Grade 10

Haa Latseen

SCIENCE

AS AN INQUIRY PROCESS

A-1 • UNIT 1

Based on the Alaska Science Standards
SA 1.1, SA 1.2, SA 2.1

FOR THE

Juneau-Douglas High School

Sealaska Heritage Institute

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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.

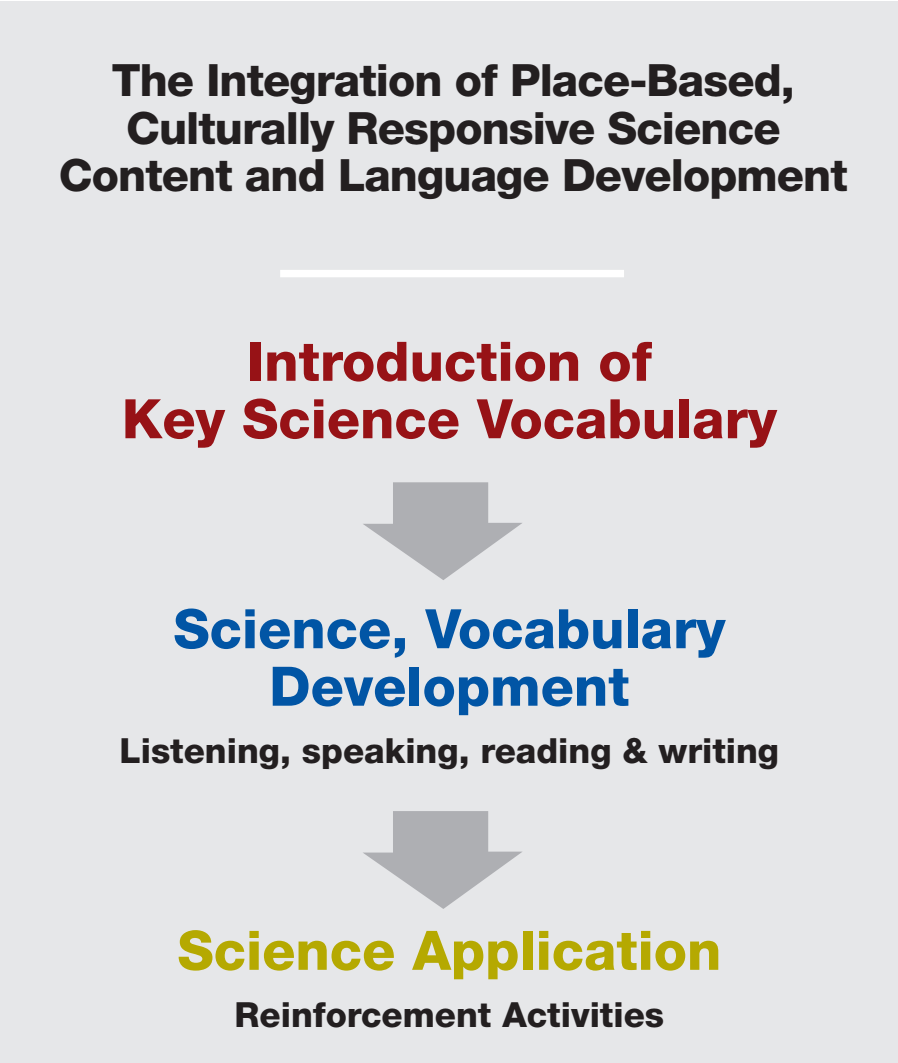
During science lessons, the students are exposed to new information and to key vocabulary that represent that information. While the students may acquire, through various processes, the scientific information, the vocabulary is often left at an exposure level and not internalized by them. Over time, 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 Developmental Language Process

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

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

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

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

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

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

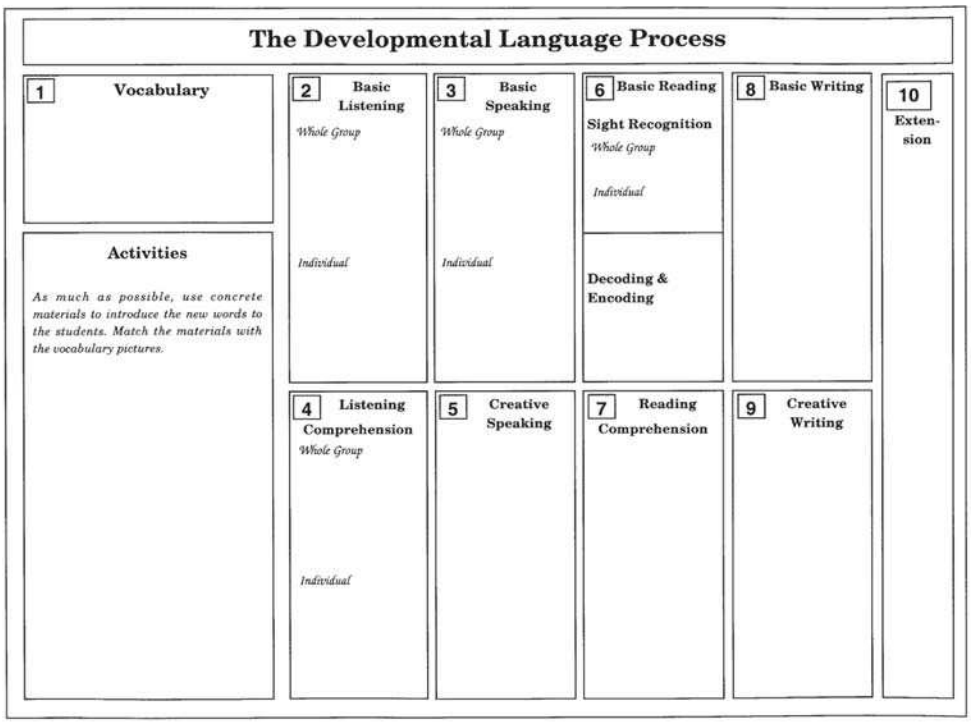
As more language goes into the children's long-term memories, they begin to comprehend more of what they read, in Reading Comprehension.

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

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

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

The Developmental Language Process is represented in this chart:



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

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

Alaska Content Standards for Science

A. Science as Inquiry and Process

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

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

B. Concepts of Physical Science

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

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

C. Concepts of Life Science

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

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

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

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

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

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

F. Cultural, Social, Personal Perspectives and Sciences
A student should understand the dynamic relationships among scientific, cultural, social, and personal perspectives. A student who meets the content standard should:

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

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

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

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


UNIT 1
Sealaska Heritage Institute

INTRODUCTION OF

Key Vocabulary

Culturally Responsive & Place-based Perspective
Introduction of Science Vocabulary

Analyze

PLACE-BASED PERSPECTIVE

Bring in a desk lamp and *analyze* the different parts of the lamp . Make a list of the different parts on the board.

Show the students the vocabulary picture from this unit. Have them relate the contents of the picture to this vocabulary word.

HERITAGE CULTURAL PERSPECTIVE

In traditional stories, Raven was often used to *analyze* real-life situations.

Model

PLACE-BASED PERSPECTIVE

Bring in some toy cars or planes and discuss how these are *models* to represent full size items.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Story boards would serve as *models* of Chilkat robes, tunics, and leggings. These story boards illustrated the designs to be used.

Pertinent

PLACE-BASED PERSPECTIVE

Hold up a dollar bill and ask the students how money is *pertinent* to their lives.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

The tides in Southeast Alaska were *pertinent* to travel and harvesting from the sea.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Literature

PLACE-BASED PERSPECTIVE

Bring in several journals and some books. Explain to the students how traditional literature and scientific *literature* differ.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Oral Native *literature* is rich in clan histories, clan origins, and place names.

Variable

PLACE-BASED PERSPECTIVE

Show the students a picture of a lizard and discuss how the lizard can change colors by varying the pigments in its skin. Use this to discuss how *variables* change.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Southeast Alaska demonstrates *variable* weather forms which impact wildlife in a variety of ways, including their color, as in the case of the ptarmigan.

Static

PLACE-BASED PERSPECTIVE

Discuss how the equation 2+2=4 is *static* because it is always the same quantity computed from a sample.

Show the students the vocabulary picture for this word. Have the students suggest how the picture

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Mean

PLACE-BASED PERSPECTIVE

Have the students measure their height to the closest inch and write the measurement on the board. Have them add up the data at their desks, count the number of students, and divide by the number of students to get the *mean* student height.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Traditionally, harvests could be described as better than average or worse than average, indicating a clear understanding of *mean* numbers. This would apply to fish, herring eggs, and other harvested foods.

Median

PLACE-BASED PERSPECTIVE

Use the data used to calculate the mean and have a student put the data in order on the board in a straight line from least to greatest. Have two students cover numbers one at a time in unison to find the *median*.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

Mode

PLACE-BASED PERSPECTIVE

Using the data set used to find the mean, have the students identify the *mode* by finding the number or numbers that appear the most in the data set.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Example

PLACE-BASED PERSPECTIVE

Have students look at an Alaskan flag and explain how the stars on the flag are an *example* of the northern hemisphere stars that create Ursa Major.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Traditional stories reflect *examples* of good and bad behavior.

Compare

PLACE-BASED PERSPECTIVE

Using two pictures of snow machines, have students *compare* and contrast them; list the similarities and differences.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Fish from different areas of Southeast Alaska often have different tastes. Native peoples would *compare* and contrast the flavors and quality of food items from other areas.

Examine

PLACE-BASED PERSPECTIVE

Show a tongue depressor. Have the students suggest its use. Lead this to a doctor *examining* a patient. Cite other examples of things that can be examined.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

The tracking of animals involved intense *examination* of the animal and its environment. This would include the examination of droppings, tracks, and plants.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Methodology

PLACE-BASED PERSPECTIVE

Provide a picture of a combustion engine and briefly discuss the operation used to move the pistons. Discuss with the students how the scientific *methodology* is similar in that there are specific steps to each.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Traditional Native life involved a wealth of *methodologies* from boat building to food harvesting and preparation.

Identify

PLACE-BASED PERSPECTIVE

Show the picture of a bird dog "pointing" and discuss with students the dog's ability to *identify* a bird for the hunter.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Artifacts can be used to *identify*, acknowledge and recognize the people and their history. These artifacts include artwork, tools, and carvings.

Bias

PLACE-BASED PERSPECTIVE

Show the picture from this unit for *bias.* Have the students discuss the contents of the picture, leading them to the concept of people's biases. Cite other examples of biases.

HERITAGE CULTURAL PERSPECTIVE

To this day, Native peoples often have *biases* towards the familiar food products from their areas and the recognized specialties of other areas.

Culturally Responsive & Place-based Perspective Introduction of Science Vocabulary

Evidence

PLACE-BASED PERSPECTIVE

Have the students imagine the types of *evidence* that police would collect at crime scenes.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

In many parts of Southeast Alaska, *evidence* of early settlement can be found. This includes bases for homes, petroglyphs, and tools.

Authentic

PLACE-BASED PERSPECTIVE

Discuss how ancient fish baskets and hooks discovered as artifacts are *authentic* pieces of the past. Show a sample of real leather and another of simulated leather. Use this to reinforce *authentic*.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

Today, many of the handicrafts purchased by tourists are not *authentic* Alaska Native art.

Deduce

PLACE-BASED PERSPECTIVE

Show the picture for *deduce* from this unit. Have the students imagine what it is that the man is thinking - lead this into what he has *deduced*. Cite other examples in which people *deduce* information.

Show the students the vocabulary picture for this word. Have the students suggest how the picture relates to the word.

HERITAGE CULTURAL PERSPECTIVE

In Southeast Alaska, people would often *deduce* a poor berry harvest based on weather factors.

Language Skills

Language & Skills Development

LISTENING

Use the activity pages from the Student Support Materials.

The Hidden Words
Say a vocabulary word for the students. Tell the students to listen for that vocabulary word as you say a running story. Provide each student with writing paper and a pen. When the students hear the vocabulary word in the running story, they must make a check mark on their papers each time the word occurs. Depending upon the readiness of your students, you may wish to have them listen for two or three words. In this case, have the students make a check mark for one word, and a "X" and an "O" for the other words.

SPEAKING

High Roller
Give a die to each of two students. When you say "Go," the students should roll their dice. The student who rolls the highest number on his/her die must then say a complete sentence about a vocabulary illustration that you show. Repeat this process until many students have responded with sentences of their own.

READING

Use the activity pages from the Student Support Materials.

Overhead Recall
Place an overhead projector on the floor, facing the chalkboard. Have a number of clozure sentences written on an overhead transparency sheet (the sight words should be missing from the sentence). Place the overhead transparency sheet on the projector so that the sentences are displayed on the chalkboard. Call upon the students to provide the words that are *missing* from the sentences. Write the words on the chalkboard, in their correct locations in the sentences. When all of the sentences have been completed in this way, turn off the overhead projector. Point to one of the sight words and call upon a student to recall its sentence. The projector may be turned on periodically to verify the students' answers.

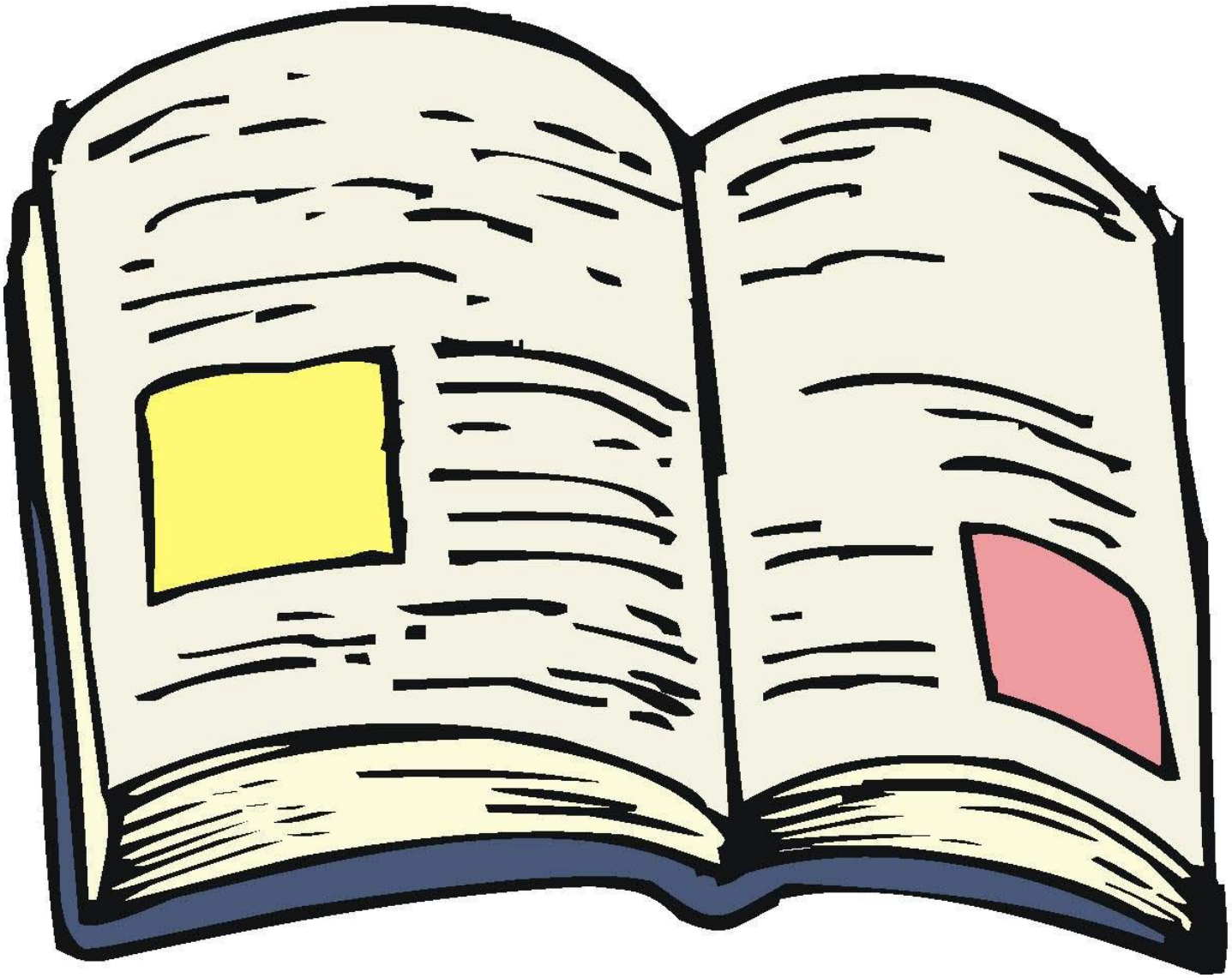
WRITING

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 redistributing the illustration halves to the two teams.

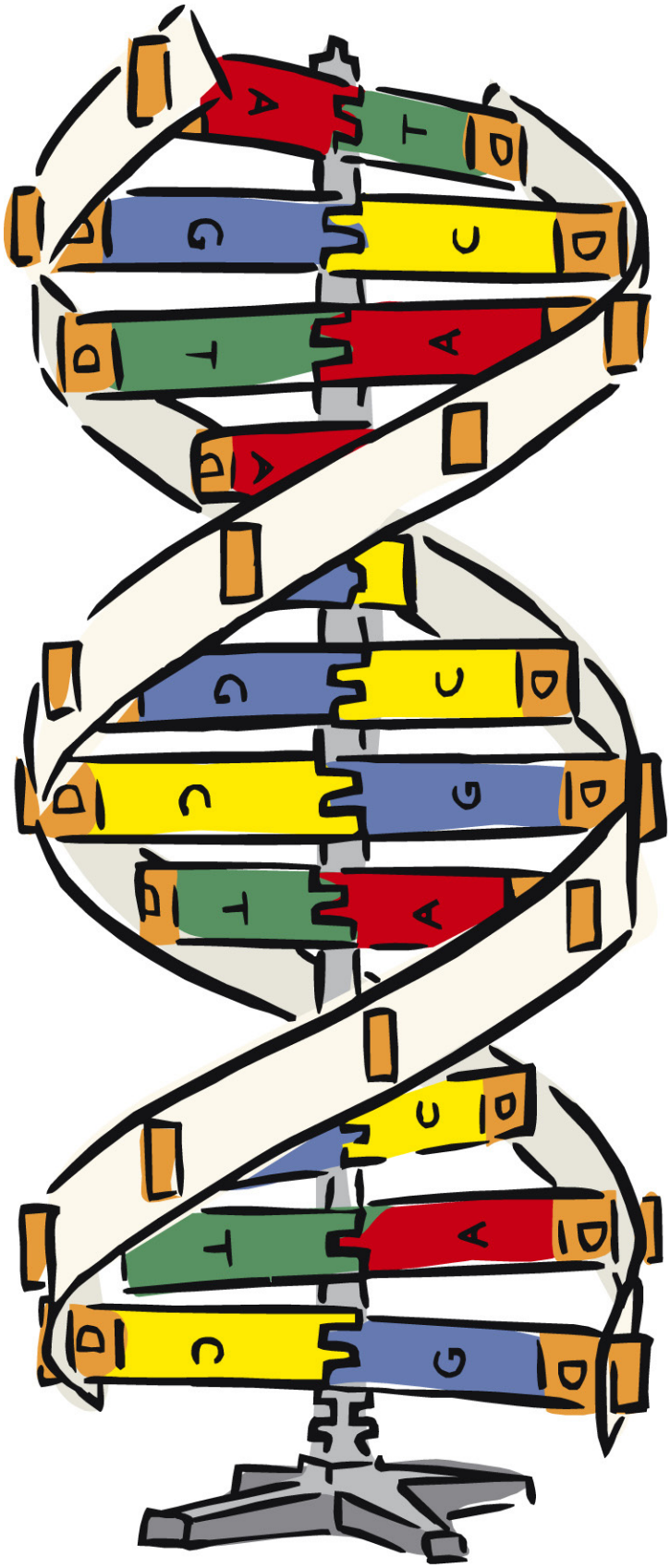
Vocabulary Images


?
FREE
SOS
LOVE
SOS



MEAN


Report Card
A+
A+
A+
A+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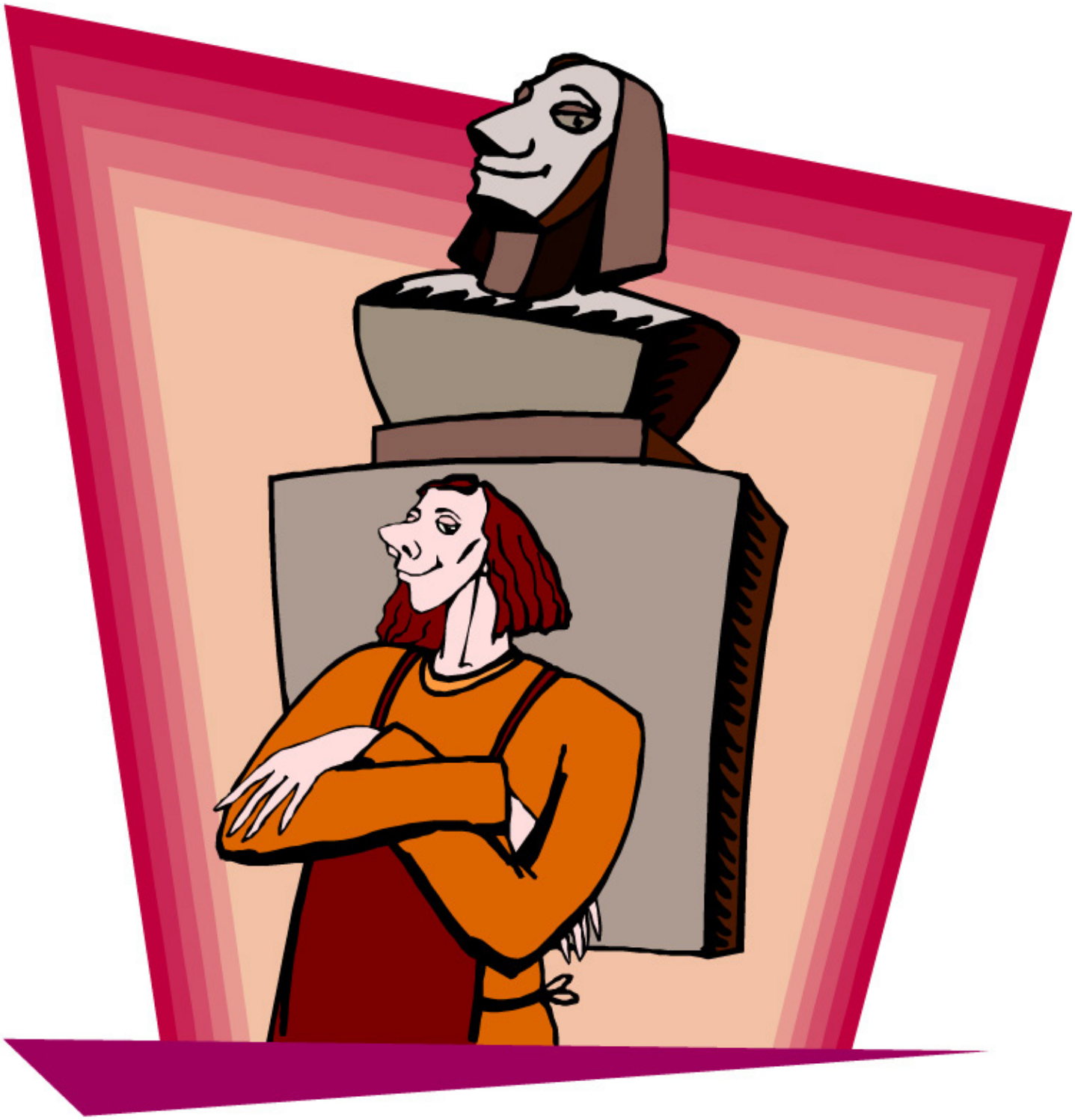
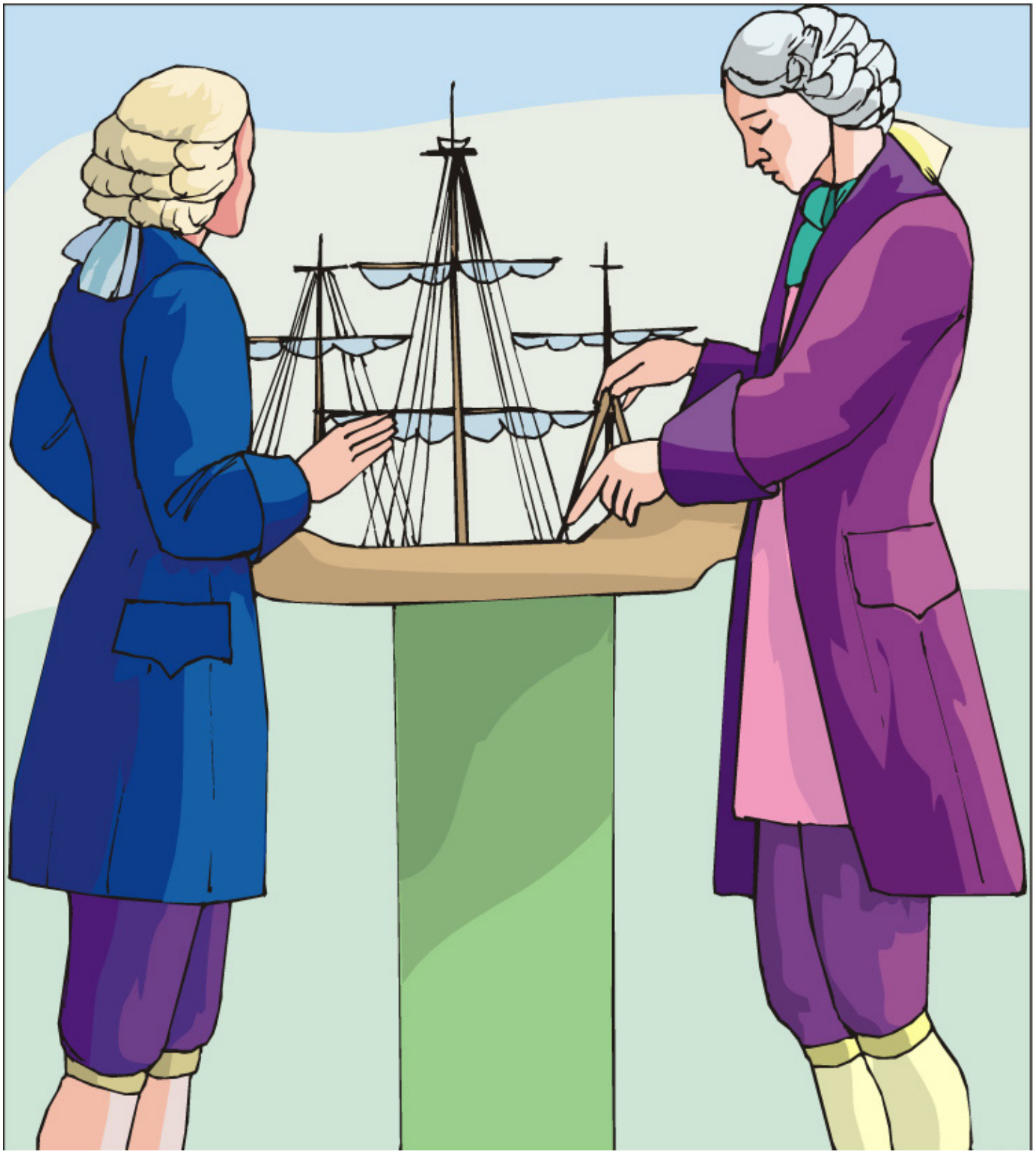


EXAMPLE



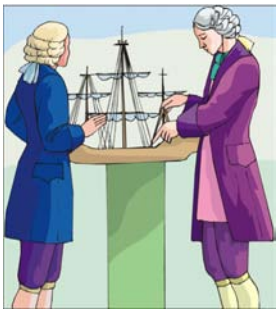
2445


Financial Statements
Forms,
Analysis and
Interpretation
Page #7
Chapter 3

STUDENT SUPPORT MATERIALS

Listening

Say these words to the students - they write the numbers of the words under the pictures.
1. compare, 2. variable, 3. methodology, 4. model, 5. analyze, 6. median, 7. authentic, 8. pertinent
9. static, 10. bias, 11. mode, 12. literature, 13. evidence, 14. mean, 15. identify, 16. deduce
17. examine, 18. example



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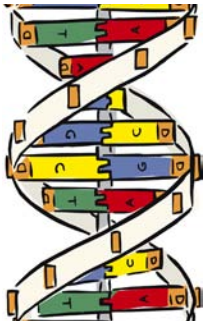

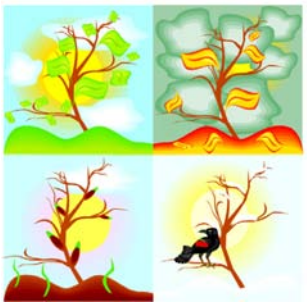

2445

Fill-in The Blanks, Paragraph

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

Science is a complicated field, especially if one does science correctly. Good science is impossible to put into a box—no single ____1____ will work for every field. But in general, in order to do science correctly, one must first pick a topic and ask an ___2____question. A search of the scientific ___3____ follows, in which all ____4____ articles are read and ____5_____. After what is known by science is known by the scientist, flaws in the original question are _____6___ and the question is revised. A study is then developed in which all ____7____ are controlled except the one in question. Once the data is collected it is (typically) ____8____ _____9_____ using the ____10____, ______11____, and ____12____ of the data. These three measures of center are then ____13____ to each other and data is further explored using other tools available, including graphing, which is a visual __14____ of the data. After the data is thoroughly digested, the scientist discusses the results with colleagues and writes up the conclusions from the study. During this entire process the scientist must be aware of his/her own ___15___ and not let them skew the findings. The ___16___ must speak for itself.

Above we have one ___17___ of how science can be done, but as discussed earlier, science is a complicated field and can be done well in many different ways. If you have been filling in the blanks and crossing out the words as you find the spaces they fill, you can probably ___18___ the last word for this last blank space.

ANSWERS

1. Methodology, 2. Authentic, 3. Literature, 4. Pertinent, 5. Examined, 6. Identified
7. Variables, 8. Statically, 9. Analyzed, 10. Mean, 11. Median, 12. Mode, 13. Compare
14. Model, 15. Biases, 16. Evidence, 17. Example, 18. Deduce

True Or False?

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

1. Scientists never use graphs to analyze sets.
2. A model can never be the same size as the actual thing.
3. Pertinent information is information that is clearly relevant to the topic at hand.
4. To have your work considered a part of the scientific literature, it is not necessary to subject your work to peer review.
5. It is important to keep all variables constant in an experiment, except the variable you are testing.
6. If you analyze data statically, you might make use of the data's mean, median, and/or mode.
7. The mean is not always the best way to represent a set of data, especially if one has a few very high (or low) numbers skewing the set of data.
8. The median is the middle number, as long as the numbers are in a random order.
9. The mode is the most common number in a set of data.
10. The pyramids of Egypt are an example of the power of democracy and the strength of grassroots efforts to build something for the common good.
11. When analyzing data, one should never compare the expected result with the actual result.
12. To play on a school sports team, it is important to ensure that one is fit enough to play.
13. It is not important to pay attention to the methodology employed by the researcher; it is enough to focus on her results and conclusions when evaluating her work.
14. Geologists use properties such as hardness, density, and color to identify minerals.
15. Scientists are incapable of having bias because the scientific method removes these issues.
16. It is a crime to tamper with evidence, but only if it is evidence for a crime.
17. You can tell an officer is authentic by looking at his uniform, since it is impossible to get a police uniform unless you are a police officer.
18. It is often possible to deduce the cause of a crime based on wind currents in the area.

ANSWERS
1. F, 2. F, 3. T, 4. F, 5. T, 6. T, 7. T, 8. F, 9. T, 10. F, 11. F, 12. T, 13. F, 14. T, 15. F, 16. T, 17. F, 18. F

STUDENT SUPPORT MATERIALS

Sight Words

analyze

authentic

bias

compare

deduce

evidence

examine

example

identify

literature

mean

median

mode

model

pertinent

static variable methodology

STUDENT SUPPORT MATERIALS

Reading

Word Find

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

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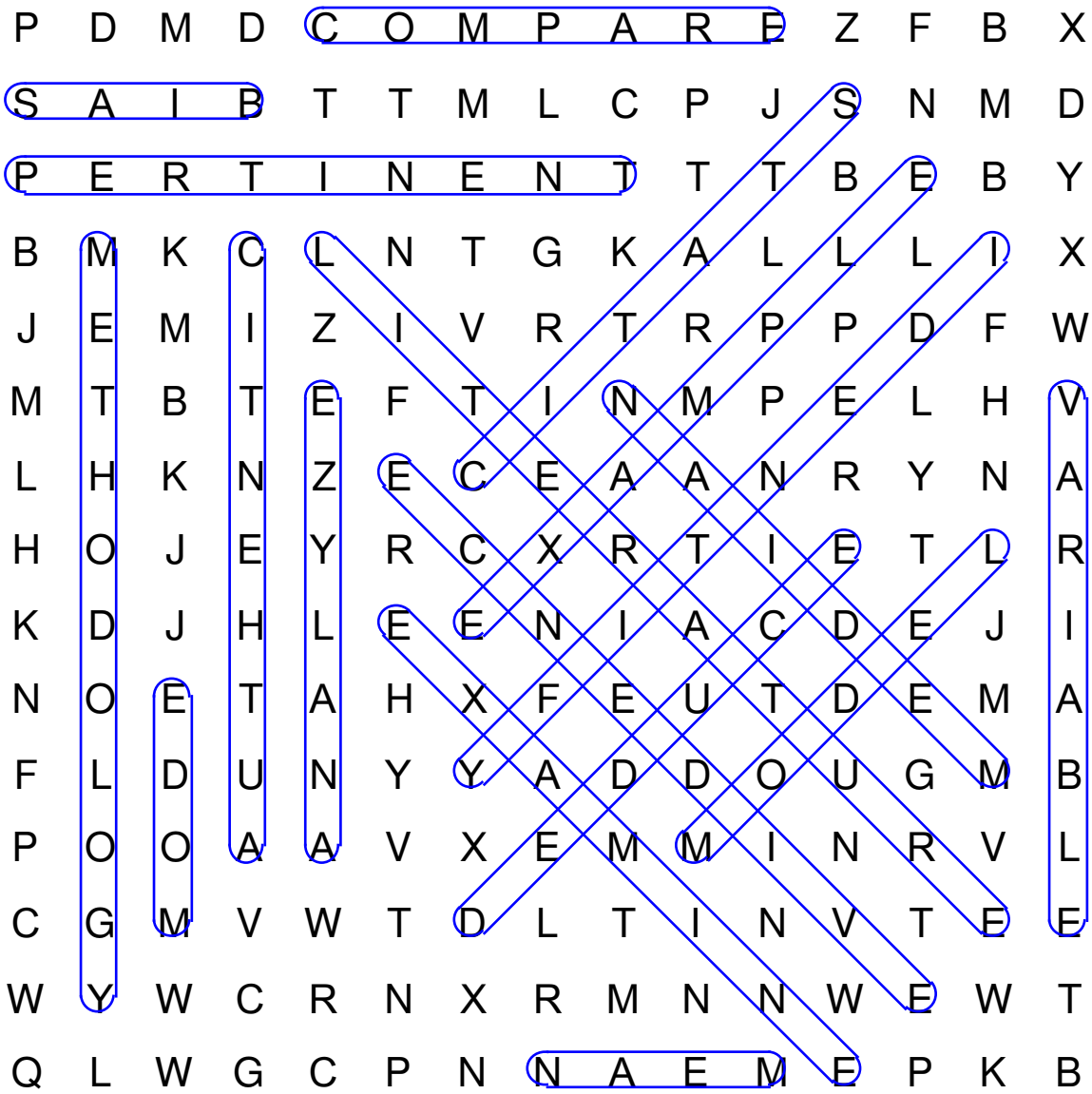
Q L W G C P N N A E M E P K B

Analyze
Authentic
Bias
Compare
Deduce
Evidence
Examine
Example
Identify
Literature
Mean
Median
Methodology
Mode
Model
Pertinent
Static
Variable

Word Find Solution



Sight Words Activity Page

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

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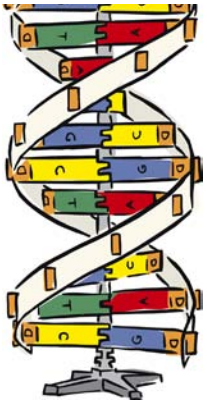

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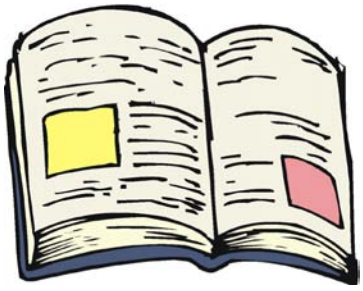

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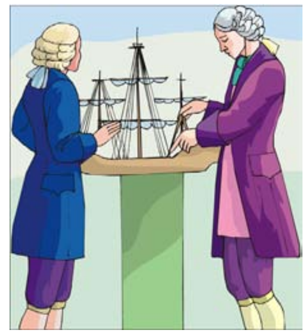

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Sentence Halves

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

1. If you analyze the clues carefully
2. I had a model train as a kid,
3. All of the pertinent information
4. You cannot say you are familiar with British literature
5. One variable that will impact the number of students at school today
6. We must learn to use and understand statics
7. One can find the mean of a set of data
8. One must first place the data
9. The most common number in a data set is called
10. Sometimes it is better to not lecture your children, but
11. If you take time to compare the costs and benefits of attending college,
12. Examine your options carefully
13. Methodology is “the study of methods,” but the word is often used
14. During an epidemic, health workers try to identify
15. Because science is a human endeavor, we must guard
16. If there is no evidence to support your idea
17. Authentic means
18. It is possible to deduce the weather in a particular location

A. Real and truthful.
B. If one knows the latitude, longitude, and time of year.
C. But I have always wanted to operate the real thing.
D. The mode.
E. You may be surprised as to what you find.
F. People who are sick or who have been exposed to disease so that they can give proper treatment.
G. Before making a decision.
H. Unless you have read Charles Dickens.
I. is the amount of fresh snow at the ski area.
J. you might want to consider changing your mind.
K. If we are going to understand polls and surveys.
L. By adding all the data together and then dividing by the number of data in the set.
M. Has already been provided by my lawyer.
N. In order to find the median.
O. You might solve the crime.
P. To mean “methods.”
Q. Instead teach by example.
R. Against bias.

ANSWERS

1/O 2/C 3/M 4/H 5/I 6/K 7/L 8/N 9/D 10/Q 11/E 12/G 13/P 14/F 15/R 16/J 17/A 18/B

Word & Definition Match

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

useful	*illustrating a rule or method*	*to establish*	*the middle value of a list of data*	*a representation of something*
a number that represents a quantity	*to reach by reasoning*	*something that can change*	*tends to prove or disprove something*	*to inspect closely*
the most common result in data	*to break down into parts to make an analysis*	*genuine*	*to examine two or more objects*	*a tendency*
	a particular procedure	*to measure the center of data*	*written works*	

1. analyze	2. model	3. pertinent	4. literature	5. variable
6. static	7. mean	8. median	9. mode	10. example
11. compare	12. examine	13. methodology	14. identify	15. bias
	16. evidence	17. authentic	18. deduce	

Which Belongs?

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

1. If you analyze/model a situation, you look at it from multiple angles and try to figure out what is happening and why.
2. A bias/model is a representation of the real thing.
3. Pertinent/model information is information that is timely, relevant, and important.
4. One can consult the literature/statics to find similar findings about this topic.
5. If something can change or vary over time or between individuals we call it a variable/static.
6. If we statically/authentically analyzed the high school student body we would proba bly find many characteristics that are closely linked to high SAT scores.
7. The mode/mean is greatly affected by outliers, but only if they present (or more heavily represent) on one side of the data set.
8. It is important to order (from least to greatest or greatest to least) your data set before trying to find the mean/median.
9. If no data points are repeated there is no median/mode.
10. Math teachers often work through examine/example problems on the board for students to follow along.
11. It is difficult to compare/analyze since they are in different weight classes, but one could say that Joe is a better wrestler than Ben because he is in better shape, has bet ter technique, and is smarter on the mat.
12. If you examined/model the toad carefully you will find that it has two tiny white patches on its head.
13. The team's methodology/literature was faulty, so their experiment was a failure.
14. The victim was asked to evidence/identify his attacker in a police line-up.
15. One's upbringing, culture, religion, class, and other influences can bias/deduce them so much that they are not even aware of it.
16. There is no mode/evidence for your theory, so I can easily dismiss it.
17. If a test is biased/authentic it will actually test what you are trying to test.
18. I can compare/deduce the location of the caribou by considering seasonal migration patterns.

ANSWERS

1. analyze, 2. model, 3. pertinent, 4. literature, 5. variable, 6. statically, 7. mean, 8. median
9. mode, 10. example, 11. compare, 12. examined, 13. methodology, 14. identify, 15. bias
16. evidence, 17. authentic, 18. deduce

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. If you analyze a situation, you
   - (a) look over the information quickly.
   - (b) carefully consider all of the evidence before coming to a conclusion.
   - (c) come to a conclusion before even looking at the evidence.

2. A model of the solar system would
   - (a) not fit in a classroom.
   - (b) be bigger than the solar system.
   - (c) be smaller than the solar system.

3. If the detective thought the information you possessed was pertinent, he would
   - (a) arrange a time to talk with you.
   - (b) avoid you at all costs.
   - (c) meet with you, but not ask you about the information you have.

4. How does one contribute to the body of scientific literature?
   - (a) One does a study, submits it to a journal for peer review, and (if all goes well) is published in a scientific journal.
   - (b) One starts an opinion blog online about scientific topics.
   - (c) One writes letters to the editor about scientific topics.

5. When graphing the relationship between two variables, one should put the independent variable
   - (a) On the y axis.
   - (b) On the x axis.
   - (c) On the x or y axis, depending on the situation.

6. Why do scientists study statics?
   - (a) Scientists study statics because it is a required course in college.
   - (b) Scientists study statics because they are citizens, and all citizens study statics so that they can understand the results of political polls.
   - (c) Scientists study statics because they use statics to analyze data and communicate the results of studies.

7. What do mathematicians mean when they use the word "mean" to talk about a set of data?
   - (a) The mean is the middle number in a set of data.
   - (b) The mean is the most common number in a set of data.
   - (c) The mean is the number you get when you add up all the data and divide by the number of data you have.

8. If the mean income of a neighborhood is high but the median income of the same neighborhood is low, you could deduce that
   - (a) There are a few people (or even one person) in the neighborhood who are making a lot more money than the others, which is pulling up the mean.
   - (b) Everybody in the neighborhood makes about the same amount of money.
   - (c) The income of everyone in the neighborhood is high, much higher than the median income.

9. If there are no data points in a set of data that repeat, there is no
   (a) Mean
   (b) Median
   (c) Mode

10. Why do debaters often cite examples in their arguments?
   (a) To distract the audience from their main points.
   (b) To illustrate the points they are trying to make.
   (c) To give their opponent something to think about before their rebuttal.

11. What qualities are important to consider when comparing two cars on the used car lot?
   (a) Price, mileage, and fuel economy.
   (b) Price and color of undercarriage.
   (c) Price, and availability of factory upgrades.

12. If you examine a leaf closely you will find that it has tiny holes in it, which botanists call
   (a) Stomatacysts
   (b) Stomata
   (c) Stomates

13. In the section titled “Methodology” the scientists will probably discuss
   (a) How they did their study.
   (b) Why they did their study.
   (c) What their data showed.

14. Forensic scientists can identify an individual by several means, but they cannot do this (yet) by
   (a) Fingerprinting.
   (b) DNA matching.
   (c) Heat signature.

15. Why do talk shows invite guests with strong biases regarding the topics that are up for discussion?
   (a) They are hoping for a smooth, agreeable discussion that will sooth viewers.
   (b) They are hoping for a lively, opinionated discussion that will attract viewers.
   (c) They are hoping for a reasoned, rational discussion that will educate viewers.

16. In court, as in science, if you have no evidence you have no
   (a) Case.
   (b) Sentence.
   (c) Peer Review.

17. What is the probability that the Rolex watch that my cousin bought for $15 from a street vendor in New York City is authentic?
   (a) 95%
   (b) 50%
   (c) Less than 50%

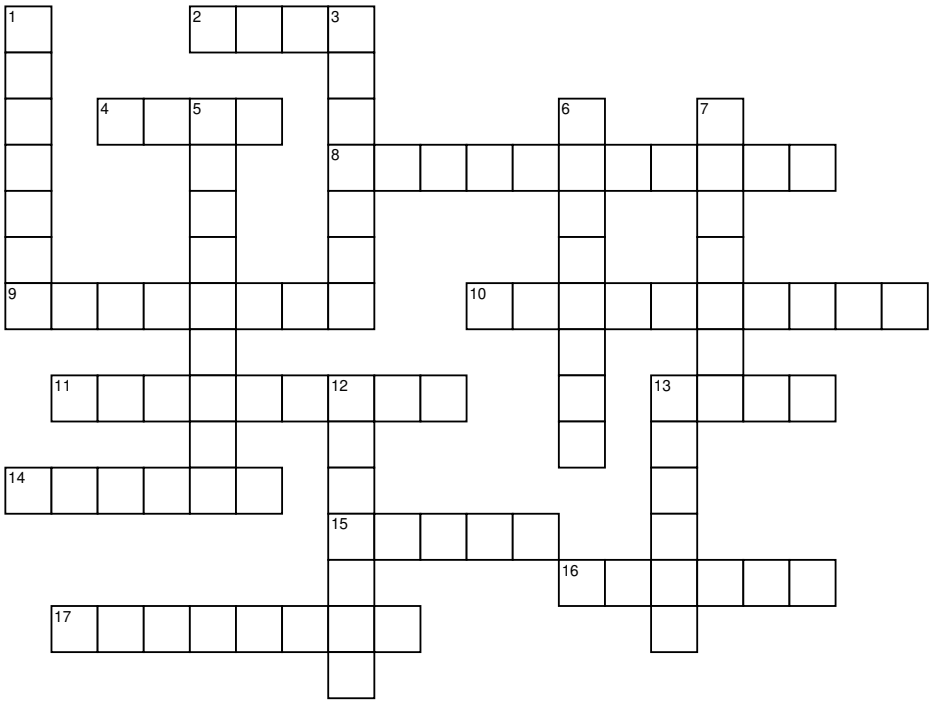
ANSWERS
1. b, 2. c, 3. a, 4. a, 5. b, 6. c, 7. c, 8. a, 9. c, 10. b, 11. a, 12. b, 13. a, 14. c, 15, b, 16. a, 17. c,

STUDENT SUPPORT MATERIALS

Writing

10th A-1 Science as Inquiry + Process

Unit 1



ACROSS

2 the most common data value in a set of data.
4 a tendency, preference, inclination, especially one that prevents unprejudiced consideration of a question.
8 a set or system of methods, principles, and rules for regulating a given discipline, as in the arts of sciences.
9 that which tends to prove or disprove something.
10 the art of written works.
11 Useful, significant, relevant.
13 a common way to measure the center.
14 to derive as a conclusion from something know, to infer from a general principle or to reach by reasoning.
15 a representation of something.
16 a number that represents a quantity, especially one that is computed from a sample.
17 something that can vary or change.

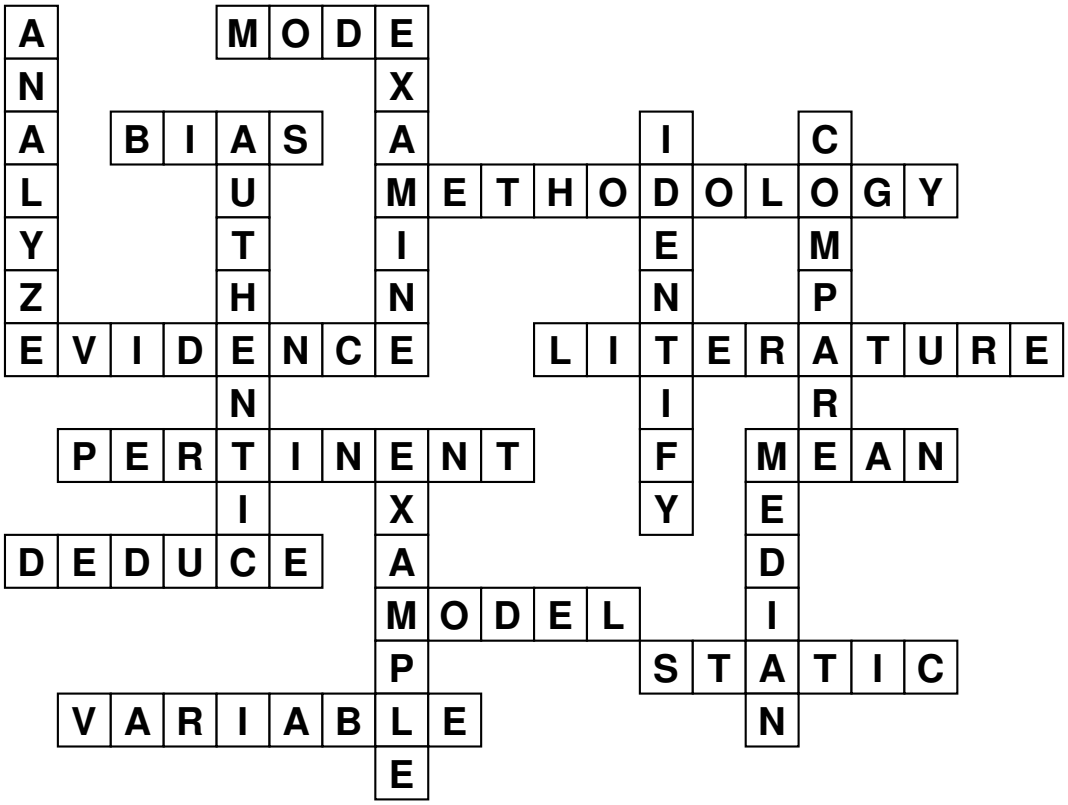
DOWN

1 break down into parts and study closely, examine, make an analysis.
3 to inspect closely, to make a detailed analysis.
5 not false or copied, genuine.
6 to find, retrieve, recognize, or establish.
7 to examine two or more objects, ideas, etc. in order to not similarities and differences.
12 an instance serving for illustration, an instance illustrating a rule or method.
13 the middle value of a list of data if the list has an odd number of items.

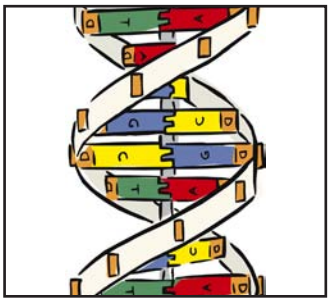
10th A-1 Science as Inquiry + Process

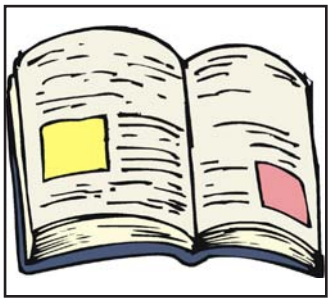
Unit 1

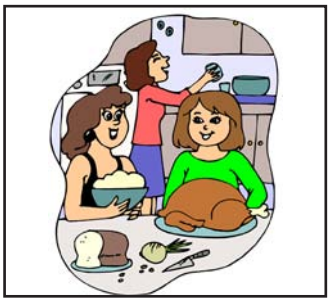
Solution:

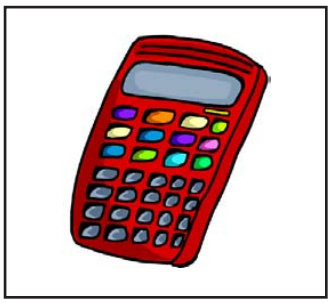


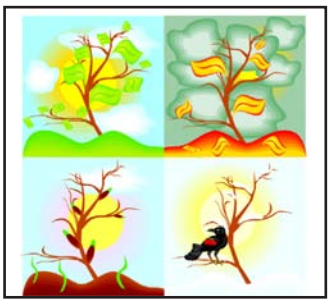
Write The Words!

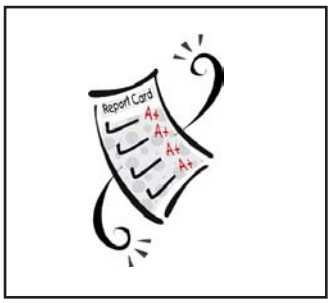


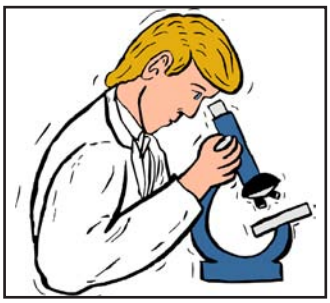












Write the Words!

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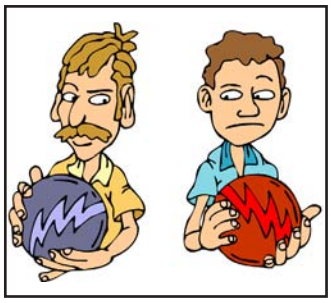

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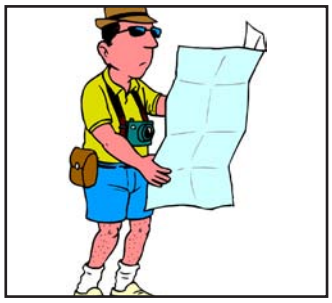

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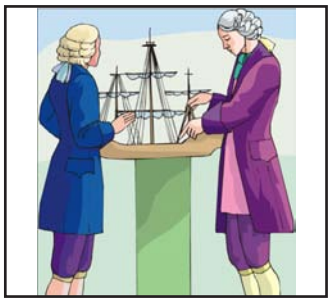

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Complete The Sentence

Have the students write the key words in the blanks.

1. In science, it is important to _____ your data carefully to make sure that your conclusions are accurate.
2. A _____ of the solar system, if small enough, will fit into a classroom; however, the actual solar system would not.
3. It is important to focus on _____ information when making a decision, not information that is insignificant and/or irrelevant.
4. If one examines the scientific _____ carefully one will find many articles written about the subject in question.
5. There are many _____ that affect how well a student does on the SAT, including the amount of sleep the student got the night before and whether he ate breakfast that day.
6. A number that represents a quantity, especially one that is computed from a sample is _____.
7. When we think of an "average" we normally think of the _____, not the median or mode.
8. The _____ of a set of data is the middle value if the list has been put in order from least to greatest or greatest to least.
9. The _____ is a statical measurement of center, even though it is merely the most common number in a set of data.
10. Sometimes a math teacher will do problems in front of the class so that students can learn by her _____.
11. Our living situation has improved much since the hurricane—it is difficult to even _____ where we were right after the hurricane and where we are today.
12. When walking through the security screening at the airport expect to have your carry-on _____ closely by security personnel.
13. Critics can examine your _____ only if you have written every step of your procedure in your report.
14. In television courtroom dramas, the witness is typically asked to _____ the perpetrator by pointing at him/her from the witness stand.
15. Scientists must be aware of their political, cultural, and other _____ when doing science, lest these slanted views impact their findings.
16. Sherlock Holmes, like a good scientist, followed the _____ no matter where it led.
17. If one is an _____ cowboy one can ride a horse, shoot a gun, and handle cattle.
18. If someone was not hurt in a serious car crash it is not fair to _____ that he/she was drunk.

ANSWERS

1. analyze, 2. model, 3. pertinent, 4. literature, 5. variables, 6. static, 7. mean, 8. median, 9. mode, 10. example, 11. compare, 12. examined, 13. methodology, 14. identify, 15. biases, 16. evidence, 17. authentic, 18. deduce

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.

analyze

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model

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pertinent

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literature

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variable

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static

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mean

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median

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mode

Creative Writing Activity Page

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example

compare

examine

methodology

identify

bias

evidence

authentic

deduce

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.

STUDENT SUPPORT MATERIALS

Reinforcement Activities

Balloon Activity

Supplies:

- A packet of yeast
- A small, clean, clear, plastic soda bottle (16 oz. or smaller)
- 1 teaspoon of sugar
- Some warm water
- A small balloon
- 6” piece of string

Methodology:

1. Each student or team needs to write their name on their bottle.
2. Fill the bottle up with about one inch of warm water.
3. Add all of the yeast packet and gently swirl the bottle a few seconds.
4. Add the sugar and swirl it around some more.
5. Blow up the balloon a few times to stretch it out then place the neck of the balloon over the neck of the bottle.
6. Tie the balloon off with a piece of string
7. Let the bottle sit in a warm place for about 20 minutes

Vocabulary application:

1. While the bottle is resting in a warm place for 20 minutes, have the students go online to review literature written about this experiment.
2. Students need to identify the variables.
3. After the balloon has filled with air, students need to examine the result of the experiment and look for evidence supporting the literature.
4. Students should measure the circumference of the balloon while on the bottle and then calculate the mean, median, and mode.
5. Students should analyze and compare each others’ data.
6. Lastly, have students deduce what would happen by changing the variables.

Unit Assessment

Unit 1 Quiz

Grade 10 A1, Unit 1 Quiz

Name: _____
Date: _____

Fill in the Blank: Write the best word in the blanks below for each item. Choose the words from those provided in the Word Bank.

Word Bank		
mean	median	mode
model	static	variable

1) The value of the _____ is computed by dividing the sum of a set of data by the number of data.

2) When you have set of data, the _____ is the most common data value in the set.

3) The _____ is the middle value of a list of data.

4) When there is something that can vary or change it is called a _____.

5) A number that represents a quantity, especially one that is computed from a sample is a _____ number.

6) A scientist or teacher will use a _____ of a volcano as a representation of the real thing, in order to demonstrate volcanic action.

Multiple Choice: From the choices provided for each question, mark the answer that is the most likely correct.

7) The job of a scientist is to _____ data, breaking it down into parts and studying it closely, and make an analysis.

a) survey

b) compare

c) analyze

d) discover

8) Which of the following statements is most likely to be true.

a) To examine is to take a test.

b) To deduce is to infer from a general principle.

c) To identify is to give someone your name.

d) To compare is to only look at differences.

9) A set or system of methods, principles and rules for regulating a given discipline, as in the sciences, and a particular procedure or set of procedures is a/an_____.

a) scientific discovery

b) example

c) methodology

d) identification

10) Which of the following definitions best fits the vocabulary word, TO COMPARE?

a) to examine two or more objects to note similarities and differences

b) to inspect closely to make a detailed analysis

c) to find, retrieve, recognize or establish

11) Which of the following definitions best fits the vocabulary word, TO IDENTIFY?

a) to examine two or more objects to note similarities and differences

b) to inspect closely to make a detailed analysis

c) to find, retrieve, recognize or establish

True/False: Read each of the following statements. Mark each one true or false.

12) LITERATURE refers only to novels and short stories.

a) True

b) False

13) An AUTHENTIC item or artifact has usually been copied from the genuine article.

a) True

b) False

14) When someone has a BIAS it means they have information that prevents them from being unprejudiced about an issue.

a) True

b) False

15) PERTINENT is another word for useful or relevant.

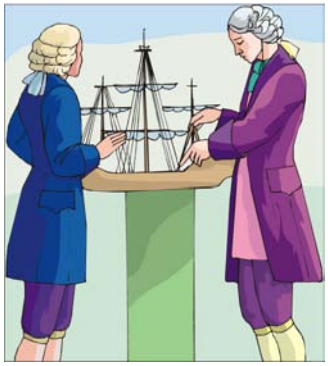
a) True

b) False

Illustration Section: For the following items, questions will refer to illustrations representing key vocabulary words.

16) Illustrate the word **EVIDENCE** in the space provided below.

17) Look at the two illustrations below. Label one illustrations as **Examine.** Label the other as **Example.**



Example

Examine

Grade 10 A1, Unit 1 Quiz

Name: _____
Date: _____

Fill in the Blank: Write the best word in the blanks below for each item. Choose the words from those provided in the Word Bank.

Word Bank		
mean	median	mode
model	static	variable

1) The value of the **mean** is computed by dividing the sum of a set of data by the number of data.

2) When you have set of data, the **mode** is the most common data value in the set.

3) The **median** is the middle value of a list of data.

4) When there is something that can vary or change it is called a **variable**.

5) A number that represents a quantity, especially one that is computed from a sample is a **static** number.

6) A scientist or teacher will use a **model** of a volcano as a representation of the real thing, in order to demonstrate volcanic action.

Multiple Choice: From the choices provided for each question, mark the answer that is the most likely correct.

7) The job of a scientist is to _____ data, breaking it down into parts and studying it closely, and make an analysis.

a) survey

b) compare

c) analyze

d) discover

8) Which of the following statements is most likely to be true.

a) To examine is to take a test.

b) To deduce is to infer from a general principle.

c) To identify is to give someone your name.

d) To compare is to only look at differences.

9) A set or system of methods, principles and rules for regulating a given discipline, as in the Sciences and a particular procedure or set of procedures is a/an._____.

a) scientific discovery

b) example

c) methodology

d) identification

10) Which of the following definitions best fits the vocabulary word, TO COMPARE?

a) to examine two or more objects to note similarities and differences

b) to inspect closely to make a detailed analysis

c) to find, retrieve, recognize or establish

11) Which of the following definitions best fits the vocabulary word, TO IDENTIFY?

a) to examine two or more objects to note similarities and differences

b) to inspect closely to make a detailed analysis

c) to find, retrieve, recognize or establish

True/False: Read each of the following statements. Mark each one true or false.

12) LITERATURE refers only to novels and short stories.

a) True

b) False

13) An AUTHENTIC item or artifact has usually been copied from the genuine article.

a) True

b) False

14) When someone has a BIAS it means they have information that prevents them from being unprejudiced about an issue.

a) True

b) False

15) PERTINENT is another word for useful or relevant.

a) True

b) False

Illustration Section: For the items, questions will refer to illustrations representing key vocabulary words.

16) Illustrate the word **EVIDENCE** in the space provided below.

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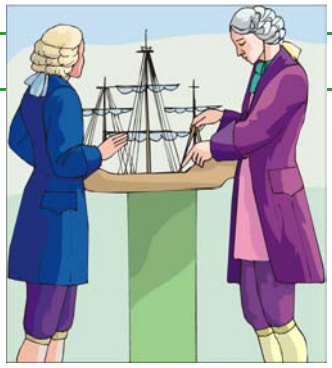

Example

Examine