Content-Area Strategies
Science
# Table of Contents

*Introduction* ................................................................. v

**Vocabulary Strategies**

**Part 1: Building Vocabulary** ........................................... 3
  - Lesson 1: Word Parts .................................................. 3
  - Lesson 2: Word Groups ................................................ 5
  - Lesson 3: Using Context Clues ...................................... 7

**Part 2: Vocabulary in Context** ....................................... 10
  - Lesson 4: Fires in the Sky .......................................... 10
    - Activity 1: Introducing Vocabulary in Context ............ 10
    - Activity 2: Developing Vocabulary in Context .......... 11
    - Activity 3: Extending Vocabulary Strategies ............ 12
  - Lesson 5: Peculiar Platypus ........................................ 13
    - Activity 1: Introducing Vocabulary in Context ......... 13
    - Activity 2: Developing Vocabulary in Context .......... 14
    - Activity 3: Extending Vocabulary Strategies .......... 15
  - Lesson 6: Dusty Lungs ................................................ 16
    - Activity 1: Introducing Vocabulary in Context ......... 16
    - Activity 2: Developing Vocabulary in Context .......... 17
    - Activity 3: Extending Vocabulary Strategies .......... 18
  - Lesson 7: Great Balls of Goo! ................................... 19
    - Activity 1: Introducing Vocabulary in Context ......... 19
    - Activity 2: Developing Vocabulary in Context .......... 20
    - Activity 3: Extending Vocabulary Strategies .......... 21
  - Lesson 8: Ice from the Air ........................................ 22
    - Activity 1: Introducing Vocabulary in Context ......... 22
    - Activity 2: Developing Vocabulary in Context .......... 23
    - Activity 3: Extending Vocabulary Strategies .......... 24

**Glossary** ................................................................. 25

**Reading Strategies**

**Part 1: Prereading** ..................................................... 31
  - Lesson 1: Previewing ................................................ 31
  - Lesson 2: Predicting ................................................ 33
  - Lesson 3: Prior Knowledge ......................................... 34
  - Lesson 4: Purpose .................................................... 35

**Part 2: Reading Strategies** .......................................... 36
  - Lesson 5: Introduction to Reading Strategies .............. 36
Lesson 6: KWL ................................................................. 38
Lesson 7: SQ3R ............................................................... 42
Lesson 8: Semantic Web .................................................. 46
Lesson 9: Outline ............................................................ 51
Lesson 10: Structured Notes .............................................. 55
**Part 3: Postreading** .................................................. 59
Lesson 11: Summarizing and Paraphrasing ........................... 59
**Part 4: Reading in Science** .......................................... 63
Lesson 12: Common Features and Patterns in Science Reading ... 63
Lesson 13: Special Terms ............................................... 64
Lesson 14: Topic and Subtopic .......................................... 66
Lesson 15: Classification .................................................. 68
Lesson 16: Steps in a Process .......................................... 70
Lesson 17: Assertion and Support ..................................... 72
Lesson 18: Review .......................................................... 74

**Writing Strategies**

**Part 1: Prewriting** .................................................. 79
Lesson 1: Writing Process Review ..................................... 79
Lesson 2: Brainstorming .................................................. 81
Lesson 3: Narrowing Your Topic ....................................... 83
Lesson 4: Purpose .......................................................... 84
Lesson 5: Audience ........................................................ 85

**Part 2: Writing Strategies** .......................................... 86
Lesson 6: Drafting .......................................................... 86
Lesson 7: Topic and Subtopic .......................................... 87
Lesson 8: Classification .................................................... 95
Lesson 9: Steps in a Process .......................................... 102
Lesson 10: Assertion and Support .................................... 109

*Graphic Organizers* .................................................. 117
*Revising Checklist* ...................................................... 130
*Proofreading Checklist* .............................................. 131
*Peer-Editing Form* ..................................................... 132
*Assessment Rubric for Essays* .................................... 133
*Answer Key* .............................................................. 135
Introduction

The goal of Content-Area Strategies: Science is simple: to give students tools to communicate effectively. This book addresses science in terms of a set of integrated skills and strategies that work together to help students read, write, speak, and think critically for success in school and beyond. Content-Area Strategies: Science is divided into three instructional sections: Vocabulary, Reading, and Writing.

Vocabulary

The building blocks of language are words. With this program, students begin by analyzing words, then synthesize what they have learned to develop strategies for comprehending new words. The Vocabulary section begins by introducing vocabulary strategies such as recognizing word parts, looking for word groups, and looking for context clues. Students then practice the strategies in a series of activities based on appealing short readings. Building vocabulary and learning how to figure out new words enhances reading, writing, speaking, listening, and thinking critically, giving students a broad base of language to draw on in classroom and real-life communication.

Reading

The second section presents reading strategies. Here, students acquire tools that help them read to learn. The transition from learning to read to reading to learn is vital to success in school and in life, and this section helps students broaden their expectations about text. Familiar patterns of narratives—stories with a beginning, a middle, and an end—are replaced by organizational constructs tailored to convey information. In this section, the act of reading is broken down into a process of steps. Students learn concrete strategies to read informational texts efficiently, to comprehend what they read, and to retain the information they have learned. The graphic organizers for the Reading section help students connect new information to their existing schemata, increasing their ability to recall and to take ownership of what they read. The reading strategies give students a way to “see” what they read—a great asset to visual learners. Organizing and writing what they read also cements information and concepts in students’ minds and helps them retain it.
Introduction (continued)

Writing
The Writing section is the third instructional part of Content-Area Strategies: Science. In this section, students review the writing process and study models of good writing. Students learn to recognize common social studies informational writing patterns and employ them themselves to write strong essays. The graphic organizers for the Writing section address each explicit step in the writing process. Breaking the process of writing an essay into a series of manageable steps makes the assignment easier to tackle and demystifies the act of writing.

Classroom Management
Content-Area Strategies: Science is easy to use. Each lesson is self-contained and may be used in class or as homework. You may want to model the strategies used in each lesson, showing students that all readers and writers—including teachers—use tools and follow processes to communicate and comprehend. The blank graphic organizers may be photocopied for use in other assignments beyond this book. Students who need more support may benefit from more modeling or from completing some activities and graphic organizers in small groups. Metacognition—talking and writing about learning—can provide structure that supports new information and makes it easier to access. Content-Area Strategies: Science transforms the abstract idea of learning into a concrete process that all students can master.
Reading Strategies
Lesson 1
Previewing

The Reading Process

Reading for content involves several steps. Some of these occur before you even read the material. Steps that you take before you read a passage to help you understand it are prereading steps. Other steps are taken during reading, and still others are postreading (or after reading) steps.

In this section, we will look at strategies you might take to prepare yourself for a content reading. The prereading strategies are the 4 Ps: previewing, predicting, activating prior knowledge, and setting a purpose.

Previewing

Previewing a text involves several steps. First, read the title and subheads, if any. Next, skim the text, or look it over quickly. Look at any photos or graphics, and read the captions. Read the first and last lines of each paragraph, or any phrases that jump out at you.

Application

Preview the following passage. (Do not read the entire passage!)

Earthquake!

5:04 P.M., October 17, 1989. Candlestick Park, in San Francisco, California, is crowded with over 40,000 fans waiting excitedly for the start of the third game of the World Series. All over the Bay Area, people are leaving their offices and getting in their cars for the commute home. People are driving on the seven great bridges that span the bay. Suddenly, the ground begins to tremble. The tremble swells to a violent shake that lasts 17 seconds before it finally dies away. When it is over, a World Series game has been canceled. More seriously, a highway has collapsed, a bridge has failed, a neighborhood is in flames from ruptured gas lines, and 62 people have lost, or are about to lose, their lives.

What causes these devastating earthquakes? Long ago, people believed that earthquakes, and most other natural disasters, were caused by the anger of gods. Today, we understand that the cause of earthquakes is a phenomenon known as plate tectonics. The earth is not a single, solid object. It is broken into large plates that move restlessly across the planet. When one plate collides with another, at regions called faults, two things can happen.

The first thing that can happen is that one of the plates will sink, or be subducted, under the other. When this occurs, the ground above the area buckles up and produces mountain ranges. Often, the friction...

(continued)
Earthquake! (continued)

that occurs during the subduction causes the rock layer to melt. This molten rock moves upward through fissures in the rock until it finds an outlet at the surface. It emerges as lava or other volcanic material, and a new volcano is born.

The other thing that can happen is that the two plates can slide against each other. In tectonically active areas, such as the California coast, small movements of the earth occur on a daily basis. But on the largest faults, such as the San Andreas Fault, motion is slight, and rare. Tension builds up as the Pacific Plate presses relentlessly against the North American Plate. When a slippage occurs—as happened in 1989—the results are catastrophic earthquakes. The 1989 earthquake, as the seismogram that follows shows, was a strong 7.1 on the Richter scale.

Earthquakes, and other tectonic activity, cannot be prevented. People who live in earthquake areas must therefore be prepared for them. Bolting houses to their foundations, attaching large pieces of furniture and hot-water heaters to walls, and keeping supplies of nonperishable food and water handy and accessible will help families to survive these inevitable events.

Let’s see if your preview was similar to the one below.

Well, looking over the article, the first thing I notice is the title “Earthquake!” So I think I can safely guess that it is about earthquakes. The exclamation point makes me think that this is going to be about a strong earthquake—one that would cause a lot of emotion.

I also see a graph. The caption mentions a seismograph needle—what is a seismograph? The caption also says “needle jumps as 1989 earthquake hits,” so I think the graph is somehow measuring a strong earthquake.

The article starts with a time and date, like a news story. The last line of that paragraph talks about a collapsed highway, fire, and deaths. Dramatic!

The next paragraph starts with a question: “What causes these devastating earthquakes?” I think this is the real point of this article. Yes, I can see some vocabulary-type words, “plate tectonics” and “faults,” that may explain the question.

The next paragraph starts with “the first thing,” so I feel even more sure that the article will talk about how an earthquake builds. The next paragraph shows that graph. I think the article is about what causes powerful earthquakes.

1. Write three words that “jumped out at you” during your preview.

2. Did looking at the graph seem helpful to you?
Lesson 2
Predicting

After you preview a text, you are ready to make predictions about what the reading will reveal. What do you think the main idea of the reading is? What is the author’s purpose for writing this passage? What does the author hope you will carry away from the reading? What do you think you will learn from this particular reading?

Application

Now that you’ve previewed the article on earthquakes, you are ready to make some predictions about what the author is trying to say here.

1. Who do you think is the intended audience for this article?

2. What do you expect to learn from this article? Why?
Lesson 3
Prior Knowledge

A reader rarely ever comes to any subject matter without some background information. Even if you think you don’t know anything about a subject, you probably have some information. Now that you know what to expect about this article, you can begin to consider what you already know about the subject.

You may have experienced an earthquake, or seen a television show about them, or ridden on an “earthquake ride” at a museum or theme park. You may know someone who has been in one. You may have read books, or some other articles, about them. Perhaps you have studied earthquakes in school. All of that knowledge is in your memory.

Application

Let’s draw on this prior experience and prior knowledge.

1. Brainstorm. Make a list of all the words you can think of that are related to this topic. Write any word that seems to be related, no matter how silly you think it might be at first glance.

2. Next, write sentences related to the topic.

3. Finally, jot down any facts you know or any ideas you might have about the topic.

How much do you already know about this subject? More than you thought?
Lesson 4

Purpose

The Writer’s Purpose

There are two kinds of purpose. The first is how the reading is meant to be read. This is the author’s purpose—why he or she wrote the piece. Is the article supposed to entertain? Inform? Explain an opinion?

The Reader’s Purpose

The reader’s purpose is simply why you are reading a particular written work. You may want to enjoy a good story or an interesting article. You may want to find out more about a subject. You may want to understand an opinion.

Application

1. Write a short purpose for reading “Earthquake!”

2. Now go ahead and read the article. Did your prereading steps prepare you for absorbing the information in the article? Why or why not?

This chart will help you to remember the prereading steps. Eventually, you will be able to do this in your head. For practice, fill it in with the information you gathered during the prereading steps.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Words, graphics, captions, headings, subheadings that jump out</td>
<td>Based on Preview, what is this reading mostly about?</td>
<td>What do I already know about this subject? Brainstorm words, phrases, figures.</td>
<td>What do I want to accomplish/get from this reading?</td>
</tr>
</tbody>
</table>
Lesson 5
Introduction to Reading Strategies

Reading Strategies
Complex subject matter, such as you might find in science, is often difficult to grasp. In order to get the most out of your reading, you might use one or more reading comprehension strategies. Some strategies are research-oriented; they help you organize your own thoughts in order to write a report or prepare for a quiz. Others help you visualize the subject and retain more information after reading. All of these strategies involve writing, and we know that writing about any subject helps to solidify knowledge.

Graphic Organizers
We also know that a visual representation helps us to remember more than a simple reading of text might do. There are many types of graphic organizers, many of which are used in scientific readings on a regular basis. For example, everyone is familiar with the simple “cycle” type of graphic organizer, which demonstrates a repeating cycle in science.

\[ 	ext{eggs} \rightarrow \text{larva (caterpillar)} \rightarrow \text{pupa (chrysalis)} \rightarrow \text{adult} \]

The Monarch Butterfly’s Life Cycle

Such a graphic device gives us a great deal of information at a glance. In this book, you will learn the following comprehension strategies that use graphic organizers.
Introduction to Reading Strategies (continued)

- **KWL** *(What I KNOW, What I WANT to know, What I LEARNED).* In this technique, you list things you already know, what you hope to learn, and then, after the reading, what you actually learned.

- **SQ3R** *(Survey, Question, Read, Recall, Reflect).* In this strategy, you pose questions to yourself before reading, then answer them after reading the selection.

- **Semantic Web.** You can use this technique to categorize your reading and organize the categories into a graphic device.

- **Outline.** This technique helps you make sense of what you read by highlighting the main and secondary points in any reading passage.

- **Structured Notes.** This technique helps you take notes more efficiently, according to the structure of the reading selection and your purpose for reading.

1. Think about the kinds of reading you do every day. List some of the things you read regularly.

2. From that list, think about when you read long passages for information. When do you do this type of reading?
Lesson 7

SQ3R

SQ3R stands for Survey, Question, Read, Recall, and Reflect. This strategy can help you focus your thoughts before reading a passage, conduct a focused search for new information, then remember what you read.

The first step is to **survey** the reading. This is another word for preview. Scan the text and record important things in the “survey” box.

Next, ask yourself **questions** about the article before you read it. You might have questions about the subject, the author’s point of view, or your prior knowledge. Write these questions in the “question” box.

**Read** the article. While you read, look for the answers to your questions. After you read, record the answers, if you found them, in the “read” box.

Next, **recall** what you have learned. Using your own words, quickly retell the main points of the article in the “recall” box.

The last step is to **reflect** on what you learned from the article. Check to see if your questions were answered fully. Write any new ideas or comments the reading prompted in the “reflect” box.

**SQ3R in Action**

Read the passage below. Then read the paragraph that shows one reader’s thoughts while filling in the S, Q, and first R sections of the chart.

**Newton’s Laws of Motion**

There are three laws of motion in mechanics. It is important to memorize them, because they are used quite often in physics. Discovered by Isaac Newton, whose name they bear, they describe almost all motion by real bodies in the universe.

The first law is often called the law of inertia. Simply put, a body at rest tends to remain at rest, unless acted upon by another body, and a body in motion tends to remain in motion.

The second law is the law of force. This law can be summarized by the expression $F = ma$, where $F$ = force, $m$ = mass, and $a$ = acceleration.

The third law states that, for every action, there is an equal but opposite reaction.
This section is about Newton’s laws of motion. From scanning the section, it looks like the laws are named for Isaac Newton, and that there are three of them. I wonder why we have to memorize them? What are they used for? Oh, OK, it says here they are used in physics all the time to describe the motion of objects.

<table>
<thead>
<tr>
<th>S</th>
<th>Q</th>
<th>R</th>
<th>R</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>Question</td>
<td>Read</td>
<td>Recall</td>
<td>Reflect</td>
</tr>
<tr>
<td>• Newton’s laws of motion</td>
<td>• Why do we have to know these?</td>
<td>• They are used in physics all the time.</td>
<td>• Newton’s laws of motion are important to learn because we use them all the time.</td>
<td>Motion:</td>
</tr>
<tr>
<td>• 3 laws named for Isaac Newton</td>
<td>• What are they used for?</td>
<td>• Used to describe the motion of real bodies in the universe</td>
<td>The laws of motion are inertia, ( F = ma ), and equal/opposite reaction.</td>
<td>• inertia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• ( F = ma )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• equal/opposite reaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• I hear the word <em>inertia</em> all the time—my dad uses it when he complains that I’ve been watching too much TV. I guess he’s trying to “act on” me to overcome the tendency to remain at rest. I didn’t know there was a scientific principle behind inertia.</td>
</tr>
</tbody>
</table>

Write the main points of the reading in the “recall” column. The act of writing what you have read helps cement that information in your mind.

The Reflect step is done mostly in your head. You may want to read over your chart, talk over your reading with a friend, a teacher, or a parent. You may want to review the questions you asked yourself and make a few notes about the main points of the reading. The reader who completed the chart above made a personal connection to the reading. Making connections helps readers retain what they have read.
Application

Use your prereading strategies to survey “The Dani,” and fill in the first column of the SQ3R chart. Then read the article and complete the chart.

**The Dani**

The Dani are an ancient people who have survived into the present day virtually unchanged. They live in East Africa and exist as pastoral nomads. They are not farmers; rather, they follow herds of domesticated animals, which provide them with food and other needs. Much of East Africa is arid, so the Dani are forced to migrate with their beasts to find grazing pasture and water.

The Dani herd four different kinds of animals: goats, cattle, sheep, and camels. They use the goats for milk and meat, the cattle for leather, meat, and milk, the sheep for skins and wool, and the camels for transportation and trading. They also use the camels’ blood for a nutritious blood pudding, which forms a staple of their diets. Bleeding a camel does not kill it, or even weaken it, so it is a renewable source of protein.

Because the animals they herd have different requirements for food and water, a Dani family will split up for long periods of time. Therefore, a very strong social order is required to keep family members from acting independently, perhaps in ways not in the best interests of the family. The Dani use a social system called an authoritarian patriarchy. The oldest male in a Dani extended family is the head of the group and holds broad powers of authority over all the other members.

<table>
<thead>
<tr>
<th>S</th>
<th>Q</th>
<th>R</th>
<th>R</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>Question</td>
<td>Read</td>
<td>Recall</td>
<td>Reflect</td>
</tr>
</tbody>
</table>
Quiz: “The Dani”

Answer the following questions.

1. Circle the letter of your choice. The word *pastoral*, as it is used in the reading on the Dani, probably means
   (a) killing germs.
   (b) herding.
   (c) green.
   (d) countryside.

2. Circle the letter of your choice. The climate where the Dani live is *arid*. This probably means
   (a) humid.
   (b) cold.
   (c) dry.
   (d) hot.

3. What four animals do the Dani herd?

4. The Dani maintain a strong social order by an authoritarian patriarchy. If they had a looser social system, what kinds of problems might arise?
Lesson 8
Semantic Web

*Semantic* means “relating to words.” A semantic web is a way to look at words and ideas in a text.

To use this strategy, you begin by selecting a term or concept from the reading. Write this word or concept in the center of a sheet of paper. Next, brainstorm a list of words or ideas that are related to your first word. Group the words and concepts you have written into several categories, and attach them to the central word with lines, forming a web. Add to what you know as you read.

Semantic Web in Action

Let’s try one. Read the following short passage.

**Alligators**

American alligators live in the deep south of the United States, in Florida, Georgia, Louisiana, Alabama, and Mississippi. Their normal habitat is fresh or brackish swampland. The Florida Everglades National Park is home to many American alligators.

Alligators are reptiles. Since they are cold-blooded, they require warmth from the environment for energy. You will often see alligators basking on warm rocks in the sun for this purpose. Their favorite foods are fish and amphibians, although they are not particular and will eat unwary mammals, birds, and other reptiles if they get a chance.

American alligators are an environmental success story. Seriously endangered only a few years ago, the species has made a comeback. However, habitat depletion is causing alligators to move out of the protected parks, and alligator infestation of human habitations is becoming a serious problem.

The major idea in this passage is the alligator. Write *alligator* at the center of your semantic web. Then list things you know about alligators, from your prior knowledge and from the reading.

I know alligators live in hot climates, usually in swamps. I also know that alligators are reptiles. Both of those things are also in the reading. I think I remember reading somewhere about birds that clean alligators’ teeth for them. The alligators don’t eat the birds. It also says in the passage that alligators will eat basically anything, and that they were endangered, but have made a comeback. Because they are losing their habitat, they are getting into people’s yards. I think I remember reading somewhere that alligators lay eggs, and that the mother helps the babies get to the water when they hatch.
Okay, so now you have a lot of information. The next step is to categorize it. The first thing you have thought about is where the alligator lives. Write the word habitat. Draw a line to connect the words alligator and habitat. What do you know about the alligator’s habitat? You know the alligator lives in the deep south of the United States. One place where it lives is the Florida Everglades National Park. You also know that the alligator’s habitat is being depleted, and that alligators are moving into human areas. All of those things can be categorized as “habitat.”

What other categories can you use here? The passage talks about what alligators eat and the fact that they are reptiles and cold-blooded. You know that alligators have a relationship with a species of bird, and that the mother alligator looks after its nest. So other categories could be “food,” “reptile,” “relationship with other animals,” and “reproduction.” Using these categories, you can organize all your information in a semantic web that looks like this.
Semantic Web (continued)

Application

Read the following article. Fill in the semantic web before, during, and after reading. Every semantic web is different. Add lines and circles as needed.

Salmon Run

It is late summer in Juneau, Alaska, and the salmon have come home. In shallow streams everywhere, the pink-fleshed fish are performing the last desperate act of their lives—spawning the next generation. In a few days, the bodies not eaten by bears and scavengers will wash gently down the streams, into rivers, and at last into the sea.

The streams where the fish die are the same streams in which they were born. Most salmon eggs never even hatch. They are a favored food of other fish and amphibians. Young salmon, called fry, live in the protected creeks for several months after hatching. However, most of the fry that hatch are soon eaten by predatory birds and small mammals. When the fry are slightly older, they move into larger bodies of water—lakes, ponds, or slow-moving rivers. After a year, they begin their migration to the sea.

The journey is not easy. Many rivers have been dammed, and there are always predators everywhere. A lucky few make it to the ocean, where they live the majority of their adult lives. There is no safety for the salmon in the sea, either. They are prey to many larger fish and harvested by humans in great numbers.

However, some do survive. They swim upstream, against the current, over fish ladders constructed for them to get over dams, all to make it back to the stream where they were born and to keep the species going for another generation. After a mating ritual, the male builds a nest. The female lays thousands of eggs, which are fertilized by her mate. The exhausted parents guard the nest as long as they can, before they finally succumb. Their babies will be born in the spring, and so the cycle continues.
Semantic Web (continued)
Semantic Web (continued)

Quiz: “Salmon Run”

Answer the following questions.

1. Circle the letter of your choice. In the passage, the word *spawning* probably means
   (a) producing young.
   (b) swimming upstream.
   (c) feeding.
   (d) dying.

2. Circle the letter of your choice. The word *predatory* is related to two other words later in the passage. These are
   (a) protected and fry.
   (b) predator and protected.
   (c) predator and prey.
   (d) prey and protected.

3. About how old are the young salmon when they begin the migration to the sea?

4. What is the greatest threat to salmon completing their life cycle?

5. How do you think humans’ alteration of the natural landscape and seaside might have affected the salmon life cycle?
You may already be familiar with making an outline to prepare you for writing an essay or a paper. This technique is also useful for helping you organize and make sense of what you are reading.

First preview the passage, then make the outline. Many people use a system of outlining using Roman numerals and the letters of the alphabet. Roman numerals denote major ideas; capital letters denote secondary ideas within the main ideas. You can continue to break down the outline to include more minor concepts by using Arabic numbers and lowercase letters.

Usually, but not always, an author groups a major idea and its supporting concepts into one or two paragraphs. You can use this as a general guide, but stay alert to references earlier or later in the passage.

**Outline in Action**

Use your prereading strategies to find the main points of the article. Then read the article and follow along with the outlining process of one reader.

**Symbiotic Relationships**

Symbiosis means “life together.” While we normally think of a symbiotic relationship as one in which both parties benefit, in reality this is only one type of symbiotic system. There are several types.

*Mutualism* is the type of symbiosis in which both parties benefit. For example, some species of whale are often seen with small fish attached to their skins. These fish keep the whale free of parasites, which they eat. Both the whale and the fish benefit from the relationship.

*Commensalism* is a form of symbiosis in which one organism benefits but the other does not. However, the other party is not hurt in the exchange. For example, African anteaters use a nest only during breeding season. After the anteaters abandon them, these underground nests are used as hiding places by small antelope.

The last kind of symbiotic relationship is called *parasitism*. As the name suggests, one organism benefits at the expense of the other. Vines that use rain-forest trees to reach sunlight, but end up harming the trees by strangling them, are a good example of parasitism.
Outline (continued)

This article is about symbiosis. By looking at the paragraphs, it looks like there are four main topics: symbiosis, mutualism, commensalism, and parasitism.

There seems to be a pattern in the paragraphs as well . . . each word is first defined, then an example is given.

I. Symbiosis
   A. Definition: Life together
   B. Two organisms living together and benefiting each other is one kind of symbiotic relationship.

II. Mutualism
   A. Definition: Two organisms that live together and benefit each other.
   B. Example: A whale that has fish living on it, eating its parasites.

III. Commensalism
   A. Definition: Only one organism benefits, but the other is not injured.
   B. Example: An antelope that uses an old anteater nest to hide in.

IV. Parasitism
   A. Definition: One organism benefits while the other is hurt.
   B. Example: A vine that lives on a tree but slowly strangles the tree to death.

Application

Use your prereading strategies to determine major categories for your outline. Then read the article and fill in the outline. Add or remove letters, numbers, and lines as needed.

Our Solar System

Our solar system is comprised of a group of planets that orbit our star, the Sun. There are also other members in the system, including asteroids, comets, and planetary satellites such as moons and rings.

Our Sun is a medium-sized star, yellow in color, which means that its temperature is average. It shines by thermonuclear fusion. The Sun has been shining for almost five billion years and will go on shining for another five billion years.

Planets come in two types: terrestrial and gas. Terrestrial planets are small and rocky, like Earth. Mercury, Venus, Earth, Mars, and Pluto are all terrestrial planets. Earth, Mars, and Pluto all have moons.

Gas planets are much larger, and they are not solid. The gas planets are Jupiter, Saturn, Uranus, and Neptune. All of them have moons and rings.

(continued)
Our Solar System (continued)

There are other things in the solar system, too. Between the orbits of Mars and Jupiter lies the asteroid belt, a group of small chunks of rock and metal. Beyond the orbit of Pluto may lie two more groups of rocks, called the Kuiper Belt and the Oort cloud. Comets are thought to originate in one of these two regions.
Quiz: “Our Solar System”

Answer the following questions.

1. Circle the letter of your choice. In the passage you just read, the word *terrestrial* probably means
   (a) gaseous.
   (b) lunar.
   (c) planetary.
   (d) Earthlike.

2. Circle the letter of your choice. Comets are thought to come from
   (a) the Oort cloud.
   (b) the asteroid belt.
   (c) the Kuiper Belt.
   (d) either a or c.

3. Name three differences between terrestrial planets and gas planets.

4. Which five planets have a solid surface?

5. If you were looking for life on one of the planets, which ones would you look at first? Why?
Lesson 10
Structured Notes

As the name of this section suggests, we will discuss how to read and take notes in such a way that you get as much out of the reading as possible.

To use structured notes, you will determine the central idea and the suborganization of the reading. Then you will construct a graphic organizer that helps you keep the arrangement clear. Structured notes can take many forms. You decide what fits the reading.

Structured Notes in Action

Use your prereading strategies to get an idea of how the article is arranged. Then read the article and follow the structured notetaking process of one reader.

The Insect Body Plan

There are thousands of species of insect, and billions of individuals, of every size, color, and shape imaginable, living in nearly every climate on Earth. Yet, they all have one fundamental thing in common.

The insect body plan is a remarkably simple and versatile one. It is based on three segments—the head, the thorax, and the abdomen.

On every insect, the head contains antennae, eyes, and mandibles, all of which are adapted to the insect’s ecosystem and lifestyle. On every insect, the thorax is the body segment to which legs and wings are attached, and the abdomen contains the vital organs. Although insects vary wildly in appearance, their body plan is exactly the same.

The author is telling us that, even though insects all look different from one another, they have something very important in common. The author first points out how insects are different from one another, then shows how they are similar, and breaks down the similarity further by telling what each part of the body plan contains.

Let’s construct a graphic organizer that covers these main points.
**Structured Notes** (continued)

**Topic: Insect Body Plan**

- How are insects different from one another?
  - color
  - size
  - location
  - shape

- What do insects have in common?
  - body plan
  - head
  - thorax
  - abdomen

- What do the different parts of the body plan contain?
  - head: antennae, eyes, mandibles
  - thorax: wings and legs
  - abdomen: vital organs

**Application**

Use your prereading strategies to help you determine categories for structured notes. Then read the article, taking notes on the graphic organizer. Change the graphic organizer as needed—you may want to create a completely different one.

**Talking to the Animals**

When Washoe was a little chimp baby, she was adopted by two psychologists who wanted to see if she could be taught to “speak” using American Sign Language. Chimpanzees lack physical structures such as vocal cords that would allow them to talk using words, as humans do; however, they are extremely intelligent animals, and the two psychologists believed chimps could be taught to understand concrete language. And so they patiently began to teach their little charge how to sign for things she wanted.

At first, Washoe would sign only in response to a request by one of the handlers. Soon, however, she began to sign spontaneously to ask for things—food, affection, toys, play. Her “vocabulary” grew to that of a five-year-old child.

When Washoe was a little older, her “parents” adopted another chimp. He had never been taught sign language, and at first did not respond when Washoe signed to him. However, in a short time, without any help from the psychologists, Washoe had taught her adopted brother how to speak.

(continued)
**Talking to the Animals (continued)**

Washoe had a baby when she became an adult and taught her infant how to sign as well. As the infant grew, she also would sign to other chimps, and to the human psychologists who worked with them.

Like chimpanzees, gorillas have also been taught American Sign Language. Certain marine mammals have been taught to communicate with humans using symbolic signs. We are finally learning to talk to the animals—or at least, teaching *them* how to talk to *us*.
Quiz: “Talking to the Animals”

Answer the following questions.

1. Circle the letter of your choice. In the previous passage, what does the word spontaneously probably mean?
   (a) quickly
   (b) voluntarily
   (c) directly
   (d) with enthusiasm

2. What “language” was Washoe taught to speak? Why?

3. What were the psychologists trying to learn by not teaching the second chimp sign language?

4. Could the chimps Washoe taught communicate with the handlers?

5. Language seems to be pretty easily taught to higher mammals. Do we have the same ability to understand their languages? For instance, can humans understand whale song? Why or why not?