CHAPTER 4

Improving Reading and Writing Skills

Reading Strategies
Tests sometimes contain words that are unfamiliar or reading passages that are difficult to understand. During most tests you won’t have a dictionary at hand. You have to figure out what the words mean on your own. Here are some things you can do:

- use context clues
- find key words in a passage
- state the main idea

Use Context Clues
The way a word is used in a sentence and the words surrounding it make up the word’s context. The word context comes from an old English word that means “the weaving together of words.” You can use a sentence’s context to help you determine the meaning of unfamiliar words.

Example  Sometimes a word is defined directly, as in the following passage.

Xylem is a type of plant tissue. It transports water and minerals from the roots of the plant to the rest of the plant. It also supports the plant.

The first sentence defines the word xylem, and the next two sentences give more details that make the meaning clearer.

Some passages contain only general, or indirect, clues about the meaning of a word.

Example  Read the following passage and see if you can guess at the meanings of the words unicellular and multicellular.

One way organisms change is by growing, or becoming larger. In a unicellular organism, growth occurs as new materials are added to the cell. The cells of a multicellular organism also grow, as new material is added to each cell. However, most growth in multicellular organisms is caused by the formation of new cells.

Note that the sentence about the unicellular organism uses the singular form of the word cell. The text referring to the growth of a multicellular organism uses the plural form, cells. These are indirect clues that unicellular refers to one cell while multicellular refers to many cells.

Test Tip
When a word is defined by the other words in the sentence, the sentence will contain a linking verb. One such verb is is. Verbs like appear or seem are also linking verbs.

Content Clue
Phloem is another kind of plant tissue. Xylem and phloem together make up a plant’s vascular system. These networks of tubes, or vessels, carry fluid and nutrients around the plant.

Content Clue
Two kingdoms consist mostly of unicellular organisms, the Monera and Protist kingdoms.
Find Key Words in a Passage
A key word is any word that can help you summarize the content of a passage. Key words may be the subjects of sentences or actions described. You identify key words to help you organize in your mind the information you read.

Example Try to identify the key words in the following paragraph. The first two are sound and vibrate.

Sound is caused by objects that vibrate. These vibrations move the air around them to form sound waves. The frequency of the vibration determines the pitch of the sound that is produced. The amplitude of the vibration determines the loudness of the sound.

The key words in this paragraph include ____________________

On tests you are sometimes asked to read a passage and then answer questions about it. Finding key words can help you answer these questions. Suppose on a test you were told to read the paragraph above, then to answer the following question:

How can you change the pitch of a sound?
First, identify the key words in the question. ____________________

Next, skim the paragraph and find these same words in the selection. This will help you locate the sentence that contains the information you need to answer the question. Now you can answer the question.

State the Main Idea
A passage can be summarized in one statement, called the main idea. Figuring out the main idea of a passage can help you understand what the whole passage is about. Often the main idea is stated directly in the first or last sentence of the paragraph. When it is not stated directly in the paragraph, you need to state it in your own words. Reread the paragraph above about sound. What is the main idea? ____________________

Where is it stated in the passage? ____________________

Test Tip
Key words can also be little words such as not, all, and none. These are especially important to note in the questions you are being asked.

Content Clue
Frequency is the number of waves that pass a given point each second.

Test Tips
Most tests don’t give you much time. Practice these reading skills before your test, until you can do them quickly and easily.

Another way to be sure you understand a passage is to restate it in your own words. First, read the passage. Then, identify key words and the main idea. Finally, put it all in your own words.
Writing Strategies

Most tests include some questions that ask you to write out the answers rather than choose one from a list. Some of these questions can be answered in one or two words, some require one or two sentences, and some require one or several paragraphs. In all cases, you need to pay attention to spelling, punctuation, grammar, and organization of thoughts. This helps the teacher understand what you are trying to say. It will also help you understand what you are trying to say.

Short-Answer Questions

Answers That Require Less Than a Sentence  These questions resemble completion questions. The answers need to be brief. Sometimes one word will answer the question. Other times a sentence fragment is enough.

Example Suppose you were given the following question:

Heat moves by conduction, convection, and radiation. A pan of water is sitting on a hot stove. Which method does heat use to travel from the stove to the pan?

First analyze the question. Exactly what are you being asked? Note that you are not being asked to describe how the water is heated, only how the stove heats the pan. The best answer here is one word only: conduction.

One- or Two-Sentence Answers  These answers should be clear and to the point.

Example Suppose you were given the following question:

Name the inner planets in our solar system and describe the differences between these planets and the outer planets.

This question has several parts. The first part asks you to name the inner planets. The second part asks you to describe the differences between the two groups. A good answer would be:

The inner planets are Mercury, Venus, Earth, and Mars. The inner planets are all small and rocky. Except for Pluto, the outer planets are large and made mostly of gas. Pluto is small and dense.
Paragraphs
Some questions require fairly long responses, or full paragraphs. These answers need to be well thought out and carefully written. Sometimes these types of answers are marked wrong on tests because they are so disorganized the teacher can’t tell what is being described. As you write, make sure your ideas flow in a logical order and lead the reader to your conclusions.

To help you write paragraphs, follow these steps:

1. Analyze the question.
2. Brainstorm.
3. Make an outline or rough draft.
4. Write out your answer.
5. Read over your answer and make corrections.

Example Suppose you were given the following question:

How do sexual reproduction, mutation, and changes in the environment work together to cause changes in species over time?

1. Analyze the Question What is the question asking? It’s asking how a species changes over time. It doesn’t ask about variations among individuals but about long-term changes in species. Make sure this is the question you answer.

2. Brainstorm Make a list of everything you can think of that might be useful in answering the question. Don’t limit yourself here. You can weed out unnecessary information later. Here are some ideas you might include in your list for this question:

- evolution
- genetics
- DNA
- variation
- change in climate
- chromosomes
- meiosis
- geographic isolation
- competition from new species

Test Tip
Brainstorm means to write down thoughts about a particular topic as they pop into your head.

Content Clues
Evolution refers to gradual change. When something evolves, it usually changes slowly.

A mutation is a sudden genetic change. It can be caused by something in the environment, such as chemicals or radiation.
3. **Make an Outline or a Rough Draft** Organize the information from your list. Next, write an outline of the main ideas you plan to cover in your answer or write a rough draft.

After each main idea in the outline or rough draft, make a list of points to include in your answer. The outline or rough draft will help you decide the order in which information should be presented. It will also help you spot any missing information and eliminate those things on your list that are not useful. Here is a possible outline for the changes in species question:

**Species Change Over Time**

**I.** The mixing together of chromosomes during sexual reproduction (meiosis) causes variation in offspring.

**II.** Mutations in DNA can cause variations in individuals that are passed down to offspring.

**III.** When environmental conditions change, only certain individuals, ones who have beneficial traits due to genetic variation, survive.

**IV.** These work together to cause species to change.

   **A.** The variations caused by sexual reproduction and mutations produce some individuals with traits that enable them to better survive in the new environment.

   **B.** Many of the individuals with the beneficial traits survive and pass these traits on to their offspring. Fewer of the individuals without the beneficial traits survive to pass on their traits to their offspring.

   **C.** Over time, the number of individuals with the beneficial traits increases while the number of individuals without them declines.

Review the outline. Note that it is simple and logical. It follows a reasonable sequence. It does not include information that is not needed. Finally, it answers the question.
4. Write Out Your Answer  Using the information in your outline or rough draft, write out the answer to the question. A possible answer to the question might be:

The mixing together of chromosomes during sexual reproduction causes variation in individual offspring. Mutations in DNA can also cause variation in individuals. If an environment changes, the traits individuals need to survive may also change. The variation caused by sexual reproduction and mutations mean that some individuals are born with traits that may let them survive better in the new environment. Individuals with traits that let them survive are more likely to pass on these traits to their offspring. Individuals without the traits that let them survive do not live long enough to pass on their traits to offspring. Over time, the number of individuals with the “survival” traits increases. The number of individuals without them decreases. This changes the species.

5. Read Over Your Answer and Make Corrections  Always take a few moments to read over your answer, checking for mistakes. Things to check for include the following:

- Your ideas flow logically and lead to a conclusion.
- The answer gives enough details to make your ideas clear. It also sticks to the point and does not confuse the reader with unneeded information.
- Words are spelled correctly.
- Each sentence begins with a capital letter and ends with a period or other closing punctuation mark.
- Each sentence has a subject and a verb and the subjects and verbs agree.
- Verb forms are correct and tenses used are logical.
- There are no run-on sentences or sentence fragments.
- Antecedents to pronouns such as it or this are clear.
- Adjectives are not being used as adverbs and vice versa (good vs. well).
Practice
Living and Nonliving Things

For questions 1–3, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science.

Monerans and protists are one-celled organisms. Monerans include such simple organisms as bacteria and cyanobacteria, or blue-green bacteria. More complex one-celled organisms, such as amoebas, paramecia, and diatoms, are protists. Protists have membrane-bound organelles such as food vacuoles and nuclei. Monerans have no membrane-bound organelles. Instead, the DNA and other materials a moneran needs to carry on its life processes float in the cell's cytoplasm.

1 Compare and contrast protists and monerans. Give one difference and one similarity.

2 Name two differences between bacteria and viruses.

3 Describe the relationship between a tissue, an organ, and a system.

4 On a separate sheet of paper, describe how the respiratory and circulatory systems work together to provide cells with oxygen and remove carbon dioxide.

Test Tip
Make a two-column chart of the information in this paragraph. Put all the information about monerans in one column. Put all the information about protists in the other.

Content Clue
Viruses are not in any kingdom because many scientists do not consider them living things.

Content Clue
The respiratory system includes the lungs. The circulatory system includes the heart and blood vessels.
Practice

Genetic Information

For questions 1–4, write your answers in the space provided.

1 Two daughter skin cells have just been formed as a result of mitosis. What do you know about their chromosomes?

2 Describe the relationship between DNA, chromosomes, and genes.

3 Barbara Jacob has detached earlobes. The gene for detached earlobes is dominant. Her husband, Jason, has attached earlobes. The gene for attached earlobes is recessive. What pairs of genes for earlobes could Barbara have? What pairs of genes for earlobes could Jason have?

4 Complete the Punnett squares below to show how the Jacobs’ genes for earlobes will be passed on to their children. Use “E” for the gene for detached earlobes and “e” for the gene for attached earlobes. On a separate sheet of paper, explain how to interpret the resulting Punnett squares.

Content Clue

Mitosis is very similar to asexual reproduction in organisms.

A DNA molecule looks like a twisted ladder. It is sometimes called a “double helix.”

Content Clue

Genes mostly occur in pairs. They are either both dominant, both recessive, or a combination of dominant and recessive. In a Punnett square, a dominant gene is represented by a capital letter. A recessive gene is represented by a lowercase letter.
Practice

Change Over Time

For questions 1 and 2, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science.

A population of rabbits lived on an island. A farmer introduced coyotes to the island. Because they lived on an island, the rabbits could not escape to a new area to live. Some of the rabbits that were faster because of genetic variations in running ability outran the coyotes. These rabbits passed down their ability to run fast to their offspring. Many of the slower rabbits were caught by the coyotes and therefore had no offspring.

1 Describe what eventually happened to the species of rabbits on this island.

2 How do bees contribute to variations in plants?

3 On a separate sheet of paper, explain how the process of meiosis leads to variations in members of a species.

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Content Clue

Introduced means to "bring a new species to a place where that species has never been before."

Introduced species can cause extinctions and upset the balance of an ecosystem.

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Content Clues

Plants can be pollinated by wind, bats, and insects.

In asexual reproduction, the chromosomes in all daughter cells are usually identical to the chromosomes in the parent cell.

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Test Tip

To better understand a question, restate it in your own words.
Practice

Reproduction and Development

For questions 1 and 2, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science.

Ferns are simple vascular plants that reproduce by a process called alternation of generations. In one generation a fern plant, called a sporophyte, produces asexual reproductive cells called spores. Each spore grows to form a small heart-shaped plant called a gametophyte. In the next generation, the gametophyte produces male and female sex cells called gametes. These cells unite to form a fertilized egg, which grows into a fern plant.

1. In alternation of generations, the plant that produces sexual reproductive cells is called a prothallus. Which generation in the passage above is the prothallus?

2. In multicellular organisms such as plants and animals, which cells are produced by meiosis?

3. Look at the diagram of the life cycle of a grasshopper. On a separate sheet of paper, describe the stages and compare its life cycle to the life cycle of a butterfly.
Practice

Meeting Daily Needs

For questions 1–4, write your answers in the space provided.
Base your answer to question 1 on the information below
and on your knowledge of science.

Humans and other animals obtain energy from carbohydrates and fats in the foods they eat. Some examples of carbohydrates are bread, rice, and potatoes. Fats are found in oils, nuts, milk, and many high-calorie nutrient-deficient foods. Energy is released from carbohydrates and fats when they are broken down inside animals’ body cells.

1 What provides an animal with the energy it needs?

2 How do humans maintain their body temperatures?

3 How are the gills of a fish and the lungs of a human similar?

4 Name two ways your body keeps viruses from infecting you. Then describe two ways your body can restore itself to a healthy state after a viral infection. Use additional paper if you need to.

Content Clue

Mammals are warm-blooded. They rely on the process of metabolism to get energy that can be used for various purposes.

Content Clue

The body system that responds to viruses is the immune system.
Practice
Energy in Ecosystems

For questions 1–3, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science. Base your answers to questions 2 and 3 on the diagram.

Carbon dioxide and oxygen flow through ecosystems in a cycle called the carbon dioxide-oxygen cycle. This cycle includes the processes of photosynthesis, in which plants take in carbon dioxide and give off oxygen, and respiration, in which all organisms take in oxygen and give off carbon dioxide. These processes help keep the balance of carbon dioxide and oxygen in the atmosphere fairly constant.

1. Do plants take in more carbon dioxide during the day or at night? Why?

2. Name the producer in this food chain.

3. Which organism in the food chain is a secondary consumer?

4. Julia ate a piece of chicken. The energy she got from the chicken originally came from the Sun. On a separate sheet of paper, describe how the energy moved from the Sun to Julia.
Practice
Humans and the Environment

For questions 1–3, write your answers in the space provided. Base your answers to questions 1 and 2 on the information below and on your knowledge of science.

There are different forms of symbiosis, or relationships between organisms. Some of these are parasitism, commensalism, and mutualism. In parasitism, one organism benefits while the other is harmed. In commensalism, one organism benefits while the other is neither helped nor harmed. In mutualism, both organisms benefit. Clownfish protect themselves from predators by living among the poisonous tentacles of sea anemones. The clownfish have a covering of mucus that protects them from the poison in the tentacles. The sea anemones feed on bits of food dropped by the clownfish.

1 Name the type of relationship between clownfish and sea anemones.

2 What is the difference between mutualism and commensalism?

3 Describe the relationship between natural resources and conservation.

4 In the science of ecology, the terms population and community have special meanings. On a separate sheet of paper, tell how an ecologist would describe the relationship between a population, a community, and an ecosystem. Give an example of each.
Practice

The Earth and Space

For questions 1–3, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science.

Saturn isn’t the only planet with rings. The other gas giants—Jupiter, Uranus, and Neptune—also have rings. However, they are much thinner and harder to see than Saturn’s rings. The rings are made up of rocky or icy pieces of matter between about 1 centimeter and 2 meters in diameter. The gaps between some of the rings are probably caused by gravitational interactions between the planets and their moons.

1 Which planets do not have rings?

2 The tilt of the Earth’s axis causes longer, warmer days in summer. What happens in winter because of the tilt? Why?

3 This diagram shows the positions of the Earth, Moon, and Sun. On a separate sheet of paper, name the phase of the Moon and describe how it looks in the sky.

4 The Earth is at perihelion during the month of January. On a separate sheet of paper, explain why January is not the warmest month of the year in the Northern Hemisphere.

Test Tip
Note any key words in the question such as not, all, or none.

Content Clue
Differences in temperature and day length over a year depend on how much of the Sun’s energy strikes the Earth’s surface.

Content Clue
Perihelion is the point in an orbit of a planet or other body when that body is closest to the Sun.
Practice

The Interaction of Air, Land, and Water

For questions 1 and 2, write your answers in the space provided. Base your answers to questions 1 and 2 on the information below and on your knowledge of science.

Water responds more slowly to changes in temperature than does land. On the seacoast, once the Sun comes up, the land warms up faster than the ocean. The air over the land also warms up faster than the air over the water. The cool air over the ocean moves in and pushes up the warmer air over the land. This is called a sea breeze. At night the opposite happens. The land cools down faster than the ocean, and the cool air over the land moves out and pushes up the warmer air over the ocean. This is a land breeze.

1 When does a sea breeze form?

2 What causes a land breeze?

Base your answers to questions 3 and 4 on the information below and on your knowledge of science.

Wind is moving air. Heat causes the molecules in all matter to move. The warmer the air is, the more its molecules spread out. In other words, it becomes less dense. Air that is less dense rises. Cold, dense air sweeps into the empty space left by the warmer air. This sets up a motion of air called a convection current.

3 What is the source of the energy that drives the convection current?

4 On a separate sheet of paper, describe how convection currents form large wind systems.
Practice

Physical Properties of Matter

For questions 1 and 2, write your answers in the space provided.

1 The illustrations below show an inflated balloon and a glass marble, each on a balance scale. List three physical properties of the marble and three properties of the balloon.

![Diagram of balance scales with weights: A has 1g, B has 25g]

2 Jerry spilled sugar and iron filings into a pile of sand. How can Jerry separate these three substances from each other?

3 On a separate sheet of paper, describe the difference between a physical change and a chemical change.

4 On Friday John left an ice cube in a glass near a warm, sunny window. When he went back on Monday, he found the glass completely empty. John knew that no one had been in the room over the weekend. On a separate sheet of paper, describe what happened to the molecules in the ice cube that had been in the glass.

Content Clue

Physical properties are sometimes called characteristics. Some physical properties are color, odor, mass, volume, density, solubility, and ability to conduct heat or electricity, among other things.

Content Clue

Some substances are soluble (dissolve) in water. Some metals are magnetic.
Practice

Forms of Energy

For question 1, write your answer in the space provided.
Base your answer to question 1 on the information below
and on your knowledge of science.

Sound is caused by vibrating objects, which move the air
around them to form sound waves. On a violin, the initial
vibration is caused by the force of the bow moving across a
string. The body of the violin then resonates with the string’s
vibrations and makes them stronger. The violinist puts a finger
on the string to change the pitch. The shorter a given string,
the faster it vibrates when the bow moves across it. This makes
the pitch it produces higher. To play a louder sound, the
violinist transfers more energy through the bow to the string,
thus increasing the amplitude of the moving string and of the
sound waves it produces.

1 Why does changing the length of a violin string change its pitch?

2 The temperature shown on a mercury thermometer was 25°C.
John put the thermometer in a glass of warm water and it
changed to show a temperature of 35°C. On a separate sheet of
paper, explain what happened to the molecules of mercury in the
thermometer when it was put in warm water.

Test Tip
Identify the key words in the question and then
locate those words in the paragraph. This will help
you quickly find the information you need
to answer the question.

Content Clue
Heat makes molecules
move faster and spread
apart.
Practice
Forces and Motion

For questions 1–3, write your answers in the space provided. Base your answer to question 1 on the information below and on your knowledge of science.

Friction is a force that opposes motion. When two pieces of matter move past each other, friction slows both of them down. Friction is a result of interactions between the atoms on the surfaces of the pieces of matter. These atoms form bonds between the two surfaces, and the bonds have to be broken in order for the matter to move.

1 What part do atoms play in friction?

2 Look at the diagram above. What will happen if the top magnet is rotated so that its end marked $N$ is over the end marked $S$ on the bottom magnet?

3 The amount of gravitational pull an object exerts depends on what?

Test Tip
Pick out the key words in this passage and the main idea. Then restate the passage in your own words.

Content Clue
Magnetic poles are the parts of magnetic fields where the magnetism is concentrated. Unlike poles attract each other. Like poles repel each other.