Identify Problem and Solution

SCIENCE CONTENT TOPICS: ES.a.1, ES.a.2, ES.a.3, ES.b.3
SCIENCE CONTENT PRACTICES: SP.1.a, SP.1.b, SP.1.c, SP.3.a, SP.3.b, SP.3.c, SP.4.a, SP.6.c

1 Learn the Skill

Sometimes, the presentation of scientific material is organized around a **problem** and its **solution**. Authors may state problems and solutions, or you might have to make inferences to recognize them. When you **identify problem and solution**, you determine what problems or solutions an author is presenting.

Identifying problem and solution lays a foundation for thinking more critically about topics. You strengthen your understanding of science concepts and their implications by analyzing problems and evaluating solutions.

2 Practice the Skill

By practicing the skill of identifying problem and solution, you will improve your study and test-taking abilities, especially as they relate to the GED® Science Test. Read the passage below. Then answer the question that follows.

SAVING SOIL RESOURCES

Soil might seem like just the dirt beneath our feet, but soil is one of Earth's most important resources. Soil is necessary for plant life and, therefore, is necessary for the survival of all animals, including humans. Because soil takes a long time to form, it is basically a nonrenewable resource. Yet we lose millions of acres of farmland soil each year to erosion. Certain agricultural practices, such as intensive farming on steep slopes, increase erosion. Erosion also increases when forests are cut or fields are cleared of vegetation because of the removal of plant roots that hold soil in place. Still, farmers do have methods to conserve soil. These methods include making terraced fields on steep slopes and limiting the digging up and plowing of fields during planting. Leaving stalks and other crop waste on fields to stabilize the soil also prevents rain from washing soil way. Conservation methods are working in many places, but drought conditions can kill plant cover and again increase soil loss.

a It is important to understand why something is a problem. Here, the opening sentences provide background about the problem the author will identify later.

b You may have to read through much of the text before you are able to identify the problem.

1. Why should people be concerned about the problem of soil erosion?

   A. Soil is necessary for our survival.
   B. Intensive farming increases erosion.
   C. Drought conditions can kill plant cover.
   D. No methods for conserving soil are available.

CONTENT TOPICS

You might think that soil is abundant and forms easily. But a basic part of soil is weathered or broken rock. It can take hundreds of years for even a thin layer of soil to form.

Analyze and Present Arguments

SCIENCE CONTENT TOPICS: ES.a.1, ES.a.3
SCIENCE PRACTICES: SP.1.a, SP.1.b, SP.1.c, SP.3.a, SP.3.b, SP.4.a, SP.5.a, SP.6.a, SP.6.c

1 Learn the Skill

Scientific facts are not subject to interpretation. They are obtained through observation and experimentation. However, scientists and others use facts to support **arguments**, or certain points of view. When you **analyze an argument**, you identify the point being made and evaluate its support. Also, you can use scientific data to express and defend your own perspectives, or **present arguments**.

2 Practice the Skill

By practicing the skill of analyzing and presenting arguments, you will improve your study and test-taking abilities, especially as they relate to the GED® Science Test. Study the information and graph below. Then answer the question that follows.

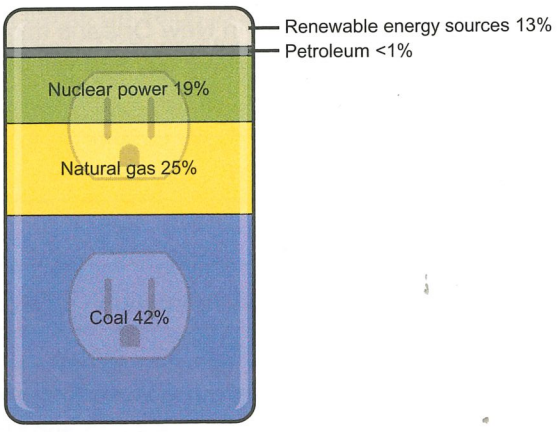
NONRENEWABLE VERSUS RENEWABLE ENERGY

a Information in a reliable source can be used to support a point of view. This information supports an argument for the use of nonrenewable energy resources.

b Some sources contain information that supports more than one point of view. This fact supports an argument for using renewable energy resources.

Almost 90 percent of the energy we use to produce electricity comes from nonrenewable energy sources, such as coal and natural gas. Nonrenewable energy sources are those that are limited in supply. The United States has large reserves of coal and natural gas, so much of the energy we use to light our homes and offices comes from our own mines and wells. This factor is crucial to the movement of the United States toward energy independence. However, nonrenewable energy sources are not a long-term solution for the nation's energy needs. Moreover, the burning of fossil fuels, especially coal, produces carbon dioxide. Most scientists now recognize this gas as a major contributor to climate change. Renewable sources, such as water, the sun's energy, and wind, do not add to atmospheric warming, but today the United States uses these options only sparingly in power plants.

SOURCES OF U.S. ELECTRICITY GENERATION, 2011



TEST-TAKING TIPS

A question may ask you to identify an argument that is based on the material being presented. Read all answer choices carefully, and eliminate any not supported by associated text or graphics.

1. Based on the information, which statement expresses an argument for using renewable energy sources to produce electric power?

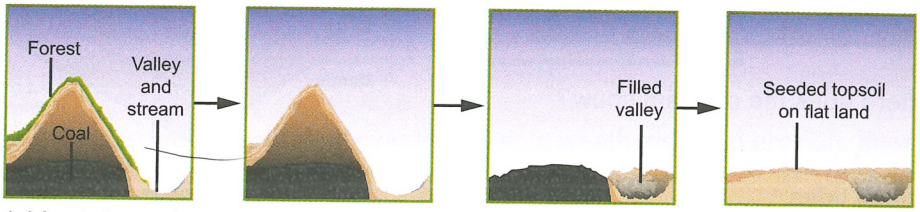
   A. They cost much less than other energy souces.
   B. They are available in limited supplies.
   C. The United States already uses them to produce electricity.
   D. Their uses do not release carbon dioxide.

Spotlighted Item: DRAG-AND-DROP

DIRECTIONS: Study the information and diagram, and read the question. Then use the drag-and-drop options to complete the table.

MOUNTAINTOP-REMOVAL COAL MINING

Mountaintop removal is a very efficient means of strip-mining coal used primarily in Appalachia. Where coal is found deep in mountainous areas, the mountains are blasted away to get at the deposits underneath. The broken rock and dirt is carted away and dumped into nearby valleys. Then huge machines scoop out the coal.



1. A forested mountain has coal inside it.
2. The forest is cut down.
3. The mountain is blasted away, and the rock and dirt are pushed into a valley.
4. After coal is mined, topsoil covers the area. Vegetation is planted on top.

2. People in a community in West Virginia have heard that a company wants to use mountaintop removal to take coal from a nearby mountain. At a town meeting, residents presented arguments for and against mountaintop-removal mining. Determine which drag-and-drop options are pros and which are cons. Then record each argument in the correct column in the table.

Pros	Cons

Drag-and-Drop Options

It provides jobs in an area that badly needs them.	Removal of forests increases erosion on steep slopes, and flooding results.
Diverse forest ecosystems are destroyed and cannot be re-created after mining.	It is safer than mining in deep shafts.
Blasting, mining, and washing the coal can emit unhealthful amounts of coal dust into the air.	It increases domestic supplies of coal, which are preferable to imported oil.

LESSON 6

Express Scientific Information

Use with *Student Book* pp. 92–93

SCIENCE CONTENT TOPICS: ES.b.1, ES.b.3
SCIENCE PRACTICES: SP.1.a, SP.1.b, SP.1.c, SP.5.a, SP.6.a, SP.6.c

1 Review the Skill

Scientific information can be communicated in numerous ways. Certain types of information might be best communicated in one particular way. For instance, scientific data often are best expressed numerically. The ability to **express scientific information** in a variety of ways will help you choose the most effective way to communicate your knowledge and understanding of science concepts.

2 Refine the Skill

By refining the skill of expressing scientific information, you will improve your study and test-taking abilities, especially as they relate to the GED® Science Test. Study the information and graphs below. Then answer the questions that follow.

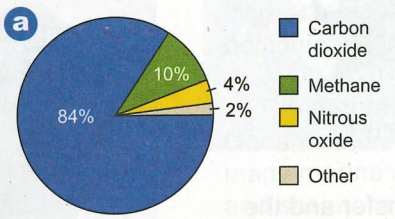
GREENHOUSE GAS EMISSIONS

Greenhouse gases in the atmosphere hold in heat and warm the planet. Some of the release of greenhouse gases into the atmosphere is natural. For example, the burning of forests due to lightning strikes releases carbon dioxide. However, since the start of the Industrial Revolution, human activities have released huge additional amounts of greenhouse gases into the atmosphere through the burning of fossil fuels. Most scientists think that this increase has contributed to a gradual warming of Earth.

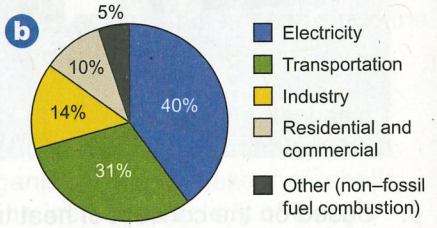
a After interpreting the first graph, you can express scientific information about how individual gases relate to total U.S. greenhouse gas emissions.

b The second graph seems simple but can be interpreted to express a great deal of scientific information.

U.S. GREENHOUSE GAS EMISSIONS, 2010



U.S. CARBON DIOXIDE EMISSIONS BY SOURCE, 2010



1. Expressed numerically, what proportion of greenhouse gases is carbon dioxide, according to 2010 data?

   A. 10 percent
   B. 16 percent
   C. 84 percent
   D. 100 percent

2. Expressed numerically, which proportion of carbon dioxide emissions in 2010 resulted from electricity production, transportation, or industry?

   A. 14 percent
   B. 31 percent
   C. 40 percent
   D. 85 percent

USING LOGIC

When using content from a visual to express scientific information, consider how its parts relate to its main idea or theme. Also, look for ways to compare or connect the individual parts of the visual.

UNIT 3

LESSON 8

Analyze and Present Arguments

Use with ***Student Book*** pp. 96–97

SCIENCE CONTENT TOPICS: ES.a.1, ES.a.3
SCIENCE PRACTICES: SP.1.a, SP.1.c, SP.3.a, SP.3.b, SP.4.a

1 Review the Skill

An **argument**, or point of view about a topic, is only as good as the data that support it. When you **analyze an argument**, you determine whether it is supported by facts from a reputable source. When you **present an argument**, you state and defend a particular point of view. This requires knowledge of both your viewpoint and the one that you will argue against. Therefore, when you present arguments, you must have a comprehensive understanding of the subject in question.

2 Refine the Skill

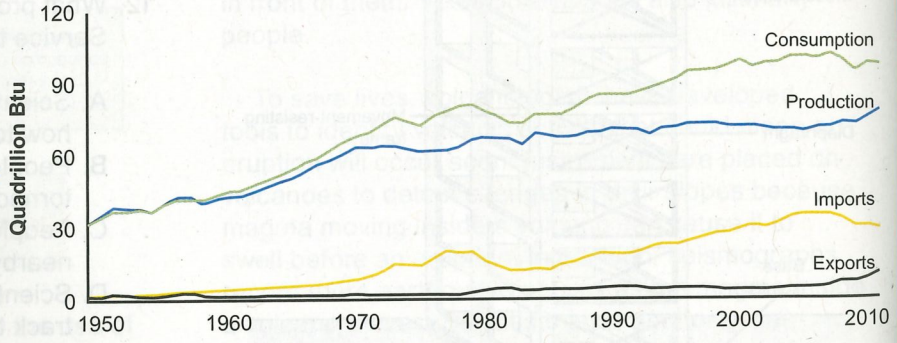
By refining the skill of analyzing and presenting arguments, you will improve your study and test-taking abilities, especially as they relate to the GED® Science Test. Study the information and graph below. Then answer the questions that follow.

ENERGY PRODUCTION AND CONSUMPTION

a References within a passage to other material often direct you to a visual element that adds more detailed information. All available information is important when analyzing or presenting an argument.

For most of the last few decades, U.S. energy consumption has trended upward as shown in the graph below. So has energy production, although its upward trend has not kept pace with that of consumption. For the time being, the United States has adequate supplies of coal and natural gas but largely must import oil, the fossil fuel we use most. An overwhelming amount of the oil consumed is used for transportation—in cars, airplanes, trains, and trucks.

b Graphs often show trends that support arguments. This graph not only shows a contrast between the energy produced and consumed but also shows that comparison as a trend over several decades.



1. Which argument is **best** supported by the data presented?

   A. Increase U.S. imports of oil.
   B. Strengthen air pollution regulations.
   C. Decrease prices of imported oil.
   D. Design vehicles with better gas mileage.

2. Which statement **best** supports an argument in favor of the use of renewable energy sources?

   A. The United States has adequate supplies of coal and natural gas.
   B. Most oil consumed is used in transportation.
   C. Energy consumption continues to trend upward.
   D. Energy production continues to trend upward.

USING LOGIC

You sometimes will find that all answer options are true statements. Look for the one that is most useful in supporting the argument in question, and eliminate the others.

UNIT 3

3 Master the Skill

DIRECTIONS: Read the passage. Then read each question, and choose the **best** answer.

MOVING TAR SANDS

The United States uses about 20 million barrels of oil each day. Much of this oil is supplied by countries overseas. However, an enormous supply of oil exists in Canada, in the form of tar sands. Tar sands are sandy goo that is part petroleum and part gritty sediment.

Plans are in place to build a new 1,700-mile-long pipeline to bring the tar sands from Alberta, Canada, to Texas. Some people view the presence of a massive oil supply in a friendly neighboring country as good news. Others worry about the proposed path of the pipeline across the Ogallala Aquifer, a huge groundwater source that provides water to millions of people for drinking and farming. They worry that a leak in the pipeline would pollute the aquifer. However, pipeline supporters state that there are safeguards that make such leaks unlikely.

3. What would be an appropriate source to use to obtain unbiased information for presenting an argument about the tar sands pipeline?

   A. American Tar Sands Association
   B. Citizens Against the Keystone Pipeline
   C. Students to Support a Clean Ogallala
   D. U.S. Department of Energy

4. Which detail from the passage would **best** support an argument in favor of building this particular pipeline?

   A. Petroleum can be obtained from the sands.
   B. Safeguards likely will prevent leaks in the pipeline.
   C. The oil supply is in a friendly neighboring country.
   D. The United States uses about 20 million barrels of oil each day.

5. Which detail from the passage would **best** support an argument against the pipeline?

   A. A leak in the pipeline could pollute the aquifer.
   B. Tar sands are part petroleum and part gritty sediment.
   C. The aquifer supplies water to many people.
   D. The United States imports a great deal of oil.

DIRECTIONS: Study the information and photos, read each question, and choose the **best** answer.

CLIMATE CHANGE

For the last few decades, climate scientists have gathered data that support the idea that Earth is warming, largely as a result of human activities such as the burning of fossil fuels. In late 2012, scientists at the National Oceanic and Atmospheric Administration reported that temperatures in the United States that year were the hottest on record. Above-normal temperatures also were recorded each month for a 16-month period from June 2011 to September 2012—another record. Additionally, scientists stated in 2010 that nine of the ten hottest years on record occurred between 2000 and 2010.

Clear signs of climate change also exist in the environment. An example is visible to visitors at Glacier National Park in Montana, as seen in the photographs of a glacier below. The photo on the left was taken in 1913; the photo on the right was taken in 2005.

Photographs by W. C. Alden (left), courtesy of U.S. Geological Survey (USGS) Photographic Library, and Blase Reardon (right), courtesy of USGS

6. What do the photographs show to provide useful evidence in making the argument that Earth is warming?

   A. The glacier was very small in 1913.
   B. The glacier has shrunk over the years.
   C. The glacier is in a rocky area.
   D. The glacier is moving downhill.

7. Which situation would provide additional evidence for an argument supporting the idea that climate change is occurring?

   A. the crumbling of mountains around the glacier
   B. the presence of sand dunes in front of the mountain
   C. the absence of the glacier in 2020
   D. a lack of change in the glacier's size by 2015

3 Master the Skill

DIRECTIONS: Study the information and table, read each question, and choose the **best** answer.

TO DRILL OR NOT TO DRILL

The United States uses a tremendous amount of imported oil. As a result, oil companies are always on the lookout for new domestic supplies. An untapped domestic oil supply sits on the Arctic Slope of Alaska, beneath the Arctic National Wildlife Refuge (ANWR). Many people think this supply of oil should be used to help meet the growing energy needs of the United States. Others believe that drilling in ANWR is an environmental risk. The table presents some of the main arguments on both sides of the issue.

For
• It would decrease dependence on foreign oil. • It would create some new jobs. • Only a small part of the refuge would be affected. • It would create revenues for state and federal governments. • It would provide oil to meet the increasing energy needs of the United States.
Against
• It would disturb a sensitive environment. • It would not produce enough oil to be worth the risk. • It is unlikely to lower oil prices. • It does not address the real problem, which is excessively high consumption levels. • A majority of Americans oppose it.

8. Based on the information, what do some people argue is the basic underlying issue related to energy use in the United States?

   A. U.S. oil use is too high.
   B. Few uses for oil exist in the United States today.
   C. The United States depends on foreign oil.
   D. Any extraction of fossil fuels disturbs the environment.

9. Based on the information, which group is **most likely** to support drilling in ANWR?

   A. foreign oil producers
   B. people who prioritize job creation over protection of the environment
   C. environmentalists
   D. people concerned about oil prices

DIRECTIONS: Read the passage. Then read each question, and choose the **best** answer.

HYDROELECTRIC POWER

Hydroelectric dams provide most of the renewable energy used in the United States today. As with any energy source, debate exists over the use of hydropower.

An advantage of hydropower is that it makes use of a free energy source—flowing water—to produce electricity. In addition, hydropower does not emit pollutants into air or water.

However, hydropower requires the construction of large dams that create huge reservoirs behind them. These reservoirs may submerge wide areas that were once farmland, forest, canyon land, or even small towns. The dams affect wildlife, too. On some rivers, they block salmon runs. They also change the environmental conditions of rivers downstream, creating a situation that in turn can negatively affect the aquatic ecosystems that depend on these rivers.

10. Which statement is a valid argument against the construction of a hydroelectric dam?

    A. The dam could threaten the survival of some species of fish.
    B. The dam could produce too much air and water pollution.
    C. The fuel to run a hydroelectric dam is much too expensive.
    D. Hydroelectric dams can be built only where there are no rivers or lakes nearby.

11. Which statement is a valid argument in favor of the construction of a hydroelectric dam?

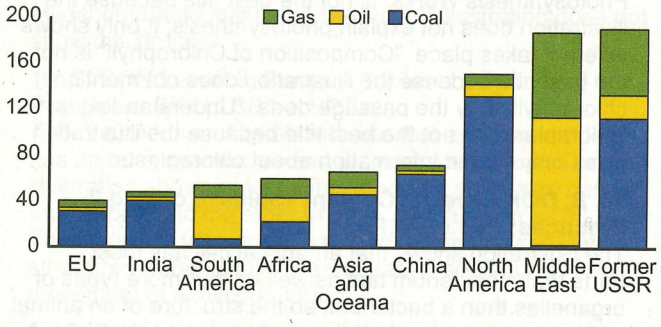
    A. Hydroelectric dams can be built anywhere.
    B. Maintenance of hydroelectric dams is costly.
    C. Hydroelectric dams produce no pollution.
    D. The use of hydroelectric dams has little impact on wildlife.

DIRECTIONS: Study the information and graph, read each question, and choose the **best** answer.

DWINDLING ENERGY RESOURCES

Although some energy experts urge the United States to shift to renewable energy sources, such as wind and solar power, the United States remains one of the world's top five consumers of coal. The country has huge coal reserves, but a drawback of depending on nonrenewable resources is that they are in limited supply and eventually will run out. According to some estimates, at the current consumption rates, U.S. coal could last another 112 years. That is a long time compared to expectations for world petroleum reserves, which could be used up in less than 50 years. Of course, these are just estimates. As countries with large populations, such as China and India, continue to develop and use more energy, reserves of fossil fuels could dwindle even faster.

FOSSIL FUELS RESERVES



12. Which argument is supported by the size of U.S. fossil fuel reserves?

    A. The United States should continue to rely on coal as a major energy source.
    B. Increasing the use of oil will make the United States more energy independent.
    C. Continued use of coal will make the United States more dependent on China.
    D. Increasing the use of natural gas rather than coal is more sustainable for the United States.

13. In which area of the world would data on current fossil fuel reserves **best** support an argument to switch to renewable energy sources?

    A. North America
    B. European Union (EU)
    C. Middle East
    D. China

14. Which idea **best** supports the argument that fossil fuel reserves will dwindle at a faster rate in the future?

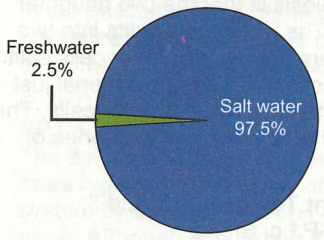
    A. Current estimates are probably wrong.
    B. Fossil fuels will be the only energy sources in the future.
    C. Developed countries will decrease their use of fossil fuels.
    D. Developing countries with large populations will use increasing amounts of fossil fuels.

DIRECTIONS: Study the information and graphs, read the question, and choose the **best** answer.

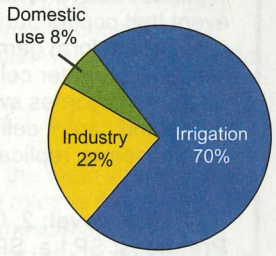
WATER RESOURCES

The graphs below show the percentages of freshwater and salt water on Earth and the uses of freshwater. People use freshwater for certain household (domestic) activities, such as drinking, cooking, and washing. However, most freshwater is used for irrigation. Irrigation is the practice of bringing water to a field through artificial means to grow crops in a place that is otherwise too dry for them. Much of the world's food is grown on irrigated land. Salt can be removed from ocean water through desalination to produce more freshwater. However, this process is expensive.

TOTAL WORLD WATER



BREAKDOWN OF FRESHWATER USE



15. Which argument is **best** supported by the information presented?

    A. Raising crops where they can grow with rainfall alone will conserve water significantly.
    B. Using desalination to produce drinking water will make the biggest impact in water conservation.
    C. To save the most water, restrictions should be placed on factory water usage.
    D. Expanding irrigated land will force people and businesses to conserve water.

UNIT 3