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**CRITICAL THINKING
SKILLS SUCCESS**
IN 20 MINUTES A DAY

CRITICAL THINKING SKILLS SUCCESS

IN 20 MINUTES
A DAY

Lauren Starkey



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How to Use this Book

C*RITICAL THINKING SKILLS SUCCESS* is about changing the way you think about the way you think. Sound complicated? It's not, especially when you learn how, lesson by 20-minute lesson. A critical thinker approaches problems and complicated situations aware of his or her thoughts, beliefs, and viewpoints. Then, he or she can direct those thoughts, beliefs, and viewpoints to be more rational and accurate. A critical thinker is willing to explore, question, and search out answers and solutions. These skills not only mean greater success at school and at work, but they are the basis of better decisions and problem solving at home, too.

Critical thinking has been specifically identified by colleges and universities, as well as by many employers, as a measure of how well an individual will perform at school and on the job. In fact, if you are applying to college or graduate school, or for a job, chances are your critical thinking skills will be tested. Standardized exams, such as the SAT and ACT, have sections on critical thinking. Employers such as federal and state governments, and many Fortune 500 companies, routinely test job applicants with exams such as the California Critical Thinking Test or the Cornell Critical Thinking Test.

Generally, critical thinking involves both problem solving and reasoning. In fact, these terms are often used interchangeably. But specifically, what are critical thinking skills? They include the ability to:

- make observations
- be curious, asking relevant questions and finding the resources you need
- challenge and examine beliefs, assumptions, and opinions against facts
- recognize and define problems
- assess the validity of statements and arguments
- make wise decisions and find valid solutions
- understand logic and logical argument

You may already be competent in some of these areas. Or, you may feel you need to learn or improve on all of them. This book is designed to help you either way. The pretest will pinpoint those critical thinking skills you need help with, and even direct you to the lessons in the book that teach those skills. The lessons themselves not only present the material you need to learn, but give you opportunities to immediately practice using that material.

In Lessons 1 and 2, you will learn how to recognize and define the problems you face. You will practice prioritizing problems, and distinguishing between actual problems and their symptoms or consequences.

Lesson 3 shows you how to be a better observer. When you are aware of the situations and contexts around you, you will make good inferences, a key to critical thinking skills success.

In Lessons 4 and 5, you will learn how to use graphic organizers such as charts, outlines, and diagrams to organize your thinking and to set goals. These visual tools help to clearly define brainstorming options and lead you from problems to solutions.

Lesson 6 is about troubleshooting. This skill helps you to anticipate and recognize problems that interfere

with your goals. Effective troubleshooting removes setbacks and keeps you on task.

Lessons 7 and 8 explain how to find the information you need to make sound decisions, and how to evaluate that information so you don't end up relying on facts and figures that aren't accurate. You will specifically learn how to judge the content of websites, which are increasingly used for research, but can be biased, misleading, and simply incorrect.

In Lesson 9, you will get a lesson in the art of persuasion. Not only will you be able to recognize when it is being used against you, but you will find out how to implement persuasion techniques effectively yourself.

Lesson 10 is about numbers, and how they are manipulated. Surveys, studies, and statistics can look important and truthful when in fact they are meaningless. You will learn what makes a valid survey or study and how to watch out for their invalid counterparts.

In Lesson 11, the topic of emotion, and its effect on critical thinking, is explored. You can't think reasonably and rationally if you allow yourself to be affected by bias, stereotyping, stress, or your ego. Learning how to keep these emotional responses in check is one of the best ways to improve critical thinking.

Lessons 12 and 13 explain deductive reasoning, one of the two forms of logical argument covered in this book. You will learn about deduction and how to tell the difference between valid and invalid deductive arguments. Logical fallacies such as slippery slope and false dilemma are explored.

Lessons 14 and 15 are about inductive reasoning. You will learn how to construct a valid inductive argument, and how induction is misused to create logical fallacies such as confusing cause and effect, and making hasty generalizations.

Lesson 16 shows you other ways in which logical arguments are misused intentionally to distract.

Fallacies such as the straw man, red herring, and *ad hominem* are explained, and you are given many practice exercises to help reinforce the lesson.

In Lesson 17, you will learn about judgment calls. These are difficult decisions in which the stakes are high, and there is no clear-cut right or wrong answer. Understanding how these decisions should be approached and how to evaluate risks and examine consequences will improve your ability to make judgment calls.

Lesson 18 teaches you about good explanations, what they are, and when they are needed. Since it is important to be able to distinguish between explanations and arguments, you will learn some key differences between the two and use exercises to practice telling them apart.

The beginning of this introduction discusses the use of critical thinking questions on exams—both for

higher education admissions and on the job. In Lesson 19, you will learn about these tests, see exactly what such questions look like, and get to practice answering some of them.

Lesson 20 summarizes the critical thinking skills that are taught in this book. It is a valuable tool for reinforcing the lessons you just learned and as a refresher months after you complete the book. It is followed by a post-test, which will help you determine how well your critical thinking skills have improved.

For the next twenty days, you will be spending twenty minutes a day learning and improving upon critical thinking skills. Success with these skills will translate into better performance at school, at work, and/or at home. Let's get started with the pretest. Good luck!

**CRITICAL THINKING
SKILLS SUCCESS**
IN 20 MINUTES A DAY



Pretest

THIS TEST IS designed to gauge how much you already know about critical thinking skills. Perhaps you have covered some of this material before, whether in a classroom or through your own study. If so, you will probably feel at ease answering some of the following questions. However, there may be other questions that you find difficult. This test will help to pinpoint any critical thinking weaknesses, and point you to the lesson(s) that cover the skills you need to work on.

There are 30 multiple-choice questions in the pretest. Take as much time as you need to answer each one. If this is your book, you may simply circle the correct answer. If the book does not belong to you, use a separate sheet of paper to record your answers, numbering 1 through 30. In many cases, there will be no simple right or wrong choice, because critical thinking skills involve making the most reasonable selection, or the one that best answers the question.

When you finish the test, use the answer key to check your results. Make a note of the lessons indicated by each wrong answer, and be sure to pay particular attention to those lessons as you work your way through this book. You may wish to spend more time on them, and less time on the lessons you have a better grasp of.

ANSWER SHEET

Pretest

- 1. (a) (b) (c) (d)
- 2. (a) (b) (c) (d)
- 3. (a) (b) (c) (d)
- 4. (a) (b) (c) (d)
- 5. (a) (b) (c) (d)
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- 8. (a) (b) (c) (d)
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- 11. (a) (b) (c) (d)
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- 14. (a) (b) (c) (d)
- 15. (a) (b) (c) (d)
- 16. (a) (b) (c) (d)
- 17. (a) (b) (c) (d)
- 18. (a) (b) (c) (d)
- 19. (a) (b) (c) (d)
- 20. (a) (b) (c) (d)

- 21. (a) (b) (c) (d)
- 22. (a) (b) (c) (d)
- 23. (a) (b) (c) (d)
- 24. (a) (b) (c) (d)
- 25. (a) (b) (c) (d)
- 26. (a) (b) (c) (d)
- 27. (a) (b) (c) (d)
- 28. (a) (b) (c) (d)
- 29. (a) (b) (c) (d)
- 30. (a) (b) (c) (d)

- 1.** You conducted a successful job search, and now have three offers from which to choose. What things can you do to most thoroughly investigate your potential employers? (Fill in all that apply.)

 - a. check out their websites
 - b. watch the news to see if the companies are mentioned
 - c. research their financial situations
 - d. speak with people who work for them already

- 2.** Every Monday, your teacher gives you a quiz on the reading he assigned for the weekend. Since he typically assigns at least 50 pages of textbook reading, the quizzes are difficult and you have not gotten good grades on them so far. Which answer represents the best idea for troubleshooting this problem and improving your grades?

 - a. ask for the assignment earlier in the week
 - b. schedule in more time on Saturday and Sunday for reading and studying
 - c. get up an hour earlier on Monday morning to go over the reading
 - d. get a good night's sleep and eat a good breakfast before the quiz

- 3.** What is the best conclusion for the argument that begins, "The other eight people in my class . . .?"

 - a. like meatballs, so I should too.
 - b. live in apartments on the south side of town, so I should live there too.
 - c. who studied Jorge's notes got D's, so I will get a D too.
 - d. who met the new principal like him, so I should too.

- 4.** Which one of the following is NOT an example of a persuasion technique?

 - a. Tigress jeans are available at your local Mega Mart store.
 - b. The very best mothers serve Longhorn Chili-in-a-can.
 - c. "Vote for me, and I promise our schools will improve. My opponent just wants to cut the school budget!"
 - d. Our tires not only look better, but they ride better, too.

- 5.** Which is a sound argument?

 - a. I had a dream that I got a D on my biology test, and it came true. If I want to do better next time, I need to have a more positive dream.
 - b. Beth wanted to become a better driver, so she took a driving class and studied the Motor Vehicles manual. Her driving really improved.
 - c. After a strong wind storm last October, all of the leaves were off the trees. That is when I learned that wind is what makes the leaves fall.
 - d. When Max realized he was getting a cold, he started taking Cold-Go-Away. In four days, he felt much better, thanks to the Cold-Go-Away.

- 6.** You are trying to decide what car to buy. You make a chart that compares a two-seater sports car, a two-door sedan, and a mini-SUV in three categories. What would not be a suitable choice for a category?

 - a. price
 - b. gas mileage
 - c. tire pressure
 - d. storage capacity

- 7.** Which answer best represents a situation that has been decided by emotion alone?
- You hate the winter, so even though you can't afford it, you take a vacation to the Bahamas.
 - The school shuts down after a bomb threat.
 - Your company's third-quarter earnings were much higher than predicted.
 - You need a new mixer, so you watch the ads in your newspaper, and buy one when it goes on sale.
- 8.** In which case would it be better to do research in the library rather than on the Internet?
- You are writing a report on recent U. S. Supreme Court decisions.
 - You want to know the historical performance of a stock you are considering purchasing.
 - You need to compare credit card interest rates.
 - You want to find out more about the old trails through the forest in your town.
- 9.** You read a story in the newspaper about salary negotiations involving public transportation workers. The workers are threatening to go on strike tomorrow if their demands for higher wages and better benefits are not met. What represents an inference made from this scenario?
- Health insurance premiums are very expensive.
 - The cost of gas will make ticket prices increase in the next few weeks.
 - People who ride the bus should look for possible alternative transportation.
 - Employers never like to meet salary demands.
- 10.** What is wrong with this argument?
- “You think we need a new regulation to control air pollution? I think we have already got too many regulations. Politicians just love to pass new ones, and control us even more than they already do. It is suffocating. We definitely do not need any new regulations.”
- The person speaking doesn't care about the environment.
 - The person speaking has changed the subject.
 - The person speaking is running for political office.
 - The person speaking does not understand pollution.
- 11.** What should you NOT rely on when making a judgment call?
- intuition
 - common sense
 - gossip
 - past experience
- 12.** Which is NOT a valid argument?
- There are six cans of tomatoes in the pantry, and another fourteen in the basement. There are no other cans of tomatoes in his house. Therefore, he has twenty cans of tomatoes in his house.
 - Everyone who was northbound on the Interstate yesterday was late to work. Faith was on the Interstate. Faith was late to work.
 - Huang lives in either Kansas City, Kansas, or Kansas City, Missouri. If he lives in Kansas, then he is an American.
 - No one who eats in the cafeteria likes the pizza. My boss eats in the cafeteria. Therefore, she does not like the pizza.

- 13.** What statement represents a judgment instead of a fact?
- My presentation was excellent. I am sure my boss will promote me now.
 - My presentation was excellent. The clients all told me they liked it.
 - My presentation was excellent. It won an award from management.
 - My presentation was excellent. It was cited as such on my peer evaluation.
- 14.** Your dream is to spend a summer in Indonesia. After some research, you conclude that you will need \$6,000 for the trip. Which answer represents the best choice for goal setting to make your dream a reality?
- Cut \$200 per month of discretionary spending, and save the money.
 - Ask family members and friends for donations.
 - Sell your car and use the money to fund the trip.
 - Look into a more reasonably priced destination for your summer trip.
- 15.** What is wrong with the following argument?
- America—love it, or leave it!
- There is nothing wrong with the argument.
 - It implies that if you leave the country on vacation, you do not love it.
 - It does not tell you how to love it.
 - It presents only two options, when in fact there are many more.
- 16.** Which of these situations does NOT require problem solving?
- After you get your new computer home, you find that there is no mouse in the box.
 - When you get your pictures back from being developed, you realize that they are someone else's.
 - Everyone on your team wants to celebrate at the Burger Palace, but you just ate there last night.
 - Your boss asks you to finish a report for tomorrow morning, but it is your son's birthday and you promised you would take him to the ball game tonight.
- 17.** Which type of website most likely provides the most objective information about Abraham Lincoln?
- www.members.aol.com/LeeV/Lincolnlover.html: home page of a history professor who wrote a book on Lincoln's presidency
 - www.southerpower.org/assassinations: a Confederate group's site on famous assassinations, most pages devoted to Lincoln
 - www.lincolndata.edu: site of a historical preservation group that archives Lincoln's correspondence
 - www.alincoln-library.com: from the presidential library in Springfield, Illinois, devoted to telling the life story of the sixteenth president

- 18.** What is the most likely cause of the following:
“Our hockey team has been undefeated this season.”
- The other teams do not have new uniforms.
 - We have a new coach who works the team hard.
 - Some of our team members went to hockey camp over the summer.
 - I wore my lucky sweater to every home game.
- 19.** What is wrong with the “logic” of the following statement?
“How can you believe his testimony? He is a convicted felon!”
- The fact that the person testifying was convicted of a crime does not mean he is lying.
 - A convicted felon cannot testify in a court of law.
 - The person speaking has a bias against criminals.
 - The person speaking obviously did not attend law school.
- 20.** Evidence shows that the people who live in the Antarctic score higher on happiness surveys than those who live in Florida. Which is the best conclusion that can be drawn from this data?
- Floridians would be happier if they moved to the Antarctic.
 - People in colder climates are happier than those in warmer climates.
 - There are only happy people in the Antarctic.
 - Those in the Antarctic who scored high on a happiness survey probably like snow.

- 21.** Which of the following is a sound argument?
- I got an A on the test. I was really tired last night, though, and I barely studied. To keep getting A's, I need to stop studying so hard.
 - Your car is not running well. You just tried that new mechanic when you needed an oil change. I bet he is the reason you are having car trouble.
 - I have not vacuumed in weeks. There is dust and dirt all over my floors, and my allergies are acting up. If I want a cleaner house, I need to vacuum more frequently.
 - The Boston Red Sox have not won a world series in almost one hundred years. They won the American League playoffs in 2003. The Red Sox will lose the series.

Read the paragraph and answer the following two questions.

I always knew I wanted to be a marine biologist. When I was six, my parents took me to an aquarium, and I was hooked. But it was in college, when I got to work on an ocean research cruise, that I decided to specialize in oceanography. The trip was sponsored by the Plankton Investigative Service, and our goal was to collect as many different types of the microscopic plants and animals as we could, in order to see what, if any, impact the increased number of fishermen had on the marine ecosystem. Our group was divided into two teams, each responsible for gathering a different type of plankton. Working with the phytoplankton, especially the blue-green algae, was fascinating. We measured the chlorophyll in the water to determine where, and in what quantity the phytoplankton were. This worked well because the water was so clear, free of sediment and contaminants.

- 22.** What is phytoplankton?
- another name for chlorophyll
 - a microscopic plant
 - a microscopic animal
 - a type of fish
- 23.** The author says her group was investigating whether more fishermen in the area of study had
- a positive impact on the local economy.
 - depleted the supply of fish.
 - made more work for marine biologists.
 - a negative impact on the health of the surrounding waters.
- 24.** You want to sell your three-year-old car and buy a new one. Which website would probably give you the best information on how to sell a used car?
- www.autotrader.com: get the latest pricing and reviews for new and used cars; tips on detailing for a higher price
 - www.betterbusinessbureau.org: provides free consumer and business education; consult us before you get started in your new business!
 - www.newwheels.com: research every make and model of Detroit's latest offerings
 - www.carbuyingtips.com: everything you need to know before you shop for your new car
- 25.** Which explanation is weakest?
- Gas prices are so high that many people are not going on long trips anymore.
 - I can't wear my new shirt tomorrow because it is in the wash.
 - Jose's homework was late because it was not turned in on time.
 - We do not have new textbooks this year because the school budget was cut.
- 26.** Which of these problems is most severe?
- Your professor is sick and misses class on the morning you are supposed to take a big exam.
 - You lose track of your schedule and forget to study for a big exam.
 - You can't find one of the books you need to study for a big exam.
 - The big exam is harder than you thought it would be and includes a section you did not study.
- 27.** What is the most important reason for evaluating information found on the Internet?
- Authors who publish on the Internet are typically less skilled than those who publish in print.
 - Web writers are usually biased.
 - Anyone can publish on the Internet; there is no guarantee that what you are reading is truthful or objective.
 - Information found in print is almost always more accurate than that found on the Internet.

28. What is wrong with the following argument?

“We should not change our grading system to numbers instead of letters. The next thing you know, they will take our names away and refer to us by numbers, too!”

- a. The conclusion is too extreme.
- b. There is nothing wrong with the argument.
- c. Students should not have a say in the type of grading system for their schools.
- d. It does not explain why they want to get rid of letter grades.

29. What is the real problem, as opposed to being the offshoots of that problem?

- a. Your bank charges a \$40 fee for bounced checks.
- b. You wrote a check at the grocery store, but did not have the money to cover it.
- c. Every month, you spend more money than you earn.
- d. Last month, you paid \$120 in bounced check charges to your bank.

30. Which phrase is an example of hyperbole?

- a. In a perfect world, there would be no war.
- b. That outfit would scare the skin off a cat.
- c. You are not the world’s best cook.
- d. He drives almost as fast as a Nascar driver.

► Pretest Answers

- 1. a, c, d** (Lesson 3)
- 2. b.** (Lesson 6)
- 3. c.** (Lesson 14)
- 4. a.** (Lesson 9)
- 5. b.** (Lesson 15)
- 6. c.** (Lesson 4)
- 7. a.** (Lesson 11)
- 8. d.** (Lesson 7)
- 9. c.** (Lesson 3)
- 10. b.** (Lesson 16)
- 11. c.** (Lesson 17)
- 12. c.** (Lesson 12)
- 13. a.** (Lesson 18)
- 14. a.** (Lesson 5)
- 15. d.** (Lesson 13)
- 16. c.** (Lesson 1)
- 17. d.** (Lesson 8)
- 18. b.** (Lesson 14)
- 19. a.** (Lesson 16)
- 20. d.** (Lesson 10)
- 21. c.** (Lesson 15)
- 22. b.** (Lesson 19)
- 23. d.** (Lesson 19)
- 24. a.** (Lesson 7)
- 25. c.** (Lesson 18)
- 26. b.** (Lesson 1)
- 27. c.** (Lesson 8)
- 28. a.** (Lesson 13)
- 29. c.** (Lesson 2)
- 30. b.** (Lesson 9)

LESSON

1



Recognizing a Problem

LESSON SUMMARY

This lesson teaches you how to recognize a problem and to determine its importance or severity, so that you can begin to think critically and begin problem solving.

WE ALL FACE problems every day. Some are simple, requiring a short period of time to solve, such as running low on gas in your car. Others are complex, and demand much of your time and thought. For instance, you might be asked by your boss to determine why the latest sales pitch for your largest client failed, and then come up with a new one.

You cannot solve a problem without first determining that you have one. Once you recognize the problem, you will want to prioritize—does your problem demand immediate attention, or can it wait until you are finished working on something else? If you have more than one situation to resolve, you must rank them in order of importance, tackling the most important first. This lesson will help you to do just that.

► What Is a Problem?

In terms of critical thinking skills, a problem is defined as a question or situation that calls for a solution. That means when you are faced with a problem, you must take action or make decisions that will lead to resolution of that problem.

Using this definition, problems that occur in the form of a question are typically those that do not have one straightforward answer. You might be asked, “Why are you voting for candidate X instead of candidate Y?” or “why do you deserve a raise more than Tannie?” Situational problems require you to think critically and make decisions about the best course of action. For example, you learn that a coworker has been exaggerating the profits of your company—and she has done so on orders from the president. Do you blow the whistle, jeopardizing your career? And, if so, to whom?

► Road Block to Recognizing a Problem

One of the most common reasons for not recognizing a problem is the desire to avoid taking action or respon-

sibility. The thinking goes that no recognition means no responsibility. This can mean simply “not noticing” that you have five checks left in your checkbook (if you noticed, you would need to take action and order more checks). Or, you look the other way as faulty items come off the conveyor belt and are packaged for distribution (if you reported it to management, you might be asked to determine the manufacturing problem).

Realize that by not recognizing the problem, you make the solution more difficult. The initial problem could grow larger and more complex with time, or by waiting you could create multiple problems that need solutions. If you do not determine that you need more checks and place an order, you will run out. Then, not only will you have to order more, but you will have to visit the bank to be issued temporary checks. In other words, the failure to recognize a problem almost always creates more work for you.

► Types of Problems

Once you recognize that a problem exists, but before you begin to solve it, you should determine the type of problem as it relates to a timeframe and your personal

But Is It Really? Determining the Existence of a Problem

Once a problem has been identified, you must take one more step before you begin to think about solving it. Some situations look like problems when, in fact, they are not. If you believe you are faced with a problem, ask yourself, is it an inevitable part of a process, or does it actually call for a solution? For example, you have spent the past two weeks training a new employee at the bank in which you work. He makes a couple of errors during his first day out of training. Do you ask your boss if you can spend more time with him? Or, should you find out what the expectations are for new employees? You may discover that your boss expects a few errors during a teller’s first week on the job. Keep in mind that something can look like a problem when it is not. It is important that you recognize when your problem solving skills are needed, and when they are not.

priorities. There are two criteria to use in your determination: **severity** and **importance**.

Severe Problems

These problems may be identified by the following characteristics:

- require immediate solutions
- may call for the involvement of others who have more expertise than you
- result in increasingly drastic consequences the longer they remain unsolved

For example, a break in your house’s plumbing is a severe problem. Water will continue to leak, or perhaps, gush out until the break is fixed. The water can damage everything it comes in contact with, including hardwood floors, carpeting, furniture, and walls. Unless you are a plumber, you will need to call a professional to solve the problem immediately. Delays can result in a more difficult plumbing issue and also costly water damage repairs. You might even need to replace flooring or other items if the break is not fixed quickly.

Some minor problems can become severe if not solved immediately. For example, a campfire in the woods that is difficult to put out may take a great deal of time and effort to extinguish. But if it is not put out, it could start a major forest fire (severe problem).

Practice

Three problems arise at work simultaneously. In what order do you solve the following?

- a. The printer in your office is down.
- b. You need to finish writing a report to meet a 3:00 P.M. deadline.
- c. Documents must be dropped off at FedEx by 5:00 P.M.

Answer

The order that makes the most sense is **a, b, c**. You cannot print your report if the printer is down, so the printer should be fixed first (it could take the longest amount of time if a repair person must be called). Then, write the report. When you are finished, gather the necessary documents and prepare them for FedEx.

Following is another practice. In this practice, you will see that time is a factor, but it is not the deciding factor, in your critical thinking process.

Practice

You invited friends over for pizza and a movie. Before they arrive, you preheat your oven to keep the pizzas warm and put the tape in the VCR to fast forward through all of the coming attractions and advertisements. However, the tape is damaged and will not play. As you head out to exchange the tape, you smell gas coming from the kitchen. What should you do?

Answer

A natural gas leak is a severe problem, and must be dealt with first. You must turn off the oven, air out the room, and take great care not to light any matches for any reason until the oven can be looked at by a professional. The problem with the rented movie is not severe. Once the apartment is safely ventilated, go get another movie and call your friends if you are running late.

Practice

Which, if any, of these problems is severe?

- a. You realize you are out of shampoo on the morning of an important job interview.
- b. You find a tick on your dog which has probably been in place for a day or two, and suspect Lyme disease.
- c. You find a nail in your tire; there is little air loss, but you are ten miles from the closest gas station.
- d. You lose your job when your boss suspects you have been stealing from your company.

Answer

Choice **d** is the most severe problem. Not only are you out of work, but you may need to hire a lawyer to fight criminal charges. You must immediately seek legal advice, and gather evidence to prove that you were not involved with the theft.

Choice **b** could be considered severe, but treatment for Lyme disease does not need to start immediately, and the situation will not deteriorate drastically if you wait a day or two after removing the tick.

Choices **a** and **c** are not severe problems. While it is always important to make a good impression during an interview, this problem ranks the lowest of the four in terms of severity. You can always use soap to wash your hair if you rinse it thoroughly. As for the problem, with the nail still in place you should have no trouble driving ten miles to a service station to repair the puncture.

Important Problems

Problems are viewed as important or unimportant in relation to one another, and according to personal priorities. When you are faced with a number of problems, you must evaluate them in terms of priority so that you are not dealing with minor issues first, and leaving the more important ones to go unattended until the last minute. Prioritizing means looking at each problem or

issue, and ranking it in terms of importance. What is most important to you as you begin the critical thinking process.

Practice

Rank these local issues in the order that is most important (1) to least important (5) in your life: healthcare, safety, education, pollution/environment, and the economy.

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

Answer

The answer depends on your personal situation. If you have children and a job that provides you with a decent salary and quality health coverage, you would probably rank education and safety highest. If the discovery of radon gas in many areas of your town weakened the local economy and forced your business to lay off half its staff, including you, you would probably rank economy and pollution/environment as most important.

Practice

You are planning a family vacation to a resort 800 miles from your home. Here are some of the details you will need to take care of:

- purchase plane tickets
- research restaurants in the area around the resort
- reserve accommodations
- suspend delivery of mail and newspaper for duration of trip
- hire a pet sitter for your cats

In what order should you complete these tasks?

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

Which is most important? _____

Least important? _____

Answer

While there is room for various answers based on personal preference (for example, a food-lover might rank restaurant research higher on the list), the following represents a ranking in order of importance:

1. purchase plane tickets—there is no vacation unless you can reach your destination
2. reserve accommodations—many resorts are crowded and you run the risk of having no place to stay if you do not take care of this detail ahead of time
3. hire a pet sitter for your cats—while this should not be a difficult detail to take care of, you can't go on vacation without securing care for your pets
4. suspend mail and newspaper delivery—a stuffed mailbox and pile of newspapers at your door tells potential thieves that you are not home; however, you could always call a neighbor from the resort to help you out if you realize you have forgotten to take care of this detail
5. research restaurants—once you get to your destination, you should have plenty of time to read local publications and ask around for recommendations; the advice you get when you are there could be superior to what you can find out from home

► **The Cost of Problem Solving**

When you are on a budget, money is an issue when determining the importance of problems. If there are two or more problems that require a payment to solve and you do not have the money available to take care of everything at once, you will need to determine what needs attention first and what can wait.

Practice

Perhaps you find that your car needs a new muffler the day before you were going to take your air conditioner in to be repaired. You do not have the money to do both right now. Make a list of the reasons each repair is necessary, and decide which should be done first.

Car Repair: _____

Air Conditioner Repair: _____

Conclusion: _____

Answer

Your lists will probably include many of the following:

Car Repair

- car will be too noisy without a muffler
- could be stopped by law enforcement and fined without muffler
- can't drive car without muffler
- need car to drive to work

Air Conditioner Repair

- wasting electricity—AC running inefficiently
- heat wave predicted for later in the week
- have trouble sleeping without AC
- live on fourth floor—too hot without AC

Conclusion: you should probably get your car repaired first. While it may be uncomfortable without

an air conditioner, you need your car to get to work and that is your top priority.

► **In Short**

When you recognize that you are faced with a problem, you also recognize the need for action on your part. But

that action depends on the type of issue you are facing. Is the problem severe? If there is more than one problem, which should be tackled first? Use your critical thinking skills to pinpoint any problem or problems before you begin to anticipate a solution.

Skill Building Until Next Time

- The next time you need to make a TO DO list, try ranking the items on your list. You might list them in order of what takes the most or least time. Or perhaps list them in order of when they have to be done. You might have your own order of importance in which to list items. For practice, try ordering them in each of the different methods listed above.
- Test your skill of problem recognition when watching the evening news. After you hear a story, list three problems that will probably occur as a result.

LESSON

2



Defining a Problem

LESSON SUMMARY

In this lesson, you will discover how to differentiate between real problems and perceived problems (those most immediately apparent), as well as understand the most common reasons for missing actual problems. When you locate and clearly define the issue you must resolve, you can then begin to work on a solution.

NO MATTER WHAT issue you face, the only way to come up with an effective solution is to identify the actual problem that needs to be solved before you do anything else. If you don't, you could end up spending your time treating the symptom or consequence of your problem while the real problem remains waiting to be dealt with.

Did you ever spend time finding a solution to something, only to discover that the real problem was still there, as big as ever, waiting for your attention? Perhaps you worked for a few hours pulling up weeds in your garden, only to discover a few days later that the very same type of weed was back in that place. What you failed to notice was that the birdfeeder full of sunflower seeds spilled into the garden every time a bird landed on it. Unless you move the birdfeeder, or change the type of birdseed you buy, you will continue to have a problem with sprouted sunflower seeds in your garden. In other words, the real problem is the location of the birdfeeder coupled with the type of birdseed you fill it with. The weeds are merely a symptom of the problem.

The scenario above represents a common error in problem solving. Many people mistake the more obvious consequences of a problem for the actual problem. This might happen for a number of reasons.

You could be busy so whatever irritates you the most gets the greatest amount of attention without much thought about whether it is the real problem. Or, you may make assumptions about the nature of your problem and act on them rather than determining first if they are valid.

There are two common results that occur when you “solve” something that is not your actual problem.

1. Your solution will be unsatisfactory. (It fails to deal with the real problem.)
2. Further decisions will have to be made to solve the real problem.

► What Is the Actual Problem?

Many times, the real problem facing you can be difficult to determine. For instance, your teacher returns your essay with a poor grade and tells you to rewrite it. With no other feedback, you may be unsure about the real problem with the essay and therefore unable to correct the problem effectively. In this case, defining the problem entails some work; you will need to read the essay over carefully first to see if you find it. If it is still not apparent, you should approach your teacher and ask him to be more specific.

At other times, your problem may seem overwhelming in its size and complexity. You may avoid dealing with it because you think you do not have the time or energy to deal with such a large issue. However, when you take a closer look, there may be only one real problem of manageable size, and a number of offshoots of that problem which will resolve themselves once you deal with the actual problem.

How do you go about defining the real problem? There are a few of things to keep in mind.

- **Get the information you need**, even if you have to ask for it.
- **Do not be tricked into solving offshoots**, or other consequences, of your problem instead of the problem itself.
- **Do not be overwhelmed** when you are faced with what looks like, or what you have been told is, a giant problem.

Practice

What is the actual problem and what is the perceived problem in the following scenario?

The owner of an office building decides to add ten floors to increase the number of tenants. When construction is complete, the original tenants begin to complain about how slowly the elevators are running. The owner calls an elevator company, explains the situation, and asks them to install a faster elevator. He is told that there is no faster elevator, and that the problem is not the speed of the elevator, but

Answer

The real problem is that the tenants must wait longer for the elevator because there are more of them using it and the elevator must travel to more floors than before. The tenants’ perceived problem is the new

slower speed of the elevator. In reality, the elevator is moving at exactly the same speed as before.

Now that you are thinking about defining real problems as opposed to perceived problems, try distinguishing offshoots of a problem from the main problem from which they stem.

Practice

What is the real problem, and what are the offshoots of that problem?

- a. There is a leak in the roof.
- b. A heavy tree branch fell on the house during a storm.
- c. A large, dead oak tree is located next to the house.
- d. The bedroom floor has water damage.

Answer

The tree, **c**, is the real problem. If it is not remedied, any solutions you come up with will be faulty. In other words, you can repair the floor and the roof and remove the branch. But the next storm could bring another branch down and you will end up with the same consequences. A real solution requires either removing the dead tree or removing any remaining branches that could fall on your house.

When you can distinguish between a real problem and its offshoots, you should also be able to envision a large, overwhelming problem as something more manageable.

Practice

What is the actual problem in this situation?

While on vacation, you withdrew money from your checking account using your debit card. The account balance went to \$0, but the check you wrote for your water

bill before you left came into the bank for payment. Although you have overdraft protection, the bank charged you a fee for insufficient funds, and returned the check to the water company, which is also charging a returned check fee.

Identify the real problem from the choices below:

- a. You owe money to the bank and the water company.
- b. The bank made a mistake by not covering the check.
- c. Your vacation cost more than you budgeted for.
- d. You do not have enough money in your checking account.

Answer

The real problem is **b**. The bank should have used your line of credit you established as overdraft protection in order to cover the check. You need to alert them to their error and have them contact the water company about your check.

► Distinguishing between Problems and their Symptoms or Consequences

How can you be certain you are dealing with real problems rather than their symptoms or consequences? There are two things you can do whenever you believe you need to find a solution: avoid making assumptions, and think the situation through.

Avoid Making Assumptions

What is an assumption in terms of problem solving? It is an idea based on too little or not very good information. For example, the manager of a convenience store has an employee who is often late for her shift. The manager makes the assumption that the employee is lazy and does not take her job seriously. In fact, the employee has had car trouble and must rely on unreliable public transportation to get to work.

When you avoid making assumptions, you get all the information you need before deciding anything. With the right information, you can see the problem clearly rather than focusing on its consequences or mistaking them for the real problem. Then you can work toward a satisfactory solution. For instance, when the manager realizes that transportation is the real problem, she might be able to help the employee find another way to work rather than reprimand her for being lazy.

Practice

Write an (A) next to each of the assumptions below. If it is not an assumption, leave it blank.

- ___ 1. I couldn't take good notes during the lecture because the professor was speaking too quickly.
- ___ 2. I don't know much about cars, but I think mine is rattling because it needs a new muffler.
- ___ 3. It's the baking powder in this recipe that makes the muffins rise.
- ___ 4. Our manager is criticizing our work today because he has problems at home.
- ___ 5. The cable TV went out after the wind knocked down those wires.

Answers

1. This is not an assumption. The student knows why her notes were poor.
2. This is an assumption. The problem with the car might be caused by something other than the muffler.
3. This is not an assumption. Baking powder is a leavening agent.
4. This is an assumption. Perhaps the manager is criticizing the work because it is not good enough.
5. This is not an assumption. If the cable lines were knocked down, that is the reason the cable TV is not working.

Think It Through

Another important way to distinguish between problems and their symptoms or consequences is to think it through. Ask yourself, "What is really happening?" Look at the problem carefully to see if there is a cause lurking underneath or if it is going to result in another problem or set of problems. Thinking it through allows you not only to define the issue(s) you face now, but can help you anticipate a problem or problems (See Lesson 7 for more information about predicting problems.).

Practice

What problems might result from the following scenario?

The town of Colchester voted against three school budgets in elections held in April, May, and June. As a result, all school hiring and purchasing was put on hold. The school board then recommended cutting two teaching positions, which would save the town \$92,000 in salary and bene-

fits. At the election in July, the townspeople approved the budget.

Answer

Think about some of the problems that might result. First, with the loss of two teachers, there will be larger class sizes as fewer classes accommodate the same number of students. In addition, since the budget was approved just a month before school was to start it could be difficult to get the supplies needed by the remaining teachers using the money that was saved. Initially it may look like the town solved the problem, but in reality they have created new problems. To learn more about brainstorming possibilities or about troubleshooting, see Lessons 4 and 6.

► Defining a Problem within a Group

If it is sometimes difficult to distinguish between real and perceived problems on your own, the difficulty is much greater when you are told of a problem by someone else. For instance, your boss asks you to call a meeting for all paralegals to explain how to correct the problem of poor communication. “Why aren’t your e-mails getting read by the attorneys on time?” he asks. Your boss wants the paralegals to somehow change the way they send e-mails. However, after looking into the situation, you discover that the real problem is that the

attorneys are not in the habit of checking their e-mail often enough.

Sometimes pinpointing the real problem must involve taking a step back and figuring out if the right question is being posed. The problem described above can’t be solved by asking, “What can the paralegals do differently?” It can be solved by asking, “How can we get the attorneys to read their e-mail more frequently?”

When you are certain you are dealing with a real problem and you must solve it in or as a group, you must lead others to see that real problem. Some may be focused on the symptoms or consequences of it, while others may have made assumptions about the problem. In order to find a successful solution, everyone needs to clearly understand the problem.

Practice

You are running a fund-raising meeting for your daughter’s soccer team. Last year, the team did not end up with enough money to travel to all of their away games. What represents the best choice for a discussion topic?

- a. Can we buy cheaper food to sell at the snack bar to increase our profits?
- b. Should we order team t-shirts and sell them to the girls at cost?
- c. Who has ideas for new fund-raising activities that will bring in more money?
- d. How much money will it cost the team to travel to the championship game this year?

Answer

The best choice is c, because the actual problem facing the group is how to raise more money than they did the previous year. The other topics are also important but they are not the best way to lead the discussion. When you are running the meeting, it is up to you to help the group see the actual problem clearly so time is not wasted trying to solve other issues.

► Roadblock to Defining a Problem

Often the biggest impediment to defining a problem is speed. When you are busy, especially on the job, you may be tempted to simply deal with superficial evidence, especially when it comes in the form of an aggravation or irritation. In such as case, you act quickly, rather than stop to look and see if the problem is merely the symptom of a larger or more serious issue.

However, what seems like a time saver (quickly resolving an aggravating situation) could actually cost you more time in the long run. If you have mistakenly identified the symptoms of a problem as the true problem, as stated earlier in this lesson, then your solution will be inadequate and the real problem will still be there.

In addition to wasting time by focusing on the false problem, you should keep in mind that there are many instances when doing the right thing is actually

faster and simpler than dealing with the symptoms of a problem. For instance, in the elevator scenario described on page 18, the real problem is that the tenants do not like the effect the extra floors have on their elevator use. When defined as such, you will not consider expensive and complicated problems such as where to buy faster elevators or how to construct additional elevator shafts.

► In Short

Effective problem solving begins with the identification of the real problem, as opposed to the perceived problem. Do not allow the size of the problem, your own assumptions, or a lack of information stand between you and an effective solution. Think the situation through, and do not be tempted to deal quickly with consequences or symptoms of your problem instead of the actual one.

Skill Building Until Next Time

Have you ever started to make a recipe, only to discover three steps into it that you are missing an ingredient or that the food needs to rest in the oven for six hours? Getting all the information you need before you begin a process such as making dinner or taking a test means reading everything through first. The next time you try a new recipe or set up a piece of equipment, for example, installing a new DVD player, spend at least ten minutes reading through and reviewing the instructions before you do anything else. Effective problem solving happens when you know exactly what you are facing before you begin.

L E S S O N

3



Focused Observation

LESSON SUMMARY

This lesson is about increasing your awareness in order to better participate in decision making and problem solving at home, at work, and/or at school.

TO IMPROVE YOUR critical thinking skills, you must become more attuned to your environment. If you consistently pay attention to what goes on around you in a focused way, you will be able to recognize when your input is needed. Becoming a more effective decision maker and problem solver involves focused observation. This skill is crucial in helping you to increase your awareness of your surroundings and situations. It means you must not only take in information about what is going on around you, but you must do it as effectively as possible.

Taking in information occurs when you are aware and capable at:

- using your own senses
- listening to what others are telling you
- personally gathering the information

► **How to Increase Awareness**

An important step in critical thinking is understanding what is happening around you. You can't make good decisions or effectively solve problems if you are not paying attention. There are three notable ways in which to increase awareness. The first is to use your own powers of observation. By being attentive to your surroundings you can spot problems and potential problems. The second is to get information directly from another person, and the third involves your active seeking of information.

While all methods can work well, there are potential hazards of each. Knowing about these hazards ahead of time, and working to avoid them, will help you to best use your powers of perception.

Observation

You are continuously using your senses to observe your environment. For instance, you *see* that the gas gauge is indicating that your tank is near empty; you *hear* your dog barking when he needs to be let out; you *feel* the heat coming off a grill before putting your food on it.

This sounds simple, and often it is. Consciously using your senses to gain a better understanding of your environment, however, involves another step. Instead of simply noting something, you need to put it in a context or make an inference once you have observed a potential problem. That means the information you gathered using one or more of your senses is not enough on its own to determine the existence of a problem. An inference is simply taking the information you observe and making sense out of it. Ask yourself, what does this mean?

For example, you are waiting with your coworkers for envelopes that contain information about pay raises. When the envelopes are passed out, those who open them and read their contents look depressed. You

have made an observation, but what does it mean? You can infer from the depressed looks of your coworkers that the raises are probably much lower than expected.

Practice

You hear your coworkers complaining that they will not work overtime. You know that you have a large project slated for tomorrow that probably won't be finished by 5:00. It will take a number of coworkers to help complete it by the deadline. **What can you infer from the information you have heard?**

Answer

The people you need to help you complete your project have said in general terms that they won't work overtime. Although you did not hear anyone say specifically that they wouldn't help complete your project, you can infer that eight hours might be all they are willing to put in. Once you make this inference, you need to take action. That could mean speaking with your coworkers about the importance of the project and how much you need their help, or possibly getting someone higher up involved. From what you overheard, it appears as though your project deadline won't be met unless something changes.

► **Direct Method**

This method involves the direct presentation of a problem to you by someone else. Your boss might tell you

she will be out of town when an important meeting is to take place and she expects you to rearrange the meeting with four other top level executives. Or, your professor might announce to your class that he has decided to include an extra section on tomorrow's exam. When you learn of a problem directly, all of the information has been told to you by someone else.

► Road Block to Increased Awareness

A potential hazard of the direct method is that the person informing you of the problem may not see the situation clearly. What he or she thinks is the problem may not be the true issue. Thus, you need to pay careful attention and not automatically assume that the information you have received is accurate. Try to substantiate it by seeking even more information about the problem before taking any action.

Practice

Your classmates complain that your teacher has unfairly graded their papers (and you believe your grade was lower than it should have been, too). They ask you to approach your school's administrators about the seemingly unjustified poor grades. You agree to do it, and the administrators set up a meeting with your teacher in attendance. She explains simply that the real problem is that the students did not follow her instructions; the papers were placed in her mailbox instead of on her desk, and she therefore received them a day late. Late papers automatically receive one letter grade lower than they would have if they were turned in on time. **What could you have done before approaching the administrators to have avoided this embarrassing situation?**

Answer

It is almost always better to go first to the person closest to the problem before going over their head to complain or attempt to get results. In this case, that means asking your teacher about the grades. Your mistake was to assume that the version of the problem you heard about from your classmates was accurate. You should have gotten more information (spoken with your teacher) before approaching the administration.

Gathering Information

Another way to increase your awareness is to actively seek information. This method is typically used after you have discovered that a problem may exist. In the previous scenario, it would have involved talking with another person (your teacher) to get more information. But you can also gather information from more than one individual, such as with tests, surveys, and opinion polls.

► Focusing Your Observations

You have already learned some of the best ways to increase your awareness. To improve problem solving and decision making skills, you will need to take this awareness to the next level by focusing. No matter which way you are informed, you will need to apply yourself to get the most out of the information you receive. You must:

- **concentrate.** You must pay undivided attention.
- **create a context.** Look at the situation as a whole, instead of zeroing in on a small part.
- **be thorough.** Your observations must be extensive and in-depth.

Concentrate

Situations occur around you all the time. Many of them require little or no attention on your part, such as your commute to work each day by bus. When you are a passenger, you can allow your mind to wander or even read or take a nap. The driving of the bus is taken care of for you. However, if you commute by car you must pay great attention, both to the road and to other drivers.

In instances that call for your awareness you must pay careful attention. Concentrate on what you are observing or hearing. Sometimes the most critical piece of information is tossed out as inconsequential, an afterthought that you might miss if you are not fully aware. For example, your teacher explains an assignment at the end of class. He writes on the board the period of history you are to write about and suggests some sources of information. After many of your classmates have closed their notebooks and grabbed their backpacks, he mentions that your papers must be no longer than six pages. If you had not been paying attention to all of his instructions you would have missed this critical piece of information.

Practice

Rank the following situations (1–5) by how much concentration (awareness) they require. The number 5 requires the most concentration.

- ___ shopping for groceries
- ___ waiting for a doctor’s appointment
- ___ attending a meeting at work
- ___ giving a speech
- ___ walking around the block

Answers

Your answers may vary, but here is an explanation of this order.

5. Giving a speech requires the most concentration. You need to follow your written speech or notes, make contact with the audience, and speak clearly and slowly enough to be understood.
4. Attending a meeting typically requires the next greatest amount of concentration. In order to participate effectively at work you need to know what is going on. Listening carefully, understanding how your superiors and coworkers function in a group, and asking questions if you are unsure of something are all part of focused observation at a business meeting.
3. In order to get the things you need when you are grocery shopping you must either keep them in mind as you walk the aisles or consult a written list.
2. Depending on where you live and how much traffic you might encounter, you must pay at least a small amount of attention to your surroundings while taking a walk.
1. Waiting for a doctor’s appointment requires the least amount of concentration. When sitting in a waiting room, even if your mind wanders you will be called when it is your turn. There is really nothing you need to be concentrating on.

Create a Context

Focusing your observations also means bringing together many pieces to make a whole. In order to make sense of what you see or hear you need to create a context for it. That means understanding your observations in terms of their surroundings. You may hear someone

talk about a problem that they want you to solve. The context in this case might be everything that person has said to you before. Perhaps he is constantly complaining about problems, many of which are not really worth your time. In that context, the new problem is probably also something you do not need to concern yourself with.

In another scenario, you begin to hear strange noises coming from under your car when driving on the highway. You then remember that there was a puddle of fluid on the garage floor under your car the day before, and you had trouble getting it started in the supermarket parking lot that morning. Putting all the pieces together, or creating a context for the problem (hearing a strange noise), leads you to believe you need to have your car looked at by a mechanic.

Practice

You are asked to bring corn on the cob to a friend's cookout. When you get to the store, you find that they have no corn. You try two other supermarkets, and they have no corn either. What pieces of information can help you create a context for this problem?

1. you heard a news story about a virus that attacks corn
2. your local supermarket is understaffed
3. you saw farmers spraying their corn crops
4. your friend does not like to cook

Answer

The problem of not being able to find corn to buy most likely has to do with numbers 1 and 3. The fact that your grocery store is understaffed is not an issue that would affect the problem, nor is the fact that your friend doesn't like to cook.

Be Thorough

Focused observations are extensive ones. They do not overlook vital pieces of information. In order to best understand the situations you face, you need to look at them from many angles and take in as much information as you can. For example, you are attending a major league baseball game. Your seat is on the third base line. The opposing team's best hitter is right-handed, and the first time he was at bat, he hit the ball into the stands a couple of rows in front of you where it barely missed another fan's head. With that observation in mind, what kind of attention will you pay to the game, especially when that hitter is at bat again? If you are thorough, you won't just watch the scoreboard, or your team's outfielders. You will observe the batter hit the ball and watch to be sure you are not in harm's way (or that you are in the right place to catch a ball!).

Practice

You are trying to decide which college to attend, and are visiting the three schools on your list of possibilities. You arrange an interview at each school with the admissions department. What things can you do to most thoroughly investigate the colleges? (circle all that apply)

- a. Write a list of questions for the interviews covering anything you did not learn about in the school's brochure and website.
- b. Ask to sit in on a class required in your chosen major.
- c. Tell the interviewer about your extra-curricular activities.
- d. Eat lunch in the student dining hall.
- e. Pick up a recent copy of the school newspaper.

Answer

Only **c** is incorrect. All of the other ideas will help you to be thorough and get the most information from your visits.

► In Short

When you increase your awareness you observe more and make better sense out of your observations. Do that by using your senses, listening to what others have to

say, and seeking more details. And when you are in the process of gathering information, concentrate, put it in a context, and be thorough. You will not miss a thing if you pay careful attention and you will become a better decision maker and problem solver in the process.

Skill Building Until Next Time

- Find a good spot for people watching, such as a coffee shop or outdoor café. Observe those around you, using your senses, with the goal of increasing your awareness. Is a couple about to have an argument? Is someone who is walking down the street without paying attention about to trip over a dog on a leash?
- The next time you are driving, make a mental list of the things you need to be aware of, and what might happen if you are not as observant as you should be. You might list an erratic driver, a child riding her bike, a utility company doing repair work from a parked truck, or an intersection regulated by four-way stop signs.

LESSON

4



Brainstorming with Graphic Organizers

LESSON SUMMARY

In this lesson, you will learn how to use some of the most effective graphic organizers for brainstorming. Graphic organizers include word webs, Venn diagrams, and concept maps.

AFTER YOU RECOGNIZE and define the real problems and decisions you face, you must begin to develop viable, effective solutions. Brainstorming is a critical thinking skill that helps to do that by coming up with as many ideas as possible with no judgment being made during the process. Perhaps you have brainstormed before when you needed to get thoughts together to solve a problem or complete a writing assignment. You took out a piece of paper and made a list of ideas, or possible solutions. Then what?

While lists can be good for simply recording information, they do not help you organize your thoughts very well. Instead, try arranging your ideas or taking the information from an existing brainstorming list and putting them in the form of a graphic (visual) organizer. By visually arranging the information, you create a sort of map of your thoughts. And a map helps to point the way toward effective decisions and solutions.

Why are graphic organizers more effective than lists?

- They are a meaningful display of complex information.
- They help you to see patterns and organization in your thinking.

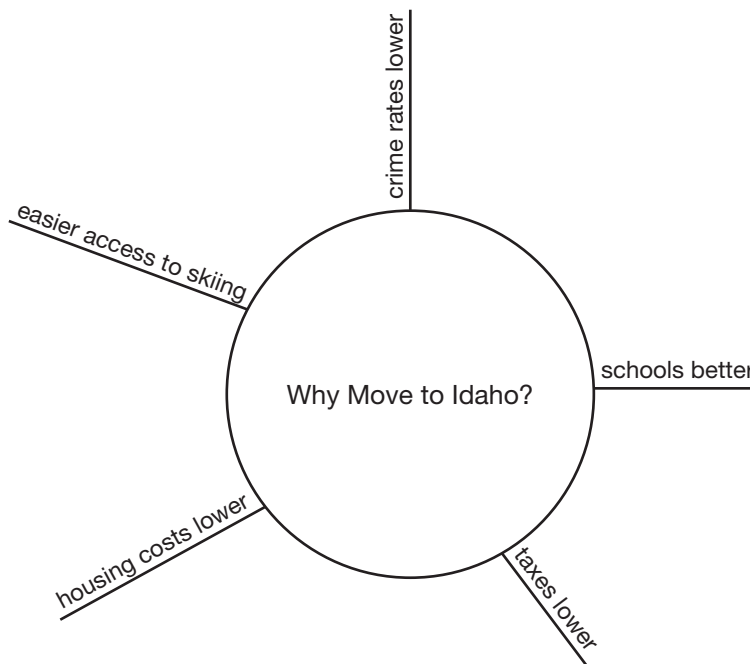
- They help you gather and compress information.
- They keep you focused on your goal.
- They show what you know and what you still need to find out.
- They help you understand and interpret your thoughts and ideas.

The types of graphic organizers covered in this lesson are:

- concept map: explores a simple topic or problem
- webbing: helps determine possible solutions for problems that have more than one cause or symptom
- Venn diagram: finds solutions by showing common ground between two or more causes or symptoms of a problem
- chart: compares and contrasts two or more elements
- problem/solution outline: helps delineate a problem, including its causes and effects, while producing possible solutions and outcomes to those solutions

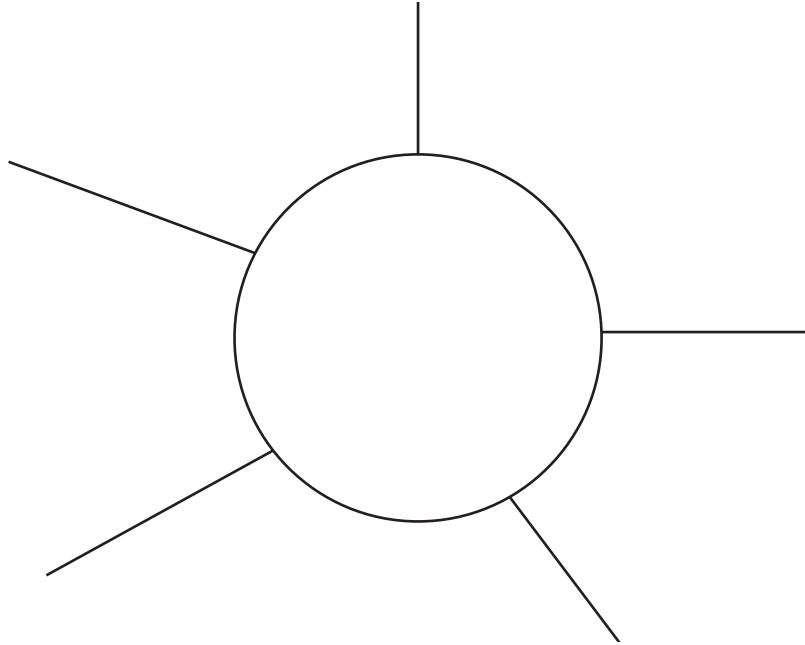
► **Concept Map**

Concept maps, also called target maps, should be used when you are exploring a topic that is not complex. To make one, draw a circle and add spokes radiating from it. Put your central idea or problem in the middle, and add possible solutions around it in any order. As you can see from the example that follows, a concept map visually arranges a simple decision and the factors that may be used in making that decision.



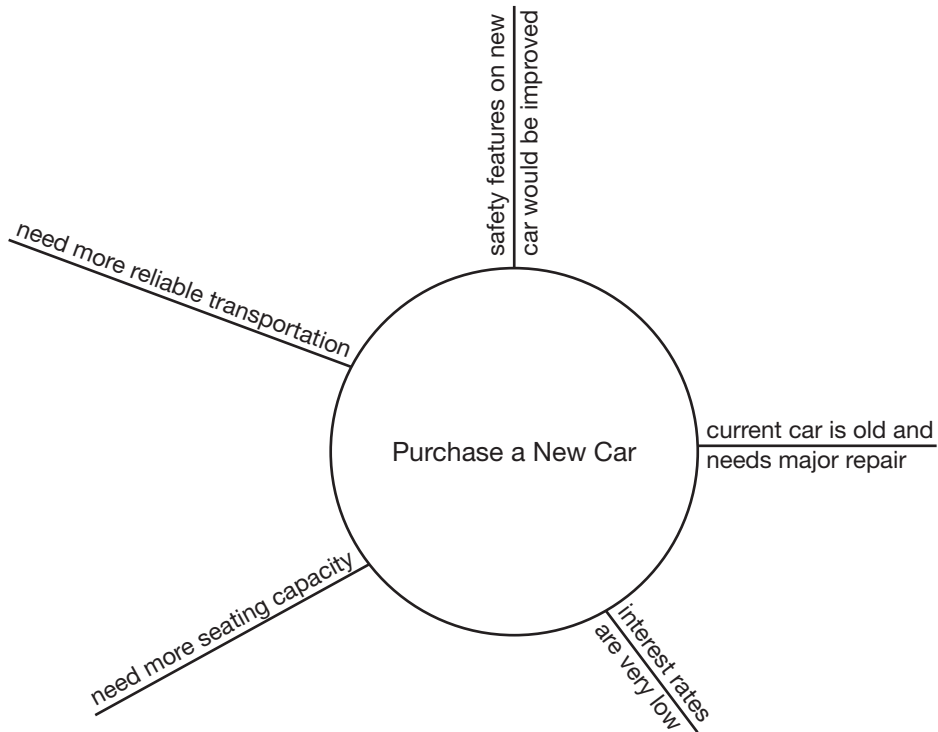
Practice

Imagine that you are considering purchasing a new car. Come up with at least five reasons why you should make the purchase. Use a concept map to organize your answer.



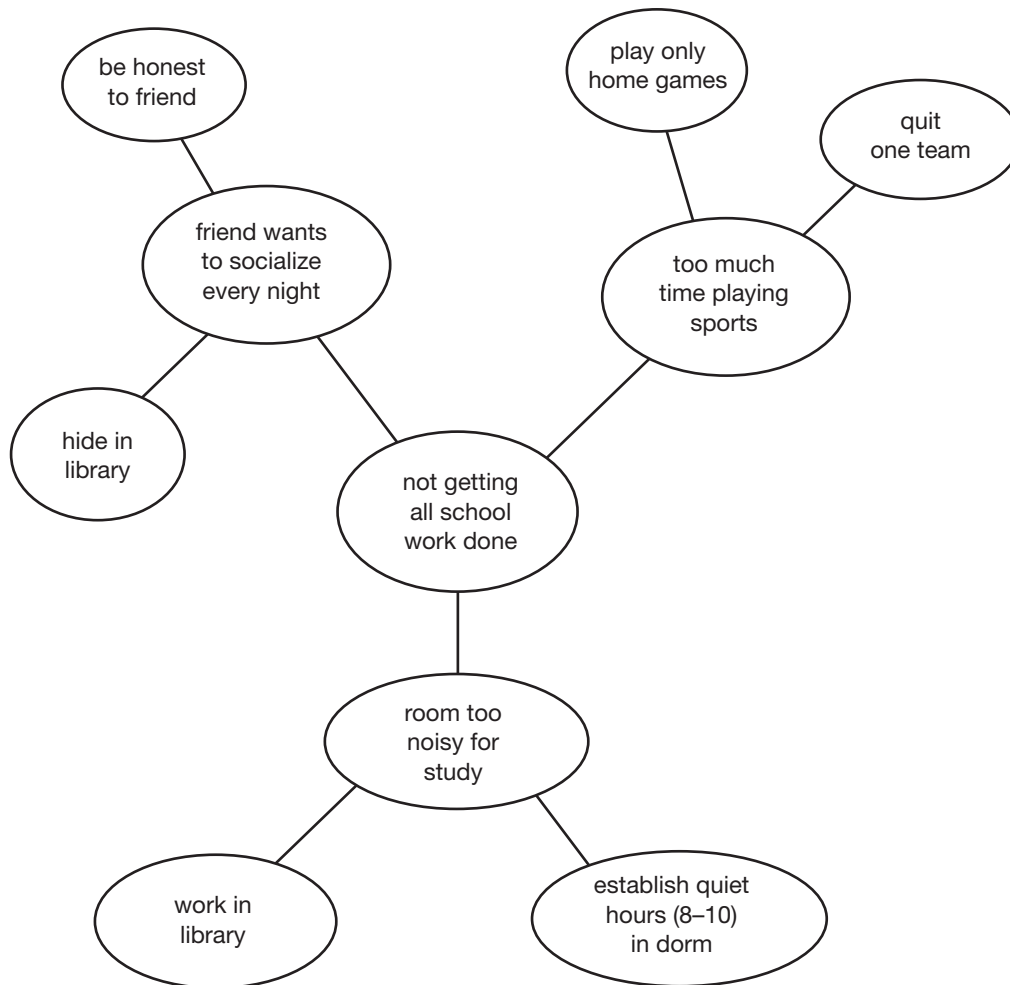
Answer

While there are many factors that must be considered before buying a new car, a possible answer might look like:



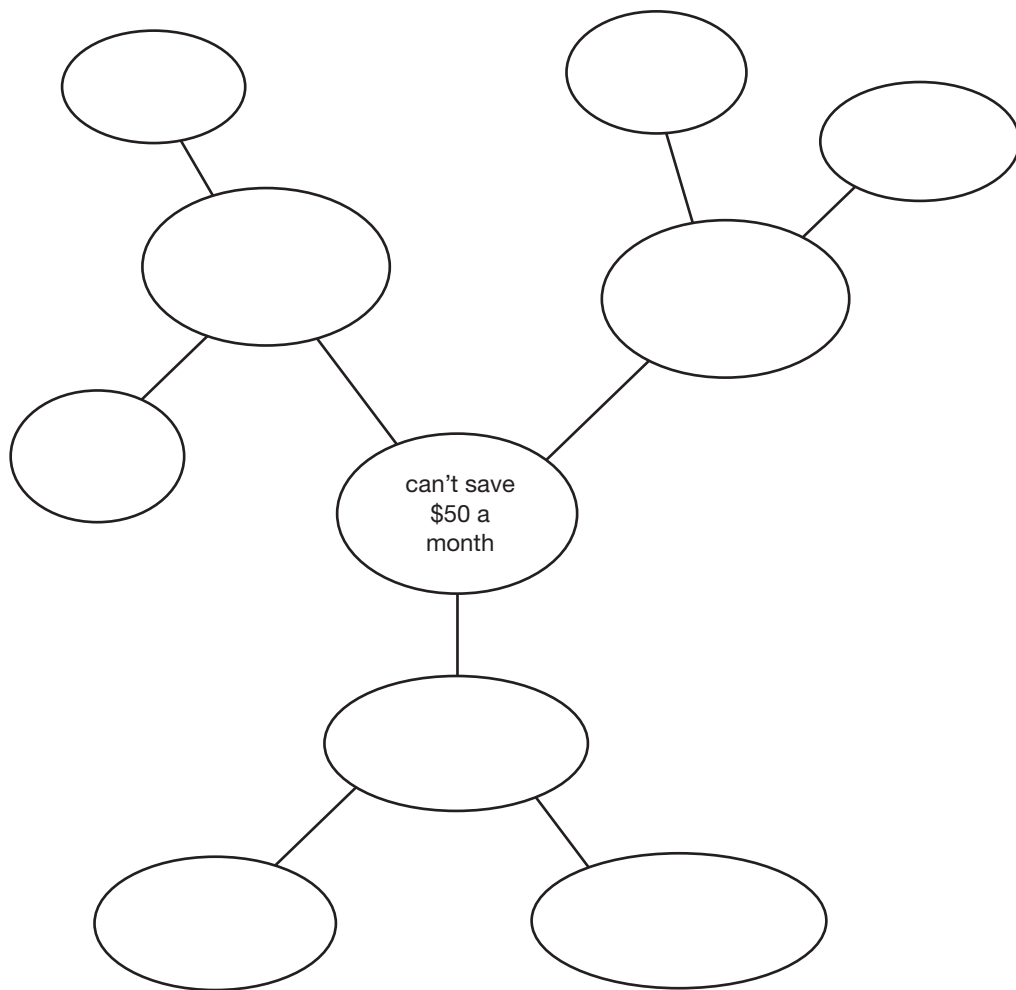
► **Webbing**

Webs are visual organizers that are more structured and complex than concept maps. They are most useful when you are exploring possible solutions to a problem that has a number of symptoms or causes. To develop a web, write your problem in a circle. Next, write the symptoms or possible causes of the problem in smaller, or secondary, circles, each connected to the center by a line. From each of the secondary bubbles, draw smaller bubbles in which you brainstorm possible solutions. Each possible solution is connected to the corresponding secondary bubble by a line.



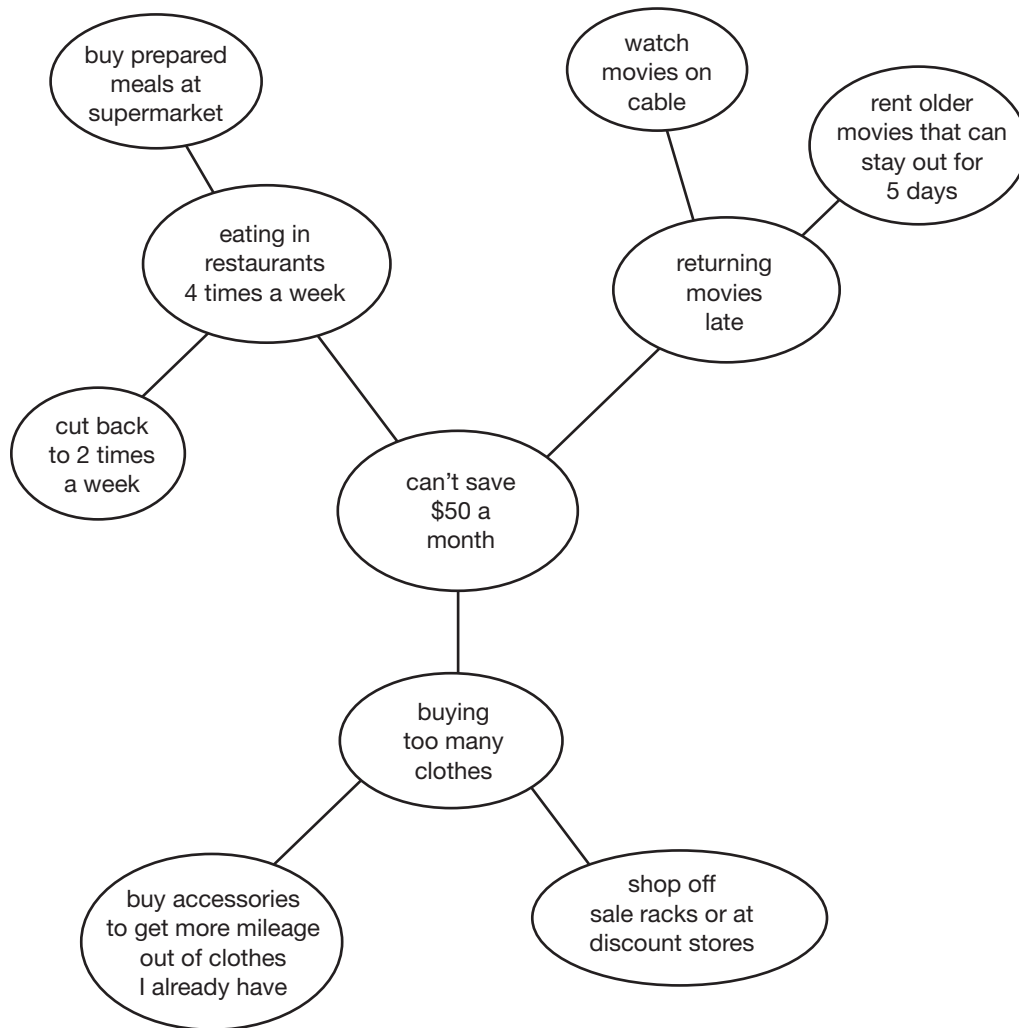
Practice

Create a web for the following problem: you want to deposit \$50 per month of disposable income in an investment account, but never seem to have the money. Causes of this problem are eating out at restaurants four times per week, not returning videos on time and paying late fees, and buying too many clothes. Brainstorm possible solutions using a web.



Answer

Possible solutions:



► **Venn Diagram**

A Venn diagram is an illustration of the relationships between and among a group of objects that have something in common. Like a web, it is useful when you want to find solutions to a problem with two or three symptoms or elements. To create a Venn diagram:

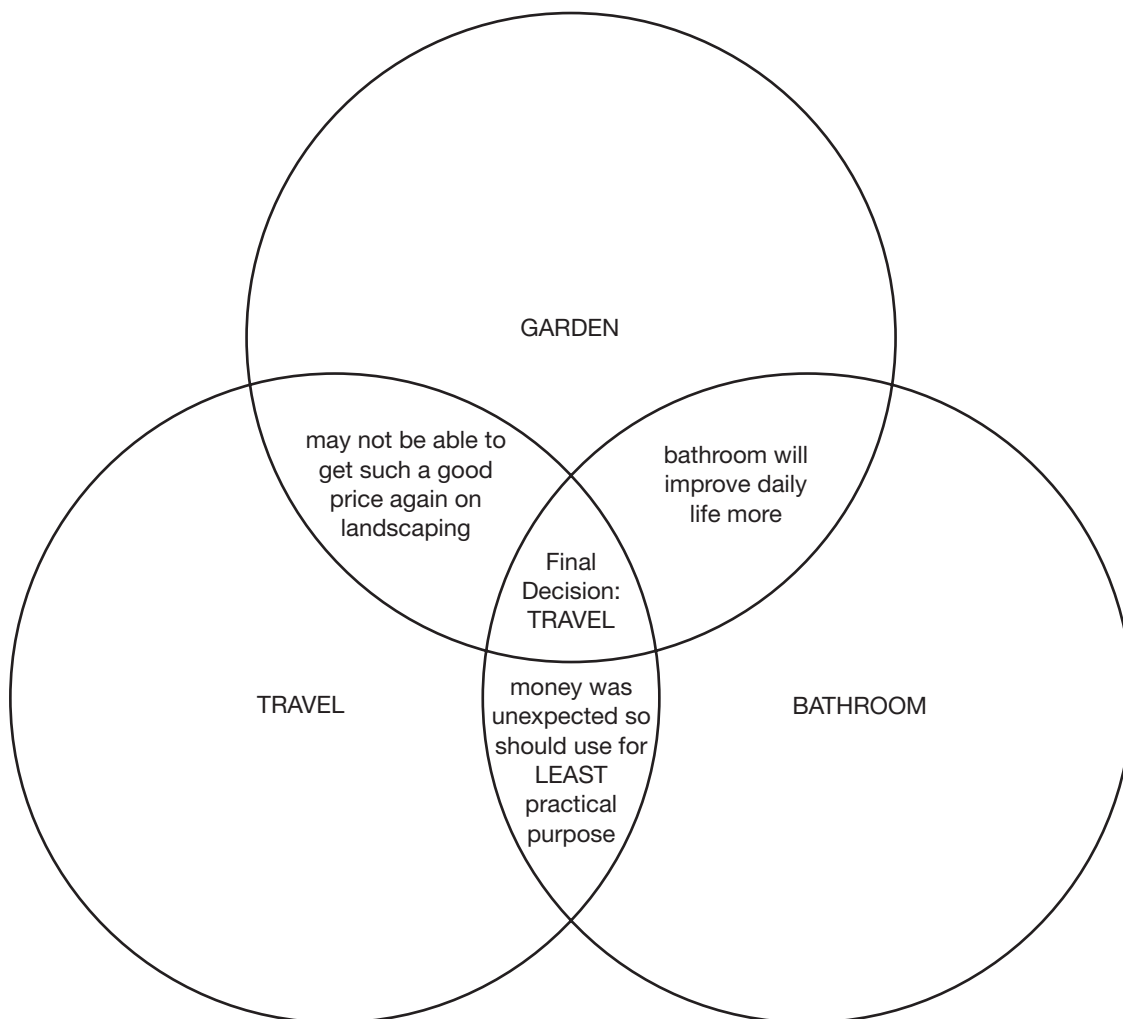
- ask yourself “what are the three symptoms of the problem?”
- write each element in a circle, and have each circle overlap (as shown on the following page)
- ask yourself “what can I do differently to resolve each overlapping set of symptoms, or how can I use these elements together to arrive at a solution?” (circle A and circle B)

BRAINSTORMING WITH GRAPHIC ORGANIZERS

- repeat the previous step with circles B and C, and A and C
- fill in the overlapping areas with your responses

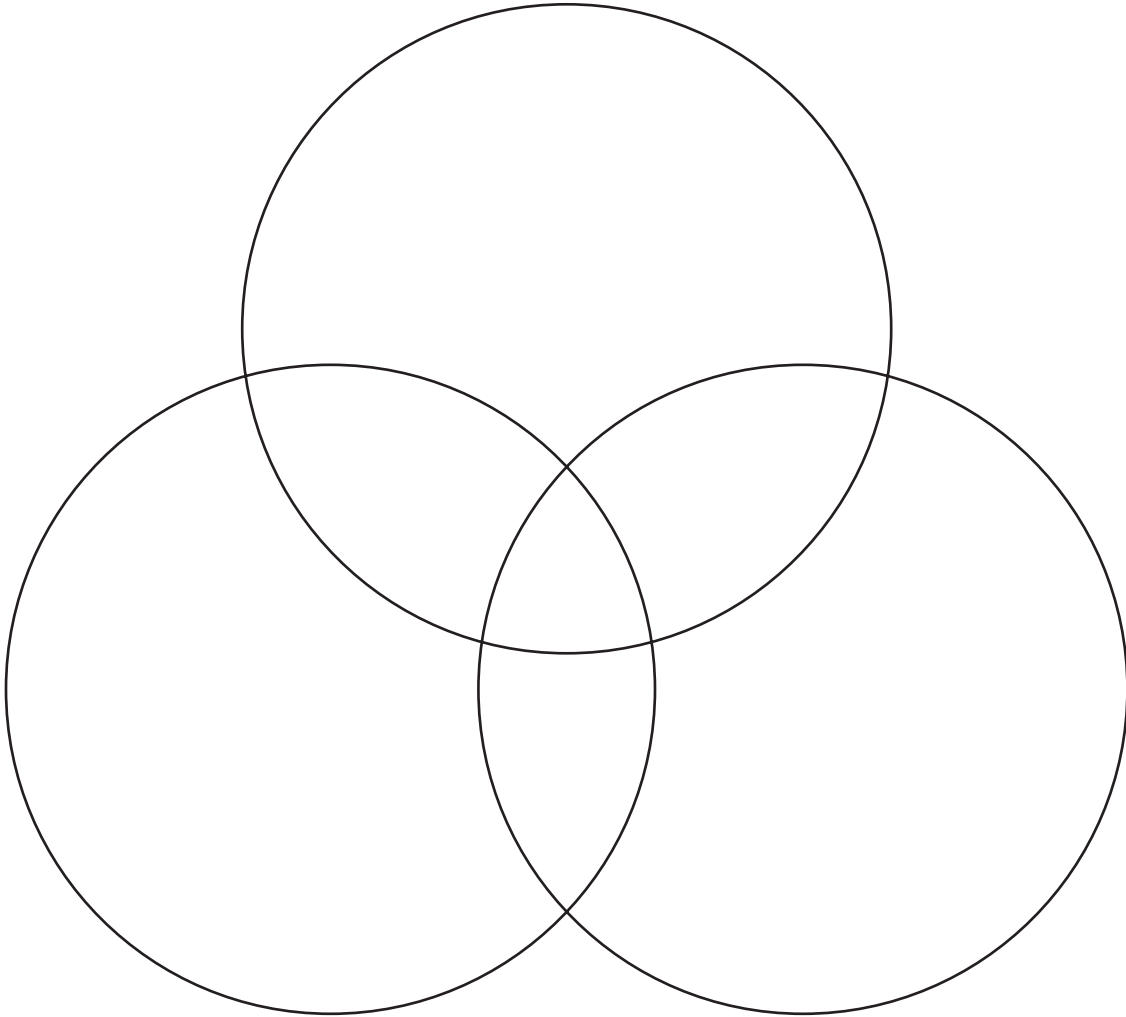
Example

You received \$2,000 from the estate of a distant relative. You always wanted to travel to Europe, but you have also been trying to save money to renovate your dilapidated bathroom. In addition, a local nursery is going out of business and the landscaping project you have only dreamed about could be yours for a 50% discount. To help determine what you should do with the money, create a Venn diagram showing the possible answers and ask yourself which is more important or deserving between each answer.



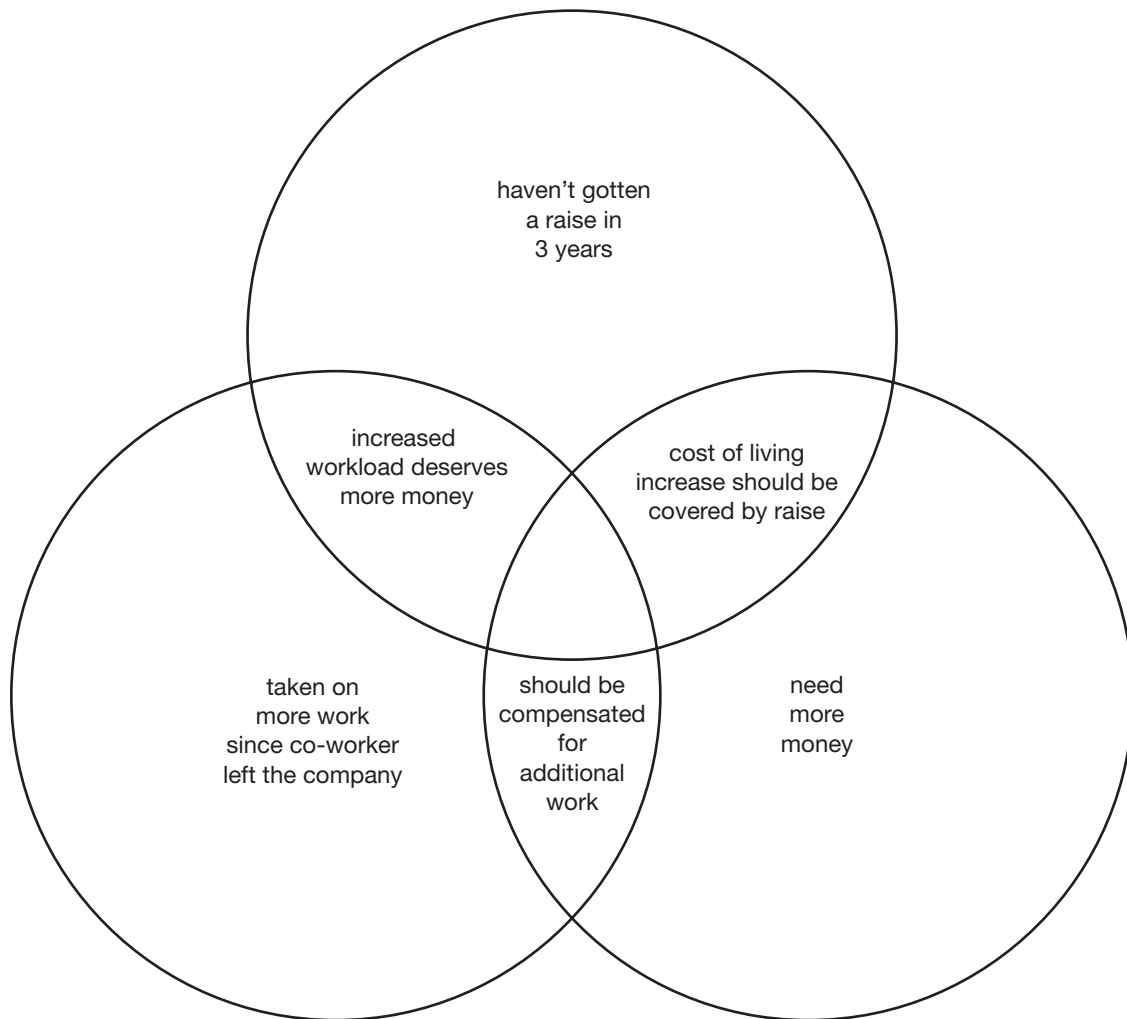
Practice

You are trying to determine whether you should ask for a raise. The three reasons you have come up with to do so are: you need more money, you have taken on more work since a fellow employee left the company, and you have not gotten a raise in three years. Put each reason in one of the circles below, and then brainstorm how to translate those reasons into a raise.



Answer

Possible answers for the overlapping sections are:

**► Chart**

Consider brainstorming with a chart if you have two or more elements that you want to compare and contrast. Charts let you clearly see how each item is similar to the others, and how it differs. In order to make an effective chart, you need to define the elements you wish to compare, and then come up with two or more areas in which to compare them. Then, you may need to conduct some research to accurately fill out your chart. The chart will keep you focused on your purpose, and on relevant information as you conduct your research.

Example

You are trying to decide whether to take a job offer in another state or stay where you are. The considerations are salary, housing, schools, and standard of living. While you already have the salary information, you will need to go to the library or Internet to find out the other facts you need to make your comparison. To guide you in your search, you create a chart that looks like this:

Decision	Salary	Housing	Schools	Standard of Living
Move to Chicago				
Stay in Atlanta				

Practice

You are trying to decide what type of college to attend. Make a chart that would show the similarities and differences between your state university, a community college, and a private four-year school.

Answer

Possible answer:

Choices	Cost	Student-Teacher Ratio	Location	Strength of Major Program
State University				
Community College				
Private Four-year School				

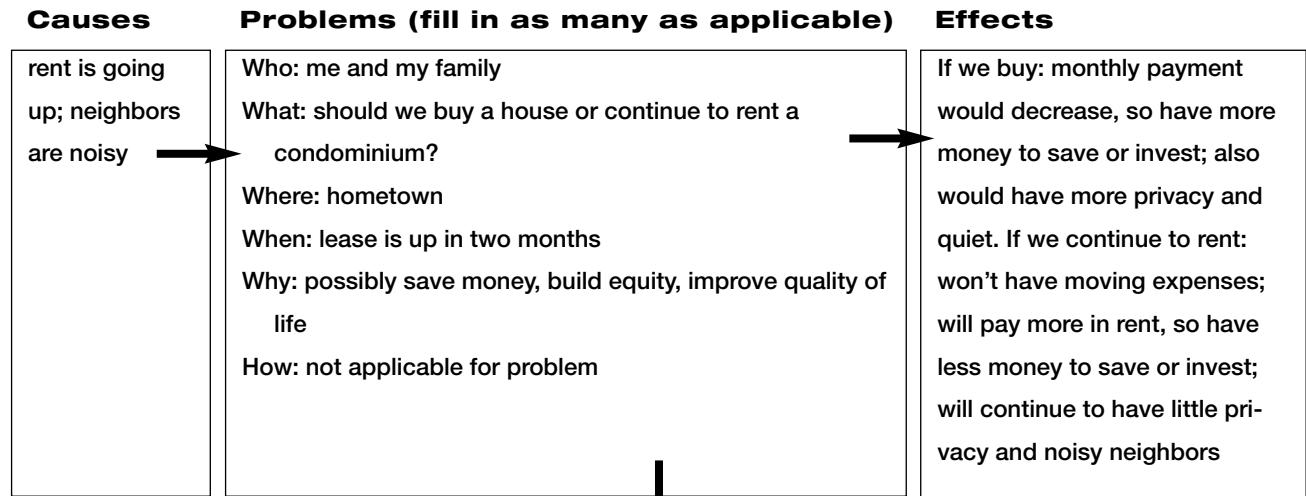
► Problem/Solution Outline

Regular outlines (the kind that use Roman numerals, capital letters, Arabic numbers, and lower case letters) are highly structured graphic organizers that don't work well for brainstorming. It is too difficult to come up with ideas quickly when you are trying to fit them into a complex pattern, such as a traditional outline, at the same time.

The problem/solution outline, however, is more simply structured. This type of graphic organizer is useful because the act of filling it out forces you to:

1. clearly delineate the problem at hand, including causes and effects
2. come up with solutions, and even possible outcomes of those solutions

Problem/Solution Outline Example



Possible Solutions

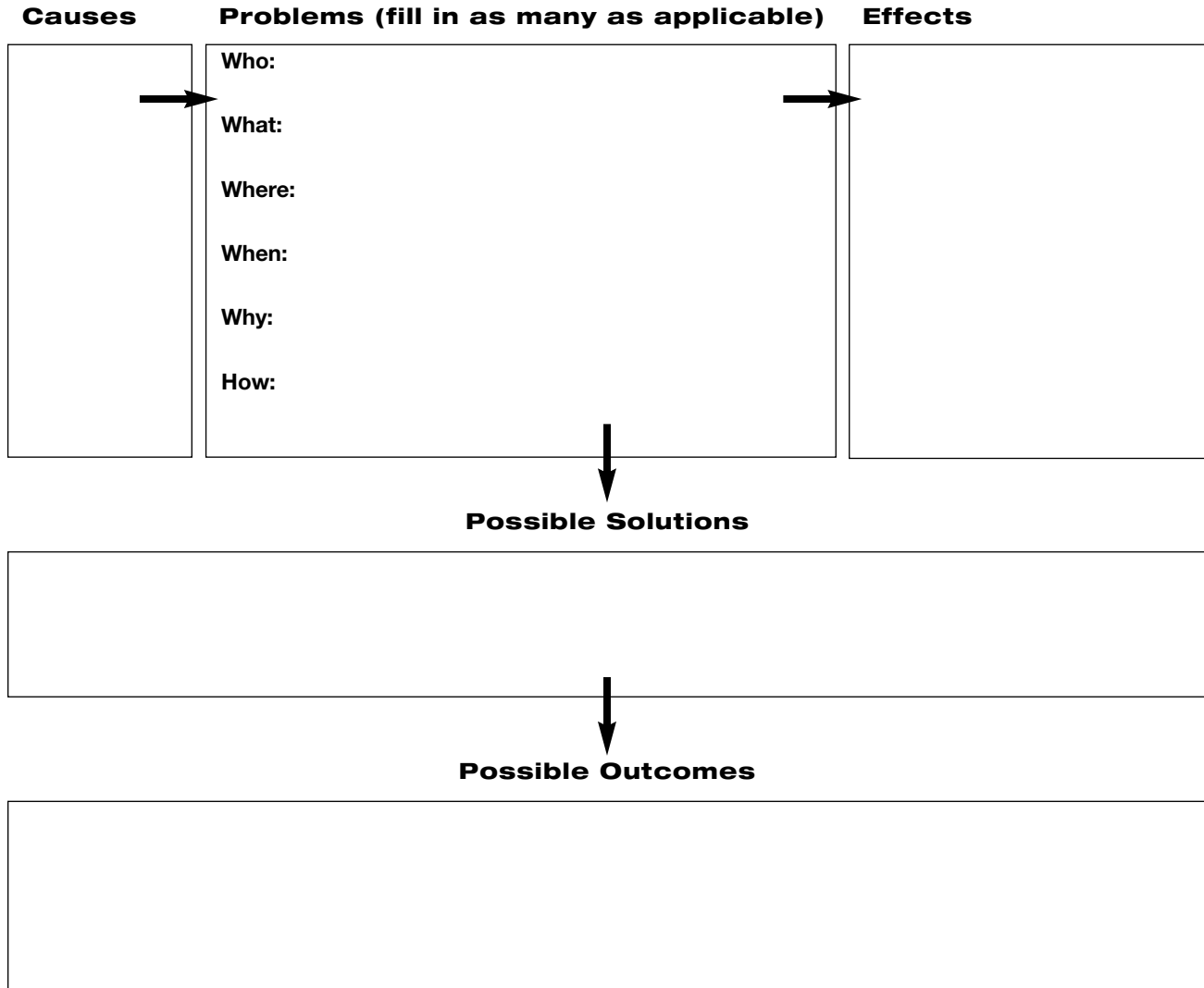
1. establish budget for home purchase, get pre-approved for mortgage, and go house hunting to see if we can find something in next two weeks within budget
2. remain in condo for another year while saving more money for a down payment

Possible Outcomes

1. find suitable house, secure mortgage, purchase house, move in
2. live with noisy neighbors for one more year, have bigger down payment and more time to look for house

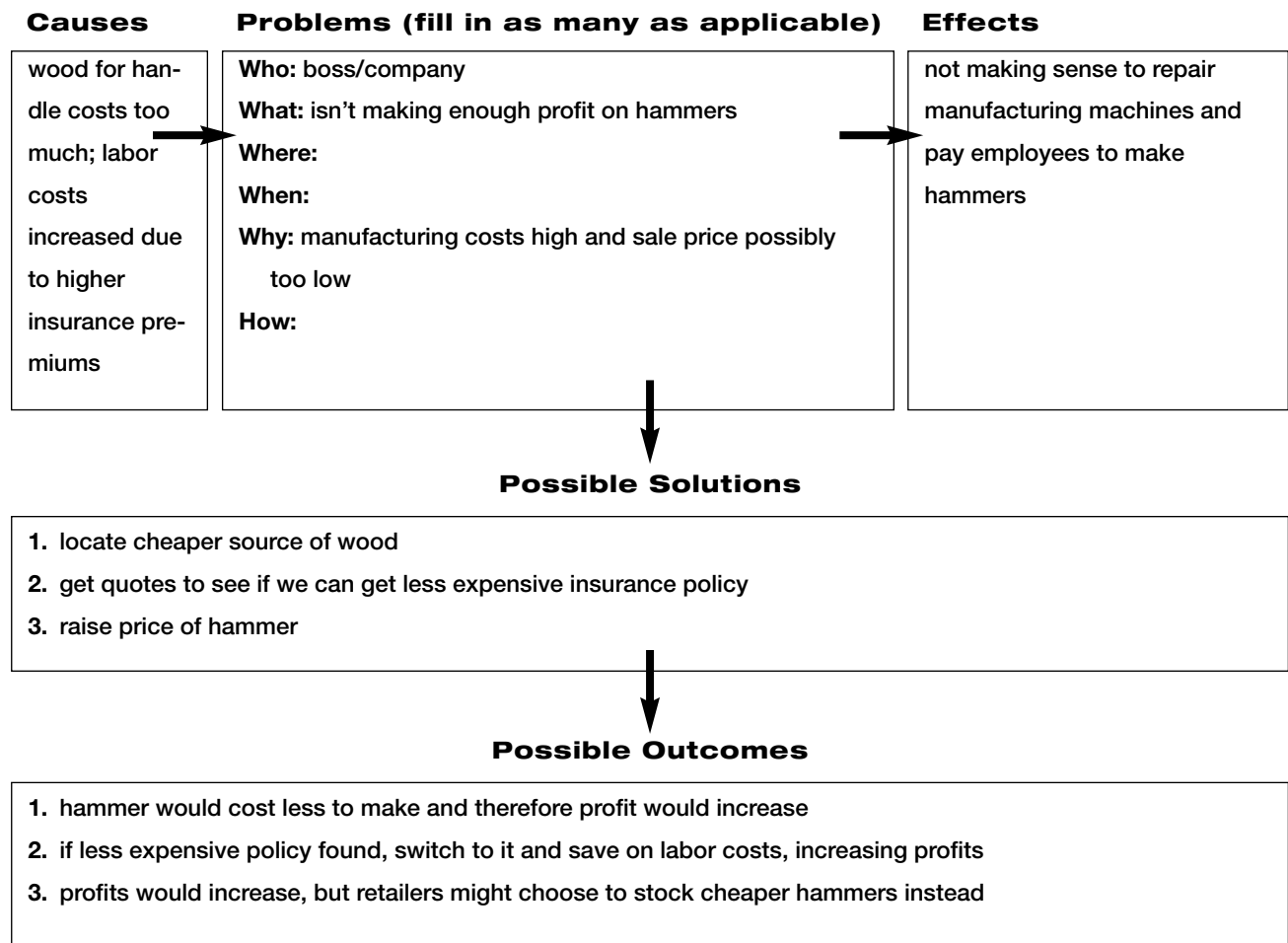
Practice

Your company has been selling its hammers to its distributors for \$3 a piece. It costs \$2.30 to manufacture each hammer. Your boss asks you for ways to decrease manufacturing costs in order to increase profits. Create a problem/solution outline to represent this scenario.



Answer

Problem/Solution Outline



► Roadblock to Brainstorming with Graphic Organizers

If you are having trouble visualizing your problem or decision using graphic organizers, there is most likely a single culprit: you have not followed the previous three lessons and clearly defined the situation you face. It is nearly impossible to fill out an organizer if you don't have a distinct understanding of what you are trying to do. Follow the advice in Lessons 1–3, clarify your issue, and then try again to create a graphic organizer.

► In Short

Graphic organizers are great tools for brainstorming. They create a visual map of your thinking, showing pat-

terns and organization where you might not have expected them. Graphic organizers also keep you focused on your goal, and can clearly point the way to effective solutions and smart decisions.

Skill Building Until Next Time

- Create a chart the next time you are faced with a decision such as which restaurant to choose or where to go on vacation. Use criteria important to you (such as ambience, service, beach, and museums) to compare and contrast your choices.
- Practice creating a graphic organizer by looking back over the past year and thinking about a problem you had to solve, such as one involving your car or a job change. Make a web showing the symptoms or causes of the problem and solutions. Brainstorm and include other solutions in addition to the one you originally chose.

LESSON

5



Setting Goals

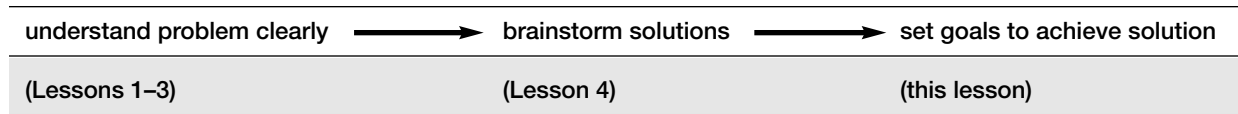
LESSON SUMMARY

This lesson is about making a plan to get you from problem to solution. That plan takes shape when you set a goal. The clearer you are about where you want to be, and the steps you need to take in order to get there, the more likely you are to attain your goals.

WHAT ARE GOALS? Goals are clear statements of things you want to accomplish or solve in the future. They can be about personal, educational, or career aims, such as “I want to become a better soccer player,” or “I will work toward getting a raise in the next six months,” or “I should refinance my mortgage.” They include the specific steps you must take in order to achieve them, creating a strategic plan for you to follow. Goals also identify the obstacles you must overcome and things you might need to acquire, such as knowledge or help from others.

► Why Set Goals?

You have learned how to define and clearly understand problems in Lessons 1 through 3, and how to brainstorm possible solutions in Lesson 4. Goal setting is the next important skill that takes you from being faced with problems and decisions, to solving them effectively.



Setting goals helps you make things happen. Goals give you a focus, and even a map, showing how to get from where you are to where you want to be.

► **Five Qualities of a Valuable Goal**

Valuable goals are:

- **in writing**—create a document of your goal
- **specific**—use as much detail as possible to explain what you want to accomplish
- **measurable**—describe your goal in terms that can be clearly evaluated
- **realistic**—don’t set the goal too high or too low; you must be capable of reaching it with time and effort
- **deadline-oriented**—determine a completion date; the achievement of your goal must hap-

pen in a reasonable time, not “in a few weeks,” or “some time in the future”

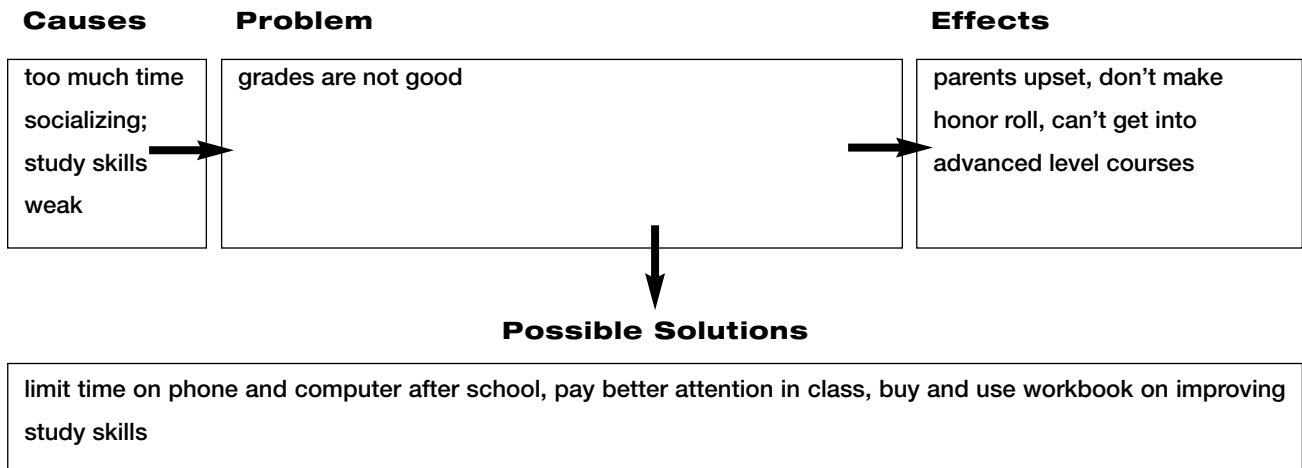
The Goal Setting Chart below is a guideline. Depending on your goal, you may not need to fill out each section, or you may need to add a section or sections. Be flexible, but keep in mind the five qualities described above.

For example, your grades are not good, and you know you can do better. Following Lessons 1–3, you have a clear understanding of the problem. Following Lesson 4, you have brainstormed possible solutions by creating a Problem/Solution Outline that looks like this (next page):

Goal Setting Chart

- Goal:
- What is in my way:
- How I will achieve my goal:
- Step 1:
- Step 2:
- Step 3:
- What I need to accomplish goal:
- Timeline for accomplishing goal:
- Daily:
- Weekly:
- When needed:
- Monthly or long term:
- What I will get from goal:

SETTING GOALS



To create a goal based on this problem, you will need to focus on the solutions you brainstormed, and create a plan to implement them effectively.

Goal Setting Chart

Goal: to get no grade below a B next marking period (which ends March 14)
What is in my way: too much socializing, poor study skills
How I will achieve my goal:
Step 1: cut back on socializing: do not sit with friends during class; no phone calls or computer until homework is done
Step 2: improve study skills; buy workbook on study skills and complete one practice exercise every day; keep notebooks organized by cleaning them out every day after school; make a file folder at home for each class; do homework every day at desk; ask teacher(s) for help if I don't understand something
What I need to accomplish goal: study skills workbook, file folders
Timeline for accomplishing goal:
Daily: no socializing in class or after school until homework is done; study skills workbook, clean out notebooks; complete all homework assignments
Weekly: file assignments, tests, and quizzes
When needed: ask teacher for help; complete missing assignments
Long term: keep up plan for getting better grades
What I will get from goal: better education; feeling of accomplishment; name on honor roll; respect of parents and teachers

Practice

Let's go back to an example from Lesson 4. You were trying to save \$50 a month but had trouble limiting your spending of discretionary income. Using a web, you brainstormed possible solutions. Now, make the monthly investment a goal and use any or all of your possible solutions to complete the following goal chart.

Goal Setting Chart

Goal:
What is in my way:
How I will achieve my goal:
Step 1:
Step 2:
Step 3:
What I need to accomplish goal:
Timeline for accomplishing goal:
Daily:
Weekly:
When needed:
Monthly or long term:
What I will get from goal:

Answer

Answers will vary depending on brainstormed possible solutions. Using the answer from Lesson 4, the goal chart looks like this:

Goal Setting Chart

Goal: to save \$50 a month
What is in my way: spending too much so I do not have the money to invest (habits I need to break)
How I will achieve my goal:
Step 1: limit restaurant meals to two times a week; buy takeout from supermarket other nights; buy cookbook and pick out one recipe a week to try
Step 2: rent one movie a week, put in briefcase when done watching it so I will return it on way to work
Step 3: limit clothing purchases to \$100 a month; watch ads for sales and shop them
What I need to accomplish goal: willpower to change habits!
Timeline for accomplishing goal:
Daily: read newspaper for ads for clothing sales; shop for and/or eat dinner according to weekly plan
Weekly: rent one movie and return it the next day; make a plan for each night's dinner (restaurant, take out, cooking)
When needed: shop for clothes on sale
Monthly or long term: set up investment account, and have \$50 automatically withdrawn for bank account each month
What I will get from goal: money to use for long-term goals and/or emergencies

► What Becomes a Goal?

When you are brainstorming, you come up with various possible solutions to a problem. But which one is worth pursuing? Goal setting is about choosing the best solution and creating a plan to make it happen. To do this, you need to clearly define your goal. What is it, exactly, that you wish for an outcome? Since every possible solution is different (by varying degrees) it can lead to different outcomes. Evaluate the ideas you came up with during brainstorming based on the specific criteria you set for your goal.

Example

You work for a company that manufactures running shoes. Compared to figures from a year ago, profits and sales are slumping. You are asked to come up with a solution that will increase both. While brainstorming, you come up with three possible solutions:

- a. start a major marketing campaign
- b. limit the availability of the product/service to increase demand
- c. lower costs so that profit margins are increased

Let's look at each of these possible solutions and their probable outcomes. A large marketing campaign would most likely increase sales. Limiting the availability to increase demand would eventually lead to higher prices and greater profits, with a possible increase in sales. But lowering costs would most likely result in increasing sales and is a better way to increase both sales and profit. Therefore, it makes sense, once you have evaluated your possible solutions in terms of possible outcomes, to choose solution c.

Practice

Your bathroom needs a major repair due to a plumbing leak under your bathtub and you decide it is a good time to renovate it. Everything is dated, the toilet tank is cracked, the faucets leak, and the tiles are an unappealing avocado green. The tub must be destroyed in order to fix the leak. You have worked out a budget after pricing new tiles, tub, vanity, sink, and toilet, and getting a quote from the workmen who will install them. The problem is that you don't have \$2,500 sitting around to pay for the job.

After doing some brainstorming, you come up with three possible solutions:

1. charge everything on a credit card
2. take out a home equity loan
3. have just the plumbing repair done now, which costs \$700, and wait to do the rest of the job later

How should you proceed?

Answer

There are three possibilities. The answer lies in how you define your goal and how you evaluate the possible solutions in light of that definition. Therefore, the first step is to clarify your goal. Your bathroom is dated and in disrepair, and you would like to redo it. This seems like a good time, because some of the tile, as well as the tub, is going to be torn out and replaced in order to fix a leaky pipe.

The first possible solution, to charge everything on your charge card, could work. You need to figure out how much you could pay each month and the interest rate you would be charged. How many months would it take to pay off the debt and how much would it cost? If the answer is quickly, and the interest charge is low, this solution would make sense.

Solution 2 makes sense if the interest rate is lower than the credit card. You might even be able to deduct the interest you pay from your income tax. If the cost of borrowing the money from the bank, using your home as collateral, is lower than solution 1, this is the best choice.

Solution 3 will cost you no money in interest because you will not need to borrow. However, you will also still need to redo your bathroom and have to temporarily patch up areas where tile was removed. If solution 1 or 2 is not too costly, it probably makes sense to choose one of them. You must have some major demolition work done to fix the leak, and the plumber will already be at your home. This is the time when you can get the whole job done least expensively.

► Roadblock to Setting Goals

A common problem with goals is that they are set too large. If they cover too much ground, or are about accomplishing something that will take a long time, your goals may be difficult to reach or you may grow tired of your plan before you complete it. When you set

a goal, look at the number of steps you specified as well as your timeline. Do the size and time period seem reasonable? Can you picture yourself following the plan as you wrote it to its conclusion? If you have a doubt,

it may be best to break down the original goal into smaller, more manageable ones.

For example, your goal is to ask for a raise in six months. You have filled out a goal chart as follows:

Goal Setting Chart

Goal: I will ask for a raise in six months.
What is in my way: my job performance evaluation last month rated me “average”
How I will achieve my goal:
Step 1: I will work longer hours and get more done at work
Step 2: I will do become more knowledgeable about my company and figure out ways to use my skills to my and my company’s advantage
What I need to accomplish goal: time, knowledge
Timeline for accomplishing goal:
Daily: be the first one into work and the last one out at night
Weekly: write a memo to my boss about what I have accomplished; check news for any stories about my company; read all material published by my company, including prospectus and other stock holders’ information
When needed: meet with my boss to tell her about special accomplishments
Monthly or long term: check to see if I can help other employees with their projects
What I will get from goal: better evaluation, chance to get higher salary

Evaluate this goal in terms of its objectives and timeline. This person is giving himself six months to improve his job performance and to learn more about his company, which does not seem unreasonable. But look at the timeline. He expects that he will do all of these things for the next 26 weeks, which could be difficult. Come in early and leave late every day? It would be better to break down the goal into more manageable pieces that he would not become tired of. Perhaps he could even leave the deadline in place, but change the timeline. For instance, the overall goal is to ask for a raise in six months. For the first month, he will con-

centrate on improving his image with his boss by coming in early and leaving late. Then, during the second month, work hard during normal business hours, and concentrate on reading information about the company at home on the weekend. During the third month, he might check for news items about his company once a week, but concentrate on brainstorming ways to help other employees.

By breaking down the one large goal with its six-month timeline into smaller goals of one month each, the employee is more likely to follow through with his plan. This point goes back to the fourth quality of a

valuable goal (see page 44): they are realistic. Be honest when you evaluate the goals you set. If you have doubts at the beginning as to whether you can accomplish it as set, go back and try to break it down into more manageable pieces.

► In Short

This lesson shows you how to set goals that you can achieve, every time. By using the goal setting chart, you

create a map that helps lead you from problem to solution. Setting goals requires you to think through a strategy and break it down into manageable steps. It means setting a deadline, and deciding exactly what you will do, and when, in order to achieve your goal. It also means choosing the right possible solution as your aim and honestly evaluating your goal to be certain it is reasonable. By setting good goals, you can move from where you are (faced with a problem or decision) to where you want to be (having an effective solution).

Skill Building Until Next Time

- Choose a short-term goal for yourself, such as a household repair. Using the list of five qualities of a valuable goal (see page 44), determine how you will get the repair accomplished. Set a deadline, be specific about what exactly you need to do, and write it all down as a visual reminder of what you will accomplish.
- For a longer-term goal, such as going back to school or something else that will take you a few weeks or months to achieve, use the goal setting chart. Break down the goal if necessary and include every step you must take, as well as when those steps will be taken. Create a map that shows how you will get from where you are to where you want to be.

L E S S O N

6



Troubleshooting

LESSON SUMMARY

This lesson is about taking care of the large and small problems that can get in your way and stall your progress.

TROUBLESHOOTING IS ABOUT thinking ahead. Before things do not go as planned, before you are faced with huge problems, you think through your situation, identify issues that could get in your way, and take care of them. When you troubleshoot, you anticipate what might go wrong and keep problems from growing by resolving them when they are of a more manageable size, or, you prevent them from coming into existence in the first place.

Troubleshooting is also about taking care of the setbacks that can stall you as you work toward reaching a goal. From small annoyances to major setbacks, these problems must be resolved in order to get where you need to go.

► Identifying Problems That Interfere with Goals

After you set a goal and begin working toward it, you will inevitably be faced with a roadblock or two. You learned in Lesson 1 that you can't solve, or "troubleshoot" problems without first acknowledging them and

that holds true for the problems that interfere with your goals. Some of these problems are foreseeable; that is, you can anticipate them before you even begin to work toward your goal. Others are unexpected and must be dealt with as they arise. Unexpected problems are usually easier to spot, and easier to solve, even though you have not prepared for them. Identifying foreseeable problems takes more work. You must honestly assess the goal you wish to achieve and think critically about what must be overcome in order to achieve it.

An example of a foreseeable problem may be found in Lesson 5, in which a goal-setting chart was presented. The goal is to get better grades, and the student notes that “too much socializing” and “poor study skills” are the problems in his way. Before he even begins to work toward achieving better grades, he knows what he must overcome or solve in order to successfully reach his goal. Note that both problems are probably not simple for the student to solve, as they require breaking habits and acquiring new skills. Socializing less means spending fewer hours with friends—not a desirable thing to do. Improving study skills involves finding and learning information.

Unforeseeable problems are typically inconveniences that get in your way as you work toward achieving your goal. For instance, you are doing some research for your boss and need a particular book from your local university’s library. When you go to pick it up, you find that it is already checked out. Another example of an unforeseeable problem is technology hang-ups. Your computer could crash, or your printer could break down as you are trying to get a report done by a deadline. These problems are relatively easy to solve. In the first case, you have a number of possibilities. You can ask for the book to be returned, ask the library to check other libraries for the book, or even look for it at book stores if the price is reasonable. Technology problems might take an expert to fix, but in the meantime, you

could find a temporary solution such as working from a backup disk on someone else’s equipment.

Unexpected problems, by their nature, can’t be planned for. You must simply figure out the best way to solve them quickly and thoroughly and then get back on your path. The rest of this lesson focuses on troubleshooting the first type of problem, because it is more complex, being more difficult to find and more difficult to solve.

Practice

List at least two of each type of problem that could arise in the following scenario. Note that while this example involves a business setting, very similar problems occur both at home and at school. When you are busy and your schedule is tight, you should be thinking seriously about troubleshooting.

Lee has a meeting with his boss and three coworkers at 10:30 to discuss new business. He is expected to present some ideas for landing a specific new account. He also has a conference scheduled across town at a major client’s offices for 11:30, in which he is to give an update on progress made on the account.

Foreseeable Problems:

Unexpected Problems:

Answer

Responses will vary, but should include:

Foreseeable Problems: Lee needs to adequately prepare for both meetings, which could take more time than he originally scheduled. He may have to work late the night before, or put off other tasks until he is ready for the two meetings.

Unexpected Problems: the first meeting could run over its allotted time, making Lee late for his second meeting; Lee could have difficulty getting to the client's office due to traffic, unavailability of taxis, etc.; Lee's presentation could go poorly at one or both meetings.

► Troubleshooting Problems That Interfere with Goals

Troubleshooting foreseeable and potential problems can be difficult. It requires critical thinking skills to examine the path to your goal, and imagine or note all of the things that might go wrong as you work toward achieving it. For example, you had minor outpatient surgery and received a bill for \$8,500. You can submit it to your insurance company which will cover 80% of the cost. However, the company has rules for filing claims, including that they be submitted no later than 30 days after treatment. If you wait two months before trying to get reimbursed, you will lose \$6,800.

Let's look at this problem in terms of troubleshooting ahead of time. You have a very expensive bill to pay. You can solve that problem by filing a claim with your insurance company because it is a covered expense. How can you determine the potential problems that could prevent you from being reimbursed \$6,800? The best way is to familiarize yourself with all of the rules of your insurance company. Do they require

the hospital to bill them directly? Do they require pre-approval? Do they have a time limit for claim filing? Once you understand exactly what they demand, you can follow their rules and get reimbursed. Your potential problems, in other words, are defined in this case as the rules for reimbursement. If you do not follow all of them, you will not get your money.

Practice

You agree to take your friend's one-year-old son for an afternoon while he attends a business meeting. You don't know much about children, other than having once been one yourself. How can you troubleshoot the problems that you imagine you might encounter? Circle all answers that apply.

- a. Ask another friend with a baby to teach you how to change a diaper.
- b. Rent some videos a one-year old boy might like.
- c. Read some child-rearing books.
- d. Do some comparison shopping for size 12-month clothes.

Answer

All responses except choice **d** are examples of troubleshooting. You will not be expected to provide clothes for your friend's child but you will need to change his diaper and entertain him. Child-rearing books could give you some advice on how to handle the boy.

► Prevention Versus Cure

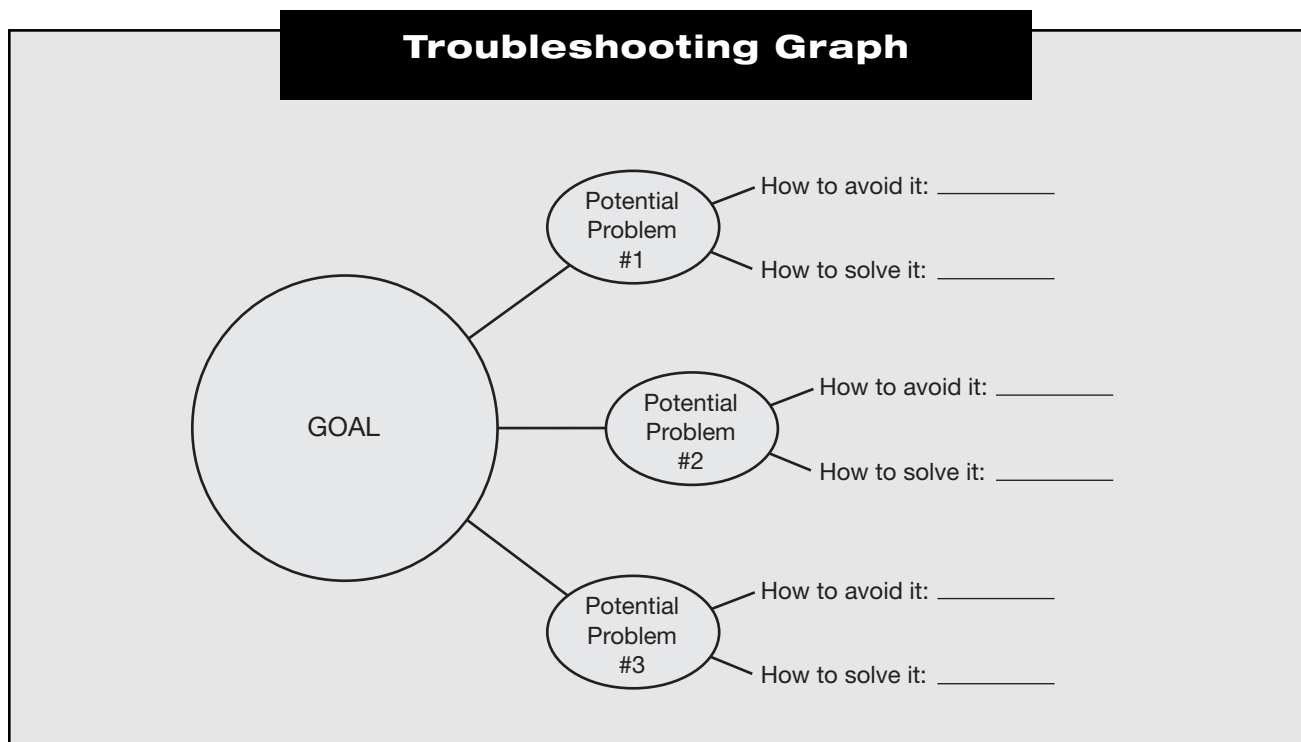
Another type of troubleshooting involves problem-causing trends. If you are constantly faced with the same type of problem, you should look at how to prevent it in the future. Figure out what is causing the problem and how you make changes to stop it from

recurring. By employing this type of troubleshooting, you prevent a problem rather than always trying to solve it each time it occurs.

Perhaps your boss meets with his boss every Friday morning to give an update as to your department's progress. You begin to notice a trend. At 4:00 P.M. every Thursday, your boss starts to become irritable. He asks you to summarize what you and your colleagues have accomplished during the week. He always needs the summary in an hour, no matter what other urgent business you have to tend to. Some weeks, you have had to drop important work to write the summary and it has given others the impression that you were not working hard enough. There are a number of ways in which you might prevent another such Thursday afternoon, rather than simply dealing with it the same way week after week.

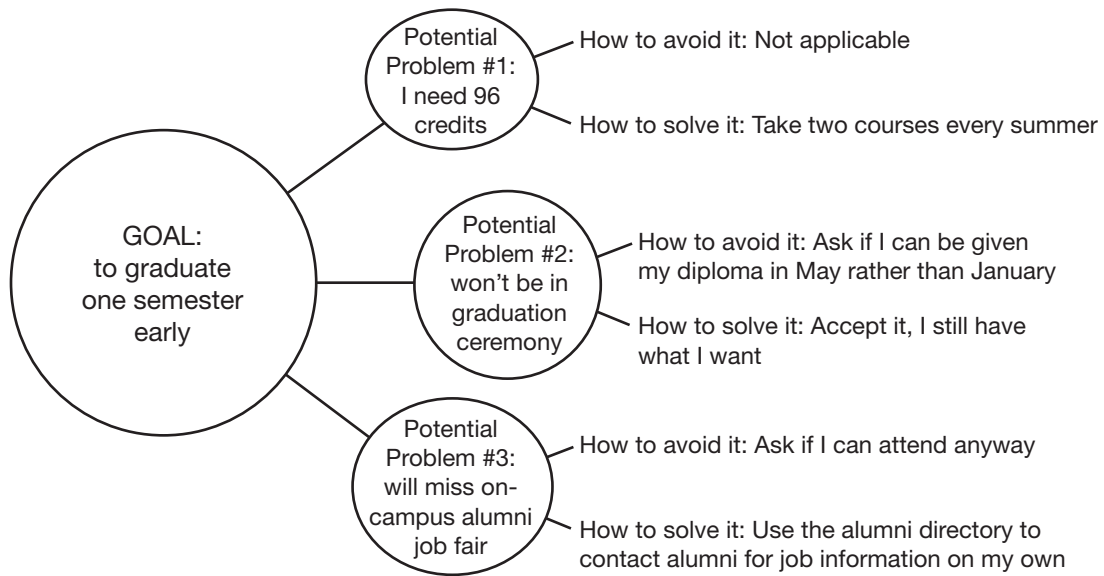
You could ask to speak with your boss about the summaries, and find out if this will be your responsibility each week. If it is, you might consider asking your boss to alert the others in your department that every Thursday you will be busy from 4:00–5:00, so everyone is clear about what you are doing. Another possible solution would be to clear your own schedule on Thursday afternoons, or even begin work on the summary on Thursday morning, or even earlier in the week. If you know you will be expected to complete this task, you can troubleshoot by preventing it from becoming a crisis. Take control of your work schedule and be ready every Thursday for the inevitable job of writing the summary.

Below is a graph you might want to use to explore possible troubleshooting methods. It can work for preventative troubleshooting, as described in the section above, or for anticipated problems that will occur whether you are prepared for them or not.



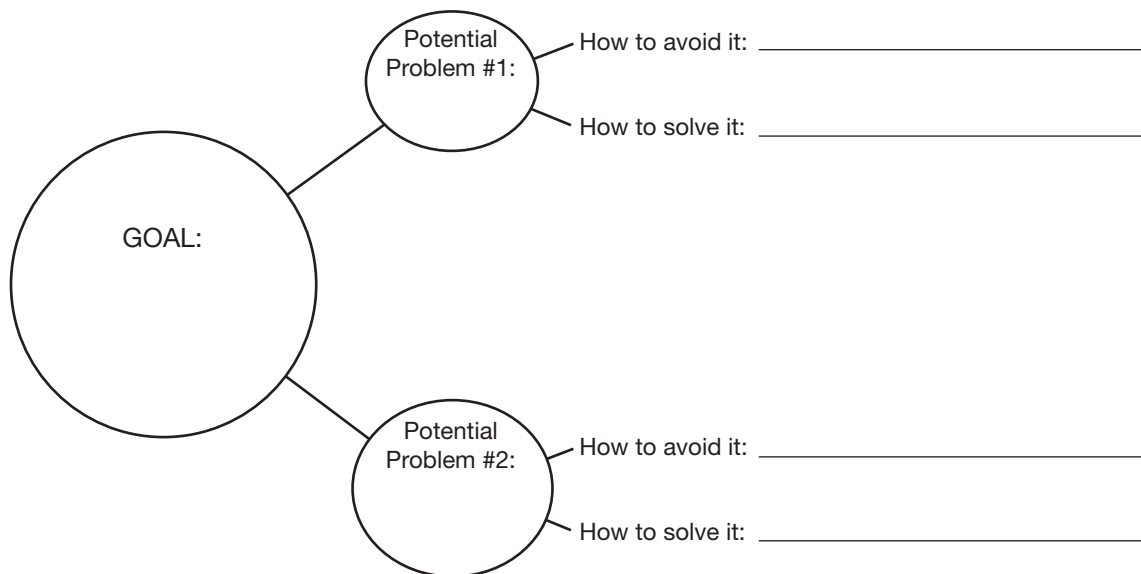
TROUBLESHOOTING

Here is a graph that has been completed to show what might happen if your goal was to graduate one semester early.



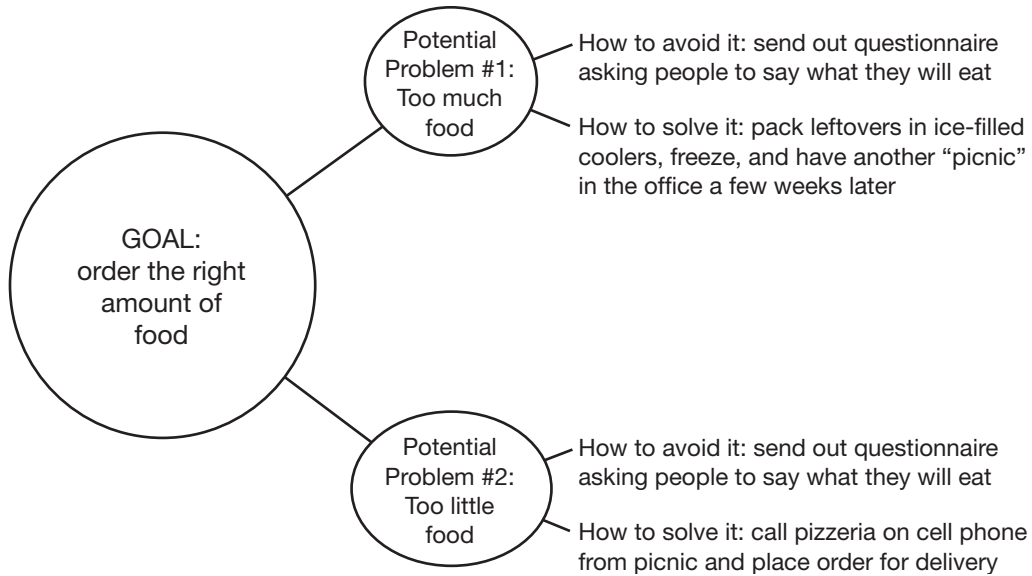
Practice

Scenario: you are asked by your boss to order the food for your annual company picnic. She anticipates that 70 coworkers will attend. Last year, 65 people were at the picnic and they consumed 50 hamburgers and 40 hot dogs. You know there will be a problem if you order too much or too little food. How can you troubleshoot these problems?



Answer

Answers will vary, but yours might include:

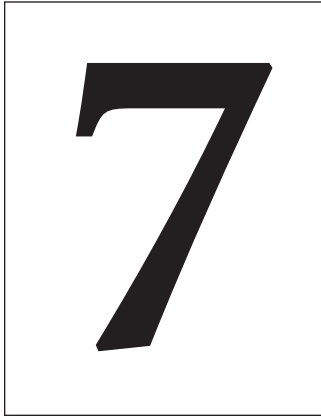
**► In Short**

Troubleshooting begins with identifying those problems that will or may get in the way of your achieving your goals. You might know about them ahead of time, and even be able to prevent them, or keep minor problems from becoming major. Or, you may encounter them as they arise without warning. Either way, knowing how to find solutions and move forward will ensure that you reach your destination.

Skill Building Until Next Time

- Practice troubleshooting someone else's problems. When a friend tells you about his or her current dilemma, think about how they might have prevented it or how they can solve it.
- Practice troubleshooting a global issue. Read a few articles on an issue of international importance, such as the crisis in the Middle East or global warming. Use the troubleshooting graph to work through possible ways to avoid or resolve the problems that may or will result from this issue.

LESSON



Finding Resources

LESSON SUMMARY

Sometimes you may find yourself facing a complicated decision for which you do not have all the facts to resolve. Other times, especially at work or school, you may be asked to justify your decisions. This lesson is about finding the information you need to make decisions and create solutions.

THERE ARE MANY problems and decisions that require little more from us than sorting through familiar details. For instance, you do not need to gather much information to decide about whether to ask for a raise or when to study for an exam. You already know the facts; you must simply use them wisely to come to a decision.

But what if you do not know what to base a decision on? What if there are factors that need to be considered that you are not familiar with? Thinking critically means being armed with accurate information, because the quality of your solutions and decisions is only as good as the information you use to make them. This lesson considers three types of resources: the Internet, the library, and human resources. The next section explores each, explaining when to use them, the best ways to get the most out of them, and their possible shortcomings.

► Internet Resources

Although you are literally able to access billions of websites, research on the Internet does not have to be confusing. You just need to know what you are looking for and determine the best way to find it. There are three basic search methods. The first is to use a search engine, such as Google (www.google.com) or AllTheWeb (www.alltheweb.com), enter search terms, and find links to the information you are looking for. You can also use meta-search engines, which go through many sites at one time. For example, SurfWax (www.surf-wax.com) searches Yahoo!, AOL, CNN, WiseNut, LookSmart, and others, and lists the results together. Neither search engine distinguishes between “good” and “bad” sites. They simply list everything they can find (sometimes thousands of links) that meet your search criteria.

Another way to search the Internet is by using subject directories. The great advantage of this method is that the sites the directories list have been chosen by qualified people. Websites deemed to be of poor quality are less likely to make the directory. Some directories even hire experts in various fields to write guides to their chosen subjects and also to provide links to related sites. Recommended subject directories include:

- About.com (www.about.com): over 50,00 subjects with links to a million websites
- Academic Info (www.academicinfo.net): consistently maintained to add free educational resources (for late high school level and above) while weeding out outdated ones
- Librarian’s Index (www.lii.org): over 11,000 Internet resources selected as “the best” by librarians
- Infomine (www.infomine.ucr.edu): aimed at university-level instructors and students, contains 115,000 Internet resources selected by university librarians

- Yahoo! (www.yahoo.com): links by subject to more than two million sites

The third way to find what you are looking for on the Internet is to search directly on a site at which you believe the information may be found. Here is a short list of such sites.

Encyclopedias

Xrefer.com: London-based reference book search engine; searches over 50 encyclopedias, dictionaries (in many categories), and thesauri

Encyclopedia.com: Columbia Encyclopedia, 6th edition

Britannica.com: the first few paragraphs of each article are free, so if you need very basic facts, chances are you will get them; for \$50 per year you can have total access to the site

Encarta.com: some entire entries are free, others are blocked to those who have not paid \$69 per year for the CD-ROM or DVD

Education.yahoo.com/reference: search the American Heritage Dictionary, Gray’s Anatomy, the U.S. Government’s World Factbook, and others

Dictionaries

Dictionary.com: searches a dozen dictionaries at one time, including American Heritage (fourth edition), Webster’s Revised Unabridged (1998), Princeton University’s WordNet, and the CIA World Factbook

M-W.com: Merriam Webster’s older dictionaries searched free; for access to the new eleventh edition, the annual fee is \$14.95 (merriam-webstercollegiate.com)

Other Fact-Checking Sites

www.bibliomania.com: search for author biographies, as well as through full texts of fiction, drama, and poetry

www.findarticles.com: search back issues of over 300 magazines and journals covering a wide variety of subjects

www.nilesonline.com/data: links to find statistics and other facts about government, crime, health, politics, and more

www.refdesk.com: find maps, calculators, currency converters, newspapers (from local U.S. to international), as well as dictionaries and encyclopedias

www.martindalecenter.com: check facts on everything from world poetry to organic chemistry, patents to computer viruses

Practice

Answer (T) true or (F) false for the statements below.

- ___ 1. Search engines direct you to the best sites about the subject you are researching.
- ___ 2. Doing research on the Internet sometimes costs money.
- ___ 3. Subject directories are created by computers.
- ___ 4. Some search engines search many other search engines at the same time.
- ___ 5. You can only find statistics at a library.

Answer

1. False
2. True
3. False
4. True
5. False

► Roadblock to Good Resources

What is the most common obstacle to finding factual, pertinent information? It is the proliferation of poorly researched, or even knowingly false, data. Primarily found on the Internet, fiction posing as facts, or simply slipshod work, can look like the real thing because legitimate websites with accurate content reside side-by-side with poor quality sites. It can be difficult to tell the difference.

The best way to avoid reliance on poor information is to be suspicious. Do not take any information you find on the Internet as truth until you can substantiate it with duplicate information on at least three other sites. Read the tips in Lesson 8 for more about evaluating the quality and content of websites.

Practice

You are building a house and need to decide how to heat it. The contractor can put in a natural gas, propane, or electric furnace. You want to choose the option that is the least expensive to operate. A search on the Internet yields five results. Which website(s) will most likely have the information you need to make a decision?

1. www.epa.org: the Environmental Protection Agency
2. www.ashrae.org/: the American Society of Heating, Refrigerating, and Air-Conditioning Engineers
3. www.forestry.ext.edu: educational site about the use of wood in home heating units
4. www.electricfurnaceswebe.com: retailer of electric powered home heating units
5. www.energycodes.gov: Kansas State University's Engineering Extension website

Answer

Numbers 2 and 5 will probably contain the most accurate, pertinent information. The EPA site considers environmental factors, such as pollution, which may result from certain types of home heating. The forestry site is not relevant to your decision. A retailer of furnaces is in business to make a sale, not necessarily to give you accurate information about how they compare to a competitor's product.

► **The Library—Print Resources**

Although it might sometimes seem otherwise, everything of interest that has ever been written is not on the Internet, nor can it be searched for on the Internet. There are still five important reasons to do research at the library.

1. **Librarians.** They are trained professionals who know how to find what you are looking for, whether in the stacks or online.
2. **Non-searchable print.** There are millions of books and other print materials that have not made it to the web. Most of the American Library Association's "Outstanding Reference Sources" are not online. In addition, the human power to key in or scan every old, deteriorating text, such as back issues of journals, magazines, and newspapers, does not exist. But they may be found in libraries either in print or on microfilm or microfiche.
3. **Reliability of information.** Not all of the information you find on the Internet is accurate. Anyone can "publish" online, and it is not always easy to distinguish between reliable and unreliable websites. Many sites containing bogus information appear professional and

well-written (see Lesson 8 for information on how to evaluate a website). Published books and periodicals, on the other hand, have been through many layers of safety nets before they reach the shelves of a library. They are typically written, edited, proofread, fact-checked, published, and then selected by a librarian for purchase.

4. **Finding anything that is not historical or current.** The Internet is a great resource for information that is either very old or very new. For instance, you can find the Magna Carta, and current state and federal statutes, but legal research on anything in the early to mid-twentieth century is difficult to nearly impossible on the Internet.
5. **Price.** The use of a library, including all of its electronic services, is free. Some of the research resources on the Internet are not. There are sites that give away some information, but charge for full access to their site. Others will not let you in at all unless you are a subscriber. Some Internet resources charge prohibitively high subscription prices, such as the Oxford English Dictionary (currently \$550 per year). Libraries often pay these prices and provide full access.

Practice

List five types of information you are more likely to find in a library rather than on the Internet.

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

Answer

Responses will vary, but using the guidelines in this section on Library Resources, you may have mentioned topics that might be found in back issues of local newspapers or periodicals, or in reference books that charge high subscription rates on the Internet. Also listed could be facts about obscure subjects or documents from the early to mid-twentieth century.

► Going to the Experts

Sometimes, you can't find out what you need to know from a website or the library. The information might be very timely, such as interest rates on mortgages that change daily, or it just might not be published (such as someone's opinion on a given subject). In such a case, you need to find a person or people who have the information you are looking for.

Experts are simply those who know their subjects and can be relied upon to supply correct information. They might know about it because they have studied it or worked with it long enough to be considered highly informed. Getting information from an expert can be simple. You might just have to look up a number in the phone book and make a quick call. Or, it can involve a number of steps. You might need to do some research first to find your expert. That could mean asking around or using the resources of your library or the Internet. Once you have a name and contact information then you can proceed to gather information.

The great benefit of finding an expert you can trust, who has the facts you need, is that he or she can save you time. Instead of hunting for information from sources that may or may not yield what you are looking for, you have a reliable source. A loan officer at your bank will know exactly what the current mortgage rate is and be able to explain the difference in cost, long-

term, between a 15- and a 20-year mortgage. Related questions may be answered without consulting other websites or print resources.

Checking Credentials

As with other types of resources, before relying on an expert, determine that the person has the proper credentials. Ask questions about where they are getting their information from. On what sources do they rely? How are they qualified to provide you with the information you are looking for? For example, you need to know how many people have used your town park's picnic area this summer. You call your Recreation and Parks Department and ask if someone can help you. The director of the department gives you a number in answer to your question. You can then ask where the number came from. Did they look up records of who reserved the park space and how many people they included in the permits, or are they estimating based on previous years' usage? For more information about checking credentials, read Lesson 8.

Practice

The college you will attend in the fall has a rule that all incoming freshman must take at least two courses outside their major during their first year at the school. After looking at the course catalog, you determine that you only have room for one such course. You need to know how steadfastly the college maintains this rule. Must you drop a course in your major, or can you take a required course outside your major as a sophomore? How will you get the information you need?

- a. write a letter to the President of the college
- b. check the school's website
- c. look it up in the brochure
- d. call the registrar

Answer

The registrar, **d**, who oversees the college's course registration process, probably has the answer to your question. The President of the college is most likely not involved in details regarding course registration. The brochure and website might mention the rule, but probably do not get into a discussion about whether there is any flexibility in its application.

► In Short

Your solutions and decisions are only as good as the information you use to make them. Sometimes that information is close-at-hand and you need only deal with facts already known to you. In other instances, you may need to do some research. The three best resources to consult are the Internet, the library, and other people (experts). Knowing how and when to use each type of resource can mean the difference between making an uninformed decision, and standing solidly behind the facts as you solve problems and decide among various options.

Skill Building Until Next Time

- Which type of Internet resource are you least familiar with? If you have never used a meta-search engine, spend some time making practice searches. You might want to compare your results with those found at a resource you use frequently. Visit some of the sites mentioned earlier in this lesson and see what each has to offer. Follow some of their links to find more information that may be of interest to you.
- The next time you have a doctor's appointment, think before you go about health-related questions you would like answered. Write them down, and consult the expert during your exam.

L E S S O N

8



Evaluating Facts

LESSON SUMMARY

In this lesson, you will learn about the difference between fact and opinion. In addition, you will learn how to differentiate between accurate, objective information and that which is false and/or biased.

MOST PEOPLE WOULD agree that a newspaper is a good source of recent factual information. However, the last time you were in the supermarket checkout line did you notice a newspaper (or two, or three?) with headlines about the impending end of the life on Earth, or about alien encounters with political figures, or monkeys with children's heads attached? You know the difference between these types of newspapers and the *Los Angeles Times* and *USA Today*. The latter are widely agreed to be trustworthy resources, while the former are considered entertainment.

But there is more to determining accuracy and objectivity in informational sources than being able to tell the difference between news reporting and a story about the prophecies of Nostradamus. The differences between truthful, impartial resources and those that claim to be can be subtle and therefore the development of a skeptical eye is necessary before you rely on any resource to make an important decision or solve a problem.

If you take everything you read, see, and hear at face value (that is, as factual and unbiased), you may rely on fiction rather than fact. In such a case, not only will your decision or solution be questioned, but you might end up looking less intelligent as well. Finding resources is not enough—you need to become a

skeptic. Look at each resource with a critical eye to determine which ones you can trust and which you can't.

► Fact Versus Opinion

Facts are objective statements whose truth can be verified. If a fact is true, then it is always true. For example, "Hawaii became a state in 1959." It is simple to do some research to verify that Hawaii did, indeed, join the United States in that year. Newspaper articles are another example of facts. They are intended to be objective reports of occurrences. The opinion of the reporter should not interfere with, or be a part of, the article.

An opinion is a subjective statement based on personal beliefs. Therefore, they are never true for everyone. For example, "Hawaii is the most beautiful state in the country." We know this is based on a personal belief because of the word "beautiful," which is subjective and therefore open to debate. There are many people who would disagree with the statement, choosing a different state as the most beautiful.

Practice

Label each statement as either (F) fact or (O) opinion.

- ___ 1. The Civil War started at Fort Sumter in 1861.
- ___ 2. Crème brulee is the most delicious dessert.
- ___ 3. I went to Minnesota for a vacation last year.
- ___ 4. Putting money in the stock market is a bad idea.

Answer

1. Fact
2. Opinion
3. Fact
4. Opinion

► Trusting the Source

Not everyone who gives out information is telling the truth. Pretty obvious, you think, and many times you are right. You probably don't take newspaper accounts of 400-year-old prophecies coming true seriously, even though you see them in print. But what about a documentary that purports to reveal the same thing? Can you be fooled by the delivery of the information, with fancy sets and a well-known actor as narrator, to believing what you might otherwise dismiss?

In order to trust the source of any information, you need to determine the agenda of the person or organization disseminating it. Are they simply trying to relay facts, or are they trying to get you to believe something or change your mind on a subject? It can be difficult to find a direct answer to that question; you can begin to get a clearer picture by looking into the following:

- **What are the author's credentials on this subject?** Is he or she qualified to write on the topic based on background or education? For some subjects, it is acceptable to use information obtained from a hobbyist, self-proclaimed expert, or enthusiast, if you can verify it elsewhere. However, most factual information should be obtained from a reputable source. And since you need to verify anyway, why not use information, for instance, derived from Yale University's Thomas Hardy Association, rather than from John Doe's personal web page homage to his favorite writer?
- **Does the author document sources?** Where do relevant facts and figures come from? If you are consulting print material, there should be footnotes and a bibliography that show the author's sources. On the Internet, you may also find such documentation, or sources may be docu-

mented by using links to other websites (see the section below on evaluating a website based on links). Even documentaries, to use a previous example, should cite sources in their credits.

- **Are the sources balanced and reputable?** Pages of footnotes are meaningless if they simply indicate that the author used untrustworthy sources, too. Check some of the sources to verify that they are accurate and unbiased. For example, a book on gun laws that relies heavily on material published by the National Rifle Association is not as reliable a source as another book on the subject that uses a wide variety of sources representing both sides of the issue.
- **What do others say about the author (whether individual or group)?** A quick way to check for opinions is to “Google” the author. Simply put his or her name (or the name of the group if there is no individual author) in the search box on www.google.com. The results can be revealing. However, remember to read

them with a critical eye. If you are searching for someone with a radical or controversial view, you will probably find detractors. A handful should not deter you, but pages of negative information might.

Practice

Terrell has been assigned a term paper that will test how well he and his class have learned research skills. He must write objectively on the subject of U.S. Military spending and has been given a list of possible sources for information. Which source or sources will provide the most objective information?

- a. Congressional Budget Office
- b. The National Rifle Association
- c. Alliance of Defense Contractors
- d. Center for World Peace

Answer

The best place for Terrell to look for balanced information is **a**, the Congressional Budget Office. It is what its name implies: a non-partisan organization that pro-

Determining Bias

While every author, like every person, has opinions about most subjects, authors of factual information are often assumed to be without such bias. Bias in this context refers to a preference that makes one prejudiced. Newspaper and television reporters, for example, are expected to deliver the facts without offering an opinion. However, you should never assume a lack of bias. As a skeptical reader, be aware of its existence and keep an eye out for it. The more you agree with an author or a subject, the more you should consider whether it is biased.

For example, the 24-hour cable news channel, Fox News, uses the phrase “fair and balanced” to describe its coverage. However, there are many critics who have accused the channel of being biased. Try watching and reading the news from a variety of sources. Check for differences in story coverage: who spent more time on the four-alarm fire than on the orphanage story? Who skipped the orphanage story to cover more of a politician’s hand-shaking opportunities that day? You may also be interested in finding out more about the reporters and commentators who deliver the news. Are they former politicians or political speech writers? Do they have affiliations with special interest groups? What, if any, are their biases?

vides budget analysis for the government. You may infer from the names of the National Rifle Association, Alliance of Defense Contractors, and Center for World Peace that they are organizations with very specific agendas. They would therefore probably not be good sources of objective information.

► How to Evaluate Information Found on the Internet

Anyone can publish on the Internet. It takes very little, both in terms of money and skill level, to create a website that offers information on any subject. Therefore, the existence and look of a website is not an indication of its value as a resource. Content should never be presumed to be truthful and unbiased. That said, the Internet is a great resource for accurate and objective information. You must simply learn how to discern between legitimate and bogus information on the Internet.

Determine Who Wrote the Page

The first step in determining the legitimacy of Internet information is to evaluate it in terms of authority. You should be able to find answers to the following three questions to establish authority:

1. **Who wrote or takes responsibility for the content of the page?** Look for the name and contact information (more than an e-mail address) of the author, who may be an individual, or an organization or institution. If no author is listed, you may find out who published the page by shortening the URL. Remove the last part of the web address located to the right of the last slash, and click on search. If you don't get to the publisher's page, remove the next

part of the web address, continuing from right to left until you reach the publisher. Does this publisher claim responsibility for the content? Does it explain why the page exists in any way? If not, you cannot determine the authority of the site.

2. **What are the qualifications of the individual or group responsible for the page for writing on this topic?** See the section on verifying an author's credentials above.
3. **Can you verify the legitimacy of the individual or group?** Does the person or group exist as they say they do? It should be relatively easy to determine this for both groups who publish online and for well-known individual authors. For others, you may e-mail an individual (if an address is provided) to ask about credentials and legitimacy, but this is not foolproof. Consider anyone whose legitimacy is difficult to establish as a source of opinion, rather than fact.

Practice

Which of the following web addresses are probably personal web pages?

- a. www.members.aol.com/jspinner582/
- b. www.stateuniversity.edu
- c. www.getthefacts.com/republican/~randyc/
- d. <http://fightforrights.org>

Answer

Choices **a** and **c** are most likely personal web pages. AOL hosts millions of personal web pages through its hometown and member services. The tilde in answer **c** gives it away as a personal page.

Tales a Web Page Address (URL) Tells

- Businesses or others trying to sell or promote products, as well as news pages, typically end in .com (“com” meaning commercial).
- Informational websites, such as those established by government or educational groups usually end in .gov, .mil, .edu, .us, or another country code.
- Organizations that try to influence public opinion (such as the Democratic and Republican parties) and non-profit groups should end in .org.
- The most potentially unreliable source of information on the Internet is personal web pages. They can be difficult to spot because some web hosts, such as Yahoo!, provide domain names to each customer. That means an individual’s web page would have an address ending in *.com. However, some personal pages are easy to identify. The presence of a tilde (~) in the address somewhere is one giveaway. For instance, some URLs that contain *.edu, which may appear at first glance to be educational, also have a tilde and a person’s name in them. That’s because some educational institutions offer free or low-cost web pages to their students, employees, and/or alumni. It is important to look at the whole URL and not just a part of it.

Judge the Accuracy of the Content

There are a few giveaways of marginal content. Review the website for the following:

1. Sources of factual information should be clearly listed so they can be verified elsewhere. Do not accept anything as fact that you can’t verify at least three times, in three unique locations.
2. Factual information should come directly from its source. A statistic from the Wall Street Journal is more likely to be correct if you get it from their website (<http://online.wsj.com/public/us>), rather than rely on it as printed somewhere else. Always go to the source website (if one exists) or print material to check facts.
3. There should be no grammatical, spelling, or typographical errors. Not only do these errors indicate weak or nonexistent editing, but they can lead to inaccuracies in information.

Check Dates

Legitimate websites are dated. They typically include the date the site was written, when it was launched, as well as the last time it was updated. Without these dates, you cannot with any certainty use the information found on the site, especially if it is of a factual or statistical nature. If you have dates, ask yourself:

- Is the information current enough for your needs?
- If you are looking for time-sensitive information, are the facts you found stale or do they represent the latest findings?
- If your information is not time-sensitive, was it placed on the Internet near the time it occurred?
- Has the page been updated a relatively short time ago or could the author have abandoned it?

Use Links to Evaluate a Site

Most websites use links to help you move from their site to other web pages. These links may be used to document sources (think of them as the Internet equivalent of footnotes) or simply to take you to more information about the topic which may be of interest.

If there are links to other pages as sources, ask yourself the following:

- Do the links work?
- Are they to reliable sources or only to other locations on the same website?
- If they take you to more information on the subject, are they well chosen and well organized?
- Do the links represent other viewpoints?
- Do they indicate a bias?

If other pages link themselves to the page you are considering as a source, ask yourself:

- Who links to the page? (read all points of view if more than one may be found)
- How many links are there? (higher numbers may generally be a good sign)
- What kinds of sites link to it (do they all represent the same point of view, giving the same information)?
- Are there any links to directories? Are the directories themselves discriminating or do they accept any and all sites?

Verify Reproduced Information

If the website includes quotes, statistics, or other information purported to be from another source, check it for accuracy. Never assume that simply because the words or numbers are printed, they are correct.

Quotes that have been retyped may contain errors, have been deliberately altered, or be complete fakes. The best way to check is to find the information somewhere else, preferably at its source.

For example, you find a website that claims the Earth's human population is decreasing. It cites an expert who is quoted in the magazine *Scientific American*. You can go the magazine's website and search its archives for \$7.95. Or, check with your public library, which may have back issues, or a subscription to the online archives so your search will be free.

Keep in mind that material reproduced from another publication, if it is legitimate, will probably include both a link to the original source (if it's online), and copyright information and permission to reproduce or reprint. If there is a link, be certain it is from the original source.

Practice

Answer (T) true or (F) false for each of the following statements.

Evaluating sources and content found on the Internet is important because:

- ___ 1. authors who publish on the Internet are less professional than those who publish in print.
- ___ 2. writers for the web are always biased.
- ___ 3. anyone can publish on the Internet; there is no guarantee that what you are reading is truthful or objective.
- ___ 4. information found in print is always more accurate than that found on the Internet

Answer

- 1. False
- 2. False
- 3. True
- 4. False

► In Short

In Lesson 7, you learned that thinking critically means being armed with accurate information. The quality of your solutions and decisions is only as good as the information you use to make them. This lesson showed how to evaluate that information, differentiating between accurate, objective data, and that which is false and/or biased.

We began by differentiating between fact and opinion. Then, we looked at the source of information, or the author. How can you trust the source? Only after you examine his or her credentials and sources. Keep a skeptical eye out for opinion posing as fact, inferior

research and documentation, and bias from every source.

Focusing on the Internet, which can be a hazardous place to find information, we explored ways of evaluating any of the billions of web pages you may come across in your research. You learned why it is important to find the author and dates for each website, as well as how to judge the accuracy of its content, and how to use its links to further evaluate a site.

Critical thinking skills are enhanced when you learn how to evaluate the information you receive. Never assume something is true without checking first and do not take for granted a source's unbiased viewpoint. Think for yourself!

Skill Building Until Next Time

- Read an article printed in a magazine and note its author. Does the magazine itself tell you anything about his or her credentials? Look up the author on the Internet to see if you can find what expertise, if any, he or she has in the subject.
- The next time you hear a fact on a televised news story, try to substantiate it. Remember the rule of threes: find it in three different sources before accepting it as fact.

LESSON

9



Persuasion Techniques

LESSON SUMMARY

In this lesson, you will learn how to recognize persuasion techniques used in speech, writing, and advertising. You will also find out how to use those techniques to your advantage.

WHAT IS PERSUASION? It is the act of using argument, reasoning, or appeal to get someone to take a course of action or change his or her point of view. Individuals try to persuade others to do things their way, to think like they think, and even simply to leave them alone. You use persuasion techniques on a daily basis, whether you are aware of it or not. You are also the target of those techniques. Perhaps you decided to ask for a raise. You felt you earned it, and went to your boss with many examples of your work and the positive results you have achieved for your company. In other words, you tried to make her think a certain way (that you are a great employee who deserves a raise) by using evidence and examples to persuade her. But instead of getting a raise, you got to listen to her explain how badly things were going at corporate headquarters. Her job was on the line. Stock prices were down. She knew you would understand, being “one of our best and brightest,” why she could not increase your salary. Your boss ended the conversation by using persuasion (including evidence and an emotional appeal of flattery) to change your mind about the raise.

Persuasion also happens in more organized ways. Political groups use it to influence your vote and advertisers use it to get you to buy certain products or services. When persuasion is particularly systematic and

organized, it is known as propaganda. Propaganda uses many persuasion techniques at once to attempt to bring about a change in a group of people.

► Recognizing Persuasion Techniques

Every day, you encounter many attempts to persuade you. People in your life, such as your family, friends, and colleagues at work, try to get you to change your mind or do things their way. The media constantly gives you information, which, in its content and delivery, may be attempts to persuade you. Advertisers reach you on the radio, billboards, television, Internet, and print materials, telling you what to buy. When you are aware of these tactics and recognize how they are used you will not be as likely to be manipulated by them.

► The Art of Persuasion Has a Long History

In fourth century BC Greece, Aristotle studied and taught philosophy, science, and other subjects. In one of his most famous works, *The Art of Rhetoric* (meaning persuasion through language), he contends that the ideal form of argument was through reason (called *logos*). However, he also acknowledged two other powerful techniques: an appeal to character (*ethos*) and an appeal to emotion (*pathos*). These same persuasion techniques are among the most successful and frequently employed ones in use today.

- **Logos: Appealing to Reason.** This appeal is successful because most people believe themselves to be logical and reasonable. When you approach them as such, you acknowledge them

positively, and then make your argument based on the assumption that any logical, reasonable person would see things the way you do. An appeal to reason might begin, “Of course we all know that if we don’t do this, then that will happen as a result.”

- **Pathos: Appealing to Emotion.** Aristotle understood that there are non-rational components of human behavior; in other words, not everything we do is based on logic. Emotional appeals can work in three different ways. First, the speaker can express his or her passion on the subject, hoping to influence others. Second, the speaker can attempt to elicit an emotional response from the listener, which will work to persuade the listener. Third, the speaker can both express his or her own emotions and simultaneously work to arouse those of the listener. As an example, environmental groups frequently use this appeal. You have probably heard something like: “Thousands of baby seals are brutally murdered for the skins, in front of their horrified mothers, every day. Shouldn’t we act now to save these innocent creatures?”
- **Ethos: Appealing to Character.** In this technique, Aristotle refers to the character of the speaker, which must be proven worthy in the eyes of the audience. In other words, for persuasion to work, the person doing the persuading must be seen as trustworthy, honest, and/or intelligent. He or she earns credibility by displaying a worthy character, one that will be trusted and believed by the listener. For instance, “During my twelve years of service in the U.S. Navy, I learned how the military operates. I am the candidate with the most direct and personal contact with our armed services,

and I know better than any other candidate how to maintain and improve them.”

Practice

Match the persuasion technique with the appropriate example.

1. *logos*
 2. *pathos*
 3. *ethos*
- a. “My five years in medical school taught me that we all need to get involved in health care reform.”
 - b. “You’re an intelligent man. I’m sure you know that a vote for Candidate Brown will not only mean lower taxes, but better schools, too.”
 - c. It makes the most sense to buy only name-brand sneakers. They are more durable, so they last longer and actually are a better value than cheap imitations.

Answers

1. c. The writer is presenting a logical argument, appealing to the reader’s reasoning abilities.
2. b. The speaker is using flattery (recognition of his intelligence) to persuade the listener.
3. a. The speaker is announcing that her opinion is based on many years of study in the field on which she is voicing an opinion. She is saying that she is highly qualified, and her opinion is therefore valid and trustworthy.

► Pathos

There are many variations on Aristotle’s three persuasion techniques. The one seen most frequently is *pathos*—there are numerous emotions that may be elicited in order to persuade. For instance, scare tactics are common. If you feel fear after listening to someone

speak, watching an ad on television, or reading print material, or browsing a website, put aside the emotion for a minute and think logically. Was your emotional response sought after? Did the speaker or writer mean to scare you in order to persuade you to do/buy/think something specific?

Scare Tactics

Here is an example of scare tactics: Linda received a phone call from a stranger, asking her if she knew how prepared her local emergency response units were to handle a terrorist attack. He described the aftermath of a bombing, with all of its destruction and bloodshed, and told her that her local medical community, fire-fighters, and law enforcement were not ready to respond adequately. He further described the chaos that would ensue because of this inadequate response. Then, he asked for a donation to a national organization that purports to provide funding for local emergency response units.

Linda was frightened by the information in the phone call, and gave the caller her credit card number, authorizing him to charge a \$50 donation to the organization he represented. The caller persuaded her to give money to a group she never heard of, and which might actually not exist, because he successfully used scare tactics.

Pity

Another example of the *pathos* technique is the use of pity. The person doing the persuading tries to make others feel sorry for him or her, hoping that they will act accordingly (do what they want, give them money, etc.) out of pity. Advertisements that show malnourished children surrounded by flies, panhandlers in city streets who tell passersby they have not eaten in days, and holiday newspaper stories about families with no

money to buy presents are all examples of the pity technique.

Flattery

Flattery is another form of *pathos*. Making people feel good about themselves, whether you are complimenting their intelligence, good taste, or wise choices can be a successful persuasion technique. It is often used in conjunction with other means of persuasion because it is so important when trying to make a personal connection. Think about it in the reverse: ridiculing a person's stand on an issue, brand they purchase, or other choice is probably not going to make them want to listen. The flattery technique is seen often in advertising, such as with the famous line "You've come a long way, baby," used in a cigarette ad targeted at women. The reader is supposed to agree that, yes, women have moved forward in many ways, such as personal freedoms, or political rights. Then, the "evolved" woman is expected to understand that the brand of cigarettes she, and other women like her, should smoke is Virginia Slims.

Practice

Which one of the following is NOT an example of a persuasion technique?

- a. Big Joe Burgers have less fat and taste better than our competitors.
- b. The library book I'm looking for is checked out.
- c. "Stay-at-home mothers don't have the experience to be politicians. Vote for me, an administrative assistant for twelve years, and you will get the representation you deserve."
- d. Only those with impeccable taste choose Sparkling Brand Diamonds.

Answer

The answer is choice **b**. This is not an example of a persuasion technique, but rather a statement of fact.

► Persuasion and the Written Word

There are many tactics used by writers to persuade their audiences. Known as rhetorical devices, these techniques subtly show the reader that the writer's point of view should be theirs, too. Here are six of the most common such devices, with definitions and examples.

1. **Rhetorical question:** implies that the answer is so obvious that there is no answer required. It persuades without making an argument.
Example: Can we really expect our teachers to maintain a high standard of professionalism when we won't pay them a fair wage?
2. **The Rule of Three:** based on the theory that people remember things when they are listed in threes, it can be used to repeat the same thing exactly, the same idea said three different ways, or three items that belong together.
Examples: "Stop, look, and listen"; "The most important factor in selling real estate is location, location, location"; "Is your car old? rusting? ready to be replaced?"
3. **Emotional language:** uses adjectives to get the reader to feel a certain way.
Example: Management won't stop these cutbacks until all our children go hungry. Then they will close the plant and leave us unemployed and out on the street.
4. **Hyperbole:** the use of exaggeration for extravagant effect; often humorous

Example: The lines in my bank are so slow. Only the tellers who fail their training get jobs there.

5. **Sound patterns:** meant to get the reader's attention and cause him or her to remember content better; some of a number of different patterns are: rhyming, alliteration (repeating the same sound at the beginning of words), consonance (repeating the same consonant sound), and assonance (the repetition of vowel sounds).

Examples: sweet smell of success; dime a dozen; "Don't just book it—Thomas Cook it"

6. **Comparisons:** show a relationship between two unlike items in one of three ways: metaphor (uses verb "to be"), simile (uses "like" or "as"), or personification (uses an animal compared to a non-animal).

Examples: the foreman is tough as nails; she eats like a pig; he's an ostrich—he won't face his problems

Practice

List the rhetorical devices used in the following paragraph:

"In closing, let me state that a vote for Sheuh Ling is a vote for a perfect world.

1

She is smart, savvy, and successful. She

2

knows how to get things done. The other candidates want to return us to a time when jobs were scarce, people were scared,

3

and government was looking over everyone's shoulder. Let's not let that happen.

Why turn back the clock when we can

4

move forward into a brighter future?"

Answer

1. "a vote for a perfect world"—hyperbole
2. "smart, savvy, and successful"—Rule of Three
3. "jobs were scarce, people were scared . . ."—emotional language
4. "why turn back the clock . . ."—rhetorical question

► **Implementing Persuasion Techniques**

The art of persuasion isn't all about cleverly getting someone to change their course of action or way of thinking. You can use it in positive ways to get results you desire in many areas of your life. For instance, in a job interview it is your task to persuade the interviewer to hire you. You are not using tactics such as preying on fears, employing logical appeals, or eliciting pity. But you are using your word choice (spoken and written—through your resume), your appearance, your manners, and body language to get the interviewer to offer you a job.

In addition to appearance and attention to details, what else can you do to improve your chances of persuading someone to do or think something? Following is a list of other techniques. Not all of them will work in every situation, so you must use your critical thinking skills to evaluate the situation and choose accordingly.

1. **Get their attention.** You should act in a way that will get someone to listen to you. That means being respectful, diplomatic (no yelling, belittling), modest but confident, and reasonable.
2. **Be sincere.** It is critical not only to sound convincing, but also to show that what you are saying is believable. Use evidence and examples to show why your claims and appeals are true and correct.
3. **Be personal.** Understand who you are trying to persuade and use your knowledge of them in your appeal. Explain exactly what they will gain, or what their benefits will be, if they see things your way. Answer their question “what’s in it for me?” before they have a chance to ask it.
4. **Show concern.** What is your audience worried about? What are they afraid of? Tell these things back to them (“I can see that you are worried about global warming and it is a real concern of mine, too”), so that they see you share their concerns (even if your view is different).
5. **Ask for what you want.** In order to get your audience to act as you wish them to you should ask directly for the result you want. For example, “Now you can see why it is important for you to brush your teeth twice a day, beginning tonight.”

Practice

Your friend wants to vacation in the Bahamas this winter but you want to ski. You have a great deal on a ski package, including hotel and airfare, but it requires two people traveling together to get the reduced rates. How do you present this information to your friend?

Answer

There are dozens of correct answers, but using the list above, you could say:

“I know you want to go the Bahamas for the warm weather, but there won’t be many people our age at that resort. I’m worried we will get bored after sitting on the beach all day. The ski lodge I looked into is directly targeting 20-somethings. They will give us a low rate on hotel, airfare, and lift tickets, plus they are throwing a free party every night in their lounge for everyone who bought the package deal.”

► **Persuasive Advertising**

There are two types of advertising. Informative marketing simply seeks to familiarize the consumer with a product or service by spreading the news about it. It can remind you of an existing product or introduce you to

a new one. In persuasive advertising, the marketer aims to manipulate your spending habits by making you want to buy his or her product or service. The manipulation can occur by appealing to the consumer's senses, emotions, or intellect.

Some of the most common appeals and claims include:

- **Sensory appeal:** a perfect looking product, an exciting background color, a catchy slogan or jingle
- **Sex appeal:** can be accomplished through visuals, voice, and/or word choice
- **Group appeal:** can be a snob (makes consumer believe purchase will place him/her in ranks of the elite), an Average Joe (reverse snob appeal—you will be like everyone else, won't stand out), "in" group (you will be more popular or cooler if you buy), or a bandwagon (you want what everyone else has)
- **Authority:** uses the endorsements of celebrities or other powerful people; you will be like them if you use the product or service

- **Scientific or statistical:** uses figures, experiments, impressive-sounding ingredients, and other proof that product is superior
- **Flattery:** makes you feel smart, attractive, etc. first with compliments, then follows with your need to buy the product
- **Unfinished claim:** says product or service is better, but doesn't tell you what it is better than

As with other forms of persuasion, you need to be aware that an advertising claim or appeal exists before you can resist it. Advertising is not difficult to spot or to understand, because it uses the same types of claims and appeals many times. Use the evaluation form below to take a close look at an advertisement or two of your choice. When you understand what you are looking for you can habitually evaluate the advertising you see and hear, without filling out the form. Instead of being drawn in, you will see the claims for what they are: attempts to manipulate you.

Persuasive Advertising Evaluation

Product _____

Appeal(s) 1. _____ how accomplished _____

2. _____ how accomplished _____

Claim(s) 1. _____ how accomplished _____

2. _____ how accomplished _____

What is effective about the appeal(s)? _____

What is effective about the claim(s)? _____

► **In Short**

Throughout history, people have found the need to get others to change their minds. Writers, politicians, business people, advertisers, and special interest groups, to name a few, use persuasion techniques to manipulate

their audiences. Therefore, you encounter (and use) many of these tactics every day. When you recognize them and understand how they work you can not only resist them when you need to, but use them to your advantage.

Skill Building Until Next Time

Go through the latest issue of your favorite magazine. Pick out two advertisements and fill out an evaluation (like the one found on the previous page) for each.

LESSON

10



Misusing Information— The Numbers Game

LESSON SUMMARY

In this lesson, we will explore some of the most common ways in which numerical information is misused. They include incorrectly gathering numbers, drawing the wrong conclusions, and misrepresenting the data.

WE ARE BOMBARDED with facts and figures every day. At work, at school, and at home there is information about what is going on in the world, who we should vote for, what we should buy, and even what we should think. If we take it all for granted as factual and objective, we are, in effect, letting someone else do our thinking for us. The problem is, facts and figures are not always factual. Information is manipulated all the time. Whether by deliberate misuse, or through negligence or plain incompetence, what we see, hear, and read is not always the truth.

Lesson 8 dealt with how to differentiate between accurate, objective information, and that which is false and/or biased. In this lesson, we will look more closely at the numbers used by those sources and how they can be manipulated. We have all heard the phrase “numbers don’t lie.” But the fact is that they do, all the time. If we rely on numbers, whether presented as statistics, polls, or percentages, as the basis for our decisions and opinions, we could be making a serious mistake. Keep in mind that researchers who work with numbers and those who analyze or interpret research data can also be biased, less than competent, and negligent. Therefore, you must be just as concerned with the source and quality of the numbers you rely on as you are with words.

The good news is that it is not difficult to get a basic understanding of how numbers can be misused. It all happens in one, or both, of two key areas. First, numbers must be gathered. If they are collected incorrectly, or by someone with an agenda or bias, you need to know that. Second, numbers must be analyzed or interpreted. Again, this process can be done incorrectly, or misused by an individual or group. Once you learn what to look for in these two areas, you can evaluate the numerical data you encounter, and rely on it only when it is objective and correct.

► Manipulating Surveys

Authors, advertisers, and politicians rely on numbers for one important reason: people tend to believe them. They use surveys, polls, and other statistics to make their arguments sound more credible and more important. The problem is, it is just as easy to mislead with numbers as it is with words. Below are some examples of how numbers are manipulated and why they should not always be trusted.

In order to be able to reach accurate conclusions, numbers must be gathered correctly. There are two ways to do that:

1. **Use an appropriate sample population.** In a survey, you use a small number of people and apply the results to a large number of people. To make it accurate, a survey population should be:
 - **large enough**—if the sample number is too low, it will not be representative of a larger population
 - **similar to the target population**—if the target population includes ages 10–60, your sample can't be taken just from a junior high school
2. **Remain un-biased.** That means asking objective questions and creating a non-threatening, non-influencing atmosphere. Compare, “do you think people should be allowed to own dangerous firearms if they have innocent young children at home?” to “do you think people should be allowed to exercise their second amendment right to own a firearm?” In addition, if the person asking either of those questions is wearing a button that says “Gun Control Now!” or is holding up a loaded pistol, the environment is biased, and will influence the answers received.

Compare “we think you’ll like Smilebright toothpaste better than Brightsmile,” to “80% of respondents in a recent survey liked Smilebright better than Brightsmile.” The high percentage in the latter example is meant to tell the reader that most people prefer Smilebright, and you probably will, too. But how was that percentage figured? The survey consisted of asking five people who already declared a preference for gel-type toothpaste whether they liked Smilebright or Brightsmile. Therefore, there was no random sampling. Everyone in the group had the same preference, which is probably not true for a larger population.

Practice

List two things wrong with the following survey:

A politician sent out a questionnaire to one thousand of his supporters. It began with an introduction about how different people used their tax refund checks to support local charities. Then he asked them, “Do you believe tax refunds to hard-working Americans should stop, and that your taxes should be increased to burdensome levels again?”

The question is biased—“hard-working” and “burdensome” indicate the author’s subjective intent

Answer

Correct answers should include two of the following:

- Population is not random—questionnaire was only sent to politician’s supporters
- The introductory paragraph is biased—shows people how beneficial tax refunds are

► **Correlation Studies**

The gathering of information is not the only time during which manipulation can occur. Once numbers are obtained, they must be interpreted or evaluated. This step also has plenty of opportunities to distort the truth. As an example, let’s look at comparisons between two sets of information between which there may be a connection. These types of comparisons are commonly referred to as correlation studies.

Researchers use correlation studies when they want to know if there is a link between two sets of data. For example, some questions that might be answered with a correlation study are:

- Is there a connection between full moons and an increase in birth rates?

Margin of Error

Most survey results end with a statement such as “there is a margin of error of three percentage points.” What does this mean? It is a statement of how confident the surveyors are that their results are correct. The lower the percentage, the greater their confidence. A 3% margin of error means that the sample population of the survey could be different from the general population by 3% in either direction. Let’s say a survey concluded that “55% of Americans want to vote for members of the Supreme Court.” If there is a 3% margin of error, the results could be either 58%, or 52%, or anywhere in between, if you conducted the identical survey asking another group of people.

As an example of the importance of knowing the margin of error, imagine the results of a political poll. The headline reads, “President’s lead slips to 58%; Republican front runner gaining momentum, 37%.” The following article notes that last week, the results were 61% for the president, and 34% for the Republican candidate. There is a margin of error of 4%. That means that there is really no difference between the two polls. No one is “slipping” or “gaining momentum.” The margin of error in this case tells the real story, and the news article is wrong.

- Does having a high IQ indicate that you will have a high income level?

If research at five area hospitals shows that during a full moon, 4% more babies are born on average than on nights in which there is no full moon, you could say there is a small but positive correlation between the two sets of data. In other words, there appears to be a connection between full moons and birth rates.

However, many studies have shown that any perceived correlation is due in fact to chance. There is no evidence to support the theory that the phases of the moon affect human behavior in any way. So, even when there is a positive correlation, it does not necessarily mean there is a cause and effect relationship between the two elements in the correlation study.

For the second question, if a study showed that Americans with the top 5% of IQ scores made an average of \$22,000 a year, while those in the middle 5% made an average of \$40,000, you would say there is a negative correlation between IQ and income levels. To describe the results of the study, you could say that there is no evidence that IQ determines income level. In other words, you do not need to have a high IQ to make a lot of money.

This conclusion is obvious. But let's look at how these same correlation study results can be used to come up with a ridiculous conclusion. The second example shows that there is no connection between a high IQ and a high income level. Is that the same as saying that "the dumber you are, the more money you will make?" Of course it isn't. This type of conclusion shows one of the dangers of correlation studies. Even if the study uses accurate data, the way in which it is interpreted can be wrong, and even foolish. When you

encounter a correlation study, as with survey and poll results, do not assume the numbers and conclusion are correct. Ask questions, and look at supporting data. Does the study make sense? Or does it seem too convenient for the advertiser/politician/new reporter/author who is using it? Think critically, and do not rely on anyone's numbers until you determine they are true and valid.

Practice

Which answer(s) could be appropriate conclusions for the following correlation study?

Researchers wanted to know if the use of nightlights or room lights in children's bedrooms leads to nearsightedness. They conducted a study which showed that while only 10% of children who didn't use nightlights developed nearsightedness, 34% of children who used a nightlight and 55% of those who slept with an overhead light on developed nearsightedness.

- Nightlights and room lights cause nearsightedness.
- Children with nearsightedness use nightlights more than children with 20/20 vision.
- Nightlights help you see better in the dark.
- Children with one or both parents having nearsightedness use nightlights more than children whose parents have 20/20 vision.

Answer

There are two possible answers to this question. Choice **b** is the best explanation for the study. However, there are studies that indicate that nearsightedness is inherited, rather than gotten from use of a nightlight or any other outside factor. Therefore, choice **d** is also correct.

► **Statistics**

Statistics is simply a mathematical science that gathers information about a population so that population may be described usefully. Statistics are often used to draw conclusions and make decisions based on that information. So, what’s the problem?

Statistics are complicated and their problems can be numerous. In general, though, problems with statistics are similar to those of other types of numerical data; namely, they can be gathered, analyzed, and/or interpreted incorrectly, or mishandled by someone with a bias. Let’s look at two common problems with statistics. The first question to ask is, is the statistic meaningful? Many parents worry, for instance, when they hear that the average baby walks at 13 months. They conclude that there must be something wrong with their 18-month-old who is still crawling. But, it has been proven that babies who walk later have no developmental differences at age two from their early-walking peers. In other words, the statistic is not meaningful; there is nothing wrong with an 18-month-old who is still crawling.

Another example: when standardized test scores were analyzed across the country, it was concluded that students from wealthy communities were smarter than students in poorer communities because their scores were higher. Is this a meaningful, accurate conclusion? Probably not. It does not take into account the many other variables that can account for lower test scores, such as inferior preparation, fatigue, and even breakfast on the day of testing.

Practice

Evidence shows that most car accidents occur on days with clear weather than on days when it is snowing. Can you conclude that it is safer to drive when it is snowing? Why, or why not?

Answer

No, the conclusion that it is safer to drive in the snow is wrong. There are other factors influencing this statistic, such as there are more clear days than snowy days, and more people are probably on the road in clear weather than snowy weather.

A second question to ask: is the statistic given in such a way that it misrepresents the data collected? Does it make the data sound better or worse than it is? Suppose a survey was done to see how many children live below the poverty line. We hear it reported on the news: “80% of all children live above the poverty line.” What about the 20% who live below it? The declaration of the 80% sounds good, while shifting the focus away from the millions of children who are poor. What about: “Women earn an average of 70 cents for every dollar earned by a man.” This sounds unfair, but it does not tell you which jobs are being compared, how long men and women have worked at those jobs, and whether men work longer hours because they do not take as much responsibility for child care.

Practice

Researchers found that 98% of juvenile offenders committing serious crimes watch violent TV shows on a regular basis. If you are an advocate for a reduction in TV violence, how would you use this statistic? What if you were an advocate for freedom of expression on television?

Answer

As an advocate for a reduction in TV violence, you would probably say, “watching violence on TV turns our young people into criminals.” If you were an advocate for freedom of expression on television, you might find out the real number of young people in the 2%. Let’s say it is 3 million. You might conclude that “millions of children watch violent programs regularly, and they don’t end up as criminals.”

Another common way in which statistics are manipulated is by leaving out key information. For instance, a company claims it is edging out its competitor with higher sales. They are correct in stating that they have had a 50% increase in sales, compared with only a 25% increase for their competitors. Is their claim valid? You can’t know unless you have more information. What if the competitor sold two thousand bicycles last year, and 2,400 this year; the other company sold 40 bicycles last year, and 60 this year. Edging out the competition? Hardly.

When you hear a statistic, either in an advertisement, a political speech, a newspaper article, or other source, remember that it is not necessarily true. Then,

ask yourself three questions: Is the statistic meaningful? Does it deliberately misrepresent the data collected? Does it give you all the information you need to evaluate it? Thinking critically about statistics will help you to avoid making the wrong conclusions, or relying on information that is faulty or simply untrue.

Practice

What is wrong with the following statement?

Russians are better off than ever; their average worker’s annual salary is now \$20,000.

Answer

Compared with what? This statistic is meaningless as it is stated because it leaves out too much information. There is a big difference between the salaries of the wealthy business class and the workers. Inflation is also a factor. If \$20,000 is worth less now than it was five years ago, the average worker could be doing worse than ever.

► In Short

It is just as easy to deceive with numbers as it is with words. Surveys, studies, and statistics are conducted and interpreted by researchers who might have a bias, or simply lack the skills necessary to do their jobs properly. Therefore, it is important to evaluate numbers before accepting them as truth. Ask questions about how the information was gathered, what its margin of error is, and how meaningful it is. Does the conclusion make sense, or does it seem to distort the findings? Thinking critically about the many numbers you encounter will help you to rely only on information that is objective and accurate.

Skill Building Until Next Time

- Watch a news broadcast and listen for the results of a survey or poll. Does the newscaster tell the margin of error? Why is it important to know this number?
- Look for a print advertisement that includes a statistic. Why was it included? Does it seem accurate and objective? How else could the advertiser have made the point without using numbers?

L E S S O N

11



Checking Your Emotions

LESSON SUMMARY

In this lesson, you will discover the role that emotions play in the decision-making process. When emotional responses are recognized and used appropriately they can be an effective piece of critical thinking.

IT IS A widely held belief that emotions are an enemy of critical thinking. The theory goes that the head is rational, while the heart is emotional, and any objective thinking or decision making should be done with the head. In fact, the word objective means “not influenced by emotions or prejudices.” But can you, and more importantly, should you, completely ignore your feelings when engaged in critical thinking?

Surprisingly, the answer is no. Emotions or feelings have a place in critical thinking, just as logic and reason do. But they must be recognized and used judiciously. That is to say, your decisions should not be reached quickly, solely on the basis of your feelings, and there are some emotions that are best recognized and then left out of the process. The goal in critical thinking is to acknowledge and understand the emotions that may influence your decision making, so you can determine when and where to let them become part of the decision-making process. If you can accomplish this, you use or listen to your emotions in a reasonable and rational way. They are not in control of you, but rather you are in control of them.

► When Emotions Take Over the Decision-Making Process

Decision-making is a systematic, conscious process that seems to leave no room for feelings. But you can probably think of many decisions you have had to make recently in which you had strong feelings that influenced your outcome. Perhaps you had to decide whether to order dessert when you were out for dinner. You ordered the cheesecake because it is a favorite, ignoring the fact that you were trying to lower your cholesterol level. Or, you left work early because you had tickets to a ball game even though you had a big project due the next day.

The first step in taking control of your emotions so you can use them effectively in critical thinking is to understand the decision-making process. It does not matter if you are making a big decision, such as whether you should change careers, or an inconsequential one, such as whether to have fries with your burger, the decision-making process is very similar. These steps have been examined in detail in preceding lessons in this book, but, to review, the eight steps are:

1. Recognize the problem.
2. Define the problem.
3. Practice focused observation to learn more about the problem.
4. Brainstorm possible solutions.
5. Choose a solution(s) and set goals.
6. Troubleshoot any problems that get in the way of your goal(s).
7. Try the solution and assess your results.
8. Use, modify, or reject the solution. Repeat the process if necessary.

As you can see, there is no step that says, “determine how you feel about the problem or decision, and

let your emotions rule.” What role, if any, do emotions have in decision making? The answer is a balanced role. They should neither be your sole criteria for making a decision, nor should they be ignored. For instance, in the first two steps, as you recognize and define the problem, also recognize and define any feelings you may have. Do not act on them, but rather acknowledge them. You might say, “this situation is making me anxious, and I feel like I don’t want to deal with it.” Or, “I’m excited about this. I want to jump right in and get going!”

What happens when you let your emotions rule the decision-making process? Here is an example: you want to go to college and have determined that it will help you prepare for the future by getting you the degree you need to pursue a certain career. But, you do not want to graduate with a huge debt. Your goal is to attend a school that offers a great education without charging too much in tuition and other fees. You apply to three schools and they all accept you. The first has a strong department in the area in which you plan to major, the best reputation of the three, and fees within your budget. The second is offering you a partial scholarship. The third costs more than the first, but it is where your best friend is going to school.

When you think critically about this decision, you use logic to conclude that the first two schools offer compelling reasons for attending. The academic strengths and strong reputation of the first school are both good reasons to choose it. The second school may be a slight notch down in quality of education, but it will cost you nothing to go there—a great reason to select it. The third school has one thing going for it—your friend. It does not satisfy any of the reasons you established for going to college. Choosing this school would be a choice of emotion (you enjoy being with your friend) over logic.

Practice

Which answer best represents a situation that has been decided by emotion alone?

- a. The local Chinese restaurant puts a take-out menu in your mailbox with the heading, “You will like our food better.”
- b. Your neighbor calls to find out if you are happy with your house cleaning service.
- c. You don’t like your boss’s evaluation of your work, so you ask to meet with her to discuss it.
- d. Your friend with three children needs a new car and buys a red, two-seat convertible.

Answer

Choice **d** represents an emotion-driven decision. It is not practical for your friend to buy this car; he most likely made the purchase because of how the car makes him feel, or how he feels about the car. Logic and reasoning don’t come into play.

► Bias and Stereotyping

Biases are preferences or beliefs that keep you from being impartial. Stereotypes are oversimplified opinions or prejudiced attitudes about a group of people. They get in the way of your making decisions and solving problems reasonably and logically. Having a bias or believing a stereotype prevents you from having an open mind. In order to think critically and logically, you need to recognize your biases and control them, rather than letting them control the decisions you make. Biases and stereotypes should not be used to make a decision.

Here are two examples:

- **Bias**—A town council member must vote on a proposal that will bring much-needed revenue to her small town, while also significantly

reducing a good friend’s property value. This friend supported the council member’s run for office, and made a contribution to her campaign. The council member’s bias is her feeling of loyalty toward her friend. If she makes a decision based on it, she will vote no on the proposal, which is not in the best interest of the town she was elected to serve.

- **Stereotyping**—A study is done of a doctor’s pain killer prescription writing habits. It is found that 75% of the prescriptions are written for male patients, even though his practice is 50% male and 50% female. When asked about this discrepancy, he reveals, “my female patients have a lower pain threshold. They should tolerate pain better, and stop relying on drugs.” This doctor believes the stereotype that women are the “weaker sex.” He thinks women tend toward hypochondria, and therefore their complaints of pain are not as valid as men’s. The stereotype prevents him from making logical decisions, and from adequately caring for half of his practice.

Practice

Circle all statements that are examples of bias or stereotyping.

1. He belongs to Greenpeace. I don’t want to go out with him again because my uncle’s law firm is fighting them in court.
2. I will take it to her office myself; the people in the mailroom are all lazy.
3. My favorite store is selling boots at 20% off this week. I bet Sara will buy some.
4. I like the eggrolls better than the dumplings.

Answer

The first statement involves bias. The speaker takes her uncle’s side against the environmental group. The sec-

ond statement declares a stereotype (all mailroom workers are lazy). The third statement is a fact, followed by a prediction. The fourth statement is also not an example of bias or stereotyping. Although it is an opinion, it is based on the fact that the speaker has tried both, and prefers one over the other. This type of opinion does not prevent the speaker from thinking objectively about anyone or anything.

► Making Decisions Under Stress

When the demands you face exceed your ability to meet them, you are under stress. Stress can affect both physical and mental health, possibly resulting in increased heart rate, a rise in blood pressure, muscular tension, irritability, and depression. Therefore, it can affect the ability to think critically, solve problems, and make sound decisions. There is no way to control every potentially stressful situation that we may encounter; time pressures at work, lack of information, information overload, and aggressive individuals are things that we have to deal with from time to time whether we want to or not. What we can control is how we deal with stress and how we let it affect us.

When you are under too much stress, or you don't deal with the stressors that are affecting you, it will affect the way you make decisions. Some of the most common effects are:

- **Inability to recognize or understand a problem.** When stressed, it is difficult to access stored information quickly, if at all. Short-term memory is affected. You may incorrectly identify something as a problem when in fact it is not.

- **Difficulty brainstorming and setting reasonable goals.** When you do not accurately recognize the problem, and you have trouble concentrating, you may come up with a quick or irrational solution. You tend to think only about the immediate future, so planning is difficult and decisions are often made quickly.
- **Inability to assess the solution.** If you are having trouble taking in information, you will not be able to see if your solution works. A short-term view of everything may keep you from being concerned with the implications of your solution.

As an example of decision making under stress, imagine an auction. Two people are interested in the same 100-year-old china plate. They both know they can find this plate at other auctions and antique stores for about \$50 so they probably set a limit, even if only in their minds, to the price they are willing to pay for it. Then, the bidding begins. Because two (or more) people are interested in the same item excitement builds and the bidders get carried away by "auction fever." In such a case, the winning bid could well exceed \$100, or double what the bidders know the plate is worth. Reason and logic, when faced with stress, take a back seat to emotion.

How could both people have eliminated the stress and bid reasonably? By doing one simple thing: recognize what they had control over, and then exercise control over it. In this case, they could have set a price before the auction begins, which they would not exceed. But what about a more complicated example? For instance, you are refinancing your mortgage. You filed the papers three weeks ago and set a date for the closing. When you get to the closing, the loan officer tells you that the interest rate has gone up a point, and you will have to pay the higher rate.

In this very stressful situation, you must make a decision. If you allow stress to take over, you will probably do one of two things: tell the loan officer to forget it, or say, “What the heck?” and continue with the closing even though the rate is higher. If you recognize what you have control over, you will ask questions before making a move. “How does this rate compare with the one I am already paying? What will my new payment be as opposed to the old? Can you waive the closing costs to help me save money?” In this situation, getting information means taking control. Do not act until you understand the situation. Even when stressed, you can check your emotions and make good decisions.

Practice

List some of the effects of stress that can get in the way of decision making.

Answer

Answers will vary, but should include some of the following: inability to concentrate; weak short-term memory; focus on the present, rather than the future; tendency to make snap judgments; difficulty accessing stored information; trouble taking in new information.

► Watch Out for Ego

A group of friends decides to go hiking in the mountains. They are all inexperienced hikers, so they choose an easy trail. Half way up, they run into a storm. It gets dark as a torrential downpour begins. Most of the

group decides to head back down the trail, worried about the storm. Two in the group decide to keep going. They laugh about the “quitters,” and boast that the storm will not hold them back. These two let their egos make their decision. Instead of thinking rationally, they choose to be seen as the strong, fearless members of the group. In doing so, they put themselves at risk of serious harm.

Ego in this scenario does not mean simply an awareness of self, but rather a feeling of superiority in relation to others. Every individual should have a healthy vision of his or her abilities, strengths, and shortcomings. Trouble comes when that vision is inflated and it becomes a part of the decision-making process. The two hikers did not consider the loss of traction on a muddy trail, the possibility of lightning striking in the woods, or of getting lost in the darkness. Their choice to continue hiking and to ignore their own limitations was based on ego.

Business people can also get into trouble with their egos when they worry too much about how they appear to others. For example, a shop owner in a mall is approached by the other shop owners about contributing to a new website to market their businesses. Although she is having cash flow problems and sales are down, she gives them \$10,000, just to “prove” that her business is doing well and she has the money. Like the hikers, she makes a decision based on ego. As a result, she must borrow money to pay her rent and utilities and cannot order the inventory she needs.

Your ego can also cause problems when it causes you to refrain from acting. If a coworker comes to you with a criticism of your performance, you might try to dismiss it in an effort to uphold your reputation. However, the criticism may be valid and indicate a problem that you can easily correct. Perhaps you have been told that there are too many spelling errors in your weekly reports to your superior. By dismissing the criticism, you lose the opportunity to make a small adjustment

in your report writing (running the spell check feature before you print it out) and turn out a superior product in the future. Aim to take criticism objectively and openly. Listen carefully without getting defensive, and then determine whether the problem requires any action on your part.

Practice

What might the results of the following situation have been if the student kept his ego out of the way?

A college student is taking a course in filmmaking, which he needs to take for his major. Three quarters of his grade are based on a final project, the making of a 10-minute film. Most of the class chose subjects based on their professor’s suggestions. However, this student chose to adapt a favorite short story, casting four of his friends in the film. The friends had trouble learning their lines, and it was more difficult to shoot their scenes outdoors than the student director expected. The film was not completed on the due date, and he received a D for the course.

Answer

This student had an exaggerated belief about his own abilities (he never made a film before), which kept him from seeing the obvious time limitations of the project. He probably should have made a simpler film which could have been finished in time, and possibly made the short story adaptation on his own time.

► In Short

When faced with a situation that calls for a decision, do not ignore your feelings. As you go through the logical steps toward making a choice, acknowledge emotions and, based on the type, decide whether they are appropriate to include in the decision-making process. Even negative feelings, such as bias and stereotyping, need to be recognized so you can consciously exclude them. Acknowledging emotions, rather than letting them take over, or trying to ignore them, will help you improve your critical thinking skills.

Skill Building Until Next Time

- The next time you attend a sporting event, or watch one on television, pay attention to the fans when the umpire or referee makes a call. Do the fans decide rationally whether the call is fair or not? How do they let their emotions participate in the way they behave?
- Think of a situation that makes you angry, whether it is listening to an opposing political group’s speeches, reading a particular columnist in the newspaper, or even going to a sale at your favorite store in which the merchandise was marked up in price before it was marked down. How could you allow your emotions to negatively influence the situation? How could you use them positively?

LESSON

12



Deductive Reasoning

LESSON SUMMARY

In deductive reasoning, an argument is made based on two facts, or premises. If the premises are true, then it should follow that the conclusion of the argument must also be true.

YOU HEAR DEDUCTIVE arguments, both good and bad, made all the time. In magazines, you read, “If you use Brand X detergent your clothes will not get clean. But our detergent works much better. Use our detergent and your clothes will get clean.” On television, you hear a politician saying, “High taxes are putting people out of work. Tax cuts are a better policy. Tax cuts will give people jobs.” At home, most people can remember a parent telling them, “if you do not finish your supper, you will not get dessert.”

Understanding how these arguments work, and do not work, will help you to do two things. One, you will learn how to use deductive reasoning to construct your own strong arguments. Getting your point across accurately and forcefully will be easier. And two, you will be able to tell when someone else’s argument is weak. You can’t be influenced or persuaded by faulty reasoning when you recognize it and see its flaws. On the other hand, you will also be able to determine when someone has a strong argument that you should be influenced by.

► What Is Deduction?

Deduction is the process of reasoning from two general premises, or things that are known, to a specific conclusion. These three parts are:

- A. major premise
- B. minor premise
- C. conclusion

For instance, we know, **A**, that dogs have four legs, and we know, **B**, that Fido is a dog. Therefore, since **A** and **B** are true, we can conclude with certainty that, **C**, Fido has four legs.

From this example, you may see that a deductive argument is sound when the premises are true, and the conclusion logically follows from the premises.

Qualities of a Deductive Argument

- It has two premises that provide a guarantee of the truth of the conclusion by providing support for it that is so strong that, if the premises are true, it would be impossible for the conclusion to be false.
- It is described by the terms valid and invalid; when the premises are correct, and the conclusion that follows is correct, the argument is said to be valid. If either or both premises are incorrect, the argument is invalid.
- It is based on rules, laws, principles, or generalizations, as opposed to inductive arguments (see Lesson 14), whose major premises are based on observations or experiences.

Practice

Which is an example of a deductive argument?

- a. There are 25 CDs on the top shelf of my bookcase and 14 on the lower shelf. There are no other CDs in my bookcase. Therefore, there are 39 CDs in my bookcase.
- b. Topeka is either in Kansas or Honduras. If Topeka is in Kansas, then Topeka is in North America. If Topeka is in Honduras, then Topeka is in Central America. Therefore, Topeka is in Kansas.
- c. No one got an A on yesterday's test. Jimmy wasn't in school yesterday. Jimmy will make up the test today, and get an A.
- d. All human beings are in favor of world peace. Terrorists don't care about world peace. Terrorists bring about destruction.

Answer

The answer is **a**, because it has two premises which are stated as generalizations or facts and a conclusion that follows logically from them. Choice **b** has three premises and the conclusion does not follow from them. Choices **c** and **d** have conclusions that do not follow the premises.

It is not difficult to figure out a deductive argument when it is presented as straightforwardly as the examples above. But that is not how you will see them much of the time. In order for you to be able to detect a deductive argument, and then determine whether or not it is valid, you must be able to figure out what the premises and the conclusion are. Let's look more closely at both of these parts that make up a deductive argument.

► Premises

The key to the credibility of a deductive conclusion lies in the premises. Since the conclusion must result from the premises, it is considered invalid if one or both of the premises is proven false. Therefore, the premises must be truthful facts, rules, principles, or generalizations. Just one word can change the premise from fact to fiction, such as the words “all” and “every.”

Consider the following example:

All dogs have brown fur.
Spot is a dog.
Spot has brown fur.

The truth is that *some* dogs have brown fur. The first premise is untrue, which makes the conclusion invalid.

Major Premise

The major premise is a statement of general truth dealing with categories rather than individual examples. It relates two terms:

All women were once girls.
Athletes are in good shape.
Professors hold advanced degrees.

The subject of the major premise (women, athletes, professors) is called the antecedent; the verb phrase (were once girls, are in good shape, hold advanced degrees) is known as the consequent.

Minor Premise

The minor premise is a statement that deals with a specific instance of the major premise:

My mother is a woman.
Tiger Woods is an athlete.
Dr. Shiu is a professor.

The minor premise either affirms the major premise, or denies it. When it affirms, part of the minor premise equates with the subject, or antecedent, of the major premise. When it denies, part of the minor premise does not equate with the consequent. For example:

Children like top 40 music.
Charles is a child.

In this case, the minor premise (Charles is a child) affirms the major premise by stating that it is something equal to the major premise (child).

Children like top 40 music.
Charles does not like top 40 music.

In this case, the minor premise denies the major premise by asserting that something is not the same as the consequent (“does not like” as opposed to “like”).

Practice

Which of the following would make the best major premise for a deductive argument? Remember that the two important factors for the major premise are:

1. it relates two terms.
2. it is stated as a generalization, rule, or principle.
 - a. No one knows if an asteroid will collide with the Earth.
 - b. There are no asteroids.
 - c. Those who believe asteroids will hit the earth have overactive imaginations.
 - d. Scientists have proven asteroids will not hit the earth.

Answer

The best choice is **c**, because it relates two terms (asteroids and imaginations), and it is stated as a generalization.

► Conclusions

Deductive arguments are those in which the truth of the conclusion is thought to be completely guaranteed and not just made probable by the truth of the premises. So if the argument is valid, the truth of the conclusion is contained within the truth of the premises. But, the conclusion must follow logically from and not go beyond or make assumptions about the premises.

Here is an example of a conclusion that follows the premises:

Banks make money by charging interest.
My bank charges me interest.
My bank makes money.

Note that the conclusion follows logically from both premises. It includes no additional information, and does not make assumptions or inferences about the premises. It is a valid conclusion.

Here is an example of a conclusion that goes beyond the truth of the premises:

Ernest Hemingway wrote some great books.
Ernest Hemingway wrote *For Whom the Bell Tolls*.
For Whom the Bell Tolls is a great book.

Why is this conclusion invalid? Because the major premise states that some of Hemingway's books are great. The conclusion assumes that *For Whom the Bell Tolls* falls into that group, when there is no evidence in the premises that this is true.

Practice

Change the following invalid conclusion to make the deductive argument valid.

The price of every daily newspaper is going up next week. *The New York Times* is a daily newspaper. Therefore, *The New York Times*'s price will double next week.

Answer

The conclusion should be: Therefore, the price of *The New York Times* will go up next week. The deductive argument does not say the price will be double.

► Two Forms of Deductive Argument

There are two common ways in which deductive arguments are expressed: syllogisms and conditionals.

The Difference Between Fact and Opinion

A fact is an objective statement whose truth can be verified. For example, "Saturn is one of the nine planets in the solar system." You can do some research to determine that Saturn is, indeed, one of the nine planets in the solar system. Ask yourself, is the statement always true? If the answer is yes, then it is a fact.

An opinion is a subjective statement that is based on personal beliefs. For example, "Saturn is the most beautiful planet in the solar system." We know this is based on a personal belief because of the word "beautiful," which is a subjective and therefore open to debate. Ask yourself, is the statement true for everyone? If the answer is no, it is an opinion.

Syllogisms

Syllogisms are made up of two premises and a conclusion. The first, or major, premise describes all of one class or group, A, in terms of some other class or group, B (All vegetarians do not eat meat). The second, or minor, premise places a third class or group, C, either within A or not within B (Gorden is a vegetarian). The conclusion states that C is B (Gorden does not eat meat).

When a negative is used in a syllogism, it follows the same form. For instance, All vegetarians do not eat meat. Gorden is not a vegetarian. Gorden eats meat. The word “not” in the second premise signals the negative.

Here are a few examples of positive and negative syllogisms:

Smart people do not believe in UFOs. (All A are not B)

Lee does not believe in UFOs. (C is not B)

Lee is smart. (C is A)

The greatest jazz artists were all improvisers.

Miles Davis was an improviser.

Miles Davis was a great jazz artist.

Conditionals

The other common form of a deductive argument, a conditional, expresses the same reasoning in a different way. The major premise is, if something is true of A, then something is true of B (If you spill the lemonade, then the table will get sticky). In the minor premise, the “if” (A) either happens or it does not (You spilled the lemonade, or You did not spill the lemonade). The conclusion then states that, as a result, B happens or it does not (The table did get sticky, or The table did not get sticky).

Let’s look at some examples:

If you attend Camp HiLow, you will lose weight. (If A, then B)

You attend Camp HiLow. (A)

You lose weight. (B)

If Jason stays after class to speak with his professor, he will miss the bus. (If A then B)

Jason did not stay after class to speak with his professor. (not A)

Jason did not miss the bus. (not B)

If we do not negotiate with the other side, they will defeat us. (If not A, then B)

We negotiated. (A)

They did not defeat us. (not B)

Practice

Consider this example, and state it as a syllogism and as a conditional deductive argument:

Samsa says that all his test scores are good, so the grades for his courses should be good, too.

Syllogism:

Conditional:

Answer

Syllogism: All good test scores mean good course grades. Samsa's test scores are all good. Samsa gets good course grades.

Conditional: If you get good test scores, then you get good course grades. Samsa gets good test scores. Therefore, he gets good course grades.

► How Deduction Can Be Misused

In the next lesson, you will learn about specific ways in which deductive arguments are used incorrectly, whether negligently or deliberately. The better you become at spotting these “logical fallacies,” the less likely you will be to accept one as truth.

Simply, a deductive argument is invalid for one of two possible reasons: either or both of the premises are invalid, or the wrong conclusion was reached even though the premises are valid. This example contains a premise that is not true:

All Americans wear sneakers. (Major premise)
Harold is an American. (Minor premise)
Therefore, Harold wears sneakers. (Conclusion)

Since all Americans do not wear sneakers, the major premise is not true. That makes the conclusion, and therefore the deductive argument itself, invalid.

In this case, the wrong conclusion is reached:

Many Americans wear sneakers.
Harold is an American.
Therefore, Harold wears sneakers.

Note that by restating the invalid premise to make it valid, you have not made the conclusion true. Harold may or may not be in the group of “many” who wear sneakers. The conclusion makes an assumption that goes beyond the information contained in the premises.

► In Short

Deductive reasoning takes two premises, which may be rules, laws, principles, or generalizations, and forms a conclusion based upon them. In order to be valid, a deductive argument must have premises that are true and a conclusion that logically follows from those premises, without trying to go beyond them. When you understand how these arguments work, you will know how to construct your own strong arguments. You will also avoid being influenced or persuaded by faulty deductive reasoning when you recognize it and see its flaws.

Skill Building Until Next Time

- Find a deductive argument in print. Put it in the form of a diagram, listing the major premise, minor premise, and conclusion. Is it valid? If not, why?
- The next time you need to persuade someone to do something, such as eat at your favorite restaurant instead of theirs or see the movie you prefer, argue for your choice using deductive reasoning.

LESSON

13



Misusing Deductive Reasoning— Logical Fallacies

LESSON SUMMARY

In this lesson you will see how the relationship between deductive reasoning and logic works, or does not work. This lesson explores four of the most common logical fallacies that make deductive reasoning fall apart.

LESSON 12 EXPLORED the characteristics of a valid deductive argument. You know that you need two premises which are true, and a conclusion that logically follows from them without assuming or inferring any information not contained in the premises. An invalid argument contains one or more errors. It might have a factual error, such as a premise that is not true, or a conclusion that is not supported by the premises. Or, it may contain an error in logic. This type of error is known as a **fallacy**.

There are a number of logical fallacies that can occur in deductive arguments. There are four major logical fallacies:

1. Slippery Slope
2. False Dilemma
3. Circular Reasoning
4. Equivocation

Each of these will be explained in detail in the next sections.

The argument might have two true premises, and a conclusion that takes them to an extreme. This is known as the **slippery slope fallacy**. Or, it might be a **false dilemma fallacy**, which presents in its major premise just two options (“either-or”) when in reality there are others. In **circular reasoning**, also known as begging the question, there is just one premise, and the conclusion simply restates it in a slightly different form. And finally, **equivocation** uses a word twice, each time implying a different meaning of that word, or uses one word that could mean at least two different things.

Arguments intended to convince or persuade may be believable to many listeners despite containing such fallacies, but they are still invalid. Recognizing these fallacies is sometimes difficult. But it is important to be able to do so to prevent being misled, or persuaded by faulty logic.

► Slippery Slope

In Lesson 12, we discussed conditionals, which are one of the ways in which a deductive argument may be framed. Conditionals use an “if-then” premise to lead to a conclusion (example: *if* you do not pay your electric bill, *then* your power will be turned off). When a conditional contains a logical fallacy, it is called a slippery slope.

In this type of fallacy, it is asserted that one event will or might happen, and then, inevitably, another, more serious or drastic, event will occur. The slippery slope does not explain how the first event leads to the other. Often, it leaves out a number of steps between the two events, without saying why they will simply be bypassed. The argument takes the following form:

1. Event A has/will/might occur.
2. Therefore, event B will inevitably occur.

The slippery slope argument makes an opponent’s argument seem more extreme. It says that event A will eventually lead to an extreme, unwanted event B. The argument infers that the only way to avoid event B is to not do event A, or even anything at all. The gun lobby uses the slippery slope all the time to argue against any type of gun control. They say that any small measure, such as registration or waiting periods to purchase firearms, will lead to drastic control, or even confiscation of their weapons.

Here is another example:

“We have to stop the tuition increase!
Today, it’s \$5,000; tomorrow, they will be charging \$40,000 a semester!”

Note that there are many possible steps between event A, the tuition increase, and event B, the charging of \$40,000 a semester. An increase could occur every year for ten years or more before there was a jump from five to forty thousand dollars. In addition, tuition might never reach \$40,000. This is a slippery slope because one tuition hike to \$5,000 does not inevitably lead to a charge of \$40,000.

Other examples are listed below. Keep in mind the possible intermediate steps between event A and event B in each, and the likelihood, or unlikelihood, that B will ever be a result of A.

- Don’t let him help you with that. The next thing you know, he will be running your life.
- You can never give anyone a break. If you do, they will walk all over you.
- This week, you want to stay out past your curfew. If I let you stay out, next week you’ll be gone all night!

Practice

Rewrite the following argument to remove the slippery slope fallacy:

We shouldn't give military aid to other countries. The next thing you know, we will have thousands of troops overseas dying for no good reason.

Answer

Answers will vary, but all should give realistic, possible reasons why we should not give military aid to other countries. There should be a logical step from event A (giving military aid) and event B (the answer). Responses might include: it's too dangerous; the next thing you know, they will be asking for more; we shouldn't let our military get spread out too thinly, etc.

► **False Dilemma**

A false dilemma is an argument which presents a limited number of options (usually two), while in reality there are more options. In other words, it gives a choice between one or another ("either-or") even though there are other choices which could be made. The false dilemma is commonly seen in black or white terms; it sets up one thing as all good and the other as all bad. When one option (typically the "all bad" one) is argued against, the false dilemma concludes that the other must be true.

Example

Stop wasting my time in this store! Either decide you can afford the stereo, or go without music in your room!

This argument contains a logical fallacy because it fails to recognize that there are many other possibilities than just buying one particular (expensive) stereo

and going without music. You could, for instance, buy a less expensive stereo or even a radio. Or, you could borrow a stereo and have music in your room without making a purchase. There are many options beside the two presented as "either-or" in the argument.

Other common false dilemmas include:

Love it or leave it.

Either you're with us, or you're against us.

Get better grades or you will never go to college.

False dilemmas are also common in politics. Many politicians would like you to believe that they, and their party, have all the right answers, and their opponents are not only wrong, but they are ruining the country. They set up a choice between all good and all bad. Political speeches often include rhetorical questions that contain false dilemmas. For instance: "Price supports on agricultural production are part of the socialist agenda. My opponent in this race consistently votes for price supports on dairy and tobacco products. It is time to stop electing socialists to Congress. Should you vote for my opponent, who wants to lead our country on the path toward socialism, or should you vote for me, and restore democracy?"

Practice

Which of the following is NOT a false dilemma?

- a. Your grades are lousy. Either study more, or drop out of school.
- b. We have a big game tonight. Either we will win and be eligible for the tournament, or we will lose and our season will be over.
- c. Stop driving like a maniac! Either slow down, or take the bus.
- d. I can't believe you didn't vote to raise the minimum wage. Either you missed the vote, or you just don't care about the working poor!

Answer

Choice **b** is not a false dilemma. It is a statement of fact that there are only two possible outcomes, a win or a loss. All the other choices present only two options, when in fact there are others to consider.

► Circular Reasoning

A valid deductive argument has a conclusion that follows logically from the premises. It does not infer or assume anything from the premises, but relies only on the information contained within them. In the fallacy of circular reasoning, often called begging the question, you assume as truth the premise you are supposed to be proving. In all valid deductions, the conclusion (what you are trying to prove) follows two premises. In an invalid argument using circular reasoning, the conclusion follows a single premise. In other words, the premise that is supposed to prove the truth of the conclusion is simply the conclusion restated with a slight variation. Circular reasoning looks like this: A is B, therefore A is B.

When a premise is left out, there is no argument. The person making the claim is simply telling you to believe that what he is telling you is true.

Examples

1. “I told you to clean your room!” “Why?”
“Because I said so!”
2. “Why do you think the Yankees are the best team in baseball?” “Because they are.”

How could these examples go from being invalid to valid, logical arguments? They need to add a second premise that supports, or gives reason for, the conclusion. Example 1 might add: “Your room is so messy that you can’t find anything in it,” or, “All of your laundry

is on the floor, and it won’t get washed until you clean it up and put it in the washer.” Example 2 could add: “They have won the World Series 26 times in the last 39 appearances,” or, “They are the only team to sweep the World Series ten times.”

Practice

Which of the following does not beg the question?

- a. I like the Brewers because they’re my favorite team.
- b. Ghosts exist because I saw something once that could only have been a ghost.
- c. The Seafood Shack is the best restaurant in town because it’s so much better than all the others.
- d. They signed Bruce Springsteen to headline the concert because he’s a rock legend and a huge star.

Answer

Choice **d** does not beg the question. It gives two reasons why Springsteen was signed. It would have been an example of circular reasoning if it went: “They signed Bruce Springsteen to headline the concert because he’s a concert headliner.”

► Equivocation

The fallacy of equivocation can be difficult to spot, because both of the premises appear to be true, and sometimes the conclusion seems to follow them. However, in this fallacy, the meaning of a certain word is unclear and it causes the meaning of the entire argument to be invalid. This can occur either by using the same word twice, each time with a different meaning, or by using one word that has an ambiguous meaning.

Examples

My history professor said everyone who wrote a term paper favoring the separatists in the Philippines is sick. I guess if I'm sick, I can skip class today.

The word "sick" is used in the argument twice, each with a different meaning. The professor meant mentally disturbed, and the student thought he meant physically ill.

Hot dogs are better than nothing. Nothing is better than steak. Therefore, hot dogs are better than steak.

It is not hard to spot the logical fallacy in this argument: the conclusion is obviously wrong although the premises are both true. There is an equivocation in the meaning of the word "nothing;" in the first premise, it means "not a thing," and in the second premise, it means "no other possible thing." Using a critical word with two different meanings makes the argument invalid.

Now you see how one word with two different meanings can be an equivocation. The other way in which reasoning may be deemed invalid due to this fallacy is by using one word that has a number of different meanings. For example, "My house is by the lake. Why don't you drop in?" Two meanings of the word "drop" could be right. It might mean, "Why don't you stop by my house," or it could mean "why don't you fall into the lake." The equivocation of the word "drop" makes the meaning of the sentences unclear. "Save soap and waste paper" is another good example. The word "waste" could mean either the noun "garbage," or the verb "to use thoughtlessly."

Equivocation can be confusing because it begins with truthful or reasonable premises, which you can agree with. Then, the meaning of a critical word is changed and an illogical or faulty conclusion is drawn. If you follow the argument, you could fall into the trap of agreeing with something you would never have otherwise accepted. The best way to handle this fallacy is to get information. Ask for clear definitions of any critical terms that could be used in different ways. When you have pinned them down, they can't be changed later on.

Practice

Which word in each example is the equivocation?

1. The sign said "fine for parking here", and since it was fine, I parked there.
2. The IRS allows a deduction for every dependent in a household. My dog is dependent on me, so I can claim a deduction for him.
3. If all men are created equal, then why are geniuses so smart?
4. Everything that runs has feet. The refrigerator runs, so the refrigerator has feet.

Answers

1. fine
2. dependent
3. equal
4. runs

► In Short

Not all deductive reasoning is reasonable. It may be flawed factually, meaning all or part of it is untrue. Or, it may be flawed logically, and contain a fallacy. It is

important to be able to recognize logical fallacies so they do not persuade or mislead you. Some of the most common of these fallacies are slippery slope, false dilemma, circular reasoning, and equivocation.

Skill Building Until Next Time

- Find a newspaper or magazine article that contains quotes from one or more politicians. Do any of them use logical fallacies in their arguments? If so, which ones?
- Think of an extravagant purchase you would like to make. Devise two arguments for buying the item, using both false dilemma and circular reasoning fallacies.

LESSON

14



Inductive Reasoning

LESSON SUMMARY

This lesson shows how to recognize and construct an inductive argument. These arguments move from specific facts to general conclusions by using common sense and/or past experience.

INDUCTION IS THE process of reasoning from the specific (particular facts or instances) to the general (principles, theories, rules). It uses two premises that support the probable truth of the conclusion. Thus, an inductive argument looks like this: If A is true and B is true, then C is probably true. How can you determine or measure what is probable or improbable? By using two things:

1. past experience
2. common sense

Past experience tells you what you might be able to expect. For instance, “for the past three weeks, my colleague has showed up a half hour late for work. Today, she will probably be late, too.” Common sense allows you to draw an inference, or a “smart guess,” based on the premises, such as, “They need five people on the team. I’m one of the strongest of the seven players at the tryouts. It’s likely that I will be picked for the team.”

Because you must make a leap from the premises to the truth of the conclusion, inductive reasoning is more likely to fail and produce fallacies, such as a *hasty conclusion fallacy* (see Lesson 15 to learn about these fallacies). Even so, most reasoning is inductive. One of the basic theories of modern biology, cell theory, is a product of inductive reasoning. It states that because every organism that has been observed is made up of cells, it is most likely that all living things are made up of cells.

There are two forms of inductive arguments. Those that compare one thing, event, or idea to another to see if they are similar are called **comparative arguments**. Those that try to determine cause from effect are **causal arguments**.

Practice

Use possible past experience and common sense to choose the best conclusion for the inductive argument that begins: The other thirteen people who work on my team

- a. liked the design of the new product, so I should too.
- b. got positive evaluations from our boss, so I should too.
- c. got sick after eating the tuna salad, so I will too.
- d. who met the new employee liked him, so I will too.

Answer

The answer is c. Based on past experience, we know that some foods can make people ill due mainly to bacteria contamination. Common sense tells us that if 13 people ate tuna salad and got sick, most everyone else who ate it will get sick, too.

► Comparison Arguments

Inductive arguments arise from experiences or observations. They compare one event, idea, or thing with another to establish that they are similar enough to make a generalization or inference about them. The most important point to note about this type of argument is that the two events being compared must be similar.

Example

Rebekah says, “Whenever I use bread flour to make my pizza, the crust turns out perfectly. So, every time I use bread flour, I will have a perfect crust.” (A leads to B many times, so A will lead to B every time.)

Rebekah is comparing one set of events (observed use of bread flour and perfect pizza crust) with another (a generalization: every time she uses bread flour, she will get a perfect crust). These events have one similarity (using bread flour), and the inductive argument is that they will also be similar in another way (result in a perfect pizza crust).

The strength of this, as well as all other, comparative inductive arguments depends on how similar the two events are. In fact, when an inductive argument fails, it is most often because the events were not really similar enough to make a comparison. Rebekah takes for granted that “every time” in the future, she will make pizza exactly as she did during each of the observed times. If that is true, her conclusion is probably true.

But what if every observed time Rebekah used the bread flour, she also used fresh yeast? If she makes a pizza in the future and uses old yeast, she will not get a perfect crust. The events will be dissimilar and the

conclusion will not hold. The second premise of any inductive argument should ideally state that there is no significant difference between the two sets of events/ideas/things. The second premise of Rebekah's argument could say "Every crust will be perfect, because there will be no key difference between my future crust making and my previous crust making." Keeping such a disclaimer in mind is important, because this is where many inductive arguments are weakest.

Practice

How could you strongly conclude the following inductive argument?

We have read over one hundred pages of her poetry manuscript. So far, the poems about nature are strong and finely crafted, and those about love and relationships are loose and even sometimes sloppy. So we expect in the next hundred pages to find . . .

Answer

You can conclude that her love poetry is loose and sometimes sloppy, and her nature poetry is finely crafted.

Practice

Which is NOT an example of a comparison argument?

- a. This month I paid my bills on time and I didn't get charged any late fees. Next month I'm going to pay them on time too so I can avoid the fees.
- b. I got so tired at work yesterday afternoon after I had a bagel for lunch. Tomorrow, I think I'll order a roast beef sandwich.
- c. Tom works out every morning and so does Bill. They are both in great shape and have lots of

energy. If I work out every morning, I could get in shape and have more energy.

- d. The chunky peanut butter was 50 cents cheaper at the supermarket every week for the past month. This week, it will probably be 50 cents cheaper, too.

Answer

The answer is choice **b**. While it might make sense to order something else other than a bagel to avoid getting tired, this argument does not show any similarities between one event and another. It is really a causal argument. This type of argument is examined next.

► Causal Arguments

The inductive arguments above relied on the establishment of similarities between two events, ideas, or things. Causal arguments, which may be used to figure out the probable cause of an effect or event, rely instead on finding a key difference. Why might it be important to determine cause? If you believe that one event (a cause) is somehow related to another event (an effect), you may want to either reproduce that relation, which would again cause the effect, or in some cases prevent the relation from recurring, thereby preventing the effect.

For example, every time you study hard for a test, you get a good grade. If you want to keep getting good grades, you want to know if there is a link between studying hard and getting good grades. When you can determine cause and effect, you can repeat the effect. In this case, that means figuring out that the studying really does result in good grades. To continue to get good grades, therefore, you need to continue to study hard for your tests.

On the other hand, what if you have been studying and getting good grades and there is a test coming up? You are busy with other things and don't study for it. You get a D on the test. The argument goes like this:

Every time I have a test coming up, I study for it and get good grades. This time, I didn't study, and I got a D.

If you don't want to get more Ds in the future, you will want to know what caused the bad grade, preventing the unwanted result by preventing the cause. What is the key difference in the argument? Studying. In this case, the key difference means if you don't want bad grades, you must study. Remember that in order to determine cause, an argument must be formed that looks for a key difference between two otherwise similar events.

Here is another example:

You had a stomachache on Thursday and you are trying to figure out why. Every morning for breakfast you eat bran cereal with skim milk and a banana. But, Thursday you were out of milk and had toast for breakfast instead. By midmorning, you had a painful stomachache. You picked up milk on the way home from work and had your usual breakfast on Friday. The stomachache did not occur on Friday. Nothing else in your routine was out of the ordinary.

What caused the stomachache? Chances are, it was the toast you ate for breakfast. It is the key difference. Every morning when you eat your regular breakfast, you feel fine. On the one morning when you ate toast instead, you got a stomachache. Every example is

not this easy, however. Sometimes the key difference is difficult to spot and requires an inference based on the information presented in the argument.

Real-life situations can get complicated. Our lives and the world around us are affected by thousands of details, making the finding of one key difference difficult. That said, if there is a strong likelihood of causation and there are no other obvious causes, you can make a convincing causal argument. But you need to have the following:

- **The effect must occur after the cause.** This sounds like common sense, but there are many arguments that place the effect before the cause.

Example

You are blamed for a computer problem at work. However, you did not use the computer until after the problem was detected. The argument against you has no strength.

- **You need more than just a strong correlation to prove causation.** Coincidence can often explain what might first appear to be cause and effect.

Example

Every time you wear your blue sweater, your team wins the game. Can you determine that if you always wear the sweater, your team will always win? The answer is no, because there is no causation. Nothing about your wearing the sweater could have caused a certain outcome in a game.

Practice

Look for causation in the following scenario.

Yesterday, I pulled out of a diagonal parking spot, and was starting to turn my

wheel and move forward, when another car backed out of a spot behind me. She drove right into me, smashing my left rear door with the corner of her bumper. The other driver told the police officer that I hit her. But he agreed with me that it was her fault, and wrote down why on the police report.

- d. The other driver must not have been looking in her rearview mirror, or she would not have backed into the other car.

Answer

The probable causes of the car accident are **a**, **b**, and **d**. While speeding in parking lots is never a good idea, it was not a factor in this accident.

What did the police officer write? Circle all that could apply.

- a. Drivers must wait their turn if another car is already pulling out of a parking space behind them. It is clear that the first car was already out of her space when she was hit on her door.
- b. It is impossible to hit the corner of someone's bumper with your rear door when backing out of a parking spot. It is possible to hit the rear door of someone's car with the corner of your bumper.
- c. Speeding in parking lots is prohibited by law.

► In Short

Inductive reasoning uses specific information that has been observed or experienced, and draws general conclusions about it. To make those conclusions, it relies on either (or both) past experience and common sense. Because the conclusions can only state what is likely or probable, there is a greater chance of error with inductive reasoning as opposed to deductive reasoning. In the next lesson, you will learn about specific ways in which inductive reasoning goes wrong.

Skill Building Until Next Time

You are always drawing conclusions from your observations. Pay attention to this inductive reasoning and evaluate your skills. Are you using common sense and/or past experience? Have you noticed a key difference, or compared two similar events? Become a better user of inductive reasoning by being aware of when and how you use it.

LESSON

15



Misusing Inductive Reasoning— Logical Fallacies

LESSON SUMMARY

An inductive fallacy looks like an argument, but it either has two premises that do not provide enough support for the conclusion, or a conclusion that does not fit the premises. This lesson helps you spot them so you are not taken in by their faulty logic.

AN INDUCTIVE CONCLUSION is only as good as the quantity and quality of its premises. There are a number of ways in which to create a strong inductive argument, and just as many ways to create a weak one. The premises must contain enough evidence or the conclusion will be what is known as a **hasty generalization**. If you claim cause and effect and there is not enough evidence, you create a **chicken and egg fallacy**. If the conclusion you draw does not fit the facts, it is a fallacy known as *post hoc, ergo propter hoc*. By focusing on parts of a whole and drawing a conclusion based only on those parts, you create a **composition fallacy**.

It is important to understand how these fallacies work so you can avoid them in your own arguments and recognize them when they are used by others.

► Chicken and Egg (Confusing Cause and Effect)

The age-old question, “which came first, the chicken or the egg?” is used to describe dilemmas to which there are no easy answers. In terms of logical arguments, when you are not sure which came first, you could make an error by confusing cause and effect. Just because two things regularly occur together, you cannot necessarily determine that one causes the other. Chicken and egg is a fallacy that has the following general form:

1. A and B regularly occur together.
2. Therefore, A is the cause of B.

This fallacy requires that there is no common cause that actually causes both A and B, and that an assumption is made that one event must cause another just because the events occur together. The assumption is based on inadequate justification; there is not enough evidence to draw the causal conclusion.

A common example of the chicken and egg fallacy is the relationship between television and movie violence and real-life violent behavior. Many people believe that violent behavior is the result of watching TV and movie violence. Many others believe that people are violent, and therefore they create, watch, and enjoy violent programming. Does television violence cause real-life violence, or vice versa? Or, is there no causal relationship between the two? The simple fact that some people are violent, and some entertaining TV shows and movies contain violence, is not enough to assert a connection.

How can you avoid the chicken and egg fallacy? The fallacy occurs because the conclusion is drawn without having enough evidence to determine cause and effect. One way to avoid it is to pay careful atten-

tion to the sequence of events. If A happens after B, A can't cause B. Another way is to ask yourself if there is anything else that could have been the cause. Think about the evidence presented. Is it enough to draw the conclusion?

Examples

- Many people who have lung cancer are smokers. Having lung cancer causes people to smoke.
- If you keep speeding, you will become a bad driver.
- Last night I had a fever. This morning, I have a cold and a fever. The fever caused the cold.

Practice

Which of the following is NOT a chicken and egg fallacy?

- a. Johnny Cash was famous. He was also on television frequently. Johnny Cash was famous because he was on television frequently.
- b. I didn't wash dishes all week. My dirty dishes started to grow mold. If I don't want mold growing on my dishes, I should wash them.
- c. My boss really liked the work I did on my latest project. I didn't work as hard on the project as I usually do. In order to make my boss happy, I shouldn't work as hard as I usually do.
- d. Your grades went down this semester. You joined a study group this semester. Your grades went down because you joined the study group.

Answer

Choice **b** is not a chicken and egg fallacy, it is a logical inductive argument. Choices **a**, **c**, and **d** are all examples of chicken and egg arguments. There is not enough information in any of the premises to be able to draw their conclusions. Either there is a common cause of

both A and B, or a reversal (B caused A, and not the other way around).

► **Jumping to Conclusions (Hasty Generalization)**

In this fallacy, there are too few samples to prove a point. While you can't be expected to poll thousands of people or know the outcome of every instance of a particular event, your sample must be large enough to draw a conclusion from. For example, a waitress complains, "those Southerners left me a lousy tip. All Southerners are cheap!" She has made a generalization about tens of millions of people based on an experience with a few of them.

A hasty generalization takes the following form:

1. A very small sample A is taken from population B.
2. Generalization C is made about population B based on sample A.

There are two common reasons for hasty generalizations. One is because of bias or prejudice. For instance, a sexist person could conclude that all women are bad drivers because he had an accident with one. (See Lesson 8 for more information about bias and prejudice in arguments.) Hasty generalizations are also often made because of negligence or laziness. It is not always easy to get a large enough sample to draw a reasonable conclusion. But if you can't get the right sample, do not make the generalization. Better yet, make an attempt to add to your sample size. Improve your argument with better evidence.

How do you know when your sample is large enough? There is no one rule that applies to every type of sample, so you will need to use the "practicality and

reasonability" test. What is the largest sample you can gather that makes sense, practically? Will it be large enough so that you can reasonably make a generalization about it? Reread the section on statistics in Lesson 10 to refresh your memory about the problems that can occur when taking a sample, and how those problems can be recognized and/or avoided.

Make an effort to avoid jumping to conclusions, and learn to spot such conclusions in the arguments of others by being certain that bias is not playing a role. If the generalization is the result of preexisting opinions about the population in question, the bias needs to be removed and the generalization rethought, based on real information. For example, you do not want to draw a conclusion about a particular type of person if all you have to rely on are a couple of isolated, negative past experiences.

Second, take the time to form an adequate sample. Your sample must be large enough that it makes sense to draw a conclusion from it. For instance, if you are drawing a conclusion about a large group of people, you will need to find out about many more of them than you would if you were drawing a conclusion about a very small group.

Examples

- I asked eight of my coworkers what they thought of the new manufacturing rules, and they all thought they are a bad idea. The new rules are generally unpopular.
- That new police drama is a really well done show. All police dramas are great shows.
- Omar threw the ball from left field to the second baseman, and he made an incredible double play. Whenever Omar gets the ball, he should throw it to the second baseman.

Practice

What information would you need to turn this argument from a hasty generalization to a strong inductive argument?

Sven is visiting the United States on vacation. He goes into a bank to exchange money, and is surprised to find he is the only one on line. That night, he e-mails his family, “Banking is so much faster in America. You can go into any bank and never have to wait in line.”

Answer

Sven has based his conclusion (“banking is faster in America”) on *one* experience in *one* bank. In order to turn this hasty generalization into a strong argument, he would need to increase his sample size. He could do that by visiting many more banks himself, or finding a reliable study of many banks that comes to the same conclusion.

► Composition

This fallacy occurs when the qualities of the parts of a whole are assumed to also be the qualities of the whole. It is a fallacy because there is no justification for making this assumption. For example, someone might argue that because every individual part of a large

machine is lightweight, the machine itself is lightweight. They assume that:

1. Since all of the parts of the machine (A) are lightweight (B),
2. Therefore, the machine as a whole (C) is lightweight (B).

This argument is fallacious because you cannot conclude that because the parts of a whole have (or lack) certain qualities, therefore the whole that they are parts of has those qualities. Let’s look at another example. A girl’s mother tells her, “You love meatloaf, applesauce, ice cream, and pickles. So, you will love what we’re having for dinner tonight! I made a meatloaf, applesauce, ice cream, and pickle casserole.” This is an example of the fallacy of composition because, while the girl loves all of those foods individually, one cannot reasonably conclude that she will love them when they are put together as a casserole (a whole made of the likeable parts is not necessarily likeable).

Sometimes an argument that states that the properties of the parts are also the properties of the whole is a strong one. In order to determine whether it is fallacious or not, you need to see if there is justification for the inference from parts to whole. For example, if every piece of a table is made of wood, there is no fallacy committed when one concludes that the whole table is also made of wood.

Examples

- The human body is made up of atoms, which are invisible. Therefore, the human body is invisible.
- Every player on their team is excellent. So their team must be excellent, too.
- 50% of marriages end in divorce. My husband and I are 50% married.

Practice

Explain the composition fallacy in the following scenario.

My friend Eugenio wants to get married. His ideal wife would be someone who is intelligent, attractive, and interested in fine dining. Another friend wants to set him up on a date with a chef who put herself through Yale University on beauty pageant scholarships. Eugenio said he does not need to date her—he wants to call and propose instead.

Answer

Eugenio has committed the composition fallacy by assuming that because the whole is made up of all the right parts, the whole will be right as well. In fact, the chef could have a terrible temper, never want to have children, and be concealing a dependency problem. Just because Eugenio likes certain aspects of the woman, does not mean, as a whole person, she is right for him.

► ***Post Hoc, Ergo Propter Hoc***

We learned in Lesson 14 that to make a strong causal argument you need the cause to precede the effect. In other words, if problem A causes result B, cause A had to occur before result B. However, this is not the only factor in determining cause. Just because one event precedes another does not mean that it caused it. When you wrongly make that assumption, you commit the fallacy known as *post hoc, ergo propter hoc*.

This fallacy, like the chicken and egg, has to do with cause and effect. Often called *post hoc*, it means in Latin, “after this, therefore because of this,” and occurs when an assumption is made that, because one event precedes another, the first event must have caused the

later one. The fallacy, sometimes referred to as **false cause**, looks like this:

1. Event A precedes event B.
2. Event A caused event B.

To make a strong causal argument, you must account for all relevant details. For example, every time Ahmed tries to open a video program on his computer, it crashes. He concludes that the program is causing the computer to crash. However, computers are complex machines, and there could be many other causes for the crashes. The fact that the opening of one program always precedes the crash is a good possibility for cause, but it cannot be maintained as the one and only cause until a stronger link is made. To avoid the *post hoc* fallacy, he would need to show that all of the many other possibilities for the cause of the crashing have been evaluated and proven to be irrelevant.

Superstitions are another example of *post hoc* fallacies. Some superstitions are widely held, such as “if you break a mirror, you will have seven years of bad luck.” Others are more personal, such as the wearing of a lucky article of clothing. However, all of them are *post hoc* fallacies because they do not account for the many other possible causes of the effect. Bad luck could happen to someone who breaks a mirror, but bad things also happen to those who do not. The superstition does not account for why the breaking of the mirror causes something bad to happen to the person who broke it. In these cases of superstitions, the real cause is usually coincidence.

How can you strengthen an argument and keep it from becoming an example of the *post hoc* fallacy? First, show that the effect would not occur if the cause did not occur. For example, if I don’t strike the match, it will not catch on fire. Second, be certain there is no other cause that could result in the effect. Are there any sources of flame near the match? Do matches spontaneously catch fire? Is there anything else that could

cause it to catch fire? If the answer is no, then there is no *post hoc* fallacy.

Examples

- I took three Echinacea tablets every day when my cold started. Within a week, my cold was gone, thanks to the Echinacea.
- I wanted to do well on the test, so I used my lucky pen. It worked again! I got an A.
- Last night I had a dream that there was a car accident in my town. When I read the paper this morning, I found out a car accident did happen last night. My dreams predict the future.

Practice

Which is NOT an example of a *post hoc* fallacy?

- a. I thought my team would lose the game, and they did. If I want them to win next time, I need to think more positively.
- b. Shari wanted to make a great meal for her guests, so she picked out a delicious-sounding recipe and followed it exactly. Her guests loved it.
- c. Jason did not have time to brush his teeth before his dentist appointment. But the dentist told him he had no cavities. So Jason has decided he does not need to brush his teeth anymore.

- d. During the solar eclipse, we performed an ancient chant that asks the sun to return. It worked!

Answer

Choice **b** does not claim that Shari’s guests loved the meal because she picked out the recipe and followed it exactly. If it did, it might be a *post hoc* fallacy, because there could be another reason or reasons for the positive response. For instance, she made pot roast, and all of her guests love pot roast, no matter how it is made. Choices **a**, **c**, and **d** are all *post hoc* fallacies.

► **In Short**

As we learned in Lesson 14, inductive reasoning is used all the time to make generalizations from specifics. But it can be misused to create arguments for things such as racial prejudice and superstitions. These weak arguments involve fallacies such as jumping to conclusions, chicken and egg, and composition (making a conclusion about a whole based on the qualities of its parts). Learning how to recognize such faulty reasoning will help you to avoid being tricked by it, and also help you avoid making such mistakes in the arguments you make yourself.

Skill Building Until Next Time

- Read the science section of your newspaper or a science article in a magazine and find an example of inductive reasoning. Check for fallacies. If none exist, come up with a way to apply one of the fallacies in this lesson to the example.
- Remember that in order to determine cause, you must have enough evidence to support the conclusion. Think about this the next time you are blamed for something, or you hear someone blaming another person. Do they have strong premises on which to base their conclusion? Who or what could have been the real cause?

LESSON

16



Distracting Techniques

LESSON SUMMARY

In this lesson, you will learn about logical fallacies that aim to distract you from real issues. These fallacies include red herring, *ad hominem*, and straw man.

HAVE YOU EVER listened to political candidates' debates? When they are over, you are probably left wondering, what just happened? The debates are supposed to be about the real issues faced by voters and the solutions the candidates are offering. Instead, they are typically filled with distracting techniques designed to shift the audience's focus off the real issues, and put opponents on the defensive.

These techniques include the **red herring**, which is an odd name for a common logical fallacy. Red herrings are simply any unrelated topic that is brought into an argument to divert attention from the subject at hand. ***Ad hominem*** is another distracting technique. It refers to an attack on the person making an argument, rather than on the argument itself. By shifting the focus to the personal, the topic of the argument is forgotten, and the person being attacked goes on the defensive. In **straw man fallacies**, you are distracted from the real issue by a distortion or exaggeration of that issue. Straw men deliberately misrepresent an opponent's view or stand on an issue, creating an argument that is easy to win.

While these distracting techniques are usually easy to spot, they can be challenging to deflect. If one is aimed at you, it's critical to understand how it works and how to take it apart so attention can be refocused onto the real issue.

► Red Herring

In an argument, a red herring can be any diversion that distracts attention from the main issue. The name of this distracter comes from a very strong-smelling cured fish that was once used, variously, to distract bloodhounds from the scent of escaping prisoners, or to distract hunting dogs from the trail of their prey.

The diversion usually takes the form of an irrelevant topic, which is designed to lead attention away from the real issue and onto another topic. Typically, someone who is on the defensive end of an argument will use a red herring to change the subject from one he is not comfortable with to one he feels he can win with. A red herring fallacy looks like this:

1. There is discussion of issue A.
2. There is introduction of issue B (irrelevant to issue A, but pretending to be relevant).
3. Issue A is forgotten and issue B becomes the focal point.

Example

“Nuclear power is a necessity, even though it has the potential to be dangerous. You know what is really dangerous, though? Bathtubs. More people die in accidents in their bathtubs every year than you can imagine.”

Where is the red herring? Here is issue A: Nuclear power is a necessity, even though it has the potential to be dangerous. Next, issue B is introduced, which is not

relevant to issue A: Bathtubs are really dangerous. Then, we hear more about issue B, and issue A is forgotten.

The speaker in this example may be uncomfortable discussing the potential dangers of nuclear power and/or she wants to lessen their impact by talking instead about the dangers of bathtubs. In either case, she has used a red herring, a distracter, to leave the issue she does not want to talk about. Simply, she has changed the subject.

Red herrings work well when the distracter is something that many people will agree with, or when it seems to be closely related to the issue at hand. In the first instance, you might throw in a comment about how no one likes paying higher taxes or working longer hours. Who would disagree? For example, “Our new boss does seem to be getting the job done. But, how about those longer hours? Are you happy about your new work schedule? You have less time with your family and you are not making any more money than before.” The speaker here diverted attention away from the good job being done by his boss, and onto the topic of longer working hours.

Practice

What is the red herring in the following argument? How might the argument continue without it?

It is a great idea to eliminate free checking from our bank services. There is a lot of support for it. You know, if the bank does not meet its profit goals, we could be out of a job.

Answer

The red herring is the last line, “if the bank does not meet its profit goals, we could be out of a job.” The argument is supposed to be about the elimination of free checking. Instead, the speaker goes off track by inserting the uncomfortable idea of job losses. It could be an effective argument if reasons were given for the “great idea.”

► **Ad Hominem**

Another common distraction fallacy is the *ad hominem* (Latin for “against the person”). Instead of arguing against a topic, the topic is rejected because of some unrelated fact about the person making the argument. In other words, the person who makes a claim becomes the issue, rather than the claim he or she was making. If you are not thinking critically, you might be persuaded by such an argument, especially if you agree with the information given about the personality.

For instance, a celebrity athlete is endorsing a car model, explaining its great gas mileage and service record. Your friend interrupts, saying, “who would believe anything that jerk says? He can’t throw a ball to save his life.” What if you agree that his ability as an athlete is lousy? It might make it more difficult for you to spot your friend’s illogical distracter. The athlete’s ability to throw a ball is not important here. What is important are the facts about the car.

Ad hominem arguments look like this:

1. Person A argues issue G.
2. Person B attacks person A.
3. Person B asserts that G is questionable or false.

Ad hominem arguments are made in three ways, all of which attempt to direct attention away from the argument being made and onto the person making it.

1. **Abusive:** an attack is made on the character or other irrelevant personal traits of the opposition. These attacks can work well if the person being attacked defends himself and gets distracted from the issue at hand.

Examples

- Your professor may have given a great lecture on the expansion of the universe, but the word around campus is that he is an unfair grader.
- She is giving you stock tips? I would not listen to her advice; just look at that horrible outfit she is wearing.

2. **Circumstantial:** irrelevant personal circumstances of the person making the claim are used to distract attention from the claim and used as evidence against it. This fallacy often includes phrases like “that is what you would expect him to do.”

Examples

- Representative Murray’s speech about getting rid of the estate tax is ridiculous. Obviously, he is going to benefit from it!
- Don’t pay attention to what the power company is saying; they get their funding from the nuclear energy industry.

3. **Tu quoque:** argues that the topic at hand is irrelevant, because the person presenting it does not practice what he or she preaches or is in some other way inconsistent. Like the abusive *ad hominem* fallacy, *tu quoque* can be effective.

tive because the person being attacked often drops her argument in order to defend herself.

Examples

- Why should I listen to you? You tell me to stop buying lottery tickets, but you go to Atlantic City and gamble away thousands in just one night!
- His speech about the new prison reforms was pretty convincing, if you can forget that he is an ex-con.

Practice

Identify each *ad hominem* fallacy as (A) abusive, (C) circumstantial, or (TQ) *tu quoque*.

- ___ 1. How can you believe that study on smoking? The tobacco industry funded it!
- ___ 2. In the last vote, you went against the gun control bill, saying it did not go far enough. Now you are voting for it, so I guess you were wrong about it not going far enough.
- ___ 3. I know she won't come with us to the gangster movie. She is not a guy—she only likes chick flicks.
- ___ 4. How can you believe that guy's views on environmental policy? Look at him—he is such a weirdo.

Answer

- 1. C, Circumstantial; the tobacco industry could gain from the study's acceptance.
- 2. TQ, *Tu quoque*; it says the person's argument against the bill was wrong because she changed her position on it.
- 3. C, Circumstantial; her views on the movie are not important—she is female, so what do you expect?
- 4. A, Abusive; the policy views have nothing to do with how someone looks.

► **Straw Man**

This fallacy presumes the question, "Which is easier? To fight a real man or one made of straw?" If we could choose, we would always pick the straw man who is so weak that he could be toppled by a breeze. When someone uses the straw man fallacy, she distracts attention away from her opponent's real position by creating a weaker one that is easier to attack. The weaker position (the "straw man") is usually an exaggerated or otherwise distorted version of the real position.

The fallacy looks like this:

1. Person A has position G.
2. Person B presents position H (a distortion of G).
3. Person B attacks position H.

For instance, a couple is having an argument about spending habits. The wife is upset because her husband has been charging expensive items to their charge card that they can't afford. "You need to be more careful with our money," she tells him. Her husband retorts, "why should I listen to you? You do not want me to spend a penny!" Where is the straw man? It is the husband's response to a reasonable claim about his overspending. Instead of acknowledging the issue his wife has brought up, he distorts it by exaggeration. Of course it is ridiculous to expect that someone never spends a penny, and by changing his wife's claim to something ridiculous, he dismisses it. Remember that his wife did not say that he should spend nothing (an extreme view), but rather that he should be more careful.

Note that the straw man fallacy attacks a position that is not actually held by his opponent. In an argument that uses the fallacy, a conclusion is drawn that denies the straw man but ignores the real issue. There may be nothing wrong with the conclusion or its prem-

ises; they make sense as an argument against the straw man. But the person arguing effectively against the straw man has bypassed the real issue. In the previous example, the point is not that the wife does not want her husband to spend even a penny. By creating a new and unreasonable position for his wife, the husband dismisses her real argument, which is that he should be more careful with their money.

Straw man arguments put people on the defensive because they (and/or their views) are misrepresented as being extreme. Such arguments take a moderate view and exaggerate or distort it until it is radical. It can be difficult to defend yourself against such an argument because you need to discount an extreme position while at the same time attempting to bring the focus back to your more moderate one. For example, it is a straw man to portray all Republicans as caring only for the wealthy. It is also a straw man to declare that all Democrats care about is creating and preserving an expensive welfare state. A Democrat who does support welfare, when faced with such an argument, would have to first try to show that it is extreme, and then try to bring the discussion back to a reasonable view on the benefits of welfare.

Examples

- We are all being asked to take a pay cut until the economy picks up. I can't believe they expect us to live on nothing!
- You want me to vacuum the family room? I just cleaned it up two days ago. I can't spend my life cleaning, you know.
- Congress is voting on reducing military spending. What do they want us to do, defend ourselves with paper airplanes?

Practice

Which is NOT an example of a straw man?

- a. My math teacher assigns too much work. She expects us to do homework all night.
- b. Can you believe they want to end the tax cuts? Tomorrow, they will be asking us to send back our tax refund checks!
- c. The Yankees are in the playoffs again. It is all about money. Give me millions of dollars, and I could put a winning team together, too.
- d. Why can't we all get along? I know we have different opinions on this issue, but it is not like we are at war.

Answer

Choices **a**, **b**, and **c** are all straw men because they distract from the real issues (too much work, ending tax cuts, winning games) by turning them into exaggerations, distortions, and extremes. Choice **d** is not an example of a straw man.

► In Short

Why would someone want to use a distracting technique? Perhaps they are faced with an argument they feel they can't win or they are uncomfortable discussing a certain topic. Whatever the reason, techniques such as red herrings, *ad hominem* attacks, and straw men are commonly used, not only by politicians and pundits, but by schoolchildren, business people, and friends as well. Learning how these fallacies work will hone your critical thinking skills and help keep you from falling victim to their faulty reasoning.

Skill Building Until Next Time

- Think of an issue you feel strongly about. Now, come up with an argument against that issue that includes an *ad hominem* attack. Make it as effective as you can. How would you argue against it, without getting defensive?
- Listen for a few minutes to a radio program known for its controversial host. As the host discusses his or her opponents, note how many times straw men are used. How extreme are these arguments, and what are the real issues they are distracting the audience from?

LESSON

17



Making Judgment Calls

LESSON SUMMARY

In this lesson, you will learn how to make decisions and solve problems when the stakes are high, and there are no obvious right or wrong answers.

MOST OF THE critical thinking skills that have been explored in this book have had to do with gathering facts and making decisions based upon them. Although not always easy, the process is pretty clear-cut: you come to understand the situation you face, learn all you can about it and the options available, and choose a solution. Judgment calls are trickier. You can't collect all the information you need to make a decision, because it does not exist. Even worse, judgment calls typically need to be made when the outcome is important. Let's look at these decisions closely and examine a number of successful ways in which to approach them.

► What Is a Judgment Call?

Judgment calls are made all the time, about such varied topics as what stock to buy, whether to perform a surgery, and if a potentially game-winning basketball shot made it through the hoop before the buzzer. But these decisions do have a number of things in common. For instance:

- the stakes are high
- the information you need is incomplete or ambiguous
- knowledgeable people disagree about them
- there are often ethical dilemmas and/or conflicting values involved

How can you make a judgment call with so much uncertainty surrounding the issue? Remember that these types of decisions, however difficult, are made all the time. Each one has an outcome that is both subjective and debatable. That is, judgment calls are not made purely on facts because the facts are not completely available. They are debatable because another person, who knows as much as you do about the decision and the situation surrounding it, could come up with a strong argument as to why your decision might be wrong (or another option is right). Accepting the nature of judgment calls before you make them can help take some of the stress out of the decision-making process.

► **Preparing to Make a Judgment Call**

If you can't gather all the pertinent information you need to come to a decision, is there a way to prepare to make a judgment call? The answer is yes. You will not end up with all the facts, because they are not always clear, and it is debatable what to include and what to exclude. But arming yourself with information is still an important step toward making such a decision. Let's consider a real-life example as we explore the preparation for a judgment call.

Example

A food pantry is opened in a small town, with a mission to provide free food and household items to people in need. After a few months, the number of people visiting the pantry doubles as word spreads to surrounding communities. Most of the new visitors are from a city ten miles away that has its own food pantry. The committee that runs the small-town pantry discovers that some of these new visitors are actually coming for food which they then turn around and sell to others. Should the pantry ignore this practice, and continue to provide food for all who come to it? Should it limit its visitors to only those who live in their town? Should it close its doors and discontinue its mission?

This is a great example of a real-life judgment call. The first step, although it will not be as complete as with other types of decisions, is to gather information. Decide what kinds of data you need and try at this point to determine what you will base your decision on. In this step, you want to identify all available options.

Example

Do most of the people who visit the food pantry have an actual need? How many people collect food and sell it? Where are they from? If the food pantry closed, where would those in need turn for assistance?

You need to decide on your criteria so you know what types of information to look for. The second step is to seek out other people as both sources of infor-

mation, and as feedback on your decision making process. Choose people who are not only knowledgeable but who will be able to provide you with objective commentary, including criticism. Discussion with others, whether one-on-one or in a group, can be an invaluable step in the process. Remember that the objective of this step is not to take a poll but to add information. You might discover better or more sources of data, find out about further options, or realize that you did not consider an important aspect of the decision.

The third step is to play “what if?” Explore each option as a solution, asking yourself (and others, if appropriate) how would this option work as a solution? Who would benefit? Who would be hurt, annoyed, or wronged? What is the best-case scenario and what is the worst for your option? Test each possibility and weigh its possible benefits and detriments. How do they measure up to the criteria you established in step one?

Example

Imagine you decided that the most important criteria for making your decision was whether or not those in need would get free food from some other source if the food pantry closed. In step three, you will ask questions such as, “are there other food pantries that are accessible to our town?” “Do those pantries limit their visitors to only those who live in their communities?” “Could we provide other assistance to those in our town to help them purchase food, such as gift certificates to grocery stores?”

Practice

You inherited \$5,000 from your great aunt. You want to put the money into a mutual fund, but your spouse wants to use it to pay off a credit card debt. What information would be important to find out in preparing to make the judgment call as to what to do with your inheritance? Circle as many as apply.

- a. What is the year-to-date rate of return on the mutual fund?
- b. How much interest is the credit card company charging you?
- c. Which kinds of investments did your great aunt favor?
- d. Can you transfer your credit card balance to a card with a 0% interest rate?

Answer

Choices **a**, **b**, and **d** would be valuable information to have when preparing to make such as judgment call. Choice **c** is not relevant.

► **What about Biases and Intuition?**

As previously noted, judgment calls are subjective. They are not simply a distillation of the facts. At some point in the decision making process, you will probably make choices that are not easy. Even after you have got your information, and explored the “what if” scenarios, the outcome is still your opinion.

In order to make good judgment calls, you need to acknowledge and check your natural inclinations toward decisions. For example, everyone has biases that influence opinion. You might have experienced, for example, the loss of a large part of your savings due to a drop in the stock market which has made you leery

of investing. Or, you grew up in a family that was never in debt and stressed the evils of credit. These experiences could cloud your ability to make an effective judgment call.

The problem is that biases, or any type of preexisting attitude, reduce your ability to objectively evaluate information. If you allow them to play an active part in your decisions you run the risk of making a bad choice. When you are aware of your biases you will not eliminate them, but you can check that they are not getting in the way of a good judgment call.

What about intuition or instincts? As you go through the process of making a judgment call, you might get a feeling, a hunch, that one option simply feels right when compared to the others even when logic tells you otherwise. Also called a gut reaction, this feeling can lead to a great decision. It can also lead to a disaster. As with biases, acknowledge your intuition but listen to it as one factor in many. It should not outweigh the facts and other input you gathered in steps 1 through 3.

Practice

Which is NOT an example of intuition being used to make a judgment call?

- a. You are the referee for a Little League game. A play was made at second base, but you sneezed and did not see it. You call the runner out because the second baseman has already made a number of great plays.
- b. While faced with a big decision regarding an important relationship, you wake up from a dream in which you made the decision and it worked out perfectly. You decide to make the decision as you did in your dream.
- c. During a job interview, you get the feeling that the interviewer, your potential boss, does not like you. When she offers you the job you turn it

down. Who wants to work for someone who does not like him or her?

- d. Your professor assigns a ten-page research paper. You really like the topic, but you are busy and do not begin writing the paper until the night before.

Answer

Choice **d** is not an example of intuition. The timing of the paper writing is not due to a hunch or instinct, but simply a time constraint.

► **Making the Call**

You can prepare as thoroughly as humanly possible before making a judgment call, getting input and information from dozens of sources, evaluating each option as carefully as possible. But it still comes down to your opinion. How do you make the leap to a decision? Here are a couple more ideas that can help.

Evaluate the Risks

After you have looked at each option in terms of “what if,” determining who (or what) will gain or lose from possible outcomes, you should look at your decision in terms of risk. How much risk are you willing to take, and are you willing to suffer the consequences if you make the wrong choice? For example, you are considering buying shares of a stock. The choice is to buy, or not to buy. The best-case scenario is that you buy and the price skyrockets. The worst-case scenario is you buy and the price plummets. Notice that the risk only occurs if you make the purchase. Therefore in this case, you need to decide if you can tolerate the risk of having the worst-case scenario occur. If you can’t, you should not buy. The best question to ask yourself is, if

you take the risk, how much money can you afford to lose?

Here is another scenario: you are a manager who must hire two new employees. When you advertise the openings you get dozens of resumes. Two of them belong to current employees who wish to move up to higher paying jobs with more responsibility. You know them and are impressed with their job performance. The top two resumes from the rest of the batch are graduates from prestigious business schools. However, they have no relevant work experience. Who do you hire?

Evaluate the decision in terms of risk. The current employees are known to you. If you hire them, there is little risk that they will not be able to perform well on the job. Based on your own observations, they are both conscientious individuals who are more than capable of doing well in the new positions. The other candidates are a riskier choice. Although they have the education, they lack experience. Will you have to spend countless hours training them? Will they be able to successfully handle the job requirements? You can only guess at the answers. If you want to make a judgment call based on what will be the least risk, you will hire the current employees.

Examine the Consequences

Remember that judgment calls are subjective and debatable. They rely on opinion as well as facts and figures. That is not to say that they rely on hunches or prejudices to make decisions. Using either (or both) does not take into account the objective realities of a situation. Let's go back to the example of the food pantry. Once you have impartially looked at the situation and the facts surrounding it, the judgment call as to whether to limit those who can visit it, remain open as usual, or close the pantry down comes down to an opinion. Half of the committee believes they are providing a valuable service to the community and should

continue to do so even though some people are taking advantage of them. Others believe they can't prevent visitors from selling the food they are giving away, so they should close. You could probably form a strong argument for either case, but what if you had to make a choice?

One way to help make such a decision is to focus on the consequences. Will anyone be helped or harmed by the decision? Weigh the value and term of the benefit or detriment—is it a convenience or inconvenience, or does it result in a long-term effect? If all options will result in some negative action or result, which is least negative? Putting your answers into a graphic organizer, such as a chart, can help you to weigh your options.

For example, an employee of a large accounting firm notices that her company is falsifying the financial records of a client, which happens to be a multinational corporation. Should she report the wrongdoing and risk losing her job, or say nothing, and allow criminal behavior to continue? We will explore both options on a chart found on the next page.

By exploring her options, the employee understands that whistle-blowing could result in possible short-term negative effects for herself (unemployment). Of course, the other consequence is that the wrongdoing would stop and the criminals who falsified the records would probably be punished. In effect, she might save shareholders of the client's company millions of dollars.

If she says nothing her career will be secure. However, there is a risk that someone else outside the company will discover the wrongdoing. If that happened, there could be major consequences not just for the person who falsified the records but for the entire company. The employee needs to carefully weigh the options in terms of possible consequences before she makes the judgment call.

Option 1: Report Wrongdoing

Who is helped?	company	Long/short term?	Short (get rid of bad employee)
Who is harmed?	self	Long/short term?	Short (might lose job)

Option 2: Keep Quiet

Who is helped?	self	Long/short term?	Long (career stable)
Who is harmed?	company	Long/short term?	Long (wrongdoing continues)

Practice

Use a chart similar to the one above to explore the possible consequences of each option in the following scenario.

The owner of a small store finds out that his best employee, a college student, closed the store an hour early over the weekend so she could attend a party. This employee has consistently been an excellent, dependable worker, and is the only one the owner can trust to close the store in his absence. In fact, finding reliable help is very difficult. However, by closing an hour early, the employee cost the store-owner a few hundred dollars in profits, based on typical Saturday night sales. Should the store-owner confront the employee about the early closing? Fire her? Pretend it didn't happen?

Option 1:

Who is helped?	Long/short term?
Who is harmed?	Long/short term?

Option 2:

Who is helped?	Long/short term?
Who is harmed?	Long/short term?

Option 3:

Who is helped?	Long/short term?
Who is harmed?	Long/short term?

Answer

Remember that judgment calls are not clear-cut. There is not always one right answer. However, a good response is one that adequately explores all three options and their possible consequences. Below is such a response.

Option 1: Confront the Employee

Who is helped?	store owner	Long/short term?	Long (won't lose profits again)
Who is harmed?	store owner	Long/short term?	Long (might lose employee)

Option 2: Fire Employee

Who is helped?	no one	Long/short term?	
Who is harmed?	store owner	Long/short term?	Possibly Long (won't easily replace employee, will have to do more work himself)

Option 3: Say Nothing

Who is helped?	employee	Long/short term?	Long (won't be embarrassed about incident, will keep job)
Who is harmed?	store owner	Long/short term?	Both (might lose more profits from early closings)

► In Short

Judgment calls can be difficult. In a situation where the stakes are high, and even the experts disagree, you may not want to make a choice that is, at best, subjective and debatable. But there are many circumstances in which you will have to do just that. You will need to consider any facts you can gather, the advice of others, your intuition, and even your values. Take your time with judgment calls, and with practice, you will become more confident in making them.

Skill Building Until Next Time

- Although they rely on evidence and prior decisions, judges must make judgment calls frequently. Check the newspaper for a complicated case and find out more information about it online. Look at the evidence that was presented by both sides. On what do you think the judge based his or her decision?
- Have you ever downloaded music without permission from the Internet? Maybe you know someone who has. Was the decision a judgment call? If so, how did you come to your decision?

LESSON

18



Explanation or Argument?

LESSON SUMMARY

In this lesson, you will learn how to judge explanations, and what makes them effective or ineffective. You will also learn how to tell the difference between explanations and arguments.

YOU HAVE GOT some explaining to do!” Everyone is in the position on occasion to either explain themselves or hear explanations from others. Sometimes, it involves a simple incident like showing up late to a movie. At other times, though, an explanation can make or break a career, or encourage a terrible decision. Explanations are often taken for granted, but, as with arguments, they can be effective or ineffective. They can get someone off the hook, or deeper into hot water. Understanding what a good explanation is, and how to differentiate it from an argument, are important critical thinking skills.

► What Is an Explanation?

At first glance, this seems like a simple question. Someone asks, “why did you do it?” Your answer, the explanation, gives them the reasons. In an explanation, a statement, or set of statements, is made that gives new information about something that has been accepted as fact. In answer to the question, “why did you do

it?” you are not going to reply that you did not do it (that would be an argument). It is accepted that you did something, and you are going to give information that tells why you did it.

An explanation is made up of two parts, the thing that will be explained (known as the **explanadum**), and the set of statements that is supposed to do the explaining (known as the **explanans**). If you were to answer the question, “why did you buy that car?” you might say, “I bought this car because it gets great gas mileage.” The phrase “I bought this car” is the explanadum. “It gets great gas mileage” is the explanans.

When an explanation is accepted, it removes or lessens a problem. The “why?” is solved. In the example above, the person asking the question does not understand something (why you bought a certain car). After your explanation, she will. In addition, a good explanation is relevant. That is, it speaks directly to the issue. If someone asks you, “why did you show up late,” and you reply, “I was late because my shirt is blue,” you have given a poor explanation. It is not relevant to the question that was asked.

To summarize, the four indicators of a good explanation are:

1. it gives new information
2. its topic is accepted as fact
3. when accepted, it removes or lessens a problem
4. it is relevant

In Lesson 13, you learned about the fallacy of circular reasoning. Logical arguments must have premises that lead to a valid conclusion. If the premise is simply a restatement of the conclusion, the argument is circular (and therefore invalid). “I like the Cubs because they are my favorite team” is an example of circular reasoning, because the premise (they are my favorite team) is the same as saying the conclusion (I like the Cubs).

Explanations may be circular as well. When they are, they offer no new information.

Example

I did well on my SATs because I got a high score.

The explanadum and the explanans simply repeat each other. Doing well on a test and getting a high score are different ways of saying the same thing. In order to make this an effective explanation, the speaker would have to give new information. We already know she did well on the test, but why? She might say:

I did well on my SATs because I studied and got enough rest before the test.

This explanation works because the explanans tell something new (the facts that the speaker studied and got enough rest). It also fulfills the other three marks of a good explanation. It is about something that is not disputed—in this case, the fact that the speaker did well on her SATs. It solves the problem of not knowing why she did well. It is relevant; the reasons for the explanadum are good ones. They make sense. If the speaker said instead, “I did well on my SATs because I have a dog that won’t walk on a leash,” we could say that the explanation is irrelevant. The fact that he has a dog has nothing to do with doing well on a standardized test.

This seems straightforward enough. Good explanations give new, relevant information about a topic, accepted as fact, that is problematic or puzzling. It is usually easy to spot an explanation that does not work on one or more of these points, such as telling someone they need to drink more milk because the sky is blue. However, it can get confusing when an argument

masquerades as an explanation, or an explanation looks like an argument.

Practice

How could you revise the following weak explanations to make them strong?

1. Everyone on our street does not have electricity because our power went out.

2. My new CD player is not working since I ate that ice cream sundae.

Answer

1. A good explanation would give reasons, or new information, about the power outage. Responses might be “because Hurricane Graham hit here yesterday,” or “because the wiring is old and needs to be replaced.” Any real reasons for a power outage would turn this weak explanation into a strong one.
2. In this case, the explanans have nothing to do with the explanandum. To make a good explanation, you would have to give relevant reasons as to why the CD player is not working, such as, “since my brother dropped it” or “since the batteries went dead.”

► **Distinguishing an Explanation from an Argument**

An explanation helps you to understand a certain fact by giving reasons that are causes of the fact. It answers

the question, “why?” An argument, on the other hand, tries to convince you of the truth of its conclusion by giving reasons (premises) that are evidence for the conclusion. Simply put, an explanation provides causes, and an argument provides evidence.

Even when you understand this basic difference, though, it can sometimes be difficult to tell one from the other. Why is it important to be able to distinguish an explanation from an argument? There are times when someone will label his or her explanation as an argument. That is, they will try to convince you of something by telling you its causes, as opposed to giving you evidence. There are three specific ways in which the two differ. They are:

1. recommendations and value judgments
2. feelings and beliefs
3. future outcomes

Each of these will be discussed in detail.

Recommendations and Value Judgments

Many arguments express a recommendation, or value judgment. They then try to convince you of the goodness or rightness of it. Explanations do not contain such recommendations or judgments. They are about undisputed facts and not attempts at persuasion. For example, here is a conclusion to an argument:

The best place for a steak is Louie’s Steak Shack. They use only high quality meat, and the décor is fabulous.

How do we know this is not an explanation? It is a judgment on the part of the speaker, meant to recommend. “The best place for a steak” is opinion, rather than fact. It could however become an explanation if

there was some factual basis for deeming the restaurant “best place for a steak.” One way to do this is to factually state another person’s opinion. For instance:

My cousin says the best place for a steak is Louie’s Steak Shack because they use only high quality meat, and the décor is fabulous.

Now, we have a simple statement of fact (what the cousin says) followed by its causes (why the cousin has that opinion—the quality of the meat, and the décor). Remember that explanations are about something that is already accepted as fact. Judgments and recommendations are not facts.

Practice

What is the fact or judgment in each of the following?

1. My career is on the fast track. I think my boss is going to promote me.
2. The helmet law should be repealed because adults can decide for themselves whether or not to wear a helmet.
3. With such clean beaches and great restaurants, the Caribbean is the best place for a vacation.
4. Since it gets great gas mileage, my new car is saving me money.

Answers

1. Judgment: “My career is on the fast track.”
2. Judgment: “The helmet law should be repealed.”
3. Judgment: “The Caribbean is the best place for a vacation.”
4. Fact: “My new car is saving me money.”

Feelings and Beliefs

Distinguishing between arguments and explanations can be tricky when they involve statements about how someone thinks or feels, believes or disbelieves. We have already determined that explanations are not value judgments or recommendations. Words like “believe” or “feel” are often a part of such judgments. But, they can also be a part of an explanation.

For example, you are considering buying stock in a company that two of your friends work for. One tells you, “Our company is doing really well. Sales are high, and one of our products won an award.” The other says, “Economists believe our company is doing really well, because our sales are high, and one of our products won an award.” The word “believe” is a warning signal

When Evidence Is Missing

When do people tend to use explanation when they really need to make an argument? When they are trying to justify an opinion. Think about the persuasive advertisements examined in Lesson 9. When an advertiser wants to convince you to buy her product, she needs an argument with evidence. But typically, there is no evidence. One detergent is just as good as another, one brand of tires performs equally with other brands. How then can the advertiser construct an argument without evidence? By using explanations that either give no new information, or give irrelevant information, such as “our dish detergent is much better than Brand X, because it smells like lemons.” When you see through these types of claims, you are distinguishing between explanations and evidence. Critical thinking skills help you to understand that weak or unsubstantiated explanations are no substitute for scarce or missing evidence.

that the statement is simply an opinion. But look closely. Whose belief is it? Your friend, the speaker, is not one of the economists. She is simply stating a fact, which is that the economists hold a belief that her company is doing well.

The first friend is trying to convince you that her conclusion (“our company is doing really well”) is valid by giving you evidence. The second is explaining the reasons why a group of people believe something. Perhaps you won’t buy the stock after either friends’ statement, but if you are thinking critically, you know the motivation of each.

Fast Forward

What about the future? If someone is talking about what will happen tomorrow, you might think it must be an argument. Explanations are about undisputed facts, and arguments are about judgments and opinions. Can there be a fact about something that has not even happened yet? The answer is yes. Just because you see the words “tomorrow,” “next week,” or “some day,” does not mean you are looking at an argument.

Here are a few examples of explanadums about the future:

This fall, the leaves will turn color before dropping to the ground.

Someday, we will all die.

I am going to get my hair cut next week.

The point is that facts are not just about things that have already happened. There are many things about the future that we can accept with certainty. Do not be fooled by references to the future. When you pay careful attention to the context of the argument or explanation, you can tell the difference between the two, regardless of whether they have to do with last week or next week.

Practice

Label each statement as an (A) argument or an (E) explanation.

- ___ 1. We should not have school on Saturdays because we need time for recreation.
- ___ 2. The reason my credit rating is high is because I never make late payments.
- ___ 3. If you worked out more, you would lose weight, because exercise burns calories.
- ___ 4. The death penalty should be abolished because two wrongs do not make a right.

Answers

- 1. Argument
- 2. Explanation
- 3. Explanation
- 4. Argument

► In Short

Good explanations are helpful. They give people the information they need to solve problems and understand situations. They differ from arguments in a number of key ways. Explanations answer the question, “why?” by giving reasons that are the causes of a particular fact. Arguments try to convince you of their conclusions by presenting evidence for them. While explanations are about facts, arguments can be value judgments or recommendations. Understanding these differences allows you to see through poor arguments that aim to convince you to do, buy, or think something based on little or no evidence. Being able to recognize and formulate good explanations is a valuable critical thinking skill.

Skill Building Until Next Time

- Listen for explanations in conversation with friends and family. How often do you hear irrelevant explanations or circular reasoning?
- Imagine you want to start a small business. You have no experience, and you need funding from your bank. How would you explain your idea to a bank loan officer?

LESSON

19



Critical Thinking for Exams

LESSON SUMMARY

Increasingly, critical thinking exams are given not only to students, but also to those seeking employment or promotions in the workforce. This lesson shows you what critical thinking questions look like, and how to use this book to approach them effectively.

MOST HIGH SCHOOL students are familiar with the ACT and the SAT, tests that are used by colleges and universities to make admissions decisions. After college, graduate exams such as the GRE, GMAT, and LSAT are taken if you are interested in attending graduate school. All of these tests include sections that measure critical thinking skills. They use various types of questions, such as those based on reading passages, scientific experiments, and written opinion and argument.

Many critical thinking tests are similar to one another. For instance, the ACT critical reading questions use a format like that found in the SAT. The GRE Analytical Writing Test is comparable to sections in the GMAT and LSAT. Instead of repeating information that applies to each test, we will focus on sections in each test that are unique.

► The Scholastic Aptitude Test (SAT)

The SAT is taken during high school and its scores are used by colleges and universities to make admissions decisions. The test is divided into two parts, verbal and math. It currently includes a critical reading section as part of the verbal half of the test, which consists of a number of passages. These passages are followed by questions that test your ability to comprehend and make inferences about their content. Critical reading questions account for almost half of the verbal section score. Beginning with the March 2005 SAT, the verbal section will be renamed Critical Reading, and all questions will refer to reading passages.

What You Will Find on the Test

The SAT passages represent various writing styles and are taken from different disciplines, including the humanities, social sciences, and natural sciences. They are written at the college level, which means they are sophisticated, complex, and contain some vocabulary that may be unknown to you. It is not expected that you have any prior knowledge of the material in the passages, but rather that you have the ability to read, understand, and use the information in them. Each Scholastic Aptitude Test also contains a pair of related passages presented as one reading section. They may express opposite points of view, support each other's point of view, or otherwise complement each other.

Specifically, critical reading questions will direct you to:

- infer the meaning of words from context
- comprehend the information presented in the passage

- analyze the information
- critique the authors' arguments (singly and as opposed to one another in a dual passage section)

Using This Book to Prepare for the SAT

The lessons in *Critical Thinking Skills Success* that relate directly to the skills you need to successfully complete the Critical Reading section are:

- **Lessons 1 and 3: Inference.** These lessons cover how to take in information, and understand what it suggests, but does not say outright. When you infer, you draw conclusions based on evidence.
- **Lesson 9: Persuasion Techniques.** Some questions will ask you to evaluate arguments. Understanding how persuasion works, and being able to identify rhetorical devices used in persuasive writing, will help you to correctly answer these types of questions.
- **Lessons 12 and 14: Deductive and Inductive Reasoning.** These lessons teach the design of logical arguments. They will both help you recognize such arguments, and show you how to make them yourself.
- **Lessons 13, 15, and 16: Logical Fallacies.** Knowing the terminology of fallacies, and how they work, will help you identify and describe weak or invalid arguments with accuracy.
- **Lesson 17: Judgment Calls.** This lesson also teaches about inference. When you have some evidence, but not enough to come to a clear-cut decision, you will need to make a judgment about the answer.

Roadblocks to Critical Reading Question Success

- 1. Using prior information.** Every answer comes from a reading selection, whether it appears directly or can be inferred. If you have prior knowledge of the subject, don't use it. Adding information, even if it makes sense to you to do so, can lead you to the wrong answer.
- 2. Choosing an answer just because it is true.** There may be a couple of true answers, but only one will answer the question best.

Practice

The following excerpt tells of a defining chapter in the life of a budding scientist.

The voyage of the "Beagle" has been by far the most important event in my life, and has determined my whole career; yet it depended on so small a circumstance as my uncle offering to drive
(5) me thirty miles to Shrewsbury, which few uncles would have done, and on such a trifle as the shape of my nose. I have always felt that I owe to the voyage the first real training or education of my mind; I was led to attend closely to several
(10) branches of natural history, and thus my powers of observation were improved, though they were always fairly developed.

The investigation of the geology of all the places visited was far more important, as reason-
(15) ing here comes into play. On first examining a new district nothing can appear more hopeless than the chaos of rocks; but by recording the stratification and nature of the rocks and fossils at many points, always reasoning and predicting
(20) what will be found elsewhere, light soon begins to dawn on the district, and the structure of the whole becomes more or less intelligible. I had brought with me the first volume of Lyell's 'Principles of Geology,' which I studied attentively; and
(25) the book was of the highest service to me in many ways. The very first place which I examined, namely St. Jago in the Cape de Verde islands, showed me clearly the wonderful superiority of

Lyell's manner of treating geology, compared with that of any other author, whose works I had with
(30) me or ever afterwards read. Another of my occupations was collecting animals of all classes, briefly describing and roughly dissecting many of the marine ones; but from not being able to draw, and from not having sufficient anatomical knowl-
(35) edge, a great pile of manuscripts which I made during the voyage has proved almost useless. I thus lost much time, with the exception of that spent in acquiring some knowledge of the Crus-
(40) taceans, as this was of service when in after years I undertook a monograph of the Cirripedia.

During some part of the day I wrote my Journal, and took much pains in describing carefully and vividly all that I had seen; and this was good
(45) practice. My Journal served also, in part, as letters to my home, and portions were sent to England whenever there was an opportunity.

The above various special studies were, however, of no importance compared with the habit of energetic industry and of concentrated attention
(50) to whatever I was engaged in, which I then acquired. Everything about which I thought or read was made to bear directly on what I had seen or was likely to see; and this habit of mind was
(55) continued during the five years of the voyage. I feel sure that it was this training which has enabled me to do whatever I have done in science.

Looking backwards, I can now perceive how my love for science gradually preponderated over every other taste. (60)

1. In lines 8–9, when the author speaks of the first real training or education of my mind, he refers to
 - a. the voyage of the Beagle.
 - b. the development of his career.
 - c. the branches of natural history.
 - d. his powers of observation.
 - e. the shape of his nose.
2. In lines 13–14, the author says he considers geology far more important due to the fact that
 - a. its structure is obvious.
 - b. it helped him learn to reason.
 - c. he made sense out of chaos.
 - d. play is as important as work.
 - e. he learned how to study.
3. In line 18, the word *stratification* most nearly means
 - a. coloration.
 - b. calcification.
 - c. layers.
 - d. composition.
 - e. location.
4. In lines 21–22, the phrase *the structure of the whole becomes more or less intelligible* refers to
 - a. the break of day.
 - b. the ability to predict findings.
 - c. a comprehensive knowledge.
 - d. the assurance of correctness.
 - e. the fitting together of disparate facts.
5. In line 37, the admission that many of the author's manuscripts proved almost useless depends on the notion that
 - a. it is necessary to draw and know anatomy when collecting animals.
 - b. additional description would have been required for clarity.
 - c. a rough dissection is better than no dissection.
 - d. publication requires more finesse than he possessed.
 - e. describing and dissection are a waste of time.
6. In line 41, the word *monograph* most nearly means
 - a. a line drawing.
 - b. a comprehensive treatment.
 - c. a one page summary.
 - d. a thorough dissection.
 - e. a written treatment.
7. In lines 42–45, the author sees the primary value of his journal as being
 - a. a contribution to English society.
 - b. good preparation for his future work.
 - c. practice in painstaking description.
 - d. killing two birds with one stone.
 - e. to serve as letters home.
8. In line 59, the word *preponderated* most nearly means
 - a. predominated.
 - b. postponed.
 - c. graduated.
 - d. eliminated.
 - e. assuaged.

Answers

1. **d.** It was the training in several branches of natural history that led to the improvement of the author's powers of observation (lines 10–11).
2. **b.** The author says the investigation of geology brought reasoning into play (lines 14–15), meaning he had to develop his reasoning.
3. **c.** *Stratification* means layers. In lines 17–19 stratification is opposed to *chaos*, as the way in which rocks are ordered.
4. **e.** As the author works through the logic of geology, the many disparate facts begin to make sense (lines 21–22).
5. **a.** The author says that the facts that he was not able to draw and did not have sufficient anatomical knowledge (lines 34–37) made his manuscripts worthless.
6. **e.** *Monograph* is a word for a narrowly focused written treatment of a subject. Compare *monograph* (line 41) with *manuscript* (line 36) for your context clue. In the context a monograph could not be less thorough than a manuscript.
7. **c.** The author says he took much pains in describing carefully and vividly, and that this was good practice (lines 42–45).
8. **a.** The word *preponderated* means took over or predominated. In line 59 the word *over* placed after *preponderated* is your clue, along with the context of the sentence.

► **ACT (American College Testing)**

The ACT, like the SAT, is a college entrance exam taken by high school students. It consists of four separate

tests: English, reading, math, and science. The reading test is similar to the SAT Critical Reading test; it consists of passages followed by questions that relate to them. The science test also involves critical thinking skills. It is designed as a reasoning test, rather than an assessment of your knowledge of particular science facts. As with the critical reading tests, you are given in the passages all the information you need to know to answer the questions. (However the ACT website does note that “background knowledge acquired in general, introductory science courses is needed to answer some of the questions.”)

What You Will Find on the Test

The ACT Science Reasoning Test has 40 questions that must be answered in 35 minutes. Content includes biology, chemistry, physics, and the Earth/space sciences (including geology, astronomy, and meteorology). The questions evaluate your interpretation, analysis, evaluation, reasoning, and problem-solving skills. You are presented with seven passages that fall into three skill categories: Data Representation, Research Summaries, and Conflicting Viewpoints. Each passage is followed by a number of multiple-choice test questions that direct you to interpret, evaluate, analyze, draw conclusions, and make predictions about the information. In the Science Reasoning Test, “passages” does not only mean written information; there may be text, figures, charts, diagrams, tables, or any combination of these.

Specifically, you will be asked to:

- read and understand scatter plots, graphs, tables, diagrams, charts, figures, etc.
- interpret scatter plots, graphs, tables, diagrams, charts, figures, etc.
- compare and interpret information presented in scatter plots, graphs, tables, diagrams, charts, figures, etc.

- draw conclusions about the information provided
- make predictions about the data
- develop hypotheses based on the data

Using This Book to Prepare for the Exam

- **Lessons 1 and 2: Recognizing and Defining Problems.** These lessons will help you to zero in on the precise problems presented in Conflicting Viewpoint passages.
- **Lesson 3: Focused Observation.** Knowing how to concentrate and approach a problem thoroughly is critical, because not only are you expected to arrive at the correct answer, but you must record it in a relatively short period.
- **Lesson 4: Graphic Organizers.** You won't need to construct graphic organizers, but you will have to interpret them. Understanding how information fits into charts, maps, and outlines will help you to make sense of, and draw conclusions about, them.
- **Lesson 9: Persuasion Techniques.** This lesson will be most useful when dealing with Conflicting Viewpoints. It explains how persuasive arguments work. Having this knowledge will help you to be better able to analyze them.
- **Lesson 10: Misusing Information: The Numbers Game.** As with lesson 4, you will gain an understanding of how numbers are used and misused. Many questions are designed to evaluate how good your skills in this area are.
- **Lessons 12 and 14: Deductive and Inductive Reasoning.** These lessons cover the structure of logical arguments, which lead to the drawing of conclusions, and, with inductive logic, the development of hypotheses.

- **Lesson 17: Judgment Calls.** Any time you make an inference, you are testing your ability to make sound judgment calls. This lesson will also help you to evaluate the consequences of possible solutions.
- **Lesson 18: Explanations.** You will be asked to choose the best answer from a field of four. This lesson shows you what makes a valid, sound explanation. When you understand this, you will better be able to make the correct selection.

Practice

Is Pluto a Planet?

Scientist 1

Based on perturbations in Neptune's orbit, the search for a ninth planet was conducted and Pluto was discovered in 1930. Pluto orbits the Sun just as the other eight planets do, it has a moon, Charon, and a stable orbit. Based on its distance from the Sun, Pluto should be grouped with the planets known as gas giants. In addition, Pluto, like the planet Mercury, has little or no atmosphere. Pluto is definitely not a comet because it does not have a tail like a comet when it is near the Sun. Pluto is also not an asteroid, although its density is closer to an asteroid than to any of the other planets. Pluto is a planet because it has been classified as one for more than sixty years since its discovery.

Scientist 2

Pluto should no longer be classified as a planet based on new evidence that has come to light in the last few years. When Pluto was first discovered, nothing was known about its orbit or its composition. Pluto has an orbit that is not in the same plane as the other planets (i.e., it is tilted) and its orbit is more eccentric, or elongated than any other planet's orbit. Pluto orbits the Sun in the outer solar system, and so should be similar in size and composition to the gas

giants, but it is not. Pluto lacks the rings that all other gas giants possess. Also, Pluto's moon is larger than any other moon relative to its parent planet. In recent years, new objects have been found which belong to the Kuiper Belt, a region of small solid icy bodies that orbit the Sun beyond the orbit of Neptune and Pluto. A large object called Quaoar has recently been discovered which has a density nearly identical to Pluto, Charon, and Triton. Based on these facts, I conclude that Pluto is a Kuiper Belt object.

1. Scientist 1 states that "Based on its distance from the Sun, Pluto should be grouped with the planets known as gas giants." Which of the following statements made by Scientist 2 opposes Scientist 1's belief that Pluto is a gas planet?
 - a. Pluto's moon is larger than any other moon relative to its parent planet.
 - b. A large object called Quaoar has recently been discovered which has a density nearly identical to Pluto, Charon, and Triton.
 - c. Pluto has an orbit that is not in the same plane as the other planets (i.e., it is tilted) and its orbit is more eccentric, or elongated than any other planet's orbit.
 - d. Pluto lacks rings that all other gas giants possess.

2. What do both scientists agree upon?
 - a. Pluto is like Mercury.
 - b. Pluto is a Kuiper Belt Object.
 - c. Pluto orbits the sun.
 - d. Charon is a planet.

3. Which of the following are reasons why Scientist 2 believes Pluto should NOT be classified as a planet?
 - I. Pluto has no atmosphere.
 - II. Pluto is similar in composition to Quaoar.
 - III. Pluto has the most eccentric orbit of all the planets.
 - IV. Pluto's orbit is not in the same plane as the orbits of the other planets.
 - a. II, III only
 - b. I, III and IV
 - c. III, IV only
 - d. II, III, IV

4. Based on composition and density, Pluto is a
 - a. Kuiper Belt Object.
 - b. Earth-like planet.
 - c. comet.
 - d. gas giant planet.

5. Based on the information presented by Scientist 2 what is a possible origin for Neptune's moon, Triton?
 - a. Triton is a natural moon of Neptune.
 - b. Triton is a captured Kuiper Belt Object.
 - c. Triton is a captured asteroid.
 - d. Triton is a captured comet.

Answers

1. d. Only the statement "Pluto lacks the rings that all other gas giants possess," opposes the statement made by Scientist 1.
2. c. If you read both passages carefully, only one fact appears in both. Scientist 1 states, "Pluto orbits the Sun just as the other eight planets do," and Scientist 2 states, "Pluto orbits the Sun in the outer solar system."

3. d. According to Scientist 2, the factors that separate Pluto are its different density, composition, and orbital characteristics, which are more like those of the Kuiper Belt Objects than the planets.
4. a. Pluto, Charon, and Neptune's moon, Triton, all have densities and compositions similar to the newly discovered object Quaoar. This infers that they are all bodies originally from the Kuiper Belt.
5. b. Triton's similar density and composition to Quaoar are evidence that indicate that it is an object that was captured by Neptune's gravity at some point in the early formation of the solar system.

► GRE (Graduate Record Exam) General Test

The GRE General Test assesses the academic knowledge and skills needed for graduate study. It has three parts: **verbal**, **quantitative**, and **analytical writing**. The verbal section is similar to the critical reading problems found in the SAT. After reading a passage, you will be asked to analyze, evaluate, and synthesize the information found in it. The analytical writing section also tests for critical thinking skills. It includes a 45-minute section in which you must "Present Your Perspective on an Issue," and a 30-minute section where you are asked to "Analyze an Argument."

What You Will Find on the Test

The GRE Analytical Writing test differs from both the SAT and ACT in that there are no multiple choice questions. The answers to both the Issue Argument sections are composed completely by the test taker. According to the Educational Testing Service, which creates and

administers the GRE, answers are judged based on how well you:

- consider the complexities and implications of the issue
- organize, develop, and express your ideas on the issue
- identify and analyze important features of the argument
- organize, develop, and express your critique of the argument
- support your ideas with relevant reasons and examples
- control the elements of standard written English

The Issue section provides two opinions on topics of general interest. You must select one and then respond to it from any perspective. Your response must be supported with sound explanations, evidence, and examples. In the next section, you are given an argument to analyze. Rather than giving your opinion on the subject, you must explain how the argument is either logically sound or not.

Using This Book to Prepare for the Test

- **Lessons 1 and 2: Recognizing and Defining Problems.** These lessons will help you to zero in on the precise problems you will discuss in both the opinion and argument sections. It is especially important that you can make the distinction between a problem and its symptoms or consequences.
- **Lesson 3: Focused Observation.** Knowing how gather information is critical, because you must not only express an opinion or critique, but

you must back it up with relevant examples and reasoning.

- **Lesson 8: Fact and Opinion.** You won't have access to research materials while taking the GRE, but you can think critically about the documentation of sources and credentials. If the author of the argument you must analyze cites facts and figures without documentation, that is an important point for you to make.
- **Lesson 9: Persuasion Techniques.** This lesson teaches you how to recognize and describe persuasion techniques. You will learn the names of the rhetorical devices used in persuasive writing, and how they work. The use of these correct terms will improve the quality of your responses.
- **Lesson 10: Misusing Information: The Numbers Game.** Surveys, studies, and statistics may be used in the argument you must analyze. Knowing how to judge the validity of such facts will help you to construct a strong response (see the sample argument and response below for a specific example).
- **Lessons 12 and 14: Deductive and Inductive Reasoning.** These lessons cover the structure of logical arguments, which lead to the drawing of conclusions, and with inductive logic, the development of hypotheses. You need a thorough understanding of reasoning to be able to identify and analyze the important features of the argument in section two.
- **Lesson 18: Explanations.** There are no "correct" answers on the GRE Analytical Writing Test. Whatever view or critique you decide to write about, you will need to explain yourself using evidence and examples. This lesson teaches you how to recognize and construct sound explanations.

Top-Score Sample Argument Essay

Prompt

The following appeared in a Letter to the Editor in the sports pages of a community newspaper.

A teacher can't earn more than \$50,000 a year doing one of the toughest jobs in the world. These saints work a lot harder and deserve to get paid a lot more for the miracles they perform on a daily basis. The average salary for professional athletes is \$650,000. That's more than ten times what the average public high school principal makes. Basketball players can earn millions in just one season, and football players can earn hundreds of thousands for just a 30-second commercial. Even benchwarmers make more in a month than teachers. Who is more important—the woman who taught you how to read and write so that you can succeed in life, or the jock who plays for a living?

Response

The author of this piece drives home the idea that professional athletes get paid too much, especially in comparison to teachers, who help you "succeed in life." As much as anyone may believe that teachers deserve to be paid more than they earn, or that some professional athletes are grossly overpaid, the argument this author makes is not very effective. Much of the evidence and reasoning used by the author of this piece is flimsy and illogically reasoned—there is a shaky conclusion, counterarguments are not addressed, and the premises the author uses to support the conclusion are not reasonably qualified.

The conclusion drawn in this argument is, "These saints work a lot harder and deserve to get paid a lot more for the miracles they perform on a daily basis." This sentence raises several red flags. First of all, the author draws a comparison between teachers and saints. It is true that teachers do noble

work, and arguably this work improves individuals and sometimes even society; however, neither of these duties makes teachers “saints.” Second of all, the author uses the word *miracles* to describe the results of teachers’ work. This word is emotionally charged, implying that a teacher’s work is amazing and fantastic. The connotation of the word *miracle* suggests bias in the author’s opinion of the teaching profession. Juxtaposed to calling the work of professional athletes “play,” this word draws on the reader’s compassion, appealing to emotional rather than presenting impartial evidence. Finally, this claim is incomplete. Teachers work harder than whom? Deserve to get paid more than whom? Although the answer “professional athletes” is implied, the claim does not explicitly state this.

The argument as given is weakened by the fact that it does not address any counterarguments or note any other perspectives. It could have addressed the positive role models many athletes play to youth, the community outreach many professional athletes do for free, or the generous charities many athletes set up and donate money to. By stating some of these counterarguments and refuting them, the author could have gained more credibility, showing that insight and logic played into his or her argument. As it is, the argument appears biased and one-sided.

What’s more, the premises the author based his or her conclusions on seem unreasonably qualified. For example, the average salary given for professional athletes doesn’t seem like the appropriate measure to use in this situation. There are many professional sports, professional table tennis or volleyball, for example, where the salaries for even the top players don’t approach \$650,000. If you were to survey all professional athletes, you’d probably find that the typical player doesn’t come close to a six-figure salary. However, because players like Shaquille O’Neal and Tiger Woods make millions of dollars, the average is higher than the typical salary. Therefore, this piece of evidence the author chooses seems loaded.

In addition, sources are not provided for this salary statistic. Furthermore, the author does not cite sources for the \$50,000 teacher’s salary or that benchwarmers make more than teachers. (Besides, it is unlikely that table tennis team benchwarmers make larger salaries than teachers!) Because this evidence lacks sources, the author’s credibility is weakened, since the evidence cannot be verified as fact. If the figures can be verified, then the premises are reasonable; however, for all the reader knows, the author simply made everything up.

Overall, this argument is not well reasoned. The conclusion of this argument seems biased and the word choice seems suspect, appealing to emotion, rather than logic. Additionally, the argument does not seem to consider alternate viewpoints, further weakening its position. Finally, the evidence presented in the argument weakens its credibility because it doesn’t cite a source to verify its validity. Although many people believe that teachers deserve to be paid a better salary, this particular argument isn’t effective. The logical conclusion would be to suggest some type of change or solution to this problem, but the incomplete conclusion, appealing to emotion makes it sound like the author is complaining, rather than making a good case for a teacher salary increase.

► Vocational and Other Critical Thinking Tests

In addition to the particular tests discussed in this lesson, critical thinking tests are given at many colleges and universities as placement exams (many use the California Critical Thinking Test or the Cornell Critical Thinking Test) in such diverse fields as agriculture, education, psychology, and nursing. Employers also use Critical Thinking Exams to help make hiring and promotion decisions. For instance, the U.S. Customs Ser-

vice gives a Critical Thinking Skills Test to those wishing to be promoted.

There are also hundreds of other civil service tests that include sections on critical reading and making inferences. The state of Louisiana gives a PET, or Professional Entry Test, to college graduates applying for jobs. In this test, you are given a fact and a conclusion. The multiple-choice questions ask you to decide whether the conclusion is valid.

Practice

Fact: Some employees in the accounting office are CPAs. Most of the CPAs in the accounting office also have MBAs. Daniel works in the accounting department.” Conclusion: Daniel has an MBA.

1. Necessarily true.
2. Probably, but not necessarily true.
3. Indeterminable, cannot be determined.
4. Probably, but not necessarily false.
5. Necessarily false.

Answer

The correct answer is 3. You cannot decide without more information, because you don't know how many “some” and “many” are.

To prepare for this type of test, review in particular the lessons on deductive and inductive reasoning, as well as the lessons on logical fallacies.

A widely used test, in both vocational and educational settings, is the Watson-Glaser Critical Thinking Appraisal (WGCTA). It is made up of various reading passages followed by 40 questions. The passages include problems, statements, arguments, and interpretations.

Questions are designed to test these skills:

- inference
- recognition of assumptions

- deduction
- interpretation
- evaluation of arguments

This test is similar to many other critical reading evaluations. It expects that you will be able to read a passage, and not only understand its content, but also understand what it implies and infers. You can prepare for the WCGTA by using this book as explained in the SAT and ACT sections already discussed.

Many vocational tests, such as the Corrections Officer Exam and the U.S. Customs Service Critical Thinking Skills Test, use situational questions. These tests supply you with a written scenario about which you must answer questions. The questions may ask you to make inferences or judgment calls based on the scenario. There are three types of situational questions:

1. read rules or agency procedures and apply them to a hypothetical situation
2. answer which hypothetical situation is most likely to indicate dangerous or criminal activity
3. read about a job-related situation and choose which of five inferences is correct, and why it is correct

These tests rely heavily on the skills you learned in Lessons 1, 2, and 3. You need to understand the problem or situation clearly and be able to determine what is implied, or may be inferred about it. Focused observation is a highly important skill in these types of jobs. Being able to make sound judgment calls (Lesson 17) is also critical. Here is an example taken from a situational reasoning part of a Corrections Officer Test.

Practice

Following are a set of rules and procedures for corrections officers. Based on these, answer the questions that follow them. You may refer back to the rules and procedures as often as needed.

- Contraband is any item that an inmate is not permitted to have in his or her possession. Officers who discover contraband will confiscate the item(s), investigate the situation, and write a report. Appropriate disciplinary action should be taken based on the results of the investigation. Pat-down searches of visitors to prison facilities should be performed whenever an officer receives a tip that a visitor may be attempting to smuggle contraband into the facility.
- Corrections officers are often responsible for seeing to it that inmates follow personal grooming rules. An officer can direct an inmate to get a haircut. To do so:
 1. The officer should approach the inmate and tell the inmate a haircut is needed.
 2. The officer should write a pass for the inmate to report to the desk supervisor.
 3. The inmate reports to the desk supervisor, who records the inmate's presence in a log and then directs the inmate to wait in line for the haircut.
 4. After the haircut, the inmate will report back to the officer who ordered the procedure.

Inmates housed in isolation are to be given the opportunity to shower every other day. The officer in charge of this procedure should document the time, date, and name of the inmate who showered.

1. Jewelry is considered contraband in prison environments. Officer Nolan conducts a search of Inmate Harland's cell and finds a gold ring under his pillow. What should he do?
 - a. He should confiscate the ring and tell Inmate Harland that he can have it back when he is released from prison.
 - b. He should leave it where it is because Inmate Harland might accuse him of planting the ring in his cell.
 - c. He should confiscate the ring and tell Inmate Harland that he won't report it as a violation, but now Inmate Harland "owes him one."
 - d. He should confiscate the ring, find out how Inmate Harland got it, and then write a report detailing the incident.
2. Inmate Greggs's hair is hanging below the bottom of his collar. Officer Trunkle orders Inmate Greggs to get a haircut. What is the next step for Officer Trunkle to take?
 - a. Check Inmate Greggs's cell mate to see if he needs a haircut.
 - b. Call his supervisor to see if he can send Inmate Greggs to the barber.
 - c. Check to see if the barber has an appointment open for Inmate Greggs.
 - d. Write a pass to the desk supervisor for Inmate Greggs.

Answers

1. d.
2. d.

► In Short

The skills you have learned in this book are invaluable when taking many kinds of exams. Those needed to gain admission to colleges and graduate schools are examples. Many such tests include sections on critical reading and writing in which you will be asked to make inferences, interpret graphic organizers, choose appropriate conclusions, and analyze arguments.

There are also critical thinking tests given to those looking to be hired, or gain a promotion in the workforce. Some are specific to certain professions, while others are more general and may be used for a wide variety of employment settings. By studying *Critical Thinking Skills Success*, you will be preparing yourself to successfully complete these kinds of exams.

Skill Building Until Next Time

- If you are preparing to take a Critical Thinking Exam, or a test in which there is a critical thinking skills component, go back to the pretest at the beginning of this book. Which questions did you answer incorrectly? Was there a particular lesson that gave you trouble? Focus your study on those areas in which you are weakest.
- Are you in college and planning to enter the workforce? Do some research into the career(s) you are considering. Are there hiring tests given? Most of this information is available on the Internet. Finding out exactly what the test(s) looks like and how it is scored will help you to prepare.

LESSON

20

Putting It All Together

SUMMARY

This lesson brings together all of the skills you learned in Lessons 1–19, reviewing each important idea and term.

THIS LESSON MAY surprise you. Now that you have arrived at Lesson 20, you might not be aware of just how much you have learned in all of the previous 19 lessons. Use the summaries below as a review for the post-test which follows this lesson, or simply to refresh your memory. Either way, if any term or idea seems unfamiliar or confusing be sure to turn back to the relevant lesson and review it. You have worked hard through *Critical Thinking Skills Success*, and you want to ensure that you will be able to retain and use all of the material presented in each lesson.

► Lesson 1: Recognizing a Problem

You learned that problem solving begins with recognition of the need for a solution. Finding out about the existence of a problem happens either through your own observations or directly from another person. Problem solving continues with prioritizing—does your problem demand immediate attention or can it wait

until you are finished working on something else? If there is more than one problem to resolve, which is most important and needs to be tackled first?

► Lesson 2: Defining a Problem

This lesson explained how to avoid “solving” something that is not your actual problem. Defining a real problem entails gathering information, and carefully examining what may first appear to be a large problem (it could be a number of smaller ones). It also means not being tricked into solving offshoots of a problem or mistaking the more obvious consequences of a problem for the actual problem. Two ways to be sure you are considering a real problem are to avoid making assumptions and to think the situation through.

► Lesson 3: Focused Observation

You learned how to become a more effective decision maker and problem solver by using focused observation. That means increasing awareness by being thorough, concentrating, and creating a context (looking at a situation as a whole, instead of zeroing in on a small part).

► Lesson 4: Brainstorming with Graphic Organizers

In this lesson, you practiced using concept maps, webs, Venn diagrams, charts, and problem/solution outlines to arrange ideas for effective solutions. These visual organizers help you to see patterns and organization in your thinking. They also help gather and compress

information. Graphic organizers can be used to keep you focused on your goal and show what you know and what you still need to find out.

► Lesson 5: Setting Goals

Goals are clear statements of things you want to accomplish or solve in the future. You learned in this lesson that valuable goals must be: in writing, specific and detailed, measurable, realistic, and deadline oriented. Using a goal chart helps with all five of these goal setting criteria.

Realistic Goals

Do not set goals that are too large! If they cover too much ground, or are about accomplishing something that will take a long time, your goals may be difficult to reach, or you may grow tired of your plan before you complete it.

► Lesson 6: Troubleshooting

You learned how to troubleshoot problems by thinking ahead, identifying issues that could get in your way, and taking care of them. You also learned about unforeseeable problems, those inconveniences that hold you up as you work toward a goal. Another type of troubleshooting involved problem-causing trends. This must be used when you are consistently faced with the same type of problem, in order to figure out how to prevent it in the future.

► Lesson 7: Finding Resources

This lesson was about being armed with accurate information. If you have a decision to make, or a problem to solve and you do not know what to base a decision on, or if there are factors that need to be considered that you are not familiar with, you need to consult other resources. They include the Internet, libraries, and experts.

of the content, and check the date of the site as well as its links. Remember, a fact is something that is known, and an opinion is something believed.

Be Careful!

Do not believe everything you read on the Internet! Use critical thinking skills to evaluate websites and determine whether they are legitimate, or bogus.

► Lesson 8: Evaluating Facts

You learned how to differentiate between accurate, objective information, and that which is false and/or biased. In order to trust the source of any information, you need to check out the author's credentials, documentation of sources, quality of sources (are they balanced and reputable?), and the opinion of others about the source. This is especially important when doing research on the Internet, where just about anyone can publish anything and make it appear legitimate. Find out who wrote the page, judge the accuracy and sources

► Lesson 9: Persuasion Techniques

This lesson examined how to recognize persuasion techniques used in speech, writing, and advertising. You learned about the three persuasion techniques described by Aristotle thousands of years ago (*logos*, *pathos*, *ethos*) and how they are still used today. Also explained were six common rhetorical devices including the rhetorical question, hyperbole, and comparisons. These techniques are used in persuasive

Why Do Research at the Library?

Here are five great reasons:

1. **Librarians.** They are trained professionals, who know how to find what you are looking for, whether in the stacks or online.
2. **Non-searchable print.** There are millions of books and other print materials that have not made it to the web.
3. **Reliability of information.** Not all of the information you find on the Internet is accurate. Anyone can "publish" online, and it is not always easy to distinguish between reliable and unreliable websites.
4. **Finding anything that is not historical or current.** The Internet is a great resource for information that is either very old, or very new. The library has most everything in between.
5. **Price.** The use of a library, including all of its electronic services, is free. Some of the research resources on the Internet are not. Libraries often pay steep prices and provide full access to these resources.

How Stress Can Affect Decision-Making

- **Inability to recognize or understand a problem.** When stressed, it is difficult to access stored information quickly (if at all). Short-term memory is affected. You may incorrectly identify something as a problem when in fact it is not.
- **Difficulty brainstorming and setting reasonable goals.** When you do not accurately recognize the problem and you have trouble concentrating, you may come up with a quick or irrational solution. You tend to think only about the immediate future, so planning is difficult and decisions are often made quickly.
- **Inability to assess the solution.** If you are having trouble taking in information, you will not be able to see if your solution works. A short-term view of everything may keep you from being concerned with the implications of your solution.

advertising, where the marketer aims to manipulate your spending habits by making you want to buy his or her product or service. When you understand how persuasion works you can avoid being swayed by it and use it to your advantage.

► Lesson 10: Misusing Information—The Numbers Game

You learned how numbers can sometimes lie. Whether by deliberate misuse, negligence, or plain incompetence the facts and figures we see, hear, and read are not always the truth. It all happens in one, or both, of two key areas. First, numbers must be gathered. If they are collected incorrectly or by someone with an agenda or bias, you need to know that. Second, numbers must be analyzed or interpreted. Again, this process can be done incorrectly, or by an individual or group with an agenda. Surveys, correlation studies, and statistics were examined.

► Lesson 11: Checking Your Emotions

This lesson was about the role emotions play in the decision-making process. Emotions, and emotional situations, explored included bias and stereotypes, stress, and the ego. When emotional responses are recognized and used appropriately they can be an effective component of critical thinking. The goal is to acknowledge and understand the emotions that may influence your decision making, so you can determine when and where to let them become part of the solutions and decisions you make.

► Lesson 12: Deductive Reasoning

You learned that in deductive reasoning, an argument is made based on two facts, or premises. These premises could be rules, laws, principles, or generalizations. If they are true, it should follow that the conclusion of the argument must also be true. That is, the truth of the conclusion is thought to be completely guaranteed and not just made probable by the truth of the premises.

But, the conclusion must follow logically from and not go beyond or make assumptions about the premises. If it does not, the argument is said to be invalid.

► Lesson 13: Misusing Deductive Reasoning—Logical Fallacies

Arguments that contain an error in logic are invalid. These types of errors are known as fallacies. This lesson explored four of the most common logical fallacies that make deductive reasoning fall apart. The argument might have two true premises, and a conclusion that takes them to an extreme. This is known as the **slippery slope fallacy**. Or, it might be a **false dilemma fallacy**, which presents in its major premise just two options (“either-or”) when in reality there are others. In **circular reasoning**, also known as **begging the question**, there is just one premise, and the conclusion simply restates it in a slightly different form. And finally, **equivocation** uses a word twice, each time implying a different meaning of that word, or uses one word that could mean at least two different things.

► Lesson 14: Inductive Reasoning

This lesson showed how to recognize and construct an inductive argument. Induction is the process of reasoning from the specific (particular facts or instances) to the general (principles, theories, rules). It uses two premises that support the probable truth of the conclusion. To determine what is probable, you must use past experience and/or common sense. The two forms of inductive arguments are **comparative** (comparing one thing, event or idea to another to see if they are similar), and **causal** (trying to determine cause from effect).

► Lesson 15: Misusing Inductive Reasoning—Logical Fallacies

You learned that an inductive fallacy looks like an argument, but it either has two premises that do not provide enough support for the conclusion, or a conclusion that does not fit the premises. Four common logical fallacies were explored, including **hasty generalization**, in which the premises do not contain enough evidence to support the conclusion. The **chicken and egg fallacy** occurs when you claim cause and effect without enough evidence. *Post hoc, ergo*

Deductive versus Inductive Reasoning

Type of Argument	Premises	Conclusion	When Is it Correct?
Deductive	general facts or rules	specific	valid when both premises are true, conclusion follows logically
Inductive	specific	general	sound when premises support principles, probable truth of conclusion theories, rules

propter hoc (Latin for “after this, therefore because of this”) is the fallacy of drawing a cause and effect conclusion that does not fit the facts. The **composition fallacy** focuses on parts of a whole, drawing a conclusion based only on those parts.

► Lesson 16: Distracting Techniques

This lesson explained more logical fallacies. In particular, it was about those fallacies that distract the audience or argument from the real issue(s). These distracting techniques are often used to put an opponent on the defensive, and they can be very effective when used in this way.

The three techniques discussed included **red herring**, **straw man**, and *ad hominem*.

► Lesson 17: Judgment Calls

You learned how to make decisions and solve problems when the stakes are high, and there are no clear right or wrong answers. Judgment calls can be made on very different things, such as sporting events, investment decisions, and employment choices, but they have four things in common: the stakes are high, the information you need is incomplete or ambiguous, knowledgeable people disagree about them, and there are sometimes conflicting values involved.

Judgment calls are subjective and debatable, but should not be made by relying on biases and intuition. Rather, take the time to evaluate the risks involved and weigh the consequences of each possible option. It is not always easy to make judgment calls, but they should not become quick, uninformed decisions because of the difficulty. Approach them carefully, and much of the difficulty will be eased.

Logical Fallacy Glossary

- **Post hoc, ergo propter hoc** (Latin for “after this, therefore because of this”): occurs when you incorrectly assume that because one event preceded another, it caused it.
- **Red herring**: any diversion that distracts attention from the main issue. Red Herrings usually takes the form of an irrelevant topic used to change the subject from one that is uncomfortable for the arguer.
- **Ad hominem** (Latin for “against the person”): instead of arguing against a topic, the topic is ignored and the person making the argument is attacked. In other words, the person who makes a claim becomes the issue, rather than the claim he or she was making.
- **Straw man**: presumes the question, “Which is easier to fight? A real man, or one made of straw?” The straw man is obviously weaker. This fallacy distracts attention away from an opponent’s real position by creating a weaker one that is easier to attack.

► Lesson 18: Explanation or Argument?

You learned that an explanation is a statement or set of statements, that gives new information about something that has been accepted as fact. It is made up of two parts, the thing that will be explained (known as the **explanandum**), and the set of statements that is supposed to do the explaining (known as the **explanans**). The four indicators of a good explanation are that it gives new information, its topic is accepted as fact, when accepted, it removes or lessens a problem, and it is relevant.

You also learned how to tell the difference between an explanation and an argument. An explanation helps you to understand a certain fact by giving reasons that are causes of the fact. It answers the question, “why?” An argument, on the other hand, tries to convince you of the truth of its conclusion by giving reasons (premises) that are evidence for the conclusion. Arguments may be opinions or value judgments, while explanations are never either of these.

► Lesson 19: Critical Thinking for Exams

In this lesson, you learned how to apply what you have learned in *Critical Thinking Skills Success* to the exams you may face when applying to college or graduate school, or when entering the workforce. Critical reading questions, on tests such as the SAT and ACT, evaluate your ability to comprehend a passage, draw inferences based on the material presented, analyze information, and critique others’ arguments.

Other tests include sections on science reasoning, analytical writing, logical reasoning, and situational reasoning. Lesson 19 showed you specifically how the skills learned in this book should be used to correctly answer the questions on these tests.

► In Short

Now that you have reviewed each of the lessons, it is time to test your skills with the post-test. Use this post-test to determine your improvement since the pretest and to see what weaknesses remain.



Post-Test

This test was designed to show you how well you learned the material presented in *Critical Thinking Skills Success*. The questions on this test are similar to those found in the pretest, so you can compare your results both before and after completing the twenty lessons in this book. However, the post-test includes much of the vocabulary found in the lessons, such as the names of logical fallacies, which are not found in the pretest.

Answer the following 30 questions, and then review the answer explanations. In addition to an explanation for each answer, you will find the lesson from which the question was drawn. You may find that you have forgotten or are unsure of some of the material on this test and wish to go back to the corresponding lesson(s) to refresh your memory. Use a separate piece of paper for your answers.

Good luck!

1. You arrange a job interview for Monday morning. When you arrive at the office, the interviewer is not there. You wait for twenty minutes, but he does not show up. What pieces of information can help you create a context for this problem? (circle all that apply)
 - a. You heard a traffic report about a tie-up on the interstate.
 - b. You realize you forgot your resume, and need to go home to get it.
 - c. The interviewer's secretary tells you the interview is on the calendar for Tuesday.
 - d. The receptionist makes a comment about how the interviewer is not punctual.

2. Three problems arise at work simultaneously. In what order should you solve the following:
 - a. A package must be shipped to your west coast office by 4:00.
 - b. Your boss needs a report on profit projections for a 1:00 meeting.
 - c. You accidentally delete the computer file containing the rough draft of the profit report.

3. Which rhetorical devices are used in the following? (circle all that apply)

"The Civil War was the darkest moment in human history. From bloody battlefields to brothers caught in bitter brawls, over half a million lost their lives. They fought over slavery, economics, and the very Constitution itself. Is it any wonder this sad episode in American history still fascinates?"

 - a. comparison
 - b. rhetorical question
 - c. sound pattern
 - d. hyperbole

4. You are going on vacation for two weeks, and you could not find a house-sitter. How can you troubleshoot the problems that you imagine might occur while you are away? Circle all answers that apply.
 - a. Take out more homeowner's insurance.
 - b. Hire someone to come into the house and water your plants.
 - c. Put lights on timers so it appears someone is home.
 - d. Suspend mail and newspaper delivery so there is not a pile-up of paper.

5. How can you explain the following: "If you do not start exercising, you will get heart disease"?
 - a. It appeals to the senses.
 - b. It is an example of the logical fallacy called false dilemma.
 - c. It is a true statement even though it sounds drastic.
 - d. It is an example of the logical fallacy called *post hoc ergo propter hoc*.

6. Which of the following addresses is probably a personal web page?
 - a. www.members.aol.com/pspeabody63/
 - b. www.stateuniversity.edu
 - c. www.fastfacts.com
 - d. <http://veteransunite.org>

- 7.** Which statement is NOT an example of bias or stereotyping?
- Sheri won't try these Do-Nuts. She says everyone who eats doughnuts ends up fat and unhealthy.
 - Isn't there one grocer in this city who speaks English?
 - I can't believe he would show up at work in that suit. He must have bought it at Discount Dan's.
 - My uncle is leaving me his entire estate in his will. I can't believe how generous he is.
- 8.** Why is the following statement NOT an example of problem solving?
 "Our manager is criticizing our work today because he has problems at home."
- The speaker could spend too much time trying to figure out how to help his manager.
 - The speaker is making an assumption about the cause of the criticism that might not be true.
 - The speaker is making an assumption about how good his work is.
 - The speaker is too worried about his job performance.
- 9.** Which is NOT a valid deductive argument?
- All of the seniors in the Engineering Department graduated with honors. Faith is in the Engineering Department, therefore Faith graduated with honors.
 - I love pugs. Chester is a pug. Therefore, I love Chester.
 - Sylvia Plath's best writing is her poetry. Plath also wrote a novel. Her novel was not her best writing.
 - If I buy these potato chips, I will eat the whole bag tonight. I bought the pretzels, and therefore I ate them instead.

Read the following passage, and answer questions 10 and 11.

One of the major causes of the French Revolution of 1789 was the social class system. The population was divided into three Estates, with the clergy, the monarchy, and noblemen in the top two, and peasants and the middle class in the third. The clergy and noblemen were not required to pay taxes, and had representation in the government. The monarchy lived lavishly and led a repressive regime that silenced its critics. The bourgeoisie paid heavy taxes, had no representation in the government, and resented the King's power and excesses. They grew angry at the unjust system, and finally revolted by storming the Bastille, a state prison in Paris.

- 10.** What did the Bastille represent to the Third Estate?
- the place of last resort
 - the excesses of the big city
 - the unjust, repressive government
 - the First and Second Estates

- 11.** What is the meaning of *bourgeoisie*?
- the middle class
 - the monarchy
 - the French aristocracy
 - the noblemen
- 12.** Ramona is not happy in her current job and wants to find a new one. What is a realistic goal for her job search?
- “I want a new job by next month. I will read the classifieds for the next four weeks, answer all interesting ads the day I see them, and line up interviews when I get responses.”
 - “I want a new job by next month. I will update my resume, and send it out to every company I am interested in working for. I will follow up the mailing with phone calls until I get an interview.”
 - “I want a new job within the next few months. This week, I will work on my resume. For the next three weeks, I will research other companies. Then, I will start networking. With the contact information I get, I will send out my resumes.”
 - “I want a new job within the next year. I will do some networking, especially with my alumni organization. I will update my resume, and do some cold calling to see if there are any openings for someone with my skills and experience.”
- 13.** Which is NOT an example of *post hoc* reasoning?
- President Anderson was in office during the highest unemployment rate in the country’s history. His policies were to blame.
 - The stock market always falls the day after I make my famous meatloaf.
 - They started making chicken pakoras at the India House after many customers requested them.
 - Is it any wonder he is in jail? I heard that before he committed the crime he was listening to heavy metal music.
- 14.** You are assigned a paper on a current political topic, and your professor stresses that it must be balanced and objective. How can you evaluate the sources you find in the course of your research? (Circle all that apply)
- Find out the author’s credentials.
 - Look for web pages written by individuals who look like they have done lots of research on the topic.
 - Check for statistical information.
 - Check the author’s sources to see if they are reputable.

- 15.** You are considering accepting a job offer in another state, four hundred miles away. List four problems you might encounter if you move. Brainstorm two possible solutions for each problem.

Problem 1: _____

Solution 1: _____

Solution 2: _____

Problem 2: _____

Solution 1: _____

Solution 2: _____

Problem 3: _____

Solution 1: _____

Solution 2: _____

Problem 4: _____

Solution 1: _____

Solution 2: _____

- 16.** What problems will most likely result from the following scenario?

Because of rising health insurance costs for government workers, there is a budget crisis in your state. The governor vowed not to raise taxes, so she is making drastic cuts in services to balance the budget. The biggest cuts are to the Department of Transportation, which is getting just 50% of its projected needs.

- 17.** What TWO things are wrong with the following survey?

An environmental group sent out a questionnaire to five hundred of its members. It began with an introduction about how local politicians are making it easier for developers to get permits to build in designated wetlands areas. Then they asked, “Do you think our precious natural resources, such as wetlands, should be depleted, so a handful of developers can get richer?”

- a. the population is not random—questionnaire was only sent to group’s members
- b. the margin of error is too high
- c. the population is too large
- d. the question is biased—“precious” and “get richer” indicate the author’s subjective intent

- 18.** Which is an example of an unfinished claim?

- a. Only sensitive, intelligent people use Taupe Soap.
- b. Buy our ground beef—it is fresher and better tasting.
- c. Big Bob’s Music World has the lowest prices on the hottest CDs.
- d. Stand out in a crowd! Wear LookAtMe perfume.

- 19.** Your company has just moved its offices to a new building. There is a group of parking spaces designated for your company, but there are not enough spaces for everyone, and you must sometimes pay to park on the street. What is the best, most time-effective way to find out how to solve this problem?
- Write a letter to the property management company.
 - Ask your personnel manager to look into the situation for you.
 - Send an e-mail to your boss explaining the problem.
 - Call the owner of the building.
- 20.** Which word in each example is the equivocation?
- Pools are full of water, so car pools must be pretty wet rides.
 - If everything is relative, then why aren't we related?
 - This beer can't be light. It weighs just as much as a regular beer.
 - This website is devoted to some really odd things. You are twenty one, so you should be mentioned on this website.

- 21.** What is the best conclusion for the following inductive argument?
- The last time we went up against this defense team, they had no concrete evidence, but they produced 150 boxes of documents. We wasted countless hours looking through them. For this case, we just got a truckload of documents. We should probably
- read through every single sheet of paper, and document them, just in case.
 - assign a few paralegals to go through a random selection of boxes to see if there is anything worthwhile.
 - forget about them. There is probably nothing we need in those documents.
 - look at the top document in each box to see if it could be of use to our case.
- 22.** Keela was assigned a term paper on the Hubble Space Telescope. She wants to find information on the federal funding of the telescope. Which website should she use to find this information?
- <http://hubble.nasa.gov>
 - www.mindspring.com/~deline/
 - www.pbs.org/deepspace/hubble/
 - www.thehubbletelescope.com/

23. What is the best conclusion for the following argument?

Every gas station in New Jersey is raising its prices tomorrow. Smith's Service Station is on State Street in Trenton. Therefore,

- a. Smith's Service Station is in New Jersey.
- b. you should fill up your tank today.
- c. Smith's Service Station is raising its prices tomorrow.
- d. gas prices are going to be too high.

24. What are four qualities of a valuable goal?

- a. written down, specific, measurable, told to a friend
- b. specific, measurable, realistic, honorable
- c. written down, realistic, deadline oriented, challenging
- d. specific, measurable, realistic, deadline oriented

25. What is wrong with the following statement: "I visited Chicago once, and it was a terrible experience. My hotel room was noisy and the restaurant I went to was too expensive. I would never go to Chicago again."

- a. It is an example of a hasty generalization.
- b. Nothing; it is the speaker's opinion, and it is valid.
- c. It is an example of circular reasoning.
- d. The speaker should use bias and stereotyping in critical thinking.

26. Why is the following scenario an example of a poor judgment call?

During a job interview, you get the feeling that the interviewer, your potential boss, does not like you. When she offers you the job, you turn it down. Who wants to work for someone who does not like them?

- a. The person being interviewed is paranoid; there is no way to know if the interviewer liked him or not, and people who are paranoid usually do not have much self confidence.
- b. The person being interviewed should have taken the job to prove that he could do it well.
- c. The person being interviewed has a bias against having a female manager.
- d. The person being interviewed should have relied on other factors, aside from the hunch that the interviewer did not like him, before deciding whether to accept the job offer.

27. Answer (T) true or (F) false for each of the following statements.

- ___ a. Internet search engines lead you only to best sites about the subject you are researching.
- ___ b. Some Internet sites cost money to search with full access.
- ___ c. Subject directories are sometimes written by experts in their fields.
- ___ d. Information on websites is just as reliable as information found in libraries.

28. Label each statement as an (A) argument or an (E) explanation.

- ___ a. My mother always says to eat chicken soup if you think you are getting a cold, because she thinks it will cure you.
- ___ b. This college is not competitive enough. I spent a half hour studying for my last exam, and I got an A.
- ___ c. The death penalty should be used in every murder case because it is fair. An eye for an eye, right?
- ___ d. I am getting my hair cut next week because it is getting too long.

29. What is wrong with the following statement?

We would all benefit if we joined the Union. They get salaries of up to \$40,000, double pay for overtime, and \$15 deductibles on health insurance policies for their workers.

- a. Workers are rarely better off when they join a union.
- b. The union is asking for too much from management, and probably won't get it.
- c. We don't know if the union gets double pay for overtime for everyone, or just some workers.
- d. We don't know what the workers have already in terms of salary, overtime pay, and deductibles.

30. Identify each *ad hominem* fallacy as (A) abusive, (C) circumstantial, or (TQ) *tu quoque*.

- ___ a. Of course he is against gun control. He works for a rifle manufacturer.
- ___ b. I thought you said borrowing money was a bad idea. Now you are taking out a car loan? I guess you were wrong—borrowing money is a great idea.
- ___ c. My boss is so cheap. I have been working for her for six months and I still haven't gotten a raise!
- ___ d. Did you buy that children's book on morals? I heard the writer got charged with drunk driving. How can her book be anything but hypocritical garbage?

► Answers

1. Choices **a**, **c**, and **d** could all create a context for the problem. Choice **b** is irrelevant. Lesson 3 deals with focusing your observations in order to create contexts.
2. The order that makes the most sense is **c**, **b**, **a**. The report should be done first, as it is needed soonest. But, you must retrieve the deleted file, or rewrite the report, before you can deliver it. The package can wait until after the report is delivered. For more information on prioritizing problems, consult Lesson 1.
3. Choice **b**, “Is it any wonder this sad episode in American history still fascinates?”; choice **c**, “bloody battlefields to brothers caught in bitter brawls”; and choice **d**, “darkest moment in human history” are correct. Lesson 9 explains other rhetorical devices, and gives examples of how they are used.
4. Choices **b**, **c**, and **d** make the most sense. There is no reason to purchase a larger homeowner’s insurance policy if you are already adequately covered. More insurance does not protect you from problems any more than the right-sized policy does. Lesson 6 explains “prevention versus cure” troubleshooting in detail.
5. Choice **b** is a false dilemma because it reduces the number of options to one, when in fact there are others. Many people who do not exercise do not develop heart disease. See Lesson 13 for more information on logical fallacies in deductive reasoning.
6. Choice **a** is most likely a personal web page. AOL hosts millions of personal web pages through its hometown and member services. For more on “reading” web addresses, turn back to Lesson 8.
7. Choice **d** is not an example of bias or stereotyping, because the speaker’s belief (that his uncle is generous) is not influencing his thoughts or behavior about anyone or anything else. See Lesson 11 for more on how emotions can get in the way of critical thinking success.
8. The best answer is choice **b**. Assumptions do not have a place in effective problem solving, as Lesson 2 explains.
9. Choice **d** is not a valid deductive argument because its major premise (If I buy these potato chips, I will eat the whole bag tonight”) is not addressed in the conclusion (“therefore I ate them instead”). See Lesson 12 for an explanation and examples of how deductive reasoning works.
10. The answer is choice **c**. As a State prison, the Bastille represented the government’s oppression.
11. The answer is choice **a**. For more on drawing inferences from reading passages in exams, refer to Lesson 19.
12. Choice **c** is the most realistic goal. Remember that goals should be deadline oriented, so even though Ramona is realistic about her job search taking up to a year, she sets smaller goals, such as updating her resume in a week and doing research for three weeks. Lesson 5 has more information about setting valuable, realistic goals.
13. Choice **c** is not an example of *post hoc* reasoning, which falsely argues that because one thing precedes another, it causes it. The customers’ requests actually caused the restaurant to add the dish to their menu. This type of logical fallacy, as well as three others, is covered in Lesson 15.

- 14.** Choices **a**, **b**, and **d** are all important. Individuals' web pages are often written by enthusiastic hobbyists. While they may look professional, their content can be bogus, and they may not be reliable sources of information. Lesson 8 explains in detail how to evaluate the information you find on the Internet.
- 15.** Your answers may vary. Here are some possible problems you may list.
 Problem 1: too far away from family
 Problem 2: have to sell house and buy another one
 Problem 3: don't know way around new city
 Problem 4: children have to go to a new school
 For more information about using graphic organizers, reread Lesson 4.
- 16.** Answers should include reduction or elimination of services provided by the Department of Transportation, such as bus and train service, road maintenance, bridge and tunnel repairs, and highway rest stops. Lesson 2 covers the subject of anticipating possible problems.
- 17.** Choices **a** and **d** are correct. The population is not random if it was sent only to the group's members, and the words "precious" and "get richer" indicate the author's subjective, biased intent. For more information on how numbers, such as those found in surveys and statistics, can be manipulated, turn back to Lesson 10.
- 18.** The answer is choice **b**. It stops short of telling you what it is fresher and better tasting than. Lesson 9 has a section on persuasive advertising, which explains how unfinished claims, and other techniques, are used.
- 19.** Choice **b** is the best answer. Sending a letter and waiting for a reply could take a week or more. Your personnel manager probably has frequent contact with the person or people who can help you. For more information on finding resources, refer to Lesson 7.
- 20.** Choice **a**, "pool." Choice **b**, "relative." Choice **c**, "light." Choice **d**, "odd." The fallacy of equivocation occurs when two meanings of a word are used or implied within the same argument. Lesson 13 explains equivocation and three other common deductive logical fallacies.
- 21.** Choice **b** is the best answer, because even though there is reason to believe there is nothing of value in the documents, the stakes are typically high in a lawsuit, and it is worth a look to see if any thing of importance was produced. Check back to Lesson 14 for more on inductive reasoning.
- 22.** Choice **a** is the best answer, because it is a government website that will probably have details about how it funded the telescope. The other sites are a personal web page, a public television website, and a site most likely built by an astronomy enthusiast. Lesson 8 has more information on finding and evaluating resources.
- 23.** The answer is **c**, because the conclusion must include information found in the premises (gas prices are being raised). See Lesson 12 for more information about how to construct a deductive argument.
- 24.** The answer is choice **d**, specific, measurable, realistic, and deadline oriented. The fifth quality is that the goal be put in writing. Lesson 5 explains what goals are and how to set them.
- 25.** The answer is choice **a**. Hasty generalization draws a conclusion when there is not enough evidence to support it. This and other common logical fallacies of inductive reasoning are explored in Lesson 15.

- 26.** The answer is choice **d**. Hunches and intuition should not be used by themselves to make a judgment call. There are many other factors to consider before making such an important decision. Lesson 17 shows you how to make better judgment calls.
- 27.** Choice **a** is false; search engines show you “hits” to every site that fits your search criteria, not necessarily the best sites. Choice **b** is true; sites such as Merriam Webster’s Dictionary and Encarta’s Encyclopedia charge for full access. Choice **c** is true; subject directories hire experts to create guides to certain subjects. Choice **d** is false; you must be more suspicious of material on the Internet, because just about anyone can create a website that appears to be legitimate. For more on finding resources, check back to Lesson 7.
- 28.** Choice **a** is an explanation. Choice **b** is argument. Choice **c** is an argument. Choice **d** is an explanation. Lesson 18 explains the difference between the two.
- 29.** Choice **d** is the correct answer. There is too much information left out to know if what the union wants for the workers is any better than what they already have. If you are not sure about the use of numbers to manipulate information and opinion, turn back to Lesson 10.
- 30.** Choice **a** is circumstantial, the fact that he works for a gun manufacturer might not be the reason he is against gun control. Choice **b** is *tu quoque* since just because the speaker’s friend’s action went against his statement does not mean the statement was wrong. Choice **c** is abusive, the reason the speaker did not get a raise yet does not mean that the boss is cheap. Choice **d** is *tu quoque*, the fact that the writer committed a crime does not mean her book is garbage. Lesson 15 considers *ad hominem* and three other distracting techniques.