

3

*“As jogging is to the body, thinking is to the brain.
The more we do it, the better we become.”*

NOB YOSHIGAHARA, JAPANESE MATHEMATICIAN AND PUZZLE MASTER



Critical and Creative Thinking

SOLVING PROBLEMS AND MAKING DECISIONS

College teaches you facts and figures—everything from the rules of English grammar to the structure and function of the human pancreas to the impact of the U.S. Census on social policy.

To serve you successfully, though, your education must do more than fill your head with information—it must also give you the tools to be a critical and creative thinker. Your success in school, career, and life depends on your willingness and ability to actively think through problems, make informed decisions, and overcome obstacles.

Critical and creative thinking skills can be developed and improved with practice. This chapter will help you understand how to analyze information, come up with creative ideas, and implement problem-solving and decision-making plans. With these skills you will be better able to learn and to reach the goals that mean the most to you.



In this chapter you will explore answers to the following questions:

- What is important to know about thinking?
- How can you improve your critical thinking skills?
- How can you improve your creative thinking skills?
- How can you use your thinking skills to solve problems and make decisions?

WHAT IS IMPORTANT TO KNOW ABOUT THINKING?

As a college student, you are required to think in greater depth and complexity than ever before. Memorizing information right before a test is no longer enough. On the contrary, college success involves first and foremost a combination of *critical* and *creative* thinking, which includes and goes beyond the ability to memorize and retain what you learn.

Thinking Means Asking and Answering Questions

What is thinking? According to experts, it is what happens when you ask questions and move toward the answers.¹ Questioning propels the action of thinking. “To think through or rethink anything,” says Dr. Richard Paul, director of research at the Center for Critical Thinking and Moral Critique, “one must ask questions that stimulate our thought. Questions define tasks, express problems, and delineate issues . . . only students who have questions are really thinking and learning.”²

As you answer questions, you transform raw data into information that you can use to achieve goals large and small. A *Wall Street Journal* article entitled “The Best Innovations Are Those That Come from Smart Questions” relays the story of a cell biology student, William Hunter, whose professor told him that “the difference between good science and great science is the quality of the questions posed.” Later, as a doctor and the president and CEO of a pharmaceutical company, Dr. Hunter asked questions about new ways to use drugs. His questions led to the development of a revolutionary product—a drug-coated coronary stent (a slender catheter made to fit into a blood vessel) that prevents scar tissue from forming. Through seeking answers to probing questions, Dr. Hunter reached a significant goal.³

You use questions in order to think both critically (“What test grades do I need in biology this semester?”) and creatively (“How can I earn those grades?”). Later in the chapter, you will find examples of the kinds of questions that drive each skill. Like any aspect of thinking, questioning is not often a straightforward process. Sometimes the answer doesn’t come right away. Often the answer leads to further, and more specific, questions. Don’t be discouraged if the answers don’t come right away; patience is key in following what can be a long process of exploration to an important end result.

In order to ask useful questions, you need to know *why* you are questioning. In other words, you need to define your purpose. Not knowing your purpose may lead you to ask questions that take you in irrelevant directions and waste your time. For example, if an assignment asks you to analyze the effectiveness of John F. Kennedy’s foreign policy during his presidency, asking questions about his personal life is likely to lead you off track.

A general question can be your starting point for defining your purpose: “What am I trying to accomplish, and why?” As you continue your thought process, you will find more specific purposes, or short-term goals, that help you generate questions along the way.

Critical and Creative Thinking Depend on Each Other

Some tasks require only one thinking skill, or ability, at a time. You might use critical thinking to complete a multiple-choice quiz, or creative thinking to come up with an idea for an essay. However, with all but the most straightforward situations, and especially when you need to solve a problem or make a decision, you use critical and creative thinking skills together to move forward.

You need to think creatively to come up with ideas and solutions; likewise, you need to think critically to evaluate the quality and usefulness of your creative ideas. Here is an example from inventor and entrepreneur Wayne Kuna: “To me as a toy inventor, critical thinking is an absolute necessity. It gives us the tools to find not just the next step, but also the step after the next step. By looking at all the things around us—the fads, the movies, the Internet—and mixing it together with what we know about how kids play and . . . where they live, we begin to develop new and better ideas that no one ever thought of before.”⁴

Thinking Power Is Yours to Build

You ask and answer critical and creative thinking questions every day, whether or not you realize it. For example, in deciding to pursue a college degree—a major life decision—you asked these kinds of questions as you thought through the consequences of the choice. “If I attend class full-time, what will that do to my schedule at work and at home?” “If I don’t go to school, how will that affect my ability to earn a living in the short and long term?”

Other examples of students using critical and creative thinking are:

- choosing the best term paper topic by looking at the list of topics, thinking about the available library and Internet sources, and taking your personal interest and the instructor’s approval into consideration
- deciding between two different courses by reading course descriptions and talking to your advisor
- after listening to one point of view in a class discussion, offering a solidly supported opposing opinion
- citing examples that back up the central idea of a paper you are writing

You can improve, now and over a lifetime, your ability to think. Studies have shown that your brain will continue to develop throughout your life if you stay active in your quest to learn new things.⁵ As you increase your thinking skill, you increase your value both in school and on the job. Critical and creative thinkers are in demand because of their ability to apply what they know, think comprehensively through a situation, innovate, and solve problems and make decisions effectively.

The *Go For It!* exercises within this chapter will give you an idea of how you perceive yourself as a critical and creative thinker and encourage the development of those skills. All the other chapter sets of *Go For It!* exercises, along with the *Make Responsible Choices* exercises at the end of each chapter, help you to build your thinking skills and apply them to chapter topics. In short, your work throughout the book is geared toward building your thinking power.

Begin by exploring the skills that every active thinker uses on a daily basis.

HOW CAN YOU IMPROVE YOUR CRITICAL THINKING SKILLS?

Critical thinking is the process of gathering information, analyzing it in different ways, and evaluating it for the purposes of gaining understanding, solving a problem, or making a decision. It is as essential for real-life problems and decisions as it is for thinking through the hypothetical questions on your chemistry homework.

Before you get into the analytical process, you need to define your purpose. What do you want to analyze, and why? Perhaps you need to analyze the plot of a novel in order to determine its structure; maybe you want to analyze your schedule in order to figure out whether you are arranging your time and responsibilities effectively.

Once you define your purpose, the process involves gathering the necessary information, analyzing and clarifying the ideas, and evaluating what you've found. Remember that, throughout the process, you will formulate new questions that may take you in new directions or even change your purpose. Stay flexible and open to where your thinking can lead you.

Gather Information

Information is the raw material for thinking. Choosing what to gather requires a careful analysis of how much information you need, how much time to spend gathering it, and whether the information is relevant. Say, for instance, that your assignment is to choose a style of American jazz music

and discuss its influence on a particular culture. If you gathered every available resource on the topic, the course would be over long before you got to the writing stage.

Here's how you might use analysis to effectively gather information for that paper:

- Reviewing the assignment, you learn that the paper should be 10 pages and cover at least three influential musicians.
- At the library and online, you find lots of what appears to be relevant information.
- You choose a jazz movement, find five or six comprehensive pieces on it, and then select three in-depth sources on each of three musicians.



These students, working with their instructor to produce a literary journal, demonstrate that successful critical thinking often requires teamwork.

In this way you achieve a subgoal—a selection of useful materials—on the way to your larger goal of writing a well-crafted paper.

Analyze and Clarify Information

Once you've gathered the information, the next step is to analyze it to determine whether the information is reliable and useful in helping you answer your questions.

Break Information into Parts

When analyzing information, you break information into parts and examine the parts so that you can see how they relate to each other and to information you already know. The following strategies help you break information down into pieces and set aside what is unclear, unrelated, or unimportant, resulting in a deeper and more reliable understanding.

Separate the ideas. If you are reading about the rise of the Bebop movement, you might name events that influenced it, key musicians, facts about the sound, and ideas behind it.

Compare and contrast. Look at how things are similar to, or different from, each other. You might explore how three Bebop musicians are similar in style. You might look at how they differ in what each musician intends to communicate with the music.

Examine cause and effect. Look at the possible reasons why something happened (possible causes) and its consequences (effects, both positive and negative). You might examine the causes that led up to the Bebop sound as well as its effects on other nonjazz musical styles.

An important caution: Analyze carefully to seek out *true causes*—some apparent causes may not be actual causes (often called “false causes”). For example, events in the musical world and general society took place when the first musicians were developing the Bebop style. Some may have led directly to the new style; others may simply have occurred at the same time.

Look for themes, patterns, and categories. Note connections that form as you look at how bits of information relate to one another. A theme of freedom vs. structure, for example, might emerge out of an examination of Bebop vs. swing jazz. A pattern of behavior might develop as you look at how different musicians broke off from the swing movement. Musicians with different styles might fall into the Bebop category based on their artistic goals.

Once the ideas are broken down, you will need to examine whether examples support ideas, separate fact from opinion, consider perspective, and investigate hidden assumptions.

Examine Whether Examples Support Ideas

When you encounter an idea or claim, examine how it is supported with examples or evidence (facts, expert opinion, research findings, personal experience, and so on). How useful an idea is to your work may depend on whether, or how well, it is backed up with solid evidence or made concrete with examples. Be critical of the information you gather; don't take it at face value.

For example, an advertisement for a weight-loss pill, claiming that it allows users to drop a pound a day, quotes “Anne,” who says that she lost 30 pounds in 30 days. The word of one person, who may or may not be telling the truth, is not adequate support. On the other hand, a peer-reviewed medical study, involving 10,000 participants and published in the world-renowned *New England Journal of Medicine*, that points to the effectiveness of a combination calorie reduction and exercise regimen to lose weight may be more reliable.

The Research Investigator materials—both online and in your booklet—go into more detail about the importance of evaluating the credibility of sources. Finding credible, reliable information with which to answer questions and come up with ideas enables you to separate fact from opinion.

Distinguish Fact from Opinion

A *statement of fact* is information presented as objectively real and verifiable (“It’s raining outside right now”). In contrast, a *statement of opinion* is a belief, conclusion, or judgment that is inherently difficult, and sometimes impossible, to verify (“This is the most miserable rainstorm ever”). Key 3.1 defines important characteristics of fact and opinion.

Key 3.1 Examine how fact and opinion differ.	
OPINIONS INCLUDE STATEMENTS THAT . . .	FACTS INCLUDE STATEMENTS THAT . . .
<p>. . . <i>show evaluation</i>. Any statement of value indicates an opinion. Words such as <i>bad</i>, <i>good</i>, <i>pointless</i>, and <i>beneficial</i> indicate value judgments.</p> <p>Example: “Jimmy Carter is the most successful peace negotiator to sit in the White House.”</p>	<p>. . . <i>deal with actual people, places, objects, or events</i>.</p> <p>Example: “In 1978, Jimmy Carter’s 13-day summit meeting with Egyptian president Anwar Sadat and Israeli prime minister Menachem Begin led to a treaty between the two countries.”</p>
<p>. . . <i>use abstract words</i>. Words that are complicated to define, like <i>misery</i> or <i>success</i>, usually indicate a personal opinion.</p> <p>Example: “The charity event was a smashing success.”</p>	<p>. . . <i>use concrete words or measurable statistics</i>.</p> <p>Example: “The charity event raised \$5,862.”</p>
<p>. . . <i>predict future events</i>. Statements that examine future occurrences are often opinions.</p> <p>Example: “Mr. Barrett’s course is going to set a new enrollment record this year.”</p>	<p>. . . <i>describe current events in exact terms</i>.</p> <p>Example: “Mr. Barrett’s course has 378 students enrolled this semester.”</p>
<p>. . . <i>use emotional words</i>. Emotions are by nature unverifiable. Chances are that statements using such words as <i>delightful</i> or <i>miserable</i> express an opinion.</p> <p>Example: “That class is a miserable experience.”</p>	<p>. . . <i>avoid emotional words and focus on the verifiable</i>.</p> <p>Example: “Citing dissatisfaction with the instruction, 7 out of the 25 students in that class withdrew in September.”</p>
<p>. . . <i>use absolutes</i>. Absolute qualifiers, such as <i>all</i>, <i>none</i>, <i>never</i>, and <i>always</i>, often point to an opinion.</p> <p>Example: “To pay tuition, all college students require financial aid support.”</p>	<p>. . . <i>avoid absolutes, using words like “may,” “possibly,” and “perhaps.”</i></p> <p>Example: “To pay tuition, some college students require financial aid support.” Or “College students may require financial support to pay tuition.”</p>

Source: Adapted from Ben E. Johnson, *Stirring Up Thinking*. New York: Houghton Mifflin, 1998, pp. 268–270.

Even though facts may seem more solid, you can also make use of opinions if you determine that they are backed up with facts. However, it is important to examine opinions for their underlying perspectives and assumptions.

Examine Perspectives and Assumptions

Perspective is a characteristic way of thinking about people, situations, events, and ideas. Perspectives can be broad, such as a generally optimistic or pessimistic view of life. Or they can be more focused, such as an attitude about whether students should commute or live on campus.

Perspectives are associated with *assumptions*—judgments, generalizations, or biases influenced by experience and values. For example, the perspective that there are many different successful ways to raise a family leads to assumptions such as “Single-parent homes can provide nurturing environments” and “Same-sex couples can rear well-adjusted children.” Having a particular experience with single-parent homes or same-sex couples can build or reinforce a perspective.

Assumptions often hide within questions and statements, blocking you from considering information in different ways. Take this classic puzzler as an example: “Which came first, the chicken or the egg?” Thinking about this question, most people assume that the egg is a chicken egg. If you think past that assumption and come up with a new idea—such as, the egg is a dinosaur egg—then the obvious answer is that the egg came first!

Examining perspectives and assumptions is important for two reasons. First, they often affect your perception of the validity of materials you read and research. Second, your own perspectives and assumptions can cloud your interpretation of the information you encounter.

Perspective and assumptions in information. Being able to determine the perspectives that underlie materials will help you separate biased from unbiased information. For example, the conclusions in two articles on federal versus state government control of education may differ radically if one appears in a politically conservative publication and one appears in a liberal publication. Comparing those articles will require that you understand and take into account the conservative and liberal perspectives on government’s role in education. You may even want to acknowledge, depending on the situation, the possibility of skewed information coming from a source because of a biased perspective.

Assumptions often affect the validity of materials you read and research. A historical Revolutionary War document that originated in the colonies, for

example, may assume that the rebellion against the British was entirely justified and leave out information to the contrary. Clearly understanding such a document means separating the assumptions from the facts.

Personal perspectives and assumptions. Your own preferences, values, and prejudices—which influence your perspective—can affect how accurately you view information. A student who thinks that the death penalty is wrong, for example, may have a hard time analyzing the facts and arguments in an article that supports it. Or, in a research situation, he might use only materials that agree with his perspective.

Consider the perspectives and assumptions that might follow from your values. Then, when you have to analyze information, try to set them aside. “Anticipate your reactions and prejudices and then consciously resist their influence,” says Colby Glass, professor of information research and philosophy at Palo Alto College.⁶

In addition to helping you analyze accurately, opening yourself to new perspectives will help you build knowledge. The more you know, the more information you have to work with as you move through life and encounter new problems and decisions. Come to school ready to hear, read, and discuss new ideas; think about their merits; and make informed decisions about what you believe. If you open up your mind to new information, you may be surprised to find yourself agreeing with ideas you would not have imagined accepting before.

Evaluate Information

You’ve gathered and analyzed your information. You have examined its components, its evidence, its validity, its perspective, and any underlying assumptions. Now, based on an examination of evidence and careful analysis, you *evaluate* whether an idea or a piece of information is important or unimportant, applicable or trivial, strong or weak, and why. You then set aside what is not useful and use the rest to form an opinion, a possible solution, or a decision.

For example, you’re working on a presentation on the effects of television on young children. You’ve gathered information that relates to your topic, come up with an idea, and analyzed whether the information supports this idea. Now you evaluate all of the evidence, presenting what’s useful in an organized, persuasive way. Another example: In creating a resume, you decide which information to include that will generate the most interest in potential employers and present you in the best light possible.

See Key 3.2 for some questions you can ask to build and use critical-thinking skills.

Key 3.2 Ask questions like these in order to think critically.

To gather information, ask:	<ul style="list-style-type: none">■ What requirements does my goal have?■ What kinds of information do I need to meet my goal?■ What information is available?■ Where and when is it available? Where and when can I get to it?■ Of the sources I found, which ones will best help me achieve my goal?
To analyze, ask:	<ul style="list-style-type: none">■ What are the parts of this information?■ What is similar to this information? What is different?■ What are the reasons for this? Why did this happen?■ What ideas or themes emerge from this material?■ How would you categorize this information?■ What conclusions can you make about this information?
To see if examples support an idea, ask:	<ul style="list-style-type: none">■ What examples, or evidence, support the idea?■ Does the evidence make sense?■ Does the evidence support the idea/claim?■ Is this evidence key information that I need to answer my question?■ Are there examples that might disprove the idea/claim?
To distinguish fact from opinion, ask:	<ul style="list-style-type: none">■ Do the words in this information signal fact or opinion? (See Key 3.1)■ What is the source of this information? Is the source reliable?■ How does this information compare to other facts or opinions?■ If this is an opinion, is it supported by facts?■ How can I use this fact or opinion?
To examine perspectives and assumptions, ask:	<ul style="list-style-type: none">■ Who is the author? What perspectives might this person have?■ What might be emphasized or left out as a result of the perspective?■ How could I consider this information from a different perspective?■ What assumptions might lie behind this statement or material?■ How could I prove, or disprove, an assumption?■ What contradictory assumptions might be equally valid?■ How might a personal perspective or assumption affect the way I see this material?
To evaluate, ask:	<ul style="list-style-type: none">■ Do I agree with this information?■ Does this information fit what I'm trying to prove or accomplish?■ Is this information strong or weak, and why?■ How important, or applicable, is this information?■ Which ideas or pieces of information would I choose to focus on?

Adapted from www-ed.fnal.gov/trc/tutorial/taxonomy.html (Richard Paul, *Critical Thinking: How to Prepare Students for a Rapidly Changing World*, 1993) and from www.kcmetro.edu/longview/ctac/blooms.htm, Barbara Fowler, Longview Community College, "Bloom's Taxonomy and Critical Thinking."



ASSESS AND BUILD YOUR CRITICAL THINKING SKILLS

This is a two-part exercise: Part I provides insight into your ability as a critical thinker, and Part II helps you build your skill.

Part I: Assess yourself. How do you perceive yourself as a critical thinker? For each statement, circle the number that feels right to you, from 1 for “least like me” to 5 for “most like me.”

- | | | | | | |
|---|---|---|---|---|---|
| 1. I tend to perform well on objective tests. | 1 | 2 | 3 | 4 | 5 |
| 2. People say I’m a “thinker,” “brainy,” “studious.” | 1 | 2 | 3 | 4 | 5 |
| 3. I am not comfortable with gray areas—I prefer information to be laid out in black and white. | 1 | 2 | 3 | 4 | 5 |
| 4. In a group setting, I like to tackle the details of a problem. | 1 | 2 | 3 | 4 | 5 |
| 5. I sometimes overthink things and miss my moment of opportunity. | 1 | 2 | 3 | 4 | 5 |

Total your answers here: _____

If your total ranges from 5 to 12, you consider your critical thinking skills to be *weak*.

If your total ranges from 13 to 19, you consider your critical thinking skills to be *average*.

If your total ranges from 20 to 25, you consider your critical thinking skills to be *strong*.

Part II: Use critical-thinking skills to analyze a statement. Thinking about this statement, answer the questions that follow.

“The Internet is the best place to find information about any topic.”

Is this statement fact or opinion? Why?

What examples can you think of that support, or negate, this statement?

What perspective(s) are guiding this statement?

What assumption(s) underlie the statement? What effects might result from accepting these assumptions and therefore agreeing with the statement?

As a result of your critical thinking, what is your evaluation of this statement?

As important as critical thinking is, it can't stand alone. Pursuing your goals, in school and in the workplace, requires not just analyzing information but also thinking creatively about how to use what you've concluded from your analysis.

HOW CAN YOU IMPROVE YOUR CREATIVE THINKING SKILLS?

Some researchers define creativity as combining existing elements in an innovative way to create a new purpose or result. For example, in 1970 Spencer Silver, a researcher for the paper company 3M, created a weak adhesive; four years later, another 3M scientist, Arthur Fry, used it to mark pages in a book. Post-it Notes are now an office staple. Others see creativity as the art of generating ideas from taking a fresh look at how things are related (noting what ladybugs eat inspired organic farmers to bring them in to consume crop-destroying aphids).⁷ Still others define it as the ability to make unusual connections—to view information in quirky ways that bring about unique results.⁸

To think creatively is to actively generate new ideas that often go against conventional wisdom and may bring change. Consider how, in the 1940s, mathematician Grace Murray Hopper pioneered the effort to create computer languages that non-mathematicians could understand; her efforts opened the world of computers to a wide audience.

Creativity is not limited to inventions. For example, Smith College junior Meghan E. Taugher used her creative mind in two ways. First, she and her study group, as part of their class on electrical circuits, devised a solar-powered battery for a laptop computer. Second, her positive experience of putting learning to work in real life led her to generate an idea of a new major and career plan—engineering.⁹

Where does creativity come from? Some people, through luck or natural inclination, seem to come up with inspired ideas more often than others. However, creative thinking, like critical thinking, is a skill that can be developed. Creativity expert Roger von Oech says that mental flexibility is essential. “Like race-car drivers who shift in and out of different gears depending on where they are on the course,” he says, you can enhance your creativity by learning to “shift in and out of different types of thinking depending on the needs of the situation at hand.”¹⁰

The following actions will help you make those shifts and build your ability to think creatively. Note that, because creative ideas often pop up at random, writing them down as they arise will help you remember them. Keep a pen and paper by your bed, your PDA in your pocket, a notepad in your car, or a small tape recorder in your backpack so that you can grab ideas before they fade from your mind.



In the writing room at CollegeHumor.com, these writers experience how creative thinking can come from people brainstorming together.

Brainstorm

Brainstorming—letting your mind free-associate to come up with different ideas or answers—is also referred to as *divergent thinking*: You start with a question and then let your mind diverge—go in many different directions—in search of solutions. Think of brainstorming as *deliberate* creative thinking—you go into it fully aware that you are attempting to create new ideas. When you brainstorm, generate ideas without immediately considering how useful they are; evaluate their quality later. Brainstorming works well in groups because group members can become inspired by, and make creative use of, one another’s ideas.¹¹

One way to inspire ideas when brainstorming is to think of similar situations—in other words, to make *analogies*. For example, the discovery of Velcro is a product of analogy: When imagining how two pieces of fabric could stick to each other, the inventor thought of the similar situation of a bur sticking to clothing.

When you are brainstorming ideas, don't get hooked on finding the one right answer. Questions may have many "right answers"—or many answers that have degrees of usefulness. The more possibilities you generate, the better your chance of finding the best one. Make sure to write down all ideas so that you don't forget them. Also, don't stop the process when you think you have the best answer—keep going until you are out of steam. You never know what may come up in those last gasps of creative energy.¹²

Take a New and Different Look

Just because everyone believes something doesn't make it so; just because something "has always been that way" doesn't make it good or right. If no one ever questioned established opinion, people would still think the earth was flat. Changing how you look at a situation or problem can inspire creative ideas. Here are some ways to do it:

Challenge assumptions. In the late 1960s, conventional wisdom said that school provided education and television provided entertainment. Jim Henson, a pioneer in children's television, asked, "Why can't we use TV to educate young children?" From that question, the characters of Sesame Street, and eventually a host of other educational programs, were born.

Shift your perspective. Try on new perspectives by asking others for their views, reading about new ways to approach situations, or deliberately going with the opposite of your first instinct.¹³ Then use those perspectives to inspire creativity. For your English lit course, analyze a novel from the point of view of one of the main characters. For political science, craft a position paper for a presidential or senatorial candidate. Perception puzzles are a fun way to experience how looking at something in a new way can bring a totally different idea (see Key 3.3).

Ask "what if" questions. Set up hypothetical environments in which new ideas can grow: "What if I knew I couldn't fail?" "What if I had unlimited money or time?" Ideas will emerge from your "what if" questions. For example, the founders of Seeds of Peace, faced with generations of conflict in the Middle East, asked: What if Israeli and Palestinian teens met at a summer camp in Maine so that the next generation has greater understanding and respect than the last? And what if follow-up programs and reunions are set up to cement friendships so that relationships change the politics of the Middle East? Based on the ideas that came up, they created an organization to prepare teenagers from the Middle East with the leadership skills needed to coexist peacefully.

Key 3.3 Use perception puzzles to experience a shift in perspective.



is this a duck or a bunny? a face or a musician? lines or a letter?

Source for face puzzle: "Sara Nader" illustration from *Mind Sights* by Roger Shepard. Copyright 1990 by Roger Shepard. Reprinted by permission of Henry Holt & Company, LLC.

Set the Stage for Creativity

Use these strategies to give yourself the best possible chance at generating creative ideas.

Choose, or create, environments that free your mind. Find places that energize you. Play music that moves you. Paint your study walls your favorite color. Seek out people who inspire you.¹⁴

Be curious. Try something you consider new and different: Take a course that has nothing to do with your major, try a new sport or game, listen to a new genre of music, read a magazine or book that you've never seen before, get to know someone outside of your circle of friends. Try something you don't think you would like, in order to see if you had misjudged your reaction. Seeking out new experiences and ideas will broaden your knowledge, giving you more raw materials with which to build creative ideas.¹⁵

Give yourself time to "sit" with a question. American society values speed, so much so that to say someone is "quick" is to consider that person intelligent.¹⁶ Equating speed with intelligence can stifle creativity, because many creative ideas come when you allow time for thoughts to percolate. Take breaks when figuring out a problem. Take the pressure off by getting some exercise, napping, talking with a friend, working on something else, doing something fun. Creative ideas often come when you give your brain permission to "leave the job" for a while.¹⁷

Believe in yourself as a creative thinker. While it is normal to want critical approval and success for your creative efforts, you may not get it right away, especially if your ideas break new ground. When Gustav Mahler’s Symphony No. 2—the Resurrection Symphony—was performed in 1910, critics walked out of the concert hall because of its innovative sound. Today, the Resurrection Symphony is considered one of the formative compositions of its era. Like Mahler, you must believe in your creative expression, no matter what others say. Critics, after all, can be wrong or simply a step or two behind.

Take Risks

Creative breakthroughs can come from sensible risk taking.

Fly in the face of convention. Entrepreneur Michael Dell turned tradition on its ear when he took a “tell me what you want and I will build it for you”

Key 3.4 Ask questions like these in order to jump-start creative thinking.

To brainstorm, ask:	<ul style="list-style-type: none"> ■ What do I want to accomplish? ■ What are the craziest ideas I can think of? ■ What are 10 ways that I can reach my goal? ■ What ideas or strategies have worked before and how can I apply them? ■ How else can this be done?
To shift your perspective, ask:	<ul style="list-style-type: none"> ■ How has this always been done—and what would be a different way? ■ What is another way to look at this situation? ■ How can I approach this task from a completely new angle? ■ How would someone else do this? How would they view this? ■ What if . . . ?
To set the stage for creativity, ask:	<ul style="list-style-type: none"> ■ Where, and with whom, do I feel relaxed and inspired? ■ What music helps me think out of the box? ■ When in the day or night am I most likely to experience a flow of creative ideas? ■ What do I think would be new and interesting to try, to see, to read? ■ What is the most outrageous outcome of a situation that I can imagine?
To take risks, ask:	<ul style="list-style-type: none"> ■ What is the conventional way of doing this? What would be a totally different way? ■ What would be a risky approach to this problem or question? ■ What choice would people caution me about and why? ■ What is the worst that can happen if I take this risk? What is the best? ■ What have I learned from this mistake?

approach to computer marketing instead of a “build it and they will buy it” approach. The possibility of failure did not stop him from risking money, time, energy, and reputation to achieve a truly unique and creative goal.

Let mistakes be okay. Open yourself to the learning that comes from not being afraid to mess up. When Dr. Hunter—successful inventor of the drug-coated coronary stent—and his company failed to develop a particular treatment for multiple sclerosis, he said, “You have to celebrate the failures. If you send the message that the only road to career success is experiments that work, people won’t ask risky questions, or get any dramatically new answers.”¹⁸

As with critical thinking, asking questions powers creative thinking. See Key 3.4 for examples of the kinds of questions you can ask to get your creative juices flowing.

Go For It!

BUILDING YOUR SKILLS



ASSESS AND BUILD YOUR CREATIVE THINKING SKILLS

This is a two-part exercise: Part I provides insight into your ability as a critical thinker, and Part II helps you build your skill.

Part I: Assess yourself. How do you perceive yourself as a creative thinker? For each statement, circle the number that feels right to you, from 1 for “least like me” to 5 for “most like me.”

- | | | | | | |
|--|---|---|---|---|---|
| 1. I tend to resist rules and regulations. | 1 | 2 | 3 | 4 | 5 |
| 2. People say I’m “expressive,” “full of ideas,” “innovative.” | 1 | 2 | 3 | 4 | 5 |
| 3. I break out of my routine and find new experiences. | 1 | 2 | 3 | 4 | 5 |
| 4. In a group setting, I like to toss ideas into the ring. | 1 | 2 | 3 | 4 | 5 |
| 5. If you say something is too risky, I’m all for it. | 1 | 2 | 3 | 4 | 5 |

Total your answers here: _____

If your total ranges from 5 to 12, you consider your creative thinking skills to be *weak*.

If your total ranges from 13 to 19, you consider your creative thinking skills to be *average*.

If your total ranges from 20 to 25, you consider your creative thinking skills to be *strong*.

Part II: Gather evidence of your creativity. Think about the past month; then, make a list of five creative acts you performed—small, earth-shattering, or anything in between.

1. _____
2. _____
3. _____
4. _____
5. _____

Now think of a situation for which you are currently trying to come up with an idea. It could be an essay that's due, a plan for studying for a test, a sticky situation with an instructor, etc. Briefly jot down two new ideas for how to deal with your situation.

1. _____
2. _____

Keep these in mind. You may want to use one soon!

When you have a problem to solve or decision to make, creative thinking allows you to generate possible solutions and choices, and critical thinking enables you to evaluate them. However, choices aren't enough and potential solutions must be tried out. You need an action plan in order to make the best solution or choice happen.

HOW CAN YOU USE YOUR THINKING SKILLS TO SOLVE PROBLEMS AND MAKE DECISIONS?

Since many on-paper academic problems—math problem sets, answering essay questions—can be solved with a fairly straightforward critical-thinking approach, it's easy to think that critical thinking alone is your ticket to success. However, real-world problems and decisions usually aren't so clear-cut, and the stakes are often higher. Your success in a sociology class, for example, may depend as much if not more on finding a way to get along with your instructor than it does on answering multiple-choice questions correctly.

Furthermore, academic knowledge on its own isn't enough to bring you success in the workplace. You need to be able to actively apply what you know to problems and decisions that come up periodically in your work. For example, while elementary education students may successfully quote child

development facts on an exam, it won't mean much to their career success unless they can evaluate and address real children's needs in the classroom.

Now that you have an understanding of what it means to think critically and creatively, explore how to put your skills into action to solve problems and make decisions successfully. Problem solving and decision making follow similar paths. Both require you to identify and analyze a situation, generate possible solutions, choose one, follow through on it, and evaluate its success. Key 3.5 gives an overview of the paths, indicating how you think at each step.

Key 3.5 Solve problems and make decisions using a plan of action.		
PROBLEM SOLVING	THINKING SKILL	DECISION MAKING
Define the problem—recognize that something needs to change, identify what's happening, look for true causes.	Step 1 Analyze	Define the decision—identify your goal (your need) and then construct a decision that will help you get it.
Analyze the problem—gather information, break it down into pieces, verify facts, look at perspectives and assumptions, evaluate information.	Step 2 Analyze	Examine needs and motives—considering the layers of needs carefully, and be honest about what you really want.
Generate possible solutions—use creative strategies to think of ways you could address the causes of this problem.	Step 3 Create	Name and/or generate different options—use creative questions to come up with choices that would fulfill your needs.
Evaluate solutions—look carefully at potential pros and cons of each, and choose what seems best.	Step 4 Evaluate	Evaluate options—look carefully at potential pros and cons of each, and choose what seems best.
Put the solution to work—persevere, focus on results, and believe in yourself as you go for your goal.	Step 5 Choose and Act	Act on your decision—go down the path and stay on target.
Evaluate how well the solution worked—look at the effects of what you did.	Step 6 Re-evaluate	Evaluate the success of your decision—look at whether it accomplished what you had hoped.
In the future, apply what you've learned—use this solution, or a better one, when a similar situation comes up again.	Step 7 Apply Results	In the future, apply what you've learned—make this choice, or a better one, when a similar decision comes up again.

Key 3.6 How problems and decisions may differ.

SITUATION	YOU HAVE A PROBLEM IF . . .	YOU NEED TO MAKE A DECISION IF . . .
Planning summer activities	Your low GPA means you need to attend summer school—and you've already accepted a summer job.	You've been accepted into two summer abroad internship programs.
Declaring a major	It's time to declare but you don't have all the prerequisites for the major you want.	There are three majors that appeal to you and you qualify for them all.
Relationships with instructors	You are having trouble following the lecture style of a particular instructor.	The Intro to Psychology course you want to take has seven sections taught by different instructors; you have to choose one.

How do you choose which path to follow? Understanding the differences between problem solving and decision making will help:

- Problem solving generally requires more focus on coming up with possible solutions. In contrast, when you face a decision, your choices are often determined.
- Problem solving aims to remove or counteract negative effects. In contrast, decision making aims to fulfill a need.

See Key 3.6 for some examples. Remember, too, that whereas all problem solving requires you to make a decision—when you decide on a solution—only some decision making requires you to solve a problem.

Solving a Problem

A problem exists when a situation has negative effects. Recognizing that there is a problem—being aware of those effects—is essential before you can begin to solve it. In other words, your first move is to go from the effects—“I'm unhappy/uneasy/angry”—to determining why: “My schedule is overwhelming me.” “I'm over my head in this course.” “My credit card debt is out of control.” Then you begin the problem-solving process in earnest.

What happens if you don't solve a problem effectively? Take for example a student having an issue with an instructor. He may get into an argument

with the instructor during class time. He may stop showing up to class. He may not make an effort with assignments. All of these choices have negative consequences for him.

Now look at how this student might work through this problem using his critical and creative thinking skills. Key 3.7 shows how his effort can pay off.

As you go through the problem-solving process, keep these tips in mind.

Use probing questions to define problems. Focus on causes. If you are not happy in a class, for example, you could ask questions like these:

- What do I think about when I feel unhappy?
- Do my feelings involve my instructor? My classmates?
- Is the subject matter difficult? The volume of work too much?
- Is my attitude toward just this one class in particular, or toward school in general?

Chances are that how you answer one or more of these questions may lead to a clear definition—and ultimately to the right solution.

Analyze carefully. Gather all the information you can, so that you can consider the situation comprehensively. Consider what you can learn from how the problem is similar to, or different from, other problems. Clarify facts. Note your own perspective, and ask others for theirs. Make sure you are not looking at the problem through the lens of an assumption.

Generate possible solutions based on causes, not effects. Addressing a cause provides a lasting solution, whereas “fixing” an effect cannot. Say, for example, that your shoulder hurts when you use your computer. Getting a friend to massage it is a nice but temporary solution, because the pain returns whenever you go back to work. Changing the height of your keyboard and mouse is a better idea, because it eliminates the cause of your pain. As you consider possible solutions, ask questions:

- What do I know that might apply to this situation?
- What have I seen or heard about what others have done that might help here?
- How does this situation compare to past situations I’ve been involved in? What has worked, or not worked, before?

Be comprehensive with your final evaluation and let it lead you to future action. It’s easy to skip the evaluation step when something is over and done with—but don’t be tempted. From looking at how things went, you

Key 3.7 Examine a problem-solving process in action.

DEFINE PROBLEM HERE	ANALYZE THE PROBLEM
I don't like my Freshman Composition instructor	We have different views and personality types— I don't feel respected or heard. I'm not interested in being there and my grades are suffering from my lack of motivation.

Use boxes below to list possible solutions:

POTENTIAL POSITIVE EFFECTS	SOLUTION #1	POTENTIAL NEGATIVE EFFECTS
<p><i>List for each solution:</i></p> Don't have to deal with that instructor Less stress	Drop the course	<p><i>List for each solution:</i></p> Grade gets entered on my transcript I'll have to take the course eventually; it's required for my major
Getting credit for the course Feeling like I've honored a commitment	SOLUTION #2 Put up with it until the end of the semester	Stress every time I'm there Lowered motivation Probably not such a good final grade
A chance to express myself Could get good advice An opportunity to ask direct questions of the instructor	SOLUTION #3 Schedule meetings with advisor and instructor	Have to face instructor one-on-one Might just make things worse

Now choose the solution you think is best . . .

. . . circle it and make it happen.

ACTUAL POSITIVE EFFECTS	ACTION TAKEN	ACTUAL NEGATIVE EFFECTS
<p><i>List for each solution:</i></p> Got some helpful advice from advisor Talking in person with the instructor actually promoted a fairly honest discussion I won't have to take the course again	I scheduled and attended meetings with both advisor and instructor, and opted to stick with the course.	<p><i>List for each solution:</i></p> The discussion was difficult and sometimes tense I still don't know how much learning I'll retain from this course

RE-EVALUATE: Was it a good or bad solution?

The solution has improved things. I'll finish the course, and even though the instructor and I aren't the best of friends, we have a mutual understanding now. I feel more respected and more willing to put my time into the course.

can learn valuable information that will help you repeat effective actions and avoid ineffective ones in the future. Ask questions like these:

- What worked well, or not so well, about my choice?
- What do I know I would do again? Why?
- What would I change if I had to do it all over again? Why?
- What effect did my actions have on others?

Making a Decision

Psychologists who have studied decision making have learned that many random factors influence the choices people make. For example, you may choose a major, not because you love the subject, but because you think your parents will approve of it. The goal is to make well-considered decisions despite factors that may derail your thinking.

What happens when you make important decisions too quickly? Consider a student trying to decide whether to transfer schools. If she makes her decision based on a reason that ultimately is not important enough to her, she may regret her choice later—most likely because she didn't consider cause and effect carefully when deciding.

Now look at how this student might make a well-considered decision. Key 3.8 shows how she worked through the parts of the process.

As you use the steps in Key 3.8 to make a decision, remember these hints.

Look at the given options—then try to think of more. Some decisions have a given set of options. For example, your school may allow you to major, double major, or major and minor. When you are making your decision, however, you may be able to brainstorm with an advisor to come up with more options—such as an interdisciplinary major you create on your own. As with problem solving, consider similar situations you've been in or heard about, what decisions were made, and what resulted from those decisions.

Think about how your decision affects others. For example, the student thinking about a transfer considers the impact on friends and family. What she concludes about that impact may play a role in her decision about when she transfers and even the school she chooses.

Gather perspectives. Talk with others who have made similar decisions. There are more ways of doing things than one brain can possibly imagine on its own.

Look at the long-term effects. As with problem solving, the final evaluation is a crucial part of the process. For important decisions, do a short-term

Key 3.8 Examine a decision-making process in action.

DEFINE THE DECISION	EXAMINE NEEDS AND MOTIVES
Whether or not to transfer schools	I attend a small private college. My father has changed jobs and can no longer afford my tuition. My goal is to become a physical therapist, so I need a school with a full physical therapy program. My family needs to cut costs. I need to transfer credits.

Use boxes below to list possible solutions:

POTENTIAL POSITIVE EFFECTS	CHOICE #1	POTENTIAL NEGATIVE EFFECTS
<p><i>List for each solution:</i></p> <p>No need to adjust to a new place or new people</p> <p>Ability to continue course work as planned</p>	Continue at the current college	<p><i>List for each solution:</i></p> <p>Need to finance most of my tuition and costs on my own</p> <p>Difficult to find time for a job</p> <p>Might not qualify for aid</p>
<p>Opportunity to connect with some high school friends</p> <p>Cheaper tuition and room costs</p> <p>Credits will transfer</p>	Transfer to a state college	<p>Need to earn some money or get financial aid</p> <p>Physical therapy program is small and not very strong</p>
<p>Many physical therapy courses available</p> <p>School is close so I could live at home and save room costs</p> <p>Reasonable tuition; credits will transfer</p>	Transfer to the community college	<p>No personal contacts there that I know of</p> <p>Less independence if I live at home</p> <p>No bachelor's degree available</p>

Now choose the solution you think is best . . .

. . . circle it and make it happen.

ACTUAL POSITIVE EFFECTS	ACTION TAKEN	ACTUAL NEGATIVE EFFECTS
<p><i>List for each solution:</i></p> <p>Money saved</p> <p>Opportunity to spend time on studies rather than on working to earn tuition money</p> <p>Availability of classes I need</p>	Go to community college for two years; then transfer to a four-year school to get a B.A. and complete physical therapy course work.	<p><i>List for each solution:</i></p> <p>Loss of some independence</p> <p>Less contact with friends</p>

RE-EVALUATE: Was it a good or bad solution?

I'm satisfied with the decision. It can be hard being at home at times, but my parents are adjusting to my independence and I'm trying to respect their concerns. With fewer social distractions, I'm really getting my work done. Plus the financial aspect of the decision is ideal.

evaluation and another evaluation after a period of time. Examine whether your decision has sent you down a path that has continued to bring positive effects.

Work Together

BUILDING YOUR SKILLS



SOLVE A PROBLEM

On a 3-by-5 card or a plain sheet of paper, each student in the class writes an academic problem—this could be a fear, a challenge, or a roadblock. Students hand these in without names. The instructor writes the list up on the board.

Divide into groups of two to four. Each group chooses one problem to work on (try not to have two groups working on the same problem). Use the empty problem-solving flowchart (Key 3.9) to fill in your work.

1. **Define the problem.** As a group, look at the negative effects and state your problem specifically. Then, explore and write down the causes.
2. **Examine the problem.** Pick it apart to see what's happening. Gather information from all group members, verify facts, go beyond assumptions.
3. **Generate possible solutions.** From the most likely causes of the problem, derive possible solutions. Record all the ideas that group members offer. After 10 minutes or so, each group member should choose one possible solution to evaluate independently.
4. **Evaluate each solution.** In thinking independently through the assigned solution, each group member should (a) weigh the positive and negative effects, (b) consider similar problems, and (c) describe how the solution affects the causes of the problem. Evaluate your assigned solution. Is it a good one? Will it work?
5. **Choose a solution.** Group members then come together, share observations and recommendations, and take a vote: Which solution is the best? You may have a tie or may want to combine two different solutions. Try to find the solution that works for most of the group. Then, together come up with a plan for how you would put your solution to work.
6. **Evaluate your solution.** As a group, share and discuss what you had individually imagined the positive and negative effects of this solution would be. Try to come to agreement on how you think the solution would work out.

Key 3.9 Work through a problem using this flowchart.

DEFINE PROBLEM HERE	ANALYZE THE PROBLEM

Use boxes below to list possible solutions:

POTENTIAL POSITIVE EFFECTS	SOLUTION #1	POTENTIAL NEGATIVE EFFECTS
<i>List for each solution:</i>		<i>List for each solution:</i>

Now choose the solution you think is best circle it and make it happen.

ACTUAL POSITIVE EFFECTS	ACTION TAKEN	ACTUAL NEGATIVE EFFECTS
<i>List for each solution:</i>		<i>List for each solution:</i>

RE-EVALUATE: Was it a good or bad solution?

As you engage your thinking skills on the road to success, keep these final tips in mind.

- **Stay motivated.** Work to persevere when you face a problem. Get started on achieving results instead of dwelling on exactly how to start. Translate thoughts into concrete actions.
- **Make the most of your personal strengths.** What you've learned in Chapter 2 will help you see what you do best. Apply those strengths when you encounter problems and decisions.
- **Manage time and tasks effectively.** Use what you know from Chapter 1 to plan your time in a way that promotes goal accomplishment. Avoid the pitfalls of procrastination. Accurately gauge what you can handle—don't take on too many projects, or too few.
- **Learn from your missteps.** Examine what happened when things go wrong. Learn from the experience and continue to apply what you have learned so that you don't repeat a mistake.
- **Focus on the goal.** Keep your eye on the big picture and complete what you've planned, rather than getting lost in the details or sidetracked by distractions.
- **Believe in yourself.** Have faith in your ability to achieve what you set out to do.

Let the obstacles come, as they will for everyone, in all aspects of life. You can face and overcome them with the power of your critical and creative thinking.

“No problem can stand the assault of sustained thinking.”

VOLTAIRE (FRANÇOIS-MARIE AROUET)

French writer and philosopher

3

Building Skill, Will, and Self-Management



Monitoring Your Progress

Test Competence: Measure What You've Learned

MULTIPLE CHOICE. Circle or highlight the answer that seems to fit best.

1. The questioning process is central to critical thinking because
 - A. it requires that you reword new information in question form.
 - B. it shows others your willingness to ask questions.
 - C. it helps you transform raw data into information you can use.
 - D. none of the above.
2. Statements of opinion include all of the following except:
 - A. value judgments.
 - B. abstract words that are hard to define.
 - C. concrete words or measurable statistics.
 - D. absolute qualifiers.
3. Statements of fact include all of the following except:
 - A. actual people, places, objects, or events.
 - B. description of current events in exact terms.
 - C. non-emotional words.
 - D. abstract words that are complicated to define.
4. Assumptions are
 - A. your direct observations of how people relate to one another.
 - B. value-based evaluations or generalizations.
 - C. value-free evaluations that are linked to observations of cause and effect.
 - D. attitudes that only prejudiced people hold.

5. An example of an absolute qualifier would be
 - A. all.
 - B. some.
 - C. may.
 - D. sometimes.
6. _____ means deciding whether an idea or a piece of information is important or unimportant, strong or weak, and why.
 - A. Logic
 - B. Evaluation
 - C. Bias
 - D. Clarification
7. A person who can devise clever new uses for an everyday item has developed _____ thinking skills.
 - A. creative
 - B. analytical
 - C. critical
 - D. ethical
8. Advertising agencies often employ what creative thinking strategy to come up with catchy jingles and effective ad campaigns?
 - A. analogy
 - B. hypothesis
 - C. brainstorming
 - D. assessment
9. _____ generally requires a focus on coming up with possible solutions and aims to remove or counteract negative effects.
 - A. Decision making
 - B. Problem solving
 - C. Brainstorming
 - D. Hypothesizing
10. In _____, the choices are often determined and you are trying to fulfill a need.
 - A. problem solving
 - B. brainstorming
 - C. hypothesizing
 - D. decision making

TRUE/FALSE. Place a *T* or an *F* beside each statement to indicate whether you think it is true or false.

- _____ 1. Defining your purpose is the first step when preparing to analyze information or a situation.
- _____ 2. *Perspective* is a characteristic way of thinking about people, situations, events, and ideas.
- _____ 3. Every question has one right answer.
- _____ 4. Accepting and exploring mistakes is part of successful creative thinking.
- _____ 5. The problem-solving process is complete when you choose a solution and put it to work.

Target and Achieve a Goal

Commit to one specific thinking strategy from this chapter to improve your study skills.

Name the strategy here: _____

Describe your goal—what you want to gain by using this strategy. _____

Describe how you plan to use this strategy through the semester to achieve this goal. _____

Building Your Skills



Brain Power: Build Vocabulary Fitness

Here is a selection from the current media. Read the material, paying special attention to the context of the vocabulary words shown in bold type. Then choose the correct definition for each word in the table on the next page. Use a dictionary to check your answers. Finally, on a separate sheet, use each vocabulary word in a sentence of your own to solidify your understanding.

Attorney Louise Phipps Senft, an expert mediator, offers an approach to mediation that focuses on each party understanding the other's point of view.

It may be true that to err is human and to forgive divine. But to sit down and resolve a conflict between two parties doesn't always require an act of divine intervention—sometimes it just takes a **neutral** third party. Or so the work of Louise Phipps Senft (Psychology '83) seems to prove.

Voted Baltimore's Best Mediator by *Baltimore Magazine*, Senft, an attorney, founded the Baltimore Mediation Center in 1993. Since then, she has provided both **mediation** services and training to thousands of individuals in family, employment, business, board, church, university, and government settings.

Her approach to mediation and conflict resolution is far from traditional. Senft believes the key to resolving conflicts, whether between individuals or corporate **entities**, is for those involved to have the opportunity to understand the other party's point of view. This others-consciousness, which she calls a "relational worldview," is at the heart of the **transformative** framework approach to mediation that she and other scholars have developed.

Where traditional mediation aims **chiefly** to solve problems and settle disputes, the transformative framework approach focuses on the quality of the **dialogue**. The process involves building the strength of the participants and giving them the chance to see the situation as a whole rather than from one perspective. The conflict usually resolves as a natural by-product. Merely "fixing" the problem is never the mediator's goal.

Source: Heather Ferngren Morton, "We Can Work It Out," *Arts & Sciences*, vol. 23, no. 1, January 2005, The College and Graduate School of Arts & Sciences at the University of Virginia.

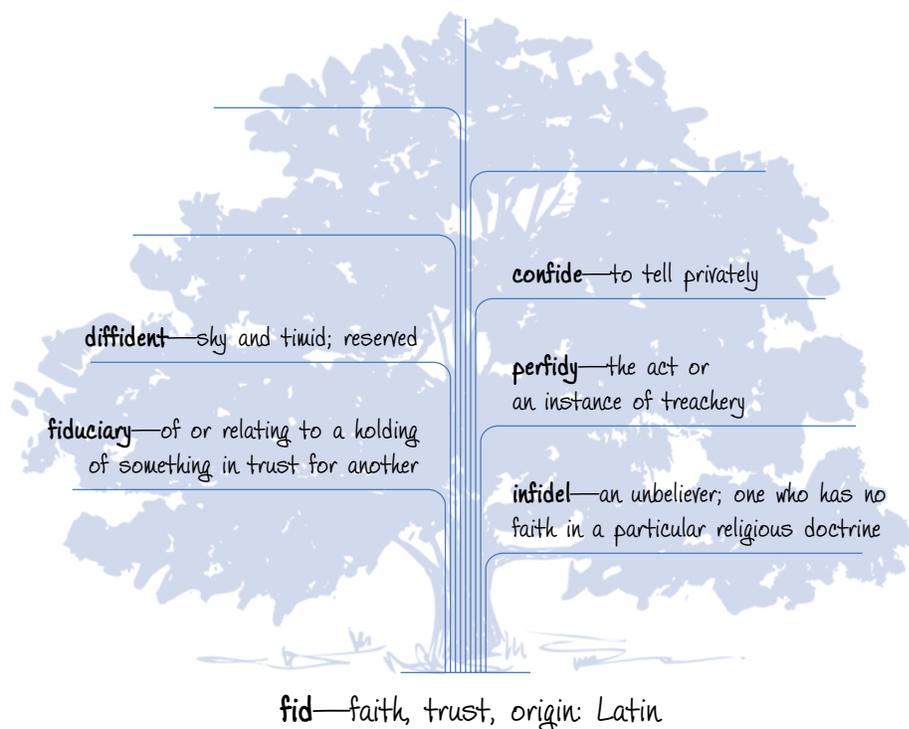
Circle the word or phrase that best defines each term as it is used in the excerpt.

VOCABULARY WORDS

	A	B	C
1. neutral (adj.)	unallied	genderless	negative
2. mediation (noun)	talk	intervention	trance
3. entities (noun)	companies	units	ideas
4. transformative (adj.)	electric	involving cooperation	involving change
5. chiefly (adv.)	carefully	first	especially
6. dialogue (noun)	conversation	scene	argument

Get to the Root

Every time you learn a Greek or Latin root, you increase your ability to recognize English vocabulary words that include that root and to figure out their meaning. Grow your vocabulary by studying this root and its related words, writing in two more words from the same root, and including definitions for both new words.



Investigate Using Research Navigator

Access Research Navigator using the Internet address shown on page 32. Then sign on to the service using your Login Name and Password. Look at the *Link Library* area. Scrolling down the list of topics, choose one career area or field that interests you and hit “go.” You will come to a collection of links grouped according to the initial letter of each link topic. Use what’s available through the letter links to find informational articles on at least two people who are or have been prominent in this area/field. After reading these articles, answer the following:

- What makes each of these individuals a critical thinker? Give one or more examples.
- What makes each of these individuals a creative thinker? What idea or product did each create?
- What inspires you personally about the thinking abilities and achievements of one or more of these people? Do you have any further interest in this area/field as a result of reading their stories?

Building Will and Self-Awareness



Make Responsible Choices

Answer the following question on a separate piece of paper or in a journal.

Think about a decision you made at school or at work that, looking back, you wish you had handled differently.

- Describe what the decision was and what option you chose. What did not feel right about this decision? What happened as a result?
- Describe what you would do if you could make the decision again. How could stronger critical and/or creative thinking have helped you reach a more successful outcome?
- What did you learn from your experience that you can apply to other decisions?

Chapter Summary

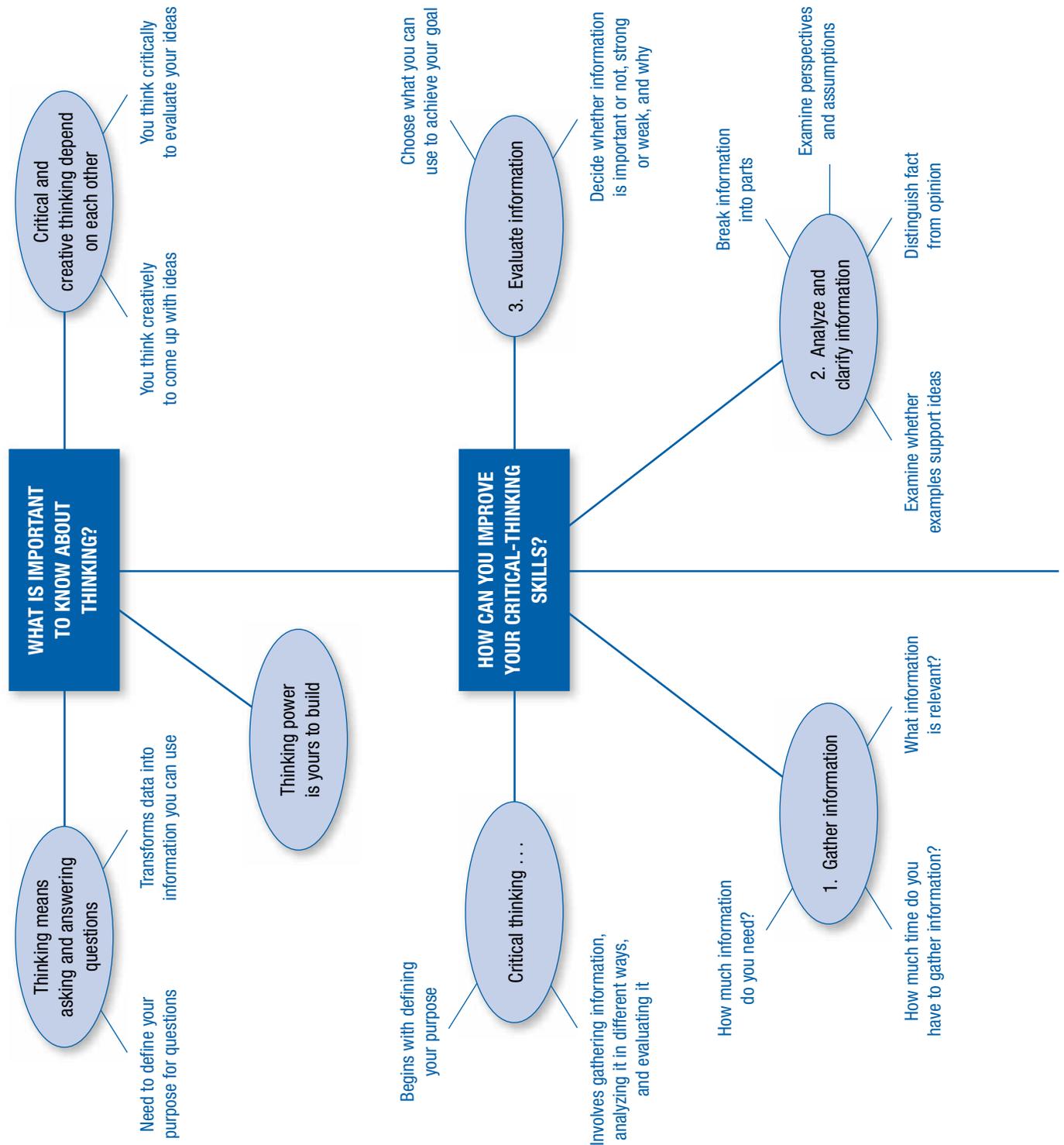
As you use the summary on pages 110–111 to review the concepts you learned in this chapter, focus also on its format—in this case a **think link**, in other chapters a formal outline, and in still others the Cornell system. As you

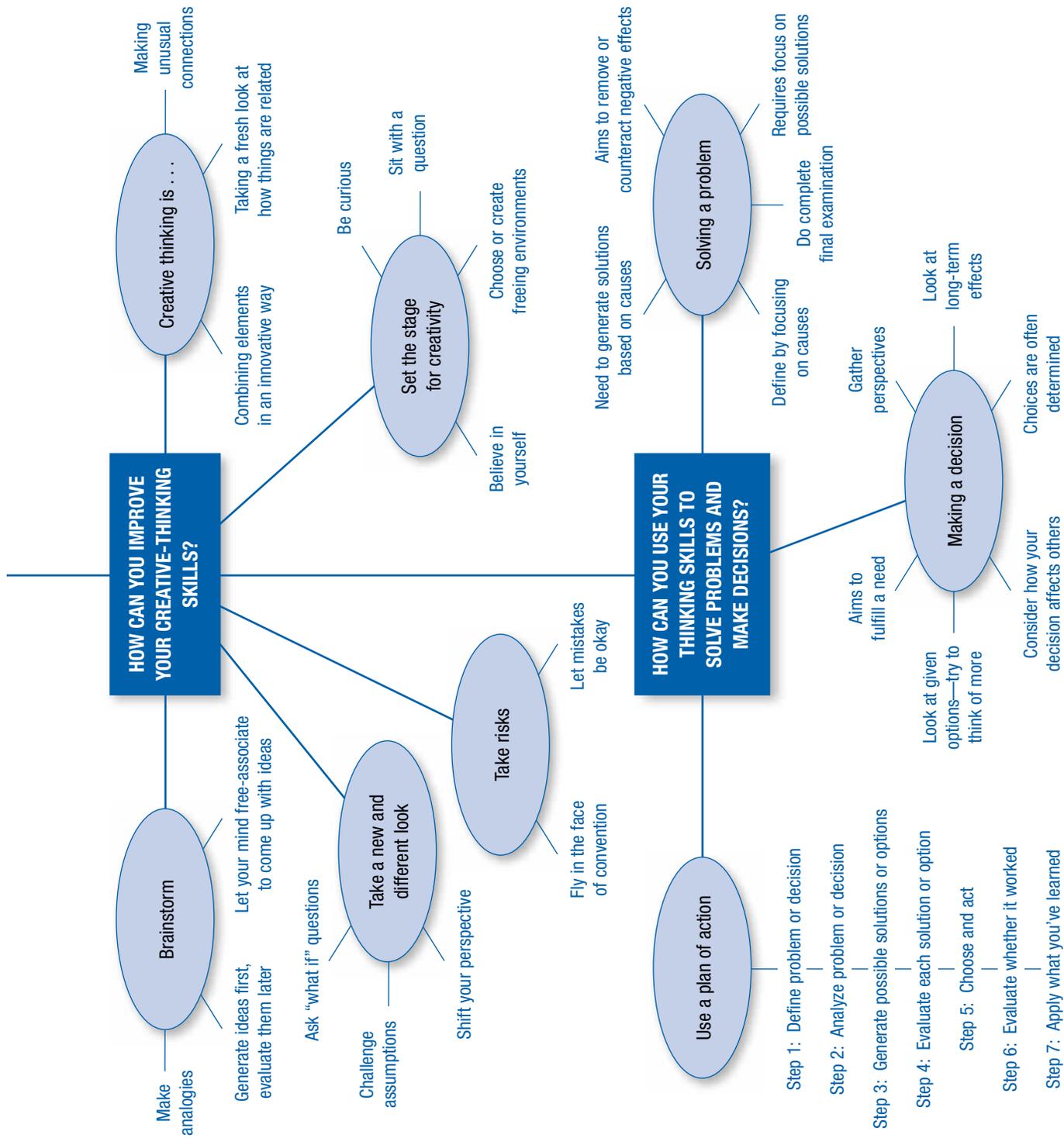
become comfortable with the organization and style of these various formats, try using each of them to take class and reading notes, noting which approach works best for you in particular situations.

Endnotes

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14. Sternberg, p. 219.

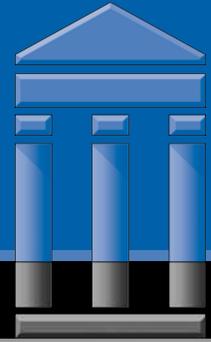
15. Adapted from T. Z. Tardif and R. J. Sternberg, “What Do We Know About Creativity?” in *The Nature of Creativity*, ed. R. J. Sternberg, 1988. London: Cambridge University Press.
16. Sternberg, p. 212.
17. Hayes.
18. “The Best Innovations Are Those That Come from Smart Questions,” *The Wall Street Journal*, April 12, 2004, B1.





Active Thinking

MONITORING YOUR PROGRESS



Find Connections Among Ideas

The following multiple-choice, true/false, fill-in-the-blank, matching, and essay questions reinforce the concepts you learned in the three chapters that make up Part I, *Knowledge, Skills, and Preparation: Where the Future Begins*. These questions differ from the end-of-chapter objective quizzes in an important way. Instead of focusing on concepts in individual chapters, they encourage you to compare and integrate material from *different* chapters as you find ways to connect ideas. Recognizing relationships among ideas is essential to active learning because it builds critical thinking skills, adds meaning to information, and makes it more likely that you will retain what you learn.

MULTIPLE CHOICE. Circle or highlight the answer that seems to fit best.

1. Being aware of your learning style is important for all of the following reasons except:
 - A. it will prepare you to be part of a rapidly changing working world that demands lifelong learning.
 - B. it will help you choose a major.
 - C. it will give you a reliable, unchanging identity as a learner.
 - D. it will help you try out and select the study strategies that work best for you.
2. One important part of using critical thinking skills to choose your best study strategies is:
 - A. evaluating whether a given strategy produces positive or negative results for you.
 - B. making a list of strategies that are available to you.
 - C. brainstorming ideas about new study strategies.
 - D. seeing what strategies match your dominant learning styles.

3. As a time manager, a thinker-dominant, logical-mathematical learner might be:
 - A. consistently late to class.
 - B. always prompt, or perhaps even early, to appointments.
 - C. loose with scheduling; sometimes late, sometimes early.
 - D. usually on time but not conscientious about calling when late.
4. If you were to use the creative strategy “choose or create new environments” in order to reduce academic stress, you might:
 - A. brainstorm ideas about ways to get exercise during study break time.
 - B. decorate your primary study area with colors and pictures that inspire you.
 - C. try study strategies you’ve never used before.
 - D. challenge your assumptions about what causes you stress.
5. Knowing how to manage goals, time, and stress forms the basis for academic success because
 - A. studying is a process that forces you to examine your personal style.
 - B. effective studying demands that you stay in control of your time.
 - C. studying is often done in groups, and this knowledge will help you adapt to the styles of other group members.
 - D. you are responsible for your work and your progress in the college environment.

TRUE/FALSE Place a T or an F beside each statement to indicate whether you think it is true or false.

- _____ 1. The questioning process that is at the heart of critical thinking is incompatible with effective time management.
- _____ 2. Academic integrity is essential for retaining what you learn and being able to use that knowledge in your work and personal life.
- _____ 3. Study skills are the most important factor in being a strategic learner.
- _____ 4. Once you understand the steps of the problem-solving process, you may be less likely to procrastinate.
- _____ 5. Self-awareness implies a self-centered approach that will most likely interfere with teamwork.

FILL-IN-THE-BLANK. Complete the following sentences with the appropriate word(s) or phrase(s) that best reflect what you learned in Part I. Choose from the items that follow each sentence.

1. Being responsible for your work is part of the _____ aspect of strategic learning. (skill building, will and self-awareness, self-management)
2. You will be more motivated to achieve a long-term goal if you base it on your _____. (short-term goals, values, talents)
3. Self-esteem, a crucial part of the will to learn, has two components: _____ and taking action. (working through roadblocks, thinking positively, teamwork)
4. Howard Gardner's theory of multiple intelligences recognizes _____ distinctive forms of intelligence. (8, 6, 2)
5. The more _____ the members of a team are, the more likely new ideas and options are to surface. (diverse, similar, focused)
6. It is important to set short-term goals that lead you step by step toward your _____ (personal mission, learning style, long-term goals).
7. Keeping your personal schedule written down will help you effectively manage your _____. (career options, time, money)
8. Through the process of _____, critical thinking enables you to transform raw data into information you can use (problem solving, memorization, questioning)
9. Various _____ may make up the structure of one person's _____. (evaluations/opinions, assumptions/perspective, perspectives/inventions)
10. _____ is often referred to as "divergent thinking."
(Brainstorming, Taking risks, Questioning)

MATCHING. Match each item in the left-hand column to an item in the right-hand column by writing the letter from the right that corresponds best to the number on the left.

- | | |
|--------------------------------------|---|
| _____ 1. opinion | A. people who have the ability to learn through bodily sensations |
| _____ 2. dyslexia | B. postponing a task until later |
| _____ 3. lecture | C. a comparison between two similar things or situations |
| _____ 4. bodily-kinesthetic learners | D. a belief or judgment |
| _____ 5. naturalistic intelligence | E. ability to understand environmental features |
| _____ 6. priorities | F. the dominant method of classroom instruction |
| _____ 7. procrastination | G. reasons and consequences |
| _____ 8. analogy | H. the way in which your mind and body react to pressure |
| _____ 9. cause and effect | I. personal decisions and actions that define what is important to you and how you will spend your time |
| _____ 10. stress | J. a reading-related learning disability |

ESSAY QUESTION. Carefully read the following excerpt from *Psychology, 3rd ed.*, by Saul Kassin, a college textbook published by Prentice Hall, and then answer the essay question that follows. This exercise will help you focus on the meaning of the selection, apply your personal knowledge and experiences to the reading, organize your ideas, and communicate your thoughts effectively in writing.

Before you begin writing your essay, it is a good idea to spend a few minutes planning. Try brainstorming possible approaches, writing a thesis statement, and jotting down your main thoughts in the form of an outline or think link. Because most essay tests are timed, limit the time you take to write your response to no more than one-half hour. This will force you to write quickly and effectively as it prepares you for actual test conditions.

WHAT PEOPLE DREAM ABOUT

In *Our Dreaming Mind*, Robert Van de Castle (1994) notes that dreams have always fascinated people. More than eight thousand years ago, the Assyrians believed that dreams were messages sent from evil spirits. Later, Egyptians believed they were messages sent by the gods. The Inuits of Hudson Bay and the Pantani of Malaysia believe that one's soul leaves the body during sleep and enters another world. Among the Kurds and Zulus, dreaming of an adulterous affair is considered an offense, and if you dream of receiving a gift, you must compensate the gift giver in waking life. In Western cultures, people assume that dreams, if properly analyzed, tell us something about the dreamer's past, present, or future. To some extent, then, dreams reflect a culture's beliefs, values, and concerns (Shulman & Stroumsa, 1999).

Over the years, psychologists and anthropologists have looked for common themes in what people from different cultures tend to dream about. Summarizing this research, G. William Domhoff (1996) notes that certain aspects of the dreams found in Western cultures are found elsewhere as well. For example, it appears that people everywhere dream more about acts of aggression than about friendship and kindness, and in these dreams, we are more likely to dream of being victims of aggression than the perpetrators. Certain gender differences in dream content also seem to be universal. For example, men dream more about aggression, while women dream more about acquaintances, friends, and family members.

Although there are cultural similarities in dream reports, Domhoff (1996) notes that there are also some striking differences that uniquely reflect each culture's beliefs, values, and social structures. In India, devout Hindus who live gender-segregated lives report having precious few sex characters in their dreams. In Japan, a "collective" society that places family and group interests ahead of those of the individual, people's dreams contain more human characters than are found in American dreams—and these characters are more likely to be familiar. Among the Yir Yomont hunters of Australia, men dream often of killing animals—and of sharing meat with familiar female characters and others. Clearly, what we dream about is shaped by our waking lives, which, in turn, is shaped by the invisible hand of culture.

Source: Excerpted from Saul Kassin, *Psychology*, 3rd ed., Upper Saddle River, NJ: Prentice Hall, 2001, p. 149. Reprinted with permission.

YOUR QUESTION. Describe a recent dream you remember or a dream you have had many times in the past. Discuss how your dream is consistent with or different from the ethnic or religious culture in your family and how it is consistent with or divergent from the general American culture. Based on your response, explain why you agree or disagree with the author's statement that "dreams reflect a culture's beliefs, values, and concerns."

Be Accountable for Your Goals from Part I



Look back at the goals you set in the *Target and Achieve a Goal* exercises at the ends of Chapters 1, 2, and 3. In the space provided below, write a short journal entry in which you assess your progress (use or continue on a separate piece of paper if you need more room). In your discussion, consider questions such as the following:

- Have you used the strategies you intended to use?
- What effect have these strategies had on your work?
- Have you achieved the goals you set? Why or why not?
- What is your plan going forward for these strategies and goals?