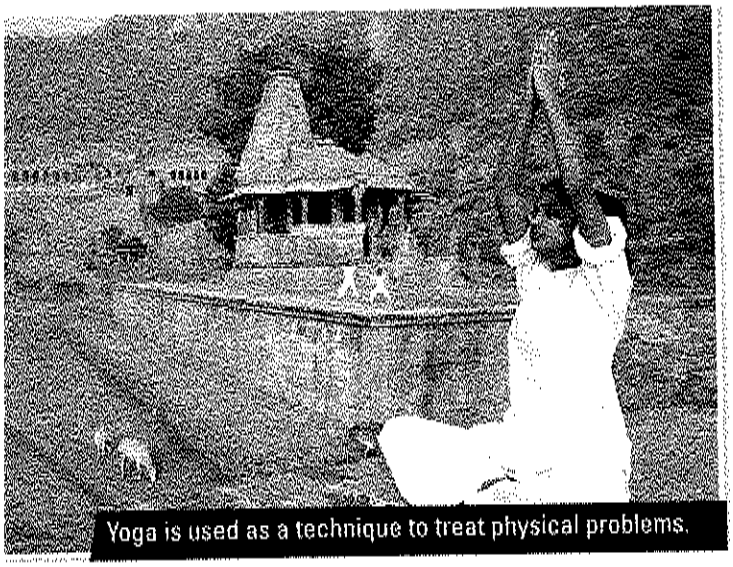
CHAPTER 5
CONSCIOUSNESS



Yoga is used as a technique to treat physical problems.

like a mirror, the biofeedback monitor reflects a person's own efforts and enables him or her to see how various voluntary behaviors affect the involuntary ones.

Studies have shown that biofeedback has numerous other applications. For example, biofeedback is moderately effective in reducing the intense pain of migraine headaches and other painful conditions.

Since Miller's studies in the 1960s and 1970s, biofeedback has had a resurgence as part of 21st-century alternative medicine that includes meditation, hypnosis, and yoga. Biofeedback is used to treat problems like high blood pressure, seizures, migraine headaches, and digestive disorders.

Biofeedback, along with other examples of alternative medicine mentioned above, has shed some light on the nature of consciousness. In this chapter you will look at various aspects of consciousness, including sleep and dreams, altered states of consciousness, and drugs and consciousness.

What do you think?

1. How can people learn to control involuntary behavior?
2. If you could use biofeedback to control an involuntary behavior, what would it be?

Chapter at a Glance

SECTION 1: The Study of Consciousness

- Consciousness, like intelligence or emotion, is a construct; that is, it is a concept that cannot be seen, touched, or measured directly.
- Consciousness has a number of different meanings, including sensory awareness, direct inner awareness, and a sense of self.
- There are several levels of consciousness, including the preconscious, unconscious, and nonconscious.

SECTION 2: Sleep and Dreams

- The sleep cycle is made up of four stages of sleep and REM sleep.
- Sleep serves important physical and psychological needs.
- Common sleep problems include insomnia, nightmares, night terrors, sleepwalking, sleep apnea, and narcolepsy.

SECTION 3: Altered States of Consciousness

- Altered states of consciousness can be achieved while awake through biofeedback, meditation, and hypnosis.
- There are many myths surrounding hypnosis.
- Although there are controversies related to the use of hypnotism, hypnosis can be used to recall memories, reduce pain, and quit bad habits.

SECTION 4: Drugs and Consciousness

- Depressants slow down the nervous system, stimulants increase the activity of the nervous system, and hallucinogens produce hallucinations.
- Treatments for drug abuse include detoxification, maintenance programs, counseling, and support groups.

SECTION 1

The Study of Consciousness

Before You Read

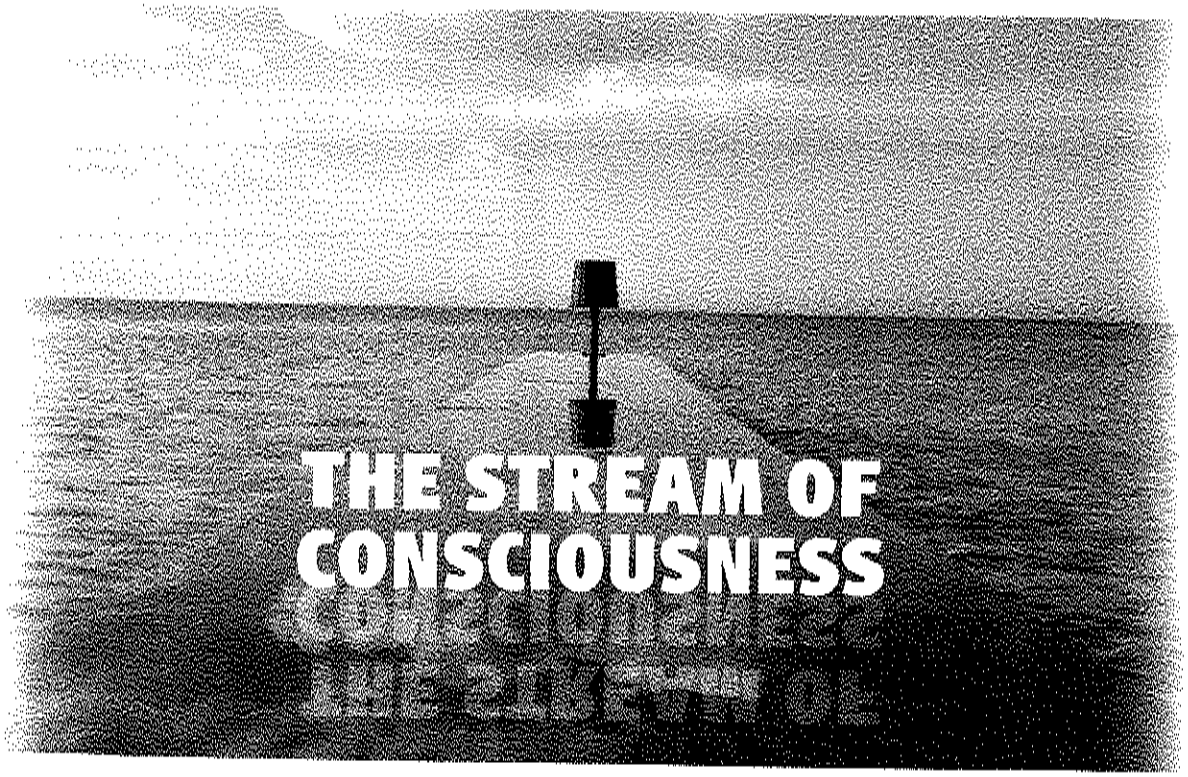
Main Idea
Consciousness, the awareness of things that are both inside and outside ourselves, is an elusive but essential subject of study for psychologists.

Reading Focus
1. Why is consciousness a psychological construct?
2. What are the general meanings of consciousness?
3. What distinguishes the different levels of consciousness from full conscious awareness?

Vocabulary
consciousness
selective attention
preconscious
unconscious
nonconscious
altered state of consciousness

TAKING NOTES Use a graphic organizer like this one to identify the different levels of consciousness.

1.	
2.	
3.	
4.	



PSYCHOLOGY CLOSE UP ***What are you aware of right now?*** William James was one of the pioneers of psychology. In his book *Principles of Psychology* (1890), he coined the term "stream of consciousness" to describe the shifting and elusive nature of consciousness. The phrase highlights the fact that consciousness changes constantly, like a stream flowing swiftly along, carrying various bits of flotsam and jetsam. Then 20th-century literary modernists such as James Joyce in *Ulysses*, Virginia Woolf in *To the Lighthouse*, and William Faulkner in *The Sound and the Fury* used stream of consciousness as a literary technique. In their writings, these authors tried to render the flow of impressions in one's consciousness by using snatches of thought and the free association of ideas and images.

Although consciousness will always be an elusive subject compared to other fields of psychological research, psychologists continue to study it. New techniques have been devised in an attempt to better understand the meaning of consciousness.

Consciousness as a Construct

Consciousness means the awareness of things that are both inside and outside ourselves. But what is consciousness? You are probably certain that you are conscious right now. You are conscious, or aware, that you are reading this page. But what about tonight, when you are asleep? Sleeping is related to consciousness. There are also several altered states of consciousness, such as those that occur when a person is in a hypnotic trance or is under the influence of certain drugs.

Today, most psychologists believe that we cannot capture the richness of human experience without talking about consciousness. However, psychologists have not always thought that consciousness should be part of the study of psychology.

In 1904 William James wrote an article titled "Does Consciousness Exist?" In this article, James questioned the value of studying consciousness because he could not think of a scientific way to observe or measure another person's consciousness. His point was that even though we can see other people talking or moving around, we cannot actually measure their consciousness. Although James later modified his position, his original position was influential.

John Watson, the founder of behaviorism, agreed with James. In 1913 Watson wrote an article called "Psychology as the Behaviorist Views It." In this article, he stated, "The time seems to have come when psychology must discard all references to consciousness." Watson, like James, questioned whether consciousness could be studied scientifically. He chose instead to focus only on observable behaviors.

Not all psychologists dismissed the possibility of studying consciousness. Today many psychologists believe that consciousness can be studied because it can be linked with measurable behaviors, such as talking, and with brain waves.

Consciousness is a psychological construct, as are intelligence and emotion. That is, none of these concepts can be seen, touched, or measured directly. However, they are known by their effects on behavior and they play roles in psychological theories. For example, we can theorize about how sleep or alcohol affects consciousness and devise ways of testing our theories. When people behave in certain ways, we may conclude that the behaviors result from, say, intelligence even though there is no way to be certain. Although consciousness cannot be seen or touched, it is real enough to most people.

Reading Check **Summarize** Why do some psychologists think consciousness can be studied?

Meanings of Consciousness

Generally speaking, consciousness means awareness. But there is more than one type of awareness. Thus, the term *consciousness* is used in a variety of ways. Sometimes consciousness refers to sensory awareness. At other times, consciousness may mean direct inner awareness. A third use of the term *consciousness* refers to the sense of self that each person experiences.

Consciousness as Sensory Awareness When you see a raindrop glistening on a leaf, when you hear your teacher's voice, or when you smell pizza in the cafeteria, you are *conscious* of all of these sensations around you, including sights, sounds, and smells. Your senses make it possible for you to be aware of your environment. Therefore, one meaning of consciousness is sensory awareness of the environment. In other words, you are conscious, or aware, of things outside yourself.

Focusing on a particular stimulus is referred to as **selective attention.** To pay attention in class, you must screen out the rustling of paper and the scraping of chairs. To get your homework done, you must pay more attention to your assignments than to your hunger pangs or the music playing in your headphones. Selective attention makes our senses keener. We may even be able to pick out the speech of a single person across a room at a party.

We tend to be more conscious of some things than others. For example, we tend to be particularly conscious of sudden changes, as when a cool breeze enters a sweltering room. We also tend to be especially conscious of unusual stimuli—for example, a dog entering the classroom. Intense stimuli—such as bright colors, loud noises, or sharp pains—also tend to get our attention.

ACADEMIC VOCABULARY

theorize propose a theory about; speculate about

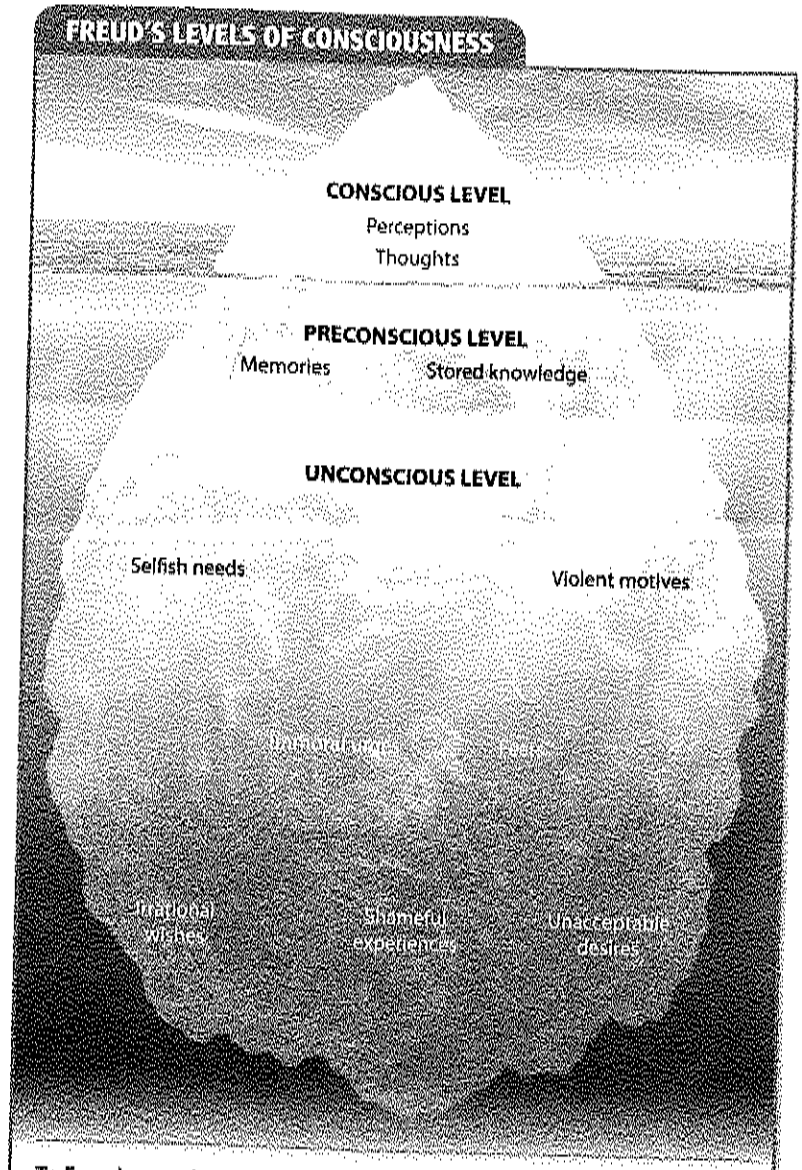
Consciousness as Direct Inner Awareness Imagine jumping into a lake or a swimming pool on a hot day. Can you feel the cool, refreshing water all around you? Although this image may be vivid, you did not really experience it. No sensory organs were involved. You are conscious of the image through what psychologists call direct inner awareness.

Any time you are aware of feeling angry, any time you remember a best friend you had when you were younger, any time you think about abstract concepts such as fairness, you do so through direct inner awareness. In other words, you do not hear, see, smell, or touch thoughts, images, emotions, or memories. Yet you are still conscious of them. This meaning of consciousness, then, is being aware of things inside yourself.

Consciousness as Sense of Self Have you ever noticed how young children sometimes refer to themselves by their names? For example, they do not say, "I want milk" but "Taylor wants milk." It is only as they grow older that they begin to understand that they are unique individuals, separate from other people and from their surroundings.

From then on, they have a sense of self, no matter how much they or the world around them might change. In some uses of the word, *consciousness* is this sense of self in which we are aware of ourselves and our existence.

Reading Check **Identify** What are the three uses of the term consciousness?



To Freud, consciousness is like an iceberg. Many memories, impulses, and feelings exist below the level of conscious awareness.

Skills Focus **INTERPRETING VISUALS** On what level did Freud place irrational wishes?

Different Levels of Consciousness

So far, we have discussed only one of the levels of consciousness—the level at which people are aware of something and are aware of their awareness. But many psychologists speak of other levels of consciousness. These include the preconscious level, the unconscious level, and the nonconscious level. At these levels of consciousness, awareness is considerably more limited.

The Preconscious Level What if someone asked you what you wore to school yesterday? Or what you did after school? Although you were not consciously thinking about any of this information before you were asked about it, you will probably be able to come up with the answers.

Preconscious ideas are not in your awareness now, but you could recall them. You can make these preconscious bits of information conscious by directing your inner awareness, or attention, to them.

The Unconscious Level Sigmund Freud theorized that people have an unconscious mind. Information stored in the **unconscious** (sometimes called the subconscious) is unavailable to awareness under most circumstances. In other words, this information is hidden from the conscious mind.

For example, imagine that you are planning to go to a party. Without realizing why, you find yourself continually distracted from getting ready. First, perhaps, you cannot find the shoes you were planning to wear. Then maybe you become involved in a lengthy phone call to a friend.

Can you guess why you were having trouble getting ready to go? It may be that you did not want to go to the party. But according to Freud, this desire to avoid the party was unconscious—you were unaware of it.

Freud believed that certain memories are painful and that some of our impulses, such as aggressiveness, are considered unacceptable. He stated that we use various mental strategies, called defense mechanisms, to push painful or unacceptable ideas out of our consciousness. In this way, we protect ourselves from feelings of anxiety, guilt, and shame.

In Freud's view, consciousness is like an iceberg. There are many layers to it, and much of it lies hidden beneath the surface. In his book *The Interpretation of Dreams* (1899), Freud argued that dreams express unconscious wishes.

For example, a child may dream of hitting a home run that sends three runners around the bases, thereby clinching a World Series title for the hometown team. Or a young girl may dream of driving the winning car in the Memorial Day Indianapolis 500.

The Nonconscious Level Many of our basic biological functions exist on a **nonconscious** level. For example, even if you tried, you could not sense your fingernails growing or your hair growing.

You know that you are breathing in and out, but you cannot actually feel the exchange of carbon dioxide and oxygen. You blink when you step from the dark into the light, but you cannot feel your pupils growing smaller. It may be just as well that these events are nonconscious. After all, how much can a person hope to keep in mind at once?

Altered States of Consciousness The word *consciousness* sometimes refers to the waking state—the state in which a person is aware. There are also **altered states of consciousness,** in which a person's sense of self or sense of the world changes. When you doze off, you are no longer conscious of what is going on around you even though, when awakened, you may claim you haven't missed a thing.

Sleep is one altered state of consciousness. Other altered states of consciousness can occur through meditation, biofeedback, and hypnosis. The rest of this chapter explores, among other topics, these altered states of consciousness, including the effects of drugs on consciousness.

Reading Check **Find the Main Idea** What are Freud's three levels of consciousness?

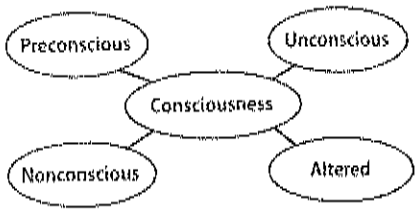
SECTION 1 Assessment

Reviewing Main Ideas and Vocabulary

1. **Recall** Why did William James question the value of studying consciousness?
2. **Explain** What are two examples of ideas that are not in your awareness right now but that could be recalled if needed?
3. **Summarize** In what way is consciousness a psychological construct?

Thinking Critically

4. **Contrast** How does an altered state of consciousness differ from the three levels at which awareness is limited?
5. **Analyze** Do you think that a person can study or understand the consciousness of another person? Why or why not?
6. **Analyze** Using your notes and a graphic organizer like the one below, explain the different levels of consciousness.



FOCUS ON WRITING

7. **Descriptive** Review the information on levels of consciousness and the illustration of consciousness as an iceberg. Write a paragraph in which you develop a different analogy about consciousness.

SECTION 2

Sleep and Dreams

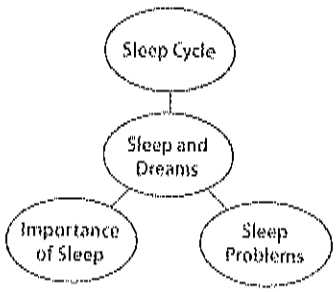
Before You Read

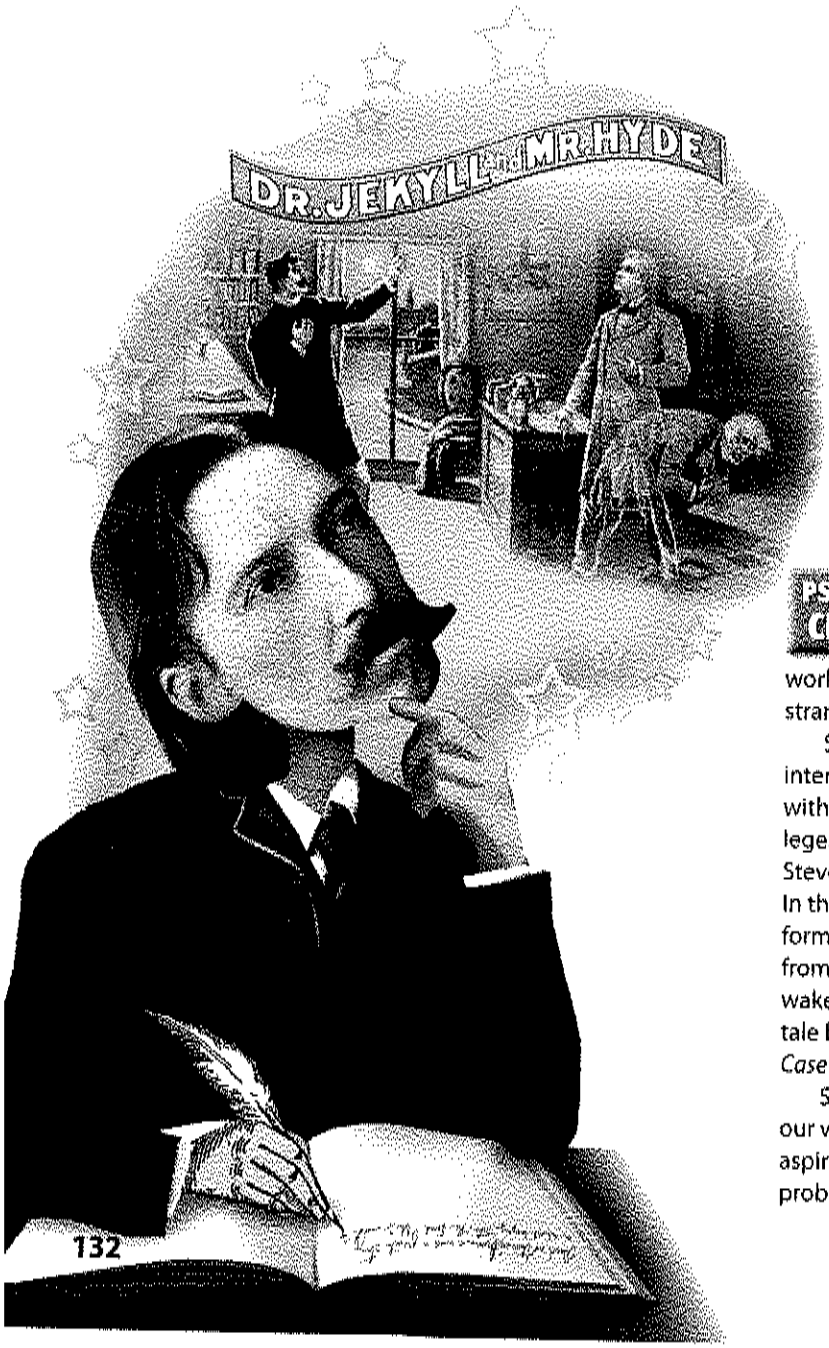
Main Idea
Sleeping and dreaming are essential to human health, although many questions remain. Some people are troubled by various sleep problems.

Reading Focus
1. What is the sleep cycle?
2. How have psychologists explored the importance of sleep and dreams?
3. What are sleep problems?

Vocabulary
circadian rhythm
rapid-eye-movement sleep
insomnia
night terror
sleep apnea
narcolepsy

TAKING NOTES Use a graphic organizer like this one to make notes about sleep and dreams.





FROM NIGHTMARE TO Novella

PSYCHOLOGY CLOSE UP ***How did a dream become a classic horror story?*** Robert Louis Stevenson was a Scottish writer who wrote such classic works as *Treasure Island* and *Kidnapped*. One of his books has a strange history.

Stevenson wanted to write a book that would show the interaction of good and evil in human nature. He struggled with the problem of how best to treat this theme. According to legend, the answer came to him in a dream one night in 1885. Stevenson had a nightmare; his cries wakened the household. In the dream he had a vision of a good doctor being transformed into an evil man by taking a potion. When awakened from his nightmare, Stevenson supposedly said: "Why did you wake me? I was dreaming a fine bogey tale." That fine bogey tale became one of the classics of horror fiction—*The Strange Case of Dr. Jekyll and Mr. Hyde*.

Stevenson's dream shows the importance of dreaming to our waking lives. Dreams can express fears, wishes, goals, and aspirations. Many believe they can even provide solutions to problems that seemed insoluble during the day.

The Sleep Cycle

Are you aware that you spend about one third of your life asleep? Why do we sleep? Why do we dream? Why do some of us have trouble getting to sleep or experience nightmares?

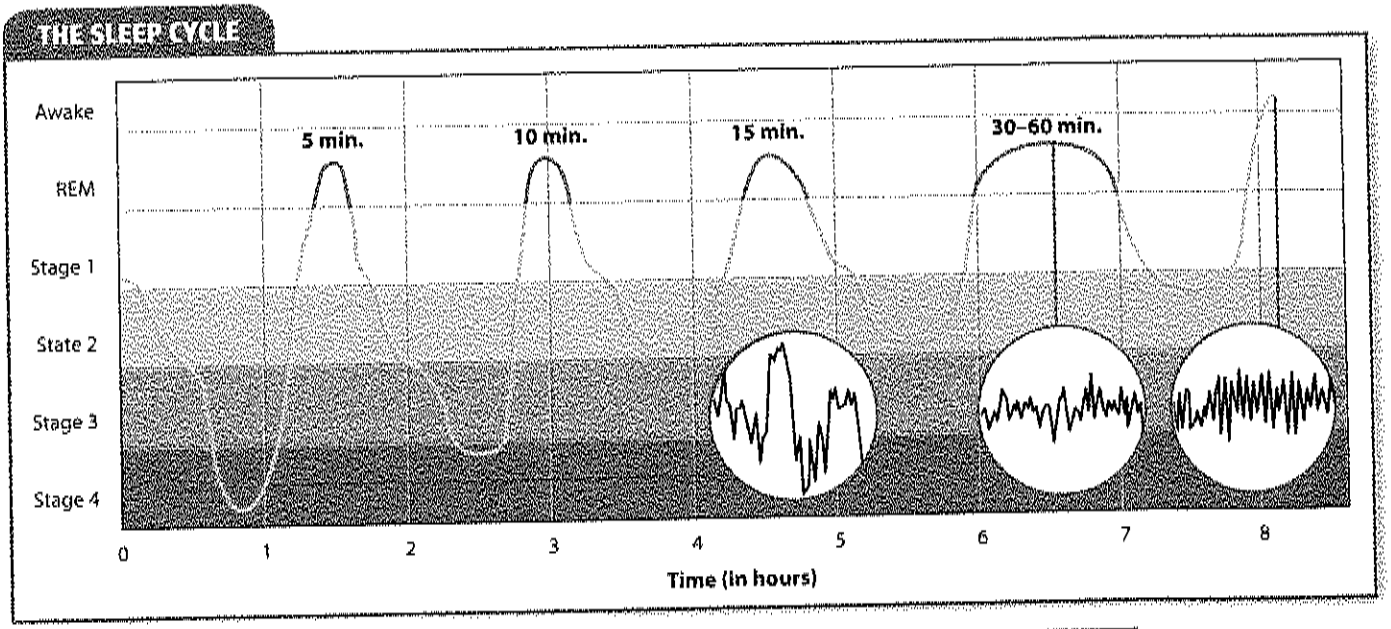
Much of how people, animals, and plants function is governed by **circadian rhythms,** or biological clocks. The word *circadian* comes from the Latin words *circa,* meaning "about," and *dies,* meaning "a day." The circadian rhythms in humans include a sequence of bodily changes, such as those in body temperature, blood pressure, and sleepiness and wakefulness, that occurs every 24 hours. The human circadian rhythms usually operate on a 24-hour day.

The most-studied circadian rhythm is that of the sleep-wake cycle. Because people normally associate periods of wakefulness and sleep with the rotation of Earth, a full sleep-wake cycle is 24 hours. However, when people are removed from cues that signal day or night (such as clocks, radio or TV shows, sunrise, and sunset), their cycle tends to expand to about 25 hours. Researchers are unsure why this happens. This and many other issues concerning sleep have been, and continue to be, the subject of much research.

The Stages of Sleep Sleep researchers have discovered that we sleep in stages. Sleep stages are defined in terms of brain-wave patterns, which can be measured by an electroencephalograph (EEG). Brain waves are cyclical, and they vary on the basis of whether we are awake, relaxed, or sleeping. Four different brain-wave patterns include the following: beta waves, alpha waves, theta waves, and delta waves.

When we are awake and alert, the brain emits beta waves, which are short and quick. As we become drowsy, the brain waves slowly move from beta waves to alpha waves, which are a little slower than beta waves. During this relaxed state, we may experience visual images such as flashes of color or sensations such as feeling as if we are falling. This state is followed by five stages of sleep.

Stage 1 is the stage of lightest sleep. As we enter stage 1 sleep, our brain waves slow down from the alpha rhythm to the slower pattern of theta waves. This transition may be accompanied by brief images that resemble vivid photographs. Because stage 1 sleep is light, if we are awakened during this stage, we will probably recall these images and feel as if we have not slept at all.



This is a typical sleep pattern. Most people go through the cycle five times in eight hours. As the night progresses, stages 3 and 4 become shorter, and REM sleep becomes longer. Brain waves are shown in the circles.

Skills Focus: INTERPRETING VISUALS

During which hours of sleep does REM sleep last the longest?

If we are not awakened, we remain in stage 1 sleep no more than 30 to 40 minutes. Then we move into sleep stages 2, 3, and 4. During stages 3 and 4, sleep is deep, and the brain produces delta waves—the slowest of the four patterns. Stage 4 is the stage of deepest sleep; it is the one during which someone would have the greatest difficulty waking us up.

REM Sleep After perhaps half an hour of stage 4 sleep, we begin a relatively quick journey back to stage 3 to stage 2 to stage 1. About 90 minutes will have passed since we fell asleep. Now something strange happens. Suddenly, we breathe more irregularly, blood pressure rises, and the heart beats faster. Brain waves become similar to those of stage 1 sleep. Yet this is another stage of sleep—the stage called **rapid-eye-movement sleep,** or REM sleep, because beneath our closed lids, our eyes are moving rapidly. The preceding four stages are known as non-rapid-eye-movement, or NREM, sleep because our eyes do not move as much during them.

During a typical eight-hour night of sleep, most people go through these stages about five times, each of which constitutes one sleep cycle. As the night goes on, periods of REM sleep become longer.

Reading Check **Recall** Which is the deepest stage of sleep?

The Importance of Sleep and Dreams

People need sleep to help revive the tired body and to build up resistance to infection. Sleep also seems to serve important psychological functions. It may help us recover from stress. It also helps us to consolidate certain memories from the previous day.

What would happen if people forced themselves to go without sleep? Randy Gardner, age 17, tried to find out as part of a science project. Under a physician's supervision, Randy stayed awake almost 11 days. He became irritable, could not focus his eyes, and had speech difficulties and memory lapses. William Dement, a sleep researcher, tracked Gardner's recovery. He found that Gardner slept an extra 6.5 hours for the first three days following the experiment. On the fourth night he slept 2.5 extra hours.

In some studies, animals or people have been deprived only of REM sleep. People and animals deprived of REM sleep tend to show what psychologists call REM-rebound. They catch up on their REM sleep by having much more of it when they sleep later on. REM sleep seems to serve particular psychological functions. Animals and people who are deprived of REM sleep learn more slowly than usual. They also forget more rapidly what they have learned. Other research findings suggest that REM sleep may help brain development in infants and "exercise" brain cells in adults.

Dreams It is during REM sleep that we have the most vivid dreams. Dreams are a mystery about which philosophers, poets, scientists, and others have theorized for centuries.

Dreams can be in black-and-white or in full color. Some dreams seem very realistic. You may have had a dream of going to class

The Mystery of Dreams
The mystery of dreams has occupied artists and thinkers for centuries. This image has qualities of both fantasy and realism that are often found in dreams. It might seem spooky or serene to you.
If dreams often express wishes or fears, what wish or fear might the above dreamlike image express?

Do You Remember Your Dreams?

Most people remember at least some of their dreams. They might remember their dreams in detail or just remember the high points. Other dreams they might have trouble recalling.

PROCEDURE

1. Try to remember your dreams for one night. One technique might be to tell yourself to try to remember your dreams just before you go to sleep.
2. Assign key words to your separate dreams for the night while you're in a still-sleeping, just-beginning-to-wake state before you get out of bed.
3. Record your information for one night's worth of dreams and report back to the class the next day. Be sure to make a list of the key words that you came up with for your dreams.

ANALYSIS

1. What do you remember about your dreams?
2. How much uninterrupted sleep accompanied each dream?
3. Discuss with classmates if there seems to be any connection or pattern between dreams and the amount of uninterrupted sleep.
4. During REM sleep, people have the most vivid dreams. These dreams are most likely to have clear images and plots that make sense, even if the events are not realistic. Do you think any of the dreams you recorded occurred during REM sleep? Why or why not?

and suddenly realizing that there was going to be a test. You had not studied. You started to panic. Then you woke up. The dream felt very real. Other dreams are disorganized and seem less real.

We may dream every time we are in REM sleep. During REM sleep, dreams are most likely to have clear imagery and plots that make sense, even if some of the events are not realistic. During NREM sleep, plots are vaguer and images more fleeting.

If the events in a person's dream seemed to last 10 minutes, that person was probably dreaming for 10 minutes. That is, people seem to dream in "real time." Although some dreams involve fantastic adventures, most of the dreams people have are extensions of the activities of the day.

We sometimes have difficulty recalling the details of our dreams. This may be because we are often unable to hold on to information from one state of consciousness (in this case, sleeping/dreaming) when we move into another (in this case, wakefulness).

The Freudian View Have you ever heard the song "A Dream Is a Wish Your Heart Makes" from the Disney film *Cinderella*? Is it true that your dreams reveal what you really want? Sigmund Freud thought so; he theorized that dreams reflect a person's unconscious wishes and urges—"wishes your heart makes."

However, some unconscious wishes may be unacceptable, even painful. Those, Freud thought, would be the ones that would most likely appear in dreams, although not always in direct or obvious forms. Freud believed that people dream in symbols. He thought that these "symbolic" dreams give people a way to deal with painful material that they cannot otherwise deal with consciously.

The Biopsychological Approach Some psychologists believe that dreams begin with biological, not psychological, activity. According to this view, during sleep, neurons fire in a part of the brain that controls movement and vision. These neuron bursts are random, and the brain tries to make sense of them. It does so by weaving a story—the dream.

The biopsychological approach explains why people dream about events that took place earlier in the day. The most current activity of the brain concerns the events or problems of the day. Thus, the brain uses everyday matters to give structure to random bursts of neurons during REM sleep.

Today most psychologists caution that there are no hard-and-fast rules for interpreting dreams. And we can never be sure whether a certain interpretation is correct.

Reading Check **Recall** When do we have the most vivid dreams?

Sleep Problems

Even when we need sleep, we may have trouble sleeping soundly. When these troubles last for long periods of time or become serious, they become sleep problems.

Insomnia The inability to sleep is called **insomnia**, from the Latin *in-*, meaning "not," and *somnus*, meaning "sleep." The most common type of insomnia is difficulty falling asleep. People with insomnia are more likely than others to worry and to have "racing minds" at bedtime. For many people, insomnia comes and goes, increasing during periods of anxiety or tension and decreasing or disappearing during less stressful periods.

People can actually make insomnia worse by *trying* to get to sleep. The effort backfires because it increases tension. We cannot force ourselves to fall asleep. We can only set the stage by lying down and relaxing when we are tired. Yet millions of people go to bed each night dreading the possibility that they will not be able to fall asleep.

Some people use sleeping pills to cope with insomnia, but many psychologists believe that the safest, simplest, most effective ways of overcoming insomnia do not involve medication. Psychologists recommend that people with insomnia try the following techniques:

- Tense the muscles, one at a time, then let the tension go. This helps relax the body.
- Avoid worrying in bed. If worrying persists, get up for a while.
- Establish a regular routine for getting up and going to sleep each day.
- Use pleasant images to relax.

Many psychologists also note that occasional insomnia is fairly common and is not necessarily a problem. It becomes a problem only if it continues for long periods of time.

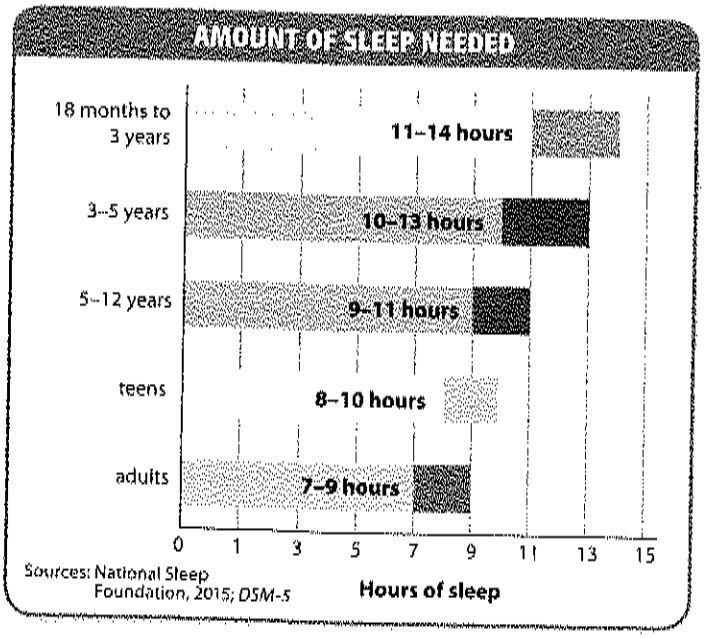
Nightmares and Night Terrors You have probably experienced nightmares in your lifetime. Some nightmares are specific to a particular activity or profession. For example, the "actor's nightmare" involves being on stage with no idea what play is being performed, much less what any of the lines are.

In the Middle Ages, nightmares were thought to be the work of demons. Today we know that nightmares, like most other dreams, are generally products of REM sleep. In one study, college students kept dream diaries and reported having an average of two nightmares a month. Upsetting events can produce nightmares. People who are anxious or depressed are also more likely to have nightmares.

Night terrors (also called sleep terrors) are similar to, but more severe than, nightmares. Dreamers with night terrors feel their hearts racing, and they gasp for air. They may suddenly sit up, talk incoherently, or thrash about.

Statistically Speaking...

Sleep Problems The bar graph shows the amount of sleep recommended for specific age groups by sleep experts. Listed below the bar graph are the percentages of people with specific sleep problems.



Sources: National Sleep Foundation, 2015; *DSM-5*

73% Percentage of Americans who do not get enough sleep

10–50% Percentage of children who have nightmares

17% Percentage of children who have sleepwalking episodes

Skills Focus **INTERPRETING DATA** Why do you think such large segments of the population do not get enough sleep?

Sources: American Academy of Sleep Medicine, 2015

They do not fully wake up. In the morning, they may recall a feeling or an image from the night terror. Memories of night terror episodes usually are vague.

Night terrors also differ from nightmares in when they occur. Night terrors tend to occur during deep sleep (stages 3 and 4), whereas nightmares occur during REM sleep. Night terrors happen during the first couple of sleep cycles, nightmares more toward morning. Night terrors are most common among young children and may reflect immaturity of the nervous system.

Sleepwalking Many children walk in their sleep. Sleepwalkers may roam about almost nightly during stages of deep sleep. They may respond to questions while they are up and about, but when they wake up they typically do not remember what they did or said. Contrary to myth, there is no evidence that sleepwalkers become violent or upset if they are awakened. However, because sleepwalkers are not fully conscious and thus may be prone to accidentally hurting themselves, they should be supervised if possible. Most children outgrow sleepwalking as they mature.

Sleep Apnea We all have occasional apneas, or interruptions in breathing. **Sleep apnea** is a breathing interruption that occurs during sleep. People with sleep apnea do not automatically start breathing again until they suddenly sit up and gasp for air. Once they begin breathing again, they fall back asleep. They usually do not wake up completely, so they may not even be aware of what has happened during the night. However, they often feel tired during the day.

Sleep apneas occur when a person's air passages are blocked. Thus, they are sometimes accompanied by snoring. A nasal mask that provides a steady air flow can help prevent breathing interruptions.

About 10 million Americans have apnea, and it is associated with obesity as well as snoring. Apnea is more than a sleep problem. It can lead to high blood pressure, heart attacks, and strokes.

Narcolepsy **Narcolepsy** is a rare sleep problem in which people suddenly fall asleep, no matter what time it is or where they are. One minute they are awake. The next, their muscles completely relax, and they are in REM sleep. Drug therapy and frequent naps have been used to treat narcolepsy.

Although people usually awaken from an episode of narcolepsy feeling refreshed, such episodes may be dangerous. For example, they can occur while driving or operating machinery. No one knows for sure what causes narcolepsy, but it is believed to be a genetic disorder of REM-sleep functioning.

Reading Check **Summarize** What are some of the main types of sleep problems?

SECTION 2 Assessment

Reviewing Main Ideas and Vocabulary

1. **Summarize** What are the five stages of sleep?
2. **Define** What is NREM sleep?
3. **Recall** Why might narcolepsy be dangerous?

Thinking Critically

4. **Compare and Contrast** How are nightmares and night terrors similar and different?
5. **Explain** What are some of the recommended techniques for dealing with insomnia?
6. **Analyze** Using your notes and a graphic organizer like the one below, describe common sleep problems.

Insomnia
Nightmares
Sleep walking
Apnea
Narcolepsy

FOCUS ON WRITING

7. **Descriptive** Write a paragraph in which you describe vivid images from a dream or nightmare that you have experienced.

Sleep Deprivation in Teens

A young tennis player experiences the effects of sleep deprivation.

Lack of sleep affects both the mind and the body. Sleep deprivation can produce mental states of fatigue, drowsiness, and irritability. In addition, lack of sleep can contribute to physical symptoms such as weight gain, heart disease, and other symptoms and ailments. Teenagers who do not get enough sleep can also develop these problems.

The television show *60 Minutes* aired a segment on "The Science of Sleep" on March 13, 2008. Leslie Stahl interviewed Eve Van Cauter, M.D., an endocrinologist at the University of Chicago School of Medicine. In her laboratory, Van Cauter studies the effects of sleep and sleeplessness on the body. Her studies have revealed links between lack of sleep and increased rates of obesity, diabetes, heart disease, high blood pressure, and stroke (Van Cauter, University of Chicago Medical Center, 2004).

Van Cauter's work confirms and builds upon work done by the National Sleep Foundation. According to a study done by the group in 2004, here are signs of sleep deprivation:

- difficulty waking in the morning
- irritability in the afternoon
- falling asleep during the day
- oversleeping on the weekend
- difficulty concentrating
- waking up often and having trouble going back to sleep

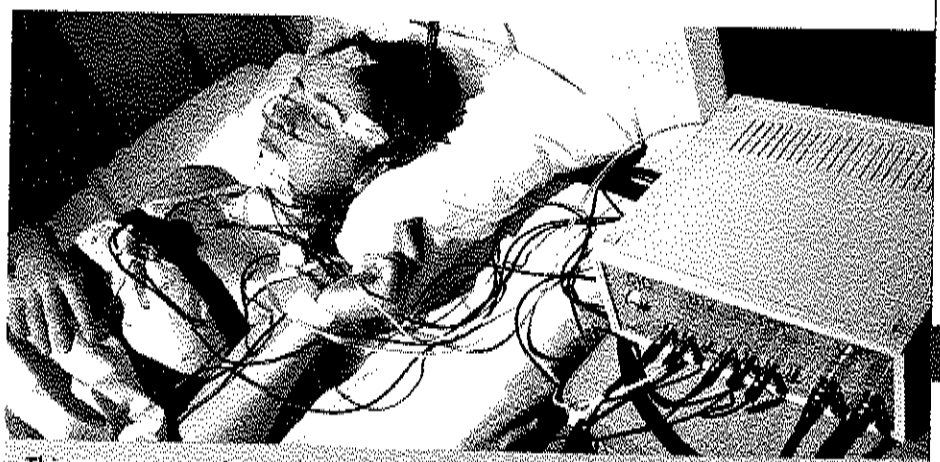
It is estimated that adolescents need 8–10 hours of sleep a night. Some estimates claim that about a third of young adults are very sleepy during the day. According to a recent study, 26 percent of high school students sleep less than 6.5 hours on school nights, while only 20 percent sleep 8.5 hours or more (National Sleep Foundation, 2015).

About 17 percent of adolescents are overweight (Center for Disease Control, 2015). The extra weight in conjunction with the lack of adequate sleep creates a vicious circle. The incidence of sleep apnea among young people is liable to increase as the number of overweight teenagers increases. The symptoms of sleep apnea at night include snoring, breathing pauses during sleep, restlessness, mouth breathing, and difficulty getting up in the morning. The symptoms during the day include hyperactivity, inattention, behavior problems, and sleepiness.

Lack of adequate sleep among teens puts them at risk not only for physical ailments but also for intellectual and emotional difficulties, including poor school performance and accidents. Sleepiness causes over 100,000 car accidents each year, and teenage drivers are at fault in many of these crashes. Sleeplessness is a high risk factor for adolescent alcohol and drug abuse (Carpenter, 2001).

One possible solution to insufficient sleep by teenagers might be to change the starting time for school. Some Minnesota schools have moved start times from 7:20 AM to 8:30 AM. And here are some other ways for teenagers to get a good night's sleep:

- Avoid caffeine in the evening.
- Try to go to bed at the same time and get up at the same time.
- Try only to sleep in bed; no TV watching or reading.
- If you have trouble sleeping, then get up and read.



This young woman is attached to various monitors as part of a study on sleep apnea using electroencephalography.

Thinking Critically

1. **Summarize** What are some of the signs of sleep deprivation?
2. **Discuss** What might be the advantages of starting school later?

SECTION 3

Altered States of Consciousness

Before You Read

Main Idea
A variety of techniques have been developed in order to achieve altered states of consciousness.

Reading Focus
1. How do meditation and biofeedback work?
2. What is hypnosis?
3. How can hypnosis be used?

Vocabulary
meditation
biofeedback
hypnosis
posthypnotic suggestion

TAKING NOTES Use a graphic organizer like this one to explain the techniques and methods of both meditation and biofeedback.

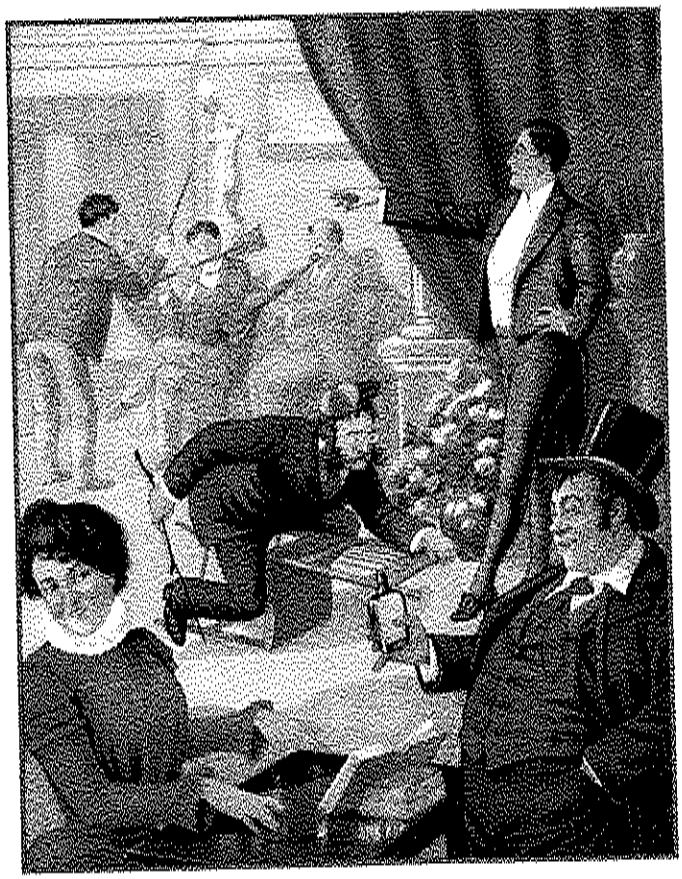
Meditation	Biofeedback

Mesmer AND MAGNETISM

PSYCHOLOGY CLOSE UP ***Are you feeling drowsy yet?*** Franz Mesmer (1734–1815) was a German physician who was an important figure in the early history of hypnotism. He developed a theory called "animal magnetism." According to this theory, an invisible bodily fluid reacted to magnetic fields. Mesmer argued that disease resulted when the invisible fluid could not circulate freely. He "mesmerized" his patients by passing magnets over their bodies to supposedly unblock obstacles to circulation. He believed that balance could be restored by putting his patients in trance states.

Mesmer's theory of animal magnetism was soon discredited. However, his skill at putting his patients into trances evolved into a tool of hypnosis, which has been useful in treating bad habits such as smoking and overeating.

Hypnosis is one way of achieving an altered state of consciousness when awake. In this section, you will learn about hypnosis and other types of altered consciousness, including meditation and biofeedback.



In this poster advertising a hypnotist, people under his influence engage in odd behavior: a woman plays a table, a man rides a chair like a racehorse, and so forth.

Meditation and Biofeedback

People who are asleep and dreaming are in an altered state of consciousness. Other altered states of consciousness occur when we are awake. Two methods for achieving these states are meditation and biofeedback.

Meditation A method some people use to try to narrow their consciousness so that the stresses of the outside world fade away is called **meditation.** Many techniques have been used to meditate. The ancient Egyptians gazed upon an oil-burning lamp. The yogis of India stare at an intricate pattern on a vase or carpet. Other meditators repeat pleasing sounds called mantras, such as *om* or *sheereem*, and mentally focus on these sounds.

ACADEMIC VOCABULARY
stimulus something that causes a response

All of these methods of meditation share a common thread—they focus on a peaceful, repetitive stimulus. This focus helps one narrow his or her consciousness and relax. By narrowing their consciousness, people can suspend planning, worrying, and other concerns. Meditation is an important part of some religions. Buddhism, for example, makes meditation a central part of its practice.

Some people claim that meditation helps them achieve "oneness with the universe," pleasure, or some great insight. These claims have never been scientifically proven, but evidence does suggest that meditation can help people relax. Studies have found that meditation can also help some people lower their high blood pressure.

CASE STUDY CONNECTION
Biofeedback Biofeedback training enables people to control bodily functions previously regarded as not subject to conscious control.

Biofeedback A system that provides, or "feeds back," data about something happening in the body is called **biofeedback.** Through biofeedback training, people have learned to control certain bodily functions, such as heart rate. Some people have used biofeedback to learn to create the brain waves produced when relaxing—alpha waves—as a way of coping with tension. Using biofeedback, people have learned to treat tension headaches and also to lower their heart rates or blood pressure. However, as with all treatments, biofeedback should be attempted only under the direct supervision of a medical professional.

Biofeedback has also been used to help in the treatment of attention-deficit/hyperactivity disorder (ADHD). A person who has attention-deficit/hyperactivity disorder is frequently inattentive or impulsively hyperactive to the point where he or she has trouble completing daily activities. The causes of ADHD are unknown. However, treatment is available for those who have ADHD. Some medications and biofeedback have proven to be helpful to some people by increasing their ability to concentrate.

Reading Check **Compare** What do meditation and biofeedback have in common?

Hypnosis: Myths and Realities

Hypnosis is another method for altering consciousness. Perhaps you have seen movies in which one character hypnotized another or seen audience members hypnotized in a magic show. If so, chances are you found that these people seemed unable to open their eyes, could not remember their own names, acted out scenes from childhood, or behaved in other odd ways. But hypnosis is not always what it seems to be in movies or magic shows.

The word *hypnosis* is derived from the Greek *hypnos*, meaning "sleep." Some psychologists believe that **hypnosis** is an altered state of consciousness during which people respond to suggestions and behave as though they are in a trance. Other psychologists, however, wonder whether hypnosis is truly an altered state of consciousness.

Studies have shown that some of the same effects achieved by hypnosis can also occur without hypnosis. Furthermore, brain-wave patterns (as measured by an EEG) of people in hypnotic states look about the same as brain-wave patterns that are produced in the waking state.

The History of Hypnosis Hypnosis began with the ideas of German physician Franz Mesmer in the late 1700s. He studied medicine at the University of Vienna, and it was there that he developed his theories of magnetism. Mesmer thought that all the various parts of the universe were connected by forms of magnetism.

To cure his patients, he would pass magnets over their bodies. Some of them would fall into a trance, then awaken feeling better. Eventually, though, scientists decided that Mesmer's so-called cures had very little scientific basis.

Myths and Facts About Hypnosis

There are many false beliefs about hypnotism. Some of the most common myths are listed below, along with the facts.

Myths	Facts
You can be hypnotized against your will.	No one can be hypnotized unless he or she is willing to be.
When hypnotized, you can't open your eyes.	Being hypnotized dulls but does not fundamentally affect the normal functioning of all of the senses.
You cannot remember your own name.	You can remember everything you normally remember.
You act out scenes from childhood.	You don't typically act out scenes at all.
You behave in unusual ways.	You usually behave quite normally.
You will do anything.	You are unlikely to do anything you wouldn't normally do.
You go into a sleep state.	You stay conscious and relatively alert.

Hypnotism, however, may have more validity than Mesmer's magnet treatment. Today hypnotism may be used in a variety of ways. For example, some doctors use hypnosis as an anesthetic in certain types of surgery. Some psychologists use it to help clients reduce anxiety, manage pain, or overcome fears. Hypnosis is also used in the birthing process to reduce stress and anxiety.

Nevertheless, there is still a great deal about hypnosis that is not understood. Thus, hypnosis should always be left in the hands of professionals.

Achieving Hypnosis Professional hypnotists may put people in a hypnotic trance by asking them to focus on something specific—a spot on the wall, an object held by the hypnotist, or merely the hypnotist's voice. Hypnotists usually suggest that people's arms and legs are becoming warm, heavy, and relaxed. They may also tell people that they are becoming sleepy or are falling asleep.

But hypnosis is not sleep. People who are sleeping have very different brain waves from people in trances. But hearing the word *sleep* often helps a person enter a hypnotic trance.

People who are easily hypnotized are said to have hypnotic suggestibility. They can focus on the instructions of the hypnotist without getting distracted. Suggestible people also usually *like* the idea of being hypnotized and do not resist. In general, people can only be hypnotized if they allow themselves to be.

Explaining Hypnosis Psychologists offer various explanations for the behavior of people under hypnosis. Sigmund Freud was trained as a physician in Vienna. He moved to Paris to study under the neurologist Dr. Jean Martin Charcot, who used hypnosis to treat the mentally ill.

When Freud returned to Vienna, he used hypnosis to treat patients and relied on it in exploring the unconscious. According to Freud, hypnotized people permit themselves to put fantasy and impulse before fact and logic. Therefore, they believe what the hypnotist tells them. They may also enjoy the experience of letting the hypnotist tell them what to do.

According to another view, called role theory, people who are hypnotized are playing a part as if they are in a play. However, unlike actors in a play, hypnotized people may believe that what they are doing is real. Research suggests that many people in hypnotic trances may *not* be faking it. Rather, they become engrossed in playing the part of a hypnotized person. They use their imaginations to try to experience what the hypnotist tells them to experience.

There is no one generally accepted explanation for hypnosis. Most researchers agree that it can and does work with certain patients.

Reading Check **Recall** Whose ideas began the technique of hypnosis?

The Uses of Hypnosis

Psychologists continue to debate whether hypnosis has a scientific basis. They also continue to research what hypnosis can and cannot do. Some of the research on hypnosis has addressed the effects of hypnosis on memory, on feelings of pain, and on the quitting of habits such as smoking or overeating. It is also used to help calm patients. Another research question is why some people are more suggestible than others.

Hypnosis and Memory Police have used hypnosis to jog the memories of witnesses to a crime. At times this approach has worked with dramatic success. Nevertheless, studies have shown that unhypnotized people are just as likely as hypnotized people to remember details of a crime. More important, hypnotized people are just as likely to make *mistakes* about those details as are others. Many psychologists thus argue that material recalled under hypnosis should not be used as testimony in trials.

One interesting finding about hypnosis and memory has to do with memory of events that occur during the hypnotic trance itself. If directed by the hypnotist, some people will not recall what happened while they were hypnotized. Some of the more suggestible may not even remember that they were hypnotized at all.

Hypnosis and Pain Prevention Under certain circumstances and with careful application, hypnosis has been used to help people prevent pain. For example, dentists have used hypnosis successfully to help people avoid feeling pain during certain procedures.

Some people are so suggestible that they can even undergo surgery without anesthesia if they are hypnotized and told they feel no pain. Some studies have shown that a similar effect can be achieved through relaxation techniques and breathing exercises.

Hypnosis and Quitting Bad Habits To help someone quit a habit such as overeating, a therapist may use **posthypnotic suggestion.** In this technique, the therapist gives instructions during hypnosis that are to be carried out after the session has ended.

Often, psychologists link the habit with something repulsive, something that would make the person feel ill or disgusted. Then whenever that person begins the habit, such as lighting up a cigarette, that sickening image appears in his or her mind.

Sometimes hypnotists give more positive posthypnotic suggestions—for example, telling a person that he or she can now resist sweets. But the effectiveness of hypnosis for helping people quit smoking is uncertain.

Reading Check **Summarize** How have the police made use of hypnosis?

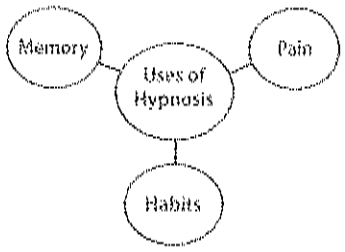
SECTION 3 Assessment

Reviewing Main Ideas and Vocabulary

1. **Recall** What common techniques do most methods of meditation share?
2. **Summarize** What is hypnotic suggestibility?

Thinking Critically

3. **Explain** How does biofeedback work?
4. **Draw Conclusions** Why do you think hypnosis is not used more often to relieve pain or change bad habits?
5. **Explain** What is posthypnotic suggestion, and how does it work?
6. **Analyze** Using your notes and a graphic organizer like the one below, explain the uses of hypnosis.



FOCUS ON WRITING

7. **Persuasion** In a paragraph, try to persuade one of your friends that he or she should be hypnotized for a specific reason.

Multicultural Perspectives on Consciousness

Accompanied by music, whirling dervishes spin around until they are in a trance.

Visions, dreams, meditation, and hallucinations are important components of many cultures, reflecting the human desire to reach beyond what the senses can perceive directly. The methods for reaching these altered states of consciousness, however, are as diverse as the people who inhabit this planet.

Australian Aborigines Aborigines in Australia believe that there are two worlds: the ordinary, physical world of daily life and another world called Dreamtime. Ritual songs, dances, stories, and dreams create the Dreamtime world. Frans Hoogland, a Dutchman who lived for 15 years among the Aborigines, described the process as beginning with a kind of emptiness or void. Then through the techniques of singing and dancing the participants create sound, beginning to give a shape to a new reality. The vibrations created by the singing and dancing, and the stories as well, help to make the spirit world of Dreamtime come into existence. For the Aborigines, dream and actuality are just different states of the same consciousness.

Mevlevi The Mevlevi are members of a Muslim sect in the country of Turkey. Like the Aborigines, the Mevlevi use dancing to create an altered state of consciousness. The Mevlevi are known as whirling dervishes because they whirl until they are in a trance. They believe that the trance brings them closer to Allah, or God, and spiritual truth.

Hinduism Some religions use meditation to achieve an altered state of consciousness. According to the yoga school, a part of Hinduism, every human being consists of two parts. The first is a person's body, mind, and conscious self. The second is the soul—or pure, empty consciousness. The yoga school uses exercises, postures, and meditations to teach the understanding of the soul.

Buddhism Buddhists meditate to achieve a state of enlightenment called nirvana. They believe that nirvana can be achieved through control of the mind, or mental discipline. Certain yoga techniques help followers achieve this control.

Inca People in some cultures use drugs to produce a religious trance. The Inca in the Andean highlands of South America use a drug called *yage* to hallucinate while a shaman, or holy man, watches them. The hallucinations range from pleasurable to terrifying. The Inca will endure even the terrifying visions because they believe that terror is something that needs to be overcome in order to communicate with the spirit world.

Huichol The Huichol Indians in central Mexico make a sacred pilgrimage to a place hundreds of miles from their homes. Once they arrive, they fast, pray, dance, and chant. The next day, they hunt for peyote, a strong stimulant that comes from a cactus plant. Then they sit with their shaman-priest, talk, eat peyote, and begin to hallucinate. They believe that the hallucinations help them achieve a state of fusion with their ancestors and the universe. The shaman must be present to help them return from the experience.

Aborigines in Australia perform ritual songs and dances in order to summon the spirit world into existence.

Thinking Critically

1. **Analyze** Why do you think some cultures view altered states of consciousness as something to be avoided?
2. **Discuss** Other cultures view altered states as something to be sought out. Why might this be so?

SECTION 4

Drugs and Consciousness

Before You Read

Main Idea
Depressants, stimulants, and hallucinogens are all drugs that can affect consciousness. Drug abuse can be dealt with by a number of available treatments.

Reading Focus
1. How do depressants affect the body?
2. What are stimulants?
3. What are hallucinogens?
4. How do some treatments for drug abuse work?

Vocabulary
addiction
depressants
intoxication
narcotics
stimulant
amphetamine
hallucination
delusion
hallucinogen
detoxification

TAKING NOTES Use a graphic organizer like this one to take notes on three major categories of drugs.

Depressants:
Stimulants:
Hallucinogens:

Keeping a DEADLY SECRET

PSYCHOLOGY CLOSE UP ***Why did tobacco companies keep the results of nicotine studies hidden from the public?*** For many years tobacco companies claimed not to know that the nicotine in cigarettes caused serious health problems. Some ads, such as the one above from the 1920s, even touted health benefits of cigarettes. By the 1970s, however, the companies decided that they needed to fund research to disprove the claims of cigarette smoke's toxic effects. The companies wanted at least to marshal some evidence to refute the claims of scientists opposed to smoking. However, the cigarette companies wanted to keep their research secret. In fact, one major American cigarette company went so far as to set up a research facility in Germany to ensure that the research done there could not be linked to the company. This secret connection was concealed not just from the public but also from many of the company's own employees. Several other tobacco companies also made concerted efforts to conceal the addictive and deadly properties of tobacco and nicotine.

Nicotine is a powerful but legal addictive drug that affects consciousness. Both legal and illegal drugs can affect consciousness.

Depressants

Some drugs slow down the nervous system, while others spur it into rapid action. Some drugs, such as alcohol and nicotine (the drug found in tobacco), have been shown to be connected to serious diseases. Many drugs are addictive. **Addiction** to a drug means that after a person takes that drug for a while, the body craves it just to feel normal. Alcohol, nicotine, and many other drugs are addictive. In addition to physical addiction, people can become psychologically dependent upon drugs. Even if the body does not crave the drug, the person depends on it for a sense of well-being.

Drugs also have a number of effects on consciousness. They may distort people's perceptions, change their moods, or cause them to see or hear things that are not real. Categories of drugs that affect consciousness include depressants, stimulants, and hallucinogens.

Depressants are drugs that slow the activity of the nervous system. They generally give people a sense of relaxation but can have many negative effects. Depressant drugs include alcohol and narcotics such as barbiturates and opiates.

Alcohol Alcohol is the most widely used drug in the United States. Alcohol is a depressant. Small amounts of alcohol may have little effect, or they may be relaxing. High doses of alcohol can put a person to sleep. Too much alcohol can be lethal, either in the long term or the short term—people have died from drinking too much at one time.

Alcohol also intoxicates. **Intoxication** is another word for drunkenness. The root of the word *intoxication* is *toxic*, which means "poisonous." Intoxication slurs people's speech, blurs their vision, makes them clumsy, and makes it difficult for them to concentrate. They may bump into things or be unable to write. It also affects their judgment. In fact, they may not even realize that they are intoxicated. Therefore, they may try to do things that require a clear mind and good coordination, such as driving a car, when they are incapable of doing these things correctly. Alcohol is involved in more than half of all fatal automobile accidents in the United States.

Some drinkers do things they would not do if they were sober. Why? When drunk, people pay less attention to the consequences of their behavior. Alcohol can also bring feelings of elation that wash away inhibitions. Furthermore, it provides an excuse for behaviors that sober people know are unwise. Drinkers may place the blame for their behavior on the alcohol. But, of course, drinkers *choose* to drink. Thus, people remain responsible for actions taken while intoxicated.

Regardless of why people start drinking, regular consumption of alcohol can lead to addiction. Once people become addicted to alcohol, they may continue drinking to avoid withdrawal symptoms such as tension and trembling. Heavy drinking has been linked to liver problems, heart problems, and cancer.

Narcotics The word *narcotic* comes from the Greek *narke*, meaning "numbness" or "stupor." **Narcotics** are addictive depressants that have been used to relieve pain and induce sleep Many narcotics—such as morphine, heroin, and codeine—are derived from the opium poppy plant.

Morphine is a narcotic that was used during the Civil War to deaden the pain from wounds. Therefore, addiction to morphine became known as "the soldier's disease."

Heroin, also introduced in the West in the 1800s, was hailed as the "hero" that would cure addiction to morphine. It was named heroin because it made people feel "heroic." This drug, which is now illegal, is a powerful narcotic that can give the user feelings of pleasure. However, coming off heroin can plunge the user into a deep depression. Furthermore, high doses impair judgment and memory and cause drowsiness and stupor. High doses of heroin can also depress the respiratory system so much that they lead to loss of consciousness, coma, and even death.

Heroin can also lead to death because it is often taken intravenously—that is, injected with a needle into a vein. Sometimes such needles are shared among users. If one user is infected with the virus that causes AIDS, needle sharing can infect other users as well.

People who are addicted to narcotics experience withdrawal symptoms when they try to stop using them. These withdrawal symptoms may include tremors, cramps, chills, rapid heartbeat, insomnia, vomiting, and diarrhea.

Reading Check **Recall** What are narcotics?

Stimulants

Stimulants, in contrast to depressants, increase the activity of the nervous system. They speed up the heart and breathing rate. Stimulants include nicotine, amphetamines, methamphetamines, and cocaine.

Nicotine Nicotine, the drug found in tobacco leaves, is one of the most common stimulants. The leaves are usually smoked in the form of cigarettes, cigars, and pipe tobacco. They can also be chewed, as in chewing tobacco.

Nicotine spurs the release of the hormone adrenaline, which causes the heart rate to increase. As a stimulant, nicotine may make people feel more alert and attentive, but research has shown that it does not improve the ability to perform complex tasks, such as solving difficult math problems.

Nicotine reduces the appetite and raises the rate at which the body changes food to energy. For these reasons, some smokers do not try to quit for fear that they will gain weight. But weight gain can be controlled by diet and exercise.

Through regular use, people can become addicted to nicotine. In fact, evidence suggests that cigarette smoking is as addictive as the use of heroin. People who stop smoking can experience symptoms such as nervousness, drowsiness, loss of energy, headaches, lightheadedness, insomnia, dizziness, cramps, heart palpitations, tremors, and sweating. Nonetheless, many people have successfully quit smoking.

Smoking has also been associated with serious health risks. All cigarette advertisements and packs sold in the United States carry a message: "Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health." Still, each year, more than 480,000 Americans die from smoking-related diseases. This is more than the number who die from motor-vehicle accidents, abuse of alcohol and all other drugs, suicide, homicide, and AIDS combined.

Smokers are 12 to 20 times more likely than nonsmokers to die of lung cancer. Moreover, the substances in cigarette smoke have been shown to cause several other kinds of cancer in laboratory animals. Cigarette smoking is also linked to death from heart disease, chronic lung and respiratory diseases, and other illnesses. Pregnant women who smoke risk miscarriage, premature birth, and babies with birth defects. Perhaps due to the risks involved in smoking, the percentage of American adults who smoke has declined from more than 40 percent in the 1960s to less than 18 percent today.

Research indicates that secondhand smoke, the cigarette smoke exhaled by smokers, can even increase the health risk of nonsmokers who inhale it. Secondhand smoke is connected with lung cancer, breathing problems, and other illnesses. It accounts for thousands of deaths per year. Because of the effects of secondhand smoke, smoking has been banned from many public places, such as government buildings, airports, and restaurants.

Amphetamines Another kind of stimulant is provided by **amphetamines.** They are especially known for helping people stay awake and for reducing appetite. Amphetamines are made from the chemical alpha-methyl-beta-phenyl-ethyl-amine, which is a colorless liquid made up of carbon, hydrogen, and nitrogen.

Amphetamines were first used by soldiers during World War II to help them remain awake and alert during the night. Sometimes called "speed" or "uppers," amphetamines can produce feelings of pleasure, especially in high doses.

Amphetamines can be taken in the form of pills. They can also be injected directly into the veins in the form of liquid methedrine, the strongest form of the drug. People who take large doses of amphetamines may stay awake and "high" for days. Such highs must come to an end, however. People who have been on prolonged highs usually "crash." That is, they fall into a deep sleep or depression. Some people even commit suicide when crashing.

High doses of amphetamines can cause restlessness, insomnia, loss of appetite, and irritability. They also affect consciousness. For example, people who have taken amphetamines sometimes experience frightening hallucinations. A **hallucination** is a perception of an object or a sound that seems to be real but is not real. One hallucination that people under the influence of amphetamines commonly experience is that bugs are crawling all over them.

MAJOR DRUG TYPES AND THEIR EFFECTS

Drugs can affect consciousness. Here are some of the major types, how they are taken, and a few of their possible intoxication effects and health consequences.

Name	How Used	Possible Intoxication Effects	Health Consequences
Depressants			
• Alcohol	• liquid that is drunk	• loss of inhibitions	• loss of coordination, confusion
• Narcotics (heroin, morphine, codeine)	• smoked, injected, swallowed, snorted	• relief from pain, sleepiness	• relief from pain, sleepiness
Stimulants			
• Nicotine	• smoked, chewed	• loss of appetite, hyperactivity, elevated blood pressure	• nervousness, lung damage
• Caffeine	• drunk or eaten	• increased alertness and energy	• jitteriness, irritability
• Amphetamines	• pills, injection, smoked, snorted	• wakefulness, reduced appetite	• depression, restlessness, insomnia
• Cocaine	• snorted, injected, smoked	• reduced appetite, relief from pain, increased confidence	• insomnia, nausea, convulsions
• Methamphetamine	• oral, smoked, snorted, injected	• euphoria, delusions	• anxiety, confusion, insomnia, violent behavior, paranoia, damage to brain cells
Hallucinogens			
• Marijuana	• smoked, swallowed, eaten	• enhanced emotions, sensory illusions	• impaired perception and coordination
• LSD	• pill	• intense hallucinations	• flashbacks, memory loss, violent outbursts
• Mushrooms	• swallowed	• sensory illusions	• flashbacks
• Mescaline	• swallowed, smoked	• distortions of reality	• panic
• Peyote	• swallowed	• dizziness	• self-injury
• Ecstasy	• swallowed	• increased sensory awareness, mild hallucinations, increased energy	• impaired memory, hyperthermia, rapid heartbeat

Skills Focus **INTERPRETING CHARTS** What are some of the long-term consequences of drug abuse?

Use of amphetamines can also cause the user to have delusions. A **delusion** is a false idea that seems real. If you thought you could fly (without the aid of an airplane), that would be a delusion. Overdoses of amphetamines are sometimes connected with delusions of being in danger or of being chased by someone or something.

One type of amphetamine has become an especially serious problem in recent years. Illegal methamphetamine—commonly called meth, crystal, or ice—is usually in the form of white or yellowish white crystals called "rocks" that are crushed and then either smoked, injected, or inhaled through the nose (that is, snorted).

ACADEMIC VOCABULARY

euphoria a feeling of great happiness or well-being

Methamphetamine's intense effects include euphoria, loss of appetite, increased alertness, and hyperactivity. These effects can give people a false sense of confidence that results in risky behavior.

Repeated use of methamphetamine causes severe damage to the body, including gum damage and advanced tooth decay, a condition known as "meth mouth." Permanent brain, kidney, and liver damage, and even death are also possible.

Methamphetamine is extremely addictive, and tolerance develops very rapidly. The illegal laboratories where the drug is produced, called meth labs, present their own dangers. The by-products of meth production include poisonous gas, toxic chemicals, and highly explosive substances. These labs often catch fire, endangering innocent people and their property.

Cocaine Cocaine is a stimulant derived from the leaves of the coca plant, which grows in the tropics of South America. Cocaine produces feelings of pleasure, reduces hunger, deadens pain, and boosts confidence. Because cocaine raises blood pressure and decreases the supply of oxygen while speeding up the heart rate, it can sometimes lead to serious consequences, even death.

Cocaine has been used as a painkiller since the early 1800s. It came to the attention of Sigmund Freud in 1884. Freud, then a young neurologist, first used the drug to overcome depression. He even published an article on cocaine called "Song of Praise." But Freud's excitement about cocaine's healing powers was soon cooled by his awareness that the drug was dangerous and addictive.

Overdoses of cocaine can cause symptoms including restlessness, insomnia, trembling, headaches, nausea, convulsions, hallucinations, and delusions. A very harmful form of cocaine is known as crack. Crack is very powerful. Moreover, crack is impure, and because of these impurities it is even more dangerous than other forms of cocaine. Because of the strain crack and other forms of cocaine can put on the heart, overdoses of these drugs are sometimes fatal.

Reading Check **Summarize** What are three types of stimulants?

Hallucinogens

A **hallucinogen** is a drug that produces hallucinations. In addition, hallucinogens may cause relaxation or feelings of pleasure. Hallucinogens can also cause feelings of panic.

Marijuana Marijuana is produced from the leaves of the *cannabis sativa* plant, which grows wild in many parts of the world. Marijuana may produce feelings of relaxation and mild hallucinations. Hashish, or "hash," comes from the sticky part of the plant. Hashish is stronger than marijuana.

Marijuana impairs perception and coordination, making it difficult to operate machines. It also impairs memory and learning. In addition, marijuana can cause anxiety and confusion. It increases the heart rate up to 140 to 150 beats per minute and in some people raises blood pressure.

Marijuana has effects on consciousness. People who are very intoxicated with marijuana may think time is passing more slowly than usual. A song might seem to last an hour rather than a few minutes.

Some people experience increased consciousness of bodily sensations such as heartbeat. Experiencing visual hallucinations is also fairly common while under the influence of marijuana.

Strong intoxication gives some marijuana smokers frightening experiences. Sometimes marijuana smokers become confused and lose their sense of self. Some fear they will lose themselves forever. Consciousness of a rapid heart rate leads others to fear that their hearts will "run away."

Many states and the District of Columbia have legalized marijuana for treatment for certain medical conditions, such as epilepsy, nausea, or chronic pain. As of 2016, Alaska, Colorado, Oregon, Washington, and the District of Columbia have legalized recreational use of marijuana as well.

LSD Lysergic acid diethylamide (LSD) is a hallucinogen. LSD is sometimes simply called acid. It is much stronger than marijuana and can produce intense hallucinations, some of which can be quite bizarre. Some users of LSD claim that it expands consciousness.

LSD's effects are not predictable. Some LSD experiences are so frightening that the

users, in a state of panic and confusion, injure themselves seriously or even commit suicide. In addition, some users of LSD experience serious negative side effects.

Other Hallucinogens Mushrooms that contain the compound psilocybin have effects similar to LSD. They are either eaten raw or with food. Psilocybin produces altered perceptions of sight, sound, taste, smell, and touch.

Other effects can include confusion, anxiety, and panic. The user may also have flashbacks. It is difficult to distinguish psilocybin from truly poisonous mushrooms. If a user takes the wrong kind, death can result.

Peyote is another hallucinogen. It comes from cactus plants native to Mexico. Its hallucinogenic properties are due to the alkaloid mescaline in the cactus. Peyote has been used in religious rituals by some Indian peoples of the southwestern United States.

Ecstasy is sometimes called a club drug because it became popular at parties and clubs. Normally taken as a pill, it produces hallucinations, increased energy, loss of judgment, and serious physical side effects, such as nausea and high blood pressure.

Reading Check **Recall** What are LSD's effects?

Treatments for Drug Abuse

Treatment for drug abuse varies, depending on the drug. One form of treatment is detoxification. **Detoxification,** the removal of the harmful substance from the body, weans addicts from the drug while restoring their health.

Types of Drug Treatment

Detoxification Removal of harmful substances from the body

Maintenance Programs Controlled amounts of drug given to participants

Counseling Group or individual sessions

Support Groups People with similar problems sharing common experiences

This treatment is most commonly used with people addicted to alcohol and narcotics.

Maintenance programs are another treatment sometimes used for people addicted to narcotics. Participants are given controlled amounts of the drug or some less addictive substitute. This treatment is controversial because the users never become completely free of drugs.

Counseling is a form of treatment that can be conducted either individually or in a group. Both individual and group methods are used for treating stimulant and depressant abuse.

Support groups consist of people who share common experiences, concerns, or problems. These individuals meet in a group setting to provide one another with emotional and moral support. Alcoholics Anonymous is a support group that encourages members to live without alcohol for the rest of their lives.

Reading Check **Summarize** What is the process of detoxification?

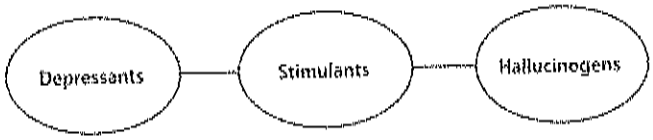
SECTION 4 Assessment

Reviewing Main Ideas and Vocabulary

1. **Describe** What are the symptoms of intoxication?
2. **Recall** What are some of the effects of cocaine?
3. **Compare and Contrast** How are marijuana and hashish alike and different?

Thinking Critically

4. **Analyze** What are some of the effects of nicotine?
5. **Evaluate** Do you think people use drugs to heighten consciousness or to escape from it?
6. **Analyze** Using your notes and a graphic organizer like the one below, describe some of the effects of depressants, stimulants, and hallucinogens on consciousness.



FOCUS ON WRITING

7. **Expository** Write a paragraph about why and how the use of morphine became widespread.

Student Achievement and Sleep Deprivation

Reading and Activity Workbook

Use the workbook to complete this experiment.

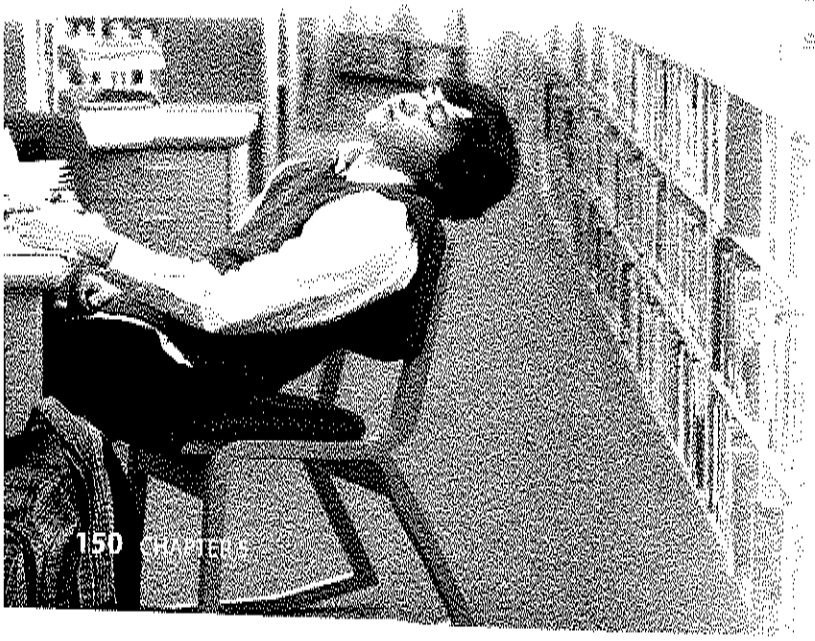
What is the connection between adequate sleep and student academic achievement?

1. Introduction

A good deal of research has been done on student achievement and sleep deprivation. Some high schools across America have even revised their school schedule to accommodate the need for sleep among teenagers.

First, choose a partner. You and your partner can then recruit classmates, peers, or schoolmates to participate in your experiment. Then design an experiment testing sleep deprivation and memory. You can design a memory task as your dependent variable to test the effects of sleep deprivation on performance. For example, you might have students recite from memory the fifty state capitals in the United States. Include the following components in your experiment and be prepared to debrief the class following the conclusion of the experiment.

- An operational definition of your experiment (hypothesis)
- Dependent variable: memory task
- Independent variable
- Control group
- Experimental group
- Random assignment



2. Steps of the Experiment

Step 1: Operational definition: state the hypothesis in an if/then format and explain how you intend to measure change.

Step 2: Once your hypothesis has been formulated, then you are ready to undertake the following procedures:

- List the population being studied in the experiment.
- Be able to explain your sample in terms of size, educational background, gender, and age.
- Establish a control group and an experimental group.
- Define the independent and dependent variables.
- Establish what variables will remain constant throughout the experiment other than the independent variable.
- Conduct the experiment and test your memory task with the participants you have selected. For example, have them try to recall the state capitals of the 50 states when they are fully rested, partially rested, and not rested because of sleep deprivation.
- Explain the findings for the experimental and control groups.
- Consider whether there might be any confounding variables.
- How did you control for experimenter bias?
- Did you have any ethical concerns?
- You are encouraged to be creative in interrupting your sleep schedules. You might set the alarm for every 90 minutes, leave the television on, or leave music and lights on to see if they affect your sleep and performance.