Equipping the Kitchen

Chapter Overview
Introduce the Chapter
In this chapter, students learn how to equip a kitchen for efficiency and good work flow. Students examine what to consider when selecting kitchen components, cabinets and countertops, and flooring; explore safe electrical systems; learn how to shop critically for appliances; and study the proper use and care of kitchen tools and equipment.

Build Background
Ask students to name the basic kitchen tools and equipment that are essential to a kitchen.

Explore the Photo
A well-equipped kitchen has plenty of work and storage space. How can you make the most of your space?

A Disorganized Kitchen
What makes a kitchen organized? What are the consequences if a kitchen is disorganized? Write a cause-and-effect paragraph in which you explore kitchen disorganization and its consequences. The disorganization will be the cause, and the consequences will be the effect.

Writing Tips
Follow these steps to write a cause-and-effect paragraph:
- Describe a cause and explain its result, or effect.
- Use detailed, specific language.
- Explain why the effect results from the cause.

Discussion
Ask students:
How can the design of a kitchen help to increase efficiency? (Answers will vary but may include: If a kitchen has an adequate amount of space, it will be easier to perform tasks.)

Worksheet

Print Resources

- Student Edition
- Teacher Wraparound Edition
- Student Activity Workbook
- Student Activity Workbook Teacher Annotated Edition

Technology Resources

- Presentation Plus! provides visual teaching aids for every section.
- Online Learning Center includes resources and activities for students and teachers.
- TeacherWorks Plus is an electronic lesson planner that provides instant access to complete teacher resources in one convenient package.

Caption Answer
Answers will vary but might include using small appliances and tools for cutting, mixing, baking, and cleaning up.

Answer Key

Answers will vary but might include using small appliances and tools for cutting, mixing, baking, and cleaning up.
Before You Read

Preview Skim through the chapter. As you skim, think about how your home kitchen is equipped. What makes it easy or difficult to use?

Read to Learn

Key Concepts
- Explain the items that make up a work triangle.
- Describe factors to consider when selecting kitchen components.
- Contrast a warranty and a service contract.
- List three large kitchen appliances and nine small kitchen appliances.
- Describe seven common types of cookware.

Main Idea
In a well-designed and equipped kitchen, you can store, prepare, and serve foods with ease.

Content Vocabulary
- workflow
- work center
- work triangle
- peninsula
- island
- universal design
- grounding
- task lighting
- EnergyGuide label
- warranty
- service contract

Academic Vocabulary
- assess
- versatile

Graphic Organizer
Use a graphic organizer like the one below to compare and contrast glass and enamel cookware.

![Graphic Organizer Image]

Academic Standards

English Language Arts
NCTE 4 Use written language to communicate effectively.

Mathematics
NCTM Number and Operations Compute fluently and make reasonable estimates.

NCTM Measurement Apply appropriate techniques, tools, and formulas to determine measurements.

Science
NSES B Develop an understanding of interactions of energy and matter.

Social Studies
NCSS VIII A Science, Technology, and Society Identify and describe both current and historical examples of the interaction and interdependence of science, technology, and society in a variety of cultural settings.

Social Studies
NCSS VI B Science, Technology, and Society
NSES B Science Education Standards
NCSS National Council for the Social Studies

Preteaching Vocabulary
Ask students to write one sentence that uses at least two of the content vocabulary terms.

Graphic Organizer
The graphic organizer is also on the TeacherWorks CD. (In one circle, students should list qualities that are unique to glass cookware: chips easily, dishwash safe. In the area where the circles overlap, students should list the similarities between glass and enamel cookware: attractive, can be used for cooking and serving, use nonabrasive cleaners and nylon scrubbers.)

Develop Concepts

Main Idea Ask students: Do you think that a well-designed kitchen can influence your food choices? (Answers may include: A well-designed kitchen functions well, and accommodates your needs. You will be less willing to use a part of your kitchen if it is poorly designed. This will affect choices you make about which foods to prepare.)
**Kitchen Design Basics**

A well-designed kitchen is organized for efficiency so that you get the most from your time and effort. An efficient kitchen starts with a floor plan that promotes the work flow. In a kitchen, **work flow** is all the steps involved in removing food from storage, preparing it, and serving it.

**Work Centers**

Kitchens are organized around work centers. A **work center** is an area designed for performing specific kitchen tasks, such as chopping vegetables or washing dishes. A well-designed work center has the equipment you need to do a task, plus convenient and adequate storage and work space.

A typical kitchen has three major work centers:

- **Cold-Storge Center** The focus of the cold-storage center is the refrigerator-freezer. Plastic storage bags, food wraps, and containers for leftovers might also be stored here.
- **Sink Center** The sink center is the place to do tasks that require running water, including cleaning fresh fruits and vegetables, draining foods, and washing dishes. Dishpans and other cleanup supplies should be stored in this area. The garbage disposal and dishwasher are also part of the sink center.
- **Cooking Center** The cooking center includes the range, small cooking appliances, and related tools. Pots and pans, cooking tools, and possibly canned and packaged foods are also stored in the cooking center.

Larger kitchens may have additional work centers. A mixing center, for example, is a place to mix and prepare foods. Here you would find measuring cups, mixing spoons, and appliances such as a food processor, along with baking ingredients such as flour and spices. Even small kitchens often have a shelf for baking tools and ingredients.

Large kitchens might have a laundry center with a washer and dryer. Some kitchens even have a computer desk or a play or study area for children.

**The Work Triangle**

The arrangement of the three main work centers in a kitchen forms the **work triangle**. Each work center is one point in the triangle. For an efficient work flow, the distance between any two centers should be between 12 and 26 feet. The work triangle should be away from through-traffic, the path of people walking from one room to another.

When one person works in the kitchen alone, the work triangle can be compact. If people share kitchen tasks, additional work space is useful. For example, a second sink lets one person scrub vegetables while another washes dishes. This arrangement might create adjacent or overlapping work triangles.

**Kitchen Plans**

A kitchen’s floor plan determines its work triangle. The four most common floor plans are shown in Figure 21.1 and described here:

- **One-Wall** Small kitchens often have a one-wall plan, with all three work centers on one wall. Kitchens with a one-wall plan often have limited storage and counter space.
- **L-Shaped** Kitchens with an L-shaped plan have work centers on two connecting walls. This layout keeps through-traffic away from the work flow.
- **Corridor** Kitchens with a corridor plan have work centers on facing walls. This design is convenient for a single cook. If doorways are located at opposite ends of the kitchen, however, through-traffic can be disruptive.
- **U-Shaped** Kitchens with a U-shaped plan have work centers on three connecting walls, forming a U shape.

**Peninsulas and Islands**

Many kitchen plans also include a peninsula or an island. A **peninsula** is a countertop extension that is open on two sides and on one end. An **island** is a freestanding counter that is open on all sides and is often placed in the center of the kitchen. Peninsulas and islands often have storage space below the countertop. They sometimes have a sink, a cooktop, or a countertop that doubles as an eating area.

**Universal Access**

**Kinesthetic Learners**

**Design a Kitchen** Have students work in groups of three or four to create and present a model for an efficient kitchen floor plan that promotes good work flow. Plans should be based on one of the common floor plans and groups should illustrate how its design saves time, effort, and energy. Encourage students to include photos, drawings, or images from catalogs and magazines to help illustrate their plan. Have groups present their models to the class. (Students’ kitchen models will vary but should be based on one of the following kitchen plans: one-wall, L-shaped, corridor, U-shaped. For efficient work flow, the distance between any two work centers should be between 12 to 26 feet. Work centers should be away from through-traffic.)
Universal Design

To make kitchens easier and more pleasant to use, designers and appliance makers use universal design, also called lifespan design. Universal design is a way of making objects and spaces easy to use by everyone, regardless of age or physical ability. Kitchens created using universal design often have wider doorways and work areas to accommodate wheelchairs and walkers. They have adjustable countertops and work surfaces at various heights so that tasks may be completed while sitting or standing. They may also have open shelves and drawer spaces, which are more accessible than closed cabinets.

Small changes can make kitchens better suited to individual needs. For example:
- Replacing cabinet knobs with large handles can help people who have trouble grasping small objects.
- Kitchen sinks can be made 6½-inches deep.
- Sinks can be fitted with handles rather than knobs.
- Push-button or touchpad controls make operating microwaves, stovetops, and other appliances easier.
- Adding Braille labels to appliance controls can help people with limited vision.
- Carts with wheels can be used to move food and equipment.
- Tongs or grippers can be used to grab items.
- Stools or tall chairs can make working at counters more comfortable.
- Fire extinguishers can be located in an easy-to-reach place.

Contrast

In a kitchen, what is the difference between a peninsula and an island?

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Kitchen Components

Consider these three factors when selecting kitchen components, including cabinets, countertops, flooring, lighting, and appliances.

- **Washability**: Washable materials, such as metal and plastic, help you keep surfaces clean and free of harmful bacteria. Materials that hold dirt or require special care are hard to keep clean.

- **Moisture Resistance**: Moisture promotes the growth of mold and bacteria, so kitchen components should be moisture resistant or treated with a moisture-proof finish. Good ventilation from a window, exhaust fan, or exhaust hood over the range is important. An exhaust fan system can also limit the spread of mold spores and airborne particles of grease.

- **Heat Resistance**: Heatproof materials help keep kitchens safe. Use only heatproof objects near appliances that produce heat, such as a range or toaster oven. Keep flammable materials out of the kitchen.

Cabinets

Kitchen cabinets that rest on the floor under a countertop are called base cabinets. Standard cabinet size is 24 inches deep and 36 inches high. Wall cabinets attach to the wall above the countertop. Tall, floor-to-ceiling cabinets are called pantries. Pantries may include a shelf for a microwave oven. Cabinets can be made of solid wood or stainless steel, but laminates are the most popular option. A laminate is made of several layers of paper that are compressed and bonded with liquid plastic. Laminates resemble more costly materials but need less care. The sides of laminate cabinets are often made from compressed wood that is chemically treated to resist water.

Special features make cabinets handy for storing various foods and tools. Some cabinets have roll-out shelves, pop-up shelves, or vertical dividers for organizing baking sheets and trays. Pull-out ventilated baskets provide cool, dry storage for produce. Storage helpers such as door racks and shelves, stackable bins, and turntables make items easy to reach. Shelf liners make cabinet shelves easy to keep clean.

Storage Strategies

A well-organized kitchen has a logical place for everything. Store utensils where you use them most often. For example, store spatulas near the range and mixing spoons near the mixing bowls. When space is limited, store items that you rarely use outside the kitchen. Large, heavy equipment belongs in low cabinets, where bulky items are easy to reach and lift. Try to avoid stacking glass items, because they break easily. Be careful of high shelves. Use a stepping stool rather than reaching for items stored over your head. Items stacked on high shelves can fall on you. If you have limited space, stack lighter glass on top of heavier glass, and do not stack too many items together.

Keep tools with sharp parts in drawers where you can see and access them easily. Use child-restraint devices on drawers and cabinets that contain sharp or breakable objects or hazardous materials like toxic chemicals.

One way to avoid clutter is to hang pots and pans from the ceiling. In some kitchens, a metal rack with hooks for pots is suspended from the ceiling.

Countertops

Countertops come in many different materials, including wood, concrete, metal, tile, stone, and laminates. Some kitchens have more than one kind of countertop. For example, counters near sinks might be made of moisture-resistant glazed tile, and counters near the range might be made of heat-resistant granite.

Laminates are usually the most affordable countertop material. Wood and stone are usually the most costly. Some countertop materials need special care, which costs time and money. For example, wood countertops need to be oiled on a regular basis.

Countertops are valuable work space, and many cooks wish they had more counter space. A cart, a table, or a portable base cabinet can add more work space. Flip-down shelves, pull-out breadboards, and adjustable cutting boards that fit over the sink also increase work space. Keeping the work space you have clear of clutter is one of the best ways to increase work space. Store small appliances that you do not use often in a pantry or in cabinets.

Universal Access

**Visual Learners**

**Selecting Kitchen Components** With students, discuss the three factors that a consumer should consider when selecting kitchen components. List the three factors on the board. As a class, discuss the value of each. Ask students: Why would laminated fronts and moisture resistant sides be practical in kitchen cabinets?

(Answers will vary, but students may include the following: washability, helps keep surfaces clean and free of harmful bacteria; moisture resistance, to prevent growth of mold and bacteria; and heat resistance, helps keep kitchens safe from flammable materials. Between cooking moisture, possible spills, and spray from cleaning, kitchen cabinets are likely to get wet.)
**Floors and Walls**

Kitchen flooring should be durable and comfortable. To be easy on the feet, floors should be resilient, which means that they spring back under pressure. Vinyl and linoleum are resilient and do not need waxing or polishing, but they can be nicked by sharp objects. Stone floors are hard to damage but can be uncomfortable to stand on for long periods. Mats or throw rugs can make hard floors easier on the feet and joints. Mats and non-slip shoes also prevent kitchen falls. Hardwood floors are attractive in the kitchen, but are easily damaged by water.

Easy cleaning is the most important quality in kitchen wall coverings, especially near the sink and range. Wallpaper and paint are both practical. Vinyl-coated wallpaper can be wiped clean with a sponge. Paint with a semigloss finish helps to repel dirt. Ceramic tile is also a good choice, but cleaning the grout can be time-consuming.

**The Electrical System**

A kitchen electrical system should be safe and sufficient for the number of appliances you use. Make sure you have enough power coming into the kitchen, as well as sufficient outlets and a grounded electrical system. **Grounding** is the process of providing a path for electrical current to travel back through the electrical system, rather than through your body. Grounding helps to prevent shocks.

The National Electric Code requires grounded wires in new homes. In some states, homes without grounded wiring need to have it installed before the home can be sold. Outlets with three holes usually have grounded wiring. Check with an electrician to be certain, however. Grounded outlets accept three-pronged plugs from grounded appliances.

Keep electrical cords away from heat sources and blades. If a cord becomes frayed, have it repaired or replace it immediately.

If appliances work slowly or poorly or lights dim or go out when you use an appliance, the wiring does not provide enough power to meet your needs. Have a qualified electrician **assess**, or evaluate, the electrical system.

**Lighting**

Good lighting is essential for comfort and safety. Injuries can happen if you cannot see what you are doing. A ceiling light or lighted panels can provide good general lighting. Close work takes **task lighting**, bright, shadow-free light over specific work areas. Light fixtures mounted beneath overhead cabinets provide good task lighting for countertops. Recessed spotlights or track lights on the ceiling can be arranged to shine on specific spots in the kitchen. A dimmer switch lets you make the lighting as bright or as dim as you need. Indirect lighting from windows also brightens a kitchen.

**Kitchen Math**

**Equipment Budget**

Mandy is moving into her first apartment. The apartment comes with all the kitchen appliances she will need (refrigerator, stove, oven, and microwave). Mandy does not own any other kitchen supplies or tools, and she will need to purchase them. She cannot afford to buy everything, so you are going to help her to determine which equipment she will need the most, and develop a budget for those supplies.

**Math Concept**

**Working with Tables**

When using tables to track information and calculations, label the columns and be sure that the type of information within each column is consistent.

**Starting Hint**

Decide on at least 10 items Mandy will need. Use the Internet or advertisements to find out the prices of the items you select. Create a table in a spreadsheet program or on a piece of paper with a proposed budget. One column should list each item needed. The next column should list the price of each item. The third column should list the quantity of each item needed. The fourth column should list the total cost (price multiplied by quantity) of the item. Add all of the total costs together.

**NCTM Number and Operations**

Compute fluently and make reasonable estimates.

**Answer**

Answers will vary depending on which items are selected by each student. Students should select a variety of items described within the chapter, concentrating on the more important ones (such as basic pots and pans, knives, and measuring tools). Each student should prepare a table as described in the starting hint, being sure to label each column. Each student’s table should include a total cost for all the items.
Buying for the Kitchen

There are tens of thousands of items available for your kitchen. With some thoughtful planning, you can select the right tools and avoid wasting money on items that you do not really need.

Before You Buy

Be a smart shopper. First, consider whether you really need the item. Second, prioritize features. Third, do research to make an informed decision.

1. Consider your needs. Before you decide to buy, consider whether you really need the item. Ask yourself these questions:
   - Does the usefulness of this item justify the cost?
   - Can tools I already own perform the same tasks?
   - Do I have room to store the new item?

2. Prioritize features. Identify the most important features of the item based on your needs, wants, and price range.

3. Conduct research. The third step is to gather information about the product and about reliable dealers or retailers for the product. Ask students to share their answers.

Consumer Safeguards

Government agencies, manufacturers, and dealers help ensure that consumers are treated fairly. Look for these consumer safeguards as you shop.

EnergyGuide Label

The EnergyGuide label is a yellow label on large appliances that shows the average cost per year of using the appliance. EnergyGuide labels are required on refrigerators, freezers, dishwashers, and other major appliances. Use the EnergyGuide label to compare operating costs of different brands and models. You can also estimate energy expenses based on the cost of gas or electricity in your area.

EnergyGuide labels usually say whether an appliance has earned the Energy Star. The Energy Star symbol shows that an appliance meets strict energy efficiency guidelines set by the Environmental Protection Agency and U.S. Department of Energy.

Explore the Photo

Caption Answer It costs $22 to run the appliance for a year when used with an electric water heater and $17 when used with a natural gas water heater. The clothes washer’s energy use is less than most similar models.

Discussion Point out that the clothes washer has earned the Energy Star symbol. What does the Energy Star symbol indicate about the appliance? (The Energy Star symbol shows that the clothes washer meets strict energy efficiency guidelines set by the Environmental Protection Agency and the U.S. Department of Energy.)
Seals of Approval
Testing agencies give seals of approval to show that a product meets certain safety and performance standards. One widely recognized group is Underwriters Laboratories (UL). On electric appliances, the UL mark certifies that the appliance design is reasonably free from risk of fire, electric shock, and other hazards. The American Gas Association (AGA) seal attests to the design, performance, and reliability of gas appliances.

If you see a seal of approval from an organization that you do not recognize, do some research. A seal is only as reliable as the group that issues it.

Warranties
A warranty is a manufacturer’s guarantee that a product will perform as advertised. If you have problems with the product, the manufacturer promises to replace or repair it. Warranties have time limits, and coverage is usually conditional. For example, most warranties only cover damage that occurs when you are following the rules in the owner’s manual.

Service Contracts
A service contract is insurance that covers repair and maintenance of a product for a specific length of time. Service contracts are usually offered by dealers who sell appliances. Service contracts are often expensive, and they often do not cover the total cost of repairs and parts. Before signing up for a service contract, check the free warranty to see if you are already well covered.

Be a Critical Shopper
Comparison shopping helps you get the best value for your money. These strategies can help you make a smart buying decision, especially when shopping for an expensive item:
- Keep written notes as you shop. List your likes and dislikes for each product.
- Check items carefully for potential hazards and for features that guard against injuries, such as heatproof handles.
- Pick up tools, cookware, and appliances. Do they seem well made and a good fit?

Be Careful with Credit Cards
Credit cards can be helpful tools for making purchases. They can also create enormous debt. If you do not pay off your credit card each month, interest can accumulate. High interest rates and compounding interest can cause you to pay much more for an item than it originally cost.

Compounding interest means that any unpaid interest becomes part of your principal debt, which continues to have interest added to it each month. To avoid drowning in debt, pay off your monthly credit card balance. Choose a card with a low- or no-interest plan.

- Look at the owner’s manual. Will the item be easy to use and care for? What does the warranty cover?
- Compare prices. High-quality items with lots of features usually cost more, but may be worth the money. An item from a well-known brand may not be better than an item from an unfamiliar brand—do research to find out.
- Ask the dealer about additional costs, such as delivery and installation charges.

Paying for Your Purchase
Most major purchases are bought with credit. Credit is a financial arrangement that delays payment for an item. Using credit is more expensive than paying with cash, but you can use the product while you pay for it.

When you buy on credit, there may be a down payment, a portion of the purchase price that you must pay before you take the item home. The purchase price minus the down payment is the principal, the amount to be financed. You borrow the principal from a lender, such as a credit card company, a bank, or a finance company. The lender charges interest.

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Universal Access
Visual Learners
Critical Shoppers Ask students to create a presentation with presentation software titled “Be a Critical Shopper.” Encourage students to use both words and art in their presentations. Have students share their presentations with the class. (Presentations may include: take notes as you shop; check items carefully for potential hazards; pick up or hold products to see if they are well made.)

Answers will vary depending on the cost of the item chosen, but should show 3% monthly interest compounded over three months $(X)(1.03)(1.03)(1.03)$. 

Skill Practice
Guided Practice
Describe Ask students: What two downfalls should you watch out for when dealing with manufacturer warranties? (Answers will vary but may include: Both warranties and service contracts attempt to ensure proper performance of equipment or a product. Warranties are offered by manufacturers at no additional charge, while time limits and conditions. Service contracts, on the other hand, are expensive, usually offered by dealers who sell appliances, and cover repair and maintenance cost for a piece of equipment over a period of time but not the total cost of repairs or parts. Have students share their paragraphs with the class.)

Teach cont.
Kitchen Appliances

Appliances are devices powered by gas or electricity that help you prepare food and clean up afterwards. A kitchen typically has three major, or large, appliances: a range, a refrigerator-freezer, and a dishwasher. Most kitchens also have several small appliances including a blender, food processor, electric mixer, toaster, toaster oven, electric skillet, slow cooker, broiler/grill, and rice cooker.

Ranges

The conventional range is a single, free-standing unit consisting of a cooktop, an oven, and a broiler. Cooking heat is generated by heating units. A heating unit is an energy source in the range. Most ranges have either gas or electric heating units. Dual-fuel ranges use electricity for the oven and gas for the cooktop.

### Skill Practice

**Guided Practice**

**List** Have students list three ways to protect an appliance purchase. (Answers will vary but may include: keep the warranty, owner’s manual, and sales receipt; file these documents together in a safe place; fill out and send in the warranty registration card.)

**Describe** Ask students to describe why it is important to read the owner’s manual before using a new appliance. What should you do if the appliance does not work correctly after testing it? (Answers will vary but may include: Read the owner’s manual before using the new appliance so you know how to use it properly. Then test the appliance to make sure it works. If it does not work properly, return it to the store or call the dealer.)

**Write** Have students write a detailed step-by-step procedure for protecting the purchase of a new blender. (Answers will vary but may include: 1. Keep the warranty, owner’s manual, and sales receipt; 2. File warranty, owner’s manual, and sales receipt together in a safe place; 3. Fill out and send in the warranty registration card to validate the warranty; 4. Read the owner’s manual; 5. Test the blender to make sure it works. 6. If the blender does not work, return it to the store or call the manufacturer. Have students share their steps with the class.)

**Reading Check**

Describe What resources can you use to conduct research about products for the kitchen?

**SAFETY MATTERS**

### Prevent Carbon Monoxide Poisoning

The natural gas that fuels gas ranges requires oxygen to burn completely. Incomplete burning creates carbon monoxide, a colorless, odorless gas that is a common cause of fatal poisoning.

Signs of incomplete burning include a pilot light that burns yellow instead of blue, and a buildup of soot near the range. To ensure a good air supply to a gas range, keep air vents open. Do not line the burner bowls with foil. If a burner lights only partially, try clearing the holes with a metal wire or paper clip. Do not use toothpicks, which can break and plug the holes.

**What Would You Do?** For the summer, your family has rented a cabin with an old gas range. What steps would you take to make sure your family will be safe from carbon monoxide poisoning?

### Interest

Interest is a fee for the loan expressed as a percentage of the amount borrowed.

When you buy something on credit, you also agree to pay the fee that a creditor adds to the purchase price. For example, if you do not pay your credit card bill in full every month, you will be charged interest on the amount you have not paid.

Interest rates can vary greatly. By law, lenders must state the annual percentage rate (APR), or the yearly rate of interest that you must pay on the principal. Annual percentage rates can be very high, up to 30 percent a year. Interest can add up quickly, making the total price of an item much higher than you originally planned.

Lenders may also charge fees, such as a service charge or insurance premiums. Fees plus interest make up the finance charge, the total amount you pay for borrowing. The finance charge is written as a dollar figure, not a percentage. Monthly payments usually equal the total cost (principal plus finance charges) divided by the number of months that you have to pay off the account.
You control the heat on a cooktop with dials, buttons, or touchpads marked with settings from low to high. You control the heat in an oven with a dial, button, or touchpad marked with temperatures. Settings range from warm, which is below 200°, to broil, which is about 500°. The broiler cooks and browns foods using direct heat.

Ovens are available with many different features. Some ovens have a self-cleaning cycle that uses intense heat to burn off spatters and spills. Some ovens have digital displays instead of dials, and some are built with racks to hold oversize pans. Some have pull-out warming drawers that create a slightly humid environment that helps to raise yeast breads or to hold cooked foods safely without drying them out.

Gas Ranges

The heating units in a gas range are called burners. Burners heat with a visible flame that is easy to turn up or down. Newer ranges use an electronic spark that ignites the gas when you turn the burner on. Older ranges use pilot lights, small flames that burn continuously. When you turn the burner on, the pilot light ignites the gas.

Some gas ranges have sealed burners that are easy to clean. Others have one continuous grate so that cookware can slide from one burner to another. The oven and broiler in a gas range are in separate compartments. The broiler is usually below the oven.

Electric Ranges

The heating units in an electric range are called elements. Elements stay hot longer than gas burners, so many electric ranges have a warning light that stays on until the cooktop has cooled.

Electric ranges come in two basic styles. One style has exposed metal coils that turn red when the heating unit is on. The other style has a glass-ceramic smoothtop covering ribbon heating elements. Some smoothtops have a bridge that connects several heating elements, which works well for oblong pots and pans. Some smoothtops also have a low-heat, warming zone to keep food hot without burning. All smoothtops are easy to clean. Unlike gas ranges, electric ranges do not have separate broiler compartments. A heating element at the bottom of the oven bakes food. An element on the ceiling of the oven comes on for broiling.

Convection Ovens

Ovens use convection currents, which are created by the natural tendency of hot air to rise. A convection oven also has a fan that circulates heated air to equalize temperatures throughout the oven. The result is faster and more even cooking and browning.

Some ranges combine convection and convection cooking. These powerful models are similar to those used in professional kitchens. Food cooks twice as fast, which helps it retain moisture and flavor.

Explore the Photo

Caption Answer The heating units on electric ranges use either heated metal coils or ribbon-shaped heating elements under a glass-ceramic layer, while the heating units on gas ranges use open flame.

Discussion Ask students: How is the broiler feature on an electric range different from a broiler on a gas range? (Answers will vary but may include: Unlike gas ranges, electric ranges do not have separate broiler compartments. An element on the ceiling of the oven comes on for broiling.)
Microwave Efficiency

Point out to students that microwaves have many advantages. Divide students into small groups. Ask them to brainstorm three ways that microwave features can help to increase efficiency in the kitchen. Have group members work together to create a graphic organizer to illustrate their answers. Ask students: What is one downfall of microwave cooking? (Answers will vary but students may say that microwaves can cook food faster, heat foods quickly, defrost foods quickly, or cook foods automatically by weight or type. A microwave cannot brown or bake food like a conventional range, which makes it unsuitable for cooking certain foods, or achieving certain effects. If a microwave does not have a turntable to rotate food, it may result in uneven cooking. Have groups share their organizers with the class.)

How Microwaves Work

Students with learning disabilities may require additional study aids, charts, or diagrams to get the most out of the material. Use a diagram to illustrate how a microwave produces heat that cooks food. Explain that a microwave converts electricity into microwaves, a form of energy that travels through space like radio waves. A fanlike device called a stirrer blade distributes the microwaves through the oven, where they bounce off the walls and floor. Microwaves pass through paper, glass, and plastic. The molecules in food, however, absorb the microwaves and vibrate against each other, which produces friction. This friction produces heat that cooks the food up to four times faster than in a conventional oven.

Microwave Ovens

A microwave oven has a magnetron (‘mag-nar-tran) tube that converts electricity into microwaves, a form of energy that travels through space like radio waves. A fanlike device called a stirrer blade distributes the microwaves through the oven, where they bounce off the walls and floor. Microwaves pass through paper, glass, and plastic. The molecules in food, however, absorb the microwaves and vibrate against each other, which produces friction. This friction produces heat that cooks the food up to four times faster than in a conventional oven.

Microwave ovens vary in size from about ½ cubic foot to 2 cubic feet. Large models produce more microwaves and cook food faster. Microwave ovens have power ratings measured in units called watts, which show how much electricity they use. A compact microwave oven might generate 600 watts of electricity. Large versions produce up to 1,100 watts.

Most microwave ovens sit on a countertop. Some are built into a wall or mounted over a range. Most newer microwaves have turntables that rotate food for more even cooking. Some have racks that increase oven capacity. Many microwave ovens have presets that can cook food automatically by weight or type. Some have sensors that adjust cooking conditions based on the amount of moisture left in a food.

Refrigerator-Freezers

Refrigerator-freezers create cold storage using a chemical blend called refrigerant. The refrigerant expands into a gas as it circulates in the refrigerator walls. The gas absorbs heat, which escapes through coils on the outside of the refrigerator.

Full-size refrigerator-freezers range in size from 10 to 30 cubic feet. Most have two doors, one for the refrigerator and one for the freezer. The freezer may be on the top, the bottom, or the side. The freezer maintains a temperature of 0°. It can freeze fresh foods and store foods that are already frozen.

Dishwashers

Dishwashers save time and tend to use less water than hand-washing. Built-in dishwashers fit under a countertop and attach to a hot water line, drain, and standard outlet. Dishwashers on wheels connect to the sink faucet and drain into the sink. You can also buy small, in-sink dishwashers that fit in a double sink.

Most dishwashers have several wash cycles, from a basic rinse to a sanitizing cycle that heats the water to above 140°. Popular dishwasher features include adjustable racks, a food disposer to keep food from resettling on clean dishes, and insulation for quiet operation. Dishwashers with a delayed-start feature let you program the washer to start at a later time.

Fast and Even

A convection oven has a fan that forces air to circulate around food. What are the benefits of a convection oven?
Small Appliances

Small appliances are electrical devices that perform a simple task, such as toasting or blending. Small appliances can save time and are cheaper and use less energy than major appliances.

Figure 21.2 shows some small appliances. Small appliances exist for almost every kitchen task, from dicing onions to blending ice cream. Accumulating appliances can create clutter, however. Before buying an appliance, think about how often you will really use it.

Useful small appliances include:

Toaster A toaster browns slices of bread and small flat pastries on both sides at the same time.

Toaster Oven A toaster oven heats, browns, or bakes small amounts of food. Some toaster ovens can broil.

Electric Skillet An electric skillet fries, roasts, steams, and bakes. Electric skillets have thermostatic temperature control.

Slow Cooker A slow cooker is a deep pot with a heating element in the base that cooks food slowly for hours. Slow cookers are convenient for one-dish meals.

Broiler/Grill A broiler/grill is used to grill food indoors.

Rice Cooker/Steamer A rice cooker cooks rice perfectly and can also be used to steam vegetables.

List

What are the three major appliances in a typical kitchen?

Chapter 21 Equipping the Kitchen 325
Food Preparation Tools and Equipment

In addition to appliances, a well-equipped kitchen has a variety of tools and cooking and serving equipment such as cookware, bakeware, and handheld tools. Cookware and bakeware can be made from many different types of materials, including aluminum, copper, cast iron, and stainless steel. While most cookware and bakeware is cylindrical, the size and shape of a cooking vessel is determined by how it will be used.

Cookware and Bakeware

- **Cookware** is equipment for cooking food on top of the range.
- **Bakeware** is equipment for cooking food in an oven. Both are available in a variety of materials. Each material has advantages, disadvantages, and rules for use and care as you can see in Figure 21.3. Cookware and bakeware are major investments that should last for years. High-quality products have durable materials and finishes, heat-resistant handles, heavy and seamless construction, smooth edges, flat bottoms, and secure lids.

### Figure 21.3 Cookware and Bakeware Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Use and Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aluminum</strong></td>
<td>• Conducts heat quickly and evenly if heavy.</td>
<td>• Warps, dents, and scratches easily.</td>
<td>• Wash by hand, not in dishwasher.</td>
</tr>
<tr>
<td></td>
<td>• Lightweight and durable.</td>
<td>• Darkens and stains, especially in dishwasher.</td>
<td>• Cool before washing to prevent warping.</td>
</tr>
<tr>
<td></td>
<td>• Comes in a variety of finishes.</td>
<td>• Pins if used with salty or acidic foods.</td>
<td>• Avoid sharp tools like knives and beaters.</td>
</tr>
<tr>
<td></td>
<td>• Comparatively inexpensive.</td>
<td></td>
<td>• Do not use to store salty or acidic foods.</td>
</tr>
<tr>
<td></td>
<td>• May be clad (covered) with stainless steel for benefits of both materials.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anodized Aluminum</strong></td>
<td>• Maintains even, consistent cooking temperature.</td>
<td>• Heavy.</td>
<td>• Wash by hand, not in dishwasher.</td>
</tr>
<tr>
<td>(coated with a hard protective finish)</td>
<td>• Durable.</td>
<td>• Can be expensive.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Will never peel, chip, or crack.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Less reactive to salty or acidic foods than non-anodized aluminum.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Anodizing makes aluminum easier to clean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Resists sticking and scratching.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stainless Steel</strong></td>
<td>• Durable, tough, hard.</td>
<td>• Conducts heat unevenly; thick aluminum or copper core bottom helps.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Lightweight.</td>
<td>• Stains when overheated or from use with starchy foods.</td>
<td>• Use stainless steel cleaner to remove stains.</td>
</tr>
<tr>
<td></td>
<td>• Will not dent easily.</td>
<td>• Can develop hot spots.</td>
<td>• Do not use to store salty or acidic foods.</td>
</tr>
<tr>
<td></td>
<td>• Can withstand use of metal utensils.</td>
<td>• Pins if salty or acidic foods used.</td>
<td></td>
</tr>
</tbody>
</table>

**Caption Answer** Glass, stoneware, and enamel.

**Discussion** Ask students: which kinds of cookware and bakeware materials are dishwasher safe? (Answers will vary but may include: glass-ceramic, enamel, microwave safe plastic, some non-stick cookware.)
<table>
<thead>
<tr>
<th>Material</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Use and Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>• Excellent heat conductor.</td>
<td>• Discolor easily.</td>
<td>• Dry after washing.</td>
</tr>
<tr>
<td></td>
<td>• Heats quickly and evenly and cools quickly.</td>
<td>• Discolor food and may create toxic compounds.</td>
<td>• Do not scour inside—the thin lining can be worn away.</td>
</tr>
<tr>
<td></td>
<td>• Attractive.</td>
<td>• Must be lined with tin, silver, or stainless steel.</td>
<td>• Expensive.</td>
</tr>
<tr>
<td>Cast Iron</td>
<td>• Distributes heat evenly.</td>
<td>• Heavy.</td>
<td>• Polish with copper cleaner or mixture of flour and vinegar.</td>
</tr>
<tr>
<td></td>
<td>• Retains heat well.</td>
<td>• Heats and cools slowly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Good for browning, frying, and slow cooking.</td>
<td>• Rusts if not wiped dry after washing.</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>• Attractive.</td>
<td>• Breaks easily, especially if exposed to extreme temperature changes.</td>
<td>• Some can be used only on the cooktop, others only in the oven.</td>
</tr>
<tr>
<td></td>
<td>• Can be used for cooking and serving.</td>
<td>• May need a wire grid if used on an electric cooktop.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Easy to clean.</td>
<td>• Holds heat, but does not conduct heat well.</td>
<td>• Do not plunge hot pan into cold water or put into the refrigerator.</td>
</tr>
<tr>
<td>Glass-Ceramic</td>
<td>• Goes from freezer to oven or cooktop.</td>
<td>• May break if dropped.</td>
<td>• Used for roasting, broiling, and baking in conventional or microwave ovens.</td>
</tr>
<tr>
<td></td>
<td>• Durable, attractive, heat-resistant.</td>
<td>• May heat unevenly.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Dishwasher-safe.</td>
<td>• May develop hot spots.</td>
<td>• Do not plunge hot pan into cold water or put into the refrigerator.</td>
</tr>
<tr>
<td></td>
<td>• Can be used for cooking and serving.</td>
<td>• Holds heat well.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Retains heat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stoneware</td>
<td>• Attractive.</td>
<td>• Breaks easily.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Dishwasher-safe.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can be used for cooking and serving.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Retains heat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enamel</td>
<td>• Attractive.</td>
<td>• Chips easily.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td>(glass fused to a base metal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can be used for cooking and serving.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro wave-Safe Plastic</td>
<td>• Durable.</td>
<td>• Can be scratched by sharp kitchen tools.</td>
<td>• Use nonabrasive cleaners and nylon scrubbers.</td>
</tr>
<tr>
<td></td>
<td>• Dishwasher-safe.</td>
<td>• Some cannot be used in conventional ovens.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stain-resistant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Easy to clean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonstick Finishes</td>
<td>• Keeps food from sticking—fat may not be necessary for browning, sautéing, or frying.</td>
<td>• Easily scratched by metal kitchen tools or abrasive cleaners.</td>
<td>• Follow manufacturer’s directions. Some cannot be washed in dishwasher.</td>
</tr>
<tr>
<td></td>
<td>• Easy to clean.</td>
<td>• High heat may stain finish or warp pan.</td>
<td>• Use nonmetal tools to prevent scratching.</td>
</tr>
</tbody>
</table>

**Figure 21.3** Cookware and Bakeware Materials (continued)

**Universal Access** English Language Learners

**Construct Sentences** Ask English language learners to write five sentences that describe or compare some of the cookware and bakeware in Figure 21.3. An example might be: Although stoneware cookware is attractive, it can break easily. Individually evaluate students’ sentences.
**Types of Cookware**

Cookware comes in two basic types: pots and pans. Pots are deep containers that usually come with a lid. Pans are broad, shallow containers that often come without a lid. Pots and pans come in different shapes and sizes for different uses, as shown in Figure 21.4.

- **Skillet** A skillet, also called a frying pan, is a shallow pan for browning and frying foods. Skillets come in many sizes and often have matching lids. A griddle is a skillet without sides.

- **Saucepan** A saucepan is a deep pan with one long handle. Large saucepans may have a small handle on the opposite side as well. Saucepans are usually made of metal or heatproof glass, and they come in sizes ranging from ½ quart to 4 quarts. Many saucepans come with a lid. They are used for simmering or boiling.

- **Pot** A pot is larger and heavier than a saucepan. Pots range in size from 3 to 20 quarts. They have two small handles, one on each side, for lifting. Most pots come with lids.

- **Double Boiler** A double boiler is a small saucepan with a lid that fits into a larger saucepan. You simmer water in the lower pan to gently heat food in the upper pan. Double boilers are useful for heating foods that scorch easily, such as chocolate, sauces, and cereals, and for keeping food warm over a long period of time.

**Figure 21.4 Types of Cookware**

**Kitchen Basics** You can buy cookware in matching sets or as individual pieces. A set of quality cookware is a good investment for a beginning cook. Which cookware would you use for making soup? Which would you use for scrambling eggs?

- **Stock Pot** A large, deep pot for making stock, soups, and pasta.
- **Saucepan** A pan with a handle for sauces and liquids.
- **Metal Steamer** A two-piece pot for steaming vegetables.
- **Dutch Oven** A heavy-duty pot for the range or oven.
- **Skillet** A pan for browning and frying.
- **Pressure Cooker** A pot with an airtight seal for cooking with pressure.
- **Double Boiler** A small saucepan used to simmer foods that scorch easily.

**Caption Answer** A stockpot would work well for soup and a skillet would work well for scrambling eggs.

**Discussion** Ask students: Which cookware would you use to keep a cheese sauce warm for the duration of a dinner party? (double-boiler)

**Mini Clip Reading: Another Point of View**

Emily M. Schell, Ed.D., educator and author, discusses standards-based instruction.
Dutch Oven
A Dutch oven is a heavy pot with a close-fitting lid that can be used on the range or in the oven. Some Dutch ovens have a rack to keep meat and poultry from sticking to the bottom.

Steamer
A steamer is a covered saucepan with an insert that holds food over a small amount of boiling water. Holes in the insert allow steam to pass through and cook the food. Steamer inserts are made of metal or bamboo.

Pressure Cooker
A pressure cooker is a heavy pot with a locked-on lid and a steam gauge. Steam builds inside the pot, creating very high temperatures that cook food quickly.

Types of Bakeware
Baking pans come in a wide variety of shapes, sizes, and materials, as shown in Figure 21.5. The type and quality of the bakeware you choose affects the texture and appearance of the finished product. You may need to adjust baking times and temperatures to fit to the pan you use. Basic bakeware includes:

Loaf Pan
A loaf pan is a deep, narrow, rectangular pan that is used for baking loaves of bread or meat.

Cookie Sheet
A cookie sheet is a flat, rectangular pan with two or three open sides that is used to bake cookies and biscuits.

Roasting Pan
A heavy pan for meat and poultry.

Caption Answer
You would use the roasting pan to cook meat in an oven.

Discussion
Ask students: Which of these items would be used to prepare meat dishes? (Answers will vary but may include: roasting pan, pie pan.)
**Baking Sheet** A baking sheet is similar to a cookie sheet, but is about 1 inch deep. Baking sheets are used for sheet cakes, pizza, chicken pieces, and fish.

**Cake Pan** A cake pan is a round or square pan that is a few inches deep and about 8 to 10 inches across. Cake pans also come in novelty shapes.

**Tube Pan** A tube pan is a deep, one- or two-piece cake pan with a center tube. Tube pans are used for angel food cakes and sponge cakes.

**Springform Pan** A springform pan is a round pan with a removable bottom. The side is latched, which allows you to open it gently to remove cheesecake or another delicate dessert.

**Pie Pan** A pie pan is a round pan with slanted sides. Tart pans are similar in shape, but are smaller.

**Muffin Pan** A muffin pan, also called a muffin tin, holds 6 to 12 muffins, rolls, or cupcakes.

**Roasting Pan** A roasting pan is a large, heavy oval or rectangular pan. Roasting pans are used for roasting meats and whole poultry.

**Casserole** A casserole is used for baking and serving main dishes and desserts. Casseroles come in many different sizes, with or without lids.

**Aluminum Foil Pan** Aluminum foil pans are lightweight recyclable pans.

**Handheld Tools**

Handheld implements help you measure, cut, mix, and cook food. (See Figure 21.6.) Handheld tools are made from a variety of materials including wood, plastic, glass, metal, and heat-resistant silicone.

**Measuring Tools**

Measuring tools help you follow recipes exactly. The basic measuring tools include:

- **Dry Measuring Cups** Dry measuring cups come in a set of several sizes, usually ¼ cup, ½ cup, ¾ cup, and 1 cup. A metric set includes 50 mL, 125 mL, and 250 mL measures.

- **Liquid Measuring Cups** Liquid measuring cups are transparent glass or plastic cups with measurements marked on the side. They are

---

**Caption Answer** Dry measuring cups measure in fractions of a cup, while liquid measuring cups measure in ounces. Liquid measuring cups also have headspace, are usually clear, and have a pour spout.

**Discuss** Point out to students that dry measuring cups come in standard and metric sizes. Ask students: When would you use measuring spoons to measure liquids instead of measuring cups? (for smaller amounts)
typically marked in fluid ounces, in fractions of a cup, and in milliliters. Liquid measuring cups have a headspace of about ¼ inch, which helps prevent spills when you move a filled cup. A spout helps with pouring. Common sizes are 1 and 2 cups.

**Measuring Spoons** Measuring spoons usually come in sets of four or five. Standard sets include four sizes: ¼ teaspoon, ½ teaspoon, 1 teaspoon, and 1 tablespoon. Metric sets include five measures: 1 mL, 2 mL, 5 mL, 15 mL, and 25 mL.

**Kitchen Scales** Kitchen scales measure food by weight rather than volume. Both spring scales and digital, plug-in scales are available.

**Cutting Tools**
Knives are the basic cutting tools in the kitchen. A quality knife has a sturdy handle firmly attached to the blade by at least two rivets, or bolts with heads. Peelers, shears, and choppers also help with cutting tasks in the kitchen. It is important to choose the right cutting tool for the job.

**Nonstick Technology**
The nonstick finish that coats some bakeware and cookware is the most slippery substance known. If it is so slippery, how do manufacturers make it stick to the pan? The process involves both mechanics and chemistry. Cookware is coated with a film of microscopic grains of ceramic, and sometimes titanium. This mix is liquified and sprayed on with force, creating a textured surface. An adhesive layer is applied next, which also helps hold the top, nonstick surface coat. The cookware is baked at 800° for about five minutes, melding the layers.

**Investigate** Nonstick technology makes cooking easier. Conduct research to learn how cooks prevented food from sticking before nonstick technology was invented.

**NCSS VIII A Science, Technology, and Society** Identify and describe both current and historical examples of the interaction and interdependence of science, technology, and society in a variety of cultural settings.

**Kitchen Basics** Kitchen knives include a paring knife, utility knife, chef’s knife, bread knife, and cleaver. How does the bread knife differ from the other knives shown here?

**Explore the Photo**

**Caption Answer** The bread knife is the only knife shown here with a serrated blade. The serrations make it easier to cut through bread.

**Discuss** Ask students: How is a utility knife different from a slicing knife? (Answers will vary but may include: A utility knife is smaller and used to cut small foods. A slicing knife is a large knife that is used to cut meat and poultry.)

**Writing Support**
**Cause and Effect Paragraph**
**Standard vs. Metric Measurements** Point out to students that measuring tools come in standard sets and metric sets and that conversions between the two are not always exact, especially when larger amounts of an ingredient are needed. What are some of the consequences when ingredients are not exact? Write a cause-and-effect paragraph in which you explore one conversion between the two sets of measuring tools and its consequences. The inexact conversion will be the cause, and the consequences will be the effect. (For tips on writing cause-and-effect paragraphs see page 314. Paragraphs will vary but should show how one thing leads to another. Students must explain why an effect is the result of a cause. Paragraphs should be focused on only one cause and one effect, free from grammatical and spelling errors, and use specific language.)
Here are some common cutting tools:

**Bread Knife** A bread knife has a serrated or saw-tooth blade for slicing bread.

**Slicing Knife** A slicing knife is a large knife used for meat and poultry.

**Chef’s Knife** Also called a French knife, a chef’s knife has a large, triangular blade for slicing, chopping, and dicing.

**Utility Knife** A utility knife is a small slicing knife that is good for cutting small foods such as tomatoes and apples.

**Boning Knife** A boning knife has a thin, angled blade suited for removing bones.

**Paring Knife** A paring knife is a small knife for removing the peel from fruits and vegetables.

**Vegetable Peeler** A peeler has a swivel blade for quickly paring fruits and vegetables.

**Kitchen Shears** Shears are powerful scissors used for snipping, trimming, and cutting.

**Food Chopper** A food chopper is a small food processor. Choppers come in various sizes, from small handheld nut choppers to large electric models with several blades.

**Food Grinder** A food grinder grinds meat, poultry, nuts, and other foods. Grinders can also be used for grating and shredding.

**Pizza Wheel** A pizza wheel is a round revolving blade on a handle for slicing pizza and cutting rolled-out dough.

**Cutting Board** A cutting board protects the countertop and the knife. Plastic cutting boards resist bacteria better than wood boards.

### Keeping Knives Sharp

Knives need regular sharpening on a sharpening stone. You can also keep most conventional knives sharp longer with a sharpening steel, a long, steel rod with a handle. Use the steel regularly, following these directions:

1. Hold the handle of the steel in your left hand (or in your right hand if you are left-handed). Place the point straight down, very firmly, on a secure cutting board. Hold the knife by the handle, blade down, with your right hand (or your left hand, if you are left-handed).

2. Hold the knife blade at a 20-degree angle against the side of the steel. The knife blade and steel should touch near the handles.

3. Draw the blade down the steel and toward you, keeping a 20-degree angle to the steel. Use gentle pressure.

4. When the tip of the knife reaches the tip of the steel, repeat the process, holding the knife against the steel. Draw the blade down along the steel four or five times, alternating right and left sides.

### Mixing Tools

Spoons, bowls, whisks, and other small tools like the ones shown in Figure 21.7, make quick work of mixing ingredients.

**Wire Whisk** A whisk is an instrument made of wire loops that are held together by a handle. Whisks are used for stirring, beating, and whipping.

**Rotary Beater** A rotary beater mixes and whips food more quickly and easily than a spoon or whisk. Beaters are great for whipping egg whites and cream.

**Sifter** A sifter is a canister with a blade or ring inside that forces dry ingredients like flour
through a wire screen at the bottom to make finer particles.

**Scrapper** A scraper quickly scrapes food from bowls, pans, and other containers. Scrapers can also be used for light mixing.

**Cooking and Baking Tools**

A variety of hand tools, as shown in Figure 21.8, help with a variety of cooking and baking tasks.

**Turner** A turner, or spatula, lets you lift and turn flat foods, such as pancakes on a griddle or cookies on a cookie sheet.

**Tongs** Tongs are like giant tweezers for gripping and lifting foods.

**Baster** A baster is a long tube with a bulb on the end that is used to suction up meat juices or other sauces for basting food that is cooking.

**Ladle** A ladle is a large, angled spoon with a long handle. It is used for dipping hot liquids from a pan.

**Pastry Brush** A pastry brush lets you brush a sauce foods or glazes on pastry.

**Rolling Pin** A rolling pin helps you roll out dough for biscuits, cookies, and pies.

**Wire Cooling Rack** A wire cooling rack holds baked goods safely until they cool.

**Potholder/Oven Mitt** Potholders and mitts are thick cloth pads that protect your hands while you handle hot containers.

**Food Thermometers**

Food thermometers measure a food’s exact temperature, which helps with safe and successful cooking. Some thermometers measure internal temperature, which reveals whether

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**Quiz**

Ask students to answer the following questions:

1. Define both peninsula and island. (A peninsula is a countertop extension that is open on two sides and on one end. An island is a freestanding counter that is open on all sides and is often placed in the center of the kitchen.)

2. What is grounding, and why is it important? (Grounding is the process of providing a path for electrical current to travel back through the electrical system, rather than through your body. Grounding helps to prevent shocks.)

3. With which tool are loaves of bread and meat usually cooked? (loaf pan)
meats, poultry, egg dishes, and leftovers are safely cooked. Choose a thermometer that is easy to read and that has a mechanism to calibrate, or adjust, the gauge for accuracy. Types of thermometers are described on the next page.

**Oven-Safe Thermometer** An oven-safe thermometer has a large dial or indicator on a probe, which you stick into roasts or whole poultry and leave in during cooking. Oven-safe thermometers do not work with small pieces of food. Some oven-safe thermometers are designed for microwave ovens.

**Instant-Read Thermometer** An instant-read thermometer has a probe with a dial or digital display. You stick the thermometer into the food and get an instant temperature reading.

**Disposable Indicator** A disposable indicator is a heat sensor that changes color when food reaches the proper internal temperature. You use it once, then throw it away.

**Pop-Up Thermometer** A pop-up thermometer is sometimes used in turkeys or roasting chickens sold by food processors. It pops up when food reaches the proper internal temperature.

**Specialty Thermometers** Specialty thermometers are helpful for certain cooking methods. A candy thermometer, for example, clips to the side of a pan to measure the temperature of candy syrup as it cooks. A frying thermometer is used to record the temperature of oil in a deep-fat fryer.

**Cleanup Supplies**

Keep food safe by cleaning tools and equipment after every use. Disease-causing bacteria can grow even in tiny bits of food. Most tools can be washed in hot, soapy water. Use a towel to thoroughly wipe off tools and appliances that cannot be immersed in water. Check the owner’s manual for cleaning instructions. You will need these cleanup supplies in the kitchen:

**Dishcloths** Use dishcloths for washing dishes and cleaning work surfaces. Have at least a

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**Critical Thinking**

Is it Done? After students finish reading about the different types of food thermometers and the foods each is typically used for, point out that a thermometer can help to ensure the quality of the foods you prepare. Ask students: Why is using food thermometers important when cooking, particularly when cooking meats, poultry and egg dishes? Why is color not a reliable indicator for doneness? Have students write a paragraph in response to these questions. (Responses will vary but should focus on the importance of cooking meats and poultry to the correct temperature to kill bacteria in food and prevent foodborne illness. Color is not reliable because some foods may change color before they reach the correct temperature. A food thermometer is the only reliable way to ensure the correct temperature of foods.)

**Writing Support**

**Cause and Effect Paragraph**

Eliminate Bacteria Point out to students that maintaining and cleaning a kitchen properly plays an important role in food safety. What are some of the consequences of failing to ensure that the tools and equipment used in the kitchen are cleaned after every use? Write a cause-and-effect paragraph in which you explore one piece of equipment that is not cleaned after every use and the consequences. Failure to clean the tool or equipment will be the cause, and the consequences will be the effect. (For tips on writing cause-and-effect paragraphs see page 314. Paragraphs will vary but should show how one thing leads to another. Students must explain why an effect is the result of a cause.)

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**Explore the Photo**

**Caption Answer** An oven-safe thermometer can be left in food as it bakes in a hot oven. An instant-read thermometer is inserted into hot food and then immediately removed.

**Discussion** Point out to students that some thermometers are meant to stay in foods while cooking, and others are not. Ask students: How is a pop-up thermometer different from an instant read thermometer? (A pop-up thermometer pops up when food reaches the proper internal temperature. An instant-read thermometer has a probe with a dial or digital display and you stick the thermometer into the food and get an instant temperature reading.)
dozen dishcloths so that you can use a fresh one every day.

**Dishtowels**  Use dishtowels, which are larger than dishcloths, to dry dishes and equipment. Have plenty on hand and keep them clean.

**Scouring Pads**  Use scouring pads to scrub hard-to-clean spots on pots and pans. Steel wool pads work for cooked-on food, but will scratch some surfaces. Nylon pads are needed for some metals and finishes.

**Bottle Brush**  Use a bottle brush to clean the inside of jars, bottles, and similar containers.

**Dish Drainer**  Use a dish drainer to let dishes air-dry.

### Grills and Grilling Tools

Most outdoor grills have a fire bowl, which is a box- or bowl-shaped metal container that holds the burning charcoal. A metal grate fits over the fire bowl to hold food over hot coals.

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**Caption Answer**  A basting spoon is used to scoop pan drippings from a pan so that they can be poured back over a roasting food, like a turkey. A turner is used to flip flat objects, like hamburgers. A baster is used to suck up pan drippings and then release them back over the top of a roasted food, like a turkey or chicken. Tongs are used to grab food from the grill and move it or remove it when it is finished cooking.

**Discussion**  Ask students: What dishes could you not prepare or not prepare well if the only kitchen utensils available to you were a baster and tongs? (Answers will vary but may include: It would be difficult to lift foods that you would want to flip, such as pancakes, or ladle stews or hearty soups into bowls.)
Grills with a fire bowl and grate come in many variations, from a portable hibachi to a 6-foot stretch grill. Kettle grills stand on long metal legs. Other models are set into a cart-like base with a work table attached. Some have domed lids to help maintain even temperatures.

Gas grills use propane gas, which comes in a heavy tank that attaches to the base of the grill. Gas grills are more expensive than charcoal grills. Some cooks prefer the taste imparted by grilling with charcoal. The advantage of a gas grill is that you do not have to wait for coals to warm before cooking. A smoker is a covered grill that burns aromatic wood chips, flavoring food as it cooks.

A good grill is stable and durable. A grill’s legs should be level, and the fire bowl should be evenly balanced on the legs. All parts of the grill should be securely attached. Heavy, stainless steel grills withstand rust, wear, and tear. Quality grilling tools make outdoor cooking safer and easier. Like other kitchen tools, clean them after each use.

Handy items for grilling include:
- A basket for grilling vegetables.
- Long metal skewers, thin rods with one pointed end, to make meat, fruit, or vegetable kebabs.
- A work table near the grill to hold tools, food, and other supplies.
- Long tongs for gripping, placing and turning food on the grill.
- A long metal spatula for flipping food such as hamburgers.
- A baster or spray bottle to put out flare-ups.
- Fireproof mitts.
- A wire grill brush with a slot in the end for scraping the grate.
- Heavy-duty aluminum foil to line the grill, catch grease, and hold small foods on the grate.

As with all kitchen tools and equipment, the best grills and grilling tools are high in quality and built to last.

### Light and Healthy Recipe

#### Slow-Cooked Lasagna

**Ingredients**

- 1 pound Italian sausage
- 1 cup Diced onion
- 2 cups Water
- 1 jar (15 oz.) Prepared spaghetti sauce
- ½ cup Fat-free ricotta cheese
- 3 cloves Minced garlic
- 1 tsp. Chopped oregano
- ½ cup Grated mozzarella cheese
- ½ cup Grated parmesan cheese
- 8 oz. Lasagna noodles

**Directions**

1. Chop and cook the sausage and onions in a pan.
2. In a large bowl, combine the sausage and onions with the sauce, water, garlic, ricotta cheese, and oregano. Combine and mix the mozzarella and parmesan cheeses.
3. Spread ½ of the sauce across the bottom of the slow cooker crock.
4. Top the mixture with ½ of the cheese. Lay lasagna noodles over the sauce and cheese, breaking the noodles as needed.
5. Repeat steps 3 and 4 twice.
6. Turn the slow cooker on low for five to six hours. Serve hot.

**Nutrition Analysis per Serving**

- Calories: 236
- Total fat: 6 g
- Saturated fat: 3 g
- Cholesterol: 19 mg
- Sodium: 391 mg
- Carbohydrate: 28 g
- Dietary fiber: 2 g
- Sugars: 7 g
- Protein: 15 g

**Yield:** 10 servings
CHAPTER 21 Review & Applications

After You Read

Chapter Summary
A well-designed kitchen is organized for efficiency and promotes good work flow. Work centers and universal design make kitchens easy to use. Kitchen components must withstand heat, moisture, and food. Ample cabinets and countertops, durable floors and walls, safe electrical systems, and good lighting are important. Before buying items for the kitchen, consider needs, prioritize features, and conduct research. Shop critically, pay carefully, and protect your purchase. Appliances, including ranges, refrigerators, and dishwashers, help you prepare food and clean up. Preparation tools and equipment, including cookware, bakeware, and utensils, help with cooking and serving.

Content and Academic Vocabulary Review
1. Use at least eight of these key terms and academic vocabulary words in a descriptive paragraph about your dream kitchen.

   Content Vocabulary
   - work flow (p. 316)
   - work center (p. 316)
   - work triangle (p. 316)
   - peninsula (p. 316)
   - island (p. 316)
   - universal design (p. 317)
   - grounding (p. 319)
   - task lighting (p. 319)

   Academic Vocabulary
   - EnergyGuide label (p. 320)
   - warranty (p. 321)
   - service contract (p. 321)
   - credit (p. 321)
   - down payment (p. 321)
   - principal (p. 321)
   - interest (p. 322)
   - annual percentage rate (APR) (p. 322)
   - finance charge (p. 322)
   - heating unit (p. 322)
   - convection oven (p. 323)
   - cookware (p. 326)
   - bakeware (p. 326)

2. Review Key Concepts
   2. Explain the items that make up a work triangle.
   3. Describe three factors to consider when selecting kitchen components.
   4. Explain the difference between a warranty and a service contract.
   5. List three large kitchen appliances and nine small kitchen appliances.
   6. Describe seven common types of cookware.

Critical Thinking
7. Explain how Henry can have more counter space to his kitchen without doing any construction.
8. Describe a good approach to buying a new dishwasher.
9. Decide the best course of action for washing dishes during a drought period. Explain your answer.
10. Explain why using dry measuring cups to measure both liquid and dry ingredients might cause a cake to fall.

5. Three large kitchen appliances are: a range, a refrigerator/freezer, and a dishwasher. Nine small kitchen appliances are: blender, food processor, electric mixer, toaster, toaster oven, electric skillet, slow cooker, broiler/grill, and rice cooker/steamer.
6. Seven common types of cookware are: aluminum, which conducts heat well but warps, dents, and scratches easily; anodized aluminum, which is coated with a hard, protective finish; stainless steel, which is durable and tough; copper, which must be lined with tin, silver, or stainless steel; cast iron, which is heavy and good for frying or browning; glass, which is attractive but breaks easily; glass-ceramic, which goes from freezer to oven to cooktop; and stoneware, which is dishwasher-safe but breaks easily. Some answers may also mention enamel, which is glass fused to a base metal, and microwave-safe plastic, which is durable and easy to clean, and cookware with nonstick surfaces, which keep food from sticking.

Critical Thinking
7. Henry can add an island to his kitchen. An island is a freestanding counter that is open on all sides.
8. Prioritize the features you are looking for, do research about the different models available, and comparison shop. This will help you make a smart decision.
9. Dishwashers tend to use less water than hand washing, so you would conserve more water during the drought if you used the dishwasher.

10. Using dry measuring cups for both liquid and dry ingredients may lead to inaccuracy when measuring, causing the cake to turn out differently than expected. Dry measuring cups measure only cups or milliliters, not fluid ounces. They are not usually transparent, so it is hard to see exactly how much liquid is inside. Also, they lack spouts, so some liquid might spill down the side during pouring.

11. **Work Centers in the Foods Lab**

   Having a well-designed foods lab can help you more easily learn and practice food preparation and cleanup skills. When all three work centers are functional and efficient, you can develop better skills to apply in your home kitchen.

   **Procedure** Prepare a simple recipe that requires the use of all three basic work centers in the foods lab. Pay attention to how well the lab layout and design of each station accommodates more than one person at a time.

   **Analysis** In a class discussion, provide feedback to these questions: Is the lab convenient for more than one person to use? Are items arranged conveniently in each work center? Are the lab, cookware, and supplies accessible to people of varying abilities? Why or why not? How might any problems be corrected?

12. Harold should choose a nonstick frying pan. He will not have to add butter or oils to prevent his food from sticking, thereby decreasing the amount of fat in his food.

13. Answers will vary depending on the appliance chosen. Presentations should include a summary of the features common to the appliance chosen and unique to the particular model chosen. Students should list a competitive price they found.

14. **Tight Spaces**

   Gwen noticed a milk residue inside a narrow drinking glass that had already been through the dishwasher. What type of cleanup supply can she use to get the glass clean where her hand cannot reach?

15. **Kitchen Floor Plans**

   Follow your teacher’s instructions to form pairs. Using images from magazines, work together to create a photo display of a kitchen floor plan. Label work centers, peninsulas and islands, indicate work triangles, and evaluate your plan for efficiency.

16. **Cash or Credit?**

   You can buy a new $1,500 dollar range on credit, and spend three years paying it off at a 12% APR. How much would you save if you paid for it entirely in cash?
Academic Skills

Mathematics

18. Calculate Counter Space  Sam has decided to remodel his kitchen. According to the plans, the counter to the left of the sink measures 2 feet by 4 feet, while another to the right of the sink measures 2 feet by 5 feet. On the other wall, counters on both sides of the stovetop will each measure 2 feet by 3 feet. The kitchen will also have a 7 feet by 4 feet island. How much total counter space will Sam’s new kitchen have?

Math Concept: Area of a Rectangle The area of a rectangle is equal to its length times its width: \( A = lw \). If necessary, convert the length and the width to the same units before multiplying.

Procedure Get a non-stick skillet and a regular skillet, filming them down with a small amount of cooking oil. Dip two thin pork chops in flour seasoned with salt and pepper. Heat the skillets first, carefully adding the chops. Cook on the first side until nicely browned, then repeat on the opposite side. Remove. Create a table to contrast both effects, including color, appearance, taste.

Analysis Is caramelization affected by the non-stick surface? Which skillet would work best for pancakes or fried eggs? Make a list of advantages and disadvantages for non-stick equipment for various cooking tasks.

English Language Arts

19. Equipping a Kitchen You write an advice column. A reader, Mary, has sent you a letter asking what appliances and supplies she will need to equip the kitchen in her new home. Write her a response explaining what she will need immediately and what she can buy in the future.

STANDARDIZED TEST PRACTICE

ANALOGY

Read the pairs of terms. Then choose the best word to match.

20. dishwasher : large appliance measuring cup: handheld tool blender: small appliance __________ : cookware

a. knife
b. saucepan
c. food processor
d. range

Test-Taking Tip When you look at the three pairs of terms listed here, identify the relationship that is common to all of them. The answer that establishes the same type of relationship as the other terms is correct.

English Language Arts

19. Students’ letters will vary slightly. Most should note that the following appliances and supplies are needed to equip a kitchen immediately: range; refrigerator/freezer; basic cookware, bakeware, utensils, and measuring tools; and clean up supplies. Items to be bought in the future may include a dishwasher, various small appliances, and more specific cook- and bakeware. Letters should be addressed to Mary, be well organized, specific, divided into paragraphs, and free from spelling and grammatical errors.

Academic Skills

Food Science

17. The Right Cookware  Non-stick pans have advantages and disadvantages. Sometimes we do not want food to stick, but other times we like caramelization, browning of surface sugars, to occur. Determine how this is affected by nonstick surfaces.

Procedure Get a non-stick skillet and a regular skillet, filming them down with a small amount of cooking oil. Dip two thin pork chops in flour seasoned with salt and pepper. Heat the skillets first, carefully adding the chops. Cook on the first side until nicely browned, then repeat on the opposite side. Remove. Create a table to contrast both effects, including color, appearance, taste.

Analysis Is caramelization affected by the non-stick surface? Which skillet would work best for pancakes or fried eggs? Make a list of advantages and disadvantages for non-stick equipment for various cooking tasks.

Starting Hint Multiply the length and width of each of the counters to find each counter’s area in square feet. Then, add the areas together.

NCTM Measurement Apply appropriate techniques, tools, and formulas to determine measurements.

NCTE 4 Use written language to communicate effectively.

Mathematics

18. Sam will have 58 square feet of counter space. The 2’ × 4’ counter has 8 sq. ft. of area. The 2’ × 5’ counter has 10 sq. ft. Each 2’ × 3’ counter has 6 sq. ft. The 7’ × 4’ island has 28 square feet. The total surface area of all counters is thus 8 + 10 + 6 + 6 + 28 = 58 sq. ft.

19. Discuss "caramelization" and "Maillard reaction" before beginning the experiment. Advantages to non-stick include easy clean up, less need to use oil, and obvious ease of sliding out food. Disadvantages include cost, special care (no metal utensils), and lack of oven safety.

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