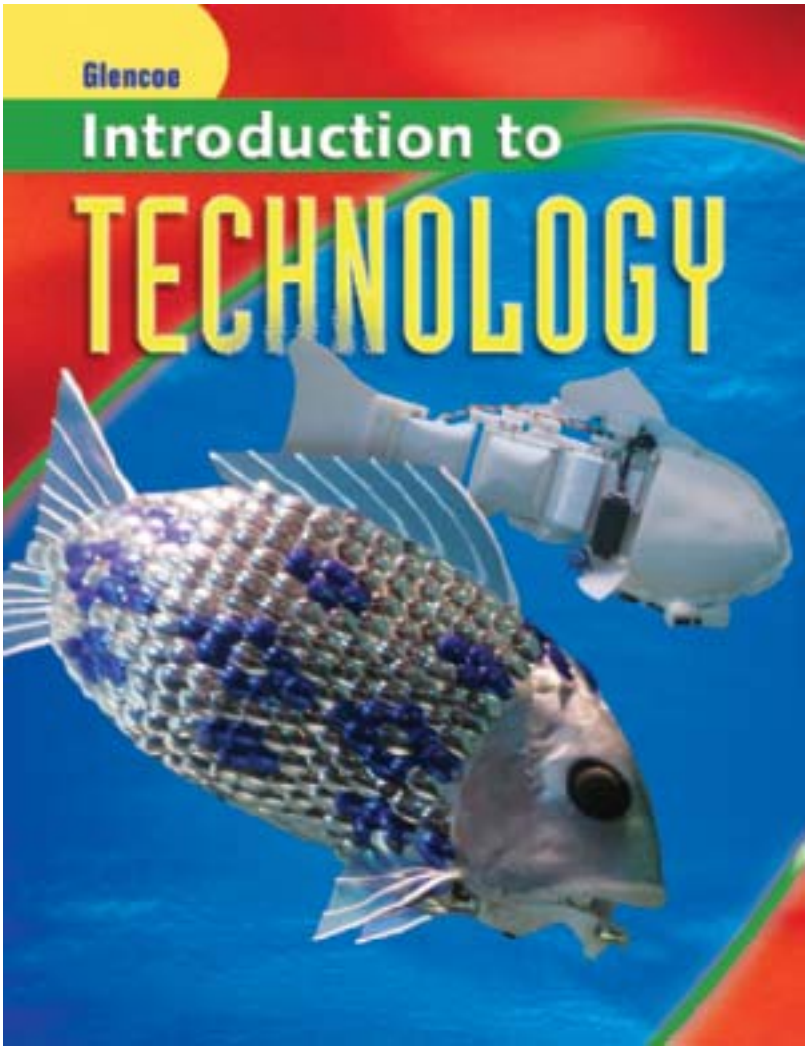

Alan J. Pierce

Dennis Karwatka

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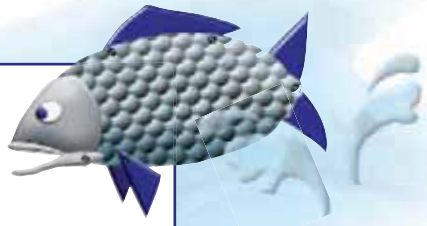

On the Cover

Aquatic Robotics The fish you see on the cover of *Introduction to Technology* is actually a robot. It is a real-life technology tool called a "robo-carp" that swims with real fish in the London Aquarium. Engineered by scientists at the University of Essex in England, this fish uses artificial intelligence and an infrared sensor in its mouth to detect and avoid obstacles. It was created to sniff out underwater mines, leaky oil pipes, and more.

Glencoe

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Printed in the United States of America.

Send all inquiries to:
Glencoe/McGraw-Hill
21600 Oxnard Street, Suite 500
Woodland Hills, California 91367

ISBN: 978-0-07-879785-9 (Student Edition)
MHID: 0-07-879785-3 (Student Edition)

ISBN: 978-0-07-890711-1 (Teacher Annotated Edition)
MHID: 0-07-890711-X (Teacher Annotated Edition)

2 3 4 5 6 7 8 9 043/071 13 12 11 10 09

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- Before You Read
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- Reading Check
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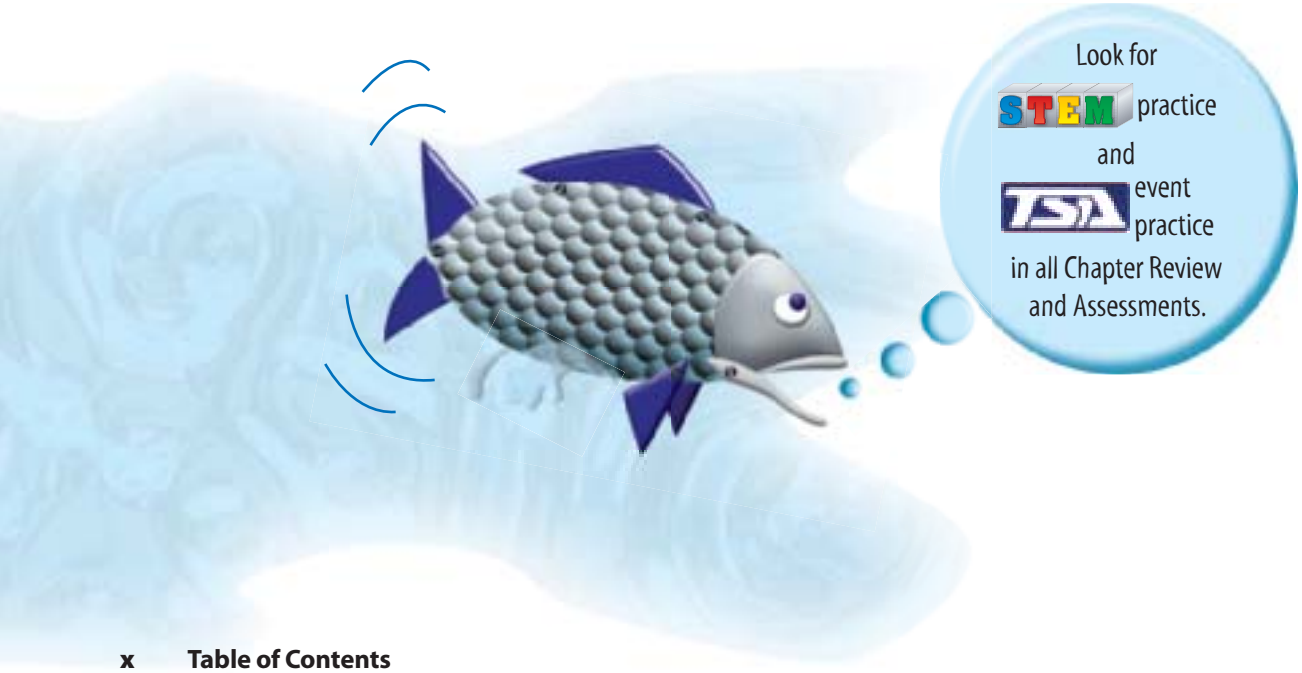

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Welcome to Introduction to Technology

Explore Your Textbook

Technology is everywhere. Did you know that you use technology each time you ride in a car, talk on a phone, watch TV, play computer games, or read a book? Start exploring your textbook so you can understand, use, design, and even make technology!

Units

Introduction to Technology has seven units. Each unit contains two to six chapters. The units explore all the major types of technology.

Unit Opener

Unit Thematic Project Preview Read about the project that comes at the end of the unit. Use the Checklist to get a head start on doing the project.

WebQuest Internet Project This takes you to the book's Online Learning Center, a Web site where you can do an activity related to the photo.

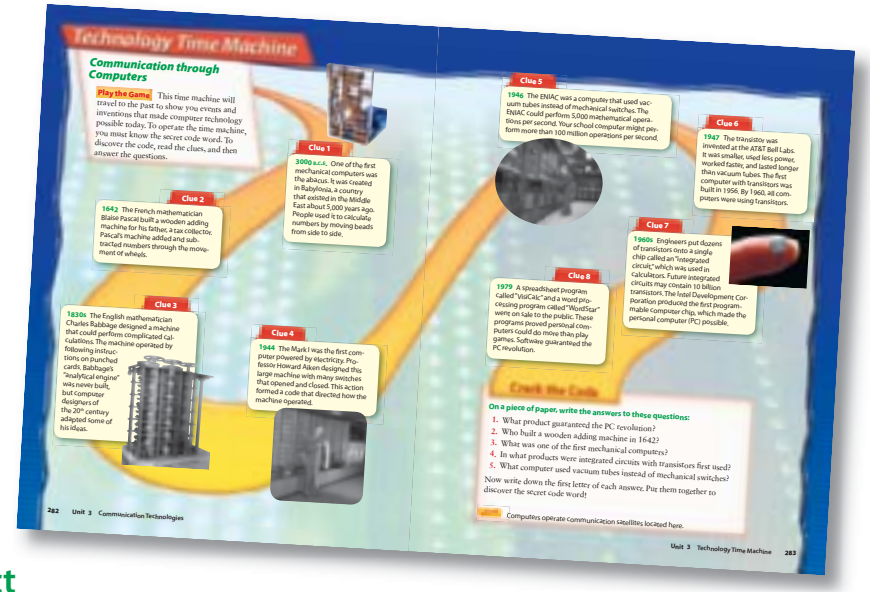
Explore the Photo The photo illustrates a technology concept. Read the caption and answer the question to jump into the unit.

Unit Close

Each unit ends with a fun feature and a project-based activity that will give you a chance to apply what you learn.

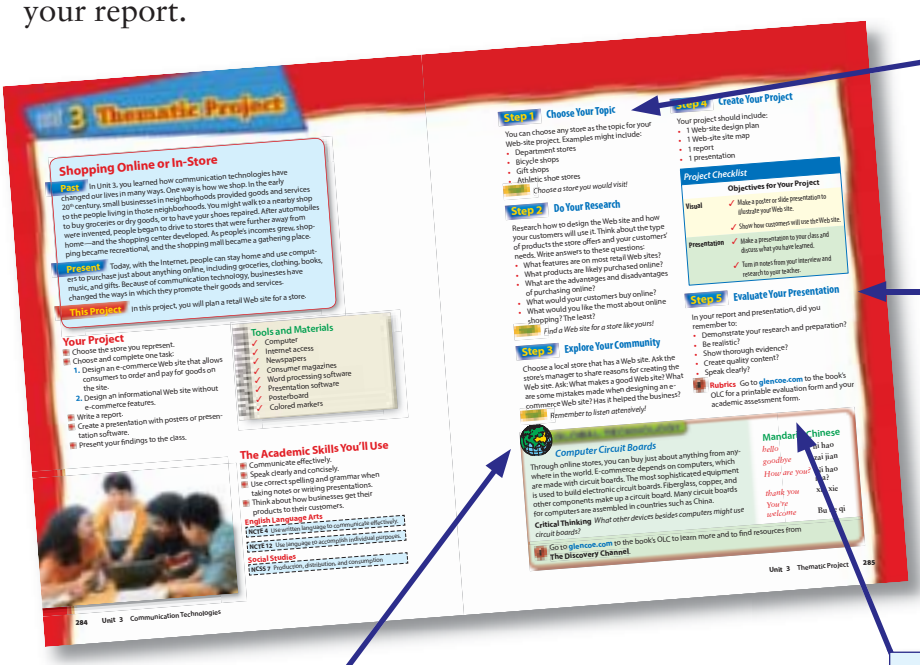
Technology Time Machine

Play this game to learn about the history of technology that we use today.



The Unit Thematic Project

Each Thematic Project begins with an introduction. Complete five steps to evaluate your resources, conduct research, create a project, present your findings, and evaluate your report.



Choose Your Topic Step 1 helps you focus on a topic or project that you would like to complete.

Research, Connect, Report Steps 2, 3, and 4 guide you through researching procedures, as you connect to the real world and report your findings.

Global Technology At the end of each project, discover how your project relates to the real world and another country. Learn new words in a world language!

Evaluate Your Presentation Step 5 takes you to the Online Learning Center to download a rubric for evaluating your project.

Discover, Learn, Apply

Chapters

The chapters of *Introduction to Technology* are organized around subjects that relate to all kinds of technology. Each chapter is divided into two or three sections. Use the reading strategies to get the most out of your studies.

Chapter Opener

What You'll Learn These chapter objectives preview the content you will learn.

Explore the Photo A photo visually illustrates chapter content. The caption asks you a question so you can start thinking about what you will read.

Launch the Technology Lab Preview a hands-on project and prepare for doing the project at the end of the chapter.

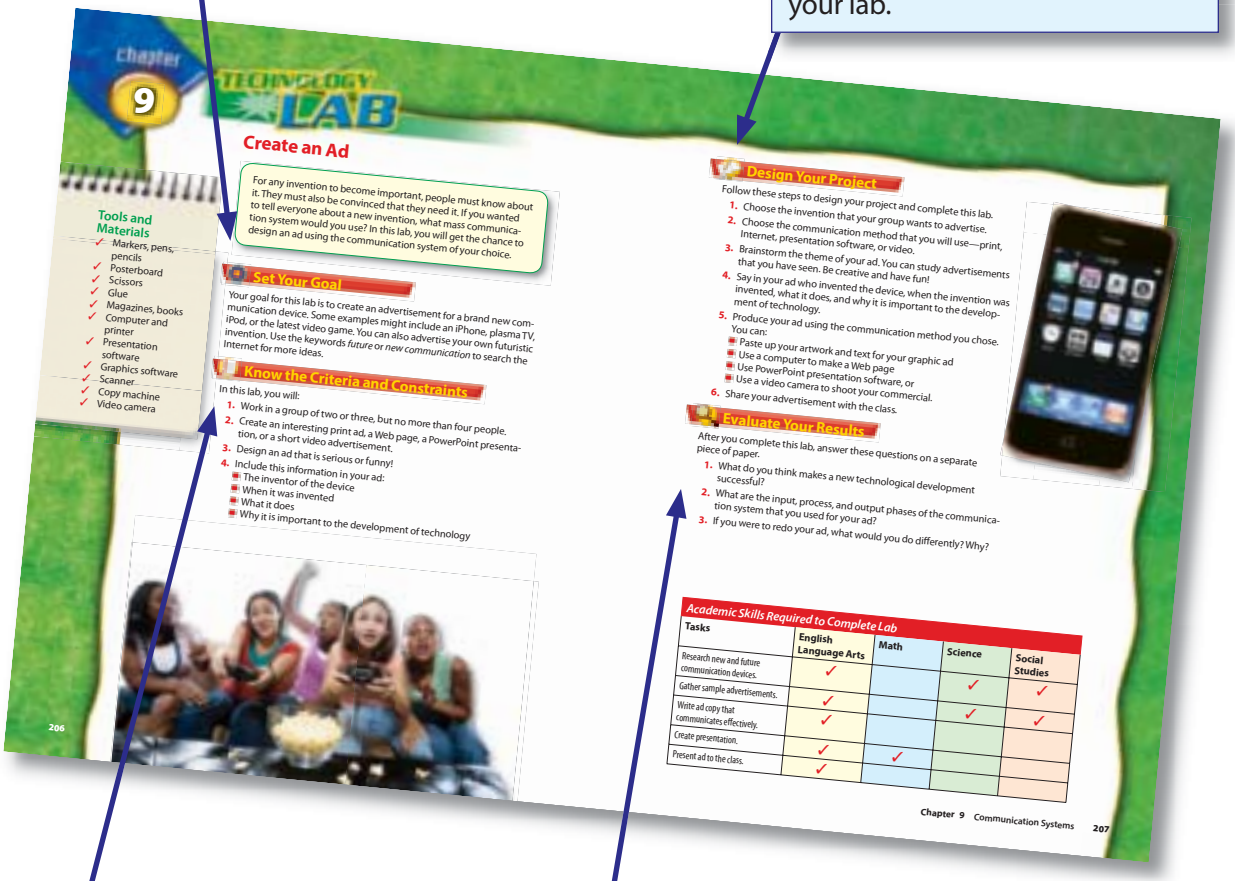
Practice Your Skills

Chapter Close—The Technology Lab

At the end of every chapter, you can create your own technology project. You might design an ad, build a model vehicle, or even make a robot!

Set Your Goal This section explains your goal for the lab.

Design Your Project This section gives you the steps to complete your lab.



Criteria and Constraints
You need to know the guidelines and limitations of what you will do. Chapter 2 explains the meanings of *criteria* and *constraints*.

Evaluate Your Results
Answer the questions to self-assess your own lab.

To the Student

Section Opener

At the beginning of each section, check out the Reading Guide. Develop your reading and comprehension skills as you preview the content, vocabulary, standards, and main ideas for that section.

Before You Read A pre-reading question helps you connect to what you will read.

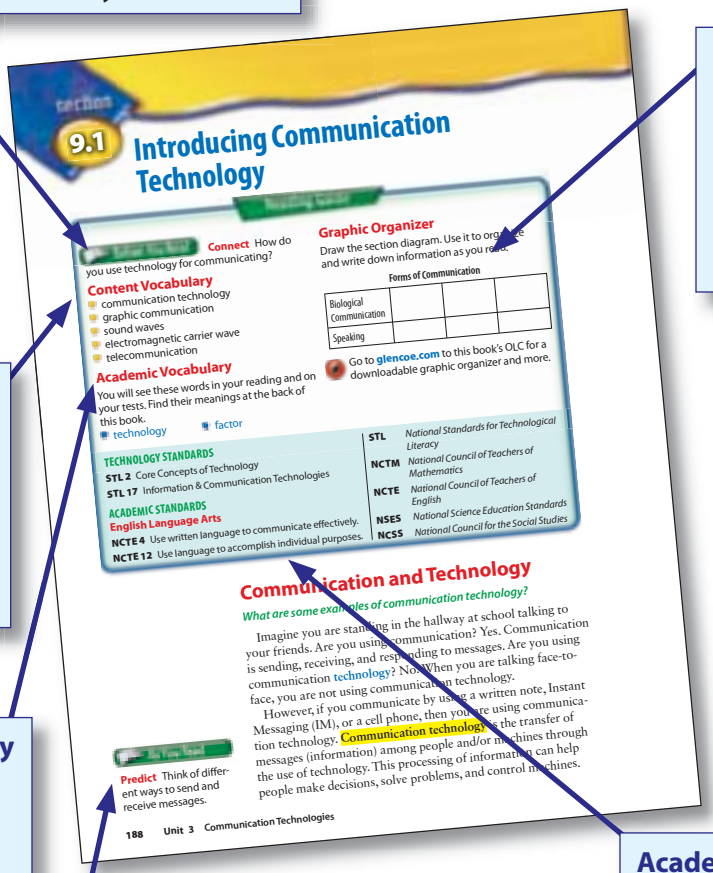
Graphic Organizer
A graphic organizer is a visual tool to help you organize and remember information you learn in the section.

Content Vocabulary
Preview the key terms you will learn in the section. Look for yellow highlighted words as you read.

Academic Vocabulary
You will see these words on tests and in your reading. Look for blue boldface type in the section.

As You Read This question helps you focus on a concept in your reading.

Academic Standards
Get skills in English language arts, mathematics, science, and social studies. The section openers list some of the academic standards for the section.



Features

Interesting features introduce basic technology topics in each chapter. You will also learn about people of the past and present. These features help you see how what you read relates to the real world.

Margin Features

Academic Connections See how technology can link to almost every subject—mathematics, science, English language arts, or social studies.

Now Hear This! You have your own built-in sound receivers—your ears. Sound waves striking your eardrums make them vibrate.

Apply Find an illustration of the ear in an encyclopedia at school. Make a drawing showing the main parts of the ear. Label the parts and functions.

EcoTech Technology can be "green"! This feature shows you how technology can be friendly to our environment. **Try This** gives you ideas that can help.

Treeless Paper

Making paper from trees can use a lot of energy and toxic chemicals. But paper can also be made from hemp, bamboo, or kenaf—a plant that grows quickly and uses eco-friendly chemicals for production.

Try This To save paper, write on both sides of your paper, use scrap paper—and recycle it.

Imagine This Learn about amazing innovations in technology for today and tomorrow.

Computers You Can Wear

Imagine wearing a computer that is a lightweight, voice-activated box with a headset and eyepiece. When you look into the eyepiece, you see a computer screen that appears as if it is a few feet away. Researchers at NASA are working on a model called a Wearable Augmented Reality Prototype (WARP) for astronauts to wear so their hands are free for other tasks. *How might wearing your computer help you in everyday communication?*

Go to **glencoe.com** to this book's OLC for answers and to learn more about NASA and technology.

***BusinessWeek* Tech News** This feature appears in a chapter once in every unit. It reports special news on technology.

Building a Super Cell Phone

The newest wave of tech entrepreneurs is transforming our mobile phones into personal computers. "The most common digital device in the world is the cell phone," says Motricity's chief technology officer. Young entrepreneurs are looking to social networking, Internet video, and online photo-sharing. They extend those applications by putting them on cell phones.

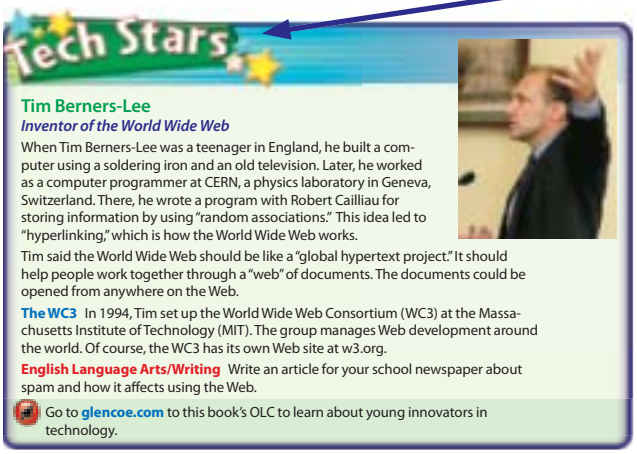
Critical Thinking *What modes of communication would apply to a super cell phone? Why?*

Go to **glencoe.com** to this book's OLC read more about this news.

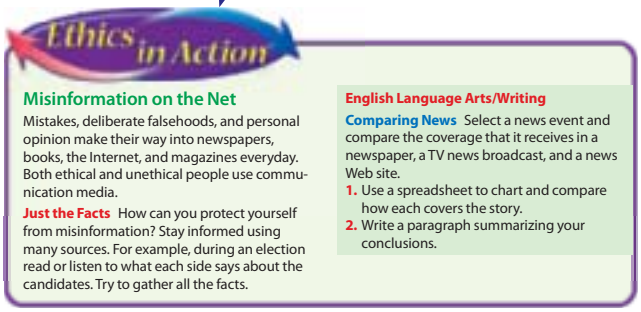
To the Student

In-Chapter Features

Tech Stars This feature profiles an innovator in a technology field that relates to the chapter.



Ethics in Action This feature lets you look at the ethical questions and choices that face the world of technology today.



Exploring Careers in Technology Read an interview with a real-world person working in technology. Learn about the tasks of the job, the skills and education needed, and the future of the career.

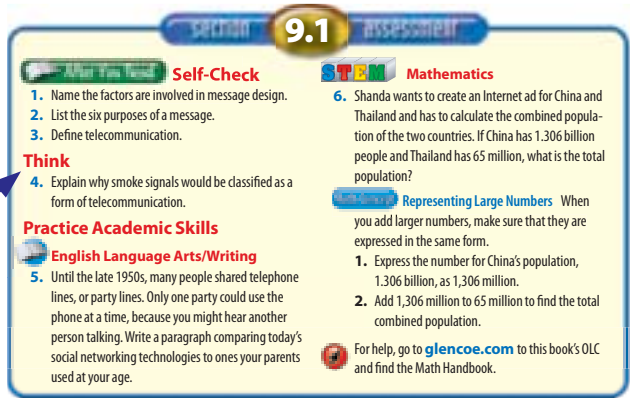
Assessment

Assessment is an important part of learning. Knowing what you have learned is a good way to find out what you need to study.

Section Assessment

Each section ends with a review and two academic activities.

After You Read: Self-Check
Check your comprehension with vocabulary and concept questions. Connect content to academics with **Academic Skills** questions.



Chapter Review and Assessment

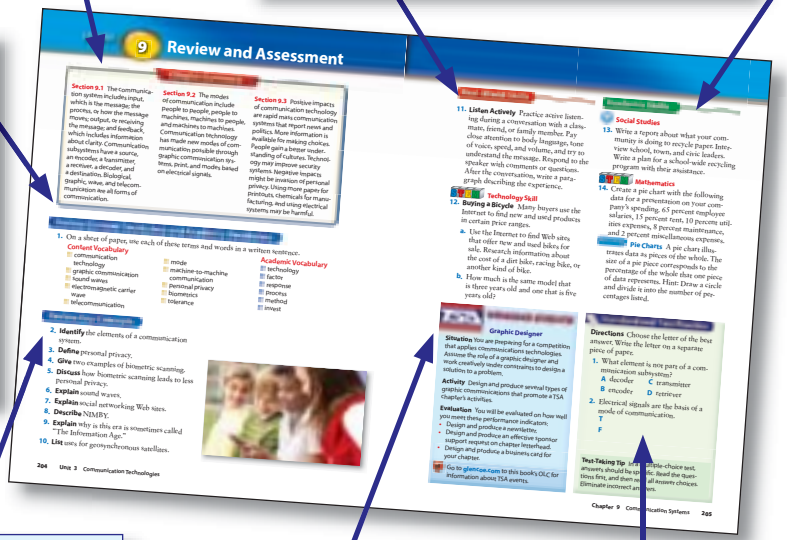
The Chapter Review and Assessment contains a variety of review questions and activities.

Chapter Summary These summaries restate the main concepts of each section.

Real-World Skills STEM-based technology and real-world activities give you the chance to practice your skills and apply what you have learned.

Academic Skills
These activities connect STEM-based mathematics and science as well as English language arts and social studies with technology concepts. **Math Concept** shows ways to solve the mathematics problems.

Review Vocabulary
The activity focuses on technology terms and words you should know for reading and tests.



Review Key Concept
Practice your skills and reinforce your understanding of key concepts in the chapter.

TSA Winning Events
Prepare for competitive events as you role-play situations from real TSA events.

Standardized Test Practice
Prepare for standardized tests through multiple-choice and true/false questions. The **Test-Taking Tip** gives you advice on taking tests.

Competitive Events

Learn, Compete, Innovate!

TSA and Competitive Events

The Technology Student Association (TSA) promotes personal growth, leadership, and opportunities in technology, innovation, design, and engineering. TSA members use and apply science, technology, engineering, and mathematics concepts by participating in co-curricular activities, competitive events, and related programs.

TSA Winning Events

Participating in TSA and other competitive events is a fun way to apply and test your technology knowledge. Get to know other students as you work on exciting technology projects. Use the role-play exercise at the end of each chapter to increase your competitive advantage.

For more information about TSA competitive events, visit www.tsaweb.org.

WINNING EVENTS

Graphic Designer

Situation You are preparing for a competition that applies communications technologies. Assume the role of a graphic designer and work creatively under constraints to design a solution to a problem.

Activity Design and produce several types of graphic communications that promote a TSA chapter's activities.

Evaluation You will be evaluated on how well you meet these performance indicators:

- Design and produce a newsletter.
- Design and produce an effective sponsor support request on chapter letterhead.
- Design and produce a business card for your chapter.

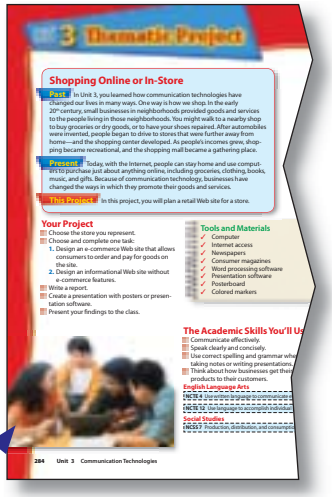
Go to **glencoe.com** to this book's OLC for information about TSA events.

What If English Is Not Your First Language?

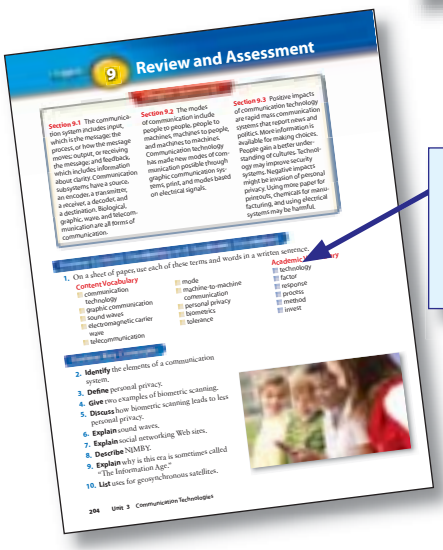
The English Language Learner

Today's classrooms offer terrific opportunities to learn many skills, including language skills. You might be a part of a classroom in which ten or more countries are represented. You and your classmates may actually speak different native languages. You can use this multicultural environment to practice speaking, writing, and listening skills. Practicing these skills with your teacher and your classmates will help you to communicate effectively in your other classes and in your future career.

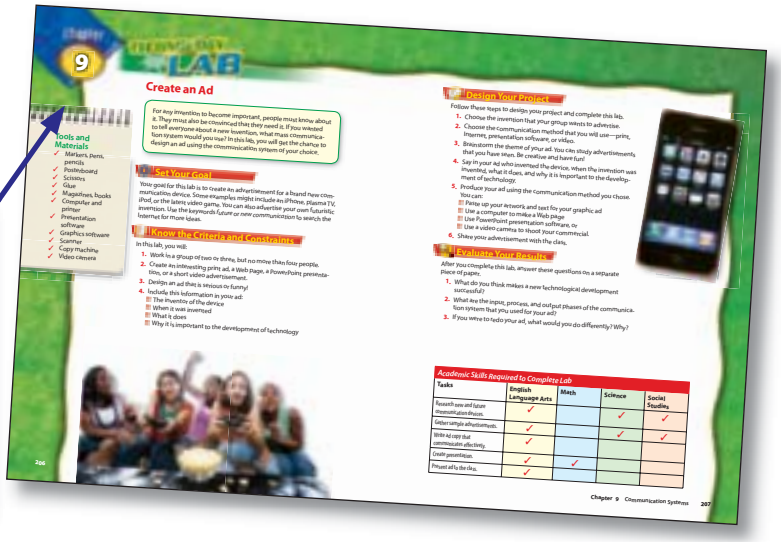
Highlight Vocabulary Check the section *Reading Guide* for vocabulary words that are not familiar. Write down these words and look them up in the glossaries at the back of the book.



Learn through Pictures Look at the photos and figures carefully. Make a connection between what you have seen in the real world and what you see in the picture. If something is not familiar, ask your teacher or a classmate to explain it.



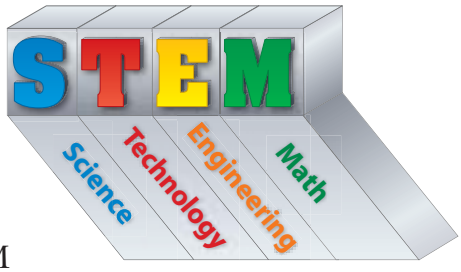
Practice Communication Study with a classmate. At the end of each chapter, review the chapter together. Start by choosing two vocabulary words from the list. Take turns defining them. Who can find the words in the chapter?



Connect to Your World Show what you have learned by doing projects like the *Technology Lab* or the *Unit Thematic Project*. When you must choose a topic, think of your culture, experiences, and skills. Then select a topic that interests you. Relate your project to your world!

Reach for Excellence in Math, Science, and Technology

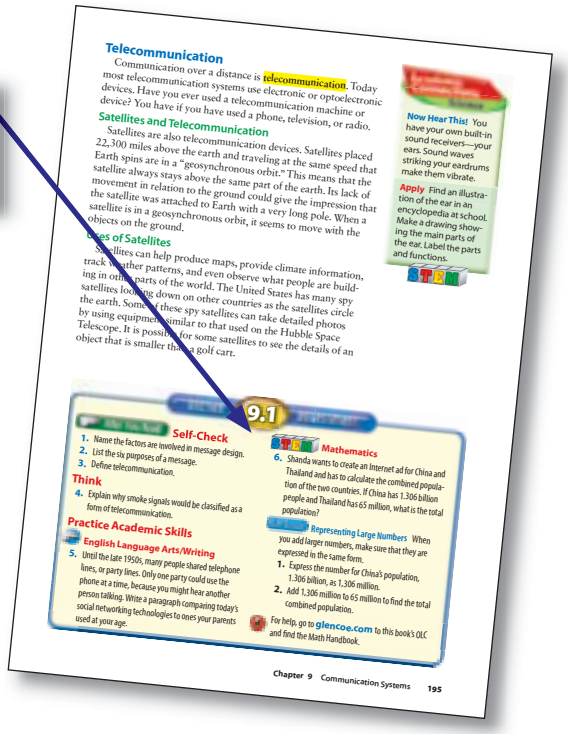
Welcome to the World of Engineering

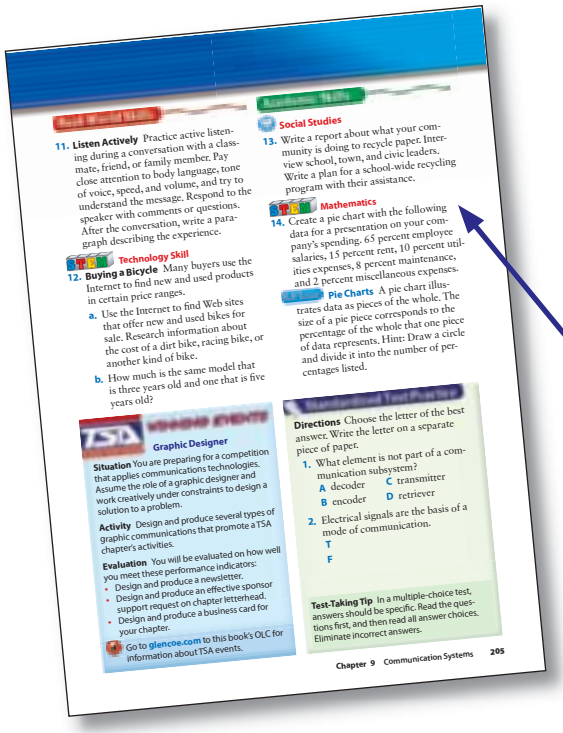


Important organizations like NASA, the space agency, and the National Science Foundation helped launch STEM learning. STEM stands for Science, Technology, Engineering, and Mathematics. STEM is also a nationwide initiative, or plan, developed for students just like you. STEM promotes learning those subjects to prepare you for success in tomorrow's world. Studying STEM subjects can lead you to exciting careers. In fact, STEM applies to most career fields today—from aircraft engineers, forensic scientists, and architects to firefighters, game developers, and auto mechanics.

In this book, you will find many Science, Technology, Engineering, and Mathematics activities in every chapter.

STEM in Section Assessments
Jumpstart your STEM know-how with quick Section Assessments.





STEM at the End of Each Chapter
Practice what you have learned in Science, Technology, Engineering, or Math through STEM activities at the end of the chapter.

For more information about STEM and exciting STEM careers, visit www.stemedcoalition.org.

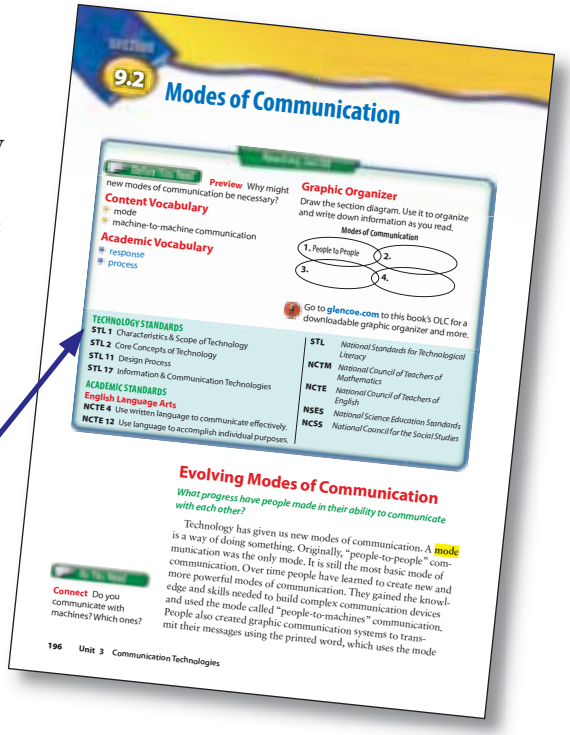
What Are Standards?

Standards for Learning

Introduction to Technology was written to meet technology standards, so you will have a better understanding of technology and its impact on our world.

Technology Standards

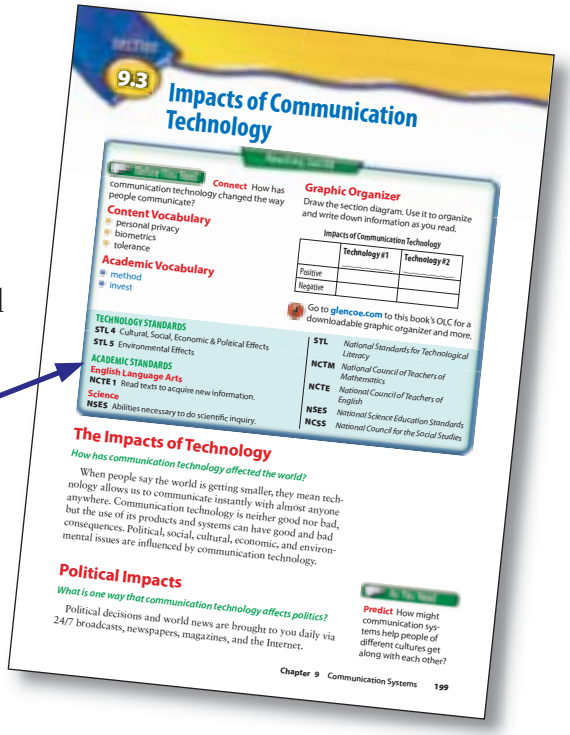
Each year we depend more and more on technology. For that reason, understanding technology is very important for everyone. Years ago the International Technology Education Association (ITEA) created the Technology for All Americans Project. This project developed standards for what students should be able to do and know to be technologically literate. These standards are called "Standards for Technological Literacy" (STL). They are also called "Technology Content Standards."



Technology Standards Each chapter of this book is divided into sections. In the Reading Guide, there is a list of the STLs covered in that section.

Academic Standards

The English Language Arts, Mathematics, Science, and Social Studies standards are listed under the "Academic Standards" in the Reading Guide. You will practice these academic skills as you move through the chapter.



Academic Standards The Reading Guide provides a list of the Academic Standards covered in that section.

Online Learning Center

How to Access the OLC Student Center

Follow these steps to get to all the textbook resources at the *Introduction to Technology* Online Learning Center.

Step 1
Go to **glencoe.com**.

Step 2
Select your state from the pull-down menu.

Step 3
Select Student.

Step 4
Scroll through the subject menu to select Technology Education.

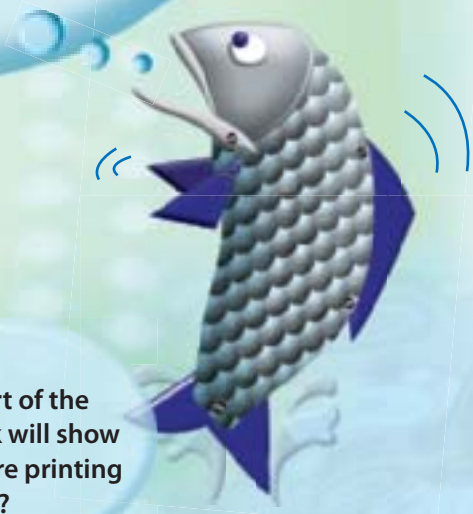
Step 5
Click ENTER.

Step 6
Select *Introduction to Technology* ©2010.

Step 7
Click Student Center for a variety of classroom resources.

Treasure Hunt

Introduction to Technology **contains a wealth of information. Knowing where to find information in your textbook will help you get the most out of your study time. Come on, let's discover your textbook!**



1. How many chapters are in the book? How many units?
2. What part of the textbook will show you where printing is taught?
3. Where do you find the WebQuest Internet Project?
4. What topic is featured in the Unit 3 Technology Time Machine?
5. If you need help with one of the math applications, where would you look?
6. Where can you find the definitions of *gravure printing* and *hardware*?
7. What skill do you practice in Chapter 10, Section 10.2 Assessment?
8. Where do you find a Unit Thematic Project?

Reading Skills Handbook

Reading: What's in It for You?

What role does reading play in your life? The possibilities are countless. Are you on a sports team? Perhaps you like to read about the latest news and sports. Are you enrolled in an English class, an algebra class, or a science or technology class? Then your assignments require a lot of reading.

Improving or Fine-Tuning Your Reading Skills Will:

- Improve your grades
- Allow you to read faster and more efficiently
- Improve your study skills
- Help you remember more information accurately
- Improve your writing

The Reading Process

Good reading skills build on one another, overlap, and spiral around in much the same way that a winding staircase goes around and around while leading you to a higher place. This handbook is designed to help you find and use the tools you will need **before, during,** and **after** reading.

Strategies You Can Use

- Identify, understand, and learn new words.
- Understand why you read.
- Take a quick look at the whole text.
- Try to predict what you are about to read.
- Take breaks while you read and ask yourself questions about the text.
- Take notes.
- Keep thinking about what will come next.
- Summarize.

Vocabulary Development

Word identification and vocabulary skills are the building blocks of the reading and the writing process. By learning to use a variety of strategies to build your word skills and vocabulary, you will become a stronger reader.

Use Context to Determine Meaning

The best way to expand and extend your vocabulary is to read widely, listen carefully, and participate in a rich variety of discussions. When reading on your own, though, you can often figure out the meanings of new words by looking at their **context,** the other words and sentences that surround them.

Tips for Using Context

Look for clues such as:

A synonym or an explanation of the unknown word in the sentence:
*Elise's shop specialized in **millinery,** or **hats for women.***

A reference to what the word is or is not like:
*An **archaeologist,** like a historian, deals with the past.*

A general topic associated with the word:
*The **cooking** teacher discussed the best way to braise meat.*

A description or action associated with the word:
*He used the **shovel** to **dig up** the garden.*

Predict a Possible Meaning

Another way to find the meaning of a word is to take the word apart. If you understand the meaning of the **base,** or **root,** part of a word, and also know the meanings of key syllables added either to the beginning or end of the base word, then you can usually figure out what the word means.

Word Origins Since Latin, Greek, and Anglo-Saxon roots are the basis for much of our English vocabulary, having some background in languages can be a useful vocabulary tool. For example, *astronomy* comes from the Greek root *astro,* which means "relating to the stars." *Stellar* also refers to stars, but its origin is Latin. Knowing root words in other languages can help you determine meanings, derivations, and spellings in English.

Prefixes and Suffixes A prefix is a word part that can be added to the beginning of a word. For example, the prefix *semi* means "half" or "partial," so *semicircle* means "half a circle." A suffix is a word part added to the end of a word. Adding a suffix can change a word's part of speech.

Using Dictionaries A dictionary provides the meaning or meanings of a word. Look at a dictionary entry to see what other information it provides.

Thesauruses and Specialized Reference Books A thesaurus provides synonyms and often antonyms. A synonym is a word that means the same thing as the word you are using. Check the exact definition of the listed words in a print or online dictionary before you use a thesaurus.

Glossaries Many textbooks contain condensed dictionaries that provide an alphabetical listing of words used in the text and their definitions.

Recognize Word Meanings across Subjects Have you learned a new word in one class, and then noticed it in your reading for other subjects? The word might not mean exactly the same thing in each class, but you can use the meaning you already know to help you understand what it means in another subject area. For example:

Math After multiplying the two numbers, explain how you found the **product.**

Science One **product** of photosynthesis is oxygen.

Economics The Gross National **Product (GNP)** is the total dollar value of goods and services produced by a nation.

Reading Skills Handbook

Understanding What You Read

Reading comprehension means understanding—deriving meaning from—what you have read. Using a variety of strategies can help you improve your comprehension and make reading more interesting and more fun.

Read for a Reason

To get the greatest benefit from what you read, you should **establish a purpose for reading.** In school, you have many reasons for reading. Some of them are:

- To learn and understand new information
- To find specific information
- To review before a test
- To complete an assignment
- To prepare (research) before you write

As your reading skills improve, you will notice that you apply different strategies to fit the different purposes for reading. For example, if you are reading for entertainment, you might read quickly, but if you read to gather information or follow directions, you might read more slowly, take notes, construct a graphic organizer, or reread sections of text.

Draw on Personal Background

Drawing on personal background may also be called activating prior knowledge. Before you start reading a text, ask yourself questions like these:

- What have I heard or read about this topic?
- Do I have any personal experience relating to this topic?

Using a KWL Chart A KWL chart is a good device for organizing information you gather before, during, and after reading. In the first column, list what you already **know,** then list what you **want** to know in the middle column. Use the third column when you review and you assess what you **learned.** You can also add more columns to record places where you found information and places where you can look for more information.

K (What I already know)	W (What I want to know)	L (What I have learned)

Adjust Your Reading Speed Your reading speed is a key factor in how well you understand what you are reading. You will need to adjust your speed depending on your reading purpose.

Scanning means running your eyes quickly over the material to look for words or phrases. Scan when you need a specific piece of information.

Skimming means reading a passage quickly to find its main idea or to get an overview. Skim a text when you preview to determine what the material is about.

Reading for detail involves careful reading while paying attention to text structure and monitoring your understanding. Read for detail when you are learning concepts, following complicated directions, or preparing to analyze a text.

Techniques to Understand and Remember What You Read

Preview

Before beginning a selection, it is helpful to **preview** what you are about to read.

Previewing Strategies

- **Read the title, headings, and subheadings of the selection.**
- **Look at the illustrations and notice how the text is organized.**
- **Skim the selection: Take a glance at the whole thing.**
- **Decide what the main idea might be.**
- **Predict what a selection will be about.**

Predict

Have you ever read a mystery, decided who committed the crime, and then changed your mind as more clues were revealed? You were adjusting your predictions. Did you smile when you found out you guessed the murderer? You were verifying your predictions.

As you read, take educated guesses about story events and outcomes; that is, **make predictions** before and during reading. This will help you focus your attention on the text, and it will improve your understanding.

Determine the Main Idea

When you look for the **main idea**, you are looking for the most important statement in a text. Depending on what kind of text you are reading, the main idea can be located at the very beginning (news stories in newspaper or a magazine) or at the end (scientific research document). Ask yourself:

- What is each sentence about?
- Is there one sentence that is more important than all the others?
- What idea do details support or point out?

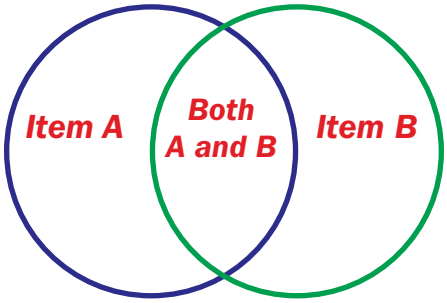
Taking Notes

Cornell Note-Taking System There are many methods for note taking. The **Cornell Note-Taking System** is a well-known method that can help you organize what you read. To the right is a note-taking chart based on the Cornell Note-Taking System.

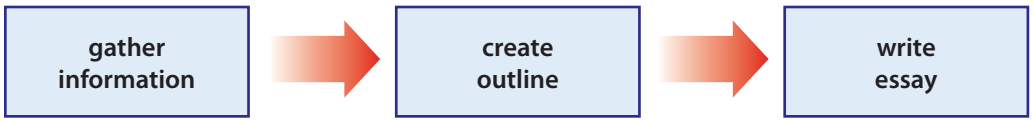
Cues	Note Taking
Summary	

Graphic organizers Using a graphic organizer to retell content in a visual representation will help you remember and retain content. You might make a **chart** or **diagram,** organizing what you have read. Here are some examples of graphic organizers:

Venn diagrams: When mapping out a comparison-and-contrast text structure, you can use a Venn diagram. The outer portions of the circles will show how two characters, ideas, or items contrast, or are different, and the overlapping part will compare two things, or show how they are similar.



Flow charts: To help you track the sequence of events, or cause and effect, use a flow chart. Arrange ideas or events in their logical, sequential order. Then draw arrows between your ideas to indicate how one idea or event flows into another.



Visualize

Try to form a mental picture of scenes, characters, and events as you read. Use the details and descriptions the author gives you. If you can **visualize** what you read, it will be more interesting, and you will remember it better.

Question

Ask yourself questions about the text while you read. Ask yourself about the importance of the sentences, how they relate to one another, if you understand what you just read, and what you think is going to come next.

Clarify

If you feel you do not understand meaning (through questioning), try these techniques:

What to Do When You Do Not Understand

- **Reread confusing parts of the text.**
- **Diagram (chart) relationships between chunks of text, ideas, and sentences.**
- **Look up unfamiliar words.**
- **Talk out the text to yourself.**
- **Read the passage once more.**

Review

Take time to stop and review what you have read. Use your note-taking tools (graphic organizers or Cornell notes charts). Also, review and consider your KWL chart.

Monitor Your Comprehension

Continue to check your understanding by using the following two strategies:

Summarize Pause and tell yourself the main ideas of the text and the key supporting details. Try to answer the following questions: Who? What? When? Where? Why? How?

Paraphrase Pause, close the book, and try to retell what you have just read in your own words. It might help to pretend you are explaining the text to someone who has not read it and does not know the material.

Understanding Text Structure

Good writers do not just put together sentences and paragraphs, they organize their writing with a specific purpose in mind. That organization is called "text structure." When you understand and follow the structure of a text, it is easier to remember the information you are reading. There are many ways text may be structured. Watch for **signal words**. They will help you follow the text's organization (also, remember to use these techniques when you write).

Compare and Contrast

This structure shows similarities and differences between people, things, and ideas. This is often used to demonstrate that things that seem alike are really different, or vice versa.

Signal words: similarly, more, less, on the one hand / on the other hand, in contrast, but, however

Cause and Effect

Writers used the cause and effect structure to explore the reasons for something happening and to examine the results or consequences of events.

Signal words: so, because, as a result, therefore, for the following reasons

Problem and Solution

When writers organize text around the question "how?" they state a problem and suggest solutions.

Signal words: how, help, problem, obstruction, overcome, difficulty, need, attempt, have to, must

Sequence

Sequencing tells you the order in which to consider thoughts or facts. Examples of sequencing are:

Chronological order refers to the order in which events take place.

Signal words: first, next, then, finally

Spatial order describes the organization of things in space (to describe a room, for example).

Signal words: above, below, behind, next to

Order of importance lists things or thoughts from the most important to the least important (or the other way around).

Signal words: principal, central, main, important, fundamental

Reading for Meaning

It is important to think about what you are reading to get the most information out of a text, to understand the consequences of what the text says, to remember the content, and to form your own opinion about what the content means.

Interpret

Interpreting is asking yourself, "What is the writer really saying?" and then using what you already know to answer that question.

Infer

Writers do not always state exactly everything they want you to understand. By providing clues and details, they sometimes imply certain information. An **inference** involves using your reason and experience to develop the idea on your own, based on what an author implies or suggests. What is most important when drawing inferences is to be sure that you have accurately based your guesses on supporting details from the text. If you cannot point to a place in the selection to help back up your inference, you may need to rethink your guess.

Reading Skills Handbook

Draw Conclusions

A conclusion is a general statement you can make and explain with reasoning or with supporting details from a text. If you read a story describing a sport in which five players bounce a ball and throw it through a high hoop, you may conclude that the sport is basketball.

Analyze

To understand persuasive nonfiction (a text that discusses facts and opinions to arrive at a conclusion), you need to analyze statements and examples to see if they support the main idea. To understand an informational text (a text, such as a textbook, that gives you information, not opinions), you need to keep track of how the ideas are organized to find the main points.

Hint: Use your graphic organizers and notes charts.

Distinguish Facts and Opinions

This is one of the most important reading skills you can learn. A fact is a statement that can be proven. An opinion is what the writer believes. A writer may support opinions with facts, but an opinion cannot be proven. For example:

Fact: California produces fruit and other agricultural products.

Opinion: California produces the best fruit and other agricultural products.

Evaluate

Would you take seriously an article on nuclear fission if you knew it was written by a comedic actor? If you need to rely on accurate information, you need to find out who wrote what you are reading and why. Where did the writer get information? Is the information one-sided? Can you verify the information?

Reading for Research

You will need to **read actively** in order to research a topic. You might also need to generate an interesting, relevant, and researchable **question** on your own and locate appropriate print and nonprint information from a wide variety of sources. Then you will need to **categorize** that information, evaluate it, and **organize** it in a new way in order to produce a research project for a specific audience. Finally, **draw conclusions** about your original research question. These conclusions may lead you to other areas for further inquiry.