Think about the past week, then make a list of 10 creative acts you performed—small, earth-shattering, or anything in between.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

What is critical thinking?

You may have heard the term “critical thinking” before. Although you might assume that the word *critical* implies something difficult and negative, as it is used here it actually means “indispensable” and “important.” Critical thinking means finding that which is important. Questioning is at the heart of critical thinking because it allows you to go beyond the basic recall of information. When you think critically, you become an active examiner by asking questions.

You ask and answer critical-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 critical-thinking questions as you thought through the consequences of the choice. “What if I go full-time—what will that do to my schedule at work and at home?” “What if I don’t go to school—how will that affect my ability to earn a good living in the short and long term?” Other examples of student critical-thinking moments 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 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
Coming up with examples that back up the central idea of a paper you are writing

Why put in the effort to think critically? Critical thinking brings you countless advantages, including:

- **Study success through increased brain power.** Critical thinkers understand how their minds work—and they use their minds actively. The more you think consciously, using specific strategies and patterns, the more effectively you can think. The more effective a thinker you are, the more you boost your chances for success in any college course, no matter what the subject.

- **Being able to apply knowledge.** Critical thinking moves you beyond repeating back what you learn. For instance, it won’t mean much for elementary education students to quote child development facts on an exam unless they can evaluate real children’s needs in the classroom. Through critical thinking you put your learning to use and benefit from your hard work at school.

- **Being an innovator.** As a questioner, you do not necessarily accept the status quo or conventional wisdom. Rather, you look for new approaches and answers, which is at the heart of innovation. Innovators are valued as collaborators, at school and on the job.

### The Path of Critical Thinking

Critical thinking consists of a path of actions performed in order. When you think critically, you:

1. Take in information
2. Examine the information through questioning
3. Draw conclusions based on the questions you ask
4. Use what you learn, through thinking processes such as problem solving, decision making, and strategic planning

Look at Figure 4.2 to see a visual representation of the critical-thinking path.

### Take In Information

The information you receive and recall is your raw material. When you take in information accurately and without judgment, you have the best material with which to work as you think. Once you have clear, complete information, examine it through questioning.

### Ask Questions

Questioning is the key to learning and to linking what you learn to other information. As you will see later in the chapter, critical thinkers ask many kinds
of questions about any given piece of information or situation, including: How can I connect this to what I already know? What does this make me think of? Is it good or bad, true or false, and why? What effects does it have? What about this isn’t clear? What is its source? How can I get more information?

Critical thinkers also ask whether information can help them with a specific action—solving a problem, for example, or making a decision.

**Draw Conclusions**

You draw conclusions from considering the information, the questions you have asked, and the answers you have found. Move yourself toward conclusions by looking at the information and asking yourself: So what? What comes to mind? What does this mean?

**Use Information**

After taking in information, examining it by questioning, and drawing conclusions from the questions, critical thinkers put the information to work. Now comes the actual work of solving the problem, making the strategic plan, and so on. This last stage of the critical-thinking path is where new knowledge—ideas and creations—is born out of the mix of what you already know, what you have newly acquired, and the power of your mind.

**Learning How Your Mind Works**

Start to put critical thinking into real-world perspective by imagining a specific scenario. You have to fulfill a math requirement and are trying to decide between two courses—Algebra I and Developmental Math for Health Sciences. As you work toward a decision, you might ask questions like the following:

- Do these courses have any prerequisites—and if so, what are they?
What are the similarities in the workloads?
How does the subject matter for these two courses differ?
How would the Algebra I course fit into my existing schedule?
Would either of the courses fit a major that interests me? If so, how?
How do I investigate the rumor that the Algebra I instructor is too tough?
Which course is the best fit for me considering all that I have discovered?

When you ask important questions like these, your mind performs basic actions. Sometimes it uses one action by itself, but most often it uses two or more in combination. To identify and understand these actions is to have a fundamental understanding of thinking. These actions are the building blocks with which you construct the critical-thinking processes described later in the chapter.

Identify your mind’s actions using a system originally derived by educators Frank Lyman, Arlene Mindus, and Charlene Lopez and developed by numerous other instructors. Based on their studies of how people think, they named seven basic types of thought. These types, referred to here as actions, are not new to you, although some of their names may be. They represent the ways in which you think all the time.

Through exploring these actions, you go beyond just thinking in order to learn how you think. In a way, you are studying an instruction manual for your mind. Following are explanations of each of the mind actions, including examples (some from the questions you just read). The Take Action exercise—writing your own examples in the blank spaces—is interspersed through the explanations.

Icons representing each action help you visualize and remember them. As you work through other chapters in this book, you will see these icons marking where particular mind actions are taking place. These will help you to identify how your mind is working.

The Mind Actions

Recall. Facts, sequence, and description. This is the simplest mind action, representing the simplest level of thinking. When you recall, you name or describe previously learned ideas, facts, objects, or events, or put them into sequence.

The icon: Capital R stands for recall or remembering.

Examples:
- Identifying the prerequisites for Developmental Math for Health Sciences and Algebra I (you discover there are placement test requirements for both).
- Naming the steps of a geometry proof, in order.

Take Action. Recall two school-related events scheduled this month.
Similarity. Analogy, likeness, comparison. This action examines what is similar about one or more elements—situations, ideas, people, stories, events, or objects.

The icon: The Venn diagram illustrates the idea of similarity. The two circles represent the elements being compared, and the shaded area of intersection indicates that they have some degree of similarity.

Examples:
- Comparing the workloads of Algebra I and Developmental Math for Health Sciences (both require quizzes and a final exam, both have a weekly study group component).
- Comparing class notes with another student to see what facts and ideas you both consider important.

Take Action. State how your two favorite classes are similar.

Difference. Distinction, contrast. This action examines what is different about one or more elements.

The icon: Here the Venn diagram is used again to show difference. The nonintersecting parts of the circles are shaded, indicating that the focus is on what is not in common.

Examples:
- Examining differences in the subject matter between Algebra I and Developmental Math for Health Sciences (DM for HS focuses more on statistics and basic math functions, while Algebra I covers algebra basics such as linear equations).
- Looking at differences between two of your instructors—one divides the class into discussion groups; the other keeps desks in place and always lectures.

Take Action. Explain how one of your favorite courses differs from a course you don’t like as much.

Cause and Effect. Reasons, consequences, prediction. Using this action, you look at what has caused a fact, situation, or event and what effects come from it. In other words, you look at why something happened and the consequence of its occurrence.

The icon: The arrows, pointing toward one another in a circular pattern, show how a cause leads to an effect.

Examples:
- Thinking through how taking the Algebra I course would affect your existing schedule (it means moving or changing another class you’ve
already registered for because it comes right after that class and is located across campus).

- Seeing how staying up too late causes you to oversleep, which causes you to be late to class, which results in missing material, which causes you to feel confused about course topics.

**Take Action.** Write what causes you to become motivated in a class.

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**Example to Idea.** *Generalization, classification.* From one or more known examples (facts or events), you develop a general idea or ideas. Grouping facts or events into patterns may allow you to make a general statement about several of them at once. This mind action moves from the known to the previously unknown and from the specific to the general.

*The icon:* The arrow and “Ex” pointing to a lightbulb on their right indicate how an example or examples lead to the idea (the lightbulb lit up).

**Examples:**

- Exploring whether Algebra I or Developmental Math for Health Sciences fits a major. (You start with the examples: You like to work with people; health workers are currently in demand; math isn’t your strongest academic area; you are interested in medicine. These examples lead you to the idea—Developmental Math for Health Sciences would probably be a better fit.)

- From several successful experiences in classes where the instructor uses visuals to illustrate ideas, you conclude that your learning style has a strong visual component.

**Take Action.** Name activities you enjoy. Using them, derive an idea of a class you want to take.

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**Idea to Example.** *Analysis, substantiation, proof.* In a reverse of the previous action, you take a known idea or ideas and think of examples (events or facts) that support or prove that idea. This mind action moves from the general to the specific, the reverse of example to idea.

*The icon:* In a reverse of the previous icon, this one starts with the lightbulb and has an arrow pointing to “Ex.” This indicates that you start with the idea and then move to the supporting examples.

**Examples:**

- Investigating the rumor that the Algebra I instructor is too tough on students. (Starting with the idea that the instructor is too tough on students, you talk to three different students who have taken the class.
Examples they give you lead you to believe that the instructor is indeed demanding.

- You present an argument to your advisor regarding a change of major. (You start with the idea—you are a good candidate for a change of major—and support it with examples—you have worked in the field you want to change to, you have already fulfilled some of the requirements for the new major.)

**Take Action.** Name an idea of a career path you would like to follow, and support this idea with examples of your interests and skills.

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**Evaluation.** *Value, judgment, rating.* Here you judge whether something is useful or not useful, important or unimportant, good or bad, or right or wrong by identifying and weighing its positive and negative effects (pros and cons). Be sure to consider the specific situation at hand (a cold drink might be good on the beach in August but not so good in the snowdrifts in January). With the facts you have gathered, you determine the value of something in terms of the predicted effects on you and others. Cause-and-effect analysis almost always accompanies evaluation.

The icon: A set of scales out of balance indicates how you weigh positive and negative effects to arrive at an evaluation.

**Examples:**

- Looking at all that you have discovered—scheduling, relation to interests, difficulty, prerequisites, subject matter—about the potential effects of taking one of the two courses you are considering, you evaluate that Developmental Math for Health Sciences makes the most sense.

- Someone offers you a chance to cheat on a test. You evaluate the potential effects if you are caught. You also evaluate the long-term effects of not actually learning the material and of doing something ethically wrong. You decide that it isn’t right or worthwhile to cheat.

**Take Action.** Evaluate your mode of transportation to school.

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You may want to use a mnemonic device—a memory tool, as explained in Chapter 6—to remember the seven mind actions. You can make a sentence of words that each start with a mind action’s first letter, such as “Really Smart Dogs Cook Eggs In Enchiladas.”

**Putting Mind Actions to Work**

When you first learned to write, someone taught you how to create the shape of each letter or character. You slowly practiced each curve and line. Later
you carefully put letters or characters together to form words. Now, much later, you write without thinking consciously about making proper letters. You focus primarily on how to express your ideas; your words appear on paper as you work toward that goal.

The process of learning and using mind actions is similar. If you take time now to think through the specific actions your mind uses when you think, they will eventually become second nature to you, a solid foundation for your thinking on which you can build productive skills. Because you have been using these actions for a long time, developing a working understanding of your mind will take you far less time than it took to learn to write.

You will rarely use the mind actions one at a time as they have been presented here. Usually you combine them and repeat them. Sometimes they overlap. When you combine them in working toward a goal (a problem to solve, a decision to make), you are performing a thinking process.

Begin to put the mind actions to use and to combat barriers to critical thinking as you gather the skills essential to every thinker.

What skills will help you become a better thinker?

When you are solving problems, making decisions, or simply evaluating information, successful results depend on your ability to think broadly and clearly. Three critical-thinking skills will pave your way: distinguishing fact from opinion, examining perspectives, and evaluating assumptions.

Distinguishing 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 and is inherently difficult, and sometimes impossible, to verify (“This is the worst rainstorm of the last 10 years”). Being able to distinguish fact from opinion enables you to evaluate the credibility of what you read, hear, and experience. The information in Table 4.1 will help you determine what is fact and what is opinion.

Keep in mind that just because a statement is factual does not mean that it is true. For example, “There are 25 hours in a day” is a false factual statement. Establishing truth requires investigation through questioning. Once you label a statement as a fact or opinion, ask questions like the following to explore its degree of truth:

- What facts or examples provide evidence of truth?