Discuss the **BIG Ideas**

Think about how you would answer these questions:

- What are reasons people take medicines?
- What are possible consequences of not following the instructions on a medicine label?

**Assess Your Health**

Read each statement. On a separate sheet of paper, write “yes,” “sometimes,” or “no” based on your typical behavior.

1. I understand the role of taking medicines and drugs in maintaining health.
2. I recognize that vaccines prevent disease.
3. I only use medicines according to directions from my doctor.
4. I avoid overusing medicines such as antibiotics.
5. I know the difference between over-the-counter and prescription medicines.

A “yes” response shows that you practice healthy behaviors. “Sometimes” indicates that you should analyze and possibly modify your behavior. A “no” response means that you should modify the behavior.
The Role of Medicines

Real Life Issues

Choosing Medicines Wisely. Grant has a cold with a cough and runny nose. He checks the medicine cabinet for any cold medications that will help him feel better. He finds more than one type of cold medicine in the cabinet. Grant is not sure which one he should take.

Writing Write a paragraph that explains what Grant should look for in a cold medicine. For example, what symptoms he wants to relieve, how much he should take, and how many hours a dose will last.

Types of Medicines

Main Idea Medicines are classified based on how they work in your body.

People use medicines to help restore their health when they are ill. Medicines are drugs that are used to treat or prevent diseases or other conditions. Drugs are substances other than food that change the structure or function of the body or mind. All medicines are drugs, but not all drugs are medicines. Drugs are effective in treating illness when taken as directed by a physician or according to the label instructions. Medicines that treat or prevent illness can be classified into four broad categories:

- Medicines that help prevent disease
- Medicines that fight pathogens
- Medicines that relieve pain and other symptoms
- Medicines that manage chronic conditions, help maintain or restore health, and regulate body’s systems

New Vocabulary
- medicines
- drugs
- vaccine
- side effects
- additive interaction
- synergistic effect
- antagonistic interaction
Preventing Disease

Today, we have medicines that prevent disease. About 95 percent of children receive vaccines, a preparation that prevents a person from contracting a specific disease.

Vaccines Vaccines contain weakened or dead pathogens that cause the disease. When injected into your body, the vaccine produces antibodies that fight those pathogens. Your body also produces memory cells that recall how to make these antibodies. This provides you with long-lasting protection against these specific pathogens.

The protection from some vaccines, however, fades over time. The vaccines for tetanus must be given periodically. For other vaccines, like those that prevent the flu, a new vaccine is required every year.

Antitoxins Antitoxins, like vaccines, prevent disease. They can also help neutralize the effects of toxins. Antitoxins fight the bacteria that produce substances toxic to the body. Antitoxins are usually produced by injecting animals with safe amounts of a specific toxin. This stimulates the animal's immune system to produce antibodies. These antibodies are then used to make an antitoxin.

Fighting Pathogens

Medicines can also help your body fight the pathogens that cause illness.

Antibiotics Antibiotics are a class of drug that destroy disease-causing microorganisms, called bacteria. Antibiotics such as penicillin work either by killing harmful bacteria in the body or by preventing bacteria from reproducing.
When antibiotics were first introduced, they were considered a miracle drug because they saved so many lives. Some antibiotics, however, can cause nausea or stomach pain. Allergies are another side effect of antibiotic use. Tell your doctor if you experience any negative side effects of antibiotics, or if you know you are allergic to an antibiotic. Antibiotics can also lose their effectiveness. The bacteria that antibiotics kill have adapted to the drug over time.

Bacteria can develop a resistance in two ways: when antibiotics are overused, and when the patient does not finish taking the full prescription. If you do not finish taking all of a prescription, you may not kill all of the bacteria. The remaining bacteria may develop a resistance, or immunity, to treatment.

**Antivirals and Antifungals** Antibiotics are effective only against bacteria. They do not cure illnesses caused by viruses. Antiviral drugs are available to treat some viral illnesses, such as the flu. These medicines suppress the virus, but do not kill it. A person who takes antiviral medication for cold sores or fever blisters, which are caused by viruses, will still have the virus in his or her body. As a result, the person often has symptom-free periods followed by flare-ups when symptoms reappear. Like bacteria, viruses can develop a resistance to medications. Fungi are another type of pathogen that can infect the body. Antifungals can suppress or kill fungus cells, such as athlete’s foot and ringworm.

**Relieving Pain**

The most commonly used medicines are analgesics, or pain relievers. Analgesics range from relatively mild medicines, such as aspirin, to strong narcotics, such as opium-based morphine and codeine. Aspirin is used to relieve pain and reduce fever. Other analgesics fight inflammation, or redness, swelling, and pain.

Even though aspirin is a widely used drug, it can cause stomach upset, dizziness, and ringing in the ears. Children who take aspirin when they have a fever are at risk of developing Reye’s syndrome, a potentially life-threatening illness of the brain and liver. For that reason, aspirin should not be given to anyone under the age of 20 unless directed by a health care professional. Some people who are sensitive to aspirin take acetaminophen or ibuprofen. Acetaminophen is the recommended analgesic for children.

**Pain Reliever Dependence** Certain types of medicines that relieve pain can be addictive. These medicines, usually called narcotics, require a doctor’s prescription. Patients who use these drugs can become physically or psychologically dependent on them.
Managing Chronic Conditions

Some medicines are used to treat chronic conditions. These medicines maintain or restore health, and offer people with chronic diseases a higher level of wellness.

**Allergy Medicines** Antihistamines reduce allergy symptoms such as sneezing, itchy or watery eyes, and a runny nose. They block the chemicals released by the immune system that cause an allergic response. For people with allergies such as those to peanuts or bee stings, severe symptoms can appear suddenly. An allergic reaction can lead to death. Individuals who know they are allergic to substances that cause severe reactions can ask a doctor to prescribe a single-dose shot of epinephrine. The medication is designed to slow down or stop an allergic reaction. The patient is taught to self-administer a shot with a single-dose injector.

**Body-Regulating Medicines** Some medicines regulate body chemistry. Insulin used by people with diabetes regulates the amount of sugar in their blood. Asthma sufferers may take medicines every day to control symptoms and prevent attacks. They may also use inhalers during an asthma attack. Cardiovascular medicines are taken to regulate blood pressure, normalize irregular heartbeats, or regulate other functions of the cardiovascular system.

**Antidepressant and Antipsychotic Medicines** Medications can also help people suffering from mental illnesses. These medicines can help regulate brain chemistry, or stabilize moods. For example, mood stabilizers are often used in the treatment of mood disorders, depression, and schizophrenia. Proper medication can help people with these diseases live healthy lives. As with other prescribed medications, it is important to talk to your doctor before you stop taking the medication, even if you feel better.

**Cancer Treatment Medicines** Some cancers can be treated and even cured. Some medicines can be used to treat cancer. These medicines can reduce rapid cell growth and help stop the spread of cancer cells. One drug, chemotherapy, uses chemicals to kill fast-growing cancer cells. Immunotherapy, or biological therapy, uses the body’s immune system to fight the cancer cells. Because these medications can also destroy healthy cells, serious side effects may occur as part of the treatment. Other medications can help treat the side effects.
Taking Medications

**Main Idea** Medicines enter the body in a variety of ways.

Medicines can be delivered to the body in many ways. Factors that determine how a medicine is taken include what the medicine is used for, and how it will most quickly and effectively help a person.

- **Oral medicines** are taken by mouth in the form of tablets, capsules, or liquids. These medicines pass from the digestive system into the bloodstream.
- **Topical medicines** are applied to the skin. Transdermal skin patches also deliver a medicine through the skin.
- **Inhaled medicines**, such as asthma medicines, are delivered in a fine mist or powder.
- **Injected medicines** are delivered through a shot, and go directly into the bloodstream.

However you take a medicine, it is always important to follow the directions on the medicine label.

Reactions to Medications

**Main Idea** The effect of medicine depends on many factors.

Medicines can have a variety of effects. They can cause **side effects**, reactions to medicine other than the one intended. Some side effects may be mild, such as drowsiness, but others may be more severe, and can even cause death.

Medicine Interactions

When two or more medicines are taken together, or when a medication is taken with certain foods, the combination may have a different effect than when the medicine is taken alone. Types of medicine interactions include the following:

- **Additive interaction** occurs when medicines work together in a positive way. For example, an anti-inflammatory and a muscle relaxant may be prescribed to treat joint pain.
- **Synergistic effect**—the interaction of two or more medicines that results in a greater effect than when each medicine is taken alone—occurs when one medicine increases the strength of another.
Antagonistic interaction occurs when the effect of one medicine is canceled or reduced when taken with another medicine. For example, someone who receives an organ transplant must take anti-rejection medicines. If the person is diabetic and takes insulin, the anti-rejection medicine may decrease the effectiveness of the insulin.

**Tolerance and Withdrawal**

When a person takes a medication for a long period of time, the body can become used to the medication. Problems that may occur include:

- **Tolerance** is a condition in which the body becomes used to the effect of a medicine. The body requires increasingly larger doses to produce the same effect. Sometimes a person will experience "reverse tolerance." In this condition, the body requires less medicine.

- **Withdrawal** occurs when a person stops using a medicine on which he or she has become physically dependent. Symptoms of withdrawal can include nervousness, insomnia, severe headaches, vomiting, chills, and cramps which gradually ease in time. Talk to your health care provider if you experience withdrawal.

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**LESSON 1 ASSESSMENT**

**After You Read**

**Reviewing Facts and Vocabulary**

1. Define the term *medicine* and the term *drugs*.

2. What types of medicines fight pathogens? What types of medicines prevent disease?

3. Compare a synergistic effect with an antagonistic interaction.

**Thinking Critically**

4. **Analyze.** Why are vaccines given to children at a young age?

5. **Evaluate.** Explain why people should not stop taking prescribed medications without talking to their doctor.

**Applying Health Skills**

6. **Accessing Information.** Use reliable online resources to find information on new and experimental drugs. Write a paragraph evaluating one of the drugs, and list the reasons why you think the information is reliable.

**Writing Critically**

7. **Descriptive.** Write a paragraph describing why it's important to take a medicine as your doctor prescribed.

**Real Life Issues**

After completing the lesson, review and analyze your response to the Real Life Issues question on page 524.
Using Medicines Safely

Real Life Issues

Safety First. Monica is on the swim team and has an earache. She visits her doctor, who prescribes an antibiotic. Monica is supposed to take the medicine for ten days. Her friend Amy, who is also on the swim team, thinks she may have an ear infection, too. Amy doesn’t want to go to the doctor, though, so she asks Monica if she can share her medicine.

Writing  Write a dialogue in which Monica explains to Amy why she doesn’t think she should share her medication.

Standards for Medicines

Main Idea  Medicines are regulated to make them safe.

All new medicines in the United States must meet standards set by the Food and Drug Administration (FDA). Before approving a drug for use, the FDA receives information about a medicine’s chemical composition, intended use, effects, and possible side effects. Drug manufacturers test new medicines according to FDA guidelines. That includes completing at least three clinical trials for a drug. During a clinical trial, the drug is tested on human volunteers. They are monitored to determine the drug’s effectiveness and to identify any harmful side effects.

Sometimes, if a drug hasn’t yet completed clinical trials but is thought to be effective, people with life-threatening illnesses are allowed to use the drug. This usage is referred to as experimental. Patients are given experimental drugs only after clinical trials show that the drugs are safe and may be effective in treating their illness.
The FDA does not regulate herbal and dietary supplements. These supplements do not go through the same testing procedures or meet the same strict requirements for safety and proven effectiveness. Many people believe that herbal supplements are safe because some are advertised as "natural." Even supplements made from natural compounds can have harmful side effects or interactions. Never take any supplement without telling your health care provider first.

**Prescription Medicines**

*Prescription medicines* are medicines that are dispensed only with the written approval of a licensed physician or nurse-practitioner. A licensed pharmacist dispenses these medicines. Prescription medicines provide only the amount of medicine that is needed to treat your condition. If more medicine is needed, your health care provider must approve a refill. A prescription medicine should be taken only by the person whose name appears on the label.

![Figure 19.6](image) Medicines are regulated by the FDA, but herbal supplements are not. Explain whether herbal supplements are safer than medicines.

**Over-the-Counter (OTC) Medicines**

*Over-the-counter (OTC) medicines*, or medicines you can buy without a doctor's prescription are available without a prescription. The FDA considers these medicines to be safe if they are used as the label directs. However, all medicines can harm you if not used according to the directions.

While all OTC medicines are available without a prescription, the distribution of some OTC medicines is controlled. For example, cold medications that contain pseudoephedrine must be kept behind the pharmacy counter. These medications can be used to make highly addictive, illegal drugs.

**Medicine Labels**

When the FDA approves a medicine, it is considered safe when used as directed. The FDA requires that all prescription and OTC medicine labels contain information telling consumers how to use the medicine safely and effectively. The requirements for prescription and OTC medicine labels differ. Prescription medicine labels must also include any special instructions for taking the medicine, the prescribing doctor's name, the patient's name, the pharmacy's name and address, the date the prescription was filled, the prescription number, and whether refills are allowed. Figure 19.7 on page 532 shows the information that must appear on all OTC medicine labels.
**Figure 19.7 Over-The-Counter Medicine**

- **Active Ingredient:** Ingredient that treats condition, including amount per unit
- **Uses:** Conditions or symptoms treated by the product
- **Warnings:** Side effects, interactions, when to talk to a doctor, when not to take the product, keep out of reach of children
- **Inactive Ingredients:** Substances added to the product that do not help treat the condition, such as flavor and color
- **Purpose:** Product category and what the product is supposed to do, such as antacid
- **Other Information and Directions:** Some information may be printed on the opposite side of the label. This information may include how to take the medicine, how to store the product, and required information about certain ingredients, such as sodium
- **Expiration Date:** The date you should no longer use the medicine

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**Medicine Misuse**

**Main Idea** Taking medicines unnecessarily or without following the label instructions is dangerous.

Medicine misuse can prevent the user from getting the full benefit of the medicine and can have serious health consequences. **Medicine misuse** involves using a medicine in ways other than the intended use. Examples of medicine misuse are:

- Failing to follow the instructions on or in the package
- Giving a prescription medicine to a person for whom it was not prescribed, or taking another person’s medicine
- Taking too much or too little of a medicine
- Taking a medicine for a longer or shorter period than prescribed or recommended
- Discontinuing use of a medicine without informing your health care provider
- Mixing medicines without the knowledge or approval of your health care provider

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Intentionally taking medications for nonmedical reasons is medicine abuse. Most teens—96 percent—use medicines correctly. Some, however, think that medicines requiring a prescription and OTC medicines are safer than illegal drugs. Abusing any medicine is dangerous and illegal. Teens should avoid using drugs to:

- To lose weight or stay awake while studying. A healthy diet and exercise are the safest way to maintain a healthy weight. Getting plenty of sleep and managing your time wisely will help you study effectively.

- To fit in with peers. A dangerous trend is the emergence of “pill parties,” where teens mix whatever OTC and prescription medicines are available. Mixing medicines, drugs, or alcohol is extremely dangerous.

- Avoid taking any medicine that was prescribed to someone else. Medicines are prescribed to treat a specific illness. It’s illegal and unsafe to use a drug not prescribed to you.

One danger of medicine misuse is drug overdose—a strong, sometimes fatal reaction to taking a large amount of a drug. Misusing medicines can also lead to addiction. Never use a medicine other than how it is prescribed or intended.

### LESSON 2 ASSESSMENT

#### After You Read

**Reviewing Facts and Vocabulary**

1. How do prescription medicines differ from OTC medicines?

2. List four pieces of information that must be on an OTC medicine label. Describe the purpose of each piece of information.

3. What is medicine misuse? How does it differ from medicine abuse?

#### Thinking Critically

4. Analyze. Why does the FDA regulate medicines and the information on medicine labels?

5. Evaluate. What are three ways you can avoid medicine abuse?

#### Applying Health Skills

6. Advocacy. Create a bookmark that gives information on the importance of correct medicine use.

#### Writing Critically

7. Expository. Create a script for a commercial or PSA that explains how people can use their health care providers, pharmacists, and medicine labels to ensure that they are using their medicines properly.

#### Real Life Issues

After completing the lesson, review and analyze your response to the Real Life Issues question on page 530.