Moving Up
Reading
2

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CONTENTS

Level 2

UNIT | 01
Cell

Science
Cells......................................................................006

Social Studies
Stem Cell Research..............................................010

Reading Skill: Main Idea

UNIT | 02
Spiders

Science
What Makes Spiders Poisonous?.......................016

Social Studies
Arachnophobia.....................................................020

Reading Skill: Facts & Details

UNIT | 03
Structures

Science
Why Don’t Skyscrapers Fall Down?.....................026

Social Studies
The Race to Build Taller and Taller Buildings.....030

Reading Skill: Sequence of Events

UNIT | 04
Buoyancy

Science
How Things Float..................................................036

Social Studies
Voyage of the Kon-Tiki..........................................040

Reading Skill: Cause & Effect

UNIT | 05
Winds

Science
Winds of the Sahara and the U.S. Plains............046

Social Studies
Protecting Against Tornadoes & Sandstorms.....050

Reading Skill: Compare & Contrast
CONTENTS

UNIT 06
Ocean
Science What Makes the Ocean Blue? ................. 056
Social Studies How Global Warming Changes Our World .... 060
Reading Skill: Inference

UNIT 07
Vertebrates
Science Vertebrates: Their Role and Function .......... 066
Social Studies Injuries to the Spinal Cord ................. 070
Reading Skill: Analyzing Language

UNIT 08
Magnets
Science Magnets: Their Uses and How They Work .... 076
Social Studies Maglev Trains ................................ 080
Reading Skill: Writer’s Purpose

UNIT 09
Pesticide
Science How Pesticides Keep Food Fresh ............... 086
Social Studies Are Pesticides More Harmful than Good? .... 090
Reading Skill: Recognizing Coherence

UNIT 10
Senses
Science Sensory System of Bats ......................... 096
Social Studies Helping the Blind See ..................... 100
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 theme of the passage?

Moving to another country can be a very difficult experience. There are many changes in location, traditions and climate. Usually, the person is not used to different food or sometimes strange customs and of course a new language.

a. Traditions are very confusing.
b. Eating unique food is really great.
c. It’s difficult to adjust to a new climate.
d. Adapting to new countries is challenging.

Strategy to Answer

In this passage, the main idea centers on the difficult experience in a new country, so the answer is d. The first sentence is the main idea, and the rest of the paragraph supports the first sentence.
Cells

Structures & Function

Cells are very unique creations. They are the basic unit of living organisms. They perform many functions. Every animal, bird, insect and plant is comprised of millions of tiny cells. Cells are essentially the “building blocks” of life. Some of the first known cells were formed 1.5 billion years ago. That is long before dinosaurs walked the Earth!

The main portion of all cells is filled with a fluid material. Just like a human body, the interior of the cell contains food, waste material or even extra water. On the outside of all cells is a protective covering called a membrane. It is just like the shell of an oyster. Sometimes cells divide in half, forming a new cell. In other words, one cell splits in half and an exact duplicate forms. Now there are two cells. When we are growing as a baby, cell division is responsible for much of our growth.

Nucleus and DNA

Just like the human body, there are many parts in a cell. In order to survive, cells rely on tiny specialized parts within them. These special “mini-cells” help the cell do certain jobs or functions. The most important “mini-cell” of all is the nucleus. The nucleus is like the air traffic control center at an airport. It controls the functions of everything inside the cell. Inside the nucleus is DNA. DNA can determine millions of factors including your height, eye color, blood type and even your personality.
Immune System
If a person has a common cold, the human body will release antibodies to fight the cold virus. Antibodies are part of our immune system that fights bacteria and viruses that are harmful. These antibodies are made by white blood cells. Sometimes they are called B cells. The unique thing about white blood cells is that they can detect which cells are carrying harmful bacteria and viruses. The more quickly these cells divide, the sooner your body can fight the cold. A strong healthy person’s body will have more white blood cells to attack the flu virus or some other illness. But sometimes this attacking process does not happen quickly enough, so we need to go to the doctor to get some medicine.

Glossary
• membrane an outer covering, usually of a cell
• nucleus the main part of a cell that directs growth and other functions
• DNA the basic genetic information in our bodies
• immune to be resistant to something

[Reading Skill Questions]

1 The main idea of the passage is ____________________.
   a. the importance of cell division in animals
   b. how membranes fight off antibodies
   c. the uniqueness of cells and their various functions
   d. the best way to grow up tall and healthy

2 What is the third paragraph about?
   a. Red and white blood cells
   b. The function of the nucleus and DNA in the cell
   c. The building blocks of DNA molecules
   d. How the nucleus fights off common colds
1. What material is inside the average cell?
   a. Building blocks
   b. Food, waste and water
   c. Divided cells and waste
   d. Membranes and antibiotics

2. What are the main functions of the nucleus?
   a. It sees how strong the immune system is.
   b. It determines the functions of the cell.
   c. It chooses the amount of antibodies.
   d. It determines your height, eye color, blood type, etc.

3. Why are white blood cells important?
   ➤

4. What does the phrase this attacking process mean in the passage?
   ➤

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

( cells  DNA  white blood cells  nucleus  immune system  antibodies )

Every living creature is comprised of millions of tiny _________. Cells are essentially the building blocks of life. There’re many parts all working together in a cell. The most important part of the cell is the _________ which controls the functions of the cell. Inside the nucleus is _________ which determines millions of factors of your character. If a person has a common cold, the human body will release _________ to fight the cold virus. Antibodies are part of our _________ made up of _________.
Look at the graphic organizer below and fill in the blanks using information from the passage.

Paragraph 1 & 2
Cells are the basic unit of living organisms.
Cells divide into new cells, allowing an organism to grow.

Paragraph 3

Paragraph 4

Main Idea
Stem Cell Research

Importance of Stem Cells
One of the most controversial debates in the scientific community concerns stem cell research from embryos. What are stem cells and why are they so important? Embryonic stem cell research is believed to hold the key for better treatments and possible cures for some serious illnesses. Stem cells are primitive cells, and they have the ability to change into many different types of cells. There are over 300 distinct types of cells in the human body, but stem cells are the only types that can be grown into other kinds of cells. This is very useful for scientists and doctors. They hope to grow stem cells to regrow damaged tissue or treat injuries. Using mice, scientists have successfully cured Parkinson’s disease, damaged nerve tissue, and even diabetes. Now the challenge is to do the same with humans.

Use of Stem Cells
For example, when a person is in a serious fire, they will likely have very bad burns. Their skin will be scarred for the rest of their life. Using stem cells, scientists think they can grow new healthy skin cells. Then they could transplant this new skin onto the burn victim. If there is damage to a person’s liver from heavy alcohol use, new liver cells could be grown.

The Controversy
In order to obtain enough stem cells from embryos, scientists often get them from fertility clinics. These are medical clinics that help women become pregnant. Sometimes, embryos are thrown in the garbage by the clinic. The embryos can be used in research laboratories. But these embryos (usually 4-5 days old) need to be killed to access the stem cells inside. This bothers many
people. Some people with strong Christian beliefs have been very outspoken against stem cell research. They argue that a single embryonic stem cell is the most basic form of human life. It is like ending the life of a human being. Due to this controversial ethical issue, in 2001, the U.S. government banned giving federal research funding to scientists conducting embryonic stem cell research. If scientists can find another way to get stem cells (other than by killing the embryos), they might be able to cure many of the diseases today.

Glossary
- embryo: the early stages of development of a living thing
- transplant: to change or relocate something
- fertility: to be able to give life or birth

[Reading Skill Questions]

1. The passage is mostly about ________________.
   a. the U.S. government’s ruling on stem cells
   b. how people recover after serious illness
   c. the outspoken groups who oppose stem cell research
   d. the benefits and controversy behind stem cell research

2. What is the third paragraph mainly talking about?
   a. Embryonic stem cells should not be thrown out.
   b. Fertility clinics should be closed in the U.S.
   c. Using embryonic stem cells is controversial.
   d. We should look for another source of stem cells.
[Comprehension Questions]

1. What is unique about stem cells?
   a. They help women get pregnant.
   b. They assist a person’s internal organs.
   c. They help cure diseases.
   d. They can change into various types of cells.

2. Why are stem cells so important to doctors?

3. What action have some Christians taken?
   a. They banned federal funding of research.
   b. They have written letters to congressmen.
   c. They have supported stem cell research.
   d. They have been very vocal against stem cell research.

4. What is implied about the future of stem cell research?
   a. Funding resources will run out soon.
   b. New sources for stem cells must be found.
   c. Fertility clinics might earn money.
   d. Christians will sue the scientists using embryonic stem cells.

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

( oppose  embryo  banned  primitive  controversial  transplanted  stem cell )

___________ research is one of the most ___________ debates in the scientific community. Stem cells are ___________ cells that can be grown into other kinds of cells. If there is damage to a person’s body, new cells could be ___________. Scientists usually get embryo stem cells from fertility clinics. But it is the source that bothers many people. It’s because a(n) ___________ is the basic life form of a living creature. Some Christians ___________ stem cell research, and in 2001, the U.S. government ___________ giving federal research funding to scientists conducting embryonic stem cell research.
Look at the graphic organizer below and fill in the blanks using information from the passage.

**Main Idea**

**How Stem Cells are Used**

Scientists are able to change stem cells into many different types of cells. They insert stem cells into an embryonic cell, then wait for new cell (and tissue) to grow into other kinds of cells.

**Pros**

**Cons**
A mother bear is very **protective** of her cubs.

It may taste great, but it is **essentially** just sugar and fat.

Cloning is still a very **controversial** issue in many countries around the world.

**Primitive** man used fire for heat for 100,000 years before they used it for cooking.

- something that is very ancient or simple in design
- describing a hot issue; contentious
- being able to protect or keep safe
- pointing at the nature of a thing; basically, fundamentally

Most people are not **immune** to the H1N1 virus.

My friends and I are **outspoken** supporters of the teachers’ strike.

Some dogs are able to **detect** a person’s scent up to thirty days after the person has been there.

The doctor was proud of his latest **creation**: cloned monkeys.

- to be fully resistant to something
- to notice or deduce
- vocal and honest
- the formation of something new, either living or manufactured

It is my **belief** that man descended from apes.

She may be beautiful but she has a terrible **personality**.

I’m worried about my dad. He has liver **transplant** surgery next week.

She went to a **fertility** clinic because she was having trouble conceiving.

- the characteristics and behavior of a person
- to be able to give life or birth
- to change or relocate something
- opinion, principle; religious idea
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 pieces of information that talk about the main idea.

Q. What happens in Seoul and Tokyo when a subway is built?

When a new subway line is built in large urban North American cities, quite often the value of real estate decreases. Conversely, in cities like Seoul, Hong Kong and Tokyo, the value of apartments often skyrockets with new subways. Hence, it is a wise investment to buy apartments near subways in Seoul, Hong Kong and Tokyo.

a. Real estate values quickly rise in price.
b. Subway routes are built very quickly.
c. The subway lines meander back and forth.
d. There is a gradual decline in real estate values.

Strategy to Answer

In this passage, “Conversely” is mentioned in the second sentence which is a contrasting term to decreasing in the price. The word “skyrocket” refers to an increase in price, and it supports the idea that real estate will rise in value in Seoul and Tokyo. So the answer is a.
What Makes Spiders Poisonous?

**Spiders**

Spiders have been on this planet for 400 million years. They are predatory insects that eat other insects (even other spiders) and small animals. Most spiders are harmless to humans. The most deadly spiders are the black widow spider, the yellow spider, the hobo spider and the red legged spider. These spiders have enough poison, or venom, to kill with one bite. Spiders are able to control how much venom they inject into their prey. In fact, they can even bite without injecting any venom. This is called a dry bite.

**Killing and Eating**

Technically speaking, spiders do not have teeth. However, they do have tiny pointed jaws. These are located just below their mouth. But the most dangerous part of a poisonous spider is its fangs. These are two sharp needle-like teeth, often one to two centimeters long. The inside of a fang is hollow. The fangs are connected to a gland inside the spider’s mouth. This gland has venom. When a spider attacks its prey, it swings its two sharp fangs like an axe into its enemy. The fangs sink into the prey and a few milligrams of venom flows out. Sometimes, the venom just paralyzes the spider’s prey. Many spiders wrap up their dead or paralyzed victim in silk and then carry it to their home. However, spiders don’t eat their prey like humans do. Spiders inject digestive enzymes into the prey. This is like an acid which turns the inside of the prey into liquid. Finally, the spider drinks the internal parts of its prey just like a milkshake.
Getting bitten
If you ever get bitten by a spider, you must immediately go to the hospital. Venom from poisonous spiders attacks the nervous system. This means you can barely move. Moreover, you usually have only a few hours to live. Serious stomach pains or dizziness also frequently occur. Since many spider bites are so small, there likely will not be any blood to see. If at all possible, try to capture the spider that bit you. This might sound crazy, but most people cannot correctly identify spiders, so the doctor at the hospital cannot give the appropriate treatment. There are no cures for some spider bites, so be careful.

Glossary
- predatory attacking or killing other animals for food
- gland an organ which produces things in your body
- paralyzed having no movement in a part or all of your body

[Reading Skill Questions]

1. What is true about the amount of venom spiders can inject?
   a. The hobo spider can only inject venom after eating.
   b. Spiders can control any amount of venom.
   c. Yellow spiders can’t inject venom without a bite
   d. Spiders only have a small amount of venom to inject.

2. What do many spiders use to wrap up their victims?
   a. They use silk.
   b. They use their pointed jaws.
   c. They use their own enzymes.
   d. They use the venom in their fangs.
Moving Up Reading 2

[ Comprehension Questions ]

1 Which of the following is NOT true about spiders?
   a. They are predatory insects.
   b. They carry their prey to their home.
   c. They chew their prey with their fangs.
   d. Mostly they are not harmful to humans.

2 How do poisonous spiders kill their victims?
   a. Spiders lure them home, then kill them.
   b. Spiders attack their prey with their fangs.
   c. Spiders spit poisonous enzymes.
   d. Spiders trick them with a web.

3 Fill in the blank with the right words.
   You can call it a dry bite when spiders bite without ____________________.

4 What does the author suggest about getting bitten?
   a. Wipe up the blood from the spider bite.
   b. Get treated at the hospital immediately.
   c. Try to hunt for the spider for sure.
   d. Clean the cut with lukewarm water.

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

( bite gland fangs deadly predatory nervous system pointed jaws )

Spiders are ___________ insects that eat other insects or small animals. However, most spiders are harmless to humans. Several ___________ spiders have enough venom to kill with one ___________. Spiders have tiny ___________ just below their mouth. But the most dangerous part of a poisonous spider is its ___________. They are connected to a ___________ inside the spider’s mouth. This gland has venom. Venom from poisonous spiders attacks the ___________. This means you can barely move if you are bitten. Once you’re beaten by a spider, you should go to the hospital immediately.
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. Write facts in the left column and several details in point form in the right column.

<table>
<thead>
<tr>
<th>Facts</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spiders</strong></td>
<td>1. Many spiders are very dangerous and can be deadly.</td>
</tr>
<tr>
<td></td>
<td>2. Deadly spiders kill their prey using venom.</td>
</tr>
<tr>
<td></td>
<td>1. These include the black widow spider, the yellow spider and the</td>
</tr>
<tr>
<td></td>
<td>hobo spider.</td>
</tr>
<tr>
<td></td>
<td>2. Some spiders can kill with one bite; others can bite without</td>
</tr>
<tr>
<td></td>
<td>injecting their venom.</td>
</tr>
<tr>
<td><strong>Killing &amp; Eating</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Getting Bitten</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Did this passage contain more facts or more opinions about poisonous spiders?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer</td>
<td></td>
</tr>
</tbody>
</table>
Arachnophobia

Many people get scared when they see a spider run across the floor of their home. Girls scream when they see them. Some men run away. Of course, most people do not really like spiders, but we are not obsessively afraid of them either. But some people have an unreasonable fear of spiders. The scientific name for this is called arachnophobia. The word comes from the Greek word \textit{arachne}, which means \textit{spider}. Phobia means fear. For many people, this fear is an obsession.

A Mental Condition

Different people suffer to different degrees. For some people with arachnophobia, it is just a mild condition. Others will yell and scream if they see a spider or spider web. They might become very anxious or start sweating. Their heart might start to speed up or they might have trouble breathing. A person who suffers from arachnophobia might avoid going near dark corners. They might even avoid reaching underneath their kitchen sink to grab a bottle of detergent. They do this because they fear that a spider is living there and will attack them. People who suffer badly from arachnophobia cannot enter a room unless someone else checks it out for spiders first. One woman, called Miss Muffet, was so afraid of spiders that she washed her car twice a day. She even used a burning cigarette to scare off the spiders.

Reasons

Historically, spiders in Europe were thought to carry diseases. During the 14th century, the Black Plague swept across Europe killing millions of people. People believed that any food that a spider had touched was infected. Spiders were believed to bring death. But actually, the plague was spread by infected rats—not spiders. In Western countries, nine out of 10 people who suffer from
arachnophobia are women. Of course, the tendency of Hollywood to make cheap science fiction movies about giant spiders does not help those with arachnophobia.

**Treatment**

One of the best ways to treat arachnophobia is to slowly confront spiders. Through aversion therapy, patients gradually get closer and closer to spiders. The therapist or doctor encourages patients to stand 15 meters away from the spider. The next time, they only stand 10 meters away. Eventually, they feel comfortable enough to stand one meter away. Other patients are given medication to reduce their anxiety of spiders.

---

**Glossary**

- **obsession** to worry a lot about something
- **plague** a terrible disease that spreads, rapidly killing many
- **aversion therapy** behavior therapy that reminds a person of what they are afraid of

---

**Reading Skill Questions**

1. **What did Miss Muffet do to avoid spiders?**
   a. She gave the plague to the spiders.
   b. She hid inside her home and did not come out.
   c. She went to the hospital every day.
   d. She washed her car obsessively.

2. **What caused the spread of the Black Plague?**
   a. Infected rats
   b. Raw food
   c. Poisonous spiders
   d. Unknown viruses
[Comprehension Questions]

1. How is the term **unreasonable** used in the first paragraph?
   a. To show the different types of obsessions
   b. To state that the Greeks hate spiders
   c. To show an unusual reaction to spiders
   d. To illustrate love and care about spiders

2. Which of the following is true?
   a. Black Plague killed billions of people around the world.
   b. Many of the people who suffer from arachnophobia are young children.
   c. It’s hard to treat arachnophobia through aversion therapy.
   d. Some people suffering from arachnophobia feel that spiders might attack them.

3. What is the main idea of the third paragraph?
   a. Some Europeans really like spiders.
   b. Burning spiders was the best way to avoid the plague.
   c. Prejudice against spiders has a long history.
   d. Women are vulnerable to spiders.

4. To accomplish his point, the writer uses a tone that is ________________.
   a. informative and factual
   b. creative and comparative
   c. opinionated and ineffectual
   d. argumentative and analytical

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

( fear attack diseases arachnophobia anxiety of aversion therapy )

Some people have an unreasonable ____________ of spiders. The scientific name for this is called ____________. A person who suffers from arachnophobia might fear that a spider will ____________ them. The fear of spiders dates back to the 14th century when the Black Plague swept across Europe killing millions of people. People believed that spiders carried ____________, but this was not true. One of the best ways to treat arachnophobia is ____________. Other patients are given medication to reduce their ____________ spiders.
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. Write facts in the second column and several details in point form in the third column.

<table>
<thead>
<tr>
<th>General Idea</th>
<th>Facts</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Most people are scared of spiders.</td>
<td>1. Many people will run away from a spider if they see one.</td>
<td></td>
</tr>
<tr>
<td>2. Being obsessively afraid of spiders is called arachnophobia.</td>
<td>2. The term arachnophobia comes from the Greek word for ‘spider.’</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.

1. The girl has a **phobia** of being confined in small places.
   - a. an organ which produces things in your body
   - b. a strong worry
   - c. the irrational fear of something
   - d. the poisonous substance delivered by some snakes and insects
   - e. the feeling of being dizzy or unbalanced, sometimes caused by spinning

2. Certain illnesses’ symptoms may include a fever and some **dizziness**.
   - a. an organ which produces things in your body
   - b. a strong worry
   - c. the irrational fear of something
   - d. the poisonous substance delivered by some snakes and insects
   - e. the feeling of being dizzy or unbalanced, sometimes caused by spinning

3. A king cobra delivers an enormous amount of **venom** with each strike.
   - a. an organ which produces things in your body
   - b. a strong worry
   - c. the irrational fear of something
   - d. the poisonous substance delivered by some snakes and insects
   - e. the feeling of being dizzy or unbalanced, sometimes caused by spinning

4. Saliva **glands** produce spit which helps you eat and swallow food.
   - a. an organ which produces things in your body
   - b. a strong worry
   - c. the irrational fear of something
   - d. the poisonous substance delivered by some snakes and insects
   - e. the feeling of being dizzy or unbalanced, sometimes caused by spinning

5. Test **anxiety** is the most common psychological disorder for American teens.
   - a. an organ which produces things in your body
   - b. a strong worry
   - c. the irrational fear of something
   - d. the poisonous substance delivered by some snakes and insects
   - e. the feeling of being dizzy or unbalanced, sometimes caused by spinning

6. Don’t be so **unreasonable**. You may never get a chance like this.
   - a. (of animals) habitually hunting and killing other animals for food
   - b. a quality of something that is very toxic and deadly
   - c. compulsively; with a fixation
   - d. when some action goes beyond normal or acceptable limits

7. I am a huge soccer fan who **obsessively** follows all of team Korea’s games.
   - a. (of animals) habitually hunting and killing other animals for food
   - b. a quality of something that is very toxic and deadly
   - c. compulsively; with a fixation
   - d. when some action goes beyond normal or acceptable limits

8. In all likelihood most of the chemicals under your kitchen sink are **poisonous**.
   - a. (of animals) habitually hunting and killing other animals for food
   - b. a quality of something that is very toxic and deadly
   - c. compulsively; with a fixation
   - d. when some action goes beyond normal or acceptable limits

9. Most dinosaurs were **not predatory** animals, but instead ate plants.
   - a. (of animals) habitually hunting and killing other animals for food
   - b. a quality of something that is very toxic and deadly
   - c. compulsively; with a fixation
   - d. when some action goes beyond normal or acceptable limits

10. You’d better **speed up** or you’ll be late for the conference.
    - a. a terrible disease that spreads rapidly, killing many
    - b. having no movement in a part or all of your body
    - c. containing disease-causing organisms
    - d. increase in speed; accelerate

11. He got **infected** after he was bitten by a komodo dragon.
    - a. a terrible disease that spreads rapidly, killing many
    - b. having no movement in a part or all of your body
    - c. containing disease-causing organisms
    - d. increase in speed; accelerate

12. He was **paralyzed** after he dove into the shallow end of the pool.
    - a. a terrible disease that spreads rapidly, killing many
    - b. having no movement in a part or all of your body
    - c. containing disease-causing organisms
    - d. increase in speed; accelerate

13. In the Middle Ages, the bubonic **plague** killed two thirds the population of Europe and western Asia.
    - a. a terrible disease that spreads rapidly, killing many
    - b. having no movement in a part or all of your body
    - c. containing disease-causing organisms
    - d. increase in speed; accelerate
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. Fill in the blanks with the right sequence words.

There is so much stress in our modern lives. (1) __________ of the first things necessary to reduce stress involves taking a break. (2) __________ , we should spend more time with family or friends. Taking some time to be alone is also helpful. (3) __________ spending time in a relaxing place like a park can help reduce stress.

a. Next  b. One  c. Finally

Strategy to Answer
In this passage, the term “One” comes first. The term “Next” refers to the second sentence about family and friends. The only choice left is “Finally” which always comes last. So the answer is [ b - a - c ].
UNIT 03 | Structures

Passage 1  Science

Why Don’t Skyscrapers Fall Down?  T-05

Skyscrapers exist in every major city in the world. From New York City, Shanghai, Kuala Lumpur, Beijing, Chicago or Dubai, you will come across many tall skyscrapers. Only a century ago, it was virtually impossible to build a structure more than five or six stories high. In 19th century stone or brick buildings, each floor put more and more weight on it from the floors above. This weight limited how high engineers could build. Today, different building techniques and technologies are used. But why don’t very tall skyscrapers collapse under their own immense weight?

Elevator Technology
The most necessary invention to make a tall building was the elevator shaft. In the mid 1800s, the first passenger elevator was installed in a New York department store. At the time, it was very difficult to conveniently move thousands of people up and down a building that was over 20 stories tall. Without elevators, tall buildings might never have been built.

Foundations and Steel Skeletons
The first step to constructing a skyscraper is digging a big foundation hole. When the Petronas Twin Towers were built in Kuala Lumpur, Malaysia, engineers had to shove massive concrete pillars 60~120 meters into the Earth’s bedrock layer. The second step to building a skyscraper is making its steel skeleton. This is just like the frame of a car. Strong iron or metal beams are welded to create long vertical columns. At each floor level, these vertical columns are connected to horizontal beams.
The third step also involves building the steel skeleton. This steel frame has outer walls (or curtain walls) that support almost all the weight of the building. The weight from all the floors gets transferred directly to the vertical columns. This sends forces through the steel skeleton down into the building’s base. In modern skyscrapers, these exterior curtain walls are made almost entirely of glass which gives more floor space for tenants to live or work. Once the skeleton has been built, the fourth step is much easier. The floors are then added to a new skyscraper, often one to two a day. A fifth and final step is stabilizing the skyscraper. Some buildings have huge weights controlled by computers. The weights glide back and forth in the opposite direction than that which the building moves during an earthquake or high winds.

**Glossary**
- *column* a supporting pillar
- *beam* a long thick bar of metal or concrete used as a horizontal support in buildings
- *weld* to join two pieces of metal together by heating them up

### Reading Skill Questions

1. **What happens during the second step of building a skyscraper?**
   - a. Elevator shaft frames are installed on every floor.
   - b. The building’s base is constructed.
   - c. The exterior of the steel skeleton is built.
   - d. The floors are added to the building.

2. **What was the breakthrough needed to build a skyscraper?**
   - a. Elevators shaft
   - b. Concrete pillars
   - c. Modern construction engineers
   - d. Lightweight glass panels
[Comprehension Questions]

1. What was the main difficulty in the 19th century to building tall structures?
   a. Too many elevators were designed poorly.
   b. There were very few construction engineers.
   c. Buildings were heavy due to the materials used.
   d. There was not enough brick and concrete material.

2. The word *shove* in the passage is closest to ________________.
   a. forcing construction workers to work harder
   b. thrusting the project faster into the ground
   c. pushing large concrete pillars into the Earth
   d. piling large steel beams on the ground

3. What benefit occurs from using exterior curtain walls?
   a. The building design is more attractive.
   b. Curtain walls support a lot of the weight.
   c. Using curtain walls decreases the cost of building.
   d. Curtain walls support electrical cables.

4. Why is the use of weights important?

   ________________

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

( floors weight stabilizing skyscraper elevator skeleton foundation hole )

Only a century ago, it was virtually impossible to build a tall building. One of the most necessary inventions to make a tall building was the _________. The first step in constructing a _________ is digging a big _________. The second step is making its _________. The third step also involves building the steel skeleton. This steel frame has curtain walls that support almost all the _________ of the building. Once the skeleton has been built, the fourth step involves adding _________. A final step is _________ the skyscraper.
The first skyscrapers were built in the 19th century using bricks and stones. This type of engineering had height limitations. Then, in the mid 1800s, the elevator was invented and used in New York City.

1. 

2. 

3. 

4. 

5.
UNIT 03 | Structures

Passage 2  Social Studies

The Race to Build Taller and Taller Buildings

In the middle of the desert in Dubai exists the world’s newest skyscraper. It is the Burj Khalifa (formerly Burj Dubai) which rises over 818 meters. Built by a Korean construction company, it is the tallest building in the world. But for how long will the Burj Khalifa hold the title as the tallest skyscraper? Many critics say building these multi-billion dollar skyscrapers is unnecessary and causes traffic congestion.

Skyscraper History
The first famous tall building was the Empire State Building built in 1931 in New York. It was constructed during the Art Deco era of architectural design, the first change in building design. It is 381 meters tall. Until 1972, when the World Trade Center (Twin Towers) was built, it was the tallest man-made structure on Earth. After the terrorist attacked on Sept. 11, 2001, the Empire State Building is again the tallest building in New York.

The second big change in skyscraper technology came when the World Trade Center in New York City and Sears Tower in Chicago were built. Both were extremely tall skyscrapers with over 100 floors. Both buildings used large light steel skeleton frames with lots of glass windows. The World Trade Center was completed in 1972 (417 meters) and the Sears Tower (without antenna or spire) was finished in 1973 (442 meters). For 20 years, these two buildings set the standard for skyscraper design. Other buildings copied their rectangular steel skeleton design. However, the Sears Tower was built in a very different manner. Instead of making one large building, nine different vertical buildings or tubes were built at different heights. The Sears Tower has 16 double-decker...
elevators. Each elevator stops at two floors at the same time (i.e. Floor 31 and 32).

Asian Skyscrapers
In the late 1990s, several East Asian cities joined the race for the tallest skyscraper honors. This marked the third phase of the “super skyscraper” race. In Shanghai, China, the Jin Mao Building was built in 1999 at 421 meters tall followed by the Petronas Towers (in Malaysia) in 1998 at 452 meters. Unlike the American or European skyscrapers, the designs of the Asian buildings reflected their own cultural and religious values. The Jin Mao Building is 88 stories tall (8 is a lucky Chinese number) while the Petronas Towers used Islamic geometric patterns to shape the building.

Reading Skill Questions

1 What was the second big change in skyscraper technology?
   a. Elevators were installed in buildings.
   b. The first 100-meter tall building was completed.
   c. Building with tubes became very popular in Europe.
   d. Large light steel frames and glass windows were built.

2 What kind of buildings were built during the third phase of development?
   a. Buildings that reflected the unique culture of the nation
   b. Multi-billion dollar skyscrapers over 100 stories tall
   c. Buildings that had high-speed elevators
   d. Skyscrapers built based on mathematical models
1 Why are critics concerned about skyscrapers?
   a. They ruin the landscape.
   b. They cause traffic congestion.
   c. The parking lots are insufficient.
   d. They use up too many natural resources.

2 How were the Sears Tower and World Trade Center different?
   a. The WTC didn’t use an exterior curtain wall.
   b. Only one of them used environmentally-friendly construction materials.
   c. The Sears Tower was made up of 9 different tubes.
   d. The WTC was much shorter than Sears Tower.

3 The word reflect is closest in meaning to ________________.
   a. remind or transparent
   b. transmit or show
   c. shape or construct
   d. speed up or race

4 What was unique about the phase of East Asian skyscraper design?
   a. Each skyscraper used a large foundation hole.
   b. All the buildings used geometric patterns.
   c. Each building represented a different culture.
   d. Each skyscraper costs more than the next.

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

(values          skyscraper          technology          frames          honors          reflected)

The first famous ____________ was the Empire State Building built, 381 meters, during the Art Deco era. The second big change in skyscraper ____________ came when the World Trade Center and the Sears Tower were built. Both had over 100 floors and used large light steel skeleton ____________ and glass windows. In the late 1990s, several East Asian cities joined the race for the tallest skyscraper _____________. This marked the third phase of the ‘super skyscraper’ race. The Asian buildings ____________ their own cultural and religious ____________.
Look at the graphic organizer below and fill in the blanks. Complete the correct sequence of events using information from the passage.

**The Race to Build Skyscrapers**

Sequence 1

Example

Sequence 2

Example

Sequence 3

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

Did you know that there are 206 bones in the human *skeleton*?

The *exterior* of the White House in Washington DC is painted white.

He showed a lot of promise in art and design, so he decided to study *architecture* at university.

The landlord was very upset because of all the damage his last *tenant* caused in the backyard.

- a. the outside or external part of something
- b. the art and science of designing and constructing buildings
- c. someone who pays money each month to rent an apartment or office
- d. the bones in a body; a basic framework

The ship broke when a *massive* wave slammed on it.

The designer is drawing *geometric* shapes and lines in her sketchbook.

The old man had *conveniently* placed his medicine bottle on his night stand.

The equator is an imaginary *horizontal* line which divides the Earth in two; the northern and the southern hemispheres.

- a. having patterns consisting of regular shapes or lines
- b. extremely large, huge, enormous, immense
- c. when something is easily or suitably available
- d. something that is flat, straight or level

Customers insist on high *standards* of quality.

Roger Ebert is perhaps the world’s most famous film *critic*.

It turned out that the building was *collapsed* due to shoddy construction.

It is important to *reflect* on what we have done wrong, so we won’t repeat our mistakes.

The problems of traffic *congestion* in metropolitan cities will not disappear in the near future.

- a. to bounce back light as in a mirror; think about something
- b. to fall down; fall apart
- c. someone who evaluates a form of work
- d. overcrowding, jam, bottleneck
- e. a level of quality or a level of behavior; criterion, example, model
CAUSE & EFFECT

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 keywords 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 was the cause that delayed Jason's arrival at the studio?

After the morning meeting, Jason’s supervisor sent him to pick up some photographs. The photos were needed for an advertising promotion the next day, but Jason was delayed getting to the photo studio due to a flat tire. That’s because his car ran over a piece of broken glass that he drove over on the highway.

a. Jason didn’t care too much about his boss’ request.
b. Jason didn’t have an updated map to find his way.
c. His tire hit a nail in front of the photo studio.
d. His car ran over some glass on the highway.

Strategy to Answer

In this passage, the last sentence refers to the car tire running over some glass. This would cause a puncture and result in a flat. So he couldn’t get to the photo studio on time. The answer is d.
When a boat floats in the water, there is a very important principle involved. It is called the Archimedes principle. It is named after a famous mathematician who lived over 2,000 years ago. This principle states that when an object is placed into water (or any other liquid), there is an automatic change. The object put into the water must remove an amount of liquid equal to the object’s weight. When a 1,000 kilogram boat is put into the water, it will move more than 1,000 kilograms of water around it. The boat floats because it displaces more water than the actual boat weighs. But how do we know if an object will float or sink?

The density of an object is a major factor that decides if an object floats (like a basketball) or sinks (like a stone). All items that have an average density less than water will float. Since the stone is thicker and denser than the air-filled basketball, the stone will sink. The basketball being less dense means that it will float. Boats, whether they are a tiny sailboat or even a very large oil tanker, all have hollow hulls. A hull is the bottom section of the boat or ship’s frame. The hollow hulls are filled with air. This makes them less dense than water. Hence, the effect of having an air-filled bottom section to a ship means that it will float.

One example of the buoyancy concept is the cola can experiment. If you take an aluminum can of cola and place it in a bucket of water, it will sink. However, if you pour out all the cola from the aluminum can and then place it in a bucket of water, it will float. The combined effect of a filled cola can brings the density to a higher level, hence it sinks. Another experiment can be
tried at home. Get some ice from the freezer and see if it floats. Normally, you would think that a block of ice would not float. After all, it is made from water. Will water float on water? But a block of ice will float since the density of frozen water is actually lower than when it’s in liquid form.

**Glossary**
- Archimedes a Greek mathematician and physicist who lived about 2,000 years ago
- hollow an empty or unfilled place
- hull the main body of a boat or tank

**Reading Skill Questions**

1. A sailboat floats on the water because ________________.
   a. it shares similar characteristics to the water
   b. its density is less than the ocean water
   c. all steel and wooden boats tend to float
   d. the weight of the boat is lighter than the water

2. Frozen ice floats because ________________.
   a. it removes less water than it weighs
   b. it causes warmer water to be displaced
   c. it is less dense than when it’s in liquid form
   d. it is denser if placed in tap water
[Comprehension Questions]

1 Which correctly states Archimedes theory?
   a. Objects placed in water always sink.
   b. Objects placed in water always float.
   c. An object prevents water from being displaced.
   d. An object will remove an equal amount of water to the object’s weight.

2 What happens to a ball that is less dense than water?
   a. The ball will move around a lot.
   b. Certainly the ball will sink quickly.
   c. The ball will float on water.
   d. It confuses people because it is lightweight.

3 Which of the following is NOT true?
   a. The buoyancy concept is based on the Archimedes’ principle.
   b. Some heavy objects can float, but a small rock will sink.
   c. The density of a filled cola can is higher than that of an empty cola can.
   d. An object put into the water removes less amount of water than the object’s weight.

4 What is the purpose of the paragraph on cola?
   a. To show how water fills up hollow cans
   b. To illustrate a simple experiment about density
   c. To compare the density of water and cola
   d. To give people a chance to experiment with a can

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

( float            sink            weight            density            remove            equal to )

The Archimedes’ principle states that when an object is placed into water, that object must _______ liquid _______ the object’s _______. The _______ of an object is a major factor that decides if an object floats or sinks. All items that are less dense than water will _______. For example, if you place an aluminum can of cola in water, it will _______. However, if you pour out all the cola from the aluminum can and then place it into water, it will float.
Archimedes’ Principle

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<td>B)</td>
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Buoyancy Concept

Whether an object will float or sink depends upon its density.

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<td>D)</td>
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Ice Density

Since ice is made from water, will it float or sink?

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<th>Cause</th>
<th>Effect</th>
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<td>E)</td>
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In 1947, a young ambitious Norwegian explorer set out to sail across the Pacific Ocean. His name was Thor Heyerdahl. He sailed in a primitive wooden raft called the Kon-Tiki. He was trying to test two theories. The first theory was that a wooden raft could actually float and could be sailed a significant distance. Many scholars laughed at the idea of a wooden boat crossing the perilous Pacific Ocean. They thought bamboo (the primary wood used on the Kon-Tiki) would become water-logged and soon sink. The second theory was about where the native tribes from the South Sea Islands came from. Hundreds of years ago, other explorers found that people lived on these islands. There were even stone statues similar to those found in Peru, South America. Heyerdahl thought they may have come from South America.

The Journey

He wanted to sail from Peru in South America to the South Sea Islands in the Pacific Ocean using just the material and resources available centuries ago. The Kon-Tiki raft was made mainly from bamboo and balsa wood trees. Inside the 13-meter long raft was 250 liters of water for drinking. The Kon-Tiki had a crude rudder attached to the rear of the boat. But it didn’t steer that well. The raft’s journey was more than 6,980 kilometers long and lasted 101 days. For a lot of the time, the raft just drifted with the ocean currents. In order to help them navigate, Heyerdahl and his crew of five brought a radio, a sextant, knives, charts and watches. None of these inventions existed centuries ago, but they were not relevant to testing his theories. Heyerdahl wanted to see if a wooden raft could actually survive the journey across the ocean. In this
respect, he succeeded. Even though the Kon-Tiki crashed on the South Sea Island of Raroia, the theory that a wooden boat could sail across the Pacific Ocean using ancient technology was proven.

**Origins of South Island Peoples**
The second theory about the origins of the South Sea Islands was disproved. Although the native Indians of Peru could have sailed to those faraway islands on a bamboo raft, they did not migrate to the South Pacific Islands. In the 1990s, DNA testing showed that the people from the South Pacific came from Southeast Asia, not from South America.

### Glossary
- **water-logged** when a piece of wood is soaked all the way through with water
- **rudder** a plate of metal or wood for steering a ship or boat
- **sextant** a navigational instrument used to calculate position

### [Reading Skill Questions]

1. **What was the result of Heyerdahl’s journey across the Pacific Ocean?**
   a. Heyerdahl found out how people lived in the South Sea Islands.
   b. Heyerdahl documented the Norwegian fishing industry.
   c. Heyerdahl perfected bamboo rudder techniques.
   d. Heyerdahl found out if a bamboo boat could cross the ocean.

2. **What was the result of testing the islanders’ DNA in the 1990s?**
   a. It disproved Heyerdahl’s theory about their origins.
   b. It showed the islanders didn’t eat red meat.
   c. Many native Indian migrated to the South Pacific Islands.
   d. It indicated that 101 days is a long time to travel 6,980 kilometers.
1 Why did scholars laugh at Thor Heyerdahl's voyage?
   a. They thought Thor Heyerdahl was just showing off.
   b. They thought a balsa wood boat couldn’t sail on the sea.
   c. They thought the boat would become water-logged and sink.
   d. They thought the currents would take the raft off course.

2 What did Heyerdahl infer from the statues on the South Sea Islands?
   a. The natives discovered North America.
   b. The native tribes might have come from Peru.
   c. The native tribes must have used modern tools.
   d. The South Sea Island tribes carved many rudders.

3 What was used to help the Kon-Tiki crew navigate?

4 What is the author’s purpose in telling about the Kon-Tiki voyage?
   a. To show how difficult it is to sail across the Pacific Ocean
   b. To describe an amazing voyage using old technology
   c. To prove that DNA testing cannot solve all theories
   d. To examine how good Norwegian sailors are

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

In 1947, Thor Heyerdahl sailed in a ________ wooden raft called the Kon-Tiki ________ two theories. The first theory was that a wooden raft could float and could be sailed a significant distance. The second was about where the ________ from the South Sea Islands came from. The raft’s ________ was more than 6,980 kilometers long and lasted 101 days. Even though the Kon-Tiki crashed on a South Sea Island, the first theory was ________ . But the second theory about the ________ of the South Sea Islands was disproved.
Look at the graphic organizer below and fill in the blanks. Match each cause and effect using information from the passage.

### Theory 1

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Experiment</th>
<th>Effect of Experiment</th>
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### Theory 2

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

I found that the information was very relevant to our business.

In a debate, the opposing side will always try to disprove your arguments.

When you finish high school, you must determine your choice of university.

The early settlers in western America displaced many of the Native American tribes.

a. to move or relocate something to another place
b. to decide or settle something conclusively
c. to show that something is not true or correct
d. related to, connected to

Einstein’s most famous work is his theory of relativity.

The fog was so dense the drivers couldn’t see anything.

Bats live in caves, cliffs, foliage and even in tree hollows.

A canoe has an unbelievable amount of natural buoyancy because of its shape.

a. an empty or unfilled place
b. an abstract thought, principle or idea
c. floatability
d. the quality of being closely packed together

The way to the summit of K2 is quite perilous.

Early explorers had no equipment used to navigate in the modern way, so instead they used the Sun and the stars to guide them.

He’s a very ambitious person; he wants to be a millionaire in 10 years time.

His boss made harsh comments about the crude method that he used.

a. to sail; to control the course of a ship or a plane
b. rough, basic, primitive
c. very dangerous
d. having a strong desire to success
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 transition word is proper for the blank?

Unfortunately, the convenience of the automobile has led to the pollution of our planet over the past century. __________, some insist that nuclear power plants will destroy the environment just as much as cars. Rather than switch to nuclear power from natural resources, such as oil or coal, we should consider solar power, although the technology is not that efficient yet.

a. However  
b. Even though  
c. Therefore  
d. Consequently

Strategy to Answer
In this passage, “However” refers to the alternative idea of nuclear power which also pollutes a lot. It is a contrasting transition word. The others are not contrasting words. So the answer is a.
UNIT 05 | Winds

Passage 1 | Science

Winds of the Sahara and the U.S. Plains

The Sahara Desert in North Africa is characterized by an extremely dry and arid climate. This desolate landscape creates very unique sandstorms and winds. They have Arabic names such as haboob, khamsin and harmattan. In the United States, a very different type of wind called a tornado routinely destroys homes in the flat Central U.S. states. Both these winds can have a devastating impact on local communities.

Sahara Winds and Sandstorms

A sandstorm is a wind storm that carries sand through hot, electrically charged air. The air becomes filled with dust and sand particles, usually swirling about no higher than 3~15 meters. Sandstorm speeds exceed 16 kilometers per hour and usually die out within three to five hours. In the Sahara Desert, the khamsin wind (meaning 50-day wind) continuously blows across the desert, from March until May. This is a typical time for winds and sandstorms. They usually come out of nowhere, blowing dust and sand into villages and the homes of nomadic tribes. It is almost impossible for villagers to walk about during these sandstorms since visibility is almost zero. The sky is filled with millions of particles of swirling fine grain sand. The experience is terrible as sand gets inside your nose and mouth, and it is terribly upsetting for camels, donkeys and other animals.

Tornadoes

In the United States, a much different kind of wind causes even greater destruction. Each year, mainly in the Central U.S., tornadoes destroy homes, kill people and throw cars hundreds of meters. The roofs of homes are ripped off and
broken up. Tornadoes are long, funnel-shaped winds that travel at over 500 kph. They are created by low-pressure regions of warm air. The air pressure outside a tornado is often 10 percent higher than inside a tornado. This air pressure causes a temperature difference, helping the tornado grow. Most of the energy and power in a tornado comes from when warm moist air rises and then cools, forming condensation inside the clouds. Usually, tornadoes disappear as soon as air pressure levels change. Tornadoes are most destructive in the spring. One flat farming area where most tornadoes occur in the U.S. is called Tornado Alley. It covers the Southern states from Texas and Oklahoma up to the farming states of Kansas, Nebraska and Iowa further north.

Glossary
- devastating something that is very shocking, disturbing or upsetting
- nomadic wandering or roaming around, usually by desert tribes
- funnel-shaped long narrow cone-shaped
- condensation when gas or vapor is reduced to a liquid or solid form, like rain

[ Reading Skill Questions ]

1. The passage mainly compares and contrasts ________________.
   a. the climate of the U.S. and the Sahara Desert
   b. the weather systems of low-pressure regions
   c. the winds and rains found in rural areas
   d. the effects of sandstorms and tornadoes on humans

2. What similarities do sandstorms and tornadoes share?
   a. Sand swirls around in both types of storms.
   b. Both types of storms can reach speeds of 500 kph.
   c. They both occur in springtime.
   d. Strong roofs are needed when hiding from storms.
Comprehension Questions

1. What type of climate is specific to the Sahara Desert?
   a. An extremely wet and hot climate
   b. A very rainy and foggy climate
   c. A climate with frequent frost
   d. An extremely dry and arid climate

2. What time and place is the worst for tornadoes?
   ➡️

3. Why does the author suggest sandstorms are upsetting for animals?
   a. There is no advanced warning for donkeys and camels.
   b. Sand is blown into animals’ noses and mouths.
   c. There is not enough room for animals to hide in.
   d. Villagers refuse to help donkeys and camels.

4. Which of the following is NOT true?
   a. The *khamsin* wind means “50-day wind.”
   b. When a sandstorm occurs, visibility is low.
   c. Tornadoes mainly occur in the Central U.S.
   d. Tornadoes are created by high-pressure regions of cold air.

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

( **blow**  **tornadoes**  **Sahara**  **destructive**  **electrically**  **sandstorms**  **occur in** )

From March until May, strong winds like the *khamsin* and *harmattan* blow in the ________. Sometimes these winds turn into ________, where sand is carried through hot, ________ charged air. They ________ dust and sand into villages and it can be a devastating experience for both humans and animals alike. In the Central U.S., ________ destroy homes, kill people and throw cars hundreds of meters. Just like the sandstorms of the Sahara, tornadoes are most ________ in the spring. The area where most tornadoes ________ the U.S. is called Tornado Alley.
**Sahara Winds, Sandstorms**

Many unique winds occur in the Sahara Desert, causing sandstorms that disrupt village life.

**Tornadoes**

One of the most destructive natural forces in the U.S. are tornadoes.

**How are they alike?**

**How are they different?**
Protecting Against Tornadoes & Sandstorms

When a tornado approaches a city or neighborhood, many people panic. In fact, there are several precautions that can be taken to survive even the most destructive tornado. Some of the most reliable information about tornadoes comes from local television or radio stations. Compared to tornadoes, sandstorms are a little more difficult to avoid. Sandstorms sweep across a wider part of the sky, whereas tornadoes have a very narrow funnel.

Surviving Tornadoes

The color of the sky usually turns greenish and dark before a severe thunderstorm. Tornado winds can easily rip off roofs, and they are most attracted to right angles. Conventional homes have roofs that overhang over the house frame. The gap between the roof and house is where the winds can get hold of and literally tear the roof off. For this reason, it is best to leave your home and go to a designated shelter in your city. This might be a school gymnasium or football stadium. An underground shelter is the safest place to go, but many people do not have access to one of these. If you have to stay in your house, do not go into the attic or top floor. The first place to go is in the basement or a strongly built room with no windows. Flying debris from a tornado may crash through a window and injure you, so stay wrapped up in blankets to protect from small rocks or glass. If you live in a tornado area, put together a storm safety kit. This has a radio, candles, flashlight, first aid supplies, food, water, and blankets.
Surviving Sandstorms

One of the key differences between tornados and sandstorms is that sandstorms can have a great effect on visibility and breathing. Wearing a mask or even goggles is essential. During sandstorms in desert countries, it is easy to become dehydrated in the dry heat. That means you will need lots of water to drink. Stay inside or find a shelter. Stockpiling large 4-liter bottles of water is crucial to surviving a long sandstorm that might last for several days or more. Unlike tornadoes, it is important to completely cover your body in clothing. In a sandstorm, the tiny sand particles are whipped around at high speeds. They can cut into a person’s skin like a very sharp knife.

Glossary
- debris pieces of something that have been destroyed
- stockpile to store or keep a lot of supplies in advance
- whipped beaten or slapped around with force

[Reading Skill Questions]

1 Which sentence shows how safety measures are similar for both storms?
   a. Drink lots of water.
   b. Wrap yourself in waterproof cloth.
   c. Stay with other people.
   d. Find shelter, either inside a room or basement.

2 Which sentence shows how damage caused by the storms differs?
   a. Sandstorms tear off roofs, tornadoes do not.
   b. Sandstorms decrease visibility, tornadoes do not.
   c. Tiny sand particles get whipped around and cut only during tornadoes.
   d. Neither storm causes much damage to homes.
1 Where is the best way to receive tornado warnings?
   a. By listening to the TV or radio
   b. By talking to neighbors who suffered through previous storms
   c. By reading brochures handed out at emergency shelters
   d. By standing on rooftops to see oncoming storms

2 Which of the following directions is NOT appropriate for avoiding a tornado?
   a. Go to a strongly built room.
   b. Hide in the school gymnasium.
   c. Go to the attic or top floor in your home.
   d. Stay in a designated shelter, preferably below ground.

3 Which of the following is NOT true?
   a. When a tornado approaches people often panic.
   b. Sandstorms greatly affect visibility and breathing.
   c. You should find a room with windows to see the outside.
   d. It’s helpful to cover your body in blankets when a sandstorm is approaching.

4 What is the worst thing likely to happen during a sandstorm?
   a. It might rip the roof off houses.
   b. The color of the sky turns greenish and dark.
   c. There’s no precautions because it is rather harmless.
   d. Tiny sand particles can cut into a person’s skin like a sharp knife.

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

( sweep shelter breathing tornadoes sandstorms rip off sand particles )

Sandstorms ___________ across a wider part of the sky, whereas ___________ have a very narrow funnel. Tornado winds can easily ___________ roofs. For this reason, you should leave your home and go to a designated ___________ in your city. Never stay in the attic. One of the key differences between tornados and sandstorms is that ___________ can affect visibility and ___________. Wearing a mask or even goggles is essential. In a sandstorm, the tiny ___________ are whipped around at high speeds. Therefore stay inside or find a shelter.
Look at the graphic organizer below and fill in the blanks to compare and contrast the information.

- Surviving Tornadoes
- Surviving Sandstorms
- Similarities
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

________ The wind is *swirling* in circles.
________ The flags *whip* around in the wind during storms.
________ The severe sandstorm *ripped off* the roofs of the houses in our town.
________ Many people are *stockpiling* food and fresh water in preparation for the hurricane.

   a. to move quickly with a twisting motion  
   b. to tear violently; to cut off or tear apart  
   c. to store or keep a lot of supplies in advance  
   d. to move suddenly; when something is beaten or slapped around with force

________ All the land is *desolate*, and vegetation is scarce.
________ The 2004 tsunami was very *devastating* to several nations.
________ My father is very *reliable*. He always does exactly what he plans to do.
________ In Mongolia, there are still *nomadic* tribes living traditionally today.

   a. wandering or roaming around, usually by desert tribes  
   b. something that is very shocking, disturbing or upsetting  
   c. deserted, uninhabited, devastated  
   d. being dependable or consistent

________ The tornado caused untold *destruction* to the park.
________ After the crash, the *debris* from the plane was spread far and wide.
________ There is limited *visibility* during snowstorms, so be careful when driving.
________ As a *precaution*, you should always wear a life vest when you operate marine crafts.
________ There was so much *condensation* on the inside of the windshield, I could barely see to drive.

   a. when gas or vapor changes to a liquid on a surface; dew  
   b. taking safety measures to prevent disaster  
   c. wreckage; scattered remains of something destroyed  
   d. the state of being able to see  
   e. devastation; the state of having been destroyed
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 does the passage imply?

Many media experts agree that newspapers are a dying industry. The only question is, “How much longer will newspapers keep printing on paper?” With more and more people getting their news online, the fate of newspapers is almost certain. Newspaper readership has been declining, especially in the 16 to 35 age group. Scientists are now experimenting with electronic paper.

a. The future of newspapers is in doubt.
b. People should invest in newspapers.
c. Newspaper readership online is very unhealthy.
d. Electronic paper is doomed to succeed.

Strategy to Answer

In this passage, the first sentence refers the problem in the newspaper industry. The next few sentences talk about increased online use and declining readership. All these point to newspaper being negatively affected. So the answer is a.
What Makes the Ocean Blue?

A glass of water looks clear, but when we look out at the ocean, it appears blue. There are two reasons that cause the human eye to see the ocean as blue. The first relates to how humans see light waves coming from the Sun. The second reason depends on how far away a person is from a water source. For example, a glass of water appears clear, yet shallow tropical water in the tropics looks turquoise blue. But the deep ocean looks dark marine blue from far away.

Light Spectrum

When light comes to the Earth from the Sun, the human eye can only see a narrow spectrum of that light. This is called the visible spectrum. The human eye is sensitive to certain colors. When the Sun shines on the ocean all colors of light enter the water. The yellow and red light is absorbed in the upper portion of the ocean. However, only the green and blue spectrum of light gets reflected back to the human eye. This is why the ocean seems blue. In other words, the color of water as seen by the human eye is a result of how light interacts with water.

Blue Ocean & Clear Bathtub Water

The color of water can seem very different depending on distance, too. A bathtub or glass full of water always looks clear, letting you see your reflection. This is because it is being viewed over a short distance. Actually, a glass of water is slightly blue. In fact, if the volume of water was sufficiently large, would it appear blue. Depending on the water source, the color of water is not always the same. In deep water, the water looks dark blue or bluish-
green because deep water only transmits a small amount of blue light. The deeper the water, the darker blue the ocean seems. Another factor that makes the ocean appear dark blue is the oxygen in the water. Sunlight is often scattered by the oxygen in the water, making it harder to reflect the blue light.

**Misconceptions**

Many people grow up believing that oceans, rivers and lakes are blue due to the blue sky. Children are sometimes taught that the blue sky is reflected off the surface of the water. This is not true. If it was, the ocean would be a cloudy color when clouds were in the sky.

---

**Reading Skill Questions**

1. **What can be inferred from the second paragraph?**
   a. Ocean water is much shallower than a glass of water.
   b. The color of water depends on changes in the light spectrum.
   c. A glass of water is actually a different color from the ocean.
   d. The color of water is different depending on distance.

2. **What color would tropical water appear to be if you looked at it close up?**
   a. It would appear to be very clear.
   b. The water would be dark bluish green.
   c. You could not see to the bottom of the ocean floor.
   d. The tropical water would look brownish from the sand.
Comprehension Questions

1 Which word is closest in meaning to water source?
   a. Tropical water
   b. Water origins
   c. Water spectrum
   d. Depth of water

2 You can conclude from the passage that ________________.
   a. there are many factors influencing how we see water
   b. water is normally dark bluish green except in the tropics
   c. oxygen levels are quite low in tropical areas
   d. more education is needed to teach about light spectrum

3 What happens when sunlight hits the ocean?
   a. The light interacts with the chemicals in the water.
   b. The light is absorbed, reflecting back red light.
   c. Only the yellow light can be seen by humans.
   d. The yellow and red light is absorbed and reflects back blue light.

4 Why does a glass of water appear to be clear?
   a. Because the viewer is looking at it from the wrong angle.
   b. Because it is being viewed from a short distance.
   c. Because the water is probably not from the ocean.
   d. Because light does not reflect well in a room.

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

( spectrum blue distance transmits reflected light waves water source )

The human eye sees the ocean as blue due to _________ coming from the Sun and the distance a person is from a _________. When the Sun shines on the ocean, only the green and blue _________ of light gets _________ back. This is why the ocean seems _________. The color of water can also seem very different depending on the _________ you are from it. A bathtub or glass full of water always looks clear. In deep water, the ocean only _________ a small amount of blue light, so it looks dark blue.
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>Light Spectrum</th>
<th>Bathtub Water</th>
<th>Misconceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Text Info</strong></td>
<td><strong>Text Info</strong></td>
<td><strong>Text Info</strong></td>
</tr>
<tr>
<td>Yellow and red light from the light spectrum is absorbed in the upper portion of the ocean when the Sun shines.</td>
<td>The color of water changes depending on the distance away from the water source. Shallow water transmits a lot of blue light.</td>
<td>Many people grow up believing that oceans, rivers and lakes are blue due to the blue sky. Children are sometimes taught that the blue sky is reflected off the surface of the water.</td>
</tr>
</tbody>
</table>
Higher temperatures around the world are leading to rising sea levels. The warming of the atmosphere is caused by more pollution from automobiles, factories and agriculture. These greenhouse gases lead to melting glaciers and cause the ocean water to warm up. Lately, water temperatures in the ocean have risen. Hence, there is more energy going up into the atmosphere to drive storm systems. Some scientists and climatologists say that this global warming trend leads to stronger hurricanes and typhoons. Even more alarming are the following facts: a) The warmest years in the 150-year history of recorded temperatures have all occurred since 1983, b) From 1978~1998, there were 20 consecutive years of rising temperatures, c) During the 20th century, sea levels rose by 20~30 centimeters.

Over the past century, the sea level in the United States alone has risen by 25 to 30 centimeters. This is a greater increase than during the last 2,000~3,000 years. More glaciers melt, more water flows into the oceans, starting at the polar ice caps (Arctic and Antarctica). This increases the volume of the ocean, raising its surface level. In one particular location in the South Pacific Ocean, on the tiny island of Tuvalu, global warming and rising sea levels are having a terrible effect. Many residents have been forced to abandon their homes as water levels have risen. Tuvalu, which has nine islands, has experienced massive flooding. Many homes have been destroyed as the sea level rises each year. Additionally, saltwater has seeped into the normal drinking supply. Over 11,000 people are seeking new homes on other islands.

The Maldives, a group of islands off the Indian subcontinent, is dealing with a
similar situation. Rising seas are forcing the 311,000 inhabitants to consider moving. Most of the tiny islands are less than two meters above sea level. During the 21st century, oceans are expected to rise another one meter. This could affect cities on coastlines like Paris, Vancouver, Shanghai, New York City and large parts of Bangladesh—a country built on a river delta. Climatologists estimate that low lying cities like Venice and Shanghai will be partially submerged under water. Scientists also estimate that for each millimeter rise in sea level, the shoreline retreats an average of 1.5 meters.

Glossary
- glacier a large sheet of ice formed millions of years ago
- climatologist a person who studies weather conditions
- seep to slowly leak or trickle some place

[Reading Skill Questions]

1. From the passage you can guess that _________________.
   a. more funding might help solve the sea level problem
   b. Tuvalu might become one of the first countries to disappear
   c. no problems will occur if they build some dikes
   d. global warming is expected to stop in a few years

2. In Tuvalu, it is most likely that _________________.
   a. the coastline began to retreat by 1,000 meters
   b. the residents had to find new homes
   c. the residents had to build new shelters
   d. the residents had to throw away old parts of their belongings
[Comprehension Questions]

1 What happened to the climate between 1978-1998?
   a. The Maldives became partially submerged.
   b. Warming occurred in coastal cities.
   c. Temperatures rose 20 consecutive years.
   d. Sea levels rose by more than 30 cm.

2 What is the main problem the Maldives people are dealing with?
   a. The slightest increase in the river delta could be disastrous.
   b. They will be forced to move to the Tuvalu islands.
   c. No problems will occur if they build some dikes.
   d. Their islands are dangerously close to flooding.

3 What might happen if the sea level rises by 1 meter in Vancouver?
   a. The shoreline will be eroded away and fall into the sea.
   b. The coastline will retreat by 1500 meters more.
   c. There will be similar problems with saltwater as on the Tuvalu.
   d. The coastline will advance by 1.5 meters more.

4 What are some examples of low-lying cities or regions?
   a. Southern islands
   b. Cities in Europe
   c. Venice and Shangha
   d. The Indian subcontinent

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

( glaciers abandon atmosphere warm up sea levels rising seas on coastlines )

The warming of the ___________ is caused by pollution and it leads to melting ___________ and causes the ocean water to ___________. On the tiny island of Tuvalu, rising ___________ are having a terrible effect. Many residents have been forced to ___________ their homes as water levels have risen. The Maldives is dealing with a similar situation, ___________ are forcing the inhabitants to consider moving. Most of the tiny islands are less than two meters above sea level. This could affect cities ___________, too.
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>1. Text from Passage</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatologists say that more pollution leads to melting of glaciers and strange weather patterns.</td>
<td>If we do not take proper steps to prevent more pollution, there'll be a lot more unpredictable weather patterns and severe natural disasters.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Text from Passage</th>
<th>Inference</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3. Text from Passage</th>
<th>Inference</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4. Text from Passage</th>
<th>Inference</th>
</tr>
</thead>
</table>
The highlighted words are from the unit articles. Guess the meanings of the highlighted words. Then match the words with their definitions.

| The ice cream began to **melt**. |
| Quick! Use this sponge to **absorb** the cola you spilled. |
| Nowadays, we use satellites to **transmit** most forms of communication. |
| Different colors of confetti were **scattered** from the roof of the buildings. |

| a. to change to a liquid, usually because of heat |
| b. to throw or drop things so that they spread well |
| c. to send or broadcast some information or data |
| d. to soak or immerse something |

| She was **slightly** eccentric, but brilliant. |
| The general was mortally wounded, so they decided to **retreat**. |
| A few dollars is usually **sufficient** if all you want to get is a single hamburger. |
| A polar bear is actually considered to be a **marine** animal because they spend all their time hunting around water. |

| a. in a very small degree |
| b. enough, adequate or satisfactory |
| c. of or relating to the oceans and seas |
| d. to move back; the act of withdrawing |

| He watched the magma slowly **seep** down the hill towards the road. |
| Most of the **inhabitants** of our town are occupied in the farming industry. |
| A prism is used to break visible light into its **spectrum** or range of colors. |
| Submarines **submerge** beneath the surface of the ocean and sneak up on their enemies. |
| The last **typhoon** had record-high wind speeds and caused almost a billion dollars in damage. |

| a. range of color in visible light |
| b. a person or animal that is a permanent resident of a particular place |
| c. to slowly leak or trickle some place |
| d. to go beneath the surface, usually of a liquid |
| e. a severe, hurricane-like storm which forms, especially over the Pacific Ocean |
To analyze both language and vocabulary, look closely at how the words, phrases and sentence structure are used. Understand 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. Find the words in the passage that are similar to the given words.

Most educators believe that assigning homework every day helps students reach a higher level. It is the only way to ensure that they continually review the material in class. Giving lots of homework is detested by students, but it helps the teacher measure if a student is doing well.

<table>
<thead>
<tr>
<th>Term</th>
<th>Similar Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>giving</td>
<td>________________</td>
</tr>
<tr>
<td>upper level</td>
<td>________________</td>
</tr>
<tr>
<td>constantly</td>
<td>________________</td>
</tr>
<tr>
<td>assess</td>
<td>________________</td>
</tr>
</tbody>
</table>

Strategy to Answer

In this passage, “assigning” means “giving,” “higher level” means a more advanced or “upper level.” “continually” implies “constantly.” “measure” is a term used to “assess, value or mark something.”
Vertebrates: Their Role and Function

One of the most essential parts of our bodies is our backbone. This is the set of bones that runs along the center of our back, connecting to our brain at the top. All living species that have a backbone are called vertebrates. All mammals, birds and most reptiles are in the vertebrate category. This even includes fish with bones. The backbone is sometimes called a spinal column. It runs down the back of the animal and protects and supports the nerves inside. This is just like a plastic pipe protecting electrical cables inside your home. Without this protective backbone, our nerves that connect with our muscles, arms and legs could easily be damaged.

Characteristics

The most advanced organisms on Earth are vertebrates. They are the smartest creatures like dolphins, chimpanzees, elephants and humans. But when the first vertebrates evolved about 525 million years ago, they were simple creatures. Later, reptiles comprised the majority of vertebrates, then dinosaurs, birds and finally mammals. All vertebrates have muscles and skeletons. Also, they usually have two pairs of limbs. In humans, this is represented by arms and legs while birds have wings and legs. Of course, fish do not have limbs, but they use two sets of fins for steering through the water. All of this means that vertebrates were able to move to a new environment when conditions changed. By being mobile, they could choose where to live more easily than other types of animals.

A Human Shock Absorber

Inside the spinal column of a human, there are 24 bones referred to as vertebrae. Between each vertebra bone is a circular-shaped disc. These discs,
separated into five distinct sections, rotate or move around as your body moves. If a basketball player jumps and shoots the ball, the discs will turn inside the spinal column. This allows the player to twist in the air. Connecting all these bones and discs is tissue called ligaments. These ligaments are just like an elastic band, stretching and moving as you do. When a person falls or lands on the ground very hard, the vertebrae, discs and ligaments absorb the shock so that you don’t get hurt. Together, these three parts function as a joint, allowing our body to bend or twist.

**Glossary**
- **vertebrate** any living creature with a backbone or spine
- **spinal column** the row of bones, discs and nerves in your back
- **steer** to navigate
- **ligament** a stretchy muscle that connects bones and tissue

### Reading Skill Questions

1. **How is the phrase represented by used in the passage?**
   
   a. To show how advanced human limbs are
   
   b. To talk about circular shaped discs
   
   c. To symbolize the flight of birds
   
   d. To show what type of limbs humans have

2. **What is the meaning of distinct sections as used in the passage?**
   
   a. The sections of bones helps to breathe.
   
   b. When bones break, they separate into five distinct pieces.
   
   c. The discs are separated into different subsections.
   
   d. The spinal cord and vertebrae are important body parts.
[Comprehension Questions]

1. What is the main purpose of the passage?
   a. To give nutritional information about bones
   b. To inform the reader about muscle development
   c. To talk about an essential part of the body, the backbone
   d. To tell the reader how to move

2. What's the main role of the backbone in a vertebrate?
   a. It makes it harder to stretch and move.
   b. It helps some species like humans to survive.
   c. It helps protect our body from becoming damaged.
   d. It helps our muscles to become stronger.

3. What are the fins of fish compared to?
   a. Reptile fins
   b. Bones and discs
   c. Spinal cord
   d. Arms and legs

4. What function do the circular discs play?
   a. They move around the ligaments.
   b. They increase in size when you jump.
   c. They contract when you start to stretch.
   d. They rotate and move as the body does.

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

(  disc nerves absorb rotate backbone bones connecting to )

One of the most essential parts of our bodies is our _________. It runs along the center of our back, ________ our brain at the top. Without this protective backbone, our _________ that connect to our muscles, arms and legs could easily be damaged. Inside the spinal column of a human, there are 24 _______ referred to as vertebrae. Between each vertebra bone is a circular-shaped _________. These discs _________ as your body moves. When a person falls or lands on the ground, the vertebrae, discs and ligaments _________ the shock.
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 answer the questions or fill in the blanks using key words or phrases from the passage.

### Challenging Words from Passage

<table>
<thead>
<tr>
<th>Definition</th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonym</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sentence containing word/phrase</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>vertebrate</th>
<th>backbone</th>
<th>comprised</th>
<th>shock absorber</th>
</tr>
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<td></td>
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</tr>
</tbody>
</table>
Injuries to the Spinal Cord

One of the most tragic moments in Hollywood occurred in 1995 when actor Christopher Reeve fell off a horse. Reeve, who was best known for his role in the movie *Superman*, severely damaged his spinal cord. He was paralyzed from the neck down and could not move his arms, legs or torso. Paralysis means the loss of movement and sensation of a particular part of the body.

If the spinal column is ever crushed, the nerves inside can get damaged. Athletes who play contact sports like football, rugby, hockey or basketball often suffer from sports-related injuries. If the vertebrae are seriously damaged, a person can lose all mobility in their body. If a person is paralyzed through most of their body, including the arms and legs, this is called quadriplegia. But if a spinal cord injury only affects the lower body, from the waist downward, then it is called paraplegia. People might even end up in a wheelchair if the nerves going to their legs are permanently damaged. One danger for people in wheelchairs is that they will get sores from sitting for so long. Since their limbs do not have any sensation, it is difficult for them to know if a sore has developed.

Treatment

At present, there is no known cure for spinal cord injuries. When the vertebrae or sections of the vertebrae are damaged in a car accident, severe fall or other injury, it is virtually impossible to repair the damage. One of the few ways to help a person who has lost movement in their body is to offer them therapy or rehabilitation. The patient has to undergo many hours of treatment with physical therapists and nurses. If the injury is limited to only one arm or leg, the goal is to try to move some of the muscles. Although many spinal cord
injuries place people in wheelchairs, many of these people are able to lead productive, independent lives.

**Research**

However, one good thing that came out of Christopher Reeve’s injury was renewed interest and funding in spinal cord research. The main goal of researching the vertebrae is to make the nerve cells grow again or regenerate. Two or three decades ago, little treatment was available. Now, people can use prosthetic limbs for their arms or legs. This enables them to use their hands to eat, write, use a computer or even drive a car.

**Glossary**

- *rehabilitation* a special treatment or therapy to heal someone
- *prosthetic* relating to a manufactured arm or leg

---

**Reading Skill Questions**

1. **How is the phrase *lose all mobility* as used in the passage?**
   a. When it’s hard to move during exercise.
   b. When you increase motion in your arms and legs.
   c. When the spinal cord loses its elasticity.
   d. When you cannot move any parts of your body.

2. **What is meant by *virtually impossible* as used in the passage?**
   a. It’s almost certainly impossible to fix nerve damage.
   b. It is too difficult to stop any accident.
   c. It will be possible to heal the disease someday.
   d. It will be partially possible to treat the damaged spinal cord.
**Comprehension Questions**

1. When was Christopher Reeve paralyzed?
   a. When Reeve was playing a game of rugby
   b. When doing a stunt while filming *Superman*
   c. While Reeve was riding his horse in 1995
   d. When Reeve was applying for spinal cord funding

2. What happens when a spinal cord gets crushed?
   a. The nerve cells start to regenerate.
   b. The nerves inside become damaged.
   c. The muscles build up and get stronger.
   d. A person’s legs become sore from walking.

3. What is the difference between a quadriplegic and paraplegic?

4. What does the author suggest about spinal cord research?
   a. Therapists should join the research.
   b. Research has slowed down over the past decade.
   c. Christopher Reeve should have joined the research.
   d. Research might help regenerate nerve cells.

**Summary**

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

( injury repair funding paralyzed damaged cure for spinal cord )

In 1995, actor Christopher Reeve damaged his _________. If a spinal column is ever crushed, the nerves inside can get _________. If a person is _________ through most of their body, this is called quadriplegia. If the _________ only affects the lower body, it is called paraplegia. At present, there is no known _________ spinal cord injuries. It is virtually impossible to _________ the damage. However, one good thing that came out of Christopher Reeve’s injury was renewed interest and _________ in spinal cord research.
1 **Paraphrasing:** Which of the following best states the essential information in the target sentence in the passage?

**Athletes who play contact sports like football, rugby, hockey or basketball often suffer from sports-related injuries.**

a. Suffering from injuries in contact sports is a result of poor regulation.
b. Contact sports have an inherent risk for participants.
c. Playing football, rugby and hockey is risky for average athletes.
d. Many contact sports result in sports-related injuries due to poor equipment.

**One good thing that came out of Christopher Reeve’s injury was renewed interest and funding in spinal cord research.**

a. Christopher Reeve was very hopeful about renewing his interest in research.
b. Spinal cord research was less popular before Christopher Reeve’s injury.
c. It was good that Christopher Reeves gave money to spinal cord research.
d. More funding was poured into spinal cord research as a result of Reeve’s injury.

2 **Word Recognition:** Choose three words from the passage and give a definition for each word. Make a sentence using each word you choose.

<table>
<thead>
<tr>
<th>Word:</th>
<th>Definition</th>
<th>Sample Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td></td>
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<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.

_____ My brother was severely injured in the crash.
_____ He had to get a prosthetic hand after the accident.
_____ Her voice is very distinct, unique and incredibly beautiful.
_____ We were virtually all the way there when the engine died, so Jack had to stay behind to wait for the tow truck.

   a. describing an artificial limb
   b. not alike, different
   c. close to actually
   d. extremely (usually negative)

_____ I had several months of rehabilitation after my knee surgery.
_____ I tore my calf muscle playing football last week and it still hurts to walk.
_____ The player has a torn ligament and won’t be able to play during the finals.
_____ A lobster is an arthropod not a vertebrate because it has an exoskeleton instead of an internal system of bones.

   a. any living creature with a backbone or spine
   b. stretchy chord that connects bones and tissue
   c. a special treatment or therapy to heal someone
   d. the fibrous tissue in bodies which determines strength

_____ Every twenty four hours the Earth will rotate once on its axis.
_____ Do you believe that human beings evolved from apes?
_____ Almost 100 albums comprise all the music ever recorded by Jimi Hendrix.
_____ Frogs are of extreme interest to genetic scientists because of their ability to regenerate severed limbs.
_____ For a long time people used sponges, but paper towel is the most widely used absorber today.

   a. to restore or regrow something to its former condition
   b. to be made up of
   c. to develop through evolutionary processes; to develop gradually
   d. something which has the capacity to absorb
   e. to move in a circular manner
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. To accomplish his purpose, the author uses a tone that ____________.

The Shanghai and Beijing art scene is swarming with trendy customers who have lots of money to spend. Ever since China’s art scene opened up to the rest of the world a decade ago, the value of Chinese art has skyrocketed. Appraisers predict that art prices will be going upward for the next few years.

a. is instructional about Chinese art  
b. informs about China’s art history  
c. expresses feelings and emotion  
d. describes China’s wealthy art scene

Strategy to Answer
In this passage, the first sentence refers to the type of customers who are spending money on art. Then the following sentences refer to the idea of rising prices. No other option talks about both these factors. The answer is d.
Magnets: Their Uses and How They Work

Magnets are objects made from metal that has a magnetic field. This magnetic field has many tiny electrons that all spin in the same direction. This powerful electric field helps the magnet attract other metal objects like steel, iron, nickel or copper. Children often play with fridge magnets, using them to pick up paper clips or coins. The magnet pulls the paper clip or coin due to its metal content.

Push or Pull
The reason that some magnets push or pull away from another metallic object is the result of tiny electrons and protons. These spin around atoms which are the building blocks of all material. When a magnet or object has more protons than electrons, it has a positive charge to it. When a magnet or object has more electrons than protons, it has a negative charge to it. A positively charged object will pull toward a negatively charged object. Every magnet has both a north and south pole. If you try and push the south pole of one magnet toward the south pole of another magnet, they will repel each other and push away. If you break a magnet in half, the two new magnetic pieces will each be assigned a new north and south pole. If you want to conduct an experiment with magnets, just gather together some thumbtacks, staples or paper clips. Hold a magnet in your hand and see how many you can attach to one end of the magnet.

Using Magnets
The most practical use of a magnet is in a compass. Compasses can assist people hiking in the mountains, sailors navigating the sea or pilots flying in the
air. In the 12th century, the compass was first invented. This invention helped Chinese sailors cross the oceans in ships. The magnetic current in the compass points a tiny iron needle to the north. But compasses do not actually point to the North Pole. They point to the Magnetic North, which is a few hundred kilometers away from the actual North Pole. Today, magnets are critical in many electronic devices. Without magnets, tape recorders, telephones and generator motors would not work. Modern compasses, called gyro-compasses, are used by planes. Although magnets are a small discovery, they allow us to use many machines that make our lives more convenient.

Glossary
- electron: a tiny piece of matter that spins around atoms and has a negative electrical charge
- proton: an atomic particle that has a positive electrical charge

[Reading Skill Questions]

1 What is the main purpose of the passage?
   a. To show how magnets work and how useful they are
   b. To tell about magnetic tricks and experiments
   c. To show us the importance of magnetic rocks
   d. To explain about 12th century sailing devices

2 What is the author's purpose in the third paragraph?
   a. To explain problems that can result from using magnets
   b. To illustrate how the Chinese invented magnets
   c. To show how important magnets are in modern devices
   d. To demonstrate how to find Magnetic North
[Comprehension Questions]

1 Why do magnets push or pull away from other metallic objects?

2 What happens when there are more electrons than protons in a magnet?
   a. The protons collide with the electrons.
   b. The magnet will pull toward any other object.
   c. The magnet has a negative charge to it.
   d. The magnet has a positive charge to it.

3 How does the needle in a magnetic compass work?
   a. A positively charged piece of iron pushes the needle.
   b. The compass needle gets pulled by the piece of lodestone.
   c. The sailor has to make an adjustment to the current.
   d. A magnetic current pushes the needle northward.

4 Which of the following is NOT true?
   a. Magnets are made from metal that has a magnetic field.
   b. Magnets attract metal objects like steel or iron.
   c. Magnetic North and the actual North Pole are the same.
   d. Gyro-compasses are helpful for navigating planes.

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

( magnet charge attract compass electrons negatively push away )

Magnets are objects that have tiny _________ that spin in the same direction. This powerful electronic field helps the magnet _________ other metal objects. When a _________ has more protons than electrons, it has a positive _________ to it. A positively charged object will pull toward a _________ charged object. Every magnet has two poles. If you push the south pole of one magnet toward the south pole of another magnet, they will _________ . The most practical use of a magnet is in a _________ . Today, magnets are critical in many electronic devices.
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>
</table>
| To inform about how a magnetic field works | Uses facts or ideas | - This magnetic field has many tiny electrons that all spin in the same direction.  
- This powerful electric field helps the magnet attract other metal objects like steel, iron, nickel or copper. |
In the early 1960s, an American researcher was stuck in traffic. He dreamed of using magnets to lift cars and send them through the air. Although this was only a fantasy, today there are some very high-tech and high-speed trains that float on a magnetic field. These trains are referred to as magnetic levitation or maglev trains.

**Floating on Air**

A maglev train is kept floating above the guide rails with a very strong magnetic field. The train is actually separated by 10 mm of air between the train and the guide rails. Hence, there is no friction like conventional trains. There is only air resistance. On a maglev train, there are no wheels. Instead, there are magnets on the guide rails and magnets on the bottom of the train. The magnets on the guide rails have the same magnetic charge as those on the train. For example, a positively charged magnet will push away from another positively charged magnet. Likewise, a negatively charged magnet will push away from another negatively charged magnet. This is because the electrical charges in both magnets are opposing each other. This helps lift the train off the guide rail and pull it forward.

**Train Costs**

The first operational maglev train was in Germany in 1979. Currently, the most well-known maglev train operates in Japan. Another train in China runs 30 km from Shanghai to the nearby Shanghai Hongqiao International Airport in just 7 minutes. It operates at 300 km/h and the ticket price is only 50 yuan ($7.30). Even though only 7,000 passengers a day use the Shanghai maglev train (20 percent of capacity), it has been enough money to pay for the $1.2 billion construction costs.
The Future
Some people believe that these trains could be the future of transportation. They are quiet and do not need electricity or diesel fuel for power. Since maglev trains do not need engines, there is no pollution. Moreover, maglev trains have achieved a top speed of 501 km/h. But others disagree. One very big disadvantage of maglev trains is that they cannot run on normal train tracks. Unlike normal high-speed trains that operate in France, Japan, and Germany, maglev trains need their own special tracks. It would be very expensive to build an entire new track system that could only be used for one type of train. This means building over 50,000 km of tracks in many European countries.

Glossary
- **levitation**: rising into the air and floating in apparent defiance of gravity
- **friction**: the resistance when two objects rub against each other

[Reading Skill Questions]

1. What is the author’s purpose of the passage?
   a. To inform about high-speed trains around the world
   b. To inform about a new train technology
   c. To show us the potential of Chinese train technology
   d. To tell us that the Shanghai train is the world’s fastest

2. What is the author’s viewpoint on the future of maglev trains?
   a. They are much more fun to ride than normal trains.
   b. They will become very popular in Germany and China only.
   c. One day maglev trains will become cheaper to operate.
   d. They have limited use since they need special tracks.
[ Comprehension Questions ]

1. How was the idea of maglev trains thought up?
   a. By a highway construction engineer
   b. By a researcher thinking of elevating cars
   c. When a scientist floated toy trains in the bathtub
   d. When a researcher put magnets in a wind tunnel

2. What prevents a maglev train from touching the rails?
   ➤

3. Why do some people believe maglev trains are beneficial?
   a. They can run on traditional train tracks.
   b. They emit no pollution and are very fast.
   c. They use less diesel fuel.
   d. They can be operated without a driver.

4. What's the disadvantage of the operation of maglev trains?
   a. They cannot be operated in some countries.
   b. It'll cost a lot to build new special tracks for them.
   c. Unexpectedly, they still cause air pollution.
   d. Their top speed is slower than people expected.

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

(floats magnet disadvantage transportation train tracks magnetic field)

A maglev train ________ above the guide rails, the result of a very strong ________. On a maglev train there are ________ on the guide rails and on the bottom of the train. Currently, the most well-known maglev trains operate in Japan. Another train in China runs 30 km from Shanghai to the nearby airport in just 7 minutes. Some believe that these trains could be the future of ________. They’re quiet, fast and there’s no pollution. However, one very big ________ of maglev trains is that they cannot run on normal ________. Maglev trains need their own expensive special tracks.
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 about the writer’s purpose. Using the sentences from the passage, fill in the blanks and describe what the writer’s purpose was.

**Paragraph 1**
In the early 1960s, an American researcher was stuck in traffic. He dreamed of using magnets to lift cars and send them through the air.

**Q.** What writing technique did the writer use to make his point?

**A.**

**Paragraph 2**
On a maglev train, there are magnets on the guide rails and magnets on the bottom of the train. The magnets on the guide rails have the same magnetic charge as those on the train.

**Q.** What writing technique did the writer use to make his point?

**A.**

**Paragraph 4**
Some people believe that these trains could be the future of transportation. They are quiet and do not need electricity or diesel fuel for power.

**Q.** What writing technique did the writer use to make his point?

**A.**
The positive diodes in a battery repel the negative charge.

Every teacher has to assign at least three essays for homework this semester.

We regularly conduct tests to detect whether the factory emits any harmful materials.

I was able to achieve much better marks this year, but my mom still wasn’t quite satisfied.

Every university professor will hire a student to act as a researcher.

You could probably never guess just how small an electron actually is.

Most grandmothers have a huge capacity for loving their grandchildren.

My street has been under construction every summer for the past five years.

When he finished remodeling the antique motorcycle, it was fully operational.

Both my mother and father oppose my going to Europe before I enter college.

We were at a big disadvantage in our negotiations because we couldn’t speak the local language.

---

a. to push or keep away from something
b. to organize an activity or task and carry it out
c. to give as a job
d. to accomplish, to succeed in doing something

a. a subatomic particle with a negative charge
b. a person who studies and compiles factual data
c. the amount, size or volume of something
d. the process of building

da. the quality of being less qualified to succeed
b. when a machine is ready to start working
c. to object or go against
RECOGNIZING COHERENCE

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.

It is no wonder that scientists have studied whale and dolphin communication techniques in an effort to fully understand the animal kingdom.

Where would the sentence best fit?

(A) Humans are not the only intelligent species on Earth. (B) It is common knowledge that whales and dolphins can communicate with each other. (C) Whales have been found to emit sounds using sonar to help them detect obstacles. (D)

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

Strategy to Answer

In this passage, the transition phrase “It is no wonder that” is a concluding phrase that best comes after the third sentence. It mentions how scientists are studying the communication techniques of whales and dolphins. Hence the answer is d.
How Pesticides Keep Food Fresh

Keeping our Food Fresh
Every day, people go shopping for groceries and fresh produce. Tomatoes, cucumbers, celery and strawberries are purchased, taken home and put in the refrigerator. But sometimes, these fruits and vegetables are not eaten until four or five days later. The main reason that these items remain fresh is due to a very useful chemical. This chemical is called a pesticide. A pesticide is any substance used to destroy a pest. Pesticides are used to control organisms (usually insects) that can cause damage or destruction. Some pesticides prevent mold from growing on crops and causing them to rot. Others are used as rodent poisons.

How do Pesticides Work?
Pesticides control or kill pests by physically, chemically or biologically interfering with their normal body behavior. (A) Their goal is to eliminate any insects that might eat valuable crops. (B) To be effective, a pesticide needs to be absorbed through the surface of the plant tissue. (C) When a pest, like an insect, slug, snail or mouse starts to nibble on a plant, the pest ingests the chemical and is destroyed. (D) One common type of pesticide is called a herbicide. Herbicides can be used to clear roadside weeds, trees and brush. They can also kill weeds that may cause environmental damage.

Spraying the Crops
When pesticides are sprayed on crops, a thin film or covering coats the crop. Farmers often use a small airplane that flies over the farm, spraying various types of pesticides. Another method is for mechanical sprayers along the side of the field to spray the pesticide with small droplets. Having purchased these crops
from the supermarket, it is recommended that consumers wash their fruits and vegetables, just to be safe.

Helping Poor Farmers

(E) In African countries or parts of Southeast Asia, there are many unique bugs that grow in harsh climates. (F) By working in laboratories, scientists have come up with new pesticides that are less susceptible to failure and make plants more resistant to the diseases brought on by tropical bugs. (G) Pesticides are modified to work in their climates, not just on North America or European farms. (H)

Glossary
- **pesticide** a chemical substance used to kill pests, usually on crops
- **susceptible** easily influenced or affected by something
- **modified** changed in a fundamental way

[Reading Skill Questions]

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

   **The biggest use of pesticides is in agriculture.**

   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:

   **This can save farmers in developing countries a lot of money if fewer crops are destroyed by pests.**

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

1 How do pesticides affect vegetables that people buy?
   a. Some pesticides add nutrients to food.
   b. Tiny organisms grow more rapidly inside vegetables.
   c. Mold cannot be prevented from growing.
   d. Food will last longer in the refrigerator.

2 What would happen if farmers stopped spraying pesticides?
   a. More crops would be attacked by pests and diseases.
   b. Some crops might not survive cold winters.
   c. More water would be needed to grow crops.
   d. There would be a drop in food prices at the supermarket.

3 What is the effect of an insect ingesting a pesticide?
   a. The pest becomes resistant to the pesticide.
   b. The pesticide speeds up the biological process.
   c. The pesticide changes the insect’s normal body behavior.
   d. There is often no change at all.

4 What would happen if fruits and vegetables were not washed?
   a. The consumer would definitely get sick from the pesticides.
   b. The fruit or vegetable might not look that fresh.
   c. Some pesticides might enter your bloodstream.
   d. The consumer would become more resistant to pests.

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

(pests nibble chemical pesticides control destruction interfering)

Fruits and vegetables remain fresh for many days due to a useful chemical called a pesticide. Pesticides are used to ________ organisms that can cause damage or _________. Pesticides control or kill _________ by physically, chemically or biologically _________. When a pest starts to _________ on a plant, it ingests the _________ and is destroyed. Farmers often spray various types of _________. Scientists have come up with new pesticides that are modified to work in other climates like those of Africa.
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 the paragraph. Where would the sentence on the right best fit and why?

**P1** Every day, people go shopping for groceries and fresh produce. B [■] Tomatoes, cucumbers, celery and strawberries are purchased, taken home and put in the refrigerator. C [■]

**P2** One common type of pesticide is called a herbicide. E [■] Herbicides can be used to clear roadside weeds, trees and brush. F [■]

**P3** Farmers often use a small airplane that flies over the farm, spraying various types of pesticides. H [■] Another method is for mechanical sprayers along the side of the field to spray the pesticide in small droplets. I [■]

**Sentence Choices**
1. There are some negative side effects of herbicides, so they should be used with caution.
2. They make a grocery list and check the shelves of the supermarket.
3. Packed inside the airplane fuselage is a device that sprays pesticides into the air.

**P1** Why?

**P2** Why?

**P3** Why?
UNIT 09 | Pesticide

Are Pesticides More Harmful than Good?

Greater Awareness
Pesticides are designed to kill disease-causing organisms or control insects and other pests. They can be very helpful to improving farmer’s crops, but there is also concern over the potential to harm humans, animals, or the environment. Over the past few decades, people have become more aware of the food they eat.

Organic Food
(A) In the past decade, consumers have started to prefer healthier food. (B) Organic food refers to fruits and vegetables that do not have pesticides sprayed on them. (C) Unlike food sprayed with pesticides, organic food must be eaten quickly. (D) It does not last long and sometimes there are insects growing inside, so the consumer has to be careful when choosing fruits and vegetables. The trend of buying organic food began after several scientific studies were completed. They showed that small doses of pesticides on crops can adversely affect people. The greatest risk of pesticides is often to pregnant women and young children.

Dangerous Pesticides and DDT
The biggest scare about pesticides came as a result of a chemical called DDT. This pesticide was invented after World War II and was used to kill insects that carried the disease, malaria. In the United States, the insides of people’s homes were sprayed with DDT. (E) By the 1960s, pesticide use had become common. (F) They argued that reliance on pesticides was causing many insects to become resistant to chemicals. (G) Instead of DDT decreasing the amount of insects carrying malaria, their numbers soared to higher and higher levels. (H) Soon, 19 species of mosquitoes worldwide were resistant to DDT.
Silent Spring

Then an American marine biologist named Rachel Carson wrote a book, *Silent Spring*, that angered many farmers and chemical companies. Carson claimed that DDT was carcinogenic—meaning it could lead to cancer. She also stated that DDT had negative effects on fish, wild birds and other wildlife. *Silent Spring*, published in 1962, caused the public to become aware of environmental contamination by pesticides. Her book caused such a debate that President Nixon created the Environmental Protection Agency eight years later. The EPA’s job was to regulate all chemicals and medication that might affect American consumers. Today, the controversy surrounding DDT and other pesticides used on food still exists.

Glossary
- organic: grown without the help of artificial pesticides
- malaria: a disease caused by a parasite, usually infected mosquitoes
- carcinogenic: something that is capable of causing cancer
- contamination: the process of making something dirty, usually by pollution

[Reading Skill Questions]

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

   This has led to the popularity of organic food markets.

   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 third paragraph:

   However, some scientists began to worry about their widespread use.

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

1 How have people's attitudes changed over time?
   a. People have started to read more scientific journals.
   b. Many people have started to grow organic food.
   c. They have become more health conscious.
   d. They have become worried about the high costs of organic food.

2 Why did scientists worry about the widespread use of DDT?
   ➡️

3 What is the main idea expressed in the fourth paragraph?
   a. DDT mainly affected the wild animal population.
   b. The American government didn’t care about people’s health.
   c. Biologists are not that qualified to talk about DDT.
   d. One book helped bring attention to a health issue.

4 The effect of regularly eating organic fruits could
   ➡️

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

( DDT harm organic alarm improve adversely )

Pesticides can help _________ a farmer’s crops, but there is also concern over the potential of _________ to humans and the environment. In the past decade, consumers have started to prefer healthy _________ food. Organic food refers to fruits and vegetables that do not have pesticides sprayed on them. Studies have shown that small doses of pesticides can _________ affect people. The biggest scare came in the 1960s after the use of _________ . An American biologist claimed that DDT was carcinogenic, causing _________ in the public.
1 Which of the following sentences could best begin the reading?
   a. Over the past few decades, people have discussed their concerns about processed food.
   b. Mankind has struggled to keep crops fresh and safe for human consumption.
   c. In future decades, consumers will start to prefer healthier food.

   Why?

2 Which of the following sentences could be removed from paragraph 4 without losing coherence?
   a. Then an American marine biologist named Rachel Carson wrote a book, Silent Spring, that angered many farmers and chemical companies.
   b. She also stated that DDT had negative effects on fish, wild birds and other wildlife.
   c. Silent Spring, published in 1962, caused the public to become aware of environmental contamination by pesticides.

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

There are many interesting birds and animal **wildlife** to study in the forest.

There is **widespread** use of kimchi in Korean restaurants.

Nowadays, popular **trends** in clothing and music often change when the fashion dies out.

If you go outside on a cold winter day without a hat, you are **susceptible** to catching a cold.

- widely spread, spread over a considerable extent
- easily influenced; very sensitive
- any animals, birds or living things living in a natural state
- a current fashion or popular mode of doing something

Many wild plants contain **poison** and are not safe to eat.

A **sprayer** was used to spread the water around the front lawn.

There was a dead rabbit lying on the **roadside**, next to the highway.

A thin **film** of water was left on the kitchen counter after the maid cleaned it.

It was the job of the government tax **agency** to collect taxes from all the people.

- a device or machine that sprays liquids or gases over an area
- a substance that is toxic or deadly
- an area beside or along a normal road or highway
- a thin layer or coating of a substance like dust or water
- an organization, especially within a company or government

She wanted to **purchase** the new book, but it was out of stock.

He tried to **control** his weight by exercising regularly at the gym.

The bestselling author recently **published** her fourth mystery novel.

By not wearing a hat on the cold winter day, he took a **risk** of catching a cold.

The scientist used a new **method** that improved the old way of doing the project.

- to buy or pay for something
- to limit or restrict something or someone
- a way of doing or carrying out something
- possible danger or injury
- to print or produce content for reading by others
To draw a conclusion, the reader 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 ability to read critically.

Q. It can be concluded that ____________________.

Each evening before going to bed, Jonathan started the water to fill the bathtub. He adjusted the temperature and put in the plug. He didn’t like his baths either too hot or too cold. Jonathan was looking forward to soaking in the warm water. The tub was almost full. Just then, he heard the telephone ring. Rushing to get the phone, he jumped up and ran downstairs to answer it.

a. Jonathan enjoyed his bath before the phone call
b. the water in the bathtub began to overflow
c. the water in the bathtub was too cold
d. Jonathan’s sister turned off the hot water

Strategy to Answer

In this passage, the phrase “ran downstairs” is a phrase that refers to time elapsed. Hence, if time goes by while Jonathan is talking on the phone, then it can be concluded that the water will overflow—answer b. There is no mention of a sister and answer c “water was cold” is in the past tense, so it can’t be the answer.
Sensory System of Bats

Bats
As humans, we use our senses to keep ourselves out of danger and choose our favorite food. But other animals use their senses for very different reasons. One animal, the bat, uses a unique sensing system called echolocation. This term is made up of two words “echo” and “location.” Using special sound pulses, the bat detects the echoes produced by those sounds. Its sensitive ears and brain “see” their surroundings, much like radar on an airplane. Bats use this system to navigate through the air. Bats can even find their way home from up to 600 km away using echolocation.

Echolocation
As you can imagine, bats spend a lot of time hanging upside down in their caves. They have adapted to this peculiar living arrangement. When a bat wants to fly to a certain place, it uses the echolocation technique to navigate. They do this by sending out a high-frequency sound pulse. Some bats create sounds using their mouths which they hold open as they fly. Others create sounds through their noses. When the sound pulse bounces off an object, like a cave wall, the bounce or echo comes back to the bat. The bat’s clever navigation lets it know exactly how far away that object is. In addition, their large earflaps help them to gather and direct sound towards their eardrums.

Bat Experiments
The work of Italian and Swiss scientists in the late 1700s led to remarkable discoveries. One of the men stuffed cotton material into the ears of some bats, blocking their hearing. The other put small bags over their heads. Then the bats were let loose to fly through the air. However, in both cases, the bats could not
navigate properly. Over a century later, in the 1930s, a Harvard University student used microphones to study bats. The student, Donald Griffen, detected ultrasonic signals produced by bats. Ultrasonic signals are tiny signals or sound waves that the human ear cannot detect. Griffen proved that bats used the echoes from the ultrasonic signals to navigate. He came up with the term “echolocation.” Through years of research into the sensory system of bats, scientists now understand how bats fly through the air. Today, there is less mystery about how these unique creatures of the night navigate.

**Glossary**
- **echolocation**: a means of locating an object using sound waves and echoes
- **navigate**: to follow a course along a particular route
- **bounce**: to move quickly away after hitting a surface
- **ultrasonic**: relating to a very high frequency sound wave that humans cannot hear

**Reading Skill Questions**

1. **It can be concluded that bats could not navigate during the experiments**
   
a. since the cotton material echoed in their ears
b. since the bags or cotton blocked the sound pulses
c. since the cave walls were too far away
d. since they couldn’t hear the sounds from other bats

2. **We can conclude that humans cannot**
   
a. safely navigate their way through caves
b. detect very quiet sounds in their ears
c. listen to echoes that bounce off caves
d. detect sound waves sent by bats
[Comprehension Questions]

1. How is the sensing system in the first paragraph explained?
   a. By showing how dolphins survive in the ocean
   b. By comparing animals that live within 600 km
   c. Through an analogy with radar and airplanes
   d. By mentioning high-frequency signals from birds

2. What is the main idea expressed in the second paragraph?
   a. It is hard to navigate in caves if bats are noisy.
   b. Bats use a navigation system based on bouncing signals.
   c. Objects that are close by send off strong echoes.
   d. Bats send echoes to each other through caves.

3. What echoes or bounces off the walls in a bat cave?
   a. Bats that cannot fly straight
   b. High-frequency signals
   c. Sound waves from the bat’s large ears
   d. Material from a bat’s nose

4. What might happen if bats didn’t have an echolocation system?
   a. They could not hear their mates call out to them.
   b. They would not be able to find their way through the air.
   c. They might get really hungry in the cave.
   d. They could easily detect echoes from other bats.

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

( echo hearing navigate echolocation bounces off high-frequency )

When a bat wants to fly, it uses the ________ sensing technique to navigate. The bat sends out a(n) ________ sound pulse, usually from its mouth or nose. When the sound pulse ________ an object, the ________ comes back to the bat. The work of two scientists in the late 1700s led to a greater knowledge of bats. They found that bats could not navigate properly if their ________ was blocked or the bats had small bags over their heads. Donald Griffen proved that bats used the echoes from the ultrasonic signals to ________.
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 drawing conclusions. Use information from the passage to support the conclusion.
Helping the Blind See

Losing your Sight

Millions of people cannot fully use their senses and enjoy life. Since humans depend on their sight for 80 percent of their information, losing the ability to see can forever change a person’s life. Yet many people have greatly reduced vision, even though they are not completely blind. In the United States, 6 million people are either blind or suffer from diseases to the retina. Luckily, a new procedure using cutting edge technology is giving some people hope. Scientists implant tiny electrical chips into a damaged eye.

Artificial Retina

Instead of repairing a damaged retina, some scientists are trying to assist bad eyes using technology. If successful, this three-year research project that puts electrodes in the eye will be able to restore sight. One woman, Barbara Campbell, is part of this experiment. When Campbell started suffering from an eye disease in her 30s, the loss of vision was devastating. Now the 56-year-old woman has tiny electrodes inside her retina. The electrodes were surgically implanted into her eyes. They basically work by electrically “activating” neural cells in the eye. However, Campbell can only see objects that radiate a lot of heat. These include the gas burner on her stove, computer monitors and of course, lights in the ceiling.

Retina

To understand how our eyesight works, we need to examine the retina. Inside the eye, the retina acts like a “light collector,” collecting light from the images we see. The retina has about 120 million tiny cells. If a person is looking at a bicycle, the retina processes these images. Tiny cones and rods inside the retina act as receptors for the light. The image of the bicycle is transmitted
from simple light signals into electrical signals. These signals are passed on to
the brain, letting us see the image as an object that we call a bicycle.

Awkward Technology
However, the technology that allows people like Campbell to improve their
vision is not perfect. In addition to the electrodes in her eyes, the New York
resident has to walk around every day with clunky machinery. There is a small
camera taped to her nose. Additionally, a video processor is strapped to her
waist to coordinate the signal. Seeing different colors is also impossible due to
the crude sensors. However, scientists think in the future they will develop
technology that will allow people like Campbell to read, write and recognize
faces.

Glossary
- electrode: a conductor through which electricity flows
- neural cell: a cell located in the nervous system of the body
- retina: a light-sensitive membrane in the eye that receives light and images
- implant: to insert or put into something

[Reading Skill Questions]

1. You can conclude from the passage that ________________.
   a. Barbara Campbell can only see well on warm days
   b. Barbara Campbell had some of her sight restored
   c. The left eye of Barbara Campbell can see full color
   d. Barbara Campbell has had more damage caused to her eyes

2. You can say that the three-year experiment was partially successful for patients
   because it ________________.
   a. taught scientists about neural cells in the eye
   b. increased battery technology in the chips
   c. gave people the ability to see more than before
   d. took away 20 percent of their vision
1. **How advanced is the technology to help people with damaged eyes?**
   a. The retina can be completely replaced with a new one.
   b. Scientists can cure over 80 percent of damaged eyes.
   c. Electrical chips can be implanted into the eye.
   d. A false eye can be inserted in some cases.

2. **We can conclude that Barbara Campbell _______________.**
   a. is skilled at playing advanced video games on a computer
   b. has difficulty seeing the lights in the ceiling
   c. cannot choose what to wear because she can’t see different colors
   d. is enjoying her life much more than in her 20s

3. **How does the retina in the eye work?**
   a. It processes the brain’s information.
   b. It receives light and sends signals to the brain.
   c. It changes electrical signals into light.
   d. It sends light to the electrode.

4. **From the passage, we can conclude that technology _______________.**
   a. helps blind people have almost no problems
   b. needs to be improved to help people live normal lives
   c. can completely replace a damaged retina with a new one
   d. only allows people to see light reflected from cold objects

**Summary**

<table>
<thead>
<tr>
<th>Fill in the blanks with the right words to complete the summary.</th>
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<tbody>
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<td>retina</td>
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</table>

Many people have greatly reduced ____________, even though they are not completely blind. Some scientists are trying to assist bad ____________ with technology. They ____________ tiny electrical chips into a(n) ____________ eye. One woman, Barbara Campbell, who suffers from an eye disease, has tiny electrodes inside her _____________. They basically work by ____________ activating neural cells in the eye. Our eyesight works due to the retina which ____________ light using 120 million tiny cells. However, the technology that allows people to improve their vision is not perfect. Seeing different colors is also impossible.
Reduced Vision
- Many people have greatly reduced vision, even though they are not completely blind.

Scientific Help

Conclusion

Barbara Campbell
- When Campbell started suffering from an eye disease in her 30s, the loss of vision was devastating.

Artificial Retina

Conclusion

Three-year Experiment
- Luckily, a new procedure using cutting-edge technology is giving some people hope.

The Result

Conclusion
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>Definition</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. to insert or put into something</td>
<td>There will implant something in his ear to improve his failing hearing.</td>
</tr>
<tr>
<td>b. a little strange or different</td>
<td>The oven radiated heat, which could be felt throughout the kitchen.</td>
</tr>
<tr>
<td>c. to make something less or smaller in amount</td>
<td>He reduced his weight by exercising at the gym every day for three months.</td>
</tr>
<tr>
<td>d. to send out energy such as heat or light</td>
<td>The boy’s blue hair and tattoos were a very peculiar type of fashion.</td>
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</tbody>
</table>

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<tr>
<td>a. overwhelming or completely shocking in a bad way</td>
<td>The buttons on the MP3 player were very clunky and hard to use.</td>
</tr>
<tr>
<td>b. awkwardly designed or made</td>
<td>Her painting was unique since it used odd shapes and interesting colors.</td>
</tr>
<tr>
<td>c. being different from others; special in some way</td>
<td>The high-frequency signal from the speaker could only be heard by dogs, not humans.</td>
</tr>
<tr>
<td>d. sounds measurable at very high frequencies, but often inaudible to humans</td>
<td>The typhoon that destroyed the coastal village had a devastating effect upon people’s lives.</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>a. a procedure to do something; course of action</td>
<td>Doctors put tiny electrodes onto the patient’s chest to monitor his heart beat.</td>
</tr>
<tr>
<td>b. the act of arranging; a plan or preparation to do something</td>
<td>Their arrangement was for the teenager to clean her room and for them to buy her a present.</td>
</tr>
<tr>
<td>c. a conductor through which electricity flows</td>
<td>When the baseball hit the player in the eye, his retina and eyesight were damaged.</td>
</tr>
<tr>
<td>d. a light-sensitive membrane in the eye that receives light and images</td>
<td>The process of making strawberry cake involves lots of baking and fresh whipping cream.</td>
</tr>
</tbody>
</table>