energy and moving air;
  - (b) A bottle breaking on the ground;
  - (c) An unmoving solitary atom in the void of space.
- 14) **The talks between the two countries had reached a critical point in which**
- (a) They were going to continue talking about the same things with no changes in position
  - (b) Big decisions were being made
  - (c) No progress was made, but they were going to continue anyway
- 15) **The two candidates were from opposite ends of the political spectrum and**
- (a) So disagreed on most every issue
  - (b) Enjoyed discussing topics due to their agreement on most points
  - (c) Thus did not have anything to argue about.

## Answers

1. a, 2. b., 3. c, 4. a., 5. a, 6. c, 7. a, 8. b, 9. a, 10. c, 11. a, 12. b, 13. c, 14. b, 15. a



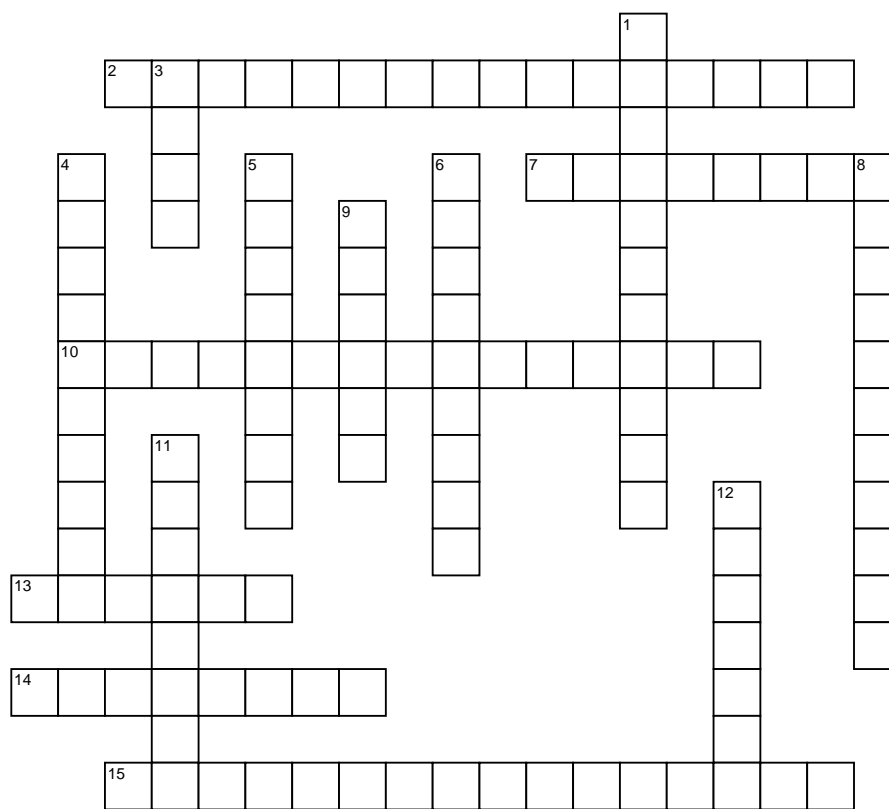
STUDENT SUPPORT MATERIALS

# Writing



# 9th B-1 Matter & Energy

## Unit 1



www.CrosswordWeaver.com

### ACROSS

- 2** the sum of the potential energy and kinetic energy of a body or system.
- 7** any atom, molecule, or compound representing, or consisting of, atoms.
- 10** converts electric current into magnetic force.
- 13** in general, a system is a broad term, referring to a group of things forming a whole.
- 14** The instance when two chemicals combine to produce different compounds and either requires the input of, or releases, energy.
- 15** the potential energy of an electric charge in an electric field, or of an electric current in a magnetic field.

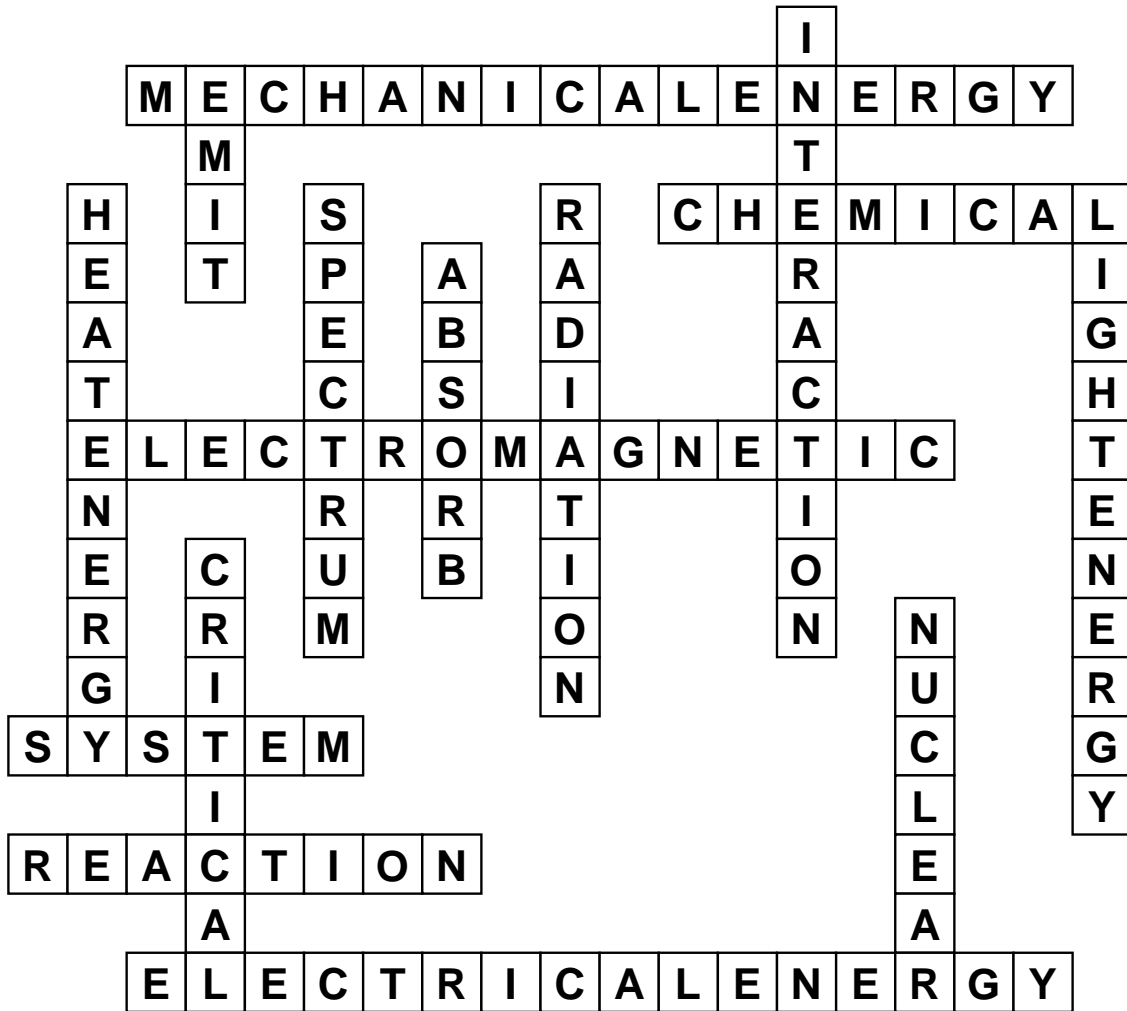
### DOWN

- 1** to act upon one another.
- 3** the release of energy, or particles, of unstable elements or from excited atoms.
- 4** is thermal energy that flows from an object or substance at a higher temperature toward an object or substance at a lower temperature.
- 5** a continuum of color formed when a beam of white light is dispersed so that its component wavelengths are arranged in order.
- 6** the transfer of waves of heat or energy from a hotter place to a cooler place.
- 8** is the electromagnetic radiation in the wavelength range including infrared, visible, ultraviolet, and X rays.
- 9** when a substance gains energy it receives as heat.
- 11** of or relating to the value of a measurement, such as temperature, at which an abrupt change in a quality, property, or state occurs.
- 12** involving atomic energy.

# 9th B-1 Matter & Energy

## Unit 1

Solution:

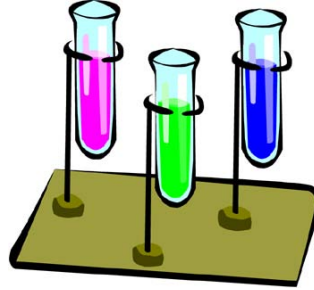




# Write The Words



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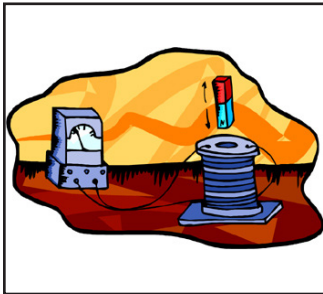
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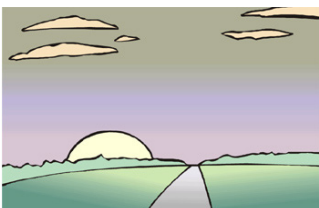
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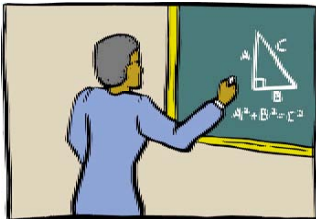


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# Write The Words



## Complete The Sentences

*Have the students write the key words in the blanks.*

1. Two-face, a villain of Batman, became altered when he fell into a vat of toxic \_\_\_\_\_.
2. Mixing chlorine and ammonia together results in a \_\_\_\_\_ that produces toxic fumes.
3. The biggest problem with \_\_\_\_\_ power is the disposal of wastes associated with the power plants.
4. Crossbows work because when drawn back, the bows store \_\_\_\_\_.
5. Absorbing \_\_\_\_\_ on a beach while laying in the sun results in a tan.
6. We utilize \_\_\_\_\_ when we plug our vacuum cleaners into a wall outlet.
7. It is much easier to lift a heavy object when a \_\_\_\_\_ of pulleys is used.
8. Radioactive elements \_\_\_\_\_ energy.
9. Because the color black \_\_\_\_\_ energy, pavement often feels very hot on a sunny day.
10. Junkyards use \_\_\_\_\_ cranes to lift up large metal objects.
11. Spiderman gained his powers when he was bitten by a spider that had been subject to \_\_\_\_\_.
12. The \_\_\_\_\_ of different compounds is what a chemist specializes in.
13. The \_\_\_\_\_ mass of plutonium is quite low, so when collecting this substance in one place one must be very careful.
14. The electromagnetic \_\_\_\_\_ is the range of all possible electromagnetic frequencies.
15. Boiling a pot of water uses \_\_\_\_\_ energy.

### **Answers**

1. chemicals, 2. reaction, 3. nuclear, 4. mechanical energy, 5. light energy, 6. electric energy, 7. system, 8. emit, 9. absorbs, 10. electromagnetic, 11. radiation, 12. interactions, 13. critical. 14. spectrum, 15. heat

# 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.*

**nuclear**

---

**mechanical energy**

---

**heat energy**

---

**light energy**

---

**electrical energy**

---

**system**

---

**emit**

---

**absorb**

---

**electromagnetic**

---

# 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.*

**radiation**

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**interactions**

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**critical**

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**spectrum**

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**reaction**

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**chemical**

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## Creative Writing Activity Page

Have the students write sentences of their own, based on the picture below. When finished, have each student read his/her sentences to the others.



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STUDENT SUPPORT MATERIALS

# Reinforcement Activities

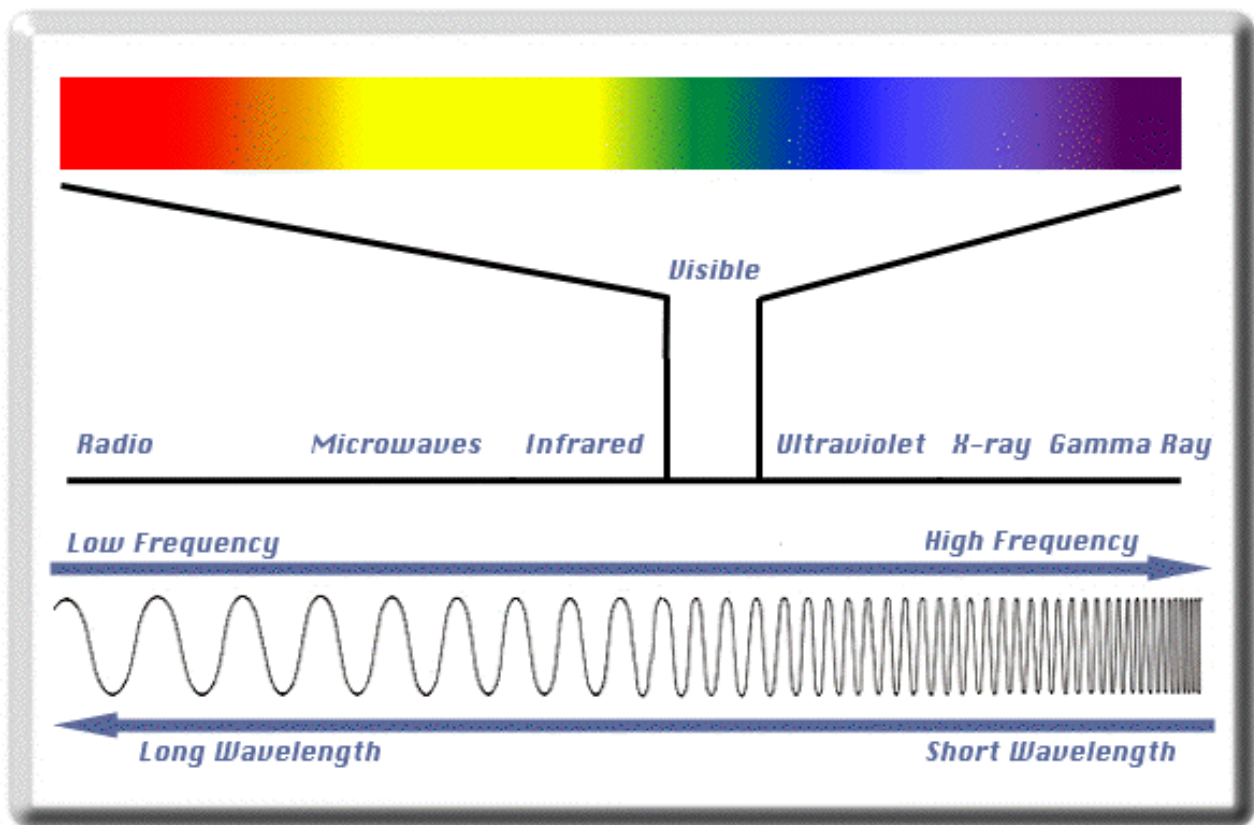




Create an electromagnet by wrapping insulated copper wire around a steel spike and closing the circuit with a D-cell battery. Show the students how you have created an electromagnet that picks up paper clips as long as there is an electrical current from the battery.

Give students two magnets, a steel nail, and a penny. Ask them to write down what happens when each one is put near the other one. Discuss with them that the results are interactions between the objects.

Have the students work in groups to construct a flow chart showing the movement of energy from the point of generation (the sun, a power plant, etc.) to the end use of that energy by either electronic systems or the highest trophic level. Each group should choose a different point of generation so that when presenting their flowcharts to the class they will learn from each other.







# Unit Assessment

## Unit 4 Quiz





## B1, Unit 1, Matter and Energy Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) Any atom, molecule or compound representing or consisting of atoms is a c\_\_\_\_.
- 2) Nuclear energy involves a\_\_\_\_\_ energy.
- 3) Match MECHANICAL ENERGY to the illustration below. Put an X by the correct illustration.

Have four illustrations: Mechanical, Heat, Light, Electrical

- 4) Match LIGHT Energy to the illustration below. Put an X by the correct illustration.

Have four illustrations: Mechanical, Heat, Light, Electrical

- 5) When electrons move through a conductor like they do in refrigerators, televisions and other appliances, they are using \_\_\_\_\_ energy.
- 6) The explosions that move pistons in an engine or in an erupting volcano, molecules are in motion, with the energy flowing from an object at a higher temperature to another at a lower temperature. This molecular motion creates \_\_\_\_\_ energy.
- 7) Light travels in the form of e\_\_\_\_\_ waves and converts electric current into magnetic forces.
- 8) "For every action there is an equal and opposite reaction. The reaction is the force, equal in magnitude, in the opposite direction to the applied force." This is known as Grave's Law.

a) True

b) False

9) When we have groups of things making up a whole, either artificial or created by nature, such as the makeup of a computer or a river or the weather, it is referred to as a \_\_\_\_\_.

- a) process.
- b) procedure
- c) system.
- d) organization

10) A full range or continuum of visible light that can be seen by the naked eye is called a \_\_\_\_\_ of visible light.

11) The heat we get from the sun moves from a hot place (the sun) to a cooler place (planet earth) and is called solar \_\_\_\_\_.

Match the words on the left with the definitions on the right.

12) \_\_\_\_\_ emit

13) \_\_\_\_\_ absorb

14) \_\_\_\_\_ electromagnetic

15) \_\_\_\_\_ critical

- a. when a substance gains or takes in energy it receives as heat
- b. uses electric current or turns electricity into a magnetic force
- c. the release of energy
- d. relating to the value of a measurement at which an abrupt change in a quality, property or state occurs



## B1, Unit 1, Matter and Energy Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) Any atom, molecule or compound representing or consisting of atoms is a c hemical .
- 2) Nuclear energy involves a tomic energy.
- 3) Match MECHANICAL ENERGY to the illustration below. Put an X by the correct illustration.

Have four illustrations: Mechanical, Heat, Light, Electrical

Correct answer not entered.

- 4) Match LIGHT Energy to the illustration below. Put an X by the correct illustration.

Have four illustrations: Mechanical, Heat, Light, Electrical

Correct answer not entered.

- 5) When electrons move through a conductor like they do in refrigerators, televisions and other appliances, they are using electrical energy.
- 6) The explosions that move pistons in an engine or in an erupting volcano, molecules are in motion, with the energy flowing from an object at a higher temperature to another at a lower temperature. This molecular motion creates heat energy.
- 7) Light travels in the form of e lectomagnetic waves and converts electric current into magnetic forces.
- 8) "For every action there is an equal and opposite reaction. The reaction is the force, equal in magnitude, in the opposite direction to the applied force." This is known as Grave's Law.

a) True

**b) False**

9) When we have groups of things making up a whole, either artificial or created by nature, such as the makeup of a computer or a river or the weather, it is referred to as a \_\_\_\_\_.

a) process.

b) procedure

**c) system.**

d) organization

10) A full range or continuum of visible light that can be seen by the naked eye is called a spectrum of visible light.

11) The heat we get from the sun moves from a hot place (the sun) to a cooler place (planet earth) and is called solar radiation.

Match the words on the left with the definitions on the right.

12) c emit

13) a absorb

14) b electromagnetic

15) d critical

a. when a substance gains or takes in energy it receives as heat

b. uses electric current or turns electricity into a magnetic force

c. the release of energy

d. relating to the value of a measurement at which an abrupt change in a quality, property or state occurs

# Motion & Forces



Sealaska Heritage Institute





INTRODUCTION OF

# Key Vocabulary





# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Motion

### PLACED-BASED PERSPECTIVE

Have the students look around the room to identify items that have or can have *motion*. This might include a clock, stapler, pen, jar lid, etc. Lead this into a discussion of *motion* outside of the classroom.



### HERITAGE CULTURAL PERSPECTIVE

The Southeast environment includes many aspects of *motion*, particularly in nature. This would include waves, rivers, glaciers, birds, and so on. *Motion is also reflected in the Native songs and dances.*

## Mass

### PLACED-BASED PERSPECTIVE

Show the students the containers of three different sized pizzas. Use the pizzas to introduce the concept of *mass* to the students. Have them identify other examples of *mass*.



### HERITAGE CULTURAL PERSPECTIVE

The glaciers of the Southeast are a fine representation of *masses* and of how masses can change. Trees are another example of *mass* in the Southeast.

## Applied Force

### PLACED-BASED PERSPECTIVE

If a sled dog harness is available, show it to the students. Have them indicate its use.

Use the harness to represent *applied force*. Have them suggest other forms of *applied forces*.



### HERITAGE CULTURAL PERSPECTIVE

Applied forces are found in traditional Native cultures in many forms. This includes totem pole raisings, bow and arrow, spears, gaff hooks, and halibut jiggers.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Gravitational

### PLACED-BASED PERSPECTIVE

Show the students a broken item such as a dish, egg shell, etc. Have them suggest *how* the item broke. Lead the students to suggest that the item may have fallen. Use this to introduce *gravitational* pull to the students.



### HERITAGE CULTURAL PERSPECTIVE

Felling a tree is a dramatic example of gravitational force in Southeast Alaska. Pit traps were used to catch deer. A pit trap is mentioned in story, "Cannibal Giant" and in "Raven And The Deer."

## Proportional

### PLACED-BASED PERSPECTIVE

Copy a recipe for 4 to 6 people on an overhead - be certain the ingredients and their measurements are included. Then, tell the students that you are catering a wedding for 100 people. Have them convert the measurements of the recipe to accommodate the larger number. Use this to introduce *proportional* to the students.



### HERITAGE CULTURAL PERSPECTIVE

Proportions are clearly represented in Native arts. Proportions also play a vital role in planning for traditional Native parties. The number of participants dictates the proportions of food, gifts, and cash to be collected for the party. Construction of tribal houses were proportional to the sizes of the clans.

## Decrease

### PLACED-BASED PERSPECTIVE

Mount a map of Canada on the board. Draw the students' attention to the Grand Banks, off the coast of Newfoundland. Tell the students that fishing for cod on the Grand Banks has been banned. Have them suggest why the ban is in place. Lead them to suggest that the number of cod has *decreased*.



### HERITAGE CULTURAL PERSPECTIVE

The receding glaciers in Southeast Alaska are a good example of mass *decreasing* in size. Also, salmon runs are significantly smaller today than in the past.



# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Interaction

### PLACED-BASED PERSPECTIVE

Show the students a picture that depicts low tide. Have the students suggest the cause of tides - the gravitational *interaction* between the moon and the earth.



### HERITAGE CULTURAL PERSPECTIVE

Native life was and is all about interactions. This included interactions with the environment, families, clans, and moieties.

Historically, the Native peoples of Southeast Alaska had interactions with other Native and non-Native groups.

## Reflection

### PLACED-BASED PERSPECTIVE

Draw an outline of car on the board - purposely omit the mirror. Have the students tell you what is *missing*. Lead them to recognize that the mirror is missing. Have the students tell the importance of the mirror in the operation of a vehicle. Use this to introduce *reflection* to the students.



### HERITAGE CULTURAL PERSPECTIVE

Traditionally, Natives of the Southeast were aware that the light of the moon and stars was the result of *reflection*. The story of Kaax'achgook (R. & N Dauenhauer) highlights the importance of *reflection* as it relates to the stars and navigation.

## Refraction

### PLACED-BASED PERSPECTIVE

Tell the students that if people are in a boat, on a lake, at night, their voices can be heard much farther away than during the day. Ask them why this is so. At night, air is cooled at the surface of a lake, and any sound that travels upward is *refracted* down by the higher layers of air that still remain warm. Thus, sounds, such as voices and music, can be heard much farther across water at night than in the daytime.



### HERITAGE CULTURAL PERSPECTIVE

When gaffing for salmon, fishermen had to accommodate for *refraction* in the placement and motion of the gaffing hook.

Today the starting of a fire using glass incorporates *refraction* of light to produce the necessary heat source.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Wave Addition

### PLACED-BASED PERSPECTIVE

If a couple of boats head off the same direction and their waves pile up on each other to make a bigger wave, it is *wave addition*.



### HERITAGE CULTURAL PERSPECTIVE

In Tlingit, *wave addition*, is described as waves stacking upon waves and there specific terminology to describe this phenomenon.

## Friction

### PLACED-BASED PERSPECTIVE

Show the students a can of WD-40. Have them suggest its uses (WD-40 is made from fish oil). Lead the students to suggest that it is a good lubricant - i.e., it reduced *friction* - cite examples of its use as a lubricant.



### HERITAGE CULTURAL PERSPECTIVE

Stone sharpeners were used to sharpen spears, arrowheads and knives. This is one example of how *friction* was applied.

Large boats were moved on land over logs - this reduced the *friction* and allowed the boats to be moved more readily.

## Velocity

### PLACED-BASED PERSPECTIVE

Locate a picture of a policeman giving a driver a ticket. Have the students suggest why the driver is being ticketed - lead them to suggest that he was driving too fast. Use this to introduce *velocity*. Show a picture of an anemometer, an instrument used to measure the *velocity* of wind.



### HERITAGE CULTURAL PERSPECTIVE

Hardwoods were carefully chosen to guarantee good arrow *velocity*. Also, sling shots were used to kill small animals - the velocity of the stones guaranteed an instant kill.

# Culturally Responsive & Place-based Introduction of Science Vocabulary

## Acceleration

### PLACED-BASED PERSPECTIVE

Tell the students that a vehicle can go from 0 to 60 in 4.6 seconds (Chev Camaro) - have them indicate what this means. Use this to introduce *acceleration* to the students.



### HERITAGE CULTURAL PERSPECTIVE

*Acceleration* was represented in a variety of forms in traditional Native life. This included running, boating, and mountain climbing. *Acceleration* also plays an important role in traditional dances, songs, and story telling.





# 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



### One to Six

Provide each student with two blank flashcards. Each student should then write a number on each of his flashcards, between one and six - one number per card. When the students' number cards are ready, toss two dice and call the numbers showing. Any student or students who have those two numbers must then identify a vocabulary illustration you show. The students may exchange number cards periodically during this activity.

## READING

Use the activity pages from the Student Support Materials.



### What's the Word?

Before the activity begins, prepare cloze sentences on sentence strips (leaving out the sight words). Write the sight words on individual sight word cards. Mount the sentence strips on the chalkboard. Lay the sight words on the floor, in front of the chalkboard. Group the students into two teams. When you say "Go," the first player from each team must rush to the sight words. Each player must select a sight word and then place it in its correct sentence on the chalkboard. Repeat this process until all students have had an opportunity to respond (be certain to have a sufficient number of cloze sentences for this activity). An alternative approach for this activity is to provide each student with a sight word card. Hold up one of your sentence strips and the student or students who have the sight word that best completes the sentence you are holding, should show their cards. Have the students exchange sight word cards periodically during the activity.

## WRITING

Use the activity pages from the Student Support Materials.



### What's the Title?

Before the activity begins, prepare a paragraph related to *motion*. Do not title the paragraph. Provide each student with a copy of the paragraph and a pencil/pen. The students should read the paragraph silently. Then, each student should create a title for it. They should write their titles at the top of the paragraph. When the students are finished, have each student read his/her title orally.







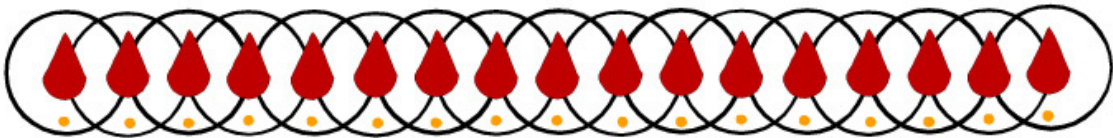
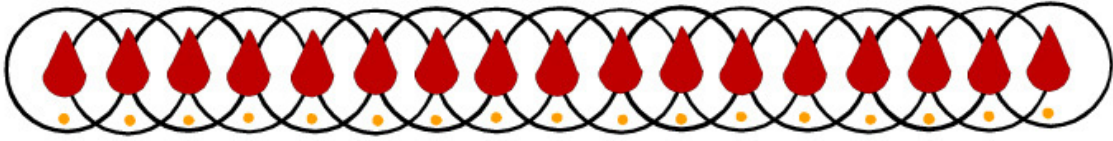
# Vocabulary Images









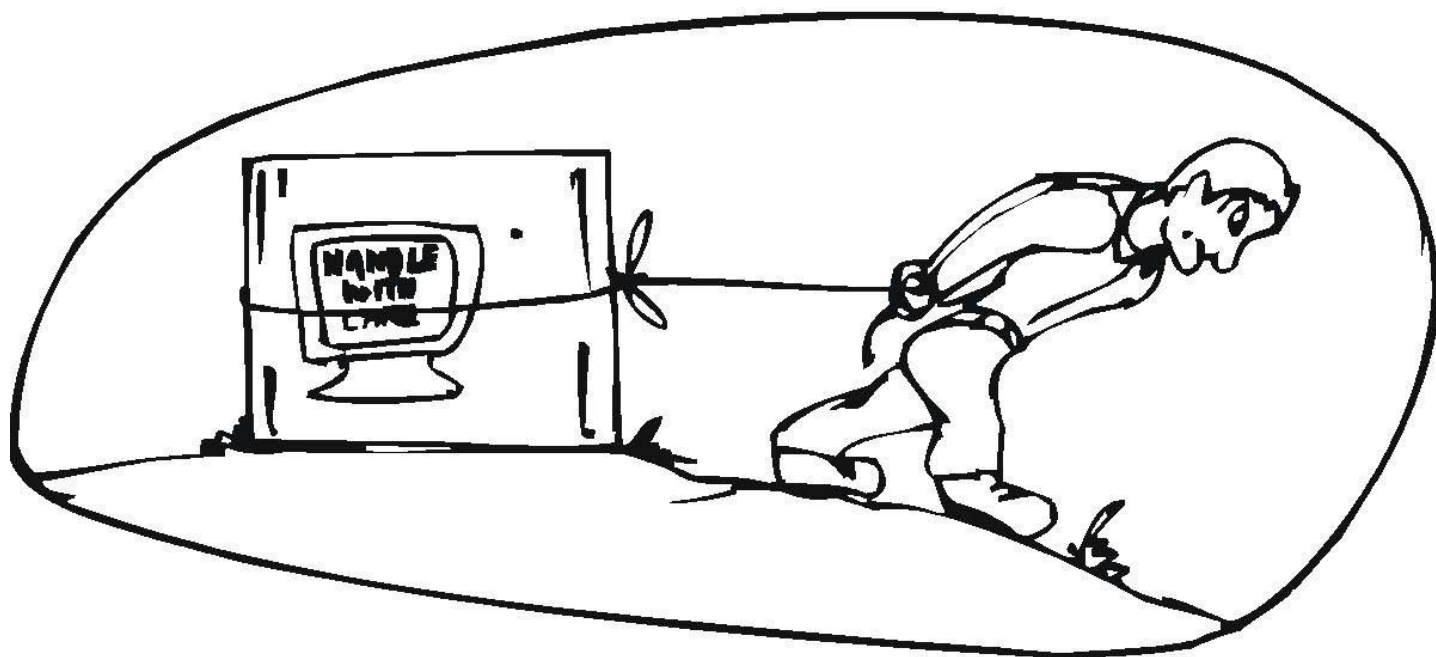




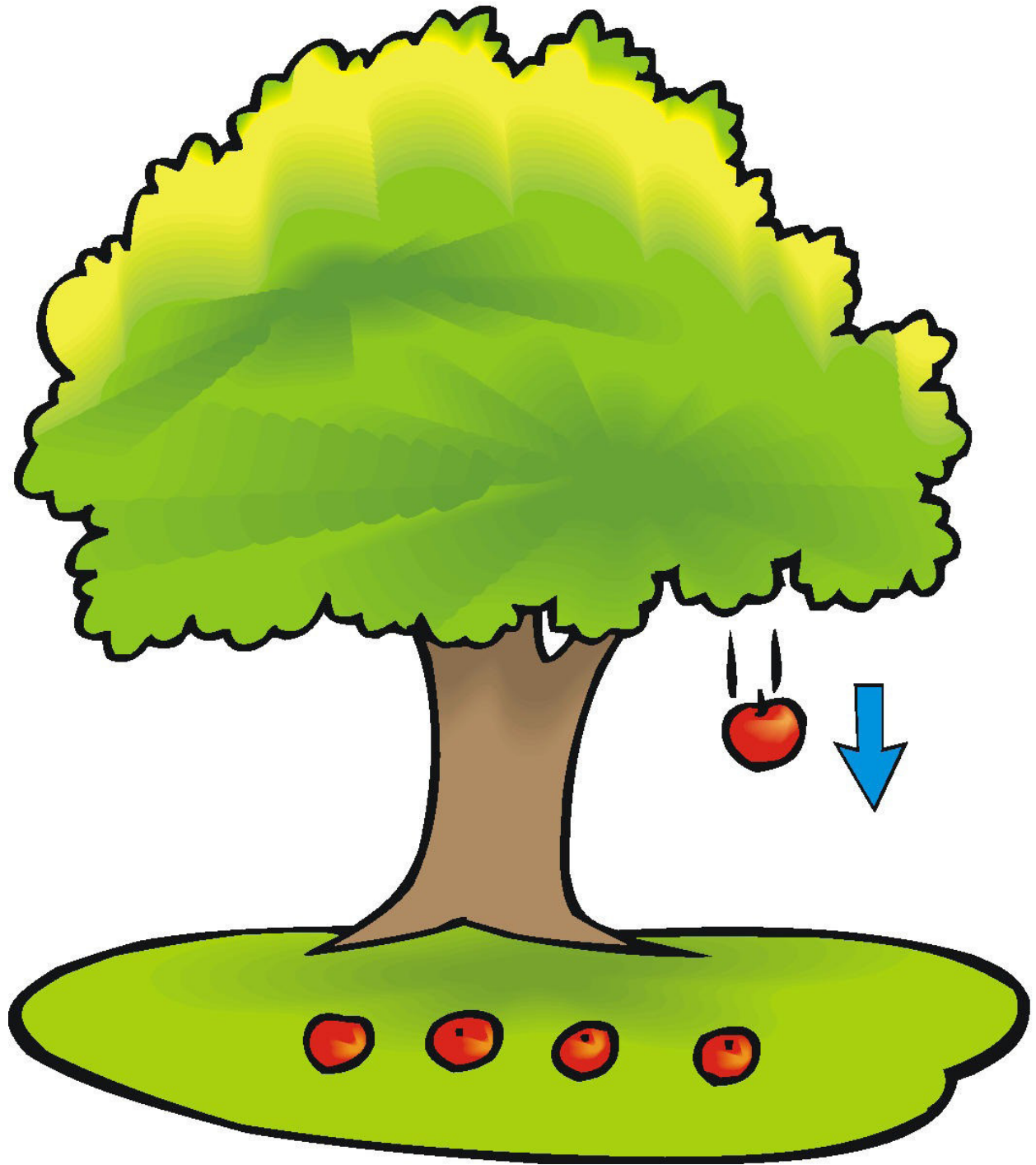




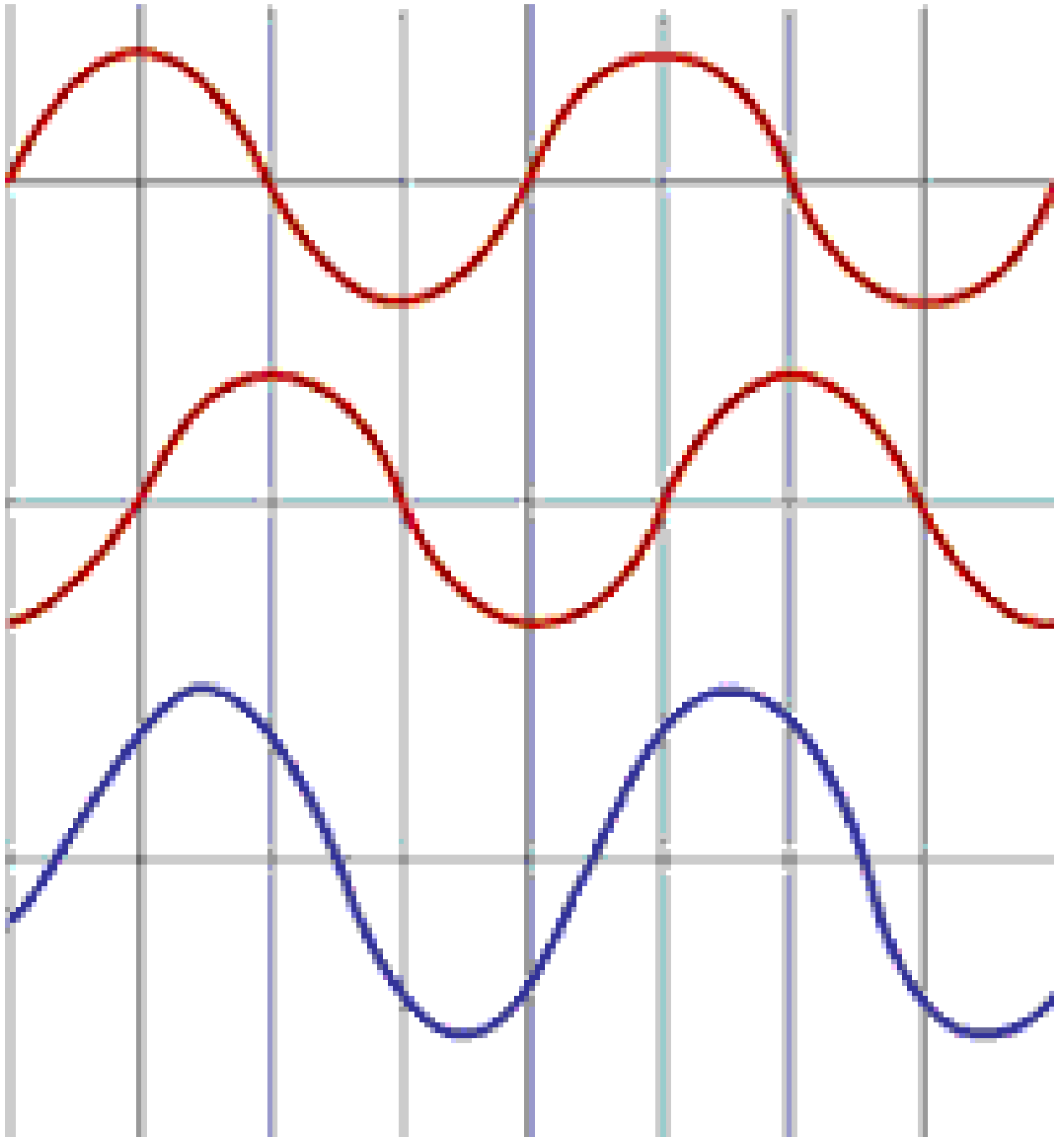


















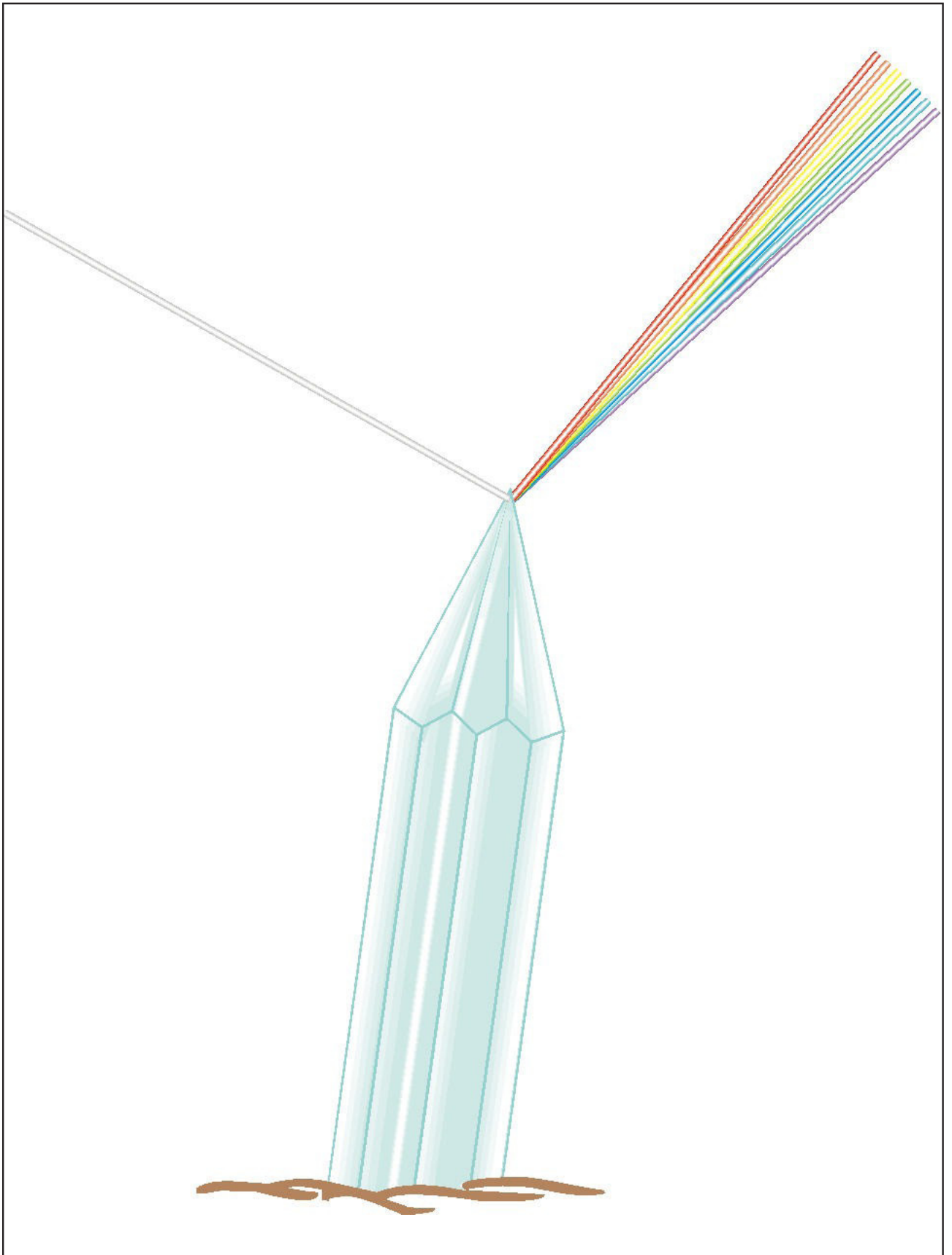










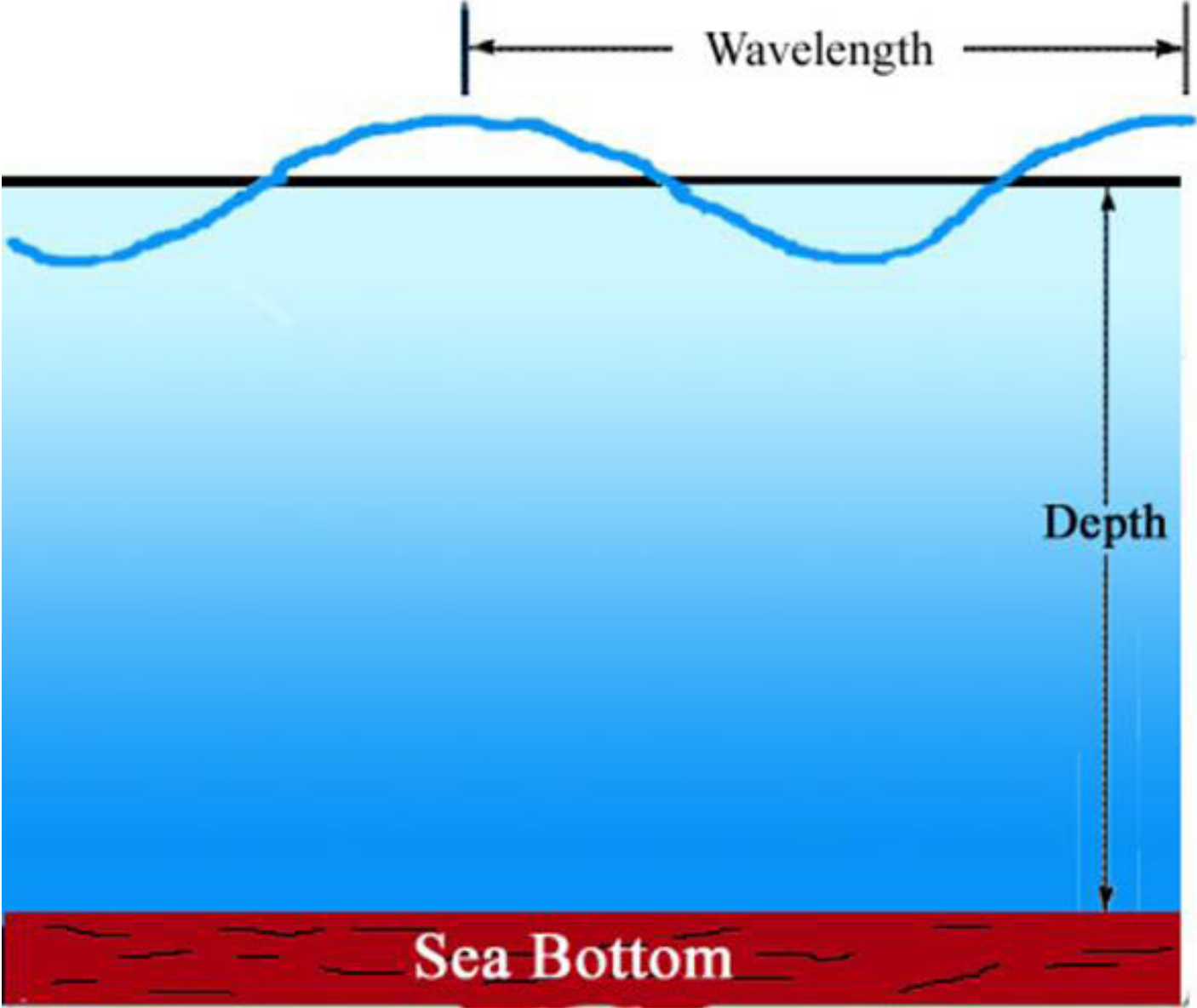




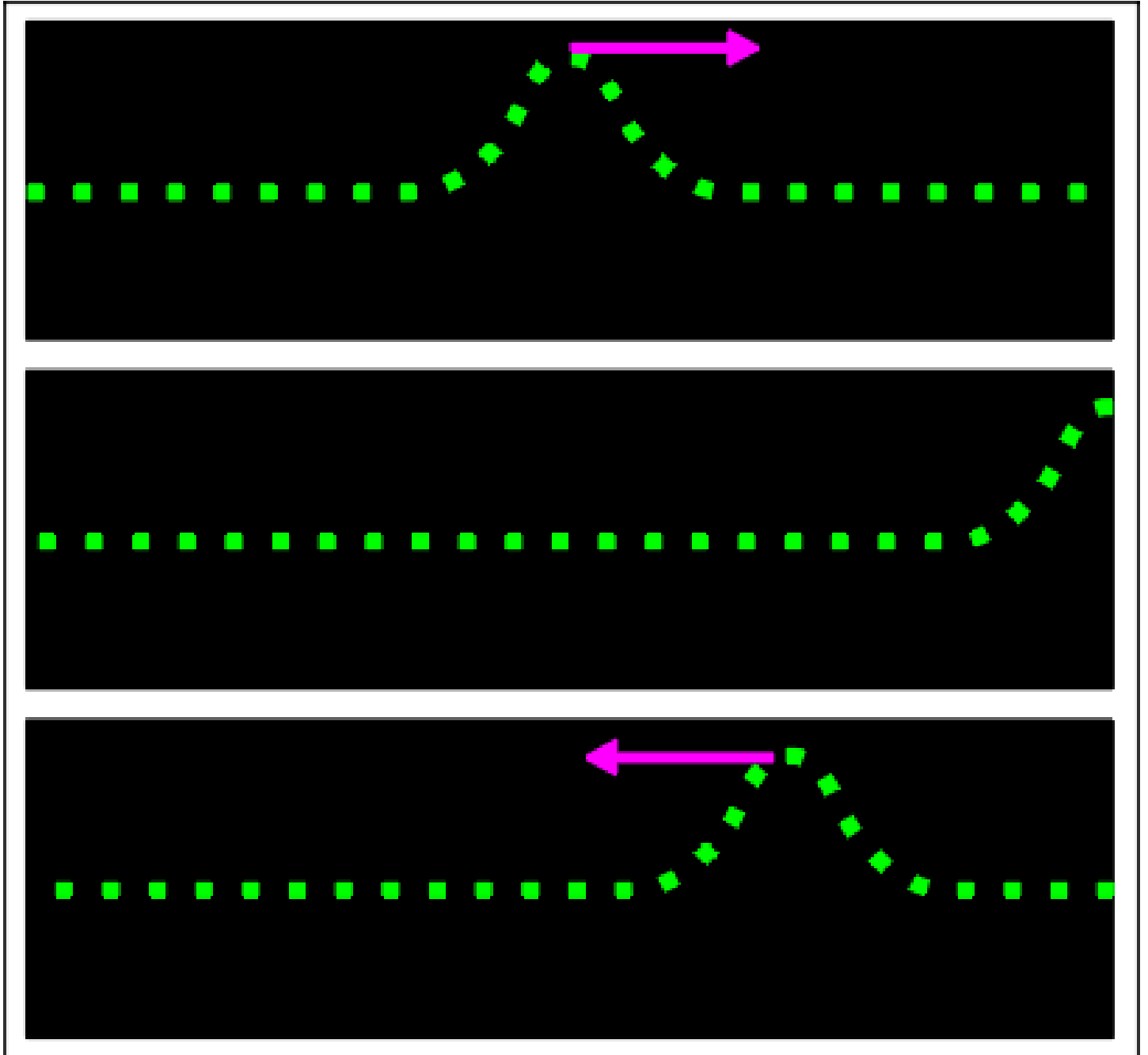
















STUDENT SUPPORT MATERIALS

# Listening





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

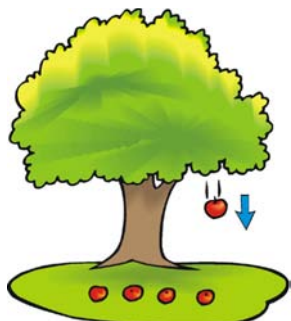
1. motion, 2. mass, 3. applied force, 4. gravitational, 5. proportional, 6. decrease, 7. interaction  
 8. reflection, 9. refraction, 10. wave addition, 11. friction, 12. velocity, 13. acceleration

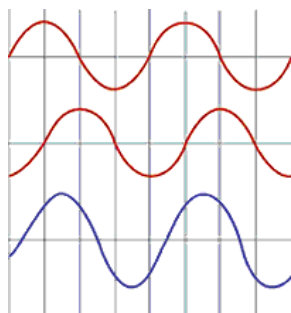












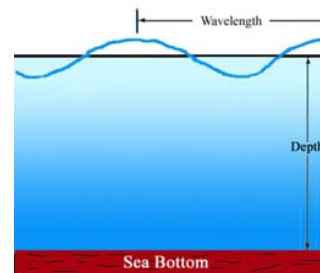


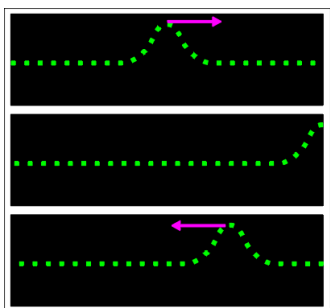












# True or False?

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

1. The motion of a boat in heavy seas often makes people sick.
2. When we step on a bathroom scale, we determine our mass.
3. Sally gave the store manager her applied force hoping she would get a job.
4. A magnet attracts a paperclip because of gravitational attraction.
5. It is important to order meals proportional to your size or you will get too full.
6. As you consume a beverage, the amount of liquid decreases.
7. Electricity is a type of energy that travels in wave form.
8. It is often possible to see your reflection in a pool of clear water.
9. The reflection of light from the moon often provides enough light to see in after dark.
10. Multiple chainsaws result in a louder sound due to wave addition.
11. It is difficult to change directions while driving on ice due to the increased friction between the tires and the icy surface.
12. “Velocity” in physics is not only the speed of an object but its direction of movement as well
13. A bullet stops accelerating only when it has finally come to rest, since acceleration can refer to speeding up or slowing down.

## Answers

1. T, 2. F, 3. F, 4. F, 5. T, 6. T, 7. F, 8. F, 9. T, 10. T, 11. F, 12. T, 13. T





STUDENT SUPPORT MATERIALS

# Sight Words





**acceleration**

**applied**

**force**

**decrease**

**friction**

**gravitational**

**interaction**

**mass**

**motion**

**proportional**

**refraction**

**velocity**

**wave**  
**addition**

# wave reflection





STUDENT SUPPORT MATERIALS

# Reading





# Word Find

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

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

[www.WordSearchMaker.com](http://www.WordSearchMaker.com)

Acceleration

Motion

Appliedforce

Proportional

Decrease

Reflection

Friction

Refraction

Gravitational

Velocity

Intraction

Waveaddition

Mass

# Word Find Solution

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

# Sight Words Activity Page



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 applied force  
 decrease  
 friction  
 gravitational  
 interaction  
 mass  
 motion  
 proportional  
 refraction  
 velocity  
 wave addition  
 wave reflection



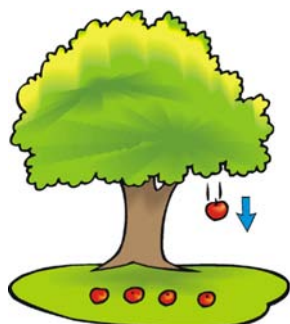
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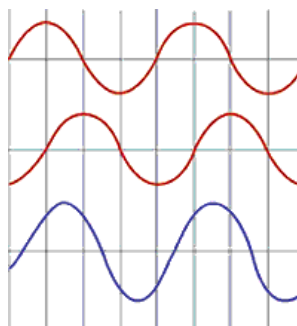
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# Sight Words Activity Page



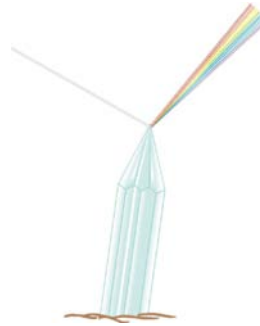
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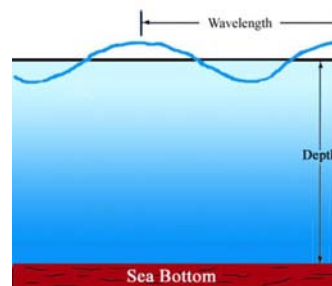
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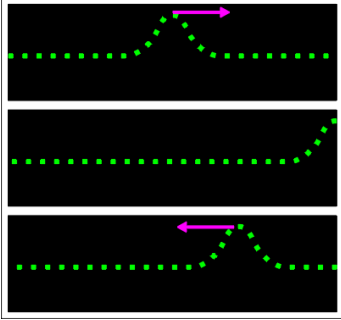


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# Sight Words Activity Page



acceleration  
applied force  
decrease  
friction  
gravitational  
interaction  
mass  
motion  
proportional  
refraction  
velocity  
wave addition  
wave reflection

## Sentence Halves

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

- |  |  |
|--|--|
| 1. People flock to amusement parks   | A. on trees decreases.   |
| 2. Although you can become weightless when in a spacecraft,                | B. due to a rogue wave – that resulted from the addition of several large waves. |
| 3. Billy was quite strong, however, his efforts                            | C. your mass never changes.  |
| 4. Gravitational forces sometimes pull meteorites                          | D. friction in internal combustion engines.                                      |
| 5. The number of leaves a tree has is                                      | E. also known as refraction.   |
| 6. As fall approaches, the number of leaves                                | F. often results in a tsunami wave.  |
| 7. Energy from an undersea earthquake                                      | G. proportional to its size.   |
| 8. Storm troopers (Star Wars) armor was white                              | H. Will not change unless the rocket is acted upon by a force.                   |
| 9. Rainbows are the result of the bending of light,                        | I. to experience the varied motion that rides offer.                             |
| 10. Although unknown, the wreck of the Edmund-Fitzgerald may have been     | J. to move the car proved fruitless as he was not able to apply enough force.    |
| 11. Lubricants decrease  | K. to better reflect blaster bolt energy.  |
| 12. The velocity of a rocket in space                                      | L. into our atmosphere.  |
| 13. Motorcycles are have faster acceleration than cars, typically, because | M. motorcycles have a larger power to mass ratio.                                |

Answers

1/I 2/C 3/J 4/L 5/G 6/A 7/F 8/K 9/E 10/B 11/D 12/H 13/M



# Word & Definition Match

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

*pertaining to gravity*

*speed*

*the amount of matter in an object*

*change in direction and change in velocity when a wave moves from one medium to another*

*pushing or pulling that act in the outside of an object*

*at a constant ratio*

*a moving disturbance in the energy level of a field*

*the result of wave interface*

*a force that appears whenever one surface rubs against another*

*when a body continues to change position*

*to make smaller*

*a change in direction that a wave experiences when it bounces between 2 kinds of media*

*rate of change of velocity as a function of time*

1. acceleration

2. applied force

3. decrease

4. friction

5. gravitational

6. interaction

7. mass

8. motion

9. proportional

10. refraction

11. velocity

12. wave addition

13. wave reflection

# Which Belongs?

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

1. Some people don't like turbulence in a plane because the sudden applied force/motion scares them.
2. Even in space, where objects are weightless, it is more difficult to move an elephant than a mouse because of its greater mass/proportional.
3. The applied force/wave addition of waves on the boat in the stormy seas resulted in it sinking.
4. In one Star Trek movie, two assassins beamed aboard a Klingon vessel wearing electromagnetic boots after the applied force/gravitational systems were disabled.
5. The amount of space something occupies is decrease/proportional to its density.
6. Compressional forces result in a proportional/decrease of volume occupied by an object.
7. The wave addition/refraction of ocean waves can result in larger rogue waves.
8. After donning his monster mask, Billy was satisfied that his refraction/reflection was sufficiently scary for the halloween party.
9. Agent 007 escaped the gunfire of enemy agents when he dove into the water and reflection/refraction as light entered the water prevented proper aim.
10. Energy is transferred through a solid medium by the interaction/applied force of particles in the medium.
11. Air hockey tables have very little friction/gravity due to the cushion of air that the puck rides on.
12. The velocity/acceleration of the object is its speed and direction.
13. Sports cars are known for their rapid acceleration/reflection.

## Answers

1. motion, 2. mass, 3. applied force, 4. gravitational, 5. proportional, 6. decrease 7. wave addition, 8. reflection, 9. refraction, 10. interaction, 11. fraction, 12. velocity 13. acceleration

## 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 of the following is true about motion:**
  - (a) An object will continue to move only when a force is applied;
  - (b) An object will continue to move unless a force is applied to slow it;
  - (c) An object will accelerate when net force is zero.
  
- 2) **Which of the following regarding mass is true:**
  - (a) A 1 kg lead weight has more mass than a 1 kg feather;
  - (b) Mass is a measurement of how much space something takes up;
  - (c) Mass is a measure of the amount of matter in an object.
  
- 3) **Tension is the result of an applied force that is:**
  - (a) A push;
  - (b) A pull;
  - (c) A push or pull.
  
- 4) **In the interaction between the Moon and the Earth, gravitational forces;**
  - (a) Are exerted only by the Earth on the Moon;
  - (b) Are exerted only by the Moon on the Earth;
  - (c) Are exerted by the Moon on the Earth and by the Earth on the Moon.
  
- 5) **Proportions are not:**
  - (a) Ratios;
  - (b) Quantities that vary directly with one another;
  - (c) Quantities that vary randomly with one another.
  
- 6) **When less fossil fuel is consumed:**
  - (a) There is a decrease in carbon dioxide emissions;
  - (b) There is an increase in carbon dioxide emissions;
  - (c) There is no effect on carbon dioxide emissions.
  
- 7) **A vibration:**
  - (a) Results in radiation of energy from its source that we call a wave;
  - (b) Results in electromagnetic radiation;
  - (c) Is associated with light energy.
  
- 8) **The property of light whereby light bounces off a surface is called:**
  - (a) Reflection;
  - (b) Refraction;
  - (c) Wave addition.

## 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) When water waves come closer to shore and enter shallow water, their speed changes and they bend, this is called:
- (a) Reflection;
  - (b) Refraction;
  - (c) Wave addition.
- 10) Rogue waves in the ocean are formed by:
- (a) Reflection;
  - (b) Refraction;
  - (c) Wave addition.
- 11) When dealing with an agree customer, a customer service agent should
- (a) Treat the customer with contempt
  - (b) Reduce friction by speaking pleasantly and agreeing with the customer whenever possible.
  - (c) Increase friction by cutting the conversation short by going on break.
- 12) Velocity is
- (a) Speed
  - (b) Direction
  - (c) Speed and direction
- 13) In physics, but not in colloquial speech, we say a car is experiencing \_\_\_\_\_ when it goes around a corner.
- (a) Acceleration
  - (b) Velocity
  - (c) A turn

### Answers

1. b, 2. c, 3. b, 4. c, 5. c, 6. a, 7. a, 8. a, 9. b, 10. c, 11. b, 12. c, 13. a



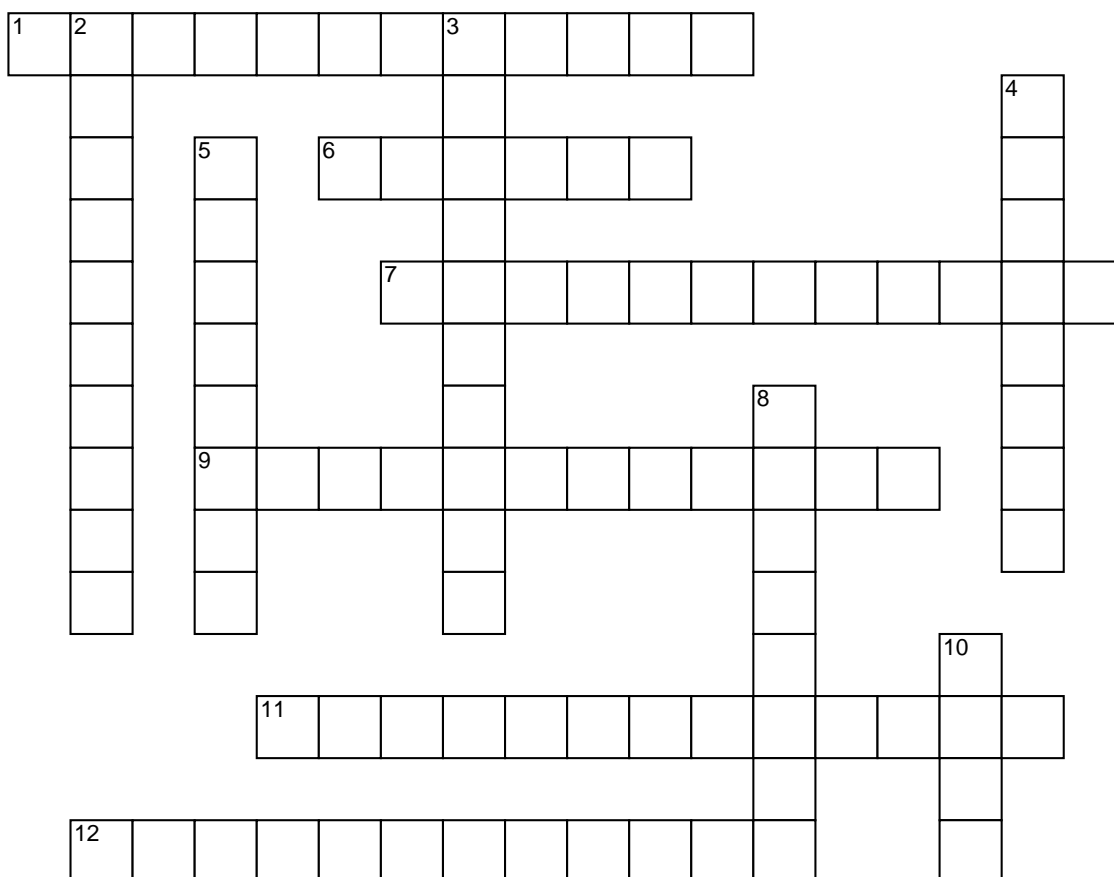
STUDENT SUPPORT MATERIALS

# Writing



# 9th B-1 Motion & Forces

## Unit 1



www.CrosswordWeaver.com

### ACROSS

- 1 at a constant ration to.
- 6 is when a body continues to change position.
- 7 the result of wave interference, waves of equal magnitude that are out of phase will cancel each other, those in phase will combine.
- 9 an applied force is a pushing or a pulling that act on the outside of an object.
- 11 pertaining to gravity or gravitation.
- 12 is the rate of change of velocity as a function of time.

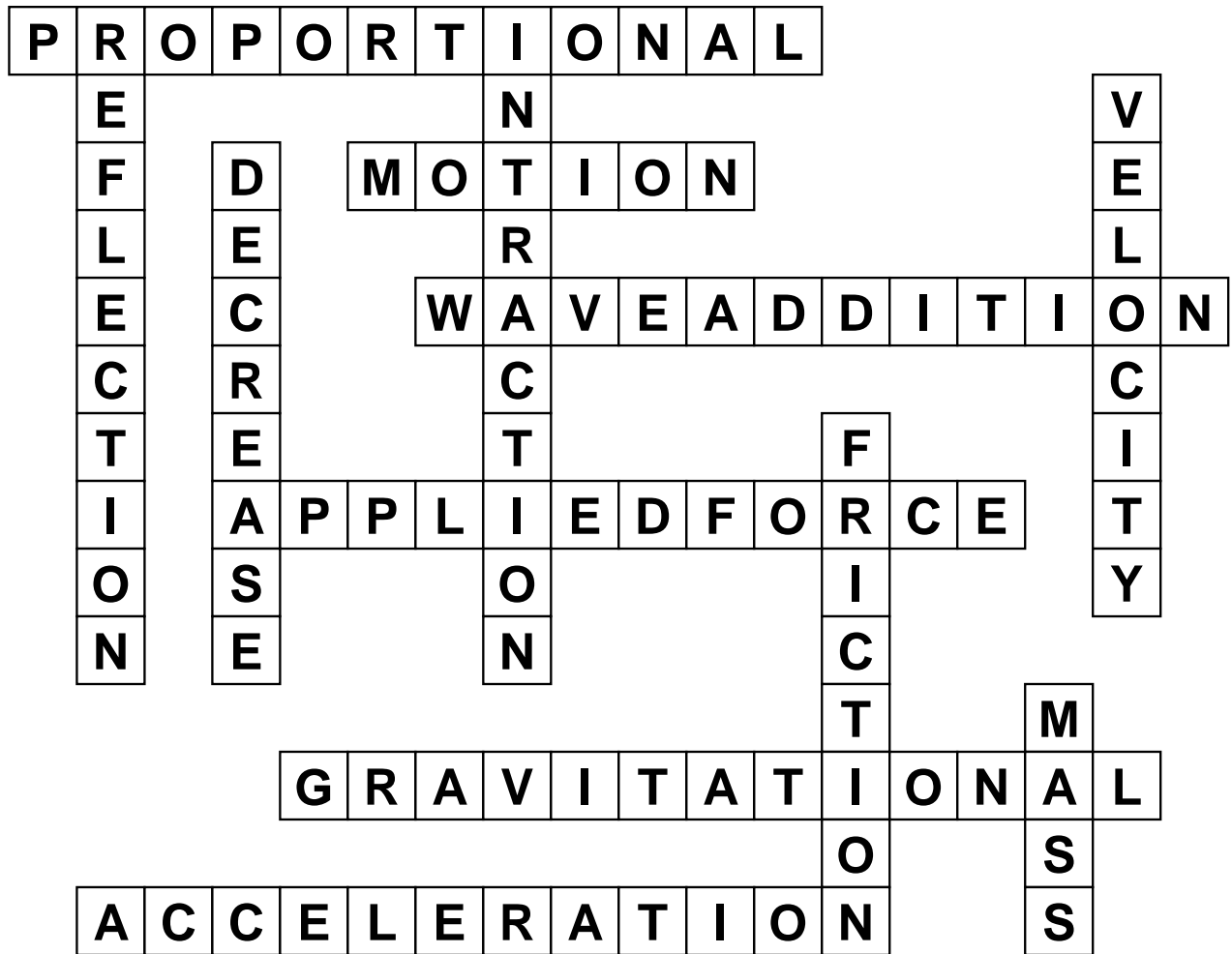
### DOWN

- 2 a change in direction and change in velocity that a wave experiences when it leaves one medium and goes into another.
- 3 a moving disturbance in the energy level of a field.
- 4 means speed-or the distance an object travels divided by the time it took to make the trip.
- 5 to make (a quantity) smaller.
- 8 a force that appears whenever one surface rubs against another.
- 10 Mass is the physical property that gives objects their resistance to change in motion.

# 9th B-1 Motion & Forces

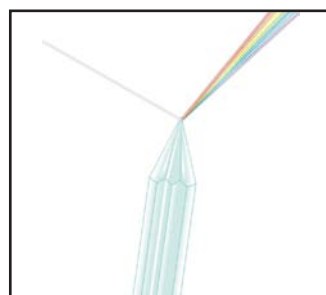
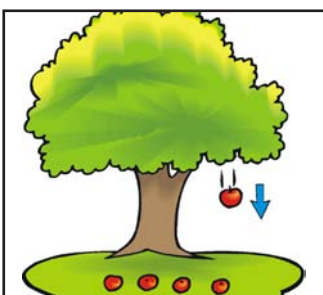
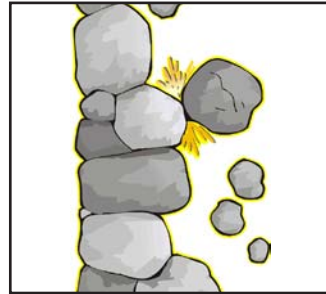
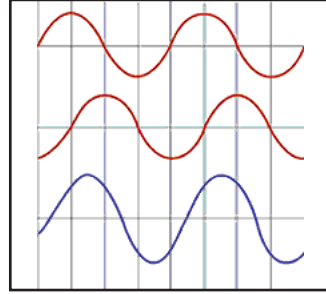
## Unit 1

Solution:





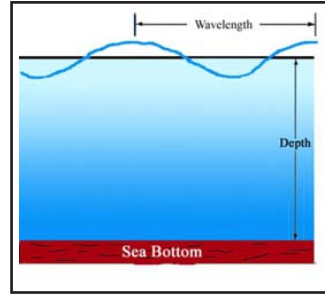
# Write The Words



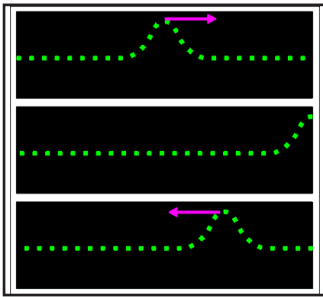
# Write The Words



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

# Complete The Sentence

*Have the students write the key words in the blanks.*

1. Unless they are at a stoplight, cars are usually in \_\_\_\_\_.
2. An elephant has more \_\_\_\_\_ than a mouse.
3. A wagon will not move unless a person grabs the handle and exerts an \_\_\_\_\_.
4. It is a good thing that \_\_\_\_\_ force exists – otherwise we would all float away into space!
5. The amount of luggage a person can fit into the truck is \_\_\_\_\_ to the size of the car.
6. If the speed of an object is to \_\_\_\_\_, the brakes must be applied.
7. Energy in the ocean travels via \_\_\_\_\_.
8. When we look in the mirror, we see our \_\_\_\_\_ as light that hit it bounces back to our eyes.
9. It is difficult to hit a fish in the water with a thrown stick because of \_\_\_\_\_, the bending of light as its speed changes when it enters the water.
10. So called “Rogue” waves that tower above other waves are the result of \_\_\_\_\_.
11. At my family gatherings there is always someone who causes unnecessary \_\_\_\_\_ by insisting on discussing religion and politics.
12. The \_\_\_\_\_ of the motorcycle changed instantly when it hit the wall.
13. The \_\_\_\_\_ of the car caused the passengers to get pushed back in their seats.

## Answers

1. motion, 2. mass, 3. applied force, 4. gravitational, 5. proportional, 6. decrease, 7. waves, 8. reflection, 9. refraction, 10. wave addition, 11. friction, 12. velocity, 13. acceleration

## 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.*

**acceleration**

---

**applied force**

---

**decrease**

---

**friction**

---

**gravitational**

---

**interaction**

---

**mass**

---

**motion**

---

**proportional**

---

## 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.*

**refraction**

---

**velocity**

---

**wave addition**

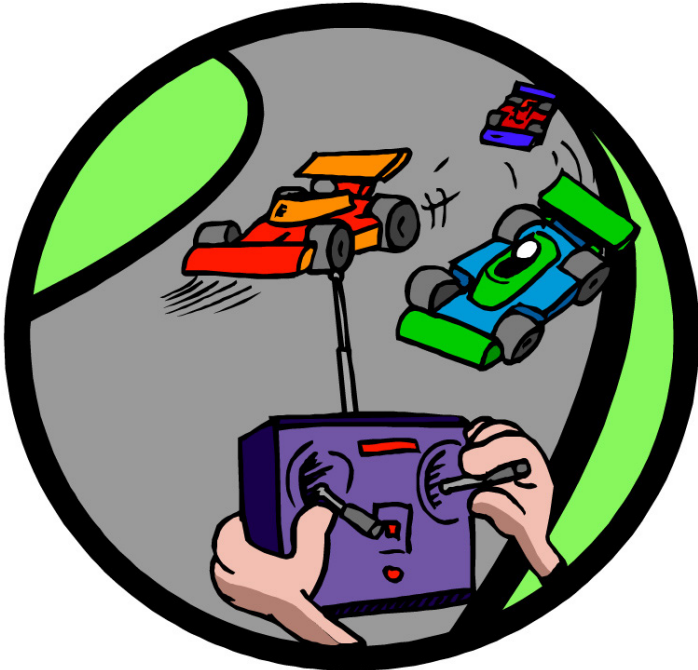
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**wave reflection**

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# Creative Writing Activity Page

Have the students write sentences of their own, based on the picture below. When finished, have each student read his/her sentences to the others.



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STUDENT SUPPORT MATERIALS

# Reinforcement Activities







Line the students up in the hallway and have them do “the wave”. Tell them to “freeze” several times as the wave moves down the line. This demonstration is motion.

Give each student a rubber band. Tell them to keep the rubber bands flat on the desk and to push them together and stretch them apart. Explain to them that they are applying force to the rubber band.

Have students drop individual drops of water onto a still surface of water in a bowl and observe the waves. Explain that light moves in similar waves (just much greater frequency) and these are fundamental interactions.

# From the work of S. Marino

## Mass

As meat dries, water evaporates. We know that this is a good method of preservation because bacteria need water to move and carry out normal cell functions. But what happens to the tissue of meat as it dries? This experiment will examine that change as it occurs.

### Materials:

- Salmon tissue
- Knife or scalpel
- Wax paper
- Metric ruler

### Methods:

- Part one:
  - Cut 5 pieces of salmon in cubes of about 1 cm<sup>3</sup>.
  - Measure all six sides and take the mass for each cube.
  - Record this information on a data table.
  - Create a column on the table for the final measurements and mass for each cube.
  - Put each piece on a small piece of wax paper and label each.
  - Trace the shape of the sample onto the wax paper.
  - These cubes will dry without being touched for the 3 or more days.
- Part two:
  - Cut one piece of salmon into a 3-5 cm<sup>3</sup>.
  - Measure all six sides and take the mass of the cube.
  - Record this information on a data table. The data table should have a column each day for you to record the measurements and mass.
  - Put the piece of salmon on a small piece of wax paper and label it.
  - Trace the shape of the sample onto the wax paper.
  - You will need to measure the dimensions of the cube and its mass each day.
- Put your sample in a safe place where your instructor indicates. Make sure your name(s) are on the samples. You will be responsible for measuring the large sample everyday.

### Predictions:

- What do you think will happen to the cubes in the first experiment? How will they change in size, shape and mass as they dry?
- For the second experiment, with the larger sample, how do you think the sample
- will change?

### Part three:

- Students should measure the dimensions and mass of the dried tissue samples to see how they have change while drying.
- Students should explain their .results.
- Students should make a graph showing how the mass changed over time.
- Students should respond to the following prompt, "How does tissue change when it dries? Address the changes in size, shape, and mass. Why does this occur?"



# Unit Assessment

Unit 5 Quiz & Test for Units 4 & 5





## B1, Unit 1 Motion and Forces Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) M\_\_\_\_\_ is the physical property that gives objects their resistance to changes in motion.
- 2) Another term for movement is m\_\_\_\_\_.
- 3) If mass is the measure of matter or the amount of matter in an object, and the amount does not change because of location, then a bowling ball will have the same mass on the moon as it does on the Earth.
  - a) True
  - b) False
- 4) If a person is pushing a desk across the room, then there is a/an \_\_\_\_\_ force acting upon the object. The \_\_\_\_\_ force is the force exerted on the desk by the person.
  - a) gravitational
  - b) frictional
  - c) applied
  - d) normal
- 5) If an object travels at a constant speed, then the distance traveled is p\_\_\_\_\_ to the time spent traveling, with the speed being the constant proportionality. There must be a constant ratio between the two numbers.
- 6) Gravitational has to do with gravitation and gravity. Gravitation is a natural phenomenon by which some objects with mass attract each other.
  - a) True
  - b) False
- 7) An INTERACTION (waves) can be defined as a moving disturbance in the energy level of a field.
  - a) True
  - b) False

- 8) When something becomes smaller, we say it \_\_\_\_\_  
a) increases.  
b) decreases.
- 9) You will see two illustrations below, one for REFLECTION, one for REFRACTION. Label each one correctly. Write the correct definition by the illustration that it matches.

Illustration for Reflection

\_\_\_\_\_

Illustration for Refraction

\_\_\_\_\_

- 10) Which of the following is NOT an example of friction?  
a) snapping your fingers  
b) meteors hitting the earth's atmosphere  
c) tires slowing a car down on the road  
d) All of the above  
e) None of the above
- 11) Look at the illustration below. Does it show VELOCITY or ACCELERATION? Write the correct word in the blank beside the illustration.

Illustration of Acceleration \_\_\_\_\_

- 12) When there is wave interference, waves of equal size and strength that are out of phase will cancel each other out. Those in phase with each other will combine. This type of wave action is called wave \_\_\_\_\_.

## B1, Unit 1 Motion and Forces Quiz

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) M\_\_\_\_\_ is the physical property that gives objects their resistance to changes in motion.
- 2) Another term for movement is m\_\_\_\_\_.
- 3) If mass is the measure of matter or the amount of matter in an object, and the amount does not change because of location, then a bowling ball will have the same mass on the moon as it does on the Earth.  
 a) True  
 b) False
- 4) If a person is pushing a desk across the room, then there is a/an \_\_\_\_\_ force acting upon the object. The \_\_\_\_\_ force is the force exerted on the desk by the person.  
 a) gravitational  
 b) frictional  
 c) applied  
 d) normal
- 5) If an object travels at a constant speed, then the distance traveled is p\_\_\_\_\_ to the time spent traveling, with the speed being the constant proportionality. There must be a constant ratio between the two numbers.
- 6) Gravitation has to do with gravitation and gravity. Gravitation is a natural phenomenon by which some objects with mass attract each other.  
 a) True  
 b) False
- 7) An INTERACTION (waves) can be defined as a moving disturbance in the energy level of a field.  
 a) True  
 b) False

8) When something becomes smaller, we say it \_\_\_\_\_

a) increases.

**b) decreases.**

9) You will see two illustrations below, one for REFLECTION, one for REFRACTION. Label each one correctly. Write the correct definition by the illustration that it matches.

Illustration for Reflection

Illustration for Refraction

\_\_\_\_\_

\_\_\_\_\_

Illustrations for Reflections

Illustration for Refractions \_\_\_\_\_

\_\_\_\_\_

10) Which of the following is NOT an example of friction?

a) snapping your fingers

b) meteors hitting the earth's atmosphere

c) tires slowing a car down on the road

**d) All of the above**

e) None of the above

11) Look at the illustration below. Does it show VELOCITY or ACCELERATION? Write the correct word in the blank beside the illustration.

Illustration of Acceleration \_\_\_\_\_

Correct answer not entered.

12) When there is wave interference, waves of equal size and strength that are out of phase will cancel each other out. Those in phase with each other will combine. This type of wave action is called wave **addition**.



## B1, Unit 1, Matter & Energy; Unit 1, Motion & Forces Test

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Fill in each blank with the word that fits best. Choose from the words below.

**electrical    mechanical    light    heat**

- 1) The energy we use on a daily basis comes in a variety of forms. Four common forms are light energy, heat energy, electrical energy and mechanical energy. The energy of moving things is \_\_\_\_\_ energy, from wind turning a turbine in a windmill, to a wrecking ball bringing down a brick building. Heated gases moving pistons in an engine is an examples of \_\_\_\_\_ energy. \_\_\_\_\_ energy, electromagnetic radiation, includes infrared, ultraviolet and x-rays. Electrons flowing through conductors in a circuit through a light bulb is an example of \_\_\_\_\_ energy.
- 2) A/An \_\_\_\_\_ is the smallest part of an element.
- a) nucleus
  - b) molecule
  - c) atom

Match the word on the left with the definition on the right. Place the letter of the correct definition in front of the matched word.

- |                       |  |
|-----------------------|--|
| 3) _____ interaction  | a. the effects of waves moving through each other      |
| 4) _____ velocity     | b. speed   |
| 5) _____ interference | c. a moving disturbance in the energy level of a field |
| 6) _____ acceleration | d. an increase in speed                                |
- 7) Which statement below is most likely to be true
- a) Mass is the physical property that gives objects their resistance to changes in motion.
  - b) Mass is the material that all objects and substances are made of.

- 8) What's the difference between velocity and acceleration? You may explain the difference with complete sentences, or you may choose to illustrate your answer, labeling your illustrations correctly.

Fill in each blank for the following statements with the word that best fits.  
Choose from the words below.

**absorbs, motion, acceleration, radiation, emits**

- 9) An incandescent light \_\_\_\_\_ or releases light and heat.
- 10) The transfer of energy from a hotter place to a cooler place is \_\_\_\_\_. The sun heats Earth through this process.
- 11) Another term for \_\_\_\_\_ is movement, when something continues to change position.
- 12) When a boat speeds up and increases its velocity it has increased its \_\_\_\_\_.
- 13) When a substance gains energy it receives it, or \_\_\_\_\_ it.
- 14) When you reach down and pick up a rock, then the throw the rock, these are examples of\_\_\_\_\_.
- a) refraction
  - b) reflection
  - c) applied force
  - d) undo force
- 15) Which of the following statements is most likely to be correct?
- a) Wave interference occurs when two waves meet while traveling along the same medium.
  - b) Wave interference results in waves always cancelling each other out.

- 16) Studded tires in the winter time, basketball shoes with good tread, sandpaper across a rough surface are example of objects where one surface rubs against another creating a force known as....
- a) motion
  - b) energy
  - c) friction

Match the definitions on the left with the illustrations on the right. Place the number number of the appropriate illustration in front of the definition that best defines it.

- |           |  |                      |
|-----------|--|----------------------|
| 17) _____ | a continuum of color formed when a beam of white light is dispersed and passes through a prism | a. illus. chemical   |
| 18) _____ | a related group of elements forming a whole  | b. illus. refraction |
| 19) _____ | the bouncing back of a wave from a surface   | c. illus. system     |
| 20) _____ | A substance with a distinct molecular composition, with atoms and subatomic particles          | d. illus. reflection |
| 21) _____ | change of direction & velocity when a wave passes from one medium into another                 | e. illus. spectrum   |
- 22) To make a quantity smaller is to \_\_\_\_\_.
- a) decrease
  - b) increase
  - c) augment
- 23) Two numbers are said to be proportional if the second varies in a direct arithmetic relation to the first.
- a) True
  - b) False

## B1, Unit 1, Matter & Energy; Unit 1, Motion & Forces Test

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Fill in each blank with the word that fits best. Choose from the words below.

**electrical    mechanical    light    heat**

- 1) The energy we use on a daily basis comes in a variety of forms. Four common forms are light energy, heat energy, electrical energy and mechanical energy. The energy of moving things is mechanical energy, from wind turning a turbine in a windmill, to a wrecking ball bringing down a brick building. Heated gases moving pistons in an engine is an examples of heat energy. Light energy, electromagnetic radiation, includes infrared, ultraviolet and x-rays. Electrons flowing through conductors in a circuit through a light bulb is an example of electrical energy.

- 2) A/An \_\_\_\_\_ is the smallest part of an element.

- a) nucleus  
b) molecule

**c) atom**

Match the word on the left with the definition on the right. Place the letter of the correct definition in front of the matched word.

- 3) c interaction  
4) b velocity  
5) a interference  
6) d acceleration

- a. the effects of waves moving through each other  
b. speed  
c. a moving disturbance in the energy level of a field  
d. an increase in speed

- 7) Which statement below is most likely to be true

**a) Mass is the physical property that gives objects their resistance to changes in**



b) Mass is the material that all objects and substances are made of.

- 8) What's the difference between velocity and acceleration? You may explain the difference with complete sentences, or you may choose to illustrate your answer, labeling your illustrations correctly.

Correct answer not entered.

Fill in each blank for the following statements with the word that best fits.  
Choose from the words below.

**absorbs, motion, acceleration, radiation, emits**

- 9) An incandescent light emits or releases light and heat.
- 10) The transfer of energy from a hotter place to a cooler place is radiation. The sun heats Earth through this process.
- 11) Another term for motion is movement, when something continues to change position.
- 12) When a boat speeds up and increases its velocity it has increased its acceleration.
- 13) When a substance gains energy it receives it, or absorbs it.
- 14) When you reach down and pick up a rock, then the throw the rock, these are examples of\_\_\_\_\_.
- a) refraction  
b) reflection  
**c) applied force**  
d) undo force
- 15) Which of the following statements is most likely to be correct?

**a) Wave interference occurs when two waves meet while traveling along the same**

b) Wave interference results in waves always cancelling each other out.

16) Studded tires in the winter time, basketball shoes with good tread, sandpaper across a rough surface are example of objects where one surface rubs against another creating a force known as....

a) motion

b) energy

**c) friction**

Match the definitions on the left with the illustrations on the right. Place the number number of the appropriate illustration in front of the definition that best defines it.

17)   e   a continuum of color formed when a beam of white light is dispersed and passes through a prism

a. illus. chemical

b. illus refraction

c. illus. system

18)   c   a related group of elements forming a whole

d. illus. reflection

e. illus. spectrum

19)   d   the bouncing back of a wave from a surface

20)   a   A substance with a distinct molecular composition, with atoms and subatomic particles

21)   b   change of direction & velocity when a wave passes from one medium into another

22) To make a quantity smaller is to \_\_\_\_\_.

**a) decrease**

b) increase

c) augment

23) Two numbers are said to be proportional if the second varies in a direct arithmetic relation to the first.

**a) True**

b) False