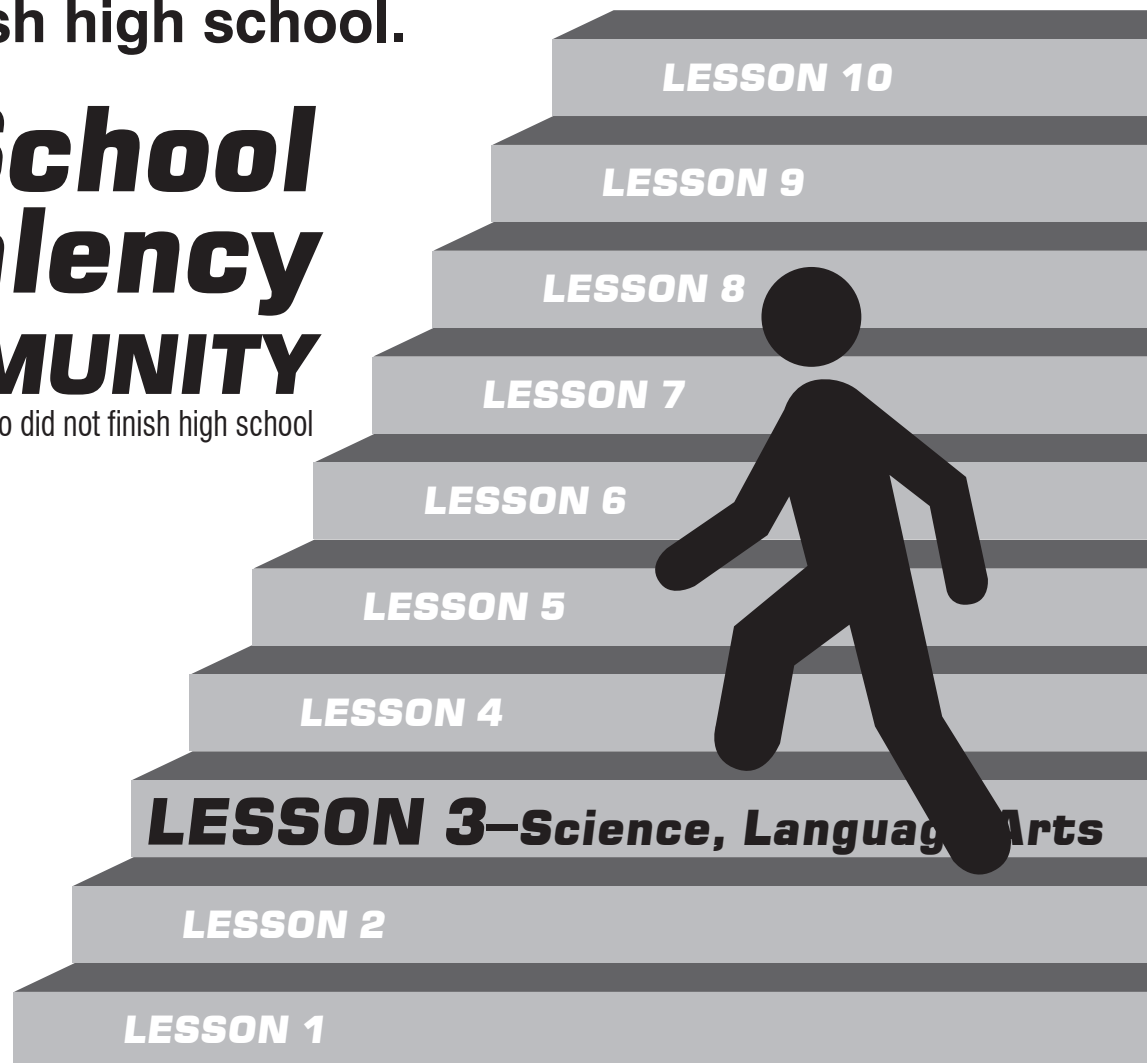


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**Third Step—
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LESSON 3

Science



Test takers will be tested on three areas of Science: Life Science, Physical Science, and Earth and Space Science. Being familiar with scientific concepts and vocabulary will be helpful when taking the test. The test will consist of multiple choice, drag and drop, hot spot, fill in the blank, drop down selection, short answer and two different, 10-minute extended responses.

Vocabulary to Know

Environmental Science—the branch of science concerned with the physical, chemical, and biological conditions of the environment and their effect on organisms

Environment—the conditions that surround someone or something; the conditions and influences that affect the growth, health, progress, etc., of someone or something: the natural world

Renewable energy—An energy that comes from resources which are continually replenished such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy does not include energy resources derived from fossil fuels, waste products from fossil sources, or waste products from inorganic sources.

Nonrenewable energy—An energy that comes from a finite resource. An example is carbon-based, organically-derived fuel. The original organic material, with the aid of heat and pressure, becomes a fuel such as oil or gas. Fossil fuels (such as coal, petroleum, and natural gas), and certain aquifers are all non-renewable resources. Metal ores are other examples of non-renewable resources.

Fossil Fuel—a fuel (such as coal, oil, or natural gas) that is formed in the earth from dead plants or animals

Biodiversity—the existence of a variety of plant and animal species in their natural environment, which is the aim of conservationists concerned about the destruction of rainforests and other habitats

LESSON 3

Science



ASSIGNMENT 1

DIRECTIONS

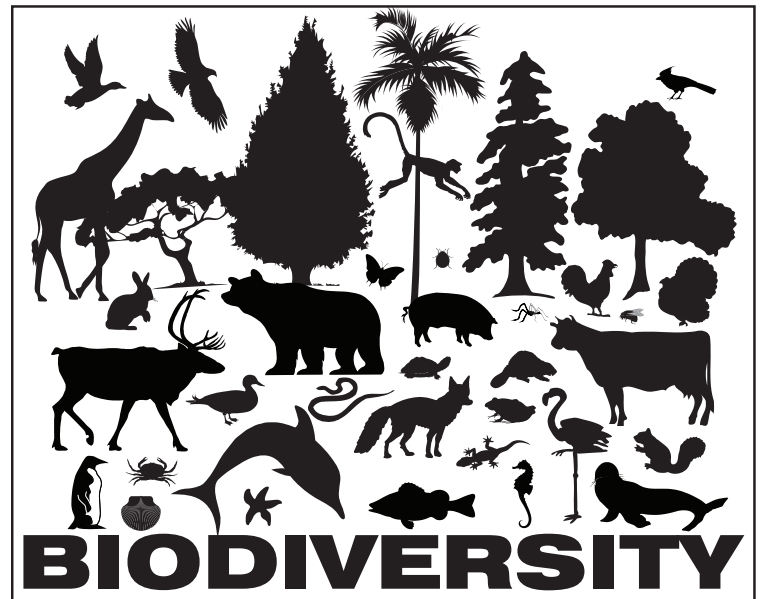
Read the following passage and answer the questions that follow. Circle your answer. You will need to use a separate sheet of paper for questions 8-10.

Changes in Biodiversity

Hundreds of years ago, before North America was split up according to states and countries, native populations lived in the many varied areas of the continent. There were jungles, forests, river lands, dry prairies, wetlands, and many other types of geographies where people lived. There were no cities as we know them today. Humans lived in tune with nature, relying on their surroundings to build shelters, hunt and gather food, and create forms of exchange (for example, shells found on beaches could be traded for animal skins).

Each Native American tribe was attuned to the specific land on which they lived, and had certain customs that utilized their land to the utmost. Native Americans living in what is now known as the Midwest relied on hunting large animals like bison for their meat and their skins. Their meat provided an important source of nourishment for many tribes, and their skins were a valuable material that was used in the production of clothes and teepees, a type of shelter. Other tribes who lived on the eastern coast of North America made extensive use of the forests there, trapping small animals and game (like deer) that lived among the trees, and farming hearty foods that could handle the changes in weather, like corn. Still other tribes, who lived in the deserts of what is now Arizona, built homes in the rocky cliffs and hills for protection.

The variety of plant and animal life in these specific environments is called biodiversity. The tribes who lived in what is now known as Seattle



fished salmon, while the tribes who lived in what is now known as Maine caught crabs and lobsters. As you can see, even though each group relied on seafood, the type of fish they ate was dependent on the type of fish that was available to them. At the time we are thinking about, if you lived in Seattle, there were no restaurants you could go to and order lobster!

Now think for a moment about what this means. Let's say one year, a pod of whales were unable to go to their usual feeding area in Alaska because a school of sharks was inhabiting those waters during the whales' feeding time. So, looking for other sources of food, the whales swam down towards Seattle and noticed a large population of salmon. They ate all the salmon and, full and content, swam away to their next destination. The next week, the human tribes living in Seattle go to where the salmon usually are in order to get the first big catch of the season, and they find that no salmon are there. Instead of catching salmon, a staple of their diet, the humans must find another food source: their habitat has changed, and now the humans, like the whales before them, must adapt to their new situation.

This brings us to the very important idea of the ecosystem. An ecosystem is a very complex and delicate arrangement of plants and animals that

LESSON 3

Science



provide nourishment for each other in a variety of ways. If one part of the ecosystem changes or is disrupted, it can affect the entire workings of an environment.

A more recent example of changes in an ecosystem involves the use of pesticides. When American farmers began using pesticides (chemical insect-repellants) to get rid of bugs that decimated entire harvests of crops, they had no idea what the consequences would be—or whether there would be any consequences. As scientists began to study how people used certain types of chemicals for certain types of crops, they learned that there are some pesticides that are not just harmful for insects—they are harmful for humans too, and were making many people sick after they had eaten the crops that had been sprayed with those pesticides. With this knowledge, scientists were able to develop other pesticides that were less harmful for humans but were still useful in getting rid of the bugs that liked to eat humans' important crops. As you can see, the changes that humans made in the ecosystem—the biodiversity that the humans cut down on by making sure the insects left the plants alone—needed to be studied carefully so that the changes made were sure to be beneficial.

- 1. What does biodiversity refer to?**
 - A. chemical replants that are used to get rid of bugs
 - B. the scientific study of an ecosystem
 - C. the variety of plant and animal life in an environment
 - D. the large population of salmon that live near Seattle
- 2. What does the author explain in the passage?**
 - A. the author explains the terms “biodiversity” and “ecosystem,” giving examples of each
 - B. the author explains the terms “tribe” and “Native American” without giving any examples
 - C. the author explains the terms “pod,” “school,” and “wetlands,” giving two examples of each
 - D. the author explains the terms “nourishment” and “chemical” without giving any examples
- 3. Changing one part of an ecosystem can affect other parts of the environment where the change is made. What evidence from the passage supports this statement?**
 - A. Native Americans who lived in what is now known as the Midwest hunted large animals like bison.
 - B. Tribes who lived in the deserts of what is now Arizona built homes in the rocky cliffs and hills.
 - C. When American farmers began using pesticide to harm bugs, they harmed humans as well.
 - D. Tribes on the West Coast of North America fished salmon, while tribes on the East Coast caught crabs and lobsters.
- 4. Based on the information in the passage, what can the reader conclude about biodiversity?**
 - A. There was very little biodiversity in North America before it was split up into states and countries.
 - B. There was a lot of biodiversity in North America before it was split up into states and countries.
 - C. Biodiversity cannot be affected by human activity.
 - D. Biodiversity cannot be affected by changes to the ecosystem.

LESSON 3

Science



5. What is this passage mainly about?

- A. different Native American tribes and the ways in which they obtained food
- B. natural environments and the way changes can affect those environments
- C. pesticides used by farmers and the harmful effects of those pesticides on humans
- D. a pod of whales that cannot go to its usual feeding area in Alaska because of sharks.

6. Read the following sentences: “An ecosystem is a very complex and delicate arrangement of plants and animals that provide nourishment for each other in a variety of ways. If one part of the ecosystem changes or is disrupted, it can affect the entire workings of an environment.” What does the word *environment* mean?

- A. a species of plant or animal
- B. a group of Native Americans living in the same place
- C. the damage that humans can do to their surroundings
- D. an area where things live

7. Choose the answer that best completes the sentence below.

Native Americans living in what is now known as the Midwest hunted large animals; _____, Native Americans living on the eastern coast caught small animals.

- A. on the other hand
- B. as a result
- C. as an illustration
- D. most importantly

DIRECTIONS

Answer questions 8-10

using *complete sentences*. Write your answers on a separate piece of paper.

The ability to write clearly will be part of your grade on the extended responses.

- 8. What happened when American farmers started using pesticides to get rid of bugs?
- 9. According to the passage, how could a pod of whales being unable to go to their usual feeding area affect humans? Be sure to describe the full chain of events in your answer.
- 10. Suppose that people living by a lake decided to put a chemical in the water to get rid of a certain type of fish in the lake. Would that action be likely to affect other living things in that environment? Use evidence from the passage to explain why or why not.

“Your time is limited; don’t waste it living someone else’s life. Don’t be trapped by dogma, which is living the result of other people’s thinking. Don’t let the noise of other’s opinion drown your own inner voice. And most important, have the courage to follow your heart and intuition, they somehow already know what you truly want to become. Everything else is secondary.”

—STEVE JOBS

LESSON 3

Science



ASSIGNMENT 2

The GED Science test will require test takers to read charts, graphs, and tables to answer questions. Use the charts, as well as the *Vocabulary to Know*, to answer the next four multiple choice questions.

The following chart is a brief summary of risks and benefits of various energy sources.

TYPE OF ENERGY	RISKS/HEALTH ISSUES	BENEFITS
Nuclear Energy	Exposure to radiation during and after an accident. Nuclear waste is a health risk and problem.	Cleaner "burning" than fossil fuels.
Fossil Fuels and Natural Gas	Air pollution and increase of greenhouse gases.	Relatively inexpensive and easy to obtain.
Fuel Cells	None determined	Preliminary results indicate that an entire fleet of fuel cell transit buses would have the equivalent emissions of one current diesel transit bus.
Photovoltaic Cells	None determined	Very low toxicity Energy is derived from the sun.

DIRECTIONS

Use the chart at the left to answer questions 1 and 2.

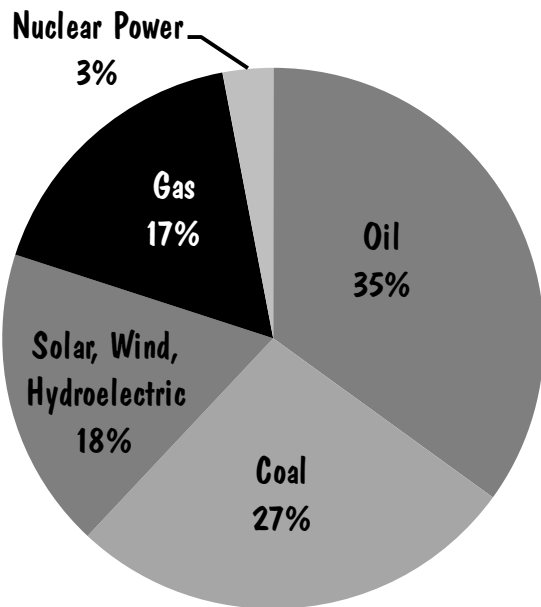
- Which type of energy has the greatest personal and societal risk if a major accident occurs?**

 - A. Nuclear Energy
 - B. Fossil Fuel
 - C. Fuel Cells
 - D. Photovoltaic cells
 - E. Natural Gas
- Based on this information, which source of energy would you suggest using to reduce the emissions from buses used for public transportation?**

 - A. Nuclear energy
 - B. fossil fuels
 - C. Fuel cell
 - D. Photovoltaic cells
 - E. Need more information

LESSON 3

Science



DIRECTIONS

Use the pie graph to answer questions 3 and 4.

3. The chart shows different sources of energy. Which *conclusion* (look at Lesson 2) can be made based on this chart?
- A. Coal is the main source of energy.
 - B. Use of nuclear power is increasing
 - C. Fossil fuels make up over three-quarters of our energy consumption.
 - D. Renewable energy sources are predominantly used.
4. A major problem with depending on fossil fuels as primary energy sources is that they are
- A. Overabundant
 - B. Nonrenewable
 - C. Deep underground
 - D. Nonpolluting

ASSIGNMENT 3

DIRECTIONS

Read the passage and answer the questions that follow. Circle your answer in the multiple choices. Use a separate sheet of paper for the writing.

Is the Earth Getting Warmer?

In 1975, a scientist named Wallace “Wally” Broecker wrote a paper in which he asked a simple question: was the Earth getting warmer? When the paper was published, some of Broecker’s colleagues laughed at him. Many of them believed that the world was actually cooling.

Historically, there have been periods in which the Earth’s temperature has slowly risen and cooled over thousands of years. This is a natural process that can be caused by many factors, including changes in radiation from the Sun, changes in the Earth’s orbit, and volcanic activity.

However, climate change can also be caused by changes in the amount of certain gases in the atmosphere. Broecker had noticed that the amount of carbon dioxide—a colorless, odorless gas—was slowly building up. While some carbon dioxide is produced through natural processes, large quantities of it are also produced by humans. Carbon dioxide is generated in especially large amounts when we burn fossil fuels, such as oil, coal, and natural gas. This burning happens when we drive cars, use electricity, and make certain products. When released into the atmosphere, carbon dioxide traps heat. Broecker reasoned that if people produced a lot of carbon dioxide, then enough heat would be trapped that the Earth would begin to warm. He called this “global warming.”

Several decades later, many climate scientists agree with Broecker: the Earth is heating up and humans are largely responsible. This warming process is often referred to as “climate change.” More carbon dioxide is being produced than ever before. Every year, humans produce about

LESSON 3

Science



8 billion metric tons of carbon. 2012 was the hottest year in recorded history. Recently, scientists estimated that more carbon dioxide exists in the atmosphere than has in over three million years.

While scientists understand how climate change works, some of its effects are still difficult to predict. Some scientists expect an increase in so-called “extreme weather” events, such as hurricanes and floods. Others foresee a rise in levels of sea water. While exactly what changes will happen are unclear, Broecker has warned that people should be prepared for some large disturbances. In an interview with the Guardian, a British newspaper, in 2008, he compared the Earth’s climate to a wild animal. Sometimes, when provoked, the animal will react violently and unpredictably.

“If you’re living with an angry beast, you shouldn’t poke it with a sharp stick,” he said.

Why are scientists able to understand some phenomena, like climate change, in a general way, but aren’t able to predict the changes they will have on the Earth? Part of the reason is because many large Earth systems involve “feedback loops”—processes that help amplify (positive feedback loops) or diminish (negative feedback loops) certain changes.

Feedback loops can occur in the climate system, too. If the temperature of the Earth rises, it can change the environment so that it produces even more heat.

There are a number of different ways in which this phenomenon occurs. Scientists who work in the Arctic, at the northern end of the Earth, have been reporting that, every year, more and more floating sea ice melts. In the last 30 years, more than one-third of the ice that appears in the Arctic during the summer has melted away.

This worries scientists because Arctic ice plays an important role in cooling the Earth—although not in the way you might think. While we add ice to our drinks to make them colder, Arctic sea ice cools the Earth in a different way. Ice, which is white colored, reflects light. This means that

much of the sunlight that hits ice bounces off and is sent right back to space. Reflecting light away helps keep the Earth cool.

However, as the Earth heats up, ice begins to melt. As ice melts, this reveals more of the darker-colored land or ocean water, which doesn’t reflect heat, but absorbs it. So, less light is reflected back into space, causing the climate’s temperature to increase. As the world gets hotter, this causes the ice to melt even faster. This increase in temperature causes still more ice to melt, which causes the world to get hotter, etc... This is an example of a positive feedback loop, in which heat produces more heat.

Similarly, there are other climate systems that can get caught in feedback loops. There are many gases that, like carbon dioxide, contribute to global warming. Some of these gases are trapped in the frozen tundra across Alaska, Canada, Russia, and other northern lands. This soil, whose temperature is below freezing, is called permafrost. When permafrost melts, much of this gas is released into the atmosphere. This causes the atmosphere to warm up, which melts more permafrost, which heats up the atmosphere, etc... Again, a feedback loop ensues, in which a warm climate leads to the creation of an even warmer climate.

A more complex example of a similar phenomenon involves the Amazon rainforest. When temperatures rise, the rainforest experiences more droughts and wildfires. This causes more trees to burn down. Just as when humans burn fossil fuels, the burning of trees causes large amounts of carbon dioxide to be released into the world. Trees play two important roles in preventing global warming: they help absorb carbon dioxide, which prevents it from trapping heat in the atmosphere, and rainforest trees help pump water into the atmosphere. When trees burn down, less water is pumped into the atmosphere, which leads to less rainfall, which leads to more trees burning—which leads to more carbon dioxide being produced. These are both examples of

LESSON 3

Science



positive feedback, but feedback can be negative too. When negative feedback occurs, an original effect is diminished.

Both positive and negative feedback loops can occur in all kinds of Earth systems, not just in a system related to the climate. For example, the relationship between different species of animals is a kind of system as well. Periodically, the populations of certain animals will wax and wane. In some cases, the population of a species can become stuck in a negative feedback loop. This can occur if a predator becomes too powerful and its prey becomes too weak. For example, in the early 19th century, humans began hunting a species of bird known as passenger pigeons. Soon, fewer birds existed, which made it more difficult for the species to mate. As mating declined, fewer birds were born, which made it still more difficult for the birds. This created a negative feedback loop in which the population of the birds continued to fall until they are now extinct.

While scientists understand some of how these feedback loops work, they lack a deep knowledge of them, making them extremely unpredictable. This is because, like any complex system, these feedback loops include many variables. Many of these systems are also interdependent, which means that many of these feedback loops affect each other. For example, when permafrost melts, it makes the whole world hotter, not just the area around the permafrost. And these changes are not just limited to temperature. Changes in the amount of rainfall an area receives can lead to changes in its atmosphere. This, in turn, can affect the Earth's temperature, which can affect how much ice melts, which can affect how much rain falls, and so on. So, a small change to a very complex system can lead to very big consequences. This makes predicting the behavior of large systems incredibly difficult.

Some skeptics about climate change point to this uncertainty as a way of casting doubt on whether the world is actually warming. However, being unable to predict the effects of climate

change does not mean that it is not happening. Think back to Broecker's analogy. If you poke a wild animal with a sharp stick, you may not be able to guess exactly how it will react. However, even if you don't know precisely what the animal will do—it may bite you or scratch you or just growl—it's still a very bad idea to provoke it.

Scientists continue to debate exactly what happens as the Earth's temperature rises. Among the most popular ideas are that dry areas will become increasingly dry, while wet areas will become increasingly wet; oceans, seas, and lakes will rise; and glaciers, ice caps and snow-covered areas will become smaller. However, many climate scientists agree that a potential way of reducing the effects of climate change is to cut down the amount of carbon dioxide in the atmosphere.

- 1. According to the passage, which gas is generated in especially large amounts when we burn fossil fuels?**
 - A. carbon dioxide
 - B. methane
 - C. carbon monoxide
 - D. sulfur dioxide
- 2. The increase of carbon dioxide in the atmosphere has had which effect on the Earth's climate?**
 - A. Average rainfall has decreased.
 - B. Extreme weather has become less common.
 - C. The Earth's temperatures are rising.
 - D. The Earth's temperatures are falling.

LESSON 3

Science



3. Arctic ice plays an important role in cooling the Earth. Which evidence from the passage best supports this statement?
- A. In the last 30 years, more than one-third of the ice that appears in the Arctic during the summer has melted away.
 - B. Arctic ice reflects the Sun's light.
 - C. When Arctic ice melts, it reveals more of the darker-colored land or ocean water.
 - D. Darker-colored land absorbs the Sun's light, causing the climate's temperature to increase.
4. Some of the gases that contribute to global warming are trapped in permafrost. When permafrost melts, many of these gases are released into the atmosphere. This leads to an increase of the atmosphere's temperature, which causes more permafrost to melt.
- What type of feedback loop is this an example of?
- A. negative feedback loop
 - B. complex feedback loop
 - C. both a positive and negative feedback loop
 - D. positive feedback loop
5. What is the main idea of this passage?
- A. Climate change is a complex and unpredictable process involving feedback loops.
 - B. Disagreements about climate change have prevented scientists from finding real solutions to global warming.
 - C. Wallace Broecker's theory may have been incorrect, but he presented some worthwhile ideas.
 - D. Climate change can be completely reversed if carbon dioxide production is changed.
6. Read the following sentences: "Some scientists expect an increase in so-called 'extreme weather' events, such as hurricane and floods. Others foresee a rise in levels of sea water."
- Which word could best replace "foresee" as used in this sentence?
- A. forecast
 - B. glimpse
 - C. pretend
 - D. discover
7. Choose the answer that best completes the sentence below.
- Trees play important roles in preventing global warming, _____ absorbing carbon dioxide and pumping water into the atmosphere.
- A. thus
 - B. finally
 - C. as a result
 - D. including
8. How does carbon dioxide increase the Earth's temperature?
9. What is a feedback loop?
10. How can heat produce more heat? Use information from the passage to support your answer.

LESSON 3

Reasoning through Language Arts



Writing–Usage

Test takers will be required to write on The Reasoning through Language Arts, Social Studies, and Science High School Equivalency Test. They will be required to show command and clarity of Standard English conventions, grammar, usage, capitalization, and punctuation.

Most of the time, a writer should use complete sentences. A complete sentence has a subject and a verb. The subject is a noun (a person, place, thing, or idea) or nouns that the sentence is about. The verb tells what the subject is doing. A sentence fragment is missing either the subject or the verb. In the sentences below, the simple subject and verb are identified by bold print: The subject is underlined once and the verb twice.

Example:

The little brown dog **ran** quickly across the meadow.

The polka-dot umbrella **is** faded and broken.

My aunt, who just returned from Washington, **likes** to bake apple pies.

ASSIGNMENT 4

DIRECTIONS

Use the information you just read. Underline the simple subject once and the verb twice in each of the following sentences.

1. Alice enjoys an afternoon coffee break.
2. Even though the weather was cold and windy, the theme park was open.
3. The dog in the last cage won the blue ribbon.
4. Human rights will be the topic of the conference.
5. Bus riders, most of whom do not own a car, learn to wait patiently.
6. Honey bees diligently collect pollen for making honey.

ASSIGNMENT 5

When writing, it is important that the subject and verb agree in number. In the present tense, when the subject is singular (just one) most regular verbs take an “s” on the end. However, when the subject is plural (more than one), most regular verbs will **not** take an “s” on the end.

Example:

The **boy rides** his bike in the park.

The subject ‘boy’ is singular, so the verb ‘rides’ takes an “s.”

The **boys ride** their bikes in the park.

The subject ‘boys’ is plural, so the verb ‘ride’ does not need “s.”

DIRECTIONS

Underline the correct verb for each of the following sentences.

1. Ellen take/takes her toys to her room.
2. The librarians make/makes finding a book easy.
3. Carol, Bob, and Deanna want/wants to go to lunch together.
4. The Boy Scout troop go/goes camping in May.
5. The Girl Scouts sell/sells cookies to raise funds.
6. I plan/plans to come to your party.
7. William don’t/doesn’t want any more ice cream.

LESSON 3

Reasoning through Language Arts



ASSIGNMENT 6

Vocabulary is an important tool in your ability to read and to write.

DIRECTIONS

Choose the word that best fits the meaning in the following sentences.

- The villain's henchman was _____, following every degrading command without hesitation or question.**
 - humble
 - freethinking
 - uppity
 - servile
 - modest
- In our system, one must be sworn into office, so, although the candidate won the election in November, he will not become president until he is _____ in January.**
 - Inaugurated
 - Baptized
 - Discharged
 - Established
 - Annulled
- Coleen's knee injury _____ her from furthering her career as a long distance runner.**
 - forbids
 - facilitates
 - precludes
 - nurtures
 - eschews
- Because of her use of convoluted language, the professor failed to _____ her ideas to her students: they later argued that her poor communication skills resulted in confusion and misunderstanding.**
 - bequeath
 - contract
 - commit
 - yield
 - convey
- Leila is _____ reader and has read more than eight books this year.**
 - a careful
 - an avid
 - a casual
 - a reluctant
 - an occasional
- It is _____ that this message be delivered to the general, so be absolutely certain he gets it.**
 - imperative
 - optional
 - intentional
 - adequate
 - Abnormal

LESSON 3

Reasoning through Language Arts



ASSIGNMENT 7

Fact and Opinion

Writers create different kinds of works for different purposes. Drama is written primarily for entertainment. Editorials are written to express an opinion or judgment. The ability to tell the difference between fact and opinion is an important reading skill. **Facts** are things that can be determined to be true. “There are two U.S. senators from each state” is a true statement, a fact. “Senator Smith-Jones should resign her position” is an **opinion** because it expresses the beliefs of a person or group, and others can disagree. It cannot be measured or verified. Many times, key words like *would*, *should*, *could*, *might*, *may*, and *ought* convey a writer’s opinion. Other words that might indicate a judgment or opinion include *good*, *better*, *best*, *bad*, *worse*, and *worst*.

Read through this newspaper’s Opinion/Editorial pages, looking for key words that indicate a writer’s opinion.

DIRECTIONS

The following business report includes some facts and some opinions. Identify each by sentence number on the lines provided.

To Harley Harrison, CEO:

(1) Sales of the Harrison Helicopter Model HH1 have increased over the past year. (2) You should raise sales staff’s commissions so that this trend will continue. (3) When we sell more units, we should be compensated accordingly. (4) Our customers have complained about our delivery charges. (5) Company pilots receive more than they deserve just for flying around in new helicopters. (6) Since I’m your brother, I’m sure you’ll agree with me about these issues.

Sincerely, Charlie Harrison, Sales Manager

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

References

www.readworks.org
www.abspd.appstate.edu

