

UNIT 9

The Art of Baking

CHAPTER 42 Baking Basics

CHAPTER 43 Quick & Yeast Breads

CHAPTER 44 Cakes, Cookies, & Candies

CHAPTER 45 Pies & Tarts

Activate Prior Knowledge

Explore the Photo Quick breads and yeast breads are some of the many types of baked goods. *What is your favorite baked good?*





Unit Thematic Project Preview

Create a Baked Good

While studying this unit, you will learn the basic techniques for making quick and yeast breads, cakes, cookies, candies, pies, and tarts. In your unit thematic project you will use one of these techniques to create your own baked good.



My Journal

Background for Baking Write a journal entry about one of these topics. This will help you prepare for the unit project at the end of the unit.

- Describe baking techniques you have used.
- Describe baking techniques you would like to learn to use.
- Explain who you would ask for advice about baking. Tell why you chose this person.

Baking Basics

Writing Activity



Cover Letter

A Bakery Job To apply for an after-school job at a bakery in your neighborhood, you must create a resume and submit it to the bakery along with a cover letter. Write a cover letter that explains what specific qualities, knowledge, and experience you can offer as an employee at a bakery.

Writing Tips Follow these steps to write a cover letter:

- Use a business letter format.
- Do not exceed one page.
- Detail what you can offer as an employee.
- Describe your background and future goals.

Activate Prior Knowledge

Explore the Photo Baking is more science than art. It requires precise measuring. *What baked items do you enjoy most?*

Reading Guide



Before You Read

Preview What ingredients and equipment do you think are needed for baking? List three. Then skim through the chapter to see if they are discussed.

Read to Learn

Key Concepts

- **List** the basic ingredients for baking and explain their roles.
- **Describe** how to prepare and place pans for baking.
- **Explain** why it is important to store baked goods properly, and how to do so.

Main Idea

Baking is an art that allows you to combine ingredients to create delicious and nutritious foods with different tastes, textures, nutrients, and visual appeal.

Content Vocabulary

You will find definitions for these words in the glossary at the back of this book.

- gluten
- bleached flour
- unbleached flour
- self-rising flour
- leavening agent
- active dry yeast
- quick-rising yeast
- compressed yeast
- proofing
- granulated sugar
- confectioners' sugar
- brown sugar
- preheat
- hot spot

Academic Vocabulary

You will find these words in your reading and on your tests. Use the glossary to look up their definitions if necessary.

- neutralize
- framework

Graphic Organizer

Use a graphic organizer like the one below to note the five basic steps of the baking process.

THE BAKING PROCESS

STEP	NOTES
1.	
2.	
3.	
4.	
5.	



Graphic Organizer Go to this book's Online Learning Center at glencoe.com to print out this graphic organizer.

Academic Standards



English Language Arts

NCTE 4 Use written language to communicate effectively.



Mathematics

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



Science

NSES B Develop an understanding of chemical reactions and interactions of energy and matter.



Social Studies

NCSS VIII B Science, Technology, and Society Make judgments about how science and technology can transform the physical world and human society.

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*

Ingredients for Baking

The basic ingredients for baking are simple: flour, liquid, leavening agents, fat, sweeteners, eggs, and flavoring. Yet baking is a complex art. You can combine ingredients in many creative ways to create baked goods with different flavors, textures, nutrients, and visual appeal.

Flours

Standard white flour is made of ground wheat kernels, minus the bran and germ. White flour is made of endosperm, so it contains starch and proteins that give structure to baked goods. Starch absorbs some of the liquid in the recipe. Some of the proteins in wheat flour combine with liquid to create an elastic substance called **gluten** ('glü-tən). The more gluten a baked product has, the chewier its texture will be.

The Role of Gluten

Gluten develops when you mix flour with liquid. Gluten forms strong, elastic strands that crisscross in a springy weave of tiny cells. These cells trap gas. As the food bakes, cells expand with heated gas, much like bubble gum stretches to hold air without bursting. The gas bubbles are trapped in the gluten bonds.

The longer you mix a dough or batter, the stronger gluten becomes. Cake batter is mixed quickly, so the gluten remains weak and the cells remain small. The result is a silky, melt-in-the-mouth texture.

The dough of yeast breads, by contrast, is kneaded for up to ten minutes to develop the gluten. This creates a very elastic **framework**, or structure, that expands easily. Air bubbles grow larger, which gives yeast breads a chewy texture.

Kinds of Wheat

The wheat flour used for most baking in the United States comes from two varieties of wheat, hard wheat and soft wheat.

Hard Wheat Hard wheat is high in protein and forms very strong gluten. The word “hard” refers to this wheat’s high protein content. Commercial bakers prefer hard-wheat flour for making bread.

Soft Wheat Soft wheat is lower in protein and forms weak gluten. Soft-wheat flour is ideal when you want a tender, delicate texture.

Flour is also made from a third type of wheat, called durum wheat. Durum wheat is the hardest type of wheat. It is too hard for baked products, but it is milled into semolina, a grainy flour that gives pasta its sturdy structure.



Lightly Floured

Sifting a light layer of flour into a baking pan prevents the cake from sticking. *Where else is a sprinkling of flour useful?*

Kinds of Flour

Different types of flours have different protein content, which affects gluten strength and therefore the texture of the baked product. The five most common types of flours are:

All-Purpose Flour All-purpose flour is the most-used flour in American kitchens. It is blended from hard and soft wheat and has a moderate protein content. All-purpose flour is sometimes **bleached**, or chemically treated, to **neutralize**, or counteract, the pigment and break down gluten. **Unbleached flour** has its natural color and is slightly less white than bleached flour. Unbleached flour does not have additives. **Self-rising flour** contains added baking powder and salt.

Whole-Wheat Flour Whole-wheat flour is made from the whole grain, including the germ and the bran. Bran limits gluten formation, so baked goods made from whole-wheat flour are denser and heavier than those made with all-purpose flour. When you use whole-wheat flour, you usually mix it with an equal or greater amount of all-purpose flour.

Bread Flour Bread flour is made from a combination of unbleached hard-wheat flour and barley flour. Bread flour has high gluten potential and works well for making yeast bread.

Cake and Pastry Flours Cake and pastry flours are made from soft wheat. They create less gluten and therefore produce baked goods with a fine, tender texture. Cake flour is bleached. Pastry flour is available in white and whole-wheat varieties.

Gluten Flour Gluten flour is a high-protein flour made from hard wheat, with protein solids added and most starch removed. The protein forms a strong gluten. Gluten flour is never used alone. It is mixed with low-protein flour, such as rye flour, to raise the gluten content. Bagels and hearty breads are sometimes strengthened with gluten flour.

Specialty Flours Flour is made from other grains as well, including buckwheat, oats, and rice. Nuts and legumes can also be milled into flour. Specialty flours lack the right combination of proteins to form gluten, however, so most recipes call for mixing them with wheat flour.

Buying and Storing Flour

Most home bakers buy wheat flour in 5-pound paper bags. Most specialty flours come in smaller bags. Check that the bag is well sealed and undamaged. Handle bags carefully because they tear easily.

Store flour in a cool, dry place. Transfer flour from an opened bag to a tightly covered container to keep it free from dirt, moisture, and pests. Refrigerate opened packages of whole-grain flour, which contains oils that could turn rancid at room temperature.

Liquids

Liquids help develop gluten and make possible many of the physical and chemical changes that add structure and texture to baked goods. Some recipes call for water, milk, fruit juice, buttermilk, sour cream, or yogurt. Different liquids create different results. The proteins in milk, for instance, add richness and increase browning. Some breads get their thick crust from ice placed into the oven just as the bread is put in to bake.

Doughs and Batters

Baked goods are made from either batter or dough. Batters have more liquid and less flour than doughs. Doughs have less liquid and more flour than batters. The types of batters and doughs are:

Pour Batters Pour batters are thin and are made from nearly equal amounts of liquid and flour. Cakes, pancakes, and waffles are made with pour batter.

Drop Batters Drop batters are thicker mixtures that contain twice as much flour as liquid. They are usually dropped by the spoonful onto baking pans or sheets for quick breads and cookies.

Soft Doughs Soft doughs have a ratio of one part liquid to three parts flour. Soft dough is sticky but moldable. It is the basis for many yeast breads and rolled biscuits.

Stiff Doughs Stiff doughs have a ratio of one part liquid to six to eight parts flour. Stiff doughs are the easiest to handle. Piecrusts and some rolled cookies are made from stiff dough.



Steam Power

Baked products can be leavened in several ways. The popover shown here is leavened through the action of air and steam. *How do baking soda and baking powder leaven?*

Leavening Agents

A **leavening agent**, or leavener, is a substance that triggers a chemical reaction that makes a baked product grow larger, or rise. Many recipes use a combination of leaveners to adding volume and height. Leavening agents come in many forms:

Air Air is added to batters and doughs as you combine ingredients, for example when you sift flour, cream fat and sugar, and beat batter. When the mixture is heated, the trapped air expands and raises the product. Angel food cake is leavened mainly by the air in beaten egg whites.

Steam Steam leavens baked goods that contain large amounts of liquid. The heat of baking turns the liquid into steam. As the steam expands and rises, so does the food. Popovers and cream puffs are leavened by steam.

Baking Soda Baking soda leavens chemically. It reacts with acidic liquids, such as buttermilk, to produce carbon dioxide gas that expands when heated. Baking soda reacts with acidic liquid instantly. Mix it first with dry ingredients and then with the liquid to prevent gas from escaping before baking.

Baking Powder Baking powder is a combination of baking soda and a dry acid such as cream of tartar. It does not need acidic liquid to work. The most common type of baking powder, double-acting baking powder, releases some carbon dioxide when first mixed with liquid. More releases during baking.

Recipes that use an acidic liquid such as buttermilk or yogurt often call for baking powder as well as baking soda. The baking powder leavens the food, and the baking soda neutralizes the excess acid.

Yeast Yeast also leavens using carbon dioxide. Yeast is a fungus that thrives on moisture and warmth. It feeds on the simple sugars in flour and sweeteners. Yeast gives off carbon dioxide as it grows. Other yeast by-products give food a distinctive flavor and aroma. **Active dry yeast** is partially dormant yeast contained in flour granules. It comes in packets and jars. **Quick-rising yeast** works twice as fast as regular yeast. **Compressed yeast** is a moist combination of yeast and starch that comes in small, individually wrapped cakes that are very perishable.

Buying and Storing Leavening Agents

Baking soda and baking powder and active dry yeast are grouped with baking supplies in the supermarket. Store these ingredients in a cool, dry cabinet. Keep the baking powder container tightly sealed. Moisture can ruin it.

Compressed yeast is found in the refrigerated section of the supermarket. Store it in the refrigerator. Compressed yeast is a light gray when fresh but turns brown as it ages.

All leaveners lose their potency over time, so observe the sell-by and use-by dates on labels. To test baking soda for freshness, add 1 teaspoon of soda to 2 tablespoons of white vinegar. Fresh baking soda will fizz and froth. To test baking powder, mix 1 teaspoon of powder with $\frac{1}{3}$ cup of hot water. It should bubble.

You can test yeast by a process called **proofing**. Place the yeast in a small bowl with a pinch of sugar and enough warm water to dissolve. Set it aside for 5 to 10 minutes. If the mixture puffs and foams, the yeast is alive.

Fats

Fats add richness and flavor to baked goods. They help crusts brown and create tender textures. Solid fats add volume by trapping air. Common solid fats used for baking include butter, margarine, vegetable shortening, and lard. Butter and margarine add flavor and sometimes include additives such as salt and coloring. Vegetable shortening is an oil that has been hydrogenated, or chemically altered to make it solid. It does not add flavor or color. Lard is purified pork fat. It makes very flaky piecrusts and biscuits but is used less in home baking than in commercial baking.

You can replace one solid fat with another in most recipes or create a blend. Different fats create different flavors. Do not substitute whipped butter and soft margarines for solid fats.

Solid fats and oils work differently in baking. Oils add moistness and density, not volume. If a recipe calls for oil, always use oil and not solid fat. Any mild-flavored cooking oil can be used, and one can be substituted for another. Corn, canola, and vegetable oil are common choices. Olive oil has a distinctive flavor and is not usually used for baking.

Buying and Storing Fat

Keep butter and margarine in the coldest part of the refrigerator, usually toward the rear of the middle shelf. Be sure they are well wrapped, because they tend to absorb flavors and aromas from other foods. Use butter within one month of purchase and margarine within two months, or freeze them in their original containers for up to four months.

Vegetable shortening and oils usually keep well in a cool, dry area. They may need refrigeration, especially if you need to keep them longer than one month. Check labels for storage instructions and freshness dates.

Sweeteners

Just like fats, sweeteners add flavor and tenderness and help with browning. Different sweeteners have different types of sugar and different amounts of liquid, so they create different results.

The following sweeteners are commonly used in baking:

Sugar **Granulated sugar** is highly refined sucrose crystals made by boiling the juice of sugarcane or sugar beets. When creamed with a solid fat, granulated sugar adds air and volume. **Confectioners' sugar**, or powdered sugar, is pulverized granulated sugar with a trace of added cornstarch. It dissolves easily and is most often used for frostings. **Brown sugar** is granulated sugar coated with molasses. Molasses adds moisture and a caramel flavor but reduces sugar's ability to trap air. A light or dark color reflects the amount of molasses and intensity of flavor.

Honey Honey is produced by bees from flower nectar. Different flowers give honey different colors and flavors. Mild clover honey is most popular in baking. Honey contains fructose, which is much sweeter than sucrose. Honey also attracts and holds more moisture than sugar, so baked goods stay fresh longer.

Science in Action

Yeast at Work

Today, commercial yeast manufacturers grow yeast on molasses. Then they process, package, and sell it in convenient forms. Before the commercial production of yeast in the 1880's, people leavened the bread that they baked by simply leaving it exposed to the yeast organisms present in the air. They prepared a dough and left it uncovered. Yeasts landed on it and began the fermentation process.

Procedure With your teacher's guidance, conduct an experiment with two batches of dough. To one batch, add commercially produced yeast from the supermarket. Leave the other batch uncovered in an undisturbed place. Record your observations of each batch of dough over a period of days.

Analysis In a paragraph, explain the changes did you observed in the both batches of dough, and when they occurred. Also answer this question: How has commercially produced yeast changed the nature and process of baking?

NSES B Develop an understanding of chemical reactions and interactions of energy and matter.

Molasses Molasses is a syrup that forms when sugarcane juice is boiled to make crystallized sugar. It is less sweet than sugar. Light molasses is extracted first and is highest in sugar and sweetness. Dark molasses is less sweet. It is made later in the sugar-manufacturing process, after boiling has extracted more raw sugar from the sugarcane juice.

Corn Syrup Corn syrup is made by breaking down the starch in corn into dextrose and water. Dark corn syrup has added caramel flavoring. Corn syrup is often used in frostings and candies. Small amounts of corn syrup can make baked goods soft and chewy.

Buying and Storing Sweeteners

Most sweeteners keep best in tightly sealed containers in a cool, dry area. Check the label to be sure. After using liquid sweeteners, wipe the containers with a damp cloth to remove drips. Traces of sugar attract insects.

Confectioners' sugar often cakes, even when properly stored. Remove lumps by sifting. Brown sugar can also harden. Soften it by putting a piece of fresh bread in the container or microwaving the sugar with a few drops of water in a glass bowl for 10 to 15 seconds.


Honey can crystallize, especially when refrigerated. To liquefy crystallized honey, remove the lid and set the container in about two inches of warm water.

Eggs

Eggs are another key ingredient in many baked products. The fats in eggs add flavor, color, richness, and tenderness. Fats in the yolk create an emulsion, binding liquids and fats in the recipe to keep batters from separating. Beating egg whites adds air and volume to batters. Heating egg whites helps set their structure.

Flavorings

Seasonings and flavorings add variety to baked products. Recipes often include spices or liquid extracts, such as maple, almond, or vanilla. Some recipes call for dried fruit, chopped nuts, citrus peel, or flavored syrups. Chocolate flavor is sometimes combined with unsweetened baking chocolate for more flavor. Flavorings change the texture and color of baked goods as well as their flavor.

 **Reading Check** **Describe** What is the difference between hard and soft wheat?

The Baking Process

Once you choose a recipe and ingredients, it is time to begin baking. First you need to prepare the oven, the pans, and the batter or dough. Then you need to bake the food at the right temperature and time, and remove it carefully from the pan. There are five basic steps to the baking process.

Choose Oven Temperature

Baking takes precise timing. Consider how a biscuit rises in a hot oven. As the surface absorbs heat, moisture evaporates and a crust forms. The crust temperature rises, and the crust begins to brown. At the same time, heat reaches the inside of the biscuit, activating leavening agents that push against the crust to raise the biscuit.



Be a Smart Consumer

Low-Fat Baking

More varieties of margarine are available now than ever, but not every margarine is suited for every recipe. A vegetable spread used for baking should be at least 60 percent fat. Thus, any item labeled margarine should be suitable for baking. However, diet and light margarines may not produce the same browning and texture in baked goods. Low-fat spreads contain more water. Cookies may spread and run together. Pastry dough will be sticky and hard to handle. If limiting fats is a concern, look for specially formulated, low-fat recipes.

 **Challenge** As a consumer, what are three resources you would use to find low-fat baking recipes? Explain your ideas in a paragraph.



Correct oven temperatures help baked goods rise properly. If the oven is too hot, the crust forms too quickly. The biscuit struggles to expand, and the crust sometimes cracks. The crust may brown while the inside is only half baked. If the oven is not hot enough, the biscuit rises too quickly. The leavening gas escapes before the gluten and starch in the flour can form the framework to trap it. Your biscuit comes out dry and fallen.

To avoid these problems, always use the temperature given in the recipe. Make sure the oven racks are properly positioned before you turn on the oven. For one pan, place the rack near the middle of the chamber. Preheat the oven unless the recipe says not to. To **preheat** is to turn the oven on about 10 minutes before using so it will be at the desired temperature when the food is placed inside.

Choose Pans

Recipes are developed for specific pan sizes. Use the type and size of pan listed in the recipe. If you need to substitute a different pan, make sure both pans have a similar volume. You can compare volume by measuring the amount of water each pan holds.

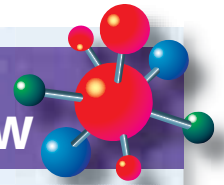
Use a pan that is the right depth. If you use a pan that is too deep or too shallow, the food may not rise properly. Avoid pans with warps and dents that will ruin the shape of the baked item.

Different materials transfer heat at different rates. Most recipes assume the use of shiny metal pans. Pans made of glass or dark metal retain more heat and can create a thick crust. Lower the oven temperature by about 10 degrees when using dark metal pans and by 25 degrees when using glass. If you are using cast iron or other materials, follow the manufacturer's directions. When using a glass pan, it is best to monitor the baking closely and judge doneness by sight.

Prepare the Pans

Most recipes tell you how to prepare the pan so the product can be easily removed after baking. Prepare the pan before mixing ingredients.

TECHNOLOGY FOR TOMORROW



Cryogenics in the Kitchen

Baking ingredients that get too hot in storage or during mixing can affect the final product. Overheated butter becomes unworkable. Overheated flour can damage the quality of dough. To cool things down, chefs may add ice to recipes, but then must adjust the other ingredients to compensate for the extra moisture. A solution can be found in cryogenics, a technology that can be used to cool storage and mixing equipment. Cryogenic cooling systems change liquid nitrogen and solid carbon dioxide (dry ice) to gases, a process that absorbs heat and lowers the surrounding temperature. These systems cool more efficiently than conventional refrigeration systems and are programmed to maintain the desired temperature.

Get Involved List and briefly explain three specific circumstances or places in which this type of technology would be most beneficial.

NCSS VIII B Science, Technology, and Society Make judgments about how science and technology can transform the physical world and human society.

Do not grease the pan when making a high-fat recipe or when cooking in a microwave oven. Also, do not grease the pan when making cakes with beaten egg white, such as angel food cake. These cakes need to cling to the sides of the pan to rise.

Common methods for preparing pans include:

Grease and flour. To grease and flour means to coat a pan lightly with solid fat and then dust it with flour. Do not use salted butter or margarine for greasing a pan, because salt creates a darkened crust that sticks to the pan. Use wax paper to spread the fat. Thoroughly grease the corners and the crease between the sides and bottom, where foods are most likely to stick. Sprinkle the pan with a little all-purpose flour. Tilt and shake the pan to distribute the flour evenly. Turn the pan upside down over the sink, and tap it to remove any excess flour.

Spray with cooking spray. Cooking spray coats a pan easily but may leave a sticky film on pans. Spray may not work for all pans or recipes, so follow label or recipe directions.

Line with paper. You can also line a pan with cooking parchment (parchment paper). Do not use ordinary brown paper or wax paper. Brown paper may transfer chemicals to food, and wax paper may transfer wax. Cut a piece of parchment the same shape and size as the bottom of the pan. Grease the pan and line the bottom with the parchment. Peel the paper off the food after you remove it from the pan. Aluminum foil can be used instead of parchment paper.

Bake the Food

To bake evenly, food must be placed in the oven so that heated air can circulate around it freely. Allow at least 1 inch of space between pans on a rack and between pans and oven walls. Crowded pans may create a **hot spot**, an area of concentrated heat that can cause uneven baking and browning.

If you are using one pan, place it in the center of the oven. If you are using two pans, place them on separate racks in diagonally opposite corners. If you are using three or four pans, stagger them so that they are not directly above one another. See **Figure 42.1**. Rotate the pans halfway during baking to help guarantee even baking.

As soon as the pans are in the oven, set a timer. Start checking for doneness about 5 minutes before the time is up. To prevent heat loss, avoid opening the oven door until then.

Baking in a Convection Oven

Most recipes for baked products are developed for conventional ovens but adapt well to convection ovens. A convection oven creates a continuous current of hot air that speeds some chemical reactions in foods. Products brown faster and lose less moisture. Some baked goods also rise more quickly. When baking in a convection oven, reduce temperatures by 25 to 50 degrees and reduce baking time by one-third. Check the owner's manual for more detailed conversions. You can also use a convection oven cookbook to find recipes similar to your own as a guide to making adjustments.

Baking in a Microwave Oven

Microwave ovens do not bake. They cook with moist heat. Foods cooked in a microwave oven do not brown or develop a crust. They stay very tender and moist, however, because less water evaporates.

It can be difficult to adapt recipes for baked goods to microwave ovens. Factors such as rapid cooking rates and pale color can lead to overbaking. For best results, use a recipe developed for microwaving.

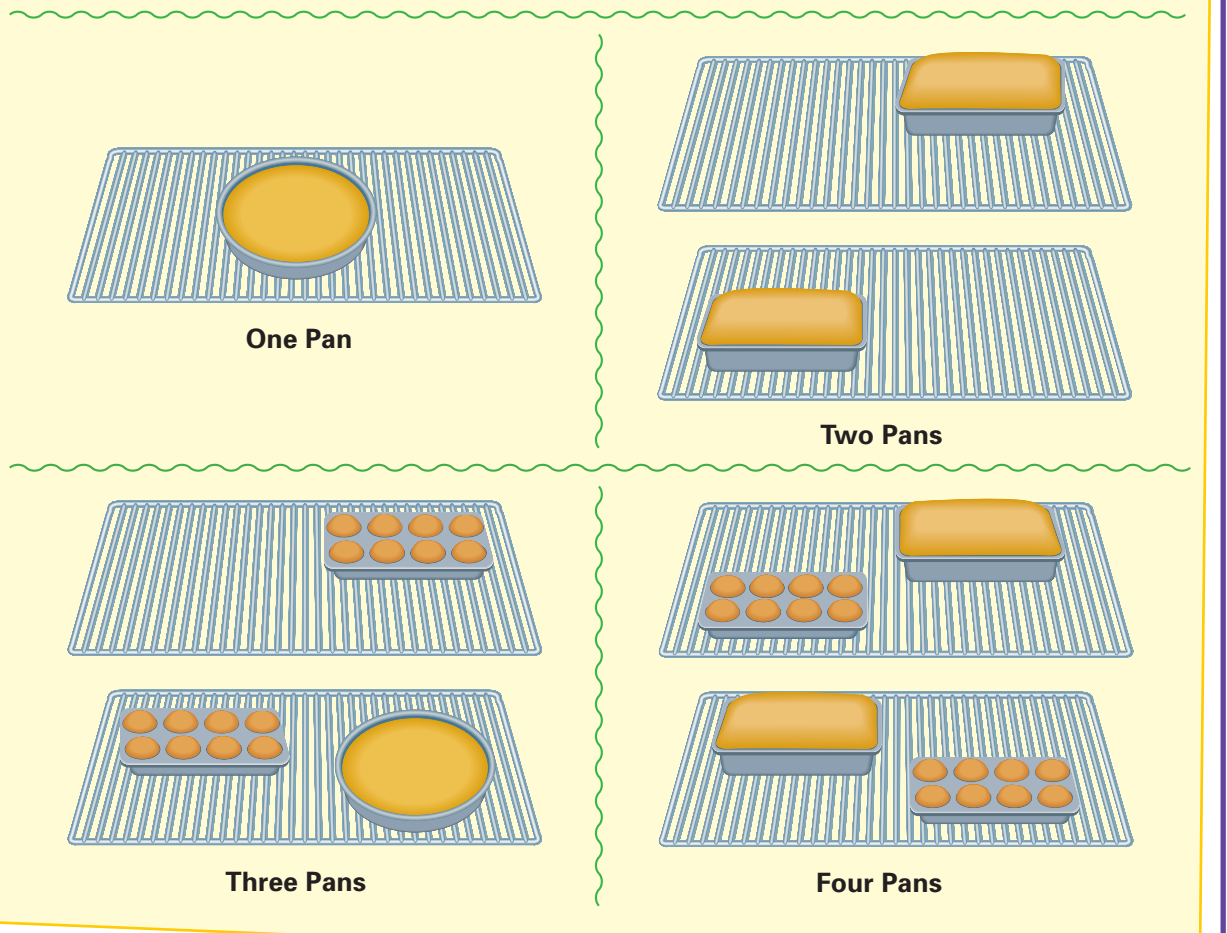


Cupcake Liners

You can use paper or foil liners in muffin tins and cupcake pans to make cleanup easier. *What other problem will using liners prevent?*

Figure 42.1 Placing Baking Pans

Position Pans Properly Arranging baking pans correctly provides the best results. Correct placement for one, two, three, and four pans is shown here. *What are hot spots? How can you prevent them from forming?*



Removing Baked Products from Pans

Follow recipe directions for removing baked goods from the pan to get the best results.

Most cookies and muffins should be removed from the pan immediately. This prevents cookies from sticking and muffins from overbaking. Some cookies need to cool for just a minute to firm up before you remove them. Most cakes and some breads need to cool partially in the pan to prevent them from cracking or tearing when you remove them. Cakes made without fat need to cool completely in the pan. Some items can be served directly from the baking pan.

Use wire cooling racks to promote quick cooling. A countertop or other solid surface does not work well for cooling because it holds the heated air, which collects moisture and makes the food soggy.

Gently remove cookies from baking sheets with a wide spatula and gentle handling. To remove yeast bread from a pan, turn the pan on its side on a wire rack. Ease the bread out with a clean pot holder or dish towel. Place the bread right side up on the wire rack.

Use this technique to remove cakes and quick breads from the pan:

1. Loosen. Gently run a spatula along the sides of the pan, if needed, to eliminate sticking points.

2. Flip. Place a wire cooling rack over the top of the cake or bread. Holding the pan and rack securely with pot holders, flip them upside down. Place the rack on a level surface.

3. Lift. Continue using pot holders and carefully lift the pan off the cake or bread, which is now upside down.

4. Flip again. Quickly place another wire rack on the bottom of the baked item. Using both hands, grasp both racks without squeezing. Flip the racks so the baked product is right side up.

5. Cool. Remove the top rack and allow the item to cool completely.

 **Reading Check** **Explain** Can you bake foods in a microwave?

Storing Baked Products

Cool baked goods thoroughly before storing. This prevents trapped heat from producing moisture that can make the food soggy and prone to spoilage. If baked goods are not going to be consumed, it is important to store them immediately because baked goods begin to lose quality the moment they finish baking.

Most cookies, cakes, and breads can be kept at room temperature in a sealed container for up to three days. They usually freeze well also. Refrigerate perishable products, including foods with custard, cream, or fruit fillings and frostings. Do not freeze filled foods, because fillings tend to separate when they thaw.

Light and Healthy

Recipe

Banana Nut Muffins

Ingredients

- 1 cup Flour
- ½ cup Sugar
- 2 tsp. Baking powder
- ¼ tsp. Salt
- ½ tsp. Baking soda
- 1 Beaten egg
- 3 Tbsp. Butter
- ½ cup Buttermilk
- 2 Mashed bananas
- ½ cup Chopped walnuts

Directions

1. Preheat oven to 375°.
2. In a large bowl, combine the flour, sugar, baking powder, salt, and baking soda.
3. Melt two tablespoons of the butter and, in a separate bowl, combine it with the egg and buttermilk. Mix well and combine with the dry ingredients. Do not overmix.
4. Use the remaining butter to grease a muffin tin. Fold in bananas and walnuts, and pour batter into muffin tins. Fill tins three-quarters full.
5. Place in oven and bake for 35 minutes.

Bananas and nuts provide energy to get you started in the morning and minerals that keep you going later in the day.

Yield 10 servings

Nutrition Analysis per Serving

■ Calories	188
■ Total fat	8 g
Saturated fat	3 mg
Cholesterol	33 mg
■ Sodium	240 mg
■ Carbohydrate	27 g
Dietary fiber	1 g
Sugars	14 g
■ Protein	4 g



After You Read

Chapter Summary

Baking is a complex art in which ingredients can be combined in different ways to create many types of baked goods. There are several basic ingredients required for baking, each with its own role and guidelines for buying and storing. The right types of ingredients must be chosen and used correctly for the best outcome. The baking process is comprised of a series of steps, including choosing oven temperature and pans, preparing pans, baking the food, and removing it once cooked. Baked products must be stored properly to retain their quality, freshness, and taste.

Content and Academic Vocabulary Review

- Write a sentence using at least two of these content and academic vocabulary words. The sentence should clearly show how the terms are related.

Content Vocabulary

- gluten (p. 654)
- bleached (p. 655)
- unbleached flour (p. 655)
- self-rising flour (p. 655)
- leavening agent (p. 656)
- active dry yeast (p. 656)
- quick-rising yeast (p. 656)
- compressed yeast (p. 656)
- proofing (p. 656)
- granulated sugar (p. 657)
- confectioners' sugar (p. 657)
- brown sugar (p. 657)
- preheat (p. 659)
- hot spot (p. 660)

Academic Vocabulary

- framework (p. 654)
- neutralize (p. 655)

Review Key Concepts

- List** the basic ingredients for baking and explain their roles.
- Describe** how to prepare and place pans for baking.
- Explain** why it is important to store baked goods properly, and how to do so.

Critical Thinking

- Describe** how you envision the texture of a special gluten-free bread that is consumed by some people with allergies to gluten.
- Explain** which questions you would ask if your homemade croissants did not turn out as light and delicate as you had hoped.
- Compare and contrast** doughs and batters. How does the ratio of flour to liquid affect the thickness?
- Evaluate** Barry's plan to cook his homemade bread faster by increasing the oven temperature.
- Infer** why one cake cooked completely and another cooked only partially if they were baked in the same oven at the same time.
- Explain** whether you should wrap a loaf of banana bread in aluminum foil immediately after removing it from the oven.

 **Foods Lab**



11. Testing

Leaveners

Several products make effective leaveners. Before using one of them, however, it is important to test its potency. Then you can be confident your baked goods will rise.

Procedure Use the procedures described in this chapter to test the potency of samples of baking soda, baking powder, and yeast provided by your teacher. Make sure to mark the samples. Record your observations.

Analysis Answer the following questions: What did you observe when you tested each sample? Which leavener[s] would you use for baking angel food cake?

 **HEALTHFUL CHOICES**

12. Avoiding Additives Ellen is concerned about the possible health risks associated with some food additives. She chooses to avoid them as much as possible in her diet. At the supermarket, she shops for ingredients to make some appealing recipes for homemade breads and biscuits. She decides an all-purpose flour would be best, but should she choose unbleached or bleached? State and explain your answer in a paragraph.

 **TECH Connection**

13. Gluten Balls What are gluten balls? Under your teacher's supervision, use the Internet to find instructions on how to make them. Then conduct an experiment to make the gluten balls. If possible, use a digital camera to take photos during different stages of your experiment, and upload the photos onto a computer to show the class. Verbally explain what you learned about gluten from this activity.

Real-World Skills

Problem-Solving Skills

14. Decreasing Saturated Fat Lily found an appealing recipe for cookies. However, it calls for 4 cups of butter. Lily thinks the cookies will contain too much saturated fat and cholesterol. Can she modify the recipe to solve the problem and make the cookies more health-friendly? If so, how? How might your solution affect the taste and texture of the cookies?

Interpersonal and Collaborative Skills

15. Flour Display Follow your teacher's instructions to form groups. Work together to make a display of five different kinds of flours. Label them with descriptions, protein levels, and storage hints. Include visuals that show how each flour type is used in baking.

Financial Literacy Skills

16. Flour Cost Comparison Visit the supermarket and compare the costs of 5 flour types (not necessarily 5 brands) of your choosing. Types may include organic, whole grain, unbleached, or oat flour. Create a chart that shows the types of flours and their costs, and share your findings with the class, giving an example of when each type may be used.

Academic Skills

**Food Science**

- 17. Chemical Leaveners** Both baking soda and baking powder are bases that react with acids to produce carbon dioxide. The difference between the two is that the soda needs an acid to react with, and the powder comes already packaged with an acid mixed in.

Procedure Place a teaspoon of baking soda and baking powder in two separate small bowls. Mix in 2 teaspoons of water to each bowl, and record results. Now add 2-3 teaspoons of vinegar to each bowl, and record results. Finally, microwave each for 30 seconds on high. Record the results.

Analysis Research double-acting baking powder, then use this information along with the results of your experiments to write a paragraph explaining what you learned.

NSES B Develop an understanding of chemical reactions and interactions of energy and matter.

**Mathematics**

- 18. Comparing Pan Volume** A lemon pound cake recipe calls for the cake to be baked in a 9 inch \times 5 inch \times 3 inch loaf pan. However, you do not have a pan with those dimensions. You have a square pan that measures 8 inches \times 8 inches \times 2 inches and an 8-inch (in diameter) cylindrical springform pan that is 3 inches deep. Which is the best substitute?

Math Concept Calculate Volume Volume is the amount of space inside an object. The volume of a rectangular three-dimensional shape (or box) equals length \times width \times height. The volume of a cylinder equals $\pi \times$ radius² \times height.

Starting Hint Find the pan with the closest volume to the one called for by the recipe. For the springform pan, use $r = \frac{1}{2}$ of the diameter. Use 3.14 for π .

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

**English Language Arts**

- 19. Comic Strip** It is possible to have a sense of humor about baking mishaps. Create a comic strip that shows an example of baking gone wrong.

NCTE 4 Use written language to communicate effectively.

STANDARDIZED TEST PRACTICE

ANALOGY

Read the three pairs of terms. Then choose the best word to match with the term leavening agent.

20. oven: cook
molasses: sweeten
egg: bind
a. baking soda
b. yeast
c. rise
d. air

Test-Taking Tip Analogies establish relationships between terms. When you look at the three pairs of terms listed here, identify the relationship that is common to all of them. Then try matching each possible answer with the term leavening agent. The one that establishes the same type of relationship as the other terms is correct.