Speaking

Lesson 17

About 17

Student 1 (M): Hi, Jennifer, did you hear about the new parking policy for next fall?

Student 2 (W): Hi, Paul, yeah, I read the announcement but I'm not happy about it. [brief pause] It's going to be a huge problem for me.

Student 1: Do you really think an extra 15 minutes will make a big difference?

Student 2: You're forgetting I'm in the orchestra.

Student 1: Oh right. You play the….

Student 2: I play the cello. And I bring my instrument home with me every night to practice and then bring it back with me to school every day for music class and rehearsals. [brief pause]Including the case, it weighs more than 10 kilos.

Student 1: And I guess you have your books, too.

Student 2: Right. It's a pretty heavy load. [brief pause]So yeah, 15 minutes does make a difference – at least for people in my situation.

Student 1: I see what you mean. [brief pause]But at least you won't have to waste time looking for a parking space.

Student 2: I'm not so sure about that. [brief pause]Cuz' when are orchestra concerts take usually held? On Fridays and on weekends!

Student 1: Oh that's right. I didn't consider that.

Student 2: And apparently neither did the university. Whenever there's a game or an event, the lot fills up really quickly. [brief pause] And if that happens, I might have to keep circling around till I find a spot and may not even find one. In which case I'd have to look for somewhere else, like on the street, and then we're talking maybe a half hour walk. [brief pause]I'll probably end up being late for performances.

Lesson 17.1

Activity 1

Student 1 (M): Hi, Jill, did you get the English Department memo about work that's handed in late?

Student 2 (W): Hi, Bob, yeah, I got it from my advisor this morning. What a surprise!

Student 1: Surprise, why? It's a good policy.

Student 2: I think it's really unfair. What if you get sick? I had the flu last semester and had to ask for extensions for my papers.

Student 1: That's the point. Instructors want students to finish papers by the due date. Some people put off work until the last minute and don't do the proper research. It can lead to problems.

Student 2: Yeah, sometimes I don't start a paper until the day before it's due. Bad time management, huh?

Student 1: True. The new policy might teach students better time management. It's a relief to get my papers done early. That way I don't worry. I don't like working under pressure. When I leave myself enough time, I always do better work.

Student 2: I guess you're right. I'll just have to manage my schedule better in the future

Lesson 17.1

Activity 2

Student 1 (W): John, did you see the announcement about visiting hours?

Student 2 (M): Yeah, Cindy, and I'm not happy about it.

Student 1: Why not? You always complain about too much noise at night.

Student 2: Yeah, I know, but the noise is made by people who live in this dorm, not by outside visitors.

Student 1: Oh, so you don't think the new policy will solve the noise problem?

Student 2: No. I think there should be a policy about no partying and too much noise after certain hours. I don't think that has to do with visitors. Sometimes I have friends over to study until 1 a.m., but we're really quiet. Now we'll have to find somewhere else to study, and their dorms are even noisier than this one.

Student 1: Yeah, that is a problem. I was glad to get in here because my last dorm was too loud. I think it's better here, but sometimes there is a lot of noise.

Student 2: That's the problem: too much noise, not the visitors.

Lesson 17.1

Activity 3

Student 1 (M): Hi, Debra, did you see the e-mail about band practice?

Student 2 (W): Yeah, Rafael, I sure did.

Student 1: You don't sound too happy about it.

Student 2: Well, I'm not. We really like practicing outdoors. I mean, we mainly perform outdoors [pause] at games and things. It sounds different when you play outdoors. Now we're going to have to practice in a gym!

Student 1: Oh, I didn't think about that. But the administration said they've gotten a lot of complaints about the noise…

Student 2: Well, if those people don't like our music, why don't they go somewhere else to study? It's just one night a week! I think the university should support the band a little bit!

Student 1: Well, yeah, maybe you're right…

Student 2: I mean, the students in that dorm have other options. They can go somewhere else for one hour a week to study. The band doesn't have any other places to practice outdoors. It's not fair.

Student 1: You know, you've got a good point. I think you need to write the administration an e-mail!

Lesson 17.1

Activity 4

Student 1 (W): Hi, Tom, did you read Nicole's letter in the paper? I thought she made some really good points.

Student 2 (M): Hi, Pam, yeah, I read it—but I like the food in the cafeteria.

Student 1: Well it does taste good, but she's right about it not being very healthy. Just think of all the fat we're eating when we eat fast food! And she's right–none of the food is actually prepared in the cafeteria.

Student 2: Oh, [pause] I didn't know that.

Student 1: Yeah. I'd really like to see some vegetables and salads and even some fruit in the cafeteria. I mean, it's really hard to lose weight if you're eating fast food all the time— [pause] it's loaded with calories!

Student 2: Yeah, you're right. I've gained fifteen pounds this semester!

Student 1: I have, too, and even though I exercise, I still need to eat healthier foods. I think everybody would benefit from healthier food in the cafeteria.

Lesson 17.2

Activity 1

Student 1 (W): Hey, Greg, did you see the announcement about the biology trip? Isn't it great? Now we won't have to worry about where we can get the samples for our research projects.

Student 2 (M): Yeah, Ann, I saw it and it is great, but I don't think I'm going.

Student 1: Why not? I thought you were really worried about getting the right samples for the project.

Student 2: Well--I am, but I heard this trip is a total waste of time. [pause] You know John from the lab? He went and said the trip was really long and hot because the bus doesn't have air conditioning. Also, when they got to the reserve, there was only one biologist to help 60 students. He said he didn't get any help at all.

Student 1: That doesn't sound too good. Was he able to get any samples for his project?

Student 2: No. When he got back to campus his instructor told him his samples were worthless because they hadn't been prepared and stored correctly. The water sample had been contaminated due to incorrect preparation and most of his plant samples had been crushed. He didn't have anyplace to put them except his backpack because the bus was so crowded.

Student 1: Well [pause] maybe I won't go either. I need samples--but I don't need all that trouble.

Lesson 17.2

Activity 2

Student 1 (M): Sarah, did you read this announcement about the spring orientation for first-year students?

Student 2 (W): Yeah, Doug, I did. What a waste of time!

Student 1: I agree. I don't understand why we have to go through another orientation.

Student 2: Well, it says it's because there's a new online registration process. [short pause] It says Student Services had a lot of calls from first-year students about the registration process for classes—but, you know, it isn't just first-year students having problems with that online registration. My sister is a senior here and she and her friends had trouble too. The system for registration is confusing and there aren't enough tech people to help if you have a problem. [short pause] They need to fix the system, not do another orientation.

Student 1: Yeah, and it's on a Saturday too! That's rough.

Student 2: I was supposed to move into a new dorm that day. Now I'll have to change all my moving plans.

Student 1: I know. I had plans that day too. But I don't want to have to re-register for all my classes! The classes I registered for are full and I wouldn't be able to get in if I had to re-register.

Student 2: This policy is really unfair. But what can we do? I guess we'll just have to go.

Lesson 17.2

Activity 3

Student 1 (M): Laura, did you see the article in the paper about the Shuttle Bus Service closing?

Student 2 (W): No, I didn't see it. What's it about?

Student 1: Well, it says that Mr. Sampson is going to close the business because he hasn't had as many customers and because the gas prices are going up.

Student 2: Oh, no! How will I get home for spring break? I don't have a car and I don't know anybody who can take me to the airport!

Student 1: Well, he isn't closing until after spring break on April 15, but something will have to be done before the end of the semester or a lot of people are going to be without a way to get to the airport when school's out.

Student 2: Well--maybe the university can set up a shuttle service and charge students for the service. They already have shuttle buses. That might even make some money for the university.

Student 1: That's a good idea, but I don't know if the administration will do it. They're already cutting back other services. They'd have to pay for gas and upkeep of the shuttle busses.

Student 2: True. But I hope somebody comes up with another service soon or I'm going to be in trouble when I have to go to the airport!

Lesson 17.2

Activity 4

Student 1 (W): Hi, Bryan. Did you see Dave's letter in the paper about eating in the computer lab?

Student 2 (M): Yeah, Amy, I saw it and I have to say—I agree with him. I don't see a problem eating in the computer lab if you're careful with your food.

Student 1: Well, I don't agree with him at all! I used to work in the computer lab when people were still allowed to bring in food and drinks. It was such a mess! The problem is

that some people aren't careful with their snacks and spill drinks and food and leave their wrappers on the floor. It was a real mess!

Student 2: Well, I never noticed that.

Student 1: You never noticed because the techs, like me, were constantly cleaning up the messes. That kept us from being able to help students who were having computer problems. Also, some equipment was damaged when a person spilled a soda on the keyboard. The keyboard was ruined and the university had to replace it. If that happened enough times, it could lead to a lot of expense.

Student 2: Well, Dave makes a good point, because if you need a snack, you have to leave the room and you might lose your computer.

Student 1: That's not true, actually. If you tell one of the techs you're taking a break, they'll put a reserved sign on the computer--and you're allowed a 15-minute break every 2 hours. I think that's fair.

Student 2: I see your point. I guess the new policy is a pretty good idea.

Lesson 18

About 18

Professor (M): One business that used this approach successfully was a big consumer electronics retailer, with hundreds of stores all over the country. The retailer sold products like . . . um . . . you know . . . televisions and cameras and DVD players.

So, as I said, they used the mystery-shopper approach. The mystery shoppers went into the stores—and, remember, the employees thought they were just normal shoppers. The shoppers would go into the stores and tell the sales person they wanted to buy, let's say, a digital camera. They'd say something like . . . uh . . . like they never owned a digital camera before and they didn't know the first thing about them. They'd ask how digital cameras worked, what were the differences between the different cameras, what were the advantages of the more expensive models, and so forth. You get the picture.

And what did they find out by doing this? Well, the employees were all very friendly and extremely courteous, *but, unfortunately*, most of them didn't know very much about the products. They didn't have answers. That's a problem, obviously, because if the mystery shoppers had been real customers, they might have become

frustrated when their questions weren't answered and maybe would have gone somewhere else to buy a camera, probably to a different store where the employees were better informed. Anyway, the shoppers wrote up what they observed and sent their reports to the company. And when they . . . when the company . . . realized their stores had this problem, they started a training program for their employees . . . m-mm . . . to teach them everything they needed to know about the products in the store. That way, the employees'd be able to answer the kinds of questions that customers typically ask.

Lesson 18.1

Activity 1

Professor (M): The Venus flytrap—a plant I'm sure you've heard about—has leaves that function in the first way. You can think of the leaves of the Venus flytrap as working like an automatic machine. The leaves act like a trap: when an insect lands in a Venus flytrap, it triggers hair-like sensors and the leaves immediately slam shut, capturing the insect. The leaves then release enzymes that kill the insect and digest the nutrients.

The pitcher plant has the other type of leaves. The leaves of the pitcher plant capture insects, but they do it *without moving*. The leaves are shaped like a pitcher or a tall bowl. They're full of rainwater that has collected there, plus some acid that the plant produces. This liquid has a smell that attracts insects, and the insects fall in the plant's leaves and drown. Eventually, the bodies of the insects decompose, and the plant absorbs their nutrients—and that's how the pitcher plant gets its essential nutrients.

Lesson 18.1

Activity 2

Professor (W): One Roman aqueduct in Spain was built to bring water to the city of Segovia. The builders had to get the water across a large valley. The aqueduct bridge they built to cross that valley measured 823 meters in length, and its arches were constructed from granite bricks. Amazingly, like other Roman aqueduct bridges, no mortar was used to hold the bricks together.

Another striking example of a Roman aqueduct is in southern France near the city of Nîmes. That is spelled N-I-M-E-S. This aqueduct crosses a river and when it was operating, it brought about 200 million liters of water a day to the city of Nemausus, the Roman name for Nîmes. This city, which grew . . . hm-m [= thinking about] . . . dramatically from the time of Augustus to a population of 30,000, badly needed this water. The design of the bridge is really beautiful. [pause] It was made from yellow limestone bricks, and, just like the Segovia aqueduct, no mortar was used, even though it has three levels of arches and the tallest are 25 meters high. The engineers built a water channel above the top level of arches—and, quite remarkably, this channel has not been destroyed or damaged.

Lesson 18.1

Activity 3

Professor (F): One interesting example of this pattern is seen in the brown tree snake in Guam, an island in the Pacific. These snakes, while not native to the island of Guam, have adapted pretty well there. In fact, since they first arrived on the island, which was most likely via military planes at the end of World War II, their numbers have increased at an astounding rate. In some places there are as many as 13,000 brown tree snakes per square mile, or, [pause] that is, for those that prefer the metric system . . . hm-m [= thinking] . . . 5,000 per square kilometer. [pause] The brown tree snake has no animal predators that hunt it on Guam, and . . . uh . . . there is also little or no competition for food from other species. The number of brown tree snakes on Guam is still growing extremely rapidly, but scientists believe it will level off when its food supply becomes scarce. In the meantime, this species has really proven itself to be quite a nuisance.

Lesson 18.1

Activity 4

Professor (M): One famous study attempted to settle that question by seeing whether a chimpanzee could be taught to use language. The chimpanzee was named Kanzi. Kanzi didn't use words—chimpanzees can't actually speak or write, after all. Instead, he was given a special keyboard with lexigrams, which are abstract symbols sort of like pictures but quite abstract, that represent words. For example, the lexigram for the word water was . . . um . . . it was a circle with a wavy line through the center of it. Kanzi learned to

use the keyboard with these lexigrams to communicate with his human trainers. He managed to learn quite a few lexigrams, roughly 250 of them.

And what's more, his language was not limited to just using individual lexigrams. He learned how to combine them . . . um . . . to combine the lexigrams into some short, simple sentences using rules of grammar. It wasn't complex grammar; rather, he used grammar at . . . oh . . . at about the same level as children do at two years of age.

Of course, all the grammar rules Kanzi knew came from sentences he learned from his human trainer. But . . . um . . . what is most interesting to researchers is that Kanzi could use these rules productively, in creative ways that expressed new and original thoughts that no one actually taught him. For example—let's look at this—if he wanted to do two actions, like drink a glass of water and play in the yard, he would put the lexigrams in the order that he wanted to perform the actions, in the sentence that he typed. That was something no one taught him to do.

Lesson 18.2

Activity 1

Professor (M): A classic example of the production possibility curve is to consider two essential goods that an economy could produce: food and shelter. [pause] Now, granted, this is really theoretical—I mean, after all, how many economies only produce two goods?—but nevertheless it is an excellent illustration of the principles of the production possibility curve. [pause] Imagine the extremes. The economy, which has only limited resources, remember, could produce only shelter and no food, or the other extreme, it could produce only food, but no shelter. Or it could be somewhere in the middle, some shelter and some food. When we plot these combinations on the graph, we make one good—food—the *x*-axis, or horizontal axis. We make the other—shelter—the *y*-axis, the vertical axis. In this case the result is a curve, not a straight line.

Now, how do economists use this graph? Well [pause] clearly there is a trade-off between food and shelter—and, hm-m [thinking about it], neither extreme is optimal. Economists can analyze the curve to find the most efficient combination or, hm-m [thinking about it] combinations of the food and shelter.

Lesson 18.2

Activity 2

Professor (W): These aren't big organisms. They're mostly bacteria or other microbes. Now, one of the first places extremophiles were ever discovered was in hot springs in Yellowstone National Park in the United States. If you've ever visited Yellowstone Park, you probably saw the hot springs, the pools of hot water bubbling up out of the ground from deep inside the earth. There is thousands of hot springs there. And you . . . you probably didn't just see the hot springs, you probably smelled them too. They have a sulfur-smell, like rotten eggs. That smell comes from sulfuric acid that's in the water. Hot water and acid: it doesn't sound attractive, does it? But, in fact, these hot springs seem to be the perfect environment for these tiny extremophiles. The high temperatures and the acidity would kill most other living things, but the extremophiles do very well there.

Now what's exciting about finding organisms surviving—actually thriving —in places like Yellowstone's hot springs is how similar the hot springs' conditions are to what we know about the atmosphere of the planet Venus. Astronomers who study the atmosphere of Venus have found dense clouds that are made up of sulfuric acid, the same sulfuric acid that's found in the hot springs of Yellowstone. And, of course, as everyone knows, the surface of Venus is extremely hot—actually a lot hotter than the hot springs in Yellowstone. But, even so, because of those kinds of similarities, there are scientists who think there's a possibility we'll find organisms like the extremophiles on Venus living in its hot clouds of sulfuric acid.

Lesson 18.2

Activity 3

Professor (M): A great example of this is the brown-headed cowbird, a common North American bird species which has this relationship with bird species like the sparrow.

Here's what happens. When a mother cowbird is ready to lay her eggs, she locates a sparrow's nest. Then, secretly, when the sparrow parents aren't there, the cowbird removes one of the sparrow's eggs and replaces it with an egg of her own. Then she flies away. It's pretty sneaky, really, because if the sparrow parents don't notice the switch—if they don't realize that one of the eggs in their nest isn't a sparrow egg but a cowbird egg, they'll take care of the egg as though it were one of their own. And . . . um . . . when the egg hatches, the sparrows continue to feed the cowbird baby until . . . um . . . until it's old enough to leave the nest. For the cowbird parents, it's like free childcare:

while other birds are taking care of their young, the cowbird parents are free to look for food for themselves.

For the sparrows, though, it's a serious problem. You see, baby cowbirds are bigger than baby sparrows, with considerably bigger mouths. And bird parents instinctively give the most food to whichever babies have the largest mouth, which means a baby cowbird that's been adopted by sparrows is likely to be much better nourished and healthier than any of the sparrow babies. In fact, many of the sparrow's offspring don't get enough food and don't survive into adulthood.

Lesson 18.2

Activity 4

Professor (W): Let's turn our attention now to a key component of these so-called"healthy fats": omega-3 fatty acids. These fatty acids are contained in polyunsaturated fats. You've probably heard of omega-3s because they've been getting a great deal of media publicity recently. The oils found in many types of fish, such as trout, mackerel, tuna, or salmon, are wonderful sources of omega-3 fatty acids—some people have actually started taking supplements of fish oils just for their health benefits.

Student (M): What are, hm-m [thinking about it], the health benefits of omega-3 fatty acids?

Professor: Well, this much we know—the research looks really promising. For example, flaxseed—which contains oils rich in omega-3 fatty acids—seems to be effective in fighting blood clots and, um [pause], flaxseed can minimize the problems associated with irregular heart rhythms.[pause] Now another great source of omega-3 fatty acids is fish, as I mentioned earlier. Recent studies have shown that by, um, eating fish one or two times a week, the fish oil you would consume helps to fight heart disease. Just remember to eat fresh or frozen fish—because, unfortunately, these great omega-3 fatty acids are destroyed when the fish is canned.

Lesson 19

About 19

Student (M): Hi, Mr. Smith. Thanks for taking the time to meet with me.

Advisor (W): Hi, Marta, no problem. How are things?

Student: Well—I'm a little [pause] worried, actually.

Advisor: How come? Tell me what's going on.

Student: Well, sir, we're almost done with the first quarter of the year and I'm not, uh, doing well in two of my classes [pause] American History and Political Science. As you know, both are required general education courses. [pause] But there is just so much reading, and with my other four classes, I have 18 credit hours this semester. I don't know. [pause] I stay up late every night reading the textbooks and completing the assignments, but I'm still barely passing those two classes.

Advisor: I see. [pause] Eighteen credit hours is a big load to carry. Why did you decide to tackle the history *and* political science courses in the same semester?

Student: Oh [pause] I thought that, um, since they were in the same building, and one was at 1 and the other at 2, that it would be good to just [pause] well, take them both. I live far from campus and this saves me a trip.

Advisor: Well, OK, I guess I understand your reasoning. Let's see. [pause] You could consider finding a tutor to help with the history course. Many of the history majors at the university tutor at the Learning Center over in Boswell Hall. A tutor could, maybe, help you focus on the, uh, most pertinent information from the textbook. Also, a tutor could teach you some reading techniques. You know, to help you cover all the information in a more streamlined way.

Student: I did, uh, look into that, Mr. Smith. But, with all the time I spend reading, going to classes, and studying for the other classes, I—I really don't have any extra time. The tutors are only available at certain times of the day. And, uh, I'm either in class or working at the library during those times.

Advisor: Oh, goodness. Well, OK. [pause] I have an idea. Why don't you consider dropping either the history class or the political science class? If you drop the course now, it won't affect your overall grade point average. And, you know, you won't lose any tuition money because you'd be dropping the class early enough.

Student: Umm. I'm not sure. [pause] Then it might take me longer to graduate.

Advisor: Yes—but it will take you just as long if you fail the course. You'd still have to take it in another semester—and you'd pay for it twice! Think about it, okay? I'd rather you take the extra time and do well than have a failing grade on your transcript.

Lesson 19.3

Activity 1

Advisor (M): Hi, Marco. How are you today?

Marco (M): I'm fine, Mr. Evans. And how are you?

Advisor: Oh, I'm doing well, thanks. So—what can I do for you today?

Marco: Well, um [thinking], I'm graduating in May with my business degree. And, well, I'm just not sure what my next step should be. [pause] I'm not sure what kind of job I'm, um [thinking], best for. And, uh, I'm not sure what my, uh [pause], options are now that I'm finishing college.

Advisor: Hmmm. I see. [pause] All right—I have a couple of ideas. Why don't we talk about them? First, I looked over your records. I noticed that you have excellent grades, you're active in extracurricular activities, and you're a respected leader in your business clubs. That's great! You're, um, also the president of the student body, am I right?

Marco: Yes, sir, I am.

Advisor: So, given all of that—I think you could easily be accepted into a good graduate school. Maybe you could, um, apply to the graduate school here at our university.

Marco: I like that idea, but, uh [pause], I'm worried about how much money that costs.

Advisor: Well—you're right about that. It'll be expensive. [pause] However, you could apply for financial aid or, uh, a graduate assistantship to help pay the tuition.

Marco: Really? I could?

Advisor: Absolutely! And—here's another thing—graduate school will give you a little extra time to figure out which area of business you want to pursue.

Marco: But—do you—do you think my skills are good enough?

Advisor: Oh, yes, absolutely. I think you are very well prepared for graduate school, Marco. You've developed really fine study skills. And—let's not forget—you've written a lot of research papers.

Marco: Well, that's for sure!

Advisor: And—as I'm sure you know—writing is really important in graduate school. Now, on the other hand [pause]—well, since your academic skills and your leadership

skills are so well developed, uh [thinking], I think you could also get a good job working for a—for a big company, too. [pause] Do you have a resume?

Marco: Uh-uh [= no], no, not yet.

Advisor: All right, then—here's my suggestion, [pause] Why don't you put a resume together and, uh, you could send it to a few companies—you know, to see if you can get a job in your field. As a matter of fact, the university career counseling center has advisors that can help you draft a resume and cover letter.

Marco: So, uh, so does the career center have a list of good companies?

Advisor: Well—yes, they'd be able to help you find the best places to send your resume, yes.

Marco: OK, thanks. Um [pause]—So, what are some of the advantages in getting a job?

Advisor: Well, let's see [pause]. For one, you'd be able to have a regular paycheck—and, um, work regular hours—and that means no more sleeping late! I know how much you dislike morning classes, Marco! With a job, you'd have to get up early.

Marco: Oh, all right, I understand. It, uh, seems like I have, uh [pause], two choices. I guess I have a lot of thinking to do.

Lesson 19.3

Activity 2

Student 1 (M): Hey there, Raquel, did you hear that the drama department is going to produce a new play?

Student 2 (W): What? Really? No, Peter, I didn't know that. Um, what's the name of the play?

Student 1: It's going to be a comedy called, um, *The Night the College Disappeared.* They're going to perform it next spring in the Oleo Theatre in the Fine Arts building. One of the students in the Department of, uh [pause], English—yeah, English—wrote it for the theater majors.

Student 2: Hey—you're a theater major, right?

Student 1: Yeah, that's right.

Student 2: Um, what'll you do for the performance?

Student 1: Gosh, [pause] I'm not sure what to do! I know I *need* to be a part of it because it's a great opportunity to get, um, valuable experience on a real live production. It'll probably help me, uh, get a good job in the entertainment industry after college.

Student 2: Mm-hmm [agreeing]. Could you try out to be an actor?

Student 1: That's a good idea, but I think I would be very, um [pause], nervous getting up in front of hundreds of people. I mean—I could forget my lines, or—or I could trip and fall down on stage! [laughs] That would ruin the whole play for everyone! And, um, I'm not sure how I could find time to learn all of those lines. I'm taking like five classes this semester as it is—and, uh, they all require a lot of work.

Student 2: Oh, OK—I understand. But--don't you want to be, um, like, famous someday?

Student 1: Uh-huh [= yes]. I really do. But, I'm worried I'm too, uh, shy to be in front of the camera. Maybe there are other ways for me to be famous. You know, [pause] behind the scenes.

Student 2: Hey—why not work on the play in some other way, then? I don't know—maybe you could work backstage. Maybe you could, like, work on the lighting or [pause] maybe the props?

Student 2: Uh-huh [= yes]. Those are great ideas. But, I don't think I could work on the lights because the theater department already has tech people to, um, handle those. And, the art majors usually do the scenery. [pause] But working on the props—yeah, that's a great idea! That way, I'd be able to work on my regular classes until the last month before the play is produced. [pause] I'd still get good grades [pause] and be a part of the play.

Student 1: There you go! It sounds like you've got a good option there.

Lesson 19.3

Activity 3

Officer (W): Abigail, hello! Please, come in!

Student (W): Hi, Ms. Brinkerman. I really appreciate your taking the time to, uh, see me today.

Officer: Oh—no problem! So [pause], what can I do for you today?

Student: Well, um, I'm not sure how to start. I, uh, [pause] want to keep going to college here next year but, well, I'm worried about money and, uh, paying tuition. I, well, hoped that you might have some suggestions for me.

Officer: Of course! Here—sit down. I'm sure we can figure something out.

Abigail: Thanks!

Officer: Why don't we start with your telling me a little about your situation.

Abigail: OK.

Officer: So—are you paying for school yourself?

Abigail: Uh, yes, I am.

Officer: And, uh—do you have a job? Or do you have savings?

Abigail: Well, I did have savings, but, um, I don't have much left at this point. [pause]

Officer: OK—so—are you working, then?

Abigail: Well, right now I'm working at the bookstore at the mall. But I, uh, only make $6.75 an hour, and, um, I know that isn't enough to cover tuition for next year.

Officer: Mm-hmm [thinking], I see. And how many hours are you working at the bookstore a week?

Abigail: Oh—about twelve at this point.

Officer: Well—let's see. [pause] Here's one suggestion. You could apply for a student loan. A lot of our students take out student loans. You'd need to decide how big a loan you'll need. We could work on that together. [pause]

Abigail: Yes, um—I know people who've taken out loans. But, uh, I worry about getting into a lot of debt with a loan.

Officer: Well, that *is* a consideration. [pause] Now, another thing you could do is take out a smaller loan, and then see if you couldn't work more hours at the bookstore to, uh, earn some extra money.

Abigail: Hmmm [thinking]. That might be an option. [pause]

Officer: Yes, well—you'd just need to figure out your time. You know—how much time your classes take, and, uh, how many hours you need to study each week—and then how much time you'd have for working at the bookstore.

Abigail: Hmm [thinking]. That makes sense. I like that idea.

Officer: Good! So—why don't you sit down and figure out how many hours you think you could work a week, and then come back here and we'll talk about how to proceed. We could, uh, take a look at your loan options then, as well.

Abigail: OK—thank you, Ms. Brinkerman! This has been really helpful for me!

Officer: My pleasure, Abigail!

Lesson 19.3

Activity 4

Student 1 (W): Hello, Ivan. Wow! It's been a long time since we've talked!

Student 2 (M): Hi, Carina. Um, yes, it's been too long. And I really need to talk to you. You see, I really need some advice.

Student 1: Oh, my. I figured everything was going well. The last time we talked you said you liked your classes. And you'd just moved into a new apartment, right? So [pause] what happened?

Student 2: Oh, no—it's not that. School's fine. But [pause]—I have this problem with my apartment. Well, sort of my apartment—[pause] actually, it's more like with my roommate, really. [pause] Remember how I decided to take more classes this semester? Well, um, I couldn't work as many hours—so I needed a roommate to help, you know, pay the bills, and stuff like that.

Student 1: Aha! Roommate troubles?! Those are the worst! [pause] Go on, tell me more.

Student 2: Well—he doesn't care about school so much. In fact, [pause] I'm not sure he's even going to classes anymore. I haven't seen him, uh, get up before noon and, well, I know he had an early morning class this semester. So, [pause] since he doesn't go to class, he stays up late instead. That wouldn't be such a, uh, bad problem but—well, he's always playing loud music or—[pause] I don't know—watching television. I can't study! It drives me crazy! And—he's a slob! I mean, he never does any dishes—they just pile up in the sink . . .

Student 1: Oooo[= "ew" drawn out]—that's not good!

Student 2: Yeah—and he never picks up his clothes, either. It wouldn't be so bad—[pause]—but he leaves his stuff all over the apartment. It's gross! I'm embarrassed to invite people over.

Student 1: All right—let me think—[pause]—have you tried talking to him? Sometimes talking about things really helps. What do you think? Maybe he'll listen if you approach it [pause] diplomatically but still, um, firmly.

Student 2: Um, yeah, I guess I could try that.

Student 1: You know—a lot of people don't even realize that someone else is upset unless the person tells them. What do you think? Think he knows you're unhappy?

Student 2: Hmmm [thinking]. I guess I'm not really sure.

Student 1: Then again—I guess you could ask him to move out.

Student 2: Yeah, I've thought of that. I mean—I like that idea [pause], but I'm not sure I can do it. I'm not sure I can afford it. After all, he pays half the rent and half of all of the bills. And I'm only working a few hours a week in the cafeteria. I can't really afford to live by myself.

Student 1: Well, maybe if he thinks you want him to move out, he'll clean up and start acting like a better roommate.

Lesson 19.4

Activity 1

Director (M): Welcome to the university, Andrea. How are you?

Student (W): Oh, I'm fine, Mr. Lee. I, I wanted to meet with you to discuss my housing options.

Director: Ah. [short pause] I see. Are you from the area?

Student: Uh-huh, yes, I am.

Director: OK, well, then [short pause], if you're from the area, then I think you have two choices in terms of housing.

Student: Two?

Director: Yes, two. First of all, you could always, uh, live at home. About 25 % of our students live at home. The city has a good transportation system—You can take a bus or a train—and even a shuttle!—to campus. I should tell you, though—you have to make sure to allow enough time to get to your classes.

Student: OK.

Director: Living at home would, uh, save you money because you wouldn't have to pay for room and board.

Student: Yeah—that's true.

Director: On the other hand, you have to arrange your classes so they're fairly close together. And, uh, you'll have to carry your books everywhere all day rather than having a place to go between classes.

Student: So, um, there are good and bad points.

Director: Yes, I guess you could say that. You could also consider living in a dormitory on campus. I'd say, uh—almost 50% of the students live in residence halls. Um, [pause] now, if you live on campus, then you don't have to spend time commuting, and, uh, you have a place to go between classes. But, of course, you have to pay for room and board. [pause] Another advantage is that you have a meal plan when you live on campus. So—I guess I'd say that, uh, although campus living is more expensive, it includes three meals a day in the school cafeterias.

Student: I see. Uh—who's in charge of the dormitories?

Director: Good question. [pause] As opposed to your parents who, shall we say, uh, "run" the house, you'll have a resident advisor. This person makes sure all the rules are followed in the dormitories. It's not quite the same as parental guidance so, um, most students seem to think that they have more freedom.

Student: Oh, OK. Well—I'm not sure what to do.

Director: If I were you, I'd take a tour of one of the dormitories to see what they're like. Talk to the some of the students who live in them. They'll tell you what it's like to live in one. That should give you a pretty good idea of what campus life would be like.

Lesson 19.4

Activity 2

Student 1 (M): Kristina, hey, what's up? Can you believe it's almost summer break? This semester just flew by! Are you almost finished with your classes?

Student 2 (W): Hi, Len. Well, I only have two more final exams before I'm finished for the semester.

Student 1: So—what are you doing this summer?

Student 2: Oh—I'm going to summer school. There's a class I want to take and, um, it's only offered then. Not good, huh? [pause] So—what are you doing?

Student 1: Well [pause] that's what I don't know. [pause] I'm, uh, not sure what to do. I had a tough semester, and I, uh, really need a break from classes, so I didn't register for any courses.

Student 2: Well, you know, there are some good internships available through the university. Maybe you could get one of those. I mean, it would give you some great experience in a business setting. And you're an accounting major, aren't you?

Student 1: Yeah, I am.

Student 2: Well, then—I think one of the accounting firms accepts college interns. And, um, it would look really good on your resume. Don't you graduate next year? Something like that might help you get a great job after you graduate.

Student 1: Well, yeah, I am graduating next year. And, uh, that sounds like a good idea. But—do you get paid for an internship?

Student 2: Sometimes—but a lot of times, no. But you get some great experience.

Student 1: Well—I'm not sure I can go all summer with no money at all. I mean, I still have a year of college to pay for.

Student 2: Well, [pause] then, you—I guess you—could get a job for the summer. There are a lot of campus jobs available. You could work in the cafeteria, or maybe at the campus bookstore—or maybe even get a job on the cleaning crew for the dormitories. You could, uh, probably work a lot of hours because, you know, a lot of students leave for the summer. The bad thing is, I think the jobs don't pay very much [pause]—but if you work a lot of hours, it could add up, right?

Student 1: Well, maybe so. I mean, I wouldn't be getting accounting experience—but at least I'd earn some money to, uh, help pay my expenses next year. So—thanks, Kristina! You've given me some great suggestions! And, either way, it sounds like we'll both be around over the summer. Maybe we can, um, get together sometime.

Student 2: Sounds good. Bye, Len.

Student 1: Bye, Kristina.

Lesson 19.4

Activity 3

Student (W): Hello, Mr. Williams. Thanks for meeting with me.

Advisor (M): It's good to see you, Judy. So—you're a sophomore now. Um, [pause] about time for you to declare a major, right?

Student: Yes, sir. Um [pause], yeah [pause], that's why I'm here. I, uh, need to decide what I want my major to be and I'm, um, [pause] just not sure which to choose.

Advisor: Well, then—let's talk about your choices. You were thinking about either the, um [pause], arts—like theater, painting—or sculpture, right?

Student: Yes. I really love to create things and I, um, thought I could become an artist and, uh [thinking] sell my paintings or, maybe, paint scenery for a movie company.

Advisor: Well, then. You could major in fine arts! That would give you a little bit of exposure to all the arts. With a major in fine arts you'll learn about the history of art and, um, you'll learn how to create your own, uh, works. You know—a fine arts major would give you a good overview and, uh, it might allow you to go many different ways. You could even be a teacher. But, of course, that requires education courses, too.

Student: Oh, huh—that sounds interesting.

Advisor: Then again [pause]—Didn't you tell me that you liked the, uh, electrical engineering courses you took last semester? So—you might also want to consider majoring in engineering.

Student: Yes, I was surprised! I ended up liking them a lot more than I, uh, than I thought I would. I mean, um [thinking about it], I really liked learning how to build things.

Advisor: OK, that's important. A major in engineering is, um, another option, then. It isn't quite as broad, so you'd be a little more limited. Plus, when you finish, you'd, uh, have to go into electrical engineering for a job. But—jobs are much easier to come by in engineering than the arts. A job in the arts is harder to find and doesn't pay as much.

Student: Well—OK. So, isn't there some way I could, um, you know—combine them?

Advisor: Well, you can choose one for your major and one for your minor. Yes, you could do that. Maybe then, um, you can discover a way to use an electrical engineering background in Hollywood!

Lesson 19.4

Activity 4

Student 1 (M): Hi, Jana, how are you?

Student 2 (W): Josef, hi—I'm doing well. I got to say—I'm glad it's almost the end of the week. So—do you have any plans for the weekend?

Student 1: Well, um [thinking], I've been trying to find out what's going on this weekend. You know—what cultural activities there are. My, uh, art teacher said we could get extra credit if we went to some cultural events and, uh, and wrote a one-page summary.

Student 2: Oh, that's great! I know of a—a few things happening around campus this weekend. OK, let's see—[pause] here's what you can do. Why don't you skip the basketball game on Sunday and go listen to music? The university orchestra is, um, performing a symphony this weekend. They're going to be in the theater across from the football field.

Student 1: Really? Um, what are they playing?

Student 2: Oh—they're playing classical music from, uh, composers like [pause] Bach, Beethoven, and, um, Mozart. I think if you enjoy classical music, you'd really like it!

Student 1: Yes, well [pause], I know I should learn more about classical music but, um [pause], but I have to say—I'd rather go to the basketball game! Say, do you know of any other events this weekend?

Student 2: Well, yes—there are other concerts. But, like, I guess those won't keep your mind, um, off the, um, basketball game! So if you don't like music, maybe you could try something like a play. I, uh, I know the drama department's hosting an improvisational troupe from the city. They're doing a new play. It's not a traditional play—I mean, they don't use scripts. The actors, um [pause], how do you say [pause], make up, yeah, they make up everything as they go along. And, people say they often ask audience members to help them! That might be fun.

Student 1: Oh, OK—that does sound like fun. Better than music, anyway.

Student 2: Uh-huh [= yes]. Well, I like plays a lot, you know. They're like books, but better—-because they're, you know, live. Sort of like, um, a book, um, being acted out. You get a good story without having to read, you know, a, uh, an actual book.

Student 1: Wow, Jana, you really know a lot about these cultural events! Thanks for the suggestions! Maybe, um, maybe I'll see you at one of these events.

Student 2: Yeah—maybe we'll see each other!

Lesson 20

About 20

Professor (M): Today's lecture will cover a particular theory in the field of geography. That theory is the theory of continental drift, which was first developed about a century ago by Alfred Wegener—a German scientist. According to Wegener's theory of continental drift, the major land masses on Earth were originally joined together in one supercontinent, and then later this supercontinent split and divided into the land masses that we can more or less identify as the modern continents.

Now then . . . Wegener based the theory of continental drift on some interesting evidence, mainly from ancient fossils. For example, he noticed some remarkable similarities between animal fossils found on separate continents—a phenomenon that could only be explained if these now-distant land masses used to be joined. For example, there was a reptile, an ancient lizard called lystresaurus which lived 250 million years ago. Well, fossils of this ancient lizard have been found in ancient rock formations on several different continents which of course are now far apart from each other—in South America, in Africa, and in Antarctica—suggesting that they all used to be connected together as one.

Fossils also told Wegener something else. Basically, fossil evidence shows that the climate on some of the continents millions of years ago was radically different from their present climate—from what their climates are today—suggesting that the continents have moved, shifted from their original positions to where they are now. For example, fossils of tropical plants in the form of coal deposits have been found in Antarctica, and since these tropical plants can only grow in warm climates, this means that Antarctica, the coldest place on the planet today, must have been situated closer to the equator, in a warmer climate where lush tropical vegetation could grow. And thus to get to where it is now, it must have moved.

Lesson 20.1

Activity 1

Professor (M): All animals get their nutrients from the food they eat, and to do this, animals need to process the food, break it down in the digestive system into usable nutrients like proteins and carbohydrates. And the way an animal processes its food depends what kind of food it eats. I'm going to talk about two different kinds of animals – herbivores and carnivores – and the different ways their digestive systems have adapted to process food.

So, first, herbivores. Herbivores are plant-eating animals, and plant material can be very hard to digest, to break down into usable nutrients. So, herbivores have adapted by developing complicated digestive systems that process food slowly. Take cows, for example, which eat grass. The food processing begins in the cow's mouth. Cows chew their food slowly. And cows have four stomachs, each one performing a different step in complex process of breaking down grass. Eventually the food goes into the cow's intestines, which are very long. In fact, it can take several days for food to move through the intestines all the way through cow's digestive system.

Carnivores, on the other hand, which are meat-eating animals, have simple digestive systems that can process large amounts of food quickly. Carnivores have simple digestive systems because meat is easy to digest – it breaks down into usable nutrients quite quickly. So if you look at a lion … first of all, lions don't chew their food –they don't need to. They can take huge pieces of meat into their mouths and swallow them whole. A lion's stomach is large – so it can hold a large volume of meat – but its intestines are short. Their intestines are short because breaking down meat into usable nutrients is and simple and quick. It only takes a few hours for food to go from a lion's mouth all the way through its digestive system.

Lesson 20.1

Activity 2

Professor (W): Today's lecture will be about developments in theater during the Elizabethan period in England, which roughly coincides with the reign of British Queen Elizabeth I [*Queen Elizabeth the first*]. This period, the Elizabethan period, lasted from the late 1500s to the mid 1600s. It was a dynamic time in the history of English drama, with major changes taking place in various aspects of English theater. I'm going to discuss two changes and why they occurred.

So, one change was . . . well, the content of plays changed—plays began to have different subjects and themes and became more commercial. You see, earlier, before the Elizabethan period, plays were often about religious or political topics. But during Elizabeth's reign, well, Queen Elizabeth wanted to avoid religious and political controversy in her country, so she outlawed plays with religious and political themes. So, since plays with religious or political themes were no longer permitted, theater companies had to perform plays about other topics, topics with everyday themes. Plays became more commercial—for entertainment—and avoided controversy. Plays about love, for example, became very popular. Plays about love could entertain people without provoking controversy.

The other change was the sheer number of plays being written and performed. More plays were produced during the Elizabethan period than ever before. Why this increase? Well, before Queen Elizabeth came to power, the government or religious authorities used to give generous financial support to playwrights and theater companies. But when religious and political plays were outlawed, religious authorities and politicians were no longer interested in supporting the theater. Without outside financial support, plays had to pay for themselves; theater companies needed to make more money, so they needed to put on more productions. So more plays were written and produced. For example, most playwrights at the time drafted about 4 plays per year—considerably more plays than ever before.

Lesson 20.1

Activity 3

Professor (W): Today's lecture is on a phenomenon in physics that has countless real world applications—thermal expansion. The basic idea of thermal expansion is this: when a substance gets warmer—when its temperature increases—it increases in volume, meaning it expands. Thermal expansion, then, is the expansion of a substance, an increase in its volume, due to a rise in temperature. Why does this happen? Well, an increase in the temperature of a substance causes an increase in the vibration of its molecules, and this increase in vibration causes the molecules to move further apart. So the substance expands. Different materials have different rates of thermal expansion . . . and this affects how different substances behave when heated.

Some materials expand very quickly when heated. This can cause these materials to crack. For example, consider what happens when you pour hot water into a cold glass container. If you pour boiling water into a cold glass container, the glass sometimes cracks. The reason is that when the hot water comes into contact with the glass, the inside surface

of the container heats up very quickly and starts expanding before the exterior surface does. And if the inside surface expands and the outside doesn't, well, this creates stress forces in the glass and these stress forces make the glass crack.

Other materials expand more slowly, and they're less likely to break due to thermal expansion. For example, there's a special material called Pyrex, which looks like glass but doesn't crack if you pour hot water into it. In fact, that's a major advantage of Pyrex. So, why doesn't a cold container that's made from Pyrex crack if you pour hot water into it? It's because its rate of thermal expansion is much lower than regular glass—Pyrex expands more slowly than glass. And this slower, more gradual rate of thermal expansion allows the outside and the inside to expand together . . . more or less at the same time. So you don't get those stress forces and the container doesn't crack.

Lesson 20.1

Activity 4

Professor (M): Today we'll discuss something everyone's familiar with: stress. Stress is a normal physical response of the body to situations that we perceive as dangerous, threatening, or frightening. Now stress is something we talk about casually all the time, and we usually think of it as negative, but stress can also be positive.

Let's first talk about how stress can be positive. Stress can increase a person's physical strength, but only —and this is important—only if it doesn't last too long. So how does stress increase physical strength? Well, stress causes certain physical reactions like elevated blood pressure and increased heart rate. And when this happens, when your blood pressure rises and your heart beats faster, more blood gets pumped to your muscles. This can help your muscles perform more efficiently in the short term, give them extra strength. Athletes know this. For example, the stress that competitive runners feel right before a big race can give them the strength to run the race faster. Which is obviously a good thing.

But stress can be negative, especially in the long term—if it continues a long time. The same physical reactions I just mentioned can cause problems if they last too long—problems like anxiety—and this can make it harder to do your job well. Doctors who work in emergency rooms have to watch out for the effects of long-term stress. All day long they're responding to medical emergencies that produce stress reactions in them—in the doctors. And if the stress is constant, if it continues week after week, doctors can end up feeling exhausted . . . burnt out. It's very hard to do your job if you feel that way.

Lesson 20.2

Activity 1

Professor (M): You've probably noticed that most commercials on television contain music. The reason they use music is that music makes commercials more effective in getting people to buy the product being advertised. Let's consider two ways that music helps advertisers sell their products.

One way music makes commercials more effective is by giving viewers a good feeling about the product being sold. Simply put, music can create positive emotions, and if music plays in the background while an announcer describes a product, those positive feelings and the product become associated in the viewers' mind, and people feel good about the product. And if people feel good about the product, they're more likely to want to purchase it. For example, if a company wants to sell tennis shoes to teenagers, they might use rap or hip-hop music in their commercials. The music doesn't have to be about tennis shoes, but if teenagers like rap music or hip-hop and they hear it during a commercial for a certain brand of tennis shoes, the positive emotions created by the music will make the kids feel more favorably about the shoes and more likely to want them.

Another thing music can do is it can help people remember information that's in a commercial. Songs can be very memorable. Even without trying to remember a song that you've heard, the combination of music together with rhyming verses can make it stick in your head. There's an advertisement by a pizza company in Canada that delivers pizza to your house when you call them on the phone. The pizza company of course wants people to remember the telephone number. So they turned it into a little song. The song is very catchy, very easy to remember. And this pizza company is very successful, because, well, when people want to order a pizza, they remember the phone number from the commercial and that's the company they call up.

Lesson 20.2

Activity 2

Professor (W): Soil erosion is when soil is blown away by wind or washed away by the rain. Soil erosion caused by rain can be very damaging, especially on hillsides, but if

there's vegetation, if there're plants growing on a hillside, there's usually less soil erosion. Vegetation helps prevent hillside soil erosion. Let's consider two ways vegetation helps prevent erosion of soil from hillsides.

One way is by reducing the force of falling raindrops, so that the raindrops fall more gently to the ground. If rain falls to the ground gently, the soil isn't disturbed, and it stays in place, doesn't wash away. That's why trees are often planted on hillsides. The leaves act like little umbrellas. When the rain comes down, even if it comes down hard, a lot of the raindrops first hit the leaves and then the raindrops fall to the ground—more gently than they would have otherwise. So the soil is less disturbed and less likely to wash away down the hill in a heavy rain.

Another way that vegetation helps prevent soil erosion on hillsides is by keeping the ground absorbent, by helping the ground soak up rainwater so that the water goes down into the ground instead of washing the soil away. How does vegetation help the ground soak up rainwater? Well, soil has several layers and the top layer is made partly of decomposing organic material—dead leaves and such—that comes from the plants growing in the soil. This top layer of soil is very spongy. It soaks up water—just like a sponge. In a pine forest, for example, the trees shed their needles year round, and these pine needles are constantly being added to the soil and can build up a very thick top layer of spongy soil. So on a hillside with a pine forest growing it, rainwater will soak into the ground, into the soil, rather than flowing down the hill and washing the soil away.

Lesson 20.2

Activity 3

Professor (M): Plant domestication is a fascinating development in human history. The domestication of plants dates back 10,000 years, and since then domesticated plants have evolved substantially from their wild predecessors. These evolutionary changes have consequences for the plants themselves. Today I want to talk about two of consequences of domestication.

So first of all, one consequence of domestication is that domesticated plants are more useful to people than the wild versions. This makes sense, right? Because that's the whole point of plant domestication, to make plants more useful to people. Take wheat, for example. If you look at the seeds of wild wheat or other ancient wild cereal plants, you'll notice they're surrounded with hard, relatively thick coverings, called husks. But seeds of domesticated cereal plants tend to have fragile husks . . . soft, thin seed coverings. Which makes sense. Wheat grains with hard husks are difficult to grind

into flour. So, over thousands of years, wheat—domesticated wheat—has evolved to have a soft, thin husk. With its soft husk, domesticated wheat can easily be ground into flour, so it's more practical, more useful than wild wheat. That's one consequence.

But domestication has disadvantages as well. Domesticated plants are often more vulnerable . . . more vulnerable to diseases. In the case of wheat plants, for example, the soft seed coverings that I just mentioned, [upspeak from here until the elipses] which make the grains easier to grind into flour . . . well, those soft seed coverings also make the plants vulnerable to fungal infections. So, for example, whereas wild wheat seeds with their hard coverings were naturally protected from harmful funguses, domesticated wheat, with its thin soft husk, is very susceptible to fungal diseases, it lacks that protection. In fact domesticated wheat plants probably wouldn't survive without humans using chemicals to kill the funguses that attack it.

Lesson 20.2

Activity 4

Professor (W): Solar heating—where the sun's energy provides the heat that's needed to keep a building warm—has been used for thousands of years, and architects today are designing more and more buildings that take advantage of the free heat that the sun provides. In designing buildings for solar heating, there are two major architectural considerations—the building needs to be made out the right material, and the building needs to have a good spatial orientation—in other words, it needs to be positioned to maximize its exposure to direct sunlight.

So, the first consideration—the building materials: when architects design for solar heating, they choose materials that efficiently absorb and store incoming solar radiation—the heat that's coming from the sun. Brick, stone, and concrete are good materials for this—they absorb and store heat very well. Sun rays falling on, let's say, a brick wall during the daytime raise the temperature of the wall, and if the wall's very thick, the heat that's stored in all those bricks will be released into the building throughout the night, When the temperature drops at night, the heat that's stored in the walls radiates into the building and keeps it warm.

The other major architectural consideration is the spatial orientation of the building—how it's positioned in relation to the sun. A building that uses solar heating needs to be positioned so that as much of the building's exterior surface as possible is exposed to the direct rays of the sun for as many hours as possible throughout the day. Because it's the sun's rays that are providing the heat. In designing a solar-heated building, you might want it to be long and narrow, and positioned in such a way that the

long side faces in the direction of the sun for most of the day. That way, with a long wall facing the sun, you get maximum sun exposure and a lot of heat will be absorbed.