

Culinary Safety

Chapter

- 1 Safety and Sanitation Principles
- 2 HACCP Applications

EXPLORE THE PHOTO

Safety and sanitation rules should be followed in the kitchen at all times.

Can you list some ways to help keep a kitchen safe and clean?

Restaurant Inspections

After completing the unit, you will know how to keep a professional foodservice business safe and sanitary. In your unit culinary project, you will research restaurant inspection sheets. Then, you will create your own inspection sheet and present it to your class.

My Journal

Write a journal entry about any complaints that you have ever had against a restaurant's or cafeteria's cleanliness.

- What areas needed to be cleaned?
- How did the lack of cleanliness make you feel?
- Did you say anything to the restaurant or cafeteria?



JOHNSON & WALES
UNIVERSITY

“A chef learns new things every day. The more developed a chef's knowledge becomes, the greater his or her creations become.”

Justin Skribner
Chef de Commis
Per Se

Safety and Sanitation Principles

SECTIONS

1.1 Safety Basics

1.2 Sanitation Challenges

WRITING ACTIVITY

Freewriting

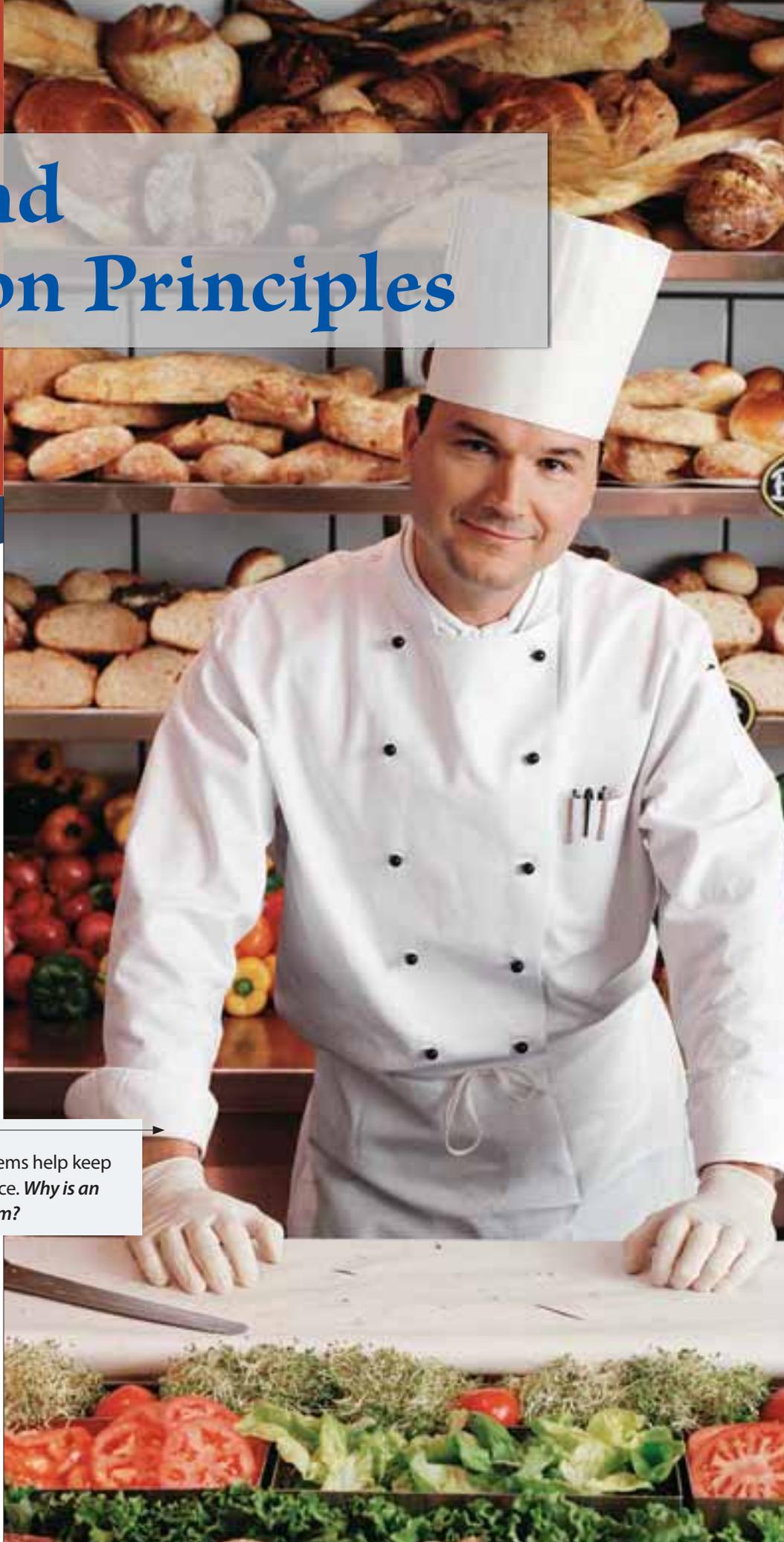
Visualize a commercial restaurant. Then, freewrite for five minutes about how you might prevent injuries in a commercial kitchen. Identify hazardous areas and what might be done to prevent accidents in those areas.

Writing Tips

- 1 Write the topic at the top of the paper to keep you focused.
- 2 Do not worry about form or structure.
- 3 Circle key ideas and phrases you can use later.

EXPLORE THE PHOTO

Safety and sanitation items help keep you safe in the workplace. *Why is an apron an important item?*



Safety Basics

Keep yourself and others safe in the kitchen.

Reading Guide

Before You Read

Preview Read the key concepts below. Write one or two sentences that predict what the section is about.

Read to Learn

Key Concepts

- **Identify** possible culinary workplace safety issues.
- **Explain** fire safety equipment and emergency procedures.
- **Describe** first aid measures for burns, wounds, and choking.

Main Idea

Burns and injuries can easily occur in a foodservice workplace. Establish fire safety procedures and know first aid measures to prevent or minimize damage.

Content Vocabulary

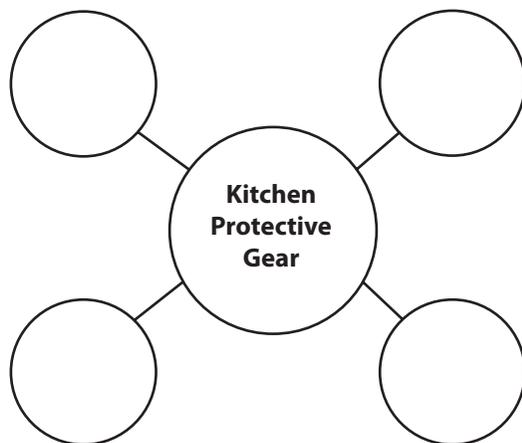
- occupational back support
- flammable
- lockout/tagout
- emergency
- first aid
- shock
- abrasion
- laceration
- avulsion
- puncture wound
- Heimlich maneuver
- cardio-pulmonary resuscitation (CPR)
- general safety audit

Academic Vocabulary

- routine
- document

Graphic Organizer

As you read, you will discover information about four types of kitchen protective gear. Use a web diagram like the one shown to list them.



Graphic Organizer

Go to this book's Online Learning Center at glencoe.com for a printable graphic organizer.

ACADEMIC STANDARDS

English Language Arts

NCTE 7 Conduct research and gather, evaluate, and synthesize data to communicate discoveries.

Mathematics

NCTM Measurement Understand measurable attributes of objects and the units, systems, and processes of measurement.

Science

NSES B Develop an understanding of chemical reactions.

NCTE National Council of Teachers of English

NCTM National Council of Teachers of Mathematics

NSES National Science Education Standards

NCSS National Council for the Social Studies

Safe Working Conditions

Accidents can easily occur in a busy kitchen. The government has written laws and codes to help protect workers on the job. But it is the personal responsibility of each worker to practice safety in the kitchen at all times. Safety is an ongoing process.

Many foodservice workplace accidents can be prevented. Government agencies help. The Occupational Safety and Health Administration (OSHA) helps keep the workplace safe by writing workplace safety and health standards. Employers must post OSHA standards in their facilities.

The Environmental Protection Agency (EPA) also plays a role in promoting workplace safety. The EPA requires foodservice operations to track how they handle and dispose of hazardous materials such as cleaning products and pesticides.

Personal Protective Clothing

Personal protective clothing, such as uniforms, aprons, and gloves, can help you practice safety in the workplace.

Aprons

Aprons are an important piece of protective clothing. Use these apron guidelines:

- Make sure aprons are clean. Bacteria can quickly grow on dirty aprons.
- Change aprons when yours gets dirty.
- Always remove your apron if you leave the food preparation area.
- Always remove your apron to take out the garbage.

Gloves

Gloves should be worn to protect your hands from injury. Gloves also help protect against food contamination by bacteria and physical hazards.

Wash your hands thoroughly with soap and water before you put on gloves. Follow a proper hand-washing **routine**, or regular set of actions, to make sure hands are completely clean.

The type of gloves you should wear depends on the task you need to do. For example, you should use heavy-duty plastic gloves to clean pots. Gloves are available in light, medium, and heavy weights. Workers with latex allergies may try nitrile ('nī-trəl) latex-free gloves.

Foodservice gloves are for a single use only. For example, the gloves you wear to crack and mix eggs should not be reused to make a sandwich. You should change your gloves when they become soiled or torn, after at least every four hours of single-use, and immediately after you handle any raw food.

Shoes

Shoes are also a form of protective clothing. Shoes should be sturdy and have slip-resistant soles for safety. All shoes must have closed toes.

Back Braces

Foodservice workers may wear a special back brace to help them lift heavy items. An **occupational back support** is a type of back brace with suspenders. It is designed to support the lower back while lifting.

Personal Injuries

Foodservice workers are responsible to help prevent slips and falls, cuts, burns and scalds, and other personal injuries in the kitchen. For example, call out, “Hot cart coming through!” when you transport large pots full of hot liquids. This can warn others in the kitchen and help prevent accidents.

Slips and Falls

Slips and falls are common work-related injuries. Yet most slips and falls can be avoided.

Prevent Injury Follow these rules to help prevent slips and falls in the kitchen:

- Walk, never run, in the kitchen.



Burn Protection Always use dry pot holders or oven mitts to handle hot items. *Why would you not want to use moist pot holders or oven mitts to handle hot items?*

- Wipe up spills immediately. Grease on a floor can cause you to slip or could cause equipment to slide.
- Use slip-resistant floor mats and make sure floors are in good repair.
- Wear shoes with slip-resistant soles. Never wear open-toed shoes.
- Use safe ladders or stools to reach high shelves. Never stand on a chair or a box.
- Always close cabinet drawers and doors.
- Ask for help or use a cart to move heavy objects.
- Keep traffic paths, especially around exits, aisles, and stairs, clutter free at all times.

Floors that are still wet from cleaning can be dangerous. Many slips and falls happen on wet floors because they are slick with water and cleaning products. Always post appropriate warning signs for safety.

Cuts

There are many sharp tools in a commercial kitchen. This means the risk of being cut in a commercial kitchen is high.

Sharp Tool Safety Guidelines Use these guidelines when you work with sharp tools to lower the risk of injury:

- Always use knives for their intended purpose only. Never use them to open plastic wrap or boxes, for example.
- Always cut away from your body, not toward your body. Cutting toward your body may cause an accident if your hand slips.
- Always carry a knife down at your side with the blade tip pointed toward the floor and the sharp edge facing behind you.

Safety Check

✓ Do Not Mix!

Although bleach and ammonia are both powerful cleaners, they should never be mixed. Mixing cleaners with these ingredients can cause chemical reactions that can create toxic, and even explosive, gasses.

CRITICAL THINKING *What can you do to ensure that bleach and ammonia cleaners are never mixed?*

- Look where you place your hands when you reach for a knife.
- Never wave your hands while holding a knife.
- If you drop a knife, do not try to grab for it as it falls. Pick up the knife after it falls to the table or floor.
- Hold knives with a firm grip on the handle when you use them or carry them.
- Never leave a knife handle hanging over the edge of a work surface.
- Keep knife handles and hands dry when you use knives.
- Keep knives sharp. Dull knives require you to apply more pressure. This may cause your hand to slip.
- Use a cutting board. Cutting on a regular counter surface could cause your hand to slip. It could also damage the knife.
- Wear protective gloves and cuff guards to clean commercial slicers.
- Wash sharp tools separately from other tools and dishes. Never leave knives soaking in a sink.
- Throw away broken knives or knives with loose blades.
- Store knives in a knife kit or a knife rack.

Burns and Scalds

Commercial kitchens have many types of heat-producing equipment. There also are many different ways a foodservice worker can get burned.

Prevent Burns You can keep burns from happening. These safety tips can help keep you safe when you work in a professional kitchen:

- Tilt pot lids away from your body to let the steam escape.
- Use dry pot holders or oven mitts. Wet cloth forms scalding steam when it touches hot pots and pans.
- Turn pot and pan handles away from the front of the range.
- Step aside when you open an oven door to avoid the rush of heat.
- Get help to move large hot containers. This also can save strain on your back.

- Follow manufacturer's directions to operate hot beverage machines. Read the instruction manual before operating them.
- Be careful when you filter or change the oil in fryers. Always wear gloves and aprons for protection.
- Always wear appropriate safety clothing when you use chemicals for cleaning. Some of these chemicals can cause burns.
- Keep oven doors closed. This will also help food cook more quickly and evenly.
- Clean ovens when they have cooled. Otherwise, you may burn yourself.
- Keep cooking areas, vent hoods, and other surfaces grease free to prevent fires.
- Always keep paper, plastic, and other flammable materials away from hot cooking areas to prevent fires. **Flammable** materials are those that are quick to burn.
- Unplug electrical appliances with frayed cords to prevent burns and electrical shocks. Inform your supervisor of the problem immediately

Back Injuries and Strains

Back injuries from improper lifting and bending are one of the most common types of workplace injuries. Many back injuries could be prevented if employees take the proper precautions. For example, pushing and pulling puts less strain on your back than lifting.

Safety Check

✓ Use Ladders Safely

Follow these guidelines to use a ladder safely:

- Only one person should use a ladder at one time.
- Always face the ladder. Do not stand on the top step. Climb only on the step side.
- Stay centered on the ladder so you do not tip over to the side.
- Do not carry objects that could make you lose your balance.

CRITICAL THINKING *What do you think could happen if you carried a large box up a ladder?*

Heavy Lifting Before lifting a heavy object, ask yourself these questions:

- Can I lift this object by myself?
- Is the object too heavy or too awkward to lift easily?
- Do I need help to move or lift the object?
- Is the path I must take free of clutter?

Follow these steps to safely lift heavy objects:

1. Bend at your knees.
2. Keep your back straight.
3. Keep your feet close to the object.
4. Center your body over the load.
5. Lift straight up and do not jerk your body.
6. Do not twist your body as you pick up or move the object.
7. Set the load down slowly. Keep your back straight.

Lifting tools can also be helpful. Use rollers under an object. A pulley or lever can help you move heavy objects more easily.

Kitchen Equipment Safety

Each kitchen is different in its design and the equipment used. You should be familiar with each piece of equipment before you operate it. If a piece of equipment is malfunctioning, be sure to follow the lockout/tagout procedure.

Lockout/tagout means that all necessary switches on malfunctioning electrical equipment are tagged and locked from use.

Be familiar with equipment safety features, such as guards and safety devices. For example, a slicer has a hand guard that must be in place to operate the machine.

Cleaning and Maintenance

You will also need to clean and maintain equipment. Always follow these safety measures when you clean kitchen equipment:

- Turn all switches to the off position.
- Unplug the equipment.
- Follow the manufacturer's instructions and the food establishment's directions for cleaning.



Identify What type of shoes should you wear to work in a kitchen?



- ▲ **Avoid Back Injuries** If you decide to lift an object by yourself, it is important to use the correct lifting technique. *How is this employee using a correct lifting technique?*

Fire Safety

Fires in the workplace cause substantial property and equipment damage each year. They also cause injuries, and even death. The flames and high heat sources used in foodservice workplaces can cause fires. A burn can be a very serious injury. Burns can be prevented by preventing fires. Fires are classified according to the type of material that catches fire. (See **Figure 1.1** on page 8.)

Fire Prevention

You can prevent and control fires. Practice good work habits and be prepared for emergencies. Keep the workplace clean, especially of built-up grease.

Here are some other tips to prevent fires and help keep your workplace safe:

- Be sure ashtray contents are completely out before you empty them into the trash.
- Be careful around gas appliances. Built-up gasses can explode if a match is lit nearby.

FIGURE 1.1 Fire Extinguisher Types

Fire Safety The universal picture symbols shown here are found on fire extinguisher labels. *What information do these symbols tell you?*

Class of Fire	Type of Flammable Material	Type of Fire Extinguisher to Use
Class A 	Wood, paper, cloth, plastic	Class A    Class A:B   
Class B 	Grease, oil, chemicals	Class A:B    Class A:B:C   
Class C 	Electrical cords, switches, wiring	Class A:C   Class B:C  
Class D 	Combustible switches, wiring, metals, iron	Class D 
Class K 	Fires in cooking appliances involving combustible vegetable or animal oils and fats	Class K 

- Store oily rags in closed metal containers so they do not start a fire.
- Make sure all smoke alarms work properly.
- Store flammable materials away from heat sources.
- Keep water away from electrical outlets.
- Clean the range and oven hoods and filters regularly to remove grease that can catch on fire.
- Keep all exits unlocked and accessible from the inside. Exits should also be clearly marked.

Fire Protection Equipment

Prevention is your best course of action when it comes to fires. But even with the right preventive steps, fires can still happen in a professional kitchen. It is essential to have the proper fire protection equipment on hand at all times.

Fire Extinguishers

Fire extinguishers are the most common type of fire protection equipment used in foodservice operations. The type, number, and location of fire extinguishers that are needed can vary. A fire extinguisher should be located within each work area.

Fire extinguishers use several types of chemicals to fight different kinds of fires. To fight a fire properly, you must use the right type, or class, of extinguisher.

Fire extinguishers are inspected and tagged on a regular basis. To use a fire extinguisher properly, hold the extinguisher upright and remove the safety pin. Point the nozzle at the bottom of the fire and push down the handle.

Hood and Sprinkler Systems

A hood system that is well vented can help remove excess smoke, heat, and vapors. Make sure hoods are cleaned regularly and are

working properly. If your kitchen has a sprinkler system, keep products and supplies at the regulated distance from the sprinkler equipment.

Fire Emergency Procedures

Every foodservice business has fire emergency procedures. Employees must be familiar with these procedures. Employers must post fire exit signs in plain view above exits. Employees should know where to meet outside the business for a head count in case of a fire. They should also know how to direct customers out of the building.

It is the foodservice staff's responsibility to keep customers calm during emergencies. If you discover a fire, call the fire department right away, even if the fire is small. Fires can grow large very quickly. Then, communicate clearly and help customers and coworkers leave the building quickly and calmly.

 **Reading Check** **Explain** What should you do if you discover a fire in the workplace?

Emergency Procedures

Fires are not the only emergencies that can happen in a kitchen. An **emergency** is a potentially life-threatening situation that usually occurs suddenly and unexpectedly. You must know how to respond and who to contact during an emergency.

Post the telephone numbers of emergency services, such as poison control and the health department, near the phone. You should also learn basic first aid and life-saving techniques. It is your responsibility to know your employer's emergency policies.

First Aid

The immediate response to an emergency often involves first aid. **First aid** involves assisting an injured person until professional medical help can be provided. The American Red Cross offers courses that teach hands-on information about first aid in the workplace.

Science à la Carte

Extinguish a Grease Fire

The best way to extinguish an oil or grease fire is to use sodium bicarbonate (NaHCO_3). Sodium bicarbonate is also called baking soda. When it is heated, baking soda breaks down and forms carbon dioxide gas (CO_2), which smothers the fire.

Procedure

Perform research to find out why carbon dioxide gas smothers a grease or oil fire. You can perform your research at the library or interview a firefighter at your local fire department.

Analysis

Create a poster to explain why carbon dioxide gas smothers a grease or oil fire, based on your research. Keep track of the sources you use, and turn them in to your teacher.

NSES B Develop an understanding of chemical reactions.



 **Fire Protection** This professional kitchen has several pieces of fire protection equipment. *How might the sprinkler system be used?*

FIGURE 1.2 Types of Burns

Bad Burns There are three types of burns, each one more severe than the last.

How would you treat a first-degree burn?

Types of Burns	Characteristics of Burns
First-Degree Burns 	The skin becomes red, sensitive, and sometimes swollen. These are the least severe of all burns.
Second-Degree Burns 	These burns cause deeper, painful damage, and blisters form on the skin. The blisters ooze and are painful.
Third-Degree Burns 	The skin may be white and soft or black, charred, and leathery. Sometimes third-degree burns are not painful because the nerves in the skin have been destroyed. These are the worst kinds of burns. Third-degree burns must be treated immediately at a hospital.

Emergency Action Tips

These general action tips should be followed during an emergency. They do not replace the need to be trained in first aid!

- Check the scene and stay calm.
- Check the victim. Keep him or her comfortable and calm.
- Call the local emergency number for professional medical help.
- Use proper first aid techniques.
- Keep people who are not needed away from the victim.
- Complete an accident report. Write the victim's name, the date and time of the accident, the type of injury or illness, the treatment, and when help arrived.

First Aid for Burns

Any type of burn requires immediate treatment. (See **Figure 1.2**.) If you or someone in the workplace is burned, call your local emergency number for medical assistance.

Follow these general guidelines for minor burns until help arrives:

- Remove the source of the heat.
- Cool the burned skin to stop the burning. Apply cold water on the affected area for at

least five minutes. Use water from a faucet or soaked towels. Do not use ice or ice water. This can cause damage to the skin.

- Never apply ointments, sprays, antiseptics, or remedies to the burned skin unless instructed to do so by a medical professional.
- Bandage the burn as directed in your first aid manual.



Wound Care Apply pressure to a wound to stop any bleeding. *What other steps should be taken to treat a minor wound?*

- Minimize the risk of shock. **Shock** is a serious medical condition in which not enough oxygen reaches tissues. Elevate the victim's feet over his or her head. Keep the victim from getting chilled or overheated. Have the victim rest.

First Aid for Wounds

There are four types of open wounds:

- An **abrasion** is a scrape or minor cut. A rug burn is an abrasion.
- A **laceration** (*ˌlɑ-sə-ˈrā-shən*) is a cut or tear in the skin that can be quite deep. A knife wound is a type of laceration.
- An **avulsion** (*ə-ˈvəl-shən*) happens when a portion of the skin is partially or completely torn off. A severed finger is an avulsion.
- A **puncture wound** happens when the skin is pierced with a pointed object, such as an ice pick, making a deep hole in the skin. Puncture wounds can be deep.

Treat Minor Wounds Follow these guidelines to treat a person with a minor cut.

- Wear disposable gloves to protect yourself and the victim from infection.
- Clean the cut with soap water.
- Place sterile gauze over the cut.
- Apply direct pressure over the sterile gauze or bandage to stop any bleeding.
- If bleeding does not stop, raise the limb above the heart.

Treat Serious Wounds Call for emergency help. Then, follow these guidelines:

- Wear disposable gloves to protect yourself and the victim from infection.
- Control the bleeding by applying pressure with sterile gauze or a clean cloth towel. Do not waste time by washing the wound first. Elevate the area while applying pressure.
- Cover the wound with clean bandages.
- Wash your hands thoroughly after emergency help has arrived.

First Aid for Choking

Choking is often caused by food that blocks a person's airway. This will cause difficulty speaking and breathing.

The **Heimlich maneuver** is a series of thrusts to the abdomen that can help dislodge something that is stuck in a person's airway. You should be formally trained to use the Heimlich maneuver. Use it only on someone who is conscious and choking. You can even use it on yourself. Never perform the Heimlich maneuver on someone who is pregnant. This could harm the baby.

The basic Heimlich maneuver steps are:

1. Stand behind the victim. Wrap your arms around the victim's waist. Locate the victim's navel.
2. Make a fist with one hand. Place the thumb side of your fist against the middle of the abdomen just above the navel and below the bottom of the breast bone.
3. Place your other hand on top of your fist.
4. Press your hands to the victim's abdomen. Use inward and upward thrusts.
5. Repeat this motion as many times as it takes to dislodge the object or food.



Heimlich Maneuver The Heimlich maneuver can be performed on a choking, conscious adult. *When would you not perform the Heimlich maneuver?*

CPR

CPR, or **cardiopulmonary resuscitation** (*ˌkɑr-dē-ō-ˈpʊl-mə-ner-ē ri-sə-sə-ˈtā-shən*), is emergency care that is performed on people who are unresponsive. This includes those who are unconscious because of choking, cardiac arrest, stroke, or heart attack.

The sooner CPR is performed, the greater the victim's chance of survival. CPR helps keep oxygen flowing to the brain and heart. This is done until advanced care can have a chance to restore normal heart function. Contact your local chapter of the American Heart Association or the American Red Cross for training and information on how to perform cardiopulmonary resuscitation correctly.

Reports and Audits

As soon as possible after an emergency is over, you should **document**, or write down, the details of the emergency. Detailed emergency

reports can help prevent future emergencies. They also can help limit a restaurant's liability in the event of an accident. Make sure that the information in the report is accurate. Your supervisor may want to discuss the information with you.

A **general safety audit** is a review and inspection of all safety procedures and equipment. The audit should be managed by foodservice employers, but carried out by foodservice workers. It should be performed at least once a year. Let a supervisor know if you find any of the following:

- Missing or low-charge fire extinguishers
- Blocked hallways or exits
- Missing safety information
- Frayed electrical cords



Reading Check

Determine How often should a general safety audit be performed?

SECTION 1.1



After You Read

Review Key Concepts

1. **Identify** four types of personal injuries that foodservice workers must help prevent.
2. **Explain** how to use a fire extinguisher properly.
3. **Describe** the three types of burns.

Practice Culinary Academics



English Language Arts

4. Choose one of the common sources of injury in the kitchen. Conduct research about the topic. Find an example of a situation where someone was injured in a professional kitchen setting. Write a short report to explain the injury, the cause of the injury, the consequences of the injury, and how the injury might have been prevented. Include your sources in your report, and turn them in to your teacher.

NCTE 7 Conduct research and gather, evaluate, and synthesize data to communicate discoveries.



Mathematics

5. Hot water can be dangerous even before it begins to boil. A two-second exposure to water at a temperature of 150°F can cause a burn. What is this temperature in degrees Celsius?

Math Concept

Converting Temperatures In the metric system, temperatures are measured in degrees Celsius. To convert temperatures from Fahrenheit (F) to Celsius (C), use this equation:
 $C = (F - 32) \times \frac{5}{9}$.

Starting Hint To convert 150°F into a Celsius temperature, first subtract 32 from the Fahrenheit amount. Multiply the result by the fraction $\frac{5}{9}$. To do so, first multiply the result by 5, then divide that product by 9.

NCTM Measurement Understand measurable attributes of objects and the units, systems, and processes of measurement.



Check your answers at this book's Online Learning Center at glencoe.com.

Sanitation Challenges

Learn how to keep food safe to eat.

Before You Read

Predict Before starting the section, read headings, bold terms, and photo captions to browse the content. Think about how they can help you predict the information in the section.

Read to Learn

Key Concepts

- **Describe** the sources of food contamination.
- **Identify** sources of chemical food contamination.
- **Illustrate** how to manage pests in a kitchen setting.

Main Idea

Food becomes contaminated by exposure to harmful microorganisms or chemical substances. Insects and rodents can also physically contaminate food.

Graphic Organizer

There are three types of hazards that can cause contamination in a kitchen. Use this problem-solution chart to identify each type of hazard, and then list the sources of contamination for each type of hazard. Finally, provide solutions to prevent that contamination.

Problem	Sources	Solutions

 **Graphic Organizer** Go to this book's Online Learning Center at glencoe.com for a printable graphic organizer.

Content Vocabulary

- sanitary
- contaminated
- direct contamination
- cross-contamination
- sanitation
- hazard
- toxin
- pathogens
- bacteria
- viruses
- parasite
- fungi
- mold
- cleaning
- sanitizing

Academic Vocabulary

- result
- transmit

ACADEMIC STANDARDS



Mathematics

NCTM Number and Operations Understand numbers, ways of representing numbers, relationships among numbers, and number systems.



Science

NSES C Develop an understanding of the behavior of organisms.



Social Studies

NCSS II B Time, Continuity, and Change Explain, analyze, and show connections among patterns of historical change and continuity.

- NCTE** National Council of Teachers of English
- NCTM** National Council of Teachers of Mathematics
- NSES** National Science Education Standards
- NCSS** National Council for the Social Studies

Contamination Basics

Foodborne illnesses kill thousands of people each year and make many more people sick. For this reason, foodservice professionals need to know how to create a clean, safe, disease-free place that can be used for food preparation. They also need to know how to prevent and properly respond to foodborne illness outbreaks.

When consumers eat out, they expect the food to be prepared and served in a sanitary environment. **Sanitary** means clean. When harmful microorganisms or substances are present in food, the food is contaminated. **Contaminated** food is food that is unfit to be eaten. Eating contaminated food can make you sick and may even cause death.

Food can be directly contaminated or cross-contaminated:

- **Direct contamination** happens when raw foods, or the plants or animals from which they come, are exposed to harmful microorganisms. For example, harmful microorganisms found in soil that is used to grow grains could contaminate the grain and any products produced from the grain.
- **Cross-contamination** is the movement of harmful microorganisms from one place to another. People cause most cases of cross-contamination. For example, food handlers can transfer organisms or substances when they prepare or serve foods.

Foodservice workers must consider direct contamination and cross-contamination. They must practice proper sanitation techniques. The word **sanitation** means healthy or clean and whole. In the workplace, sanitation means healthy and sanitary conditions. Foodservice workers have a responsibility to prepare food in a sanitary environment. Federal, state, and local health departments have created regulations to protect consumers from foodborne diseases.

In the foodservice industry, workers need to know the different types of food hazards.

A **hazard** is a source of danger. These hazards are biological, chemical, and physical. Any of these hazards can **result**, or have an outcome, in contaminated food.

Biological Hazards

Biological hazards come from microorganisms such as bacteria. Other types of biological hazards include viruses, parasites, and fungi. Certain plants and fish can also carry harmful toxins. A **toxin** is a harmful organism or substance. However, disease-causing microorganisms called **pathogens** cause the majority of foodborne illnesses. For detailed information on specific foodborne illnesses, see **Figure 1.3** on page 15.

Foodborne Illness

Microorganisms can grow in and on food when it is not handled properly. Other conditions that can lead to foodborne illness outbreaks are cross-contamination, poor personal hygiene, and food handler illness. For example, uncooked meats that are stored above cooked meats in the refrigerator can cause cross-contamination because the uncooked meat may drip onto the cooked meat.

Each year the number of incidents of foodborne illness grows. Children, the elderly, and pregnant women have the highest risk to catch a foodborne illness. People who are chronically ill or who have weakened immune systems also are at risk. The good news is, conditions that cause foodborne illness can be prevented. Follow industry safety standards to help lower the threat of foodborne illness.

Bacteria Tiny, single-celled microorganisms are called **bacteria** (bak-'tir-ē-ə). Some forms of bacteria can make people very sick if they are eaten. People who have a bacterial illness may have symptoms such as nausea, abdominal pain, and vomiting. Other symptoms include dizziness, chills, and headache.

Bacteria multiply very quickly under the right conditions. The acronym FATTOM can help you remember these conditions:

FIGURE 1.3 Foodborne Illnesses

Food Contamination There are several forms of bacteria, viruses, and parasites that can cause customers to become sick. *How can you prevent foodborne illnesses?*

Illness—Cause	Symptoms	Foods Involved
Salmonellosis—Bacteria	Cramps, nausea, headache, fever, diarrhea, vomiting.	Poultry and poultry products, eggs, meat and meat products, fish, dairy products, protein foods, fresh produce.
Campylobacter jejuni—Bacteria	Nausea, vomiting, fever, diarrhea, abdominal pain, headache, and muscle pain	Meats and poultry, unpasteurized milk and dairy products
Hepatitis A—Virus	Fatigue, discomfort, fever, headache, nausea, loss of appetite, vomiting, jaundice	Water, ice, salads, cold cuts, sandwiches, shellfish, fruit, fruit juices, milk and milk products, vegetables
Norwalk—Virus	Cramps, nausea, headache, fever, vomiting	Water, raw vegetables, fresh fruit, salads, shellfish
Trichinosis—Parasite	Abdominal pain, nausea, diarrhea, fever, swelling around eyes, thirst, sweating, chills, fatigue, hemorrhaging	Pork, nonpork sausages, wild game
Shigellosis—Bacteria	Abdominal pain, diarrhea, vomiting, fever, dehydration	Protein salads, lettuce, raw vegetables, poultry, shrimp, milk and milk products
Listeriosis—Bacteria	Headache, fever, chills, nausea, vomiting, diarrhea, backache, meningitis, encephalitis	Ice cream, frozen yogurt, unpasteurized milk and cheese, raw vegetables, poultry, meat, seafood
Rotavirus—Virus	Abdominal pain, diarrhea, vomiting, mild fever	Water, ice, salads, fruit, hors d'oeuvres
Anisakiasis—Parasite	Tingling in throat, abdominal pain, coughing up worms, cramping, vomiting, nausea	Fish, seafood
Giardiasis—Parasite	Cramps, nausea, intestinal gas, fatigue, loss of weight	Water, ice, salads
Botulism—Bacteria	Constipation and diarrhea, vomiting, fatigue, vertigo, double vision, dry mouth, paralysis, death	Underprocessed foods, canned low-acid foods, sautéed onions in butter sauce, baked potatoes, untreated garlic and oil products
E. Coli—Bacteria	Severe abdominal cramps, diarrhea, vomiting, mild fever, kidney failure	Raw ground beef, undercooked meat, unpasteurized milk and apple cider or juice, mayonnaise, lettuce, melons, fish from contaminated water
Staphylococcus aureus—Bacteria	Nausea, vomiting, stomach cramps, diarrhea	Handmade items that do not require cooking, such as sliced meats, puddings, and sandwiches

- **F=Food** Bacteria need food for energy to grow.
- **A=Acidity** Bacteria generally do not grow well in acidic environments.
- **T=Temperature** Bacteria can thrive in temperatures between 41°F (5°C) and 135°F (57°C). Some bacteria can survive freezing and cooking.
- **T=Time** Although some bacteria multiply more quickly than others, it does take time for them to grow.
- **O=Oxygen** Many bacteria need oxygen to live. However, some bacteria do not need oxygen to grow.
- **M=Moisture** Bacteria prefer foods that are high in protein and moisture.

Viruses Simple organisms that cause many food-related illnesses are called **viruses**. Viruses need a host, or another living cell, to grow. A host can be a person, animal, or plant. Once inside the host, the virus can multiply. Like bacteria, viruses can survive freezing and cooking. It is easy to **transmit**, or spread, viruses from person to person. They usually contaminate food when a foodservice worker uses poor hygiene. Poor hygiene may include sneezing on food or not washing your hands after going to the bathroom. Salads, sandwiches, milk, and other unheated foods are especially susceptible to viruses.

Parasites A **parasite** (ˈpär-ə-sīt) is an organism that must live in or on a host to survive. Parasites are larger than bacteria and viruses. Parasites are often found in poultry, fish, and meats. Some common parasites found in food include protozoa, roundworms, and flatworms.

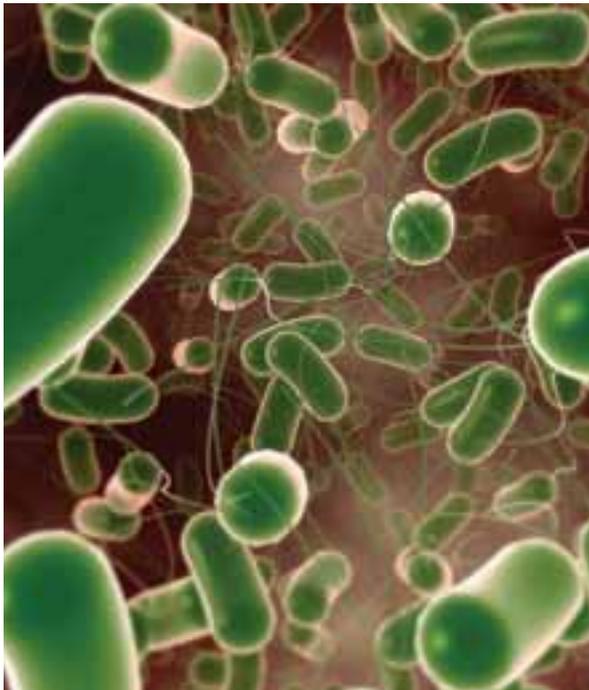
Parasites can be eliminated from food by following proper cooking methods. Freezing the food product for a number of days also

can destroy parasites. Poultry, fish, and meat should be cooked until the minimum internal temperature is reached. These foods, when uncooked, should not come into contact with other foods. Carefully check the food in several different spots to be sure that the safe temperature has been reached throughout the food. If the parasites are not eliminated, they can infect anyone who eats the contaminated food.

Fungi Spore-producing organisms found in soil, plants, animals, water, and in the air are called **fungi** (ˈfən-gī). Fungi also are naturally present in some foods. Some fungi can be large, such as mushrooms. Some fungi can be eaten, while others cannot. Eating some fungi can cause stomach problems, or even death.

Molds A **mold** is a form of fungus. The fuzzy-looking spores produced by molds can be seen with the naked eye. Molds can grow at nearly any temperature. Even if only part of a food has mold, the whole thing should be thrown away, although some cheeses can be saved.

Yeast Another form of fungus is yeast. Yeast is most often associated with bread and the baking process. In this case, yeast is helpful. However, if yeast is present in other foods, such as sauerkraut, honey, and jelly, it can cause those foods to spoil.



Bacterial Illness Salmonella bacteria is one of the leading causes of foodborne illness. *How could you help prevent the spread of salmonella in a foodservice operation?*

Sanitation Check

✓ Hepatitis A

Hepatitis A is a disease that causes inflammation, or swelling, of the liver. Foodservice workers with the disease can transmit the virus to food. It also can be transmitted by contact with contaminated water, or eating shellfish that has been raised in contaminated water. The symptoms of hepatitis A are similar to the flu. Hepatitis A can be prevented. You should wash your hands thoroughly after restroom use. In addition, a vaccination for hepatitis A can help protect you from infection.

CRITICAL THINKING *If you get a hepatitis A vaccination, can you forgo hand-washing procedures? Why or why not?*

A TASTE OF HISTORY

1941

Breakfast cereal Cheerios is introduced as CheeriOats by General Mills

1947

First two-door refrigerator/freezer is produced

Keep Food Cool

Until the early twentieth century, people in cities who needed ice to keep their food cold purchased ice from local ice houses. The ice houses stored ice that was collected in the winter months.

The first electric refrigerators were in use by the late 1800s, but there were no mass-produced modern refrigerators until after World War II. Today, food-service operations can choose from a large variety of refrigerators to keep food cold and fresh.

History Application

The evolution of the refrigerator/freezer had a direct connection to the frozen food industry. Create a time line about the frozen food industry that traces how the storage and shipping of frozen food has changed over time.

NCSS II B Time, Continuity, and Change Explain, analyze, and show connections among patterns of historical change and continuity.



Forms of Fungus Mold is a type of fungus. *Why are some types of fungi safe to eat, but others are not?*

Outbreak Response

If you have ever felt queasy several hours after eating, you may have been a victim of a foodborne illness. An outbreak of foodborne illness happens when several people become sick after eating the same food.

Any outbreak of foodborne illness must be reported to the local health department. If you think there has been an outbreak at your facility, a quick response is essential. An outbreak could cost the business thousands of dollars in legal fees, insurance costs, and loss of customers. It also could force the foodservice establishment out of business.

A laboratory analysis can tell which food made customers sick. In most areas, the public health department will investigate any outbreak of foodborne illness to protect public health. The department's job is to learn how the illness was spread and how its spread can be prevented in the future.

If you suspect a foodborne illness outbreak, take these steps:

- Tell the manager or supervisor of your suspicions immediately. It is your supervisor's responsibility to contact the appropriate authorities for an investigation.
- Avoid panic. There are many reasons why people become ill, so it is best to let the health authorities check the situation.
- Save any food you suspect may be contaminated. Wrap food in its original container or in a plastic bag. Clearly label the bag or container Do Not Use.

Reading Check **Define** What is the difference between direct contamination and cross-contamination?

Chemical Hazards

Chemical hazards include cleaning supplies, pesticides, food additives, and metals.

To help prevent chemical accidents, Material Safety Data Sheets (MSDS) must be kept on file. A material safety data sheet is a form that shows information about a substance and how to use it safely. The Occupational Safety and Health Administration's Right to Know law requires that employers post information about dangerous substances in the workplace and how to work with them safely.

Cleaning Products

Cleaning products used in the foodservice industry include:

- **Detergents** Used to clean walls, floors, prep surfaces, equipment, and utensils. Heavy-duty detergents cut through grease.
- **Hygiene Detergents** Used to clean, deodorize, and disinfect floors, walls, and table tops.

Sanitation Check

✓ Personal Hygiene

Foodservice professionals must have excellent personal hygiene. Microorganisms can spread from tools, equipment, and cooking surfaces to food on the hands of foodservice workers. This can lead to food contamination, disease, or food poisoning. To lower the chance of spreading microorganisms in the kitchen, you should:

- Use proper hand-washing techniques.
- Practice good grooming and cleanliness.
- Wear gloves and other protective clothing when required.
- Maintain good health and stay home when you are sick.
- Immediately report any illnesses or injuries to your supervisor.

CRITICAL THINKING *How does good grooming prevent contamination?*

- **Degreasers** Solvent cleaners used on range hoods, oven doors, and backsplashes to remove grease.
- **Abrasive Cleaners** Used to scrub off dirt or grime that can be difficult to remove. Abrasive cleaners are used on floors and pots and pans to remove burned-on food.
- **Acid Cleaners** Used to remove mineral deposits in equipment such as dishwashers and steam tables. However, acid cleaners should not be used on aluminum. They can eat through the metal. Follow product directions and use with care.

To avoid possible contamination, each cleaning product should be used and stored properly. Cleaning products should not be stored near food. The storage area should be kept neat and well organized to avoid confusion or spills.

Cleaning products should always be kept in their original labeled containers. Confusing a cleaning product with a cooking ingredient can cause illness, or even death. Check the labels to make sure you know how to use each product safely. Follow directions to dilute them properly. Labels usually have antidotes for accidental swallowing, and signal words such as caution, warning, danger, and poison. Report any unlabeled products to a supervisor.

You must follow local regulations to throw away cleaning products. Local health departments should have suggestions for environmentally friendly disposal.

Kitchen Cleanliness

Keep the facilities clean and sanitary to help lower the risk of contamination. **Cleaning** means removing food and other soil from a surface. You should always clean as you work. Do not wait until all the work is done before cleaning or sanitizing. **Sanitizing** (¹sa-nə-₁tīz-₁in) means reducing the number of microorganisms on the surface. You must do both to eliminate contamination.



◀ **Industrial Cleaning**
Here are some examples of industrial cleaning products. *How do you think industrial cleaning products differ from those used at home?*

Cleaning and Sanitizing

Everything in a foodservice operation should be kept clean and sanitary at all times. All pots, pans, and dishes, and all food contact surfaces, should be thoroughly cleaned each time they are used. For example, clean and sanitize a work surface before you use it to prepare another food product. Clean and sanitize tools at four-hour intervals. You should also clean them if they become contaminated by another food product.

In addition, you can use color-coded cutting boards and containers for each type of food product. This can help prevent cross-contamination. For example, you might use a green cutting board to cut raw vegetables. But you would never use that same cutting board to cut raw meat or chicken. Raw meat and chicken are more likely to carry bacteria that can cause illness if transferred to foods that will be eaten raw. You should take extra care with these foods. Be sure to sanitize all cutting boards thoroughly.

Kitchen tools and surfaces should be cleaned and sanitized with soapy hot water and a sanitizer. Notice the warning labels associated with using that product.

Pesticides

There are many pesticides (¹pes-tə-₁sīds) that are used in food storage and preparation areas to control pests like bugs or rats. If they are used carelessly or in large amounts, pesticides may contaminate food. Pesticides can make people who eat the contaminated food very sick. They can even cause death in large amounts.

Pesticides must be used according to directions. They should be stored away from food and in a locked or secure area. Be sure all pesticides are labeled correctly. They should always be kept in their original containers. Some jurisdictions require a special permit to use pesticides, while others do not allow their use.

Empty pesticide containers should never be reused for any purpose. Because pesticides are hazardous materials, they cannot just be thrown away. Check local regulations for disposing of hazardous waste before you throw away pesticides or pesticide containers.

 **Reading Check** **Summarize** What are the potential dangers of using pesticides in a commercial kitchen?

Physical Hazards

Physical hazards are caused by particles, such as glass chips, metal shavings, hair, bits of wood, or other foreign matter, that could get into food. Some physical hazards are found in food itself, such as bone shards or chips. However, most contamination occurs when foodhandlers do not follow proper safety and sanitation practices. Always use care when you prepare, cook, and serve food.

Pest Management

Wherever there is food, there may be insects and rodents. These pests can pose a serious threat to the safety of food products. Flies, roaches, and mice, for example, can carry harmful bacteria and spread disease. Once a facility is infested, it can be difficult to get rid of all pests. It is very important to create an effective pest management program.

Most pests need water, food, and shelter. A clean and sanitary environment is not attractive to most pests. Pests seek out damp, dark, and dirty places. Make sure garbage is disposed of quickly and in the appropriate containers.

To help keep pests out of storage areas:

- Keep storage areas clean, sanitary, and dry.
- Dispose of any garbage quickly.
- Keep food stored at least 6 in. (15 cm) off the floor and 6 in. (15 cm) away from walls.
- Remove as many items as possible from cardboard boxes before you store them.
- Maintain appropriate temperatures in storage areas.

A workplace may become infested even if you carefully follow a good pest management program. If you see signs of insects or rodents, report the problem to your supervisor. The supervisor can call a professional exterminator.

 **Reading Check** Explain What do pests need to live?

SECTION 1.2

After You Read

Review Key Concepts

1. **Describe** the biological sources of food contamination.
2. **Identify** cleaning products commonly used in the foodservice industry.
3. **Explain** what to do if you suspect the workplace has become infested with pests.

Practice Culinary Academics



Science

4. **Procedure** Slice three pieces of bread in half, and expose each half to different conditions: 1) one dry and one wet; 2) one in the dark and one in the light; 3) one cold and one warm. Examine them every day for a week. Record any changes.

Analysis Based on observation, what is the best way to store bread? Write a paragraph to explain.

NSES C Develop an understanding of the behavior of organisms.



Mathematics

5. You are asked to make a batch of sanitizing solution by combining 4 gallons (512 ounces) of water with $\frac{1}{2}$ ounce of liquid bleach. What is the ratio of bleach to water in this solution?

Math Concept Forming Ratios A ratio is a comparison of two quantities, and is typically written as a fraction. Like other fractions, a ratio should be reduced to its lowest terms.

Starting Hint Write a fraction with the amount of bleach ($\frac{1}{2}$ ounce as the numerator and the amount of water (512 ounces) as the denominator. Reduce the fraction to its lowest terms by dividing the numerator and denominator by their greatest common factor.

NCTM Number and Operations Understand numbers, ways of representing numbers, relationships among numbers, and number systems.



Check your answers at this book's Online Learning Center at glencoe.com.

Chapter Summary

Safety rules and equipment help keep food-service workers safe. Use caution around gas appliances, store oily rags properly, and keep the workplace free of built-up grease to avoid fire danger. Employees should know first aid to treat emergencies, including CPR and the Heimlich maneuver.

Harmful microorganisms that cause illness can contaminate food. There are three types of hazards in the kitchen: biological, chemical, and physical. If an outbreak of foodborne illness occurs, follow company procedures and report it to your supervisor. Use cleaning products carefully, and according to directions.

Content and Academic Vocabulary Review

1. Use each of these vocabulary words in a sentence.

Content Vocabulary

- occupational back support (p. 4)
- flammable (p. 6)
- lockout/tagout (p. 7)
- emergency (p. 9)
- first aid (p. 9)
- shock (p. 11)
- abrasion (p. 11)
- laceration (p. 11)
- avulsion (p. 11)
- puncture wound (p. 11)
- Heimlich maneuver (p. 11)
- cardiopulmonary resuscitation (CPR) (p. 12)
- general safety audit (p. 12)
- sanitary (p. 14)
- contaminated (p. 14)
- direct contamination (p. 14)
- cross-contamination (p. 14)
- sanitation (p. 14)
- hazard (p. 14)
- toxin (p. 14)
- pathogens (p. 14)
- bacteria (p. 14)
- viruses (p. 16)
- parasite (p. 16)
- fungi (p. 16)
- mold (p. 16)
- cleaning (p. 18)
- sanitizing (p. 18)

Academic Vocabulary

- routine (p. 4)
- document (p. 12)
- result (p. 14)
- transmit (p. 16)

Review Key Concepts

2. **Identify** possible culinary workplace safety issues.
3. **Explain** fire safety equipment and emergency procedures.
4. **Describe** first aid measures for burns, wounds, and choking.
5. **Describe** the sources of food contamination.
6. **Identify** sources of chemical food contamination.
7. **Illustrate** how to manage pests in a kitchen setting.

Critical Thinking

8. **Consider:** Why are the type of shoes you wear in a kitchen important? What are the possible consequences of wearing inappropriate footwear in a kitchen?
9. **Analyze** response times. If foodborne illness breaks out at a restaurant, why are a quick response and notification of the local health department important?
10. **Suggest** outbreak solutions. Find a newspaper article about a foodborne illness outbreak. What methods would you suggest to help prevent a similar outbreak?

Academic Skills

**English Language Arts**

11. **Kitchen Safety Training** Imagine that you are responsible for training new kitchen employees in a restaurant. Write an outline for a five-minute oral presentation that you would give to employees on their first day on the job to teach them the kitchen safety procedures of your restaurant. Create any visual aids you believe would be helpful in training new employees. Give your presentation to the class and give your presentation outline to your teacher.

NCTE 4 Use written language to communicate effectively.

**Science**

12. **Hand Washing** It is vital to have clean hands.
- Procedure** Form into groups as directed by your teacher. Have two group members cover their hands with washable paint. Then, wash off the paint, with one student using water only, and the other using soap and water.
- Analysis** Record how long it takes to wash off all of the paint using both methods. Create a procedure based on your results. Explain how it can be used at work and at home.

NSES F Develop an understanding of personal and community health.

**Mathematics**

13. **Cleaning Product Proportions** One common method for cleaning surfaces that can hold on to grease, such as countertops, is to use a solution of 3 tablespoons of vinegar and 1 gallon of water. You have been asked to make up a larger batch of this cleaning solution for use in your restaurant kitchen. How much vinegar should you add to 2.5 gallons of water so that the final solution has the same proportion of ingredients as the one described above?

Math Concept **Using Ratios to Solve for an Unknown** When proportions are equal, you can set up two equal ratios to relate what you already know to what you are solving for. Use x to represent the unknown amount in the second ratio.

Starting Hint Write two fractions representing the ratio of tablespoons of vinegar to gallons of water: first, using the original quantities ($3/1$), and second, representing the larger batch ($x/2.5$). Because the larger batch has the same proportions as the original formula, the two ratios are equal: $3/1 = x/2.5$. Solve for x by multiplying both sides of the equation by 2.5.

NCTM Algebra Understand patterns, relations, and functions.

Certification Prep

Directions Read the questions. Then, read the answer choices and choose the best possible answer for each.

14. Which of the following is a virus?
- a. salmonella c. hepatitis A
b. listeriosis d. trichinosis
15. If you feel ill and have flu-like symptoms, you should:
- a. Go to work and warn your co-workers to be careful around you.
b. Call your boss and tell him or her that you are sick.
c. Take medicine for your symptoms and go to work.
d. Do not tell anyone and continue to work.

Sharpen your test-taking skills to improve your kitchen certification program score.

Test-Taking Tip

In a multiple-choice test, the answers should be specific and precise. Read the question first, and then read all the answer choices. Eliminate answers that you know are incorrect.

Real-World Skills and Applications

Management Skills

16. Design a Foodborne Illness Plan Imagine that you are the manager of a restaurant, and that recent outbreaks of foodborne illness around the country have you concerned. Design a system to document, investigate, and report incidents of foodborne illness. Write out a description of your plan.

Critical Thinking Skills

17. Use Detergents Effectively Split up into groups as directed by your teacher. Place two small spots of kitchen grease on a counter surface. Use a small amount of detergent and try to remove the first grease spot. Then, dilute the detergent with water and try to remove the second grease spot. Write a description of the results, and your group's observations on using detergent.

Financial Literacy

18. Purchase an Emergency Kit You have been given \$500 to create an emergency kit for your restaurant. You may spend no more than 25% of your budget on a fire extinguisher. How much money do you have to spend on the fire extinguisher, and how much for other supplies?

Technology Applications

19. Create a Disaster Plan Imagine that you own a banquet facility. Your facility employs a host, servers, dishwashers, cooks, and an executive chef. Use a word-processing program to create a poster to show plans to deal with the following emergencies: a fire in the kitchen, a minor cut, and a customer having a heart attack. Include responsibilities for the employees, a general procedure, and key locations for emergency procedures.

Culinary Lab

Develop a Safety Manual

20. Create a Manual In this culinary lab activity, you will work as part of a team to create a complete safety manual for a foodservice operation.

A. Plan the contents. Your manual should include the following information:

- Table of contents
- Short paragraph on the importance of workplace safety
- How OSHA and the EPA ensure workplace safety
- Employer and employee workplace safety responsibilities
- Kitchen safety guidelines
- First aid guidelines and a list of local emergency numbers
- Cross-contamination prevention guidelines
- Safe cleaning supply, chemical, and pesticide disposal
- Protective clothing checklist
- Personal hygiene tips

B. Prepare your manual. Discuss how you can present each item in your manual, and assign topics to each team member to research.

C. Conduct research. First, review the material in the chapter for information. Then, conduct additional research in your school library or on the Internet. Select pictures to include in your manual to illustrate the topics.

D. Write the manual. As a team, put together the results of your research in a word processing document. Insert the information and pictures in the proper order.

E. Share your work. Share your team's safety manual with the class and display it in the classroom.

Use the culinary skills you have learned in this chapter.

Create Your Evaluation

Create a sheet that contains the following categories: Completeness, Organization, Appearance, Writing Quality, and Clarity. Rate the manuals from 1 to 10 for each of the qualities. Provide a short summary of what each manual did well, and how each could be improved.