Brady Fotheringham

© 2010 published by WorldCom Publishing Inc.

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission in writing from the publisher.


Desk Copy Request / Information
To place your desk copy request or for more information, please contact the following office:
Tel: (02) 3273-4300  Fax: (02) 3273-4303
Homepage: www.wcbooks.co.kr
CONTENTS

Level 3

UNIT 01
Metal Detectors
- Metal Detectors & Scanners: How They Work ...006
- How CT Scans Help the Military ..................010

Reading Skill: Main Idea

UNIT 02
Respiration
- How the Human Body Breathes ....................016
- Breathing Problems in Large Cities ...............020

Reading Skill: Facts & Details

UNIT 03
Ships
- Ship Design ....................................................026
- America’s Cup: Cutting-edge Boat Design .......030

Reading Skill: Sequence of Events

UNIT 04
Avalanches
- Anatomy of an Avalanche .............................036
- How to Stop Avalanches ...............................040

Reading Skill: Cause & Effect

UNIT 05
Alternative Fuel
- Choosing Between Alternative Fuels ...............046
- Hybrid Cars vs. Electric Cars .......................050

Reading Skill: Compare & Contrast
CONTENTS

UNIT 06
Forensics

Reading Skill: Inference

UNIT 07
Continent

Reading Skill: Analyzing Language

UNIT 08
Inventions

Reading Skill: Writer’s Purpose

UNIT 09
Mummy

Reading Skill: Recognizing Coherence

UNIT 10
Cloud Seeding

Reading Skill: Drawing Conclusions
The main idea is the most important element of a passage. It is the focus of the text. Try and figure out the main theme from the information and details in the passage. Focus on discovering the main idea or topic.

Q. What is the main idea of the passage?

Legendary boxer Mohammed Ali is known all over the world for his World Heavyweight Championship titles. His daughter Laila has taken up boxing, trying to carry on the family tradition. For the past several years, she tried to copy her father’s success in the women’s boxing category, but to no avail.

a. Laila Ali’s boxing technique needs more work.
b. Women’s boxing is not that competitive.
c. Boxing was very difficult for Mohammed Ali.
d. Laila Ali did not succeed at boxing as easily as her father.

Strategy to Answer

In this passage, the main idea centers on Mohammed Ali’s daughter, Laila Ali’s struggle to be recognized as a boxer. The third sentence mentions her lack of success even after several years of boxing. The answer is d.
UNIT 01 | Metal Detectors

Passage 1 Science

Metal Detectors & Scanners: How They Work

Airport Security
Traveling on airplanes is routine for millions of people. Yet most travelers never think about the security precautions that are taken at airports. When people check in at airports, their luggage and carry-on bags have to go through an elaborate screening process. The machines that perform this duty are typically metal detectors or X-ray scanners.

Metal Detectors
The principle of a metal detector is quite simple. Inside the machine are wire coils. A transmitter sends an electronic current through the coils. The current flow goes from clockwise to counterclockwise and back to clockwise again. This current creates an electromagnetic field. The direction of the current flow is reversed several thousand times every second. After a few seconds, this current or pulse slows down and disperses. Any metallic object like keys, coins, a knife or even a cell phone which happens to enter this electromagnetic field will influence the speed of the current. If the pulse hits a metallic object, it will take a few milliseconds longer for the magnetic pulse to go away. This delay sets off an alarm.

CT Baggage Scanners
When a passenger puts their bags through an X-ray machine, they go through a type of electromagnetic energy. Unlike visible light, humans cannot see X-rays. In hospitals, these X-ray energy beams can see through skin tissue to detect broken bones, tumors or other injuries. In an airport, X-ray technology is used in CT (computer tomography) scanners. Suitcases from passengers ride along a conveyor belt and pass through the hollow CT scanning machines. The X-rays bounce off the objects inside the suitcases, measuring the density and mass of each object. All that data is immediately entered into a computer. CT scanners are more complex than metal detectors and can analyze chemical components in addition to metallic objects. If the density and mass of items in the suitcase match...
items that are known to be dangerous, the objects are removed from the suitcase.

**High-tech Scanners**

One limitation of CT scanning technology is that bags are scanned too slowly. This means only bags from suspicious passengers are scanned. Since this is not that effective, newer high-tech systems have been developed that are capable of detecting chemical components in individual items. The X-ray scanners most people see in airports are for screening carry-on bags. But these scanners are too small to scan all the luggage that goes into the cargo section of the plane. In busy airports, large trucks with built-in X-ray scanners (up to 5~7 meters long) are used. These trucks pull up beside containers that hold the suitcases, bags and other cargo. The entire container is scanned at once.

**Glossary**

- **clockwise** in the same direction as the hands of a clock move
- **electromagnetic** created by or relating to electric forces or fields
- **milliseconds** a unit of time that is one thousandth of a second

**Reading Skill Questions**

1. **The main idea of the passage is _____________.**
   a. how magnetic fields are used in everyday life
   b. how an electromagnetic field works
   c. how metal detectors and scanners work
   d. how technology is helpful for our modern life

2. **What is the fourth paragraph about?**
   a. The advantages of small X-ray scanners
   b. How useful CT scanning technology is
   c. How poor airport security is in many airports
   d. How busy airports scan large amounts of baggage
[Comprehension Questions]

1. The word disperses is closest in meaning to ________________.
   a. duplicates
   b. speeds up
   c. scatters
   d. increases

2. How do X-ray scanners actually work?
   a. They detect the quality of suitcase material.
   b. They scan only dense liquids.
   c. They use visible light to detect objects.
   d. They measure the density and mass of an object.

3. What is one disadvantage of CT scanners?
   a. Their X-rays give off too much radiation.
   b. They are too inconvenient for passengers.
   c. It costs double the regular cost of metal detectors.
   d. They scan objects too slowly for a busy airport.

4. Which of the following is NOT true?
   a. Some X-ray scanners see through skin tissue.
   b. Passport data is entered into the X-ray machine’s computer.
   c. At busy airports luggage is screened by built-in scanners.
   d. X-ray scanners can also analyze chemical components in a luggage.

Summary

Fill in the blanks with the right words to complete the summary.

(alarm detect scanned interrupt baggage electromagnetic metal detectors)

Traveling on airplanes means checking in at airports and having your luggage ___________. The machines that perform this duty are typically ___________ or X-ray scanners. The principle of a metal detector involves wire coils, a transmitter and current that creates a(n) ___________ field. Any metallic object that enters this electromagnetic field will ___________ the current and signal a(n) ___________. X-ray or CT scanning technology is used to ___________ the density and mass of objects, even their chemical components. In busy airports, large trucks with built-in X-ray scanners are used to scan large amounts of ___________ at one time.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks using information from the passage.

Main Idea

- **Metal Detector**
  - scan many objects in an airport like suitcases or luggage
  - Principle

- **CT Scanner**
  - scan many objects in an airport like suitcases or luggage
  - Principle

- **High-tech Scanner**
  - use large scanners built into trucks (because CT scanners scan very slowly)
  - Principle
How CT Scans Help the Military

CT Scans

CT scanning machines are routinely used by hospitals and doctors to see straight through human tissue. Based on X-ray technology, invented back in 1895 by a German physicist, CT scans let doctors detect brain tumors, or see broken bones. But recently, the U.S. Army has been using CT scan technology to help determine the cause of death of soldiers who died in the battlefield.

Autopsies

Prior to 2003, the United States military would conduct a basic autopsy on a dead soldier. An autopsy is a forensic examination of a dead body conducted to determine why or how a person died. The family of each soldier wants to know how their son or daughter died while fighting for their country. This involved cutting open a deceased soldier’s body and looking for bullet fragments, shrapnel from land mines or other injuries. Since there are so many ways to die, it often takes many hours for a coroner to discover the cause of death. Autopsies are necessary in potential murder cases. But in the military, the cause of death is almost always due to enemy fire.

Helping the Dead

However, since 2004, every American soldier killed in Iraq or Afghanistan has been scanned. The practice of using CT scans to check dead people’s bodies started in Switzerland a decade ago. It was quickly adopted by the U.S. Military. This has reduced the need for long and laborious autopsies. After a dead soldier’s body is flown back to the U.S., their entire body is put inside a CT scanner. The CT scan results quickly show where a bullet is inside the body. It also reveals broken bones. If a soldier is caught up in a fight with the enemy, they might die from a bullet, rocket launcher, and land mine explosion or maybe their Army vehicle just rolls over, crushing them underneath. By putting the bodies through a CT scanner, the cause of death is discovered more quickly.
Benefits from CT Scans

After each soldier is scanned, the information is kept in a database for reference purposes. After scanning bodies for several years, one radiologist discovered a disturbing trend. By examining the data, he found that many American soldiers were dying from bullet wounds to the upper chest. The information was sent to the manufacturers of body armor equipment. Body armor is protective bullet-proof clothing worn underneath a soldier’s or police officer’s uniform. The radiologist and manufacturer decided to increase the size and length of the body armor for soldiers. Now soldiers are fighting with better equipment.

Glossary
- **autopsy** the examination of a dead body to see how it died
- **coroner** a medical examiner who investigates suspicious deaths
- **bullet-proof** capable of withstanding the impact of a bullet
- **radiologist** a technician who uses X-ray machines to detect diseases

[Reading Skill Questions]

1. **The passage is mostly about __________________.**
   a. why the U.S. Army is fighting in Afghanistan
   b. how CT scans help find lost soldiers
   c. how body armor is manufactured in the U.S.
   d. how CT scans help identify the cause of a soldier’s death

2. **What is the main idea of the last paragraph?**
   a. It’s important to enter data into computers.
   b. Radiologists have a very important job.
   c. CT scan data can help soldiers on the battlefield.
   d. The cost of body armor is too expensive.
[Comprehension Questions]

1. Which of the following is NOT true?
   a. CT scanners can help check tissue cells.
   b. CT technology is used by the U.S. Army.
   c. X-ray technology was invented by a German physicist.
   d. CT scanners are used when recruiting soldiers.

2. Which statement is true?
   a. It’s impractical to detect a bullet with a CT scan.
   b. There is less demand for autopsies now.
   c. The use of CT scans for the dead people’s bodies started in the U.S.
   d. The German Military invented X-ray technology.

3. How is the phrase adopted used in the passage?
   a. To show a practice copied by the U.S. Military
   b. To help give back technology to the Swiss
   c. To explain how the U.S. Military stole secrets from the Swiss
   d. To prepare the Swiss for receiving CT scan documents

4. How did the radiologist discover the trend in chest wounds?
   ➞ __________________________________________

Summary | Fill in the blanks with the right words to complete the summary.
(cause reference coroner autopsies CT scan body armor X-ray technology)

___________ was invented back in 1895 by a German physicist. Based on it, the U.S. Army recently has been using __________ technology to help determine the __________ of death of soldiers. Scanning replaced __________, which often took many hours for a(n) __________ to discover the actual cause of death. The CT scan results quickly show where a bullet is inside a soldier’s body and also reveal broken bones. When each soldier is scanned, the information is kept in a database for __________ purposes. Using the CT scan information, manufacturers of body armor have increased the size and length of the __________.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks using information from the passage.

Main Idea

Paragraph 1
1. CT scans are based on a technology invented in Germany back in the 1800s.
2. Recently, the U.S. Army has started to use scanning technology to see how soldiers died.

Paragraph 2

Paragraph 3

Paragraph 4
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

The car waiting outside the bank seems very **suspicious**.

All new gaming consoles have **built-in** fans to keep them cool.

The **deceased** doctor wished his body would be donated to the hospital.

The lamp shattered into a thousand **fragments** after it was hit by the baseball.

a. a small piece of something  
b. created as a part of a larger structure  
c. dead, late  
d. distrustful, doubtful, unbelieving; feeling that something's wrong

Salt water has a higher **density** than fresh water.

He did an **autopsy** on the unidentified corpse to determine the cause of death.

The most important **component** of your computer is the motherboard.

The **coroner** performed the immediate autopsy, which revealed a heart attack.

You should take every necessary **precaution** before embarking on a major mountain climbing trip.

a. the examination of a dead body to see how it died  
b. a medical examiner who investigates suspicious deaths  
c. a measure taken to ensure safety  
d. the quality of being dense  
e. a part of something

Students at every school are **prohibited** from smoking.

The dogs are used for **detecting** explosives in the airport.

When he spilled his milk, it quickly **dispersed** across the surface of the table.

Before you can **board** your flight, you will have to present your passport one final time.

a. to notice, discover, find  
b. to spread out; to scatter  
c. to enter an airplane or ship  
d. to make something illegal; to ban, forbid, disallow
Facts and details are small pieces of information. You need to remember specific details and essential information within the story. Try to focus on the facts and details mentioned in the passage that can be proven true. Details are sentences that talk about the main idea.

Q. What was so special about the copper penny?

In 2002, an old retired American steel worker bought a couch at a garage sale. One day, he looked under the cushions and discovered some “buried” treasure. The retired 66-year-old found a rare 1943 copper penny that has since been valued at $20,000. The $25 he spent on the couch turned out to be a real investment.

a. The 1943 penny turned out to be worth of $20,000.
b. Old pennies were not acceptable currency anymore.
c. The couch helped preserve the coin to its original.
d. The price of copper had risen by 25 percent since 1943.

Strategy to Answer

In this passage, the third sentence contrasts the $20,000 value of the rare coin with the initial purchase price of the couch at $25. This makes the couch significant since the man realized a huge investment after such a small purchase. The answer is a.
How the Human Body Breathes

**Inhaling Oxygen**
The primary purpose of the respiratory system is to bring oxygen to the lungs and remove any unnecessary gases. Without oxygen, mammals could not breathe, move or turn food into energy. All animals need oxygen to live. This is true whether it is humans who breathe through their mouths, fish who breathe through their gills or reptiles who breathe through their skin. In each case, there is an exchange of gases in the body. The respiratory system in mammals has a passageway that goes from the mouth to the lungs for breathing. It is most commonly called the windpipe.

**Carbon Dioxide**
The respiratory system brings in oxygen through the mouth or nose. Humans breathe in oxygen, approximately 20 times each minute. As air is breathed in, it passes through the back of the nose where dust and gases are filtered. Two tubes branch off from the windpipe and go to each lung. When you breathe out (exhale), carbon dioxide is released—a natural by-product. How most creatures breathe is quite similar except for that of birds. Technically speaking, even plants have respiratory systems, but they exhale oxygen and inhale carbon dioxide. This is why plants are so important to our environment. They breathe in the harmful carbon dioxide that other mammals breathe out.

**Birds**
Birds have a unique respiratory system. Birds need a tremendous amount of oxygen to gain energy for flight, so they have developed a different respiratory system. Unlike mammals, the lungs of birds do not inflate or deflate as they breathe in and out. Instead, they have air sacs which are like tiny air bags in cars. These air sacs ventilate air, leaving their lungs full of air at all times. The process of oxygen circulating through the body in birds is done through small blood vessels.
Interacting with Other Systems

There are two important components of the respiratory system that do not have anything to do with breathing. The mouth takes in food and liquids. Of course, food does not go into the lungs; rather it gets digested in the stomach. The respiratory system is responsible for directing oxygen, liquids and food to the proper location in your body. This is just like a traffic policeman directing cars during rush hour. A tiny flap of tissue covers the windpipe when we swallow our food so that we don’t choke. Then the windpipe carries oxygen straight to your lungs. The second function relates to smell and connects to our nose. All of these respiratory functions working together are just one part of our amazing body.

Glossary
- respiratory relating to the breathing system
- ventilate to breathe outward, letting in fresh air
- circulating passing through
- blood vessels an artery or vein that blood flows through

[Reading Skill Questions]

1. What is the passageway called that helps transport air to the lungs?
   a. The air sac
   b. Exhale tube
   c. The windpipe
   d. Circulatory system

2. What is one function that the respiration system is not responsible for?
   a. Inhaling and exhaling air sacs in birds
   b. Directing oxygen, liquids and food to the proper location
   c. Helping the lungs to inflate in and out
   d. Sending digestive enzyme to the food we swallow
**Comprehension Questions**

1. Which of the following has a similar meaning to *by-product* as used in the passage?
   - a. frequent cause
   - b. spin-off
   - c. good result
   - d. side-effect

2. What is different about plants’ respiratory systems from those of mammals?

3. What is the effect of birds storing oxygen in special air sacs?
   - a. It helps give them more energy while flying.
   - b. It allows them to breathe out more quickly.
   - c. It helps them breathe more carbon dioxide.
   - d. It assists them in digesting their food.

4. What other two functions does the respiratory system help with?
   - a. Sensing security
   - b. Swallowing food
   - c. Smelling things
   - d. Helping improve blood flow

**Summary**

Fill in the blanks with the right words to complete the summary.

( smelling lungs windpipe swallowing respiratory breathed air sacs carbon dioxide )

The purpose of the _________ system is to bring oxygen to the _________ and remove unnecessary gases. Whether breathing through mouths, gills or the skin, there is an exchange of gases in the body. In mammals, air is _________ passing through the back of the nose and then it flows into two tubes that branch off from the _________ in the throat. When you breathe out, _________ is released. However, plants breathe in carbon dioxide. Birds have a different respiratory system and use _________ . Two less important functions of the respiratory system are _________ food and _________.
<table>
<thead>
<tr>
<th>Paragraph 1</th>
<th>Respiratory System</th>
</tr>
</thead>
<tbody>
<tr>
<td>The main function of the respiratory system</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paragraph 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhaling &amp; Exhaling</td>
</tr>
<tr>
<td>• Animal</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>• Plant</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paragraph 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique respiratory system of birds</td>
</tr>
<tr>
<td>• Air sacs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paragraph 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other two functions</td>
</tr>
</tbody>
</table>
UNIT 02 | Respiration

Passage 2 | Social Studies

Breathing Problems in Large Cities

Polluted Cities
Cities are getting more congested; pollution levels are rising, and society is aging. When people have respiratory problems or allergies, their bodies react by coughing, sneezing or having runny eyes or noses. In many urban cities, there are high levels of smog which causes breathing problems and even lung diseases. Dealing with these common breathing problems is a major health issue in large urban areas around the world.

Dealing with Allergies
Respiratory allergies are caused by pollen, mold or dust that circulates in the air. Allergies are quite common, especially during the spring when flowers and other plants start to bloom. However, it is virtually impossible to eliminate the various plants and trees in one’s city that cause respiratory allergies. The only practical solution is to move to less humid climates where fewer pollinating plants grow. The state of Arizona in the United States has become a popular retirement place for elderly people (many of whom suffer from allergies). There are fewer cases of pneumonia and other winter-related illnesses. Entire retirement communities have sprung up in Arizona due to the dry climate.

Problems for the Elderly
Hospitals are seeing a rise in medical claims as more seniors come in for respiratory-related ailments. Seniors are especially vulnerable to respiratory problems. Just like small children, they get viral infections more frequently than most other people. This includes complications from the flu and pneumonia. One of the biggest problems for old people is pneumonia, which infects the lungs. Lung tissue easily becomes inflamed in elderly people. This often occurs when particles of mold grow inside air conditioners and start to float around the room. So it is important to frequently change the filters. Normally, immune systems in healthy people successfully fight off the bacteria, but this is not so for the elderly.
Solutions
Healthcare workers and nurses who deal with the elderly on a daily basis try to improve the air quality, especially in nursing homes. One of these methods is reducing indoor air pollution to help people breathe better. But one respiratory problem persists amongst many elderly. Bronchitis, a common respiratory problem, often occurs in those with sensitive nasal passages and those who smoke. Bronchitis is a virus or bacteria that irritates or inflames the inside of the nose. Elderly people often get bronchitis right after they have had the cold or flu. By reducing exposure to air with many foreign particles and bad habits like smoking, many elderly people can enjoy a healthy life.

Glossary
- pollinate to fertilize a plant or a tree with pollen
- complications problems or difficulties caused by other factors
- viral caused by a virus
- inflame to irritate or bother something

[ Reading Skill Questions ]

1 Which of the following is true?
   a. City gardeners are kept busy trying to reduce pollen levels.
   b. Respiratory issues increase health costs in dry states like Arizona.
   c. Respiratory issues affect many younger people in school.
   d. Respiratory issues cause many difficulties, particularly for the elderly.

2 What negative effect can air conditioners have on the elderly?
   a. They can lead to a strong fever and chills.
   b. They can lessen the amount a person sneezes.
   c. The filters might give the person bronchitis.
   d. They can cause irritation in people if there is mold.
[ Comprehension Questions ]

1 What kind of symptoms do people with allergies have? Choose all that are correct.
   a. Nausea
   b. Coughing
   c. Sneezing
   d. Runny eyes

2 What is true about living in dry climates like Arizona?
   a. There are fewer plants that pollinate.
   b. Healthcare for the elderly is inadequate in desert states.
   c. Pneumonia is a big problem in warmer climates.
   d. Parks spend more money planting flowers.

3 What can be inferred about Arizona?
   a. Allergies began to take hold in communities.
   b. Elderly people started to leave their retirement homes.
   c. New retirement towns started to be developed in Arizona.
   d. More mold-free flowers were planted in Arizona.

4 What role does the immune system play in the body?
   a. It moderates the body’s temperature system.
   b. It causes the nose to swell up in winter.
   c. It brings in pollen that irritates the lungs.
   d. It fights off harmful bacteria that cause disease.

Summary | Fill in the blanks with the right words to complete the summary.

( viral elderly allergies circulates breathe vulnerable pollinating plants )

Dealing with breathing problems is a major health issue in large urban areas, especially for the _________. Respiratory _________ are caused by pollen, mold or dust that ________ in the air. Moving to less humid climates where fewer _________ grow is a good solution for old people. The elderly are more _________ to respiratory problems, so they get _________ infections more frequently than most other people. Healthcare workers and nurses who deal with the elderly try to reduce indoor air pollution to help people _________ better.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks using facts and details from the passage.

**City pollution**

- symptom:
  - __________________________
  - __________________________
- result:
  - __________________________

**Respiratory allergies**

- reason:
  - __________________________
  - __________________________
- solution:
  - __________________________
  - __________________________

**Solutions**

**Breathing problems in large cities**

**Elderly people**
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

A fishbone got stuck in her throat and blocked her windpipe.

It's easy to find. Just take the passageway under the street and turn left.

Today, there is an effective vaccine for babies to prevent pneumonia.

After the star player broke his ankle, he suffered from a complication when the break became infected.

- a. a part of your neck that carries air to your lungs
- b. a way through, hallway, lane way
- c. a lung disease
- d. a medical condition arising as a consequence of another

Some bees are used to pollinate crops.

They tried to eliminate any potential risk factors.

The blood circulates throughout the body, bringing oxygen.

Did you know that the biggest cause of choking comes from ice cubes?

Many chemicals can inflame the skin.

- a. to move freely in a closed place or system
- b. to remove, to get rid of
- c. to have one’s breathing obstructed
- d. to cause something to become sore and swollen
- e. to fertilize a plant or a tree with pollen

A timber frame house is more vulnerable to fire.

Seoul’s major roads and highways are often congested.

I much prefer the taste of filtered water rather than tap water.

We all exhaled after the goalie stopped the shot.

- a. easily hurt physically and emotionally; susceptible, weak, sensitive, unprotected
- b. being by passing through a filter
- c. crowded; full of traffic
- d. to breathe out
SEQUENCE OF EVENTS

Identifying the sequence of something means that you organize the information in the correct order. Think about the order of each event. How did the author organize the information in this selection? What words or phrases did the author use to help readers track the sequence of events: first, next, then, finally, last, while, during, after, dates, times. What happened before and after the event.

Q. Number the sentences in their correct order.

In 1825, the first permanent photograph was invented. Then black and white photography became increasingly popular. Around 1861, the process to develop color photographs was perfected. But it wasn’t until the 1940s that the public could buy color film. But photography would radically change again a half century later when digital cameras were invented.

___ The process to develop color photographs was perfected.
___ Photography would change again a half century later with digital cameras.
___ In 1825, the first permanent photograph was invented.
___ The public could buy color film since 1940s.

Strategy to Answer

In this passage, the development of photography and cameras is indicated by dates. Using the dates, you can determine the correct order of the sentences. The answer is [2-4-1-3].
Early Ship Design
Ships come in all shapes and sizes and usually fall into three categories: commercial, fishing, and military. Ships date back to at least 60,000 years ago when humans sailed from Southeast Asia to the island of New Guinea. These first ships were very primitive. Not much changed in ship design for several millennia.

Egyptian Khufu Ships
A revolutionary type of ship design was developed in Egypt (early Mesopotamia) around 3,000 BC. This was the first major phase of ship design. These first vessels were made using planks of wood from papyrus trees and were connected together with leather straps and treenails. These 43-meter-long ships called Khufu ships sailed down the Nile River and used oars for steering through the water.

Tidal Docks
By 2,500 BC, the Indians advanced ship design by building the very first tidal docks. These were rectangular work areas where a ship could be parked or docked while it was being built or needed repairs. This second phase of ship design helped speed up the production of shipbuilding. Tidal dock technology would be copied by all major naval powers in the coming centuries. Large ship design continued during the Egyptian, Roman, Indian and Chinese Empires.

China’s Rudder Design
But it was the Chinese under the Han Dynasty that added a crucial technological development that advanced ship design. During the 1st century AD, they invented the wooden rudder which was used for steering. A rudder is basically a flat sheet of wood, used for steering that is connected to a boat via a hinge (or pivot). Cables connect to the rudder, pushing or pulling it to the left or right, thereby turning the ship. The stern-mounted rudder replaced the oar steering system as it required less manpower and didn’t interfere with the operation of sails.
Modern Ships

Wooden ships patrolled the oceans on expeditions up until the late 18th century when ship builders began to experiment with iron. The British, Portuguese, Dutch and Spanish navies introduced cannons on their ships. But the weight of these increased stress on the wooden beams. So iron was used to reinforce a ship’s internal frame. By the 19th century, the fourth phase of ship design occurred. Iron (and later steel) replaced wood as the preferred material for constructing ships. To prevent sinking, especially during maritime battles, ship designers built watertight bulkhead compartments. These were separate boxlike sections made of iron. If a ship had a hole in it, water would only fill up the one bulkhead.

**Glossary**
- **rudder** a steering mechanism for a ship, boat or plane mounted at the back
- **cannon** a large weapon that fires iron balls through an iron tube
- **watertight** not allowing water to pass in or out

**Reading Skill Questions**

1. What important invention occurred in the third phase of ship design?
   a. The Indians built tidal docks.
   b. The Egyptians welded rudders together.
   c. The Chinese invented the rudder for steering.
   d. The British invented the stern-mounted oar.

2. What was the fourth major development in ship design?
   a. Starting maritime battles
   b. Patrolling the oceans with navies
   c. Using iron beams to replace wood
   d. Introducing cannons on sailing ships
Comprehension Questions

1 Which of the following is NOT true?
   a. The first ships were built 60,000 years ago.
   b. The first phase of ship design occurred in Egypt.
   c. A lot has changed in ship design since the first ships were made.
   d. The Chinese invented the wooden rudder during the 1st century AD.

2 What is the author’s point about tidal docks?
   a. They made it cost less to build ships.
   b. They made it easier to copy ancient ship designs.
   c. They helped ships be built more efficiently.
   d. They demonstrated how primitive Egyptian ship design was.

3 How did the invention of the rudder improve sailing?

4 How did watertight bulkhead compartments help ship design?
   a. They improved the handling of the sails.
   b. They made it harder for a ship to sink.
   c. They strengthened beams that supported cannons.
   d. They made it easier to steer the ship.

Summary Fill in the blanks with the right words to complete the summary.

(Egypt supports steering tidal docks papyrus trees ship design steel skeleton)

There are many types of ships. In 3,000 BC, a revolutionary ship design was invented in ___________. It used planks of wood from ___________. Then the Indians advanced ship design by building ___________ in 2,500 BC. These work areas allowed a ship to be docked while it was being built or repaired. The Chinese added a crucial technological development to ___________. They invented the wooden rudder for ___________. The fourth step involves building the ___________. This steel frame ___________ almost all the weight of the ship. Now modern ships are constructed using steel and built in boxlike sections.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the boxes. Complete the correct sequence of events using information from the passage.

<table>
<thead>
<tr>
<th>Sequence 1</th>
<th>Early Ship Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence 2</td>
<td>Khufu Ships</td>
</tr>
<tr>
<td>Sequence 3</td>
<td>Tidal Docks</td>
</tr>
<tr>
<td>Sequence 4</td>
<td>Chinese Rudder</td>
</tr>
<tr>
<td>Sequence 5</td>
<td>Modern Ships</td>
</tr>
</tbody>
</table>
America’s Cup: Cutting-edge Boat Design

America’s Cup
Yacht racing is a sport requiring technical skills, strategy and a cutting-edge boat design. The America’s Cup race, run every three to four years, is the most prestigious yacht race. It costs millions of dollars to develop and build a yacht for this race. For 113 years, the Cup stayed in the hands of the New York Yacht Club. Only five times since 1870 (four of them since 2000) has the America’s Cup been won by a country other than a United States boat.

Deed of Gift
The most important thing in preparing for the America’s Cup is to thoroughly review the rules. Strict rules set by an agreement called the Deed of Gift state the rules of conduct during the race, including technical and design dimensions for the boats. Adhering to these rules can make the difference between winning and being disqualified. These Universal Rules, as they were called, focused on limiting sail area, boat length (23~27 meters), and water displacement.

Restrictions on Size
Following World War II, the money available to invest in yachting had dwindled due to wartime losses. It was too expensive to keep building the large 23-meter plus boats. There were no races held between 1938 and 1957. So, when the America’s Cup returned in 1958, the Twelve-Meter Class rule was implemented, making the boats smaller, lighter and faster. For the next 31 years, the Twelve-Meter rule was the standard.

Designing a Yacht
As the computer age came into being in the 1980s, a new stage evolved using cutting-edge design software. Specialist design companies and engineers designed prototype models of a boat. Using computer simulations, teams tested various forces acting on a sailboat. If designers could reduce the underwater hydrodynamic forces (resistance) that act on a boat’s hull, then a boat could reduce drag and turn more
quickly. These technological developments brought the Australians, New Zealanders and Italians into the race, each with their own multi-million-dollar team.

**Design Secrets**

During preparations for the 1988 America’s Cup, an innovative American yacht called the *Stars and Stripes 88* was built using a twin-hulled catamaran with a carbon fiber keel. This was the first time such a design had ever been entered in the America’s Cup. By having two thin hulls instead of a large one, drag on the boat was substantially reduced. However, arguments over the design rules with the New Zealand team led to a lengthy court case. But eventually the American team won (both the case and the race). Today, the boats are bigger in size (26 meters), and teams still refuse to give away their secrets.

---

**Glossary**

- **displacement**: the amount of water moved by a boat when it is put in the water
- **prototype**: the first fully functioning model of a machine
- **hydrodynamic**: relating to the mechanical properties of liquids
- **keel**: one of the main steel beams along the base of a ship, to which the frames are fastened

---

[**Reading Skill Questions**](#)

1. **What happened during and after World War II?**
   a. The America’s Cup race started.
   b. New rules were made between 1914 and 1937.
   c. Ship designers started to use computer simulations.
   d. There were no races between 1938 and 1957.

2. **What happened after the computer age came?**
   a. Aerodynamic forces are tested on 12-meter-long boats.
   b. Prototype models were designed and tested.
   c. Various scuba diving equipment is simulated.
   d. Money was raised to bring back the race after 31 years.
[ Comprehension Questions ]

1 Which of the following is true?
   a. The America’s Cup race runs every two years.
   b. The United States won the America’s Cup four times since 2000.
   c. Since World War I, the Twelve-Meter Class rule has been implemented.
   d. The Deed of Gift is an agreement stating the rules of conduct during the race.

2 How do hydrodynamic forces affect a sailing boat?
   a. They affect how fast a boat can sail upwind.
   b. They affect how fast a keel turns over in the water.
   c. They affect how quickly a boat can maneuver.
   d. They influence the type of sail material used.

3 What was the result of the 1988 America’s Cup race?
   a. The prototype design was never finished by the Americans.
   b. The American team had its design disqualified.
   c. The New Zealand boat had to undergo a redesign.
   d. It was eventually won by the American team.

4 What was special about the U.S. boat used in the 1988 race?
   ➞

Summary | Fill in the blanks with the right words to complete the summary.

( prototype no races yacht racing court case design rules boat designs )

__________ is a sport requiring technical skill, strategy and a cutting-edge __________. For the America’s Cup, you should thoroughly review the rules in the Deed of Gift. After World War II, the money available to invest in yachting had dwindled. There were __________ held between 1938 and 1957. The boats were made smaller when the races resumed in 1958. When the computer age started, a third stage using cutting-edge design software began. Engineers designed __________ model boats. During the 1988 America’s Cup, arguments over the __________ with the New Zealand team led to a lengthy __________, which the American team won.
**Graphic Organizer**

A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the timeline. Complete the correct sequence of events using information from the passage.

The History of America’s Cup
The America’s Cup is the most prestigious yacht race in the world.

|--------------|-------|------------------|-------------|------------|-------|------|

<table>
<thead>
<tr>
<th><strong>1800s</strong></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early Race Period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1938 ~ 1957</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Since 1958</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1980s</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1988</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Check Your Vocabulary

The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

<table>
<thead>
<tr>
<th></th>
<th>You should oil those <em>hinges</em> so they don’t squeak.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The U.S. relies heavily on <em>commercial</em> trade as a source of income.</td>
</tr>
<tr>
<td></td>
<td>At one time, England had the most powerful <em>naval</em> forces on Earth.</td>
</tr>
<tr>
<td></td>
<td>Stone arrow heads are very good examples of <em>primitive</em> weapons.</td>
</tr>
<tr>
<td></td>
<td>The <em>Titanic</em> sank because the iceberg tore into many of its <em>bulkheads</em>.</td>
</tr>
<tr>
<td></td>
<td>He started his investigations and took the <em>dimensions</em> of the room.</td>
</tr>
<tr>
<td></td>
<td>The building of the highway will need considerable time and <em>manpower</em>.</td>
</tr>
<tr>
<td></td>
<td>Ernest Shackleton made the most famous <em>expedition</em> to the South Pole.</td>
</tr>
<tr>
<td></td>
<td>The early <em>prototypes</em> used in space flight were extremely dangerous to fly.</td>
</tr>
<tr>
<td></td>
<td>Mr. Johnson pledged to <em>implement</em> his campaign promises.</td>
</tr>
<tr>
<td></td>
<td>The population in the small towns is <em>dwindling</em>.</td>
</tr>
<tr>
<td></td>
<td>You should <em>reinforce</em> your house before the hurricane makes landfall.</td>
</tr>
<tr>
<td></td>
<td>The weather is so bad today that all but the biggest ships are <em>docked</em> in the harbor.</td>
</tr>
</tbody>
</table>

| a. | being the first or earliest kind of something |
| b. | relating to the navy |
| c. | engaged in commerce |
| d. | a flexible joint on which a door swings |
| e. | people available for work |
| f. | a partition dividing a ship into sections |
| g. | a measurement in space; extent, size, bulk |
| h. | journey, a trip with a particular purpose |
| i. | the first version of something |
| j. | to strengthen |
| k. | to lessen, to decline, to diminish |
| l. | to carry out, to apply, to perform |
| m. | to bring a ship into a dock |
| n. | a legal hearing where two sides can contest a dispute |
“Cause and effect” refers to two events that are related to each other. Cause is defined as “why something happened.” Effect is defined as “what happened.” The first event has an effect on the second. Look for key words that will show a connection between two related events. Transition words such as because, so, consequently, therefore, thus, and since refer to a related event.

Q. What do the cryogenics salesmen say will cause people to stop aging?

Some entrepreneurs are selling a dream come true, to live forever. Cryogenics salesmen have persuaded some people to pay money to be frozen. They claim the bodies will be defrosted just like strawberries in the future. By freezing people, their age and body condition will remain the same, hence prolonging their lives. Yet, this medical technology has not been perfected.

a. People won’t be exposed to air pollution and stressful jobs.
b. The freezing process will stop the body from aging.
c. Technology in the future will prevent wrinkling.
d. Skin cells do not age as quickly as normally expected.

Strategy to Answer

In this passage, the fourth sentence refers to the freezing process which keeps the body condition the same. This shows that the effects of keeping a body frozen could slow down or stop the normal aging process. The sentence also uses the preposition, “By” which is used to show the effect of something. The answer is b.
Avalanches
Each year, avalanches claim numerous lives. Skiers or even backcountry hikers get covered in a wall of snow in a valley or on a mountainside. Basically, avalanches occur when there is more stress on the top layer of snow than on the bottom layer. In winter and spring, experienced and novice skiers alike frequently search for fresh powder trails. On ski mountains, it is not uncommon for skiers to deliberately ski outside the marked boundaries of trails. Avalanches can travel at up to 300 km/h and carry with them thousands of tons of snow. Being trapped in an avalanche is the worst fate imaginable. If you are buried underneath several meters of snow, you will run out of oxygen and suffocate. After 35 minutes, a person has only a 30 percent chance of survival.

Multiple Snow Layers
There are three main causes that contribute to avalanche conditions. On the surface of a mountain is the snowpack. This is the snow that has fallen and accumulated over the past weeks and months. Usually, there are several layers of snow on the mountain. The first layer of snow is called the “bed layer.” Some of this snow will melt away, leaving a second thin layer of ice particles on top of the bed layer. It might take several weeks before another heavy snowfall. The danger comes when the third layer of snow falls. If it is made of light, loose or fluffy snow (not heavy wet snow), the danger starts. This third layer is called the “weak or slab layer.” A weak layer of snow lying on top of ice and bed layers means that an avalanche is more likely to occur.

The Trigger and Angle
A trigger is needed for the slab layer of snow to slip off. This means something causes the slab to slide off the second thin layer of ice. This is the second cause of an avalanche. The pressure from the weight of a skier can easily cause the top slab...
layer to break off. Then an avalanche starts. The third cause of an avalanche relates to slope angle. Most avalanches occur on slopes that have an angle of 25 to 60 degrees. If the slope is greater than 60 degrees, the snow will constantly slide off, never allowing avalanche conditions to form. According to statistics, slab avalanches account for 90 percent of all ski fatalities. Since it is very difficult to know how much stress there is on snow slopes, most ski resorts have strict rules about skiing out of bounds.

**Reading Skill Questions**

1. **A likely cause of a slab avalanche is _______________.**
   a. explosive devices
   b. aggressive skiers on icy snow conditions
   c. any trigger that puts pressure on snow
   d. mountains with 60-90-degree slope angles

2. **What mostly happens to the skiers who were buried in the avalanche?**
   a. They suffer from frostbite afterwards.
   b. They wait for the rescue team.
   c. They black out right after the accident, but without injury.
   d. They run out of oxygen and suffocate.
**Comprehension Questions**

1. What is the passage mainly talking about?
   a. How to stop avalanches
   b. The conditions that cause avalanches
   c. Several risks while skiing
   d. How to survive the avalanches

2. What does the worst fate in the passage refer to?
   a. The loss of numerous lives while climbing
   b. The most confusing terrain to ski on
   c. The worst skiing conditions
   d. Being trapped in an avalanche

3. Which of the following is true?
   a. There are 3 causes related to slope angles.
   b. There are 3 causes related to avalanches.
   c. Avalanches only occur after it's been snowing for weeks.
   d. Different kinds of skiers cause different avalanches.

4. Why are there no avalanches on slopes over 60 degrees?
   a. Snow melts faster on extreme slopes.
   b. The snow will constantly slide off the slope.
   c. It is easy for the base layer of snow to stick on steep slopes.
   d. Temperatures are too warm on steep slopes to form an icy layer.

**Summary**

Fill in the blanks with the right words to complete the summary.

( trigger causes degrees snowpack avalanches slip off slab layer )

__________ claim numerous lives every year when people get caught in a wall of snow. There are three main _________ that produce avalanches. The first is the _________ . On top of the snowpack is the icy layer followed by a third layer called the _________ . Having a weak layer of snow lying on top of the ice and bed layers means that an avalanche is more likely to occur. A _________ is needed for the slab layer of snow to _________ . Most avalanches occur on slopes that have angles of 25 to 60 _________ .
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks. Match each cause and effect using information from the passage.

<table>
<thead>
<tr>
<th><strong>Effect</strong></th>
<th><strong>Nature Factor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow conditions are perfect for an avalanche to start.</td>
<td><strong>Cause 1</strong> (3 sub-factors)</td>
</tr>
<tr>
<td>An avalanche starts, causing thousands of tons of snow to flow down a mountain.</td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td>b.</td>
</tr>
<tr>
<td></td>
<td>c.</td>
</tr>
</tbody>
</table>

**Cause 2**

**Human Factor**

**Cause 3**
How to Stop Avalanches

A major concern of ski resorts is avalanche control. Most avalanches occur outside the boundaries of the regular groomed ski runs. But each year, skiers and trekkers on snowshoes go into these remote areas where most avalanches occur. There are two primary ways to prevent avalanches—by blasting the snow with explosives, or by erecting snow fences.

Explosives
Explosives are primarily used to prevent avalanches, especially at ski resorts where other methods are often impractical. Maintenance staff from the ski resort travel to potential avalanche areas and areas with steep slopes. First, they measure the depth of the snow and its quality. They want to check for hard, loose, wet or icy snow layers. If an area is considered dangerous, small explosives are fired into the side of the steep terrain. The explosion loosens the top layer of snow, which tumbles harmlessly down the mountainside. But using explosives is costly and dangerous. Some researchers are currently experimenting with the cheaper and safer method of using ultrasonic sound waves that shock the snow into falling, averting an avalanche and saving lives.

Snow Fences
It is very common to put up snow nets or snow fences. These nylon nets or wooden and steel fences are placed at the top of slopes. They prevent the buildup of snow on the downwind side, thereby lessening the chance of a slab avalanche.

Beacons and Radio Devices
Fortunately, there are companies that specialize in making rescue beacons. These are small electronic devices that send out a radio signal to search and rescue crews. Most people who venture into the backcountry carry some sort of beacon or GPS device. They can help locate a buried victim up to 80 meters away. However, these beacons and GPS devices only send out a signal if the victim turns...
it on. Often, the victim is too injured to think clearly and press the ‘on button.’ If search and rescue crews do not quickly reach the victims, the skiers will not be discovered in time.

**Surviving an Avalanche**

If you are ever caught in an avalanche, the chances are slim that you will survive. If you are not killed instantly, you only have a short time (15~35 minutes) before your oxygen runs out. Take off your ski, boots and poles. Use a swimming motion to claw your way to the surface. Often people do not know which way is up or down. The effect of this is disorientation. It is not uncommon for avalanche victims to dig in the wrong direction. With proper precautions, both skiers and ski resorts can avoid the tragedy of an avalanche.

**Glossary**

- **trekker** a person who goes for long hikes, usually in the mountains
- **ultrasonic** relating to a very high frequency sound wave that is beyond human hearing
- **beacon** a device that sends out a radio signal

### Reading Skill Questions

1. **What is the reason why explosives are used to prevent avalanches?**
   a. Staff do not need to measure the snow depth.
   b. Using explosives is cheap, even though it’s slow.
   c. Blasting explosives is safe for the maintenance staff.
   d. Other methods are not that effective to remove snow.

2. **Why are some avalanche victims unable to find their way out?**
   a. They easily lose their sense of direction under the snow.
   b. They can’t find the top part of the GPS device.
   c. They wait for the rescue team to discover them.
   d. They want to find all their ski equipment before getting out.
Comprehension Questions

1. What's the disadvantage of using the explosives?
   a. They are expensive and dangerous.
   b. It's so hard to place an explosive in the snow.
   c. There is a shortage of experts to place an explosive.
   d. They harm the animals and plants on the mountains.

2. What is the advantage of using ultrasonic sound waves?
   a. It's easy to use for the skiers.
   b. Ski patrol staff like new scientific devices.
   c. The mountain is easier to access for novice skiers.
   d. They are safer than conventional explosives.

3. Which of the following is true?
   a. Ski poles interfere with GPS signals.
   b. It is easy to locate buried victims within 15 minutes.
   c. Most avalanche victims forget to turn on the beacon.
   d. Beacons or GPS devices are useless when they're not turned on.

4. You can tell from the passage that disorientation means ________________.
   a. being cautious and careful
   b. being out of breath
   c. being confused and lost
   d. not knowing how to ski properly

Summary | Fill in the blanks with the right words to complete the summary.

( beacons loosens explosives prevent avalanche snow fences survive )

A major concern of ski resorts is __________ control. There are two ways to __________ avalanches—blasting the snow with explosives or erecting snow fences. __________ are primarily used to prevent avalanches, especially at ski resorts. The effect of the explosion __________ the top layer of snow, which tumbles harmlessly down the mountainside. And __________ prevent the buildup of snow on the downwind side of ski runs. For your safety, you can carry __________ or GPS devices. However, it is very unlikely someone will __________ an avalanche.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks. Match each cause and effect using information from the passage.

<table>
<thead>
<tr>
<th>Method 1</th>
<th>Method 2</th>
<th>Method 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
<td>Effect</td>
<td>Effect</td>
</tr>
</tbody>
</table>

How to Rescue an Avalanche Victim
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

The terrorists **blasted** bombs in the local trains.

The family was **suffocated** in their sleep by fumes from a fire.

The tiger started to **claw** its way out of the cage by tearing at the wooden door.

The Himalayas are the highest mountains on earth and contain some of the most **hostile** **terrain**.

Korea is home to **numerous** species of beetles.

He tried to **avert** any further conflict or inquiries.

Owning a houseboat in a desert is very **impractical**.

You should never **deliberately** hurt your sister. Now, say you’re sorry.

Throughout his acting career, he **accumulated** several awards for his performances.

When the mountain closes, all the best ski hills are **groomed** to keep the runs smooth.

Jack **tumbled** down the stairs so hard that he ended up in the hospital with a cast on his arm.

In science class I had to **measure** my height and weight and compare them to those of the other students.

The team uses explosives to trigger avalanches, thereby **lessening** the chances of someone being killed.
COMPARE & CONTRAST

When you compare two or more things in a passage, pay attention to comparing and contrasting people, events, places, or things. It helps to make a list of the facts and ideas that are similar or different. Look for metaphors and analogies. A metaphor is an implied comparison between two unlike things. An analogy is also a comparison of two or more objects.

Q. Which expression best describes the statistics about women in the workforce?

In 1960, over 70 percent of American homes had a working father with a mother who stayed at home. Over 40 years later, that number has shrunk to a mere 15 percent. Now, women comprise the majority of small business owners. Since the late 1990s, more women are applying to medical school than men.

a. Only 15 percent of mothers started up small businesses in 1960.
b. Four times as many working mothers quit their jobs by the 1990s.
c. Fewer small business owners went to medical school in the 1990s.
d. Today, less than 20 percent of married women are stay-at-home mothers.

Strategy to Answer

In this passage, “less than 20 percent” refers to the number of married women who do not work and stay at home. The actual number is “15 percent” but answer d uses a contrasting word “less than.”
Choosing Between Alternative Fuels

Alternative Fuels
Over the past several decades, fossil fuels have been polluting the environment. Biofuels can be made from renewable natural resources whereas fossil fuels are non-renewable resources. Corn ethanol fuel and fuel made from switch grass are two of the most promising alternative fuels, or biofuels. The main goal of biofuels is to reduce our dependency on buying oil from the Middle East and produce fuel locally.

Biofuels
By definition, biofuels are fuels that are comprised of biological ingredients like plant material. In order to be used in an automotive engine, plant material has to go through a refining process. This process turns raw plant material into ethanol. Both corn ethanol and switch grass fuels come from plants that are replenishable. That means they can be grown over and over again. Just like regular gasoline-powered cars, biofuels emit carbon dioxide, but up to 94 percent less.

Corn Ethanol
One advantage of corn ethanol is that it burns hotter than gasoline. Although this is good for engine efficiency, corn ethanol has lower energy content. This means that it takes more corn ethanol fuel to produce the same amount of power compared to engines using gasoline. Other disadvantages relate to the energy needed to grow the corn, transport it to the refinery plant and process it into ethanol. The entire process is very energy-intensive and wasteful. Moreover, growing corn for the ethanol market uses up valuable agricultural land. Despite these drawbacks, corn ethanol fuel has become very popular. The U.S. government has encouraged farmers to sell their corn to biofuel refineries, which has caused prices to rise substantially—much more than any other biofuel source and more than selling corn for animal feed.
Switch Grass

Switch grass is one of the most efficient biofuels yet developed. It is a perennial crop, meaning that it grows all year long. Normally, switch grass grows on the prairies and can reach 2.2 meters tall. Through a refining process, switch grass is turned into cellulosic ethanol which can be used in car engines. Some studies show that biofuels using switch grass produce 540 percent more energy than needed to grow, process and refine it. This is a very high “net energy yield,” much better than corn ethanol. Currently, the technology used to convert switch grass into ethanol is not as advanced as that for turning corn into ethanol. Fortunately, switch grass is the one biofuel that does not adversely affect food prices. Both of these biofuels are promising for the future.

**Glossary**
- **fossil fuels** combustible products like gasoline, oil or natural gas
- **replenishable** able to be used again or refilled
- **ethanol** a colorless liquid used in alcohol or as a solvent
- **refinery** an industrial plant where oil or sugar is processed

**Reading Skill Questions**

1. **What is true about the advantages of switch grass over corn ethanol?**
   a. Farmers are more likely to get high prices for selling corn for animal feed.
   b. Switch grass has a higher net energy yield than corn ethanol.
   c. The U.S. government ensures a higher price for corn.
   d. Switch grass produces less energy needed to make cellulosic ethanol.

2. **What similarities do switch grass and corn ethanol share?**
   a. Each crop is an annual plant.
   b. Both types of crops have a very low energy yield.
   c. They both go through an elaborate refining process.
   d. They both use advanced technology to convert into carbon dioxide.
[Comprehension Questions]

1 What is suggested about developing biofuels?
   a. The price of fossil fuels will start to increase.
   b. All pollution from cars will be completely eliminated.
   c. They will help reduce the need for fossil fuels.
   d. Growing corn will become more efficient.

2 What is special about corn ethanol and switch grass fuel?
   a. Their refining process is highly efficient.
   b. They are non-renewable fuels.
   c. They use replenishable plants.
   d. They both have a higher energy content than fossil fuels.

3 Which of the following is NOT true?
   a. Switch grass greatly affects food prices.
   b. Biofuels are comprised of biological ingredients like plants.
   c. Switch grass is one of the most efficient biofuels yet developed.
   d. Switch grass is turned into cellulosic ethanol through a refining process.

4 The information in the passage suggests that ________________.
   a. more research into corn needs to be done
   b. there is no clean biofuel with no drawbacks
   c. refining biofuels is a quick and easy process
   d. all biofuels are equally as efficient

Summary | Fill in the blanks with the right words to complete the summary.

( gasoline efficient alternative biological net energy yield )

Corn ethanol fuel and fuel made from switch grass are two of the most promising ___________ fuels or biofuels. Biofuels are fuels that are comprised of ___________ ingredients like plant material. One advantage of corn ethanol biofuel is that it burns hotter than ___________. Switch grass grows all year long and it is one of the most ___________ biofuels yet developed. Switch grass has a very high ___________ , much better than corn ethanol, but it is not widely used at present.
Look at the graphic organizer below and fill in the blanks to compare and contrast the information.

- **Corn Ethanol**
  - Advantages
  - Drawbacks

- **Switch Grass**
  - Advantages
  - Drawbacks

**Similarities**

A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.
UNIT 05 | Alternative Fuel
Passage 2  Social Studies

Hybrid Cars vs. Electric Cars

With oil prices rising to record highs in 2007 and 2008, research into the next green technology for the automotive industry has picked up speed. The main goal of developing a new type of environmentally friendly car is to replace the regular combustion gasoline engine with a cleaner or pollution-free engine. This would increase fuel savings and reduce harmful carbon dioxide emissions. Presently, the development of hydrogen fuel cells and car batteries has not progressed as hoped. Neither technology is cost-effective and ready to go to market. That leaves hybrid and electric cars as the best options for alternative engine designs.

Hybrid Cars

A hybrid car uses a combination of fuel sources to power the engine. Typically, this involves a regular combustion gasoline engine and a small battery connected to an electric motor. When a driver is idling at a stop light waiting for the light to turn green, a hybrid car uses only battery power. This means pollution levels will be reduced. When the engine is producing a lot of power, excess energy from the gasoline engine is converted into energy and stored in the battery. Even when the brakes are used, excess power is stored in the battery. Hence, hybrid cars are very efficient for city driving due to all the stopping and starting. But for a hybrid car to be efficient, the engine needs to be small. Critics contend that hybrid cars might only be popular for small cars, not all for makes and models.

Electric Cars

Unlike hybrid cars, electric cars have many disadvantages. Since they are dependent on a set of rechargeable batteries that provide electricity to the motor, their range is limited. Additionally, their acceleration is quite slow. A typical electric car can only travel 100 to 300 km before it needs to be recharged. This compares to 450~600 km for hybrid cars. Electric cars are ideal for short trips in the city, but very impractical for longer road trips.
Tesla Motors

Tesla Motors, a small California company, has designed a two-door electric sports car called the Roadster. It is stylish but is priced a little high to be competitive. The small company believes that once the major car manufacturers start to produce electric cars in great volume, prices will come down. Experts say that building a larger four-door sedan which most people use would be too heavy. Larger electric cars need more batteries, which reduces their fuel efficiency. Unfortunately for the environment, most major car manufacturers like Toyota, General Motors, BMW, Hyundai, and Lexus are not investing as much in electric car models. They are introducing hybrid models as the way of the future.

Glossary

- combustion: the burning of fuel in an engine to provide power
- emission: when energy or exhaust waste is let out, usually from an engine
- fuel cells: a type of battery that can usually be recharged with hydrogen

[Reading Skill Questions]

1. Which of these facts is true for both hybrid and electric cars?
   a. Both cars can accelerate very quickly.
   b. They both substantially reduce pollution levels.
   c. The range of both types is very extensive.
   d. Both are ready to go to the market.

2. Why is the Tesla Roadster design more suitable than a sedan?
   a. Its overall price is more attractive than the cost of a sedan.
   b. The Roadster is more popular with ordinary people.
   c. The sports car version has heavier batteries.
   d. The small electric car’s fuel efficiency is better than the larger one’s.
[ Comprehension Questions ]

1 What is the definition of a hybrid car?

2 What is the closest meaning to idling?
   a. cost-effective
   b. recharging
   c. not progressing
   d. converting into

3 What are two main disadvantages of electric cars?
   a. Their range is limited to 100-300 km.
   b. They do not accelerate very quickly.
   c. There are not many places to recharge them.
   d. Their design is not very stylish.

4 What can you infer from the passage?
   a. Hybrid cars have too many disadvantages.
   b. Car companies are spending too much on electric cars.
   c. Hybrid models are less stylish than most electric cars.
   d. Hybrid cars are less environmentally friendly than electric cars.

Summary | Fill in the blanks with the right words to complete the summary.

( limited hybrid rechargeable combination disadvantages environmentally )

The main goal of developing a new type of __________ friendly car is to replace the regular gasoline engine. A hybrid car uses a(n) __________ of fuel sources, combining a gasoline engine and a small battery connected to an electric motor. When the engine produces power, excess energy from the gasoline engine is stored in the battery. Electric cars have many __________ since they are dependent on __________ batteries. Their range is __________ and their acceleration is slow. Major car manufacturers are introducing __________ models—not electric car models.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships, and facts of the passage.

Look at the graphic organizer below and fill in the blanks to compare and contrast the information.

Hybrid Cars

- What it uses for power
- What purpose is it best used for
- How long it can travel
- Miscellaneous

Electric Cars

How are they alike?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

_____ That old diesel car *emits* too much black smoke in its exhaust.

_____ A major *drawback* of using the Internet is that it is easier to get computer viruses.

_____ I can’t believe he left his car *idling* in the driveway. Doesn’t he know how bad that is for the environment?

_____ The rise in gas prices is something we will have to *contend* with if we want to continue to expand our business.

   a. not moving
   b. to give out or send out something such as gas, heat, or smell, etc.
   c. to deal with; to argue, struggle
   d. a downside to something

_____ My mother has a *perennial* garden of which she is very proud.

_____ Dogs make great pets. *Adversely*, they can be very expensive.

_____ Many private schools run *intensive* programs during school breaks.

_____ Much of the rural *agricultural* land surrounding cities is being converted into housing developments.

   a. being intense in nature
   b. relating to farm production
   c. lasting for years
   d. unfavorably, disadvantageously

_____ My wife’s new budget is very *cost-effective*.

_____ We have to increase our *efficiency* in getting our product to market.

_____ My grandmother uses about five *ingredients* in her homemade kimchi.

_____ The increased use of *biofuel* around the world has greatly affected food stocks.

   a. a part of something
   b. a fuel derived from biological material
   c. the ability to do something with little time or effort
   d. efficient in cost or monetary requirements
An inference is an opinion or decision that you assume could happen, but all the details are not provided. It means you need to make your own decisions about some of the information and details in the passage. It is similar to making your best guess. An inference might not always be supported by existing facts.

Q. What is the likely reason Trevor did not go out that night with Jessica?

Trevor was really tired of studying all the time for his political science final exam. After nine weekends in a row, he sacrificed his free time to be with his girlfriend. When Jessica called and asked him to go out the next day, Trevor said that he couldn’t go out.

a. His political science exam was the next day.
b. He wanted to take a rest.
c. He hadn’t seen his girlfriend in a long while.
d. Jessica refused to help him with his final exam.

Strategy to Answer
In this passage, the comment from Trevor implies what he needed. The logical reason for this is from his studying so much for nine weekends. It can reasonably be inferred that anyone who studies a lot needs some rest. The answer is b.
Passage 1 Science

Examining Forensic Evidence

Forensics

Forensic science involves using scientific techniques for legal purposes, usually in a criminal investigation and trial. Forensic science is a highly technical field, involving chemistry, biology, physics, metallurgy, and even engineering. Other fields that play a part include geology, psychology, and social science. Evidence, such as hair, fingerprints, or blood samples, is collected at the scene of the crime by forensic technicians. They try to match this evidence to a suspect in the case, hopefully using a match to get a conviction. Then, experienced forensic scientists, who often specialize in one forensic discipline, give the evidence in court as an expert witness.

Physical or Trace Evidence

When physical evidence arrives in the laboratory, it is in a sealed plastic bag. Physical evidence refers to guns, knives, shirts with blood droplets, and even documents found at a crime scene. But the greatest technological advancements in forensic science over the past decade have occurred in the area of trace evidence. Trace evidence refers to very minute evidence like strands of hair, skin cells, blood specimens, or fingerprints. Equipment used to analyze this evidence includes high-powered electron microscopes, digital image processors, toxicology analyzers for drug testing, paint analyzers, and even the ability to cast shoe textures and imprints.

Analyzing Time of Death

On police or crime TV shows such as C.S.I., the forensic investigator often asks, “What is the TOD?” This refers to the time of death or the exact moment when a person died. Temperature is an important indicator telling investigators when a person died. Organs that respond most quickly to changes in body temperature are the liver and the brain, and it’s due to their mass and density. By analyzing these organs, a coroner can tell the TOD. After death, a person’s body temperature starts...
to lower to that of the surrounding environment at a rate of 1.27 degrees Celsius per hour. Normal body temperature is 30.5 degrees Celsius. So if the police find a murder victim with a body temperature of 25.4 degrees at 1:30 a.m., the person is likely to have been killed 4~5 hours before.

**Rigor Mortis**

Another factor forensic investigators look at in a dead body is *rigor mortis*. This Latin term describes the state of a dead body. A few hours after a person dies (depending on conditions), the joints of a dead body stiffen and become locked in place. *Rigor mortis* is caused by chemical changes in the body after death due to oxygen depletion and the buildup of calcium. When a person is alive, the calcium in a body is carried outside the body’s cells. This allows muscle fibers to move. But since a dead body is no longer receiving oxygen, calcium builds up causing the muscles to stiffen up and contract.

**Glossary**

- **forensics** the analysis of evidence using science to determine a crime’s cause
- **metallurgy** the study of metals and their properties
- **toxicology** the study of poisons and their effects on the body

**Reading Skill Questions**

1. What can be inferred about the reason evidence is put in plastic bags?
   a. To help identify the victim’s fingerprints more quickly
   b. To protect the evidence from witnesses
   c. To protect it from becoming contaminated
   d. To make sure that hair and blood samples match the victim

2. In the third paragraph, what is the estimated time of death for the murder victim?
   a. He died the previous morning.
   b. He died between 8:30 and 9:30 p.m.
   c. He died right before 1:30 a.m.
   d. It cannot be solved.
Comprehension Questions

1 What is the job of a forensic technician?
   a. To prove all victims innocent of the crime
   b. To analyze physical and trace evidence
   c. To watch the criminal during court cases
   d. To determine the motive of the crime

2 What is the correct meaning of trace evidence?
   a. Evidence that can result in a conviction
   b. Evidence found having hair roots
   c. Evidence that is very tiny or small
   d. Evidence that needs to be examined at the lab

3 How is physical evidence different from trace evidence?
   a. Trace evidence rarely involves blood specimens.
   b. Physical evidence involves larger pieces of evidence that can be easily held.
   c. Physical evidence involves more expensive equipment.
   d. Technicians find it hard to analyze physical evidence.

4 What happens when there is too much calcium in a dead body?

Summary | Fill in the blanks with the right words to complete the summary.

(trace  physical  forensic  criminal  rigor mortis  crime  time of death)

Forensic science involves using scientific techniques in a ________ investigation and trial. ________ evidence refers to guns, knives, bloody shirts, or even documents found at a ________ scene. ________ evidence refers to very small pieces of evidence like strands of hair, skin cells, or fingerprints. Temperature is an important indicator telling investigators when a person died, usually called “__________.” Another factor ________ investigators look for on a dead body is _________. A few hours after a person dies, the joints of a dead body stiffen and become locked in place.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks. Match each inference using information from the passage.

<table>
<thead>
<tr>
<th>Text Info</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collecting Evidence – What Happens</strong></td>
<td>Finding evidence is quite demanding, but it's very important in order to solve a case. So a lack of evidence at a crime scene will result in no conviction in court.</td>
</tr>
<tr>
<td>• Evidence is collected at the crime scene.</td>
<td></td>
</tr>
<tr>
<td>• Sometimes experienced forensic scientists give evidence in court as expert witnesses.</td>
<td></td>
</tr>
<tr>
<td><strong>Protecting Evidence</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Technology in the C.S.I. Lab</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Time of Death</strong></td>
<td></td>
</tr>
</tbody>
</table>
The C.S.I. Effect

The television shows *C.S.I.: Crime Scene Investigator* and *C.S.I. Miami* and *C.S.I New York* entertain millions of viewers each week. Ratings are high and the shows have created other copycat TV shows. But the success of the C.S.I. forensic-science series has idealized the science of investigating crimes. This has created a term called the C.S.I. effect. More than any other police or criminal TV series, the C.S.I. shows have adversely impacted the justice system. Some legal analysts claim that C.S.I. has led jurors in criminal cases to expect a quick resolution to a case, just as on television.

Positive & Negative Effects

The three C.S.I. series are generally considered good television entertainment. Since the first C.S.I. show started in 2000, there has been an increase in applicants at police stations, morgues, and science laboratories. Universities in particular have seen a rise in applications for forensic-related fields. Some colleges and universities have even set up new departments to deal with the influx of students. Unfortunately, many graduates are disappointed when they see the actual conditions of most city crime labs. Most are not as well funded or equipped as the sets on the C.S.I. shows.

But the C.S.I. effect is often more negative than positive. Experts argue that the C.S.I. shows have simplified a very complex system of analyzing evidence and prosecuting criminals. With special effects, computer graphics, and eye-catching images on screen, the complicated process of uncovering evidence and analyzing it seems so easy on TV. Regrettably, criminals are paying greater attention to the show. Police are finding more and more cases of murderers using bleach to remove blood stains or fingerprints. These are techniques from previous C.S.I. shows.
Influencing Court Cases
Critics of the C.S.I. effect argue that jurors have unrealistic expectations and expect a case to be quickly solved based on forensic evidence. The series, they say, has given jurors, lawyers, and the general public a simplistic education on analyzing evidence. Many judges are now seeing cases where lawyers for the prosecution or defense rely more heavily on forensic ‘C.S.I.’ technicians than before. They expect the technicians to quickly process blood, fingerprint, or DNA evidence in their favor. DNA samples like blood or hair evidence now dominate a larger part of court cases. This is in contrast to previous cases where motive and opportunity to commit a crime were the main focus. This puts added pressure on forensic technicians. Never before has such a popular TV show had such an important effect on the justice system.

Glossary
• copycat something that is quite similar to something else
• morgue a place run by the city where dead bodies are kept until identified
• prosecute to formally charge someone with a civil or criminal offense

[Reading Skill Questions]

1 What can be inferred from the applicants for forensic-related jobs?
   a. They might solve forensic cases too quickly.
   b. They will become better forensic technicians.
   c. They will choose to work as a defense lawyer.
   d. They might become disillusioned because of the differences between TV and real life.

2 Which of the following might be one of the negative effects of the C.S.I. shows?
   a. Some criminals will learn how to avoid the criminal scene.
   b. Some criminals will start to destroy forensic evidence.
   c. Some criminals will uncover evidence left behind at crime scenes.
   d. Trace evidence in crime labs might be infected by some criminals.
[Comprehension Questions]

1. How is the word copycat used in the passage?
   a. To illustrate how TV network executives write TV scripts
   b. To show how other TV shows have copied the C.S.I. style
   c. To talk about highly rated detective shows on TV
   d. To demonstrate how criminals are learning from the C.S.I. show

2. Why are experts critical of the C.S.I. shows?
   a. They help viewers learn forensic skills.
   b. They make viewers think more thoughtlessly.
   c. They don’t explain how to prosecute cases better.
   d. They simplify complicated investigations with special effects.

3. What does the phrase in their favor mean as used in the passage?
   a. To reexamine evidence that was contaminated
   b. To analyze evidence that will help the prosecution
   c. To look at evidence that might help the client
   d. To process evidence that supports their case

4. What is the writer’s purpose in discussing the C.S.I. effect?
   a. To illustrate how influential science is on crime rates
   b. To demonstrate various fingerprinting techniques
   c. To show the influence one show can have on society
   d. To explain how one TV show can increase university attendance

Summary | Fill in the blanks with the right words to complete the summary.
( graduates crimes resolution analysts reality prosecution )

The television show C.S.I. entertains millions of viewers each week. But the success of the series has idealized the science of investigating __________. Some legal __________ claim that C.S.I. has led jurors in criminal cases to expect a quick __________ to a case. One positive effect is that a greater number of young people are attracted to this field. However, critics argue that many __________ will be disappointed when they are faced with the __________ of city crime labs. Many judges are now seeing cases where lawyers for the __________ or defense start to rely more heavily on forensic ‘C.S.I.’ technicians.
A **graphic organizer** is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks. Match each inference using information from the passage.

<table>
<thead>
<tr>
<th>Facts</th>
<th>Passage Clues</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>There has been an increase in applicants at police stations, morgues, and science laboratories.</td>
<td>When these students get jobs, many find the C.S.I. labs are not that high tech.</td>
<td></td>
</tr>
</tbody>
</table>
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t be a copycat</td>
<td>It’s not nice to imitate your brother.</td>
</tr>
<tr>
<td>It is unrealistic</td>
<td>It is unrealistic to expect science to find the cures to all human diseases.</td>
</tr>
<tr>
<td>At one point in time</td>
<td>The world’s oceans were abundant with fish species.</td>
</tr>
<tr>
<td>There were twelve applicants</td>
<td>The three jobs being offered at the company.</td>
</tr>
<tr>
<td>Forensic scientists</td>
<td>Forensic scientists are examining evidence from the scene of a controlled explosion.</td>
</tr>
<tr>
<td>We are prosecuting</td>
<td>We are prosecuting the suspect on a number of charges.</td>
</tr>
<tr>
<td>I suspect</td>
<td>I suspect that it was my brother who took my book without asking.</td>
</tr>
<tr>
<td>He was convicted</td>
<td>He was convicted of the bank robbery because of all the video evidence against him.</td>
</tr>
<tr>
<td>At one time people believed the world to be flat. However, Columbus disproved this notion.</td>
<td></td>
</tr>
<tr>
<td>They found his body in the morgue days later.</td>
<td></td>
</tr>
<tr>
<td>The detective carefully examined the imprint of the tire tread.</td>
<td></td>
</tr>
<tr>
<td>My parents have the expectation that I will study medicine at university.</td>
<td></td>
</tr>
<tr>
<td>Doctors say that body fat levels are not a good indicator of overall health.</td>
<td></td>
</tr>
<tr>
<td>Artificial sweeteners are so effective that you only need one droplet instead of several spoons of sugar.</td>
<td></td>
</tr>
</tbody>
</table>

a. plentiful, full, rich
b. not pertaining to reality
c. something[someone] that is quite similar to something[someone] else
d. someone who is applying for something
e. related to the work of scientists who examine evidence to help the police solve crimes

f. to be suspicious of
g. to find someone guilty
h. to show to be false
i. to take to court in a criminal case

j. a small drop of liquid
k. strong belief that something will happen
l. a room or place where dead bodies are kept before they are buried
m. a mark made by the pressure of an object on another
n. sign, mark, signal, symbol
ANALYZING LANGUAGE

To analyze both language and vocabulary, look closely at how the words, phrases, and sentence structure are used. Understand in what context they are used in the passage and what the overall meaning is. Then you can understand the different ways ideas are expressed.

Q. How is the phrase **environmentally friendly** used in the passage?

Animal testing is considered by many to be cruel and unnecessary. The most well-known example is using rabbits to test cosmetic products. However, years ago, **environmentally friendly** companies like the Body Shop were already researching ways to test products in a safe manner without using animals. This has been part of their business success.

a. To illustrate how cosmetic products need more research
b. To show how testing can be done without harming the environment
c. To demonstrate how cosmetics are sold by other friendly companies
d. To show how friendly rabbits are to the environment

Strategy to Answer

In this passage, “environmentally friendly” means not harming things relating to the environment. In this case, this means “rabbits” and “animal testing.” So answer b indicates another way to conduct testing.
Continental Drift: How the Earth Moves

The thin crust of the Earth, like the shell of an egg, is all that protects the surface and continents from the hot molten rock inside. Deep inside the Earth at the center is the core. Between the surface of the Earth and the core is the mantle. It is the continents, or rather tectonic plates underneath the Earth’s surface that move on top of this mantle. These eight major tectonic plates are 100~200 km thick and create the Earth’s crust. The movement of continents relative to each other is referred to as continental drift. Understanding how and why this is happening has important consequences for everyday lives.

By studying the tectonic plates, scientists found that the plates move, or float, because of the intense heat underneath them. There are immense pressures at work in the core, mantle and crust. Put together, these pressures cause the tectonic plates to move or slip, sometimes causing earthquakes, tsunamis, and volcanoes. The big continental plates include the Pacific Plate that extends almost to Japan and runs down the west side of North and South America. But it is the tiny Indian Plate that pushes northward into the largest plate of all: the Eurasian Plate. The collision of these two plates created the Himalaya and Karakoram mountain ranges. Earthquakes occur when two plates rub up against each other. Eventually, one plate will give way and slip under the other plate. This sudden movement, sometimes only one meter, has tremendous consequences. In the Pacific Ocean, tidal waves are started. The 2004 tsunami that swept across the Indian Ocean and hit Indonesia, Thailand, and Sri Lanka, killing 230,000 people, is an example of continental drift and plate tectonics.

The eruption of volcanoes is one factor in changing the Earth’s crust. When two tectonic plates move away from each other, magma flows up from the mantle, filling the space between the two plates. This is how volcanoes are created (many
of them underwater). When the molten lava cools, the surrounding rock and crust contributes to a buildup of crust on the ocean floor. This hot liquid called magma contributes to the shape of the ocean floor. Another factor is the general movement of continental plates. When volcanoes cool, the crust on the ocean floor is pushed further and further apart. The Pacific Ocean is getting smaller as the North and South American plates move west. Conversely, the Atlantic Ocean is getting larger as North and South America move away from Europe and Africa.

**Glossary**
- **tectonic plates**: sections underneath continents that make up the Earth’s crust
- **continental drift**: the gradual movement of continents over millions of years
- **lava**: very hot rock that originates in the Earth’s mantle and comes from a volcano

**Reading Skill Questions**

1. **What simile is used to describe the Earth’s crust?**
   a. The crust protects the Earth’s surface like an egg shell.
   b. The crust is similar in consistency to molten lava.
   c. The crust is forceful and fluid, like a tsunami.
   d. The crust has a fluid interior, just like the mantle.

2. **How is the word consequences used in the passage?**
   a. To explain how the Earth’s core is evolving
   b. To show how the core moves over the top mantle
   c. To show how important continental drift is
   d. To illustrate how continents were once together
**Comprehension Questions**

1. **Why do the Earth's continents move around?**
   a. Due to rising water levels between continents
   b. Due to irresistible natural disasters
   c. Due to pressure in the atmosphere
   d. Due to tectonic forces just below the surface

2. **What is the correct meaning of give way in the passage?**
   a. When a continental plate breaks up
   b. When a continental plate yields under pressure
   c. When a continental plate moves swiftly
   d. When a continental plate explore

3. **How do volcanoes influence the Earth's crust?**
   a. They cause friction on the new molten crust.
   b. They make the Atlantic Ocean become smaller.
   c. They erupt molten lava, which builds new crust.
   d. They help the water cool, creating more plates in the sea.

4. **What is the reason for the smaller Pacific Ocean and the larger Atlantic Ocean?**

**Summary**

Fill in the blanks with the right words to complete the summary.

( collision protects volcanoes earthquakes intense heat molten lava tectonic plates )

The thin crust of the Earth ________ the surface and continents from the hot molten rock inside. ________ move, or float, because of the ________ underneath them. Himalaya and Karakoram mountain ranges were created by the ________ of the two plates. Also ________ occur when two plates rub up against each other. The eruption of ________ is caused when two tectonic plates move away from each other. ________ then fills the space between the two plates and builds up new crust on the ocean floor.
1 Answer the questions.

What process does the phrase “immense pressures” refer to as used in paragraph 2?

a. Tectonic plates pressuring the core to move inward
b. Tectonic plates moving against each other, sliding in all directions
c. Tectonic plates moving against each other, disrupting the flow of the mantle
d. Tectonic plates pushing down on the crust, forcing magma inward

What process does the phrase “tremendous consequence” refers to as used in paragraph 2?

a. The sudden movement of tectonic plates can move mountains quickly, killing people.
b. The sudden slippage of tectonic plates can lead to new mountain ranges being formed, reshaping old continents.
c. When tectonic plates suddenly move, molten lava mixes with waves, causing deadly steam.
d. The sudden movement of tectonic plates can create surges of ocean water, killing people.

2 Fill in the context clues chart for the target words.

Tip: You can use context clues to find the meaning of these words. Context clues are tips in the nearby words or sentences that can help you figure out what an unknown word means.

<table>
<thead>
<tr>
<th>Target Word</th>
<th>crust</th>
<th>magma</th>
<th>eruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Clues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaning of Word</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Theory of One Continent
If you have ever spilled ice cubes on your kitchen counter, you notice that they slide around quite easily. This is just like the continental plates floating around on top of the Earth’s mantle. In the 1600s and 1700s, English philosopher and scientist Francis Bacon and American statesman and scientist Benjamin Franklin noticed that the two continents on either side of the Atlantic Ocean (South America and Africa) seemed to fit together. Back then, sliding or drifting tectonic plates were unknown. This theory of a moving Earth was first proposed as continental drift in 1912 by a German scientist named Alfred Wegener. He noticed that the continents appeared to fit together like a giant jigsaw puzzle.

Unproven Theory
At first, scientists rejected Wegener’s theory as being highly unlikely. One common theory at the time was that the Earth was constantly expanding in size, not rearranging itself. This was not true. During his lifetime, Wegener could not actually prove his theory of continental drift. It was just a hypothesis. The technological instruments needed to prove the theory were not available until the 1950s, long after his death.

Carbon Dating
With modern satellite photos and radiometric dating, scientists have proven the age of the Earth’s crust. For samples older than 70,000 years, they used radiometric dating. This technology is based on carbon dating useful for items up to 50,000 years old. Devised in the 1950s, it detects and records the amount of carbon in fossils (dead organisms), wood, or rocks and compares it to the levels of carbon and oxygen in the atmosphere. A certain amount of carbon is expected in a sample from the early 19th century and a different amount of carbon from the 17th century. Archaeologists discovered that fossils of the same species were found on different continents using radiometric dating. For example, the east coast
of South America in areas like Brazil had similar plant life as areas of Western Africa even though they are thousands of kilometers apart.

**Pangaea**

Approximately 250~300 million years ago, one giant continent existed, called Pangaea. Eventually, Pangaea began to break up about 200 million years ago. Two large sections of the Pangaea supercontinent began drifting apart at an incredibly slow pace. One was called Gondwanaland, and the other was called Laurasia. Gradually, the area between these continents filled with water. This change in continents created the rivers, inlets, fjords, and the world’s major oceans. Today, the former Gondwanaland, which was warm and humid, is now Madagascar, India, Australia, and Antarctica. The other landmass, Laurasia, broke up into North America, Siberia, and Northern China. Through continental drift and millions of years, the continents eventually ended up in their present position as we know them today.

**Glossary**
- **tectonic** a geological term that applies to the movement of continental plates
- **carbon dating** determining the date of organic remains based on their carbon content
- **fossil** the remains of an animal or plant preserved in rock

[**Reading Skill Questions**]

1. **What is the most likely use of carbon dating?**
   a. To show how fossils have different origins
   b. To measure differences in the atmosphere
   c. To detect how old an organism might be
   d. To explain how human civilizations developed

2. **What analogy is used to show how the continental plates are floating?**
   a. Ice cubes that slide around on a kitchen counter
   b. Several words that complete the puzzle
   c. Landmasses that float on the mantle
   d. Different levels in the ocean that rise and fall
Comprehension Questions

1. What is the first paragraph mostly talking about?
   a. Francis Bacon doubted the continental drift theory.
   b. There is disagreement amongst scientists.
   c. Two continents seemed once connected.
   d. Continental plates float around on ice.

2. What was the initial response of scientists to Wegener's theory?
   a. Few agreed that the Earth was expanding.
   b. They thought it was an unlikely theory.
   c. They criticized his unpublished article.
   d. They suggested conducting further research.

3. Which important breakthrough occurred in the 1950s?
   a. Cameras to go on satellites
   b. Weather prediction techniques
   c. Navigation and mapping techniques
   d. Carbon dating technology

4. What did archaeologists discover in South America using radiometric dating technology?
   a. New radar techniques
   b. Some ancient organisms from East Africa
   c. Similar fossils as those found in West Africa
   d. Some new plant species from the rainforest

Summary | Fill in the blanks with the right words to complete the summary.

( floating hypothesis Pangaea the age radiometric dating continental drift )

Continental plates ________ on top of the Earth’s mantle are just like ice cubes sliding on your kitchen counter. This theory of a moving Earth was first proposed in 1912 by a German scientist, Alfred Wegener. During his lifetime, Wegener could not actually prove his theory of _________. It was just a _________. Now with modern satellite photos and _________, scientists have proven ________ of the Earth’s crust. One giant continent existed, called _________. Eventually, it began to break up about 200 million years ago into two large sections: Gondwanaland and Laurasia.
This theory of a moving Earth was first **proposed** as continental drift in 1912 by a German scientist named Alfred Wegener.

One common theory at the time was that the Earth was constantly expanding in size—not **rearranging** itself.

During his lifetime, Wegener could not actually prove his **theory** of continental drift.

**Archaeologists** discovered that fossils of the same species were found on different continents.

---

### Graphic Organizer

**A graphic organizer** is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks. Use information from the passage about the key words or phrases that relate to the contextual sentences.

<table>
<thead>
<tr>
<th>Target word</th>
<th>This theory of a moving Earth was first <strong>proposed</strong> as continental drift in 1912 by a German scientist named Alfred Wegener.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Synonym</td>
<td></td>
</tr>
<tr>
<td>• Antonym</td>
<td></td>
</tr>
<tr>
<td>• Example Sentence</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target word</th>
<th>One common theory at the time was that the Earth was constantly expanding in size—not <strong>rearranging</strong> itself.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Synonym</td>
<td></td>
</tr>
<tr>
<td>• Antonym</td>
<td></td>
</tr>
<tr>
<td>• Example Sentence</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target word</th>
<th>During his lifetime, Wegener could not actually prove his <strong>theory</strong> of continental drift.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Synonym</td>
<td></td>
</tr>
<tr>
<td>• Antonym</td>
<td></td>
</tr>
<tr>
<td>• Example Sentence</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target word</th>
<th><strong>Archaeologists</strong> discovered that fossils of the same species were found on different continents.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Synonym</td>
<td></td>
</tr>
<tr>
<td>• Antonym</td>
<td></td>
</tr>
<tr>
<td>• Example Sentence</td>
<td></td>
</tr>
</tbody>
</table>
### Check Your Vocabulary

The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>tremendous</strong></td>
<td>huge, great, enormous</td>
</tr>
<tr>
<td><strong>fossil</strong></td>
<td>remains of living material converted to stone over time</td>
</tr>
<tr>
<td><strong>erupted</strong></td>
<td>to explode, to blow up</td>
</tr>
<tr>
<td><strong>evolving</strong></td>
<td>to change or develop gradually into different forms</td>
</tr>
<tr>
<td><strong>relative</strong></td>
<td>in relation to one another</td>
</tr>
<tr>
<td><strong>enormous</strong></td>
<td>huge, large in size or quantity</td>
</tr>
<tr>
<td><strong>hypothesis</strong></td>
<td>an idea suggested as a possible explanation for a certain fact or observation</td>
</tr>
<tr>
<td><strong>philosopher</strong></td>
<td>someone who studies philosophy</td>
</tr>
<tr>
<td><strong>tectonic</strong></td>
<td>relating to the large floating sheets of rock that comprise the earth’s crust</td>
</tr>
<tr>
<td><strong>tsunami</strong></td>
<td>giant wave caused by tectonic forces</td>
</tr>
</tbody>
</table>

---

**2008 Beijing Olympics were a tremendous success.**

**The Bad Lands is one of the most fossil-rich areas in America.**

**When Krakatoa erupted in 1883, it spewed volcanic ash and smoke into the atmosphere.**

**Newspaper companies around the world are evolving to stay relevant despite the Internet.**

- a. remains of living material converted to stone over time
- b. to change or develop gradually into different forms
- c. to explode, to blow up
- d. huge, great, enormous

---

**The synchronized swimmers moved relative to each other in perfect harmony.**

**In comparison to the species we see today, prehistoric reptiles were truly enormous.**

**It’s recommended to do intense aerobic exercise 30 minutes a day, and 3 days a week.**

**Japan is situated next to a tectonic plate, which explains why it is an earthquake zone.**

- a. in relation to one another
- b. relating to the large floating sheets of rock that comprise the earth’s crust
- c. huge, large in size or quantity
- d. very great in strength or degree

---

**After repeated tests, her hypothesis has been finally confirmed.**

**Michel Foucault is my favorite twentieth century philosopher.**

**Geologists help us understand what causes major earthquakes.**

**The 2004 Indonesian tsunami was the most devastating in modern history.**

- a. someone who studies philosophy
- b. giant wave caused by tectonic forces
- c. someone who studies the earth’s crust
- d. an idea suggested as a possible explanation for a certain fact or observation
There can be many reasons why an author writes a passage. You have to ask yourself why you think the author wrote the article. Was it to persuade, to entertain, or to inform? If readers enjoyed what they read, one of the author’s purposes may have been to entertain. An author’s purpose can be stated explicitly or readers may have to infer the intent.

Q. The writer’s tone suggests Eastern medicine ____________________.

Thai yoga massage is renowned as a way to relieve stress and helps bring the body into a state of meditation. However, Eastern methods of medicine and meditation are routinely ignored by many Western doctors as ineffective. If only Western doctors would open their minds, more people could enjoy the benefits of Thai yoga.

a. is ineffective if practiced by Western doctors
b. is in need of further examination by professionals
c. is not that effective in reducing stress and headaches
d. is highly underappreciated by Western doctors

Strategy to Answer
In this passage, the second sentence refers to Western doctors believing that Eastern medicine is not effective. Then the writer suggests they should try alternative types of medicine like Eastern methods, Thai yoga. The term “underappreciated” in answer d summarizes the attitude of Western doctors.
UNIT 08 | Inventions

Passage 1 Science

Inventing the Post-it Note

One of the most interesting invention stories involves the Post-it note by the 3M Company. Through sheer luck and ingenuity, two employees at the multinational company improved on a basic design and helped make the Post-it note a household product around the world. Perfecting the Post-it note involved a very complicated process. It took several attempts to come up with the appropriate adhesive. This involved experimenting with numerous chemicals, specifically the acrylate family of chemicals.

Church Hymns

In 1974, Art Fry, a 3M chemical engineer, was attending Sunday morning church in his hometown. Fry was in the habit of marking his favorite church hymns by putting pieces of paper between the pages like a bookmark. But these tiny pieces of scrap paper would fall out of the hymnal. Then Fry came across the research of another 3M scientist, Dr. Spencer Silver. Silver had started experimenting in 1968 with an adhesive for general industrial purposes. The adhesive could stick to surfaces like glue, but did not leave any leftover residue. It was like packing tape but easily removable. But the company could not find an appropriate application for it. When Fry approached Silver, a chemist, he told him about the hymnal. Using Silver’s adhesive, he realized how useful the “sticky bookmark” could be. But there were problems with the adhesive.

Adhesives

The central compound of Silver’s adhesive was an acrylate copolymer. But the adhesive was too weak and wouldn’t stick for long. Acrylate polymers were a category of chemical compounds often used in paints, plastics and textiles. What Fry wanted was the perfect pressure-sensitive adhesive. He experimented with particles called microspheres, tiny round molecules. When sprayed onto a surface, the adhesive coating was just like the pebbled surface of a basketball. By spraying the adhesive in the form of these round microspheres, he could coat a surface that
wasn’t too sticky or too weak. This allowed a Post-it note to stick onto the page of a book, but it could later be easily removed and stuck again somewhere else. Conversely, normal packing tape had a flat surface, hence allowing it to stick permanently.

**Success**

Although 3M launched the Post-it note in 1977, it was not successful. Customers didn’t understand how it could be used. They even developed a sticky bulletin board coated with the adhesive. However, dust and dirt eventually built up on the board, diminishing its stickiness. Only by giving out thousands of free samples in a small Idaho town did the Post-it note catch on. By 1980, the Post-it note became a success used by students, office workers, housewives and even the U.S. Post Office.

**Glossary**

- *adhesive* a sticky substance used to stick two things together
- *hymnal* a song or hymn book used in church
- *polymer* a natural or synthetic compound often used to make nylon
- *molecule* the smallest unit of a chemical substance

**Reading Skill Questions**

1. What is the writer’s purpose in mentioning the hymnal anecdote?
   a. To show how resourceful some scientists are in church
   b. To explain why appropriate adhesives are hard to perfect
   c. To illustrate how everyday problems can lead to inventions
   d. To show that scrap pieces of paper needed more glue

2. What is the writer’s purpose in describing the marketing failure in 1977?
   a. To illustrate how controversial new products were in Idaho
   b. To explain how consumers need to be shown practical applications
   c. To show us the potential of Post-it notes in offices
   d. To tell us that Post-it notes needed a larger advertising campaign
**Comprehension Questions**

1. How did Art Fry think of the idea of the Post-it note?
   a. He heard it from another chemist who attended church.
   b. He was trying to mark the pages of a hymnbook.
   c. He was experimenting with some glue at home.
   d. He was writing some church hymns which stuck together.

2. What stage of the invention process did Dr. Silver have trouble with?
   a. Removing of toxic residue
   b. Creating consumer demand for the product
   c. Finding a way to wash off the sticky residue
   d. Finding an appropriate adhesive

3. What was the main obstacle to perfecting the Post-it note?
   a. Designing a non-toxic adhesive for the notes
   b. Experimenting with various chemicals
   c. Finding an appropriate shape for the notes
   d. Making the right type of sticky adhesive

4. Which of the following is true?
   a. 3M launched the Post-it note in the early 20th century.
   b. The strength of the Post-it note is that it can stick permanently.
   c. The Post-it note is easily removable and stuck again somewhere else.
   d. The Post-it note was very successful from the beginning of going into the market.

**Summary**

Fill in the blanks with the right words to complete the summary.

(sticky, invented, adhesive, market, to mark, stick to)

Through sheer luck and ingenuity, two employees at the multinational company invented the Post-it note. In 1974, Art Fry put pieces of paper between the pages to mark his favorite church hymns but they would fall out of the hymnal. Then Fry came across a(n) invented by another scientist named Dr. Silver. The adhesive could stick to surfaces like glue, but did not leave any leftover residue. The central compound of Silver's adhesive was an acrylate copolymer. With experiments with microspheres, he could make adhesive that wasn’t too sticky or too weak. It took years for 3M to successfully market the Post-it note.
Look at the graphic organizer below and fill in the blanks about the writer’s purpose using information from the passage. Which phrases or sentences from the passage match the writer’s purpose?

<table>
<thead>
<tr>
<th>Writer’s Purpose</th>
<th>How</th>
<th>Sentences or words that indicate the writer’s purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>To inform about a discovery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To describe an experiment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To indicate particular features about adhesives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Secret of Velcro

Many everyday devices used in modern society have their roots in simple beginnings. One man’s innate curiosity led to a tiny invention that almost everyone takes for granted today. When we put on our clothes, we use buttons, buckles, zippers, straps and Velcro to hold our clothes together. Prior to the invention of Velcro, it was common to use brooches as a clothing fastener. Then the safety pin, first called the miracle fastener, came along in 1849. But all of these were supplanted by the invention of Velcro.

Cocklebur Hooks
In 1941, a Swiss engineer was taking a walk in the woods. While out for a stroll, George de Mestral found some cocklebur seeds sticking to his clothes. He tried to brush them off, but they stuck onto the wool of his clothes. Back home, he examined the cocklebur seed under a microscope. The cocklebur was a plant comprised of an intricate, yet simple, combination of tiny seeds with thin strands or hooks. In the plant world, these hooks are called burrs. They easily attached themselves to anything that brushes by. If an animal walks by, its fur catches onto the plant. De Mestral discovered that the concept of two opposing burrs or hooks could be used to make a fastener.

Perfecting the Design
The trick was to invent a loop that the hook could catch onto. With stiff hooks and soft loops, de Mestral would have the basic components of a fastener that people could use on their clothes. However, it took a long time to perfect his invention. For eight years, he experimented and perfected his invention, which consists of two strips of nylon fabric. One strip contains thousands of small hooks. The other strip contains small loops. These tiny hooks and loops were attached to a strip of nylon. When the two strips are pressed together, they interlock and form a strong connection. With the help of a weaver from a textile factory in France, he...
perfected his prototype. The nylon hooks were manufactured and sewn under a special infrared light. In this way, the hooks perfectly matched with the nylon loops.

**Patenting Velcro**

It was only in 1955 that he applied for a patent to protect his idea. Out of this came de Mestral’s company Velcro Industries. Velcro Industries learned how to mechanize the process of making Velcro. Out of this amazing yet simple invention have come Velcro fasteners for shoes, backpacks, pants, and shirts. It was even used by NASA astronauts. They used Velcro to attach pouches full of supplies and food to the interiors of their space capsules.

---

**Glossary**

- **fastener** a plastic or metal device used to close a piece of clothing
- **burr** a tiny hook-shaped object often found on plants
- **interlocking** when two things connect or fit together

---

[**Reading Skill** Questions]

1. **What is the writer’s attitude toward the new inventions?**
   a. Inventors usually have help from a third party to perfect their design.
   b. Labor and financial resources have led to useful inventions.
   c. Innate curiosity often leads to simple but important discoveries.
   d. Walking in the woods is often helpful in coming up with new ideas.

2. **What is the writer’s purpose in the third paragraph?**
   a. To explain about French textile factories
   b. To talk about different types of fasteners
   c. To demonstrate how lucky it is to get suitable nylon
   d. To show the difficulty of making an interlocking loop
[Comprehension Questions]

1. In the context of the passage, what's the closest meaning to **supplant**?
   a. strip off
   b. replace
   c. produce
   d. explain

2. Which of the following is true?
   a. Velcro was invented by a Swiss engineer.
   b. The hooks on the cocklebur seeds easily fall off the clothes.
   c. De Mestral gave the exclusive distributor rights to another company.
   d. The prototype of Velcro was perfected by one of the NASA engineers.

3. What happens when hooks and loops touch?
   a. Their sides press on each other.
   b. They often repel each other.
   c. They interlock with each other.
   d. They easily pull apart and fall.

4. In what way did Velcro likely assist NASA astronauts on their missions?
   a. Velcro allowed astronauts to more easily repair their space boots.
   b. It lowered the weight of supplies on the space capsule.
   c. Velcro straps made it easier to attach things when using gloves.
   d. It reduced the amount of metal needed aboard the spacecraft.

**Summary** | Fill in the blanks with the right words to complete the summary.

( hooks      fastener      devices      prototype      interlock      sticking      catches onto
)

Many everyday _________ have their roots in simple beginnings. Prior to the invention of Velcro, it was common to use brooches or safety pins as a clothing _________ . In 1941, a Swiss engineer found some cocklebur seeds _________ to his clothes. The cocklebur was a plant that had thin strands or _________ . If an animal walks by, its fur _________ the plant. For eight years, de Mestral tried to get the tiny hooks and loops to _________ with each other. Finally he perfected his _________ with the help of a weaver. Out of this amazing yet simple invention have come Velcro fasteners for shoes, backpacks, pants, and shirts.
Look at the graphic organizer below and check the boxes. Match each writer's purpose using examples from the passage. How does the writer communicate?

<table>
<thead>
<tr>
<th>Writer's Purpose</th>
<th>How</th>
<th>Sentences or words that indicate the writer's purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>To explain how an inventor got an idea by chance</td>
<td>Uses creative writing</td>
<td>While out for a stroll, George de Mestral found some cocklebur seeds sticking to his clothes.</td>
</tr>
</tbody>
</table>
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

It was a **sheer** luck that no one was hurt.

I think he has an **innate** ability to learn foreign languages.

The **infrared** signal from the TV remote control turned on the television.

- a. complete, absolute; not mixed with extraneous elements
- b. of a natural ability to do something
- c. a type of light often used in remote control devices to send a signal

The seamstress used some bright red silk **fabric** to sew the dress.

The couple would go out for a **stroll** around the block every evening.

Tony's **ingenuity** was coupled with his sense of responsibility to be a good architect.

The **patent** on the microchip protected the inventor from having his product copied by others.

- a. inventive skill, talent, or idea
- b. a slow, gradual walk
- c. a legal permit that prevents others from copying your invention
- d. a type of woven material used for clothing, usually cotton, silk, linen etc.

The daily newspaper is being **supplanted** by online news sites.

The factory owner wanted to **mechanize** the plant to make it more modern.

I’m so mad that my parents wouldn’t **grant** me permission to go on the school trip to Europe.

For hobby fishermen, you can bait your **hook** with almost anything you like, but the most popular choices are worms and minnows.

- a. to alternate or switch one for another
- b. to allow, to permit
- c. to make something mechanical in nature
- d. a curved angular piece of metal
In this type of question, you will see four black squares. You are given a new sentence and are asked where in the passage it would best fit. You need to understand the logic of the passage, as well as the grammatical connections between sentences.

Q. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

After regularly hunting the bison all this time, it became the source of the Native American’s food, lodging, clothing, bedding, fuel, and equipment.

Where would the sentence best fit?

(A) In the American West, the bison is a symbol of majesty and power, roaming the prairie fields.  
(B) For thousands of years, Native Americans hunted the bison on foot, using spears and arrows.  
(C) Although they sometimes stampeded whole herds over cliffs, the Indians usually killed only one or two.  
(D) 

a. (A)  b. (B)  c. (C)  d. (D)

Strategy to Answer

In this passage, the second sentence mentions how the Native Americans killed the bison. The highlighted sentence mentions in greater detail how they used the bison after killing it, using the phrase “all this time” which refers to “thousands of years”. So the best location is c.
UNIT 09 | Mummy

Passage 1  Science

How Egyptian Mummies Were Made

Digging in the Desert
Perhaps the most intriguing archaeological find of the early 20th century was a discovery made in the Egyptian desert in 1922 by two British archaeologists. The tomb of King Tutankhamen, filled with gold furniture, fragments of gold foil and broken chariots, had remained hidden for 3,000 years. It eluded even the cleverest of tomb robbers. Through the process of mummification the remains of the 19-year-old boy king have lasted throughout the centuries, since 1325 B.C.

Finding King Tut
This amazing archaeological find began in 1907 in the Valley of the Kings. An American businessman found embalming materials such as linen bags and broken pottery. It was well-known that the technique of embalming (preserving the body) was used to prevent decomposition and help the mummy’s soul journey to the afterlife. After unsuccessful attempts to find a long-lost tomb, British explorer Howard Carter and his partner Lord Carnarvon began digging after World War I. When Carter’s team discovered King Tut’s tomb in 1922, they learned about the world’s oldest preservation technique—mummification.

Embalming or Mummification
(A) Tutankhamen, or King Tut, is a mummy that had been buried in an elaborate sarcophagus or coffin. (B) A mummy is simply a corpse whose flesh has been preserved by chemicals and low temperatures. (C) Clean the body, make the body presentable and finally, prevent the body from decaying. The first step was quite disgusting; pulling the brain out through the dead person’s nose with hooks. Other main organs like the intestines, stomach, liver and the lungs were removed through the side of the mummy. (D) Only the heart was left inside, symbolizing the mummy’s emotions and mind. Then, the body would be thoroughly cleansed with special liquids, often with water from the Nile River. Next, mercury, scented
oils, and 180kg of special natron salts (sodium carbonate) were applied. The fourth step would be to stuff the mummy with sand, sawdust and linen.

**Wrapping the Mummy**

(E) Large sections of linen were thrown over the body as a base layer. (F) This painstaking process involved an elaborate wrapping technique. (G) Over 20 alternating layers of linen bandages were used. These were held together by coats of resin. (H) Sometimes they would place protective amulets and jewelry in between some of the layers. The bandages were wrapped very tightly to keep the distinct figure of the mummy. Lastly, a ceremonial mask, like King Tut’s exquisite gold mask, was placed to finish the process. This elaborate procedure was used to preserve all of Egypt’s kings or pharaohs, keeping them safe until they reached the afterlife.

**Glossary**

- *mummification* the process of preserving a dead body for burial
- *embalm* to preserve a dead body with special substances, usually liquids
- *decomposition* when organic matter breaks down due to bacteria growth

[ **Reading Skill Questions** ]

1. Look at the four squares [■] that indicate where the following sentence could be added in the third paragraph:

   **The mummification process, which uses embalming techniques, has three goals.**

   Where would the sentence best fit?
   
   a. (A)   b. (B)   c. (C)   d. (D)

2. Look at the four squares [■] that indicate where the following sentence could be added in the fourth paragraph:

   **Once the mummy was prepared, the wrapping began.**

   Where would the sentence best fit?
   
   a. (E)   b. (F)   c. (G)   d. (H)
[Comprehension Questions]

1 Which of the following is mentioned in the passage?
   a. Some of the gold foil helped to preserve the mummy.
   b. British archaeologists were persistent to discover King Tut’s hidden tomb.
   c. A map from 1922 was essential in finding King Tut’s buried tomb.
   d. Tomb robbers narrowly escaped while stealing the gold in the tomb.

2 Which is the main reason for burying King Tut’s body in such an elaborate manner?
   a. The king had special workers who loved him very much.
   b. There were lots of extra linen and gold to wrap him up with.
   c. Egyptian kings were respected more than anyone else.
   d. All Egyptian kings were supposed to reach the afterlife.

3 Fill in the blank using a word from the passage.
   
   The contents of a tomb might begin to _________ if moisture and bacteria entered the tomb.

4 Which of the following is NOT one of the mummification process?
   a. Cleaning the body with special liquids
   b. Removing the brain and other organs from the dead body
   c. Stuffing the dead body with sand, sawdust, and linen
   d. Decorating the body with a suit of armor and burying people alive

Summary | Fill in the blanks with the right words to complete the summary.

(  glue  remove  cleansed  wrapped  mummy  discovery  decomposition )

The most intriguing archaeological find of the early 20th century was the __________
of King Tutankhamen’s tomb. It was only through the process of mummification that ___________was prevented. A ___________ is a corpse whose flesh has been preserved by chemicals and low temperatures. The first step was to pull the brain out through the dead body, then ___________all other organs. Next, the body would be ___________with special liquids, then ___________in linens. Over 20 alternating layers of linen bandages were used, held together by coats of resin as a ___________.

Summary
1 Which of the following sentences could be removed from paragraph 2 without losing coherence?

a. It was well-known that the technique of embalming (preserving the body) was used to prevent decomposition and help the mummy’s soul journey to the afterlife.
b. An American businessman found embalming materials such as linen bags and broken pottery.
c. After unsuccessful attempts to find a long-lost tomb, British explorer Howard Carter and his partner Lord Carnarvon began digging after World War I.

Why?

2 Which of the following sentences could best end the reading?

a. A journey to the afterlife is sought by all, especially if they wear protective amulets and jewelry.
b. This amazing embalming process that helped preserve famous Egyptian kings can still be seen today in museums.
c. Preserving Egypt’s kings or pharaohs was a difficult task, even if many of them didn’t reach the afterlife.

Why?
UNIT 09 | Mummy

Passage 2 Social Studies

The Mummy’s Curse

Beginning of Bad Luck
When the tomb of King Tutankhamen was unearthed in the Egyptian desert, a series of stories and rumors started to circulate. These became known as King Tut’s Curse, the stories focused on several mysterious and unexplained deaths involving people associated with the ancient mummy. When Howard Carter’s men found the stone step in 1921, they began furiously digging downwards. Excavating the area, they reached a hidden door and found a series of antechambers; they discovered King Tut’s mummified body in 1922.

Curse or Strange Circumstances?
Lord George Herbert Carnarvon, Carter’s partner, was best known as helping to finance the expedition. (A) A year after opening the door to King Tut’s tomb, Carnarvon suddenly died on April 5, 1923, in the Continental-Savoy Hotel in Cairo. (B) The simple explanation was that he had been bitten by a mosquito carrying an infectious disease. But the locals didn’t believe it. (C) At the exact moment Lord Carnarvon died, the lights in Cairo mysteriously went out. A few hours later, his dog died. (D) Many thought King Tut was angry.

Interrupting the Life Force
In ancient Egypt, it was important for a person’s “ka” to survive after they had died. This life force or “ka” needed to be free to experience a new life. By wrapping up Egyptian kings, it was thought that these powerful leaders would safely make it to the next life. Digging up a mummy was widely viewed in Egypt as interrupting the life force—hence the curse.

Academic Studies
(E) It wasn’t until 2002, long after everyone linked with the discovery had died that an explanation was finally found—toxic dust particles. (F) The respected
British Medical Journal published a scientific study of the survival rates of 44 Westerners who had been in Egypt when the King Tut mummy was found. (G) Those who entered the tomb lived an average of 20.8 years after being exposed to the tomb dust. (H) Those not exposed to the tomb lived 28.9 years.

Refuting the Curse
The most important discovery was that bacteria on the wall of the tomb might have been the cause of the curse. Anyone who entered the tomb breathed in microscopic spores floating in the air. Could exposure to toxic pathogens in the tomb have killed Carnarvon and the others? Despite these mysterious deaths, there is no explanation why Howard Carter lived for another 16 years, dying of cancer in 1939. He was 64 years old. Today, you can visit King Tutankhamen in a Cairo Museum and judge for yourself.
[Comprehension Questions]

1. From the passage, the people of Egypt would have preferred for
   a. the British Medical Journal to stop telling lies
   b. no one to have unearthed King Tut’s tomb
   c. King Tut’s remains to be returned to the Cairo Museum
   d. the British to let Egyptian archaeologists make the discovery

2. What is mentioned about the deaths related to King Tut’s curse?
   a. All the tomb robbers died an early death by 1939.
   b. A person from the British Medical Journal died.
   c. The Continental-Savoy Hotel manager’s dog died.
   d. Lord Carnarvon died very unexpectedly.

3. Why is the “ka” important in Egyptian culture?
   a. A dead body needed to be punished for its sins.
   b. The Egyptian royal family was required to live forever.
   c. A body needed to be free and live afterwards.
   d. Stories found in tombs said that “ka” was necessary for happiness.

4. We can predict that going into Egyptian tombs ________________.
   a. might result in people breathing in toxic bacteria
   b. would cause people to be get easily lost
   c. might be boring since no one can read the tomb inscriptions
   d. reveal secrets of how Lord Carnarvon died

Summary | Fill in the blanks with the right words to complete the summary.

( tomb curse opening circulate unearthed mysterious linked with )

When the tomb of King Tut was __________, rumors started to __________. These became known as King Tut’s Curse, the stories focused on several __________ deaths. A year after __________ the door to King Tut’s tomb, Lord Carnarvon suddenly died. Some other people __________ the expedition also died under suspicious circumstances. Digging up a mummy was viewed in Egypt as interrupting the life force—hence the __________. It wasn’t until 2002 that an explanation was finally found. Toxic bacteria on the wall of the __________ were breathed in by those who died.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the three squares [■] that indicate where the following sentence could be added to each paragraph. Where would the sentence best fit?

**P2**
A [■] Lord George Herbert Carnarvon, Carter’s partner, was best known as helping to finance the expedition. B [■] A year after opening the door to King Tut’s tomb, Carnarvon suddenly died on April 5, 1923 in the Continental-Savoy Hotel in Cairo. C [■] The simple explanation was that he had been bitten by a mosquito carrying an infectious disease. Initially the hotel staff thought it was due to the heat wave that week, but then other factors came into play.

Why?

**P3**
A [■] This life force or “ka” needed to be free to experience a new life. B [■] By wrapping up Egyptian kings, it was thought that these powerful leaders would safely make it to the next life. C [■] Digging up a mummy was widely viewed in Egypt as interrupting the life force—hence the curse. There is a spiritual belief system in many Arabic countries that focuses on the happiness of the individual, even after death.

Why?

**P5**
A [■] The most important discovery was that bacteria on the wall of the tomb that might have been the cause of the curse. B [■] Anyone who entered the tomb breathed in microscopic spores floating in the air. C [■] Could exposure to toxic pathogens in the tomb have killed Carnarvon and the others? After careful observation and study by scientists, it was concluded that the atmosphere within the tomb was likely a factor in the mysterious deaths.

Why?
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

<table>
<thead>
<tr>
<th>The <em>mummy</em> was discovered all wrapped up in linens and buried beneath the ground.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The government set aside 100 sq. kilometers of forest in the efforts of wildlife <em>preservation</em>.</td>
</tr>
<tr>
<td>In the hot summer heat, <em>decomposition</em> of the apple core had started, bringing with it bacteria.</td>
</tr>
<tr>
<td>Being an <em>archaeologist</em> involves a lot of patience; they must dig up countless areas in the hope of finding bones.</td>
</tr>
</tbody>
</table>

| a. when some organic matter begins to rot or break down |
| b. the conservation or protection of something, usually animals or antiques |
| c. a preserved body wrapped up in cloth and embalmed with fluids |
| d. a scientist who studies ancient cultures |

<table>
<thead>
<tr>
<th>Her grandmother needed an <em>organ</em> transplant to replace her failed liver.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Egyptian king was buried in an elaborate <em>sarcophagus</em> in the tomb.</td>
</tr>
<tr>
<td>The girls went to the <em>pottery</em> shop and made some clay dinner plates as a gift.</td>
</tr>
<tr>
<td>The archaeologist found a <em>fragment</em> of a dinosaur fossil in the mud.</td>
</tr>
<tr>
<td>Tiny <em>spores</em> from the flowers outside filtered through the air conditioner and into the office area.</td>
</tr>
</tbody>
</table>

| a. a piece that is broken off from the main piece |
| b. a tiny one-celled microscopic particle produced by algae and fungi |
| c. an object made from molding and shaping moist clay |
| d. a special coffin made of stone or marble |
| e. an internal part of a plant or animal that has a specific function |

<table>
<thead>
<tr>
<th>His mother just <em>cleansed</em> the carpet by using a chemical cleaner.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The American explorers went on a long <em>expedition</em> trekking to the South Pole.</td>
</tr>
<tr>
<td>Dressed in his new Italian shoes and custom-tailored suit, he looked very <em>presentable</em>.</td>
</tr>
<tr>
<td>The collapse of the <em>financial</em> system resulted in stock markets losing 30 percent of their value.</td>
</tr>
</tbody>
</table>

| a. to remove dirt from something so as to clean it |
| b. looking good enough to be introduced to other people |
| c. a long adventurous trip made by a group of people |
| d. relating to money or how money is managed |
To draw a conclusion, readers must understand what the author is saying. They must think about what they have read and draw a conclusion supported by the facts. Drawing a conclusion means arriving at a decision justified by the evidence. A person’s ability to draw an accurate conclusion depends upon his or her ability to read critically.

Q. It can be concluded that seniors _________________.

In an effort to improve the health of elderly people, cute puppies are often brought into their nursing homes on a weekly basis. The seniors play with the young dogs and some even become emotionally attached. Each week, the puppies give their unqualified affection and love to the seniors. In some cases, the health of the seniors improves.

a. will live longer if they live with family
b. can feel alone and unloved
c. can express their feelings and emotions
d. can benefit from playing with a pet

Strategy to Answer
In this passage, the life of seniors is mentioned and a connection is made between “emotions” (unqualified affection) and “seniors’ health.” In the fourth sentence, it mentions how health can improve, and it makes answer d correct.
Passage 1  Science

How to Make It Rain

Praying for Rain
During ancient times, the Greeks would pray to the rain gods, sometimes even offering a human sacrifice in the hopes that it would rain. Native Americans and many Europeans also had special customs meant to control the weather. As we all know, there is no correlation between hoping for rain and creating clouds. But several decades ago, meteorology scientists came up with a method to improve the chance of rain: cloud seeding. This involves adding particles into the sky, which helps water droplets grow faster, thereby increasing levels of precipitation.

Drought
In many dry areas, droughts have made it difficult for farmers to grow their crops. From the southern USA to Australia to northern China, dry periods have been very destructive, leading to catastrophic results. Australia recently went through a seven-year dry period, which hit dairy farmers most severely, since their cows did not have enough grass to feed off. Drinking water and crop water were subsequently rationed. Many of these nations have tried cloud seeding with limited success.

Playing God with the Weather
Making it rain via cloud seeding involves a complex procedure, but it cannot occur if there isn’t any water in the sky or clouds. Luckily, there is always some amount of moisture in the sky. Cloud seeding essentially helps Mother Nature bring rain sooner than normal and hopefully in greater amounts. For rain to occur, water has to condense. To make cloud seeding work, nuclei particles (tiny particles like atoms) are added to the sky. This is done by dropping the particles from an airplane or shooting them into the sky with an artillery gun or cannon. The particles form a nucleus around which water droplets or ice crystals can attach, increasing the size of the droplet.
When the droplet becomes large enough, it falls as rain. The nuclei used in cloud seeding include salts, calcium chloride, dry ice (frozen carbon dioxide) or silver iodide.

**Planting Seeds**

The most common cloud seeding method is called static cloud seeding. It involves spreading the chemical silver iodide into clouds, which is very effective because its structure is very similar to ice crystals. This process allows moisture to gather and condense on the silver iodide crystals. It’s just like rolling a tennis ball (the crystal) through the snow. Some of the snow will attach itself to the tennis ball. A second type of cloud seeding is called hygroscopic cloud seeding. This process disperses salts into clouds through flares that are fired by large guns. The salts then grow as water attaches to them. When cloud seeding works, it can be an effective way to increase the natural water supply.

---

**Glossary**

- **meteorology** the scientific study of the weather and the atmosphere
- **nuclei** a central part around which other parts are grouped
- **condense** for a particle to change from a gas to a liquid by losing water
- **hygroscopic** capable of easily absorbing water

---

**Reading Skill Questions**

1. **We can conclude that ________________ if the drinking water was not rationed in Australia.**
   a. the grasses eaten by dairy cows would have increased
   b. there would have been a second natural disaster
   c. the dairy cows would not have had enough nutrients to eat
   d. the communities around the dairy farms might have run out of water

2. **It is possible to conclude that cloud seeding _________________.**
   a. hasn’t always worked to prevent droughts in Australia
   b. was spread too thinly in the Australian atmosphere
   c. didn’t stop Australian dairy farmers from producing milk
   d. was a big failure in Australian urban communities
[Comprehension Questions]

1. How successful was rain making during ancient times?
   a. It was very successful, dependent upon praying.
   b. It was less reliable than the Native American technique.
   c. It was a new technique that sometimes worked in Greece.
   d. There is no mention of its success in the passage.

2. What is the basic principle of cloud seeding?
   a. Rationing nuclei particles in the sky
   b. Using condensed water in the clouds to make them bigger
   c. Adding particles to assist the growth of water droplets
   d. Praying really hard to the Cloud Gods for rain

3. How is the phrase subsequently rationed used in the second paragraph?
   a. To measure water droplets in the clouds
   b. To increase the amount of water use
   c. To decrease the amount of water created
   d. To carefully use the water you have

4. What analogy is used to show how ice crystals turn into rain?
   a. Calcium chloride that collects droplets like a tennis ball
   b. Nuclei particles that collect droplets like a tennis ball
   c. Ice crystals that are stuffed with rain like a tennis ball
   d. Condensed ice that collects droplets like a tennis ball

Summary | Fill in the blanks with the right words to complete the summary.

Making it rain is hard, but scientists came up with a method called cloud seeding a few decades ago. In many dry areas, droughts have made it difficult for farmers to receive enough water to grow their crops. Making it rain via cloud seeding involves a complex procedure. To make cloud seeding work, tiny particles like atoms are added to the sky. The particles form a nucleus in the cloud, allowing ice crystals to increase the size of the droplets. The most common cloud seeding method involves silver iodide into clouds.
Look at the graphic organizer below and fill in the evidence about the drawing conclusions. Use information from the passage to support the conclusion.

<table>
<thead>
<tr>
<th>Passage Facts</th>
<th>Passage Clues</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ancient Times</strong></td>
<td>During ancient times, the Greeks would pray to the rain gods, sometimes even offering a human sacrifice in the hopes that it would rain.</td>
<td>As we all know, there is no correlation between hoping for rain and creating clouds.</td>
</tr>
<tr>
<td><strong>Droughts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cloud Seeding</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Criticism of Cloud Seeding

Criticism
The desire to control the weather goes back to ancient civilizations. Although the modern technique of cloud seeding may sometimes produce rain, it is a method that has many critics. Some experts argue that cloud seeding usually occurs in conditions which are going to rain anyway. Additionally, cloud seeding can result in excessive amounts of rain and cause flash floods, thereby damaging homes. Two questions are often asked: would it have rained in an area without the use of cloud seeding, and would it have rained in smaller amounts? Meteorologists, scientists who study the weather, are divided on this issue. In 2003, the United States National Academy of Sciences declared that over a 30-year period, there was not enough “convincing” evidence that cloud seeding worked.

China
In many countries—both developed and undeveloped—there is a growing need for more water resources. As a result, governments find it hard to ignore the use of cloud seeding technology. A perfect example is China’s preparations for the 2008 Summer Olympic Games. Using satellite images, Chinese meteorologists found out the exact location of clouds in July and August. Then, using 1,104 rocket launchers and cannons, they spread millions of silver iodide particles into the air. Unfortunately, it did rain for a few days during the Olympics.

How Effective?
Cloud seeding depends heavily on environmental conditions like temperature and the type of cloud, called cloud composition. In some areas it works quite frequently while in other areas it fails. By spending $60~90 million a year to create more water, the Chinese have had a lot of experience with rainmaking. Even during normal periods, many of the water resources in China are polluted. To make matters worse, Beijing is situated in northern China, where rainfall levels
are 35 percent below the world average. To combat the falling water levels in the Yellow River, thousands of plane flights from 2001 to 2005 helped to create rainfall equivalent to 210 billion cubic meters of water. But critics say that much of this rain would have fallen anyway, just at a later date.

**More Concerns**
One drawback of cloud seeding is that it deprives some areas of rain by giving it to other regions. Others say that there is soil contamination from the silver iodide particles released in the air. In order to increase water resources, nations must use traditional water supply methods like building dams and diverting rivers. By 2050, water demand is projected to rise at a faster pace than the world’s population growth. Only by solving the demand for water, will nations be able to grow.

**Glossary**
- *flash flood* a sudden destructive rush of water during heavy rains
- *contamination* when something becomes polluted or infected
- *silver iodide* a tiny salt particle made from hydriodic acid

[**Reading Skill Questions**]

1. **It can be concluded that the preparations before the Beijing Olympics were meant to __________________.**
   a. make it rain prior to the harvest season
   b. make it rain during the Olympics
   c. stop it from raining for the rainy season
   d. make it rain prior to the Olympics, leaving blue skies

2. **It can be concluded that cloud seeding increases water resources _____________.**
   a. only if silver iodide particles are used
   b. usually during dry summer months
   c. in countries with less severe problems than China
   d. less reliably than through building dams
[ Comprehension Questions ]

1 What is a main criticism of those who oppose cloud seeding?
   a. Cloud seeding wastes too much money.
   b. It probably would have rained anyway.
   c. It doesn’t cause enough flash floods.
   d. Cloud seeding only works in humid conditions.

2 It can be inferred that there is a need for more water resources in countries ________________.
   a. due to soil contamination in dry areas
   b. because environmental conditions are improving
   c. due to growing populations and industry
   d. because of excessive amounts of flash floods

3 Which of the following is true?
   a. Cloud seeding has inconsistent results.
   b. The Chinese used the wrong cloud seeding technique.
   c. Weather conditions were perfect in Beijing for the Olympics.
   d. Pollution in the Yellow River made dry conditions worse.

4 Which criticism is NOT made of cloud seeding in the passage?
   a. The success of cloud seeding is often hard to measure.
   b. Cloud seeding increases the amount of acid rain.
   c. Cloud seeding deprives some areas of rainfall.
   d. Cloud seeding does not always work as planned.

Summary | Fill in the blanks with the right words to complete the summary.

The modern technique of cloud seeding is a method that has many ___________. Some experts ___________ that cloud seeding usually ___________ conditions which are going to rain anyway. In many countries, there is a growing need for more ___________. Using satellite images, Chinese meteorologists found out the exact location of clouds. Despite spreading millions of silver iodide particles into the air, it didn’t completely work as ___________. Cloud seeding heavily depends on environmental conditions like ___________ and the type of cloud. In some areas it works quite frequently while in other areas it fails.
A graphic organizer is a visual display, usually a diagram or illustration. It can help you organize information or facilitate the visualization of concepts, relationships and facts of the passage.

Look at the graphic organizer below and fill in the blanks about the drawing conclusions. Use information from the passage to support the conclusion.

<table>
<thead>
<tr>
<th>Pros &amp; Cons</th>
<th>How Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>In China</td>
</tr>
<tr>
<td>Cons</td>
<td>In America</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Conclusion</td>
</tr>
</tbody>
</table>
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

Tiny **nuclei** particles were observed under the electron microscope.

After the volcano, the resulting damage to the town was **catastrophic**.

Much of sub-Saharan Africa is full of impoverished and **undeveloped** countries.

The riot police tried to **disperse** the crowd after the soccer match by shooting tear gas.

- a. causing great damage or being disastrous in nature
- b. to scatter something or make something go away
- c. not fully developed
- d. a central part around which other parts are grouped

Weathermen need to study **meteorology** to predict the weather.

The CSI investigator was examining microscopic **particles** of DNA.

Physicists were examining **atom** particles under a powerful microscope.

There will be a 70 percent chance of **precipitation** tomorrow, so get your umbrella ready.

The HAZMAT team was sent to seal off the radiation **contamination** at the nuclear power plant.

- a. a minute or tiny portion or fragment of something
- b. the smallest portion of an element
- c. the scientific study of the weather and the atmosphere
- d. rain, snow, or hail formed by condensation in clouds
- e. when something becomes polluted or infected

The **rocket launcher** was used to fire missiles into enemy territory.

The Chinese government fully believes in using **cloud seeding** to make it rain.

Each spring, there are **flash floods** at the bottom of mountains when rainfall runs off.

- a. a technique to make it rain, using particles put into clouds
- b. a sudden destructive rush of water during heavy rains
- c. a piece of artillery equipment normally used by the military