

UNIT 5

Culinary Applications

Chapter

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EXPLORE THE PHOTO

Culinary workers must prepare a variety of foods. *What types of foods have you prepared?*





Culinary Project Preview

Local and Seasonal Foods

After completing this unit, you will know how to identify and cook a variety of foods. In your unit thematic project you will find foods from your local area. Then you will create a visual presentation on how to prepare them and prepare a dish using them.



My Journal

Write a journal entry about the different types of foods you have made.

- What ingredients have you used?
- How did you choose them?
- How did you cook them?



JOHNSON & WALES
UNIVERSITY

“Culinary school allowed me to experience a tremendous amount of new foods and spices, and even tickled taste buds I never knew I had.”

Zena Harrison
Assistant Food and
Beverage Director/Catering Chef
Compass Group

Cooking Techniques

SECTIONS

15.1 How Cooking Alters Food

15.2 Dry Cooking Techniques

15.3 Moist Cooking Techniques

WRITING ACTIVITY

Cause-and-Effect Paragraph

Cause-and-effect paragraphs explain the reasons for something, or the results of something. Write a cause-and-effect paragraph about how an egg changes when it is cooked.

Writing Tips

- 1 Use focusing sentences to help readers anticipate organization.
- 2 Use conjunctions such as “as a result,” “due to,” or “because.”
- 3 End with a concluding sentence.



EXPLORE THE PHOTO

Different cooking methods affect the flavor, texture, appearance, and nutritional content of food. *How many different cooking techniques can you name?*

How Cooking Alters Food

Use different cooking techniques for different foods.

Reading Guide

Before You Read

Think of an Example Look over the Key Concepts for this section. Think of an example of how or when you could use one of the skills from the Key Concepts. Thinking of how you might apply a skill can help motivate your learning by showing you why the skill is important.

Read to Learn

Key Concepts

- **Compare and contrast** different cooking methods.
- **Explain** how cooking affects a food's nutritive value, texture, color, aroma, and flavor.

Content Vocabulary

- dry cooking technique
- evaporate
- moist cooking technique
- combination cooking
- coagulate
- pigment
- caramelization

Academic Vocabulary

- subject
- enhance


Main Idea

Cooking is heating food to transform it in some way. Food is affected in different ways by different cooking techniques.

Graphic Organizer

As you read, you will discover five changes in food made by cooking. Use a herringbone diagram like this one to list the changes.



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

ACADEMIC STANDARDS

Mathematics

NCTM Data Analysis and Probability Understand and apply basic concepts of probability.

Science

NSES B Develop an understanding of chemical reactions.

NSES B Develop an understanding of the structure and properties of matter.

Social Studies

NCSS I A Culture Analyze and explain the ways groups, societies and cultures address human needs and concerns.

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

Cooking Techniques

Suppose the restaurant where you work offers chicken for dinner. There can be many different results, depending on how you choose to cook the chicken. You use very different cooking techniques to cook an egg, grill a steak, or stew tomatoes. Although each technique involves heating the food, they all use a different process to transfer heat to the food.

The degree of change that occurs during the cooking process depends on the length of cooking time, the temperature, and the cooking technique you use. Some methods will produce a great deal of change, while others will not produce very much change. The three cooking techniques are dry, moist, and a combination of both.

Dry Cooking

A **dry cooking technique** uses oil, fat, the radiation of hot air, or metal to transfer heat. No moisture is used in this cooking process. Any moisture that comes from the food evaporates into the air. To **evaporate** means that a

liquid escapes from a pan as a vapor. Baking and sautéing are good examples of dry cooking techniques. You will learn more about using dry cooking techniques in Section 15.2.

Moist Cooking

A **moist cooking technique** uses liquid instead of oil to create the heat energy that is needed to cook the food. Boiling and simmering are good examples of moist cooking techniques. You will learn more about how to use moist cooking techniques in Section 15.3.

Combination Cooking

Combination cooking uses both moist and dry cooking techniques. This kind of cooking is a two-step process. You start by using one technique and finishing with the other. For example, for stew, you brown the meat, a dry cooking technique. Then, you simmer the meat and vegetables with seasonings, a moist technique. The objective of combination cooking is to build upon food flavors.



Method Knowledge You must know many different cooking methods to work in a professional kitchen. *Why is it important to understand how different cooking methods work?*



Perfect Timing Perfectly cooked vegetables should be colorful and flavorful.
What happens to vegetables that have been overcooked?

If you understand each type of cooking technique, you can combine them in ways that create great-tasting food. You will learn more about how to use combination cooking techniques in Section 15.3.

Reading Check **Distinguish** What are the key differences between the dry, moist, and combination cooking techniques?

Changes in Cooked Food

A food's nutritive value, texture, color, aroma, flavor, and appearance do not stay the same after cooking. The cooking technique you choose can affect all of these factors. It is important to know how food will change after it is cooked.

Nutritive Value

The length of time food is cooked and the cooking technique you use determine how much nutrition a food will retain. Raw foods

lose more nutritive value the longer they cook. In fact, certain cooking techniques can actually speed up nutrient loss. For example, boiling green beans extracts nutrients in two ways. Nutrients are destroyed simply because the green beans are exposed to heat. Nutrients also are lost during boiling because they are diluted in the liquid.

You might think that if you steam the green beans, you will maintain all of the nutrients. Although steaming is one of the best ways to minimize nutrient loss, exposure to heat will still extract some nutrients from the green beans. However, because the vegetables are cooked by the steam, and not in water, they will not lose nearly as many nutrients as if they had been boiled.

Texture

If you have ever overcooked vegetables, you have seen how cooking can change the texture of food. During cooking, moisture is lost, food tissue breaks down, and proteins coagulate. All of these factors change the texture of cooked food.

When heat is applied, the proteins in food **coagulate**. This means that they change from a liquid or semiliquid state to a drier, solid state. The longer that you **subject**, or expose, the proteins to heat the firmer and more solid they will become. For example, compare the difference in texture between a soft-cooked egg and a hard-cooked egg. If you simmer an egg for three to five minutes, you will produce a soft-cooked egg with a partly solid white and a semiliquid yolk. To produce a hard-cooked egg with both a solid white and yolk, the egg must be simmered for 8 to 10 minutes. The length of time cooked will affect the texture of the egg white and yolk.

Coagulation also occurs in meat proteins as heat is applied during cooking. Meat proteins lose some moisture as the protein becomes more solid during cooking. Long, slow cooking techniques and moderate heat will make some meats tender, flavorful, and juicy. However, using too much heat can toughen the protein in those same meats. This happens because too much moisture is lost.

Color

The cooking process also affects the color of food. For example, certain ingredients that are commonly used to cook vegetables, such as lemon juice, vinegar and baking soda, can change the color of vegetables. There are cooking techniques, such as blanching, that can help keep the color of vegetables. (You will learn about blanching in Section 15.3)

Fruits and vegetables get their unique colors from naturally occurring pigments. A **pigment** is the matter in cells and tissue that gives them their color. Common pigments in foods include chlorophyll (green vegetables), flavonoids (red, purple, and blue vegetables), and carotenoids (yellow, orange, and red vegetables). Many foods have more than one type of pigment. Remember that the longer that fruits and vegetables are cooked, the more their color will change.

Likewise, as meat cooks for extended periods of time, moisture is extracted. The meat will lose its deep-red color as it cooks. These color changes happen at different temperatures.



Texture Changes When high-protein foods are cooked, their texture changes. *How can you tell which egg has been cooked longer?*

As the internal temperature of meat reaches between 140°F and 160°F (60°C and 71°C), the redness decreases significantly. The same thing happens when the meat reaches an internal temperature between 168°F and 176°F (76°C and 80°C). That is why the inside of a rare steak is red, a medium rare steak is pink, and a well done steak is brownish gray. Remember, however, that using a thermometer to measure internal temperature is the only safe way to determine if meat is done.

Aroma

The aroma created from cooking food can be as appealing as the flavor and presentation of the final dish. Cooking techniques that use fat as an ingredient or as a way to transfer heat create an appealing aroma. **Caramelization** (¹ker-ə-məl-ə-zā-shən), or the process of cooking sugar to high temperatures, is what creates these pleasing aromas. As the sugar in the food turns brown, a rich aroma is produced. Caramelization can also affect the color and flavor of food.

Flavor

The cooking process also affects the flavor of food. If you have ever eaten overcooked meat or vegetables, you know that overcooking can ruin the flavor. However, if you use the correct cooking technique, you can actually **enhance**, or increase the quality of, the flavor of food. For example, if you grill meats over charcoal or woods such as hickory and mesquite, it will give them an appealing, smoky flavor. Foods that are cooked with dry-heat methods taste rich because of the caramelization that occurs. Moist cooking techniques help bring out a food's natural flavor.

The flavor of foods can also be changed during cooking by using seasonings and flavorings at different times during the cooking process. Cooking methods that use liquids rather than fats to cook can bring out

Science à la Carte

Color Fade

Do you know what gives green vegetables their color? Green vegetables, such as broccoli and spinach, contain two types of the pigment chlorophyll. One type of chlorophyll is a bright bluish-green color. The other type is a yellowish-green color. Green vegetables have about four times more of the blue-green type than the yellow-green type.

To maintain the color of a green vegetable, do not overcook it. Heat from cooking damages the vegetable's cells. This allows the acids that were in the once-living cells of the vegetable to be released. Once exposed to this acid, the chlorophyll changes to a brownish-yellow color.

Procedure

To complete the following experiment, you will need four broccoli stalks, a pot with a lid, and a second pot without a lid. Bring 3 cups of water to a boil in each uncovered pot. Separate the florets, or flowers, of the broccoli. Place half of the broccoli in one pot and cover it with the lid. Place the rest of the broccoli in the other pot without a lid. Cook both pots of broccoli for 7 minutes. After 7 minutes, drain each pot and place the broccoli into two separate bowls.

Analysis

Determine which style of cooking provided a greener vegetable. Examine each bowl. Describe the color and the texture of the broccoli in each bowl. Which dish has the greener broccoli? Explain in a short summary why you think one method of cooking had a greater impact on the color change than the other.

NSES B Develop an understanding of chemical reactions.

flavors in a food. Slow roasting foods will bring out rich flavors. Deep-frying foods creates a unique flavor that is enhanced by the crispness of the food.

It is important to enhance the flavor of food because it increases the appeal of the food to the customer. Appealing food is one of the main factors that will bring back customers to a restaurant. If you do not choose the right cooking method for a food, all other methods to enhance flavor will be wasted.

Another way to enhance the flavor of food is to add seasonings and flavorings before, during, or after the cooking process. These seasonings and flavorings, including herbs, spices, and condiments, will be discussed in more detail in Chapter 16. Not all seasonings and flavorings are used in the same way. Knowing which seasoning to add, and when to add it, is an important part of your culinary training.



Reading Check

Explain Why does the texture of foods toughen after prolonged exposure to heat?

SECTION 15.1



After You Read

Review Key Concepts

1. **Describe** dry cooking techniques.
2. **Explain** how cooking can affect the texture of a food.

Practice Culinary Academics



Science

3. **Procedure** Work in groups as directed by your teacher. Wash and peel several carrots and divide them into three even amounts. Cook each group using the following techniques: 1) steam, 2) roast, 3) sear and then braise.

Analysis Sample each group of carrots and evaluate the differences in texture, color, aroma, and flavor. Why are there differences? Summarize your results.

NSES Content Standard B Develop an understanding of the structure and properties of matter.



Social Studies

4. Choose a country and research common cooking techniques that are used in that country. What types of cooking methods are they? Can you predict how these techniques would affect nutritive value, texture, color, aroma, and flavor? Give a five-minute oral presentation on your findings. Use pictures to illustrate cooking techniques.

NCSS I A Culture Analyze and explain the ways groups, societies and cultures address human needs and concerns.

Safety Check



Internal Temperatures

Although you should be careful not to overcook food, it must be cooked to a minimum internal temperature to be safe. A thermometer shows the minimum safe internal cooking temperatures for various foods.

CRITICAL THINKING What might happen if food is not cooked to the minimum internal temperature?



Mathematics

5. Your sous chef prepared one dozen soft-cooked eggs and one dozen hard-cooked eggs. Unfortunately, he then mixed the two batches together in one container. What is the probability that if you grab two of the eggs, both will be hard-cooked?

Math Concept Probability of Dependent

Events When two events are dependent (the probability of a second event depends on the outcome of the first), find the probability of each event, and multiply those probabilities together.

Starting Hint For the first selection, the probability that the egg is hard-cooked is $\frac{12}{24}$ (or $\frac{1}{2}$). However, when you select the next egg, remember that there will be one fewer hard-cooked egg, and one fewer egg overall.

NCTM Data Analysis and Probability Understand and apply basic concepts of probability.



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

Dry Cooking Techniques

Bake, roast, or grill foods to give them a rich flavor.

Reading Guide

Before You Read

Study with a Buddy It can be difficult to review your own notes and quiz yourself on what you have just read. According to research, studying with a partner for just 12 minutes can help you study better.

Read to Learn

Key Concepts

- **Demonstrate** dry cooking techniques.

Main Idea

Dry cooking causes moisture in food to evaporate into the air. Dry cooking techniques include baking, roasting, sautéing, stir-frying, pan-frying, deep-frying, grilling, and broiling.

Content Vocabulary

- bake
- carryover cooking
- smoking
- roasting
- sear
- basting
- open-spit roast
- sautéing
- stir-frying
- wok
- frying
- dredging
- breading
- batter
- heat lamp
- pan-fry
- deep-fried
- recovery time
- grilling
- griddle
- broiling

Academic Vocabulary


- effect
- delicate

Graphic Organizer

Use a matrix like the one below to list the different dry cooking techniques, with a short description of each.

Dry Cooking Techniques

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

ACADEMIC STANDARDS

English Language Arts

NCTE 5 Use different writing process elements to communicate effectively.

Mathematics

NCTM Geometry Use visualization, spatial reasoning, and geometric modeling to solve problems.

Science

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

Social Studies

NCSS V A Individuals, Groups, and Institutions Apply concepts such as role, status, and social class in describing the connections and interactions of individuals, groups, and institutions in society.

NCSS I B Culture Predict how data and experiences may be interpreted by people from diverse cultural perspectives and frames of reference.

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

Dry Cooking

Dry cooking techniques include baking, roasting, sautéing, stir-frying, pan-frying, deep-frying, grilling, and broiling. Do not let the word dry fool you. It is called the dry cooking technique because no moisture is directly used in the cooking process. Any moisture that comes from the food evaporates into the air. Some dry cooking techniques use oil and fat to transfer heat. Others use metal and radiation of hot air to create heat. This section will introduce you to dry cooking techniques.

Baking

Baking is a very popular dry cooking technique. Bread and chicken are foods that are commonly baked. Fish, vegetables, fruits, breads, and pastry items also can be baked.

To **bake**, you use dry heat in a closed environment, usually an oven. No fat or liquid is added to the cooking process. Any moisture that comes from food is turned into steam and evaporates into the air. This is because the food is baked uncovered.

A large food product will continue to cook for 5 to 15 minutes after you remove it from the oven. This is called **carryover cooking**, or the cooking that takes place after you remove something from its heat source. This happens because the outside of the food is hotter than the inside of the food. This **effect**, or result, continues until the temperature throughout the food becomes stable. Carryover cooking can add 5 to 15 degrees to the food's final temperature. There is no way to stop the carryover cooking that happens at the end of dry heat cooking. You must keep this effect in mind when you plan cooking times.

Smoking

Smoking is usually done with meats, but also can be done with other foods, such as nuts, vegetables, and cheeses. **Smoking** is a form of cooking that uses low heat, long cooking times, and wood smoke for flavor. Commercial smokers are usually kept at a temperature of 225°F (107°C). Smoking is done with hot coals, to which smoking wood chunks of hickory, mesquite or just about any



◀ **Roasted Foods** Roasting adds a rich flavor to meats and vegetables. *What other foods could be roasted?*

hardwood or fruitwood is added. Foods are placed on the opposite side of the smoker as the coals and wood. This keeps the food from cooking too quickly.

Roasting

Like baking, **roasting** uses dry heat in a closed environment to cook food. Foods commonly roasted include meat and poultry. These foods are placed on top of a rack that is inside a pan. This allows air to circulate all the way around the food so that it cooks evenly. In general, roasting involves longer cooking times than baking.

Carryover cooking also applies to roasting. Remove roasted foods from the oven just before they reach the desired doneness. Remember to use a thermometer to check the internal temperature of foods for safety. The carryover heat that occurs will complete the cooking process.

Searing

Roasting differs from baking in that sometimes the outside of the food product is seared. To **sear** means to quickly brown the outside of food at the start of the cooking process. Searing enhances flavors and adds color. It also helps to build body in juice drippings that can later be used to make sauces. Searing can be done two different ways: in a pan on the rangetop or in the oven.

When you sear foods on the rangetop, heat the pan, then place the food in a pan that contains a small amount of heated oil. Brown the meat on one side, and then turn the meat until all of its surfaces are browned. After this is done, place the pan in a hot oven to finish the cooking process.

When searing in the oven, place the food, such as a roast, in a pan in a 450°F to 475°F (232°C to 246°C) oven. Cook the meat for about 15 to 20 minutes, or until the outside begins to turn golden brown. Then, reduce the heat to 325°F to 350°F (163°C to 177°C) to finish the cooking process.

A TASTE OF HISTORY

1960

John F. Kennedy is elected President of the United States

1963

Julia Child's cooking show *The French Chef* debuts on TV

Cooking Through Time

Cave drawings dating back to the Stone Age show that prehistoric life centered around the gathering and preparation of food. Prehistoric people had no choice but to grill or roast their food on small open fires. During the Middle Ages, the cauldron was the main cooking pot in the kitchen. Seventeenth- and 18th-century people cooked food over fire in kettles or on spits.

Chefs such as Elizabeth David and Julia Child have made an impact on cooking history by introducing both new and historic cooking methods to the masses through their cookbooks and television shows. Although some cooking methods have evolved, others remain the same today as they were in prehistoric times.

History Application

Imagine that you are a TV news reporter doing a story on Julia Child's life and career. Research Julia Child's career and write a short biography on her life. Explain how she revolutionized the cooking world.

NCSS VA Individuals, Groups, and Institutions Apply concepts such as role, status, and social class in describing the connections and interactions of individuals, groups, and institutions in society.

Some meats should be basted during the cooking process to avoid dryness. **Basting** involves moistening foods with melted fats, pan drippings, or another liquid during the cooking time.

Open-Spit Roasting

Many cooks prefer to roast food over an open fire. This is called **open-spit roasting**. To open-spit roast, place the food, usually meat such as pork, on a metal rod or a long skewer. Then, slowly turn it over the heat source. Place a drip pan under the food to catch its juices. Many commercial roasters will automatically turn the spit during the long cooking time.

Check the internal temperature with a thermometer before you remove food from the spit. Remember that the food will continue to cook for another 5 to 15 minutes after you remove it from the heat source.

Sautéing and Stir-Frying

Sautéing (sò-'tā-īn) is a quick, dry cooking technique that uses a small amount of fat or oil in a shallow pan to cook foods. Sautéing is generally used with **delicate**, or fragile, foods that cook relatively quickly. These foods include fish fillets, scallops, tender cuts of meat, vegetables, and fruit. Most sautéed foods are served with a sauce.

During sautéing, you will want to seal the surface of the food. To do this, preheat a pan on high heat, then add a small amount of fat or oil. When the fat or oil is heated and nearly smoking, add the food. Do not overcrowd the pan. Doing so will lower the temperature of the food, and it will not cook properly. After the food is sealed, lower the temperature so that the food cooks evenly throughout. Foods may need to be turned in the pan while they are sautéing.

Stir-frying is a dry cooking technique that is similar to sautéing. When stir-frying, you use a wok. A **wok** is a large pan with sloping sides. Stir-fried foods require less cooking time than sautéed foods. Vegetables and tender, boneless meats are often stir-fried.

To stir-fry, place a wok over high heat, add a small amount of fat, and then add small pieces of food. Because of the wok's size and shape, it is important to constantly stir the food as it cooks.

Frying

It is hard for most people to resist crispy foods, such as fried chicken and French fries. Foods like these are prepared using a dry-heat cooking technique called **frying**. During frying, foods are cooked in larger amounts of hot fat or oil.

Small Bites

Pan-Frying Tip Chill cuts of meat before you pan-fry them. The outside of the meat will brown before the inside finishes cooking.

The outside of the food becomes sealed when it comes in contact with the hot oil during frying. The natural moisture that is in the food turns to steam, which bubbles up to the surface. Because the outside of the food is sealed, fried foods are often moist and juicy on the inside.

Foods are usually coated before frying. To do this, foods can be dredged, breaded, or battered.

Dredging One way to prepare foods for frying is to dredge them. **Dredging** means to coat foods with flour or finely ground crumbs.

Breading Another way to add texture and flavor to fried foods is to add a **breadcrumbing**, or a coating made of eggs and crumbs.

Batter Another tasty way to prepare fried foods is to batter them before frying them. This adds texture and flavor. **Batter** is a semiliquid mixture that contains ingredients such as flour, milk, eggs, and seasonings. Dip the food into the batter immediately before frying.

Tips to Follow After Frying

After food has been fried, remove it from the oil and drain it well on an absorbent surface such as paper towels. You can also add seasoning at this time. Fried foods are best served and eaten immediately after being cooked. If you cannot serve fried foods right away, they can be temporarily stored under a heat lamp. A **heat lamp** uses light in the infrared spectrum to keep food warm during holding without becoming soggy.

Pan-Frying

One way to fry food is pan-frying. To **pan-fry**, heat a moderate amount of fat in a pan before adding food. Use enough fat to cover about one-half to three-quarters of

Dredge and Bread Food

- 1 Dredge the food product in seasoned, dry flour by dipping it into the flour and coating it evenly on all surfaces. Shake off any excess flour.



- 2 Immediately dip the food into an egg wash or other liquid. An egg wash is a mixture of beaten eggs and a liquid such as milk or water. Coat the food completely. Shake off any excess.



- 3 Quickly place the food into a container of dry crumbs and coat evenly. Crumbs can be made from bread, ground nuts, cereal, crackers, or shredded coconut.



the food. The fat should not be so hot that it smokes. Instead, it should be hot enough to sizzle when food is added, usually at 350°F to 375°F (177°C to 191°C).

Pan-frying does use more fat than sautéing, so it requires longer cooking times and lower heat. Because food is not completely covered by the oil during pan-frying, you will need to turn the food after one side is done to allow for even cooking throughout. Foods that are often pan-fried include chicken, potatoes, fish, and pork chops.

Deep-Frying

Another way to fry foods is to deep-fry them. **Deep-frying** means to cook foods by completely submerging them in heated fat or oil at temperatures between 350°F and 375°F (177°C to 191°C). Fried foods must be cooked until they are done on the inside. Temperature and timing on deep-fat fryers help you determine doneness. Deep-fried foods will be a golden brown color. Once deep-fried foods are done, remove them from the oil and briefly hold them up over the oil tank

so that the excess fat can drip off. Oil must be changed frequently. Heat and use can cause oil to darken, break down, and give food an off flavor. Oil can also transfer strong flavors between foods.

The most popular types of deep-fried foods are potatoes, onions, fish, and poultry. Many foodservice operations purchase foods that are already breaded and are ready to be deep-fried. Commercial fryers with fry baskets that can sit directly in the oil are commonly used.

Commercial deep-fryers have some advantages over other frying equipment:

- There is less recovery time than with stove-top pots. **Recovery time** is the time it takes for the fat or oil to return to the preset temperature after the food has been submerged.
- The life of the fat or oil is maximized if correct temperatures are used.

Grilling

Many commercial kitchens use gas, electric, charcoal, or wood-fired grills. **Grilling** is often used for tender foods that cook relatively


quickly. To grill foods properly, you must first preheat the grill. Depending on the type of food you wish to grill, brush the food lightly with oil, and then place it on the grill. Do not move the food after you place it initially. This will help create the distinctive markings of a grilled food product.

Griddle Use

Grilling can also be done on a griddle. A **griddle** is a flat, solid plate of metal with a gas or electric heat source. Griddles are commonly used to make sandwiches such as grilled cheese and breakfast items such as pancakes and eggs. Depending on the type of food that is cooked, you may want to add a little fat to the griddle to keep the food from sticking. The temperature of a griddle is about 350°F (177°C).

Food can also be grilled on a grooved griddle. This type of griddle has raised ridges. Although grooved griddles are similar in design to grills, they do not generate as much smoke as a grill. That is why food cooked on a griddle will not have the same smoky flavor as food cooked on a grill.



 **Colorful Cooking** Cooking foods produces many changes in the food. *What changes occurred to this food as it cooked?*

Broiling

Broiling means to cook food directly under a primary heat source. When you broil food, the temperature is controlled by how close the food is to the heat source. Thicker foods should be placed farther from the heat source, and thinner foods should be placed closer to the heat source. This ensures that the inside and outside of the food will cook at the same rate.

Foods that are commonly broiled include vegetables, meats, and poultry. Tender foods lend themselves to being broiled. Foods are usually turned only once during cooking when they are broiled. The broiling rack may make grill marks on the food, or a heatproof

Small Bites

Seasonings Some cooks add seasonings to the meat before broiling. Do not add salt before broiling, however, because it draws out juices. This can dry out the meat.

platter may be used. Unlike a grill, broilers are heated only by gas or electricity. Additional flavors cannot be added to the food by burning charcoal or wood. Broiling uses no extra fat to cook food.

Reading Check **Compare and Contrast** How do stir-frying and sautéing differ?

SECTION 15.2 After You Read

Review Key Concepts

1. **Explain** how to use a griddle.

Practice Culinary Academics

English Language Arts

2. Imagine that you write an advice column for a local or school newspaper about cooking. Ask and answer two questions about using dry cooking techniques. Share your column with the class.

NCTE 5 Use different writing process elements to communicate effectively.

Science

3. **Procedure** Cook a piece of chicken and a potato. Record the temperature immediately after removing the food from the oven. Record the temperature again each minute until the food begins to cool.

Analysis Create a chart of the cooling times for each item. What do you observe about carryover cooking times?

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

Social Studies

4. Choose a dry cooking technique and study its development. What were the first cultures to use the technique? How has it changed since then?

What cultures use the technique now? Create a two-page report to discuss your research.

NCSSEB Culture Predict how data and experiences may be interpreted by people from diverse cultural perspectives and frames of reference.

Mathematics

5. To pan-fry some breaded chicken cutlets, Jody adds oil to her pan so that the oil is 1/2-inch deep. If the pan is 10 inches in diameter, how many fluid ounces of oil did Jody use?

Math Concept **Volume of a Cylinder** Calculate the volume (V) of a cylinder as $V = \pi r^2 h$, where r = the radius of the circular base, and h is the height of the cylinder. Use 3.14 for π .

Starting Hint Find the volume in cubic inches of the oil using the formula, with 0.5 inches as h and one-half the pan's diameter as r . One cubic inch = 0.554 fluid ounces, so multiply the volume by 0.554.

NCTM Geometry Use visualization, spatial reasoning, and geometric modeling to solve problems.

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

Moist Cooking Techniques

Reading Guide

Before You Read

Preview Understanding causes and effects can help clarify connections. A cause is an event or action that makes something happen. An effect is a result of a cause. Ask yourself, "Why does this happen?" to help you recognize cause-and-effect relationships in this section.

Read to Learn

Key Concepts

- **Demonstrate** moist cooking techniques.
- **Describe** combination cooking techniques.

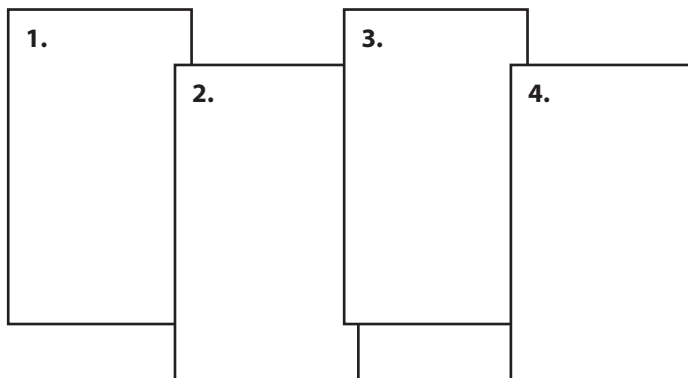
Main Idea


Moist cooking involves heating food in a liquid. Sometimes moist cooking techniques are applied to food that has been partially cooked with a dry cooking technique.

Graphic Organizer

There are four steps in stewing foods. Use a sequence chart like this one as you read to list these steps.

Steps in Stewing Foods



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

Boil, simmer, or poach foods to add tenderness and flavor.

ACADEMIC STANDARDS

English Language Arts

NCTE 12 Use language to accomplish individual purposes.

Mathematics

NCTM Problem Solving
Build new mathematical knowledge through problem solving.

Science

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

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

Cooking in Liquid

There is more than one way to cook eggs. Some people like them to be boiled so that they are hard-cooked, while others prefer their eggs lightly poached so that they are softer in texture. Boiling and poaching are both moist cooking techniques.

Cooking food using a moist technique involves heating food in a liquid other than oil. Moist cooking techniques include boiling, blanching, parboiling, simmering, poaching, and steaming. Sometimes, a moist cooking technique is applied to foods that have already been partially cooked using a dry cooking technique. This section will introduce you to moist and combination cooking techniques.

When you cook foods in water or other liquids, foods are completely **submerged**, or covered in liquid. Boiling, simmering, and poaching involve cooking in liquid. The doneness of food will depend on the type of food that is cooked and the specific method chosen.

Boiling

Boiling is a moist cooking technique in which you bring a liquid, such as water or stock, to the boiling point and keep it at that temperature while the food cooks. The **boiling point**, or temperature at which a liquid boils, of water is 212°F (100°C) at sea level. When liquid reaches the boiling point, food can be added and cooked.

When liquid boils, a process called convection occurs. During **convection**, the liquid closest to the bottom of the pan is heated and rises to the top. Meanwhile, the cooler liquid descends to the bottom of the pan. This sets off a circular motion in the pan that keeps the food in constant motion. This motion keeps food from sticking to the pan.

Boiling cooks food quickly. However, it can be harmful to some food. The rapid circular motion of the liquid does not harm pasta, but it can break apart a tender piece of fish. Because of this, very few food items are cooked completely by boiling.



Bring to a Boil Boiling is best used for foods that are not too tender or delicate.
Why should delicate foods not be boiled?



Cool Down One way to cool food immediately after blanching is to plunge it into ice water. *What should be done with food after it has been blanched?*

Blanching

Using the boiling method to partially cook food is also known as **blanching**. It is a quick way to change the flavor and keep the color in foods. Blanching is usually a two-step process:

1. Completely submerge the food in a boiling liquid and blanch, or briefly cook, it.
2. Remove the blanched food from the liquid. To make sure the food stops cooking as soon as you remove it from the liquid, briefly plunge the food into ice water. This is called **shocking**. This will completely stop the cooking process.

Remember that a blanched food item is only partially cooked. You will need a second stage of cooking to complete the cooking process. For example, you might first blanch green beans and then sauté them in butter and herbs.

Blanching has many uses. Blanching is sometimes used to:

- Simplify peeling of vegetables and fruits.
- Precook foods before they are frozen.
- Soften herbs.
- Lock in the color of foods.

- Help preserve a food's nutrients.
- Remove excess salt from ham or pork.
- Remove blood from meats.
- Remove strong flavors from meats.
- Cook food partially to prepare it for faster service later.

Parboiling

Parboiling is a moist cooking technique that is similar to blanching. In **parboiling**, foods are put into boiling water and partially cooked. However, the cooking time for parboiling foods is longer than for blanching. Recipes that include parboiling will give you the exact timing for a particular food item. For example, ribs are often parboiled before they are grilled. This tenderizes the meat and reduces grilling time.

Small Bites

Tomato Peeling You can lightly blanch a fresh tomato to make it easier to peel. You must immediately plunge the tomato into ice water after blanching so that it does not continue to cook.

Simmering

Simmering is the most commonly used moist cooking method. It can be used to cook food items, or blanch them. Foods should be simmered until they are moist and tender. Like boiling, simmering involves cooking food in liquid. However, during **simmering**, food cooks slowly and steadily in a slightly cooler liquid that is heated from 185°F to 200°F (85°C to 93°C). The bubbles in the liquid rise slowly to the surface of the liquid, but do not break the surface.

Because of the lower temperature, not as much convection action occurs during simmering. This makes simmering a much more gentle cooking process than boiling. Foods such as yellow squash and zucchini should be fully submerged in the liquid to simmer. The advantages of simmering include less shrinkage of the food, less evaporation and better control over evaporation, and less breakup of fragile food, such as fish.

Simmering is also used to **reduce**, or decrease the volume of, a liquid. For example, you might want to simmer spaghetti sauce to make it thicker.

Poaching

Poaching is an even gentler method of moist cooking than simmering. To **poach** means to cook food in a flavorful liquid between 150°F (66°C) and 185°F (85°C). Generally, tender or delicate foods such as fish and eggs are poached in just enough liquid to cover the food. You can poach food on the rangetop or in the oven. Sometimes the poaching liquid is used to make a sauce that accompanies the food when it is served.

Steaming

Steamed vegetables are both tasty and nutritious. **Steaming** means cooking vegetables or other foods in a closed environment filled with steam, such as in a pot with a tight-fitting lid. Steam is created inside the pot when water reaches the boiling point and turns into vapor. Although the food never touches the liquid, the temperature inside the closed environment rises high enough to cook the food. Steaming is generally faster than other moist cooking techniques.



Gentle Simmer Simmering cooks foods slowly. *What are some of the advantages of simmering versus boiling?*

If pressure is added during steaming, the temperature inside the pot rises even higher. This cooks the food even faster. A pressure steamer holds steam under pressure. As the pressure increases, so does the temperature. For example, say you cook asparagus at 10 pounds of pressure per square inch (psi) at 240°F (116°C). If you increase the pressure to 15 psi, the temperature will rise to 250°F (121°C). Steamers cook foods, such as vegetables, without dissolving the nutrients.

Reading Check Summarize Why would you blanch a food?

Combination Cooking

Sometimes, great things happen when you combine the best of two techniques. This is the case with combination cooking. As the term suggests, combination cooking combines two techniques you have already learned: moist and dry. Two major combination techniques are braising and stewing. Braising and stewing involve both a dry and a moist cooking

process. The first step for both cooking methods is usually to brown the food using dry heat. Then, the food is completely cooked by simmering the food in a liquid.

Cooking food using a combination technique is especially useful for tough, but flavorful, cuts of meat. The combination cooking process makes the meat more tender. It is also an excellent way to prepare large pieces of less-tender meat.

Braising

Braising is a long, slow cooking process. It can make tough cuts of meat more tender. Meat is first seared and the pan deglazed before the moist cooking technique is used. To **deglaze** means to add a small amount of liquid such as stock or water to a pan to loosen brown bits of food after searing or sautéing. An additional amount of stock, sauce, or water is added, and the food is cooked on top of the range or in the oven.

During cooking, braising produces a very flavorful liquid. The flavors **extracted**, or drawn out, from the food become highly concentrated.



Flavorful Liquid Braising liquid should be strained before it can be reused for sauces. *Why do you think this is?*

Imagine braising a pork loin. The juices from the pork are mixed with the braising liquid. The braising liquid takes on the flavor of the meat's juices.

Braised foods are always served with the cooking liquid. You will want to strain, thicken, and add salt, pepper, or other spices to the liquid before you serve it.

HOW TO

Braise Food

- 1 Begin by searing the food in a frying or roasting pan.



- 2 Remove the food from the pan or push it to one side. Add mirepoix or vegetables that are appropriate to the preparation.



- 3 Cook the vegetables and deglaze by adding a small amount of liquid to the pan. Stir to dissolve the browned bits of food that stick to the pan. Return the seared food to the pan if you removed it.



- 4 Add enough liquid, such as stock or sauce, to cover no more than two-thirds of the food. Cover the pan, if desired. Place the pan in a 350°F (177°C) oven, and cook the food slowly until it is fork-tender. Turn the food every 20 to 30 minutes. Braising can also be done on the rangetop over low heat.



Stewing

Stewing is another combination cooking technique. However, stewed foods are completely covered with liquid during cooking. Cooking time for stewing is generally shorter than for braising. That is because the main food item in stew is cut into smaller pieces before cooking.

Follow these steps to stew foods:

1. First, sear the food in a pan over high heat. Tender cuts of meat should not be stewed or they will become tough.
2. Completely cover the food with liquid.
3. Bring the stew to a simmer and cook until tender.
4. Add vegetables, if desired, part of the way through simmering the main food.

This will ensure that the vegetables will not be overcooked when the main food in the stew is fully cooked.



Reading Check

Explain What are the differences between braising and stewing?

Safety Check



Burned by Steam

Take special care when you remove the lids from pots or containers that may have steam trapped inside. Always tip the lid open by lifting it away from your hand and body. Steam is at least 212°F (100°C) and can cause severe burns.

CRITICAL THINKING Why do you think the steam is so hot?

SECTION 15.3



After You Read

Review Key Concepts

1. **Explain** how to blanch foods.
2. **Describe** the braising process.

Practice Culinary Academics



Science

3. **Procedure** Browning occurs in meat when it is cooked at high heat. Cook two pieces of meat. Sear one piece, and use another cooking technique on the second piece that does not involve searing.

Analysis Compare the flavor of the seared meat with the other meat. Create a chart to record observations about the appearance and flavor. Write a short summary of why you think meat is browned before stewing or braising.

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



English Language Arts

4. Create a poster to illustrate the process of braising foods. Use drawings and text to display each step in the process. Display your posters in the classroom.

NCTE 12 Use language to accomplish individual purposes.



Mathematics

5. Gina can cook basmati rice $3\frac{1}{2}$ times faster in her pressure cooker than in a regular pot. If rice normally cooks in 20 minutes, what is the cooking time in the pressure cooker (to the nearest second)?

Math Concept

Working with Time To convert decimal minutes (such as 12.43) into minutes and seconds, keep the whole number portion (as minutes), and multiply the decimal portion by 60 (which represents the seconds).

Starting Hint Find the new cooking time by dividing 20 minutes by $3\frac{1}{2}$. Convert any decimal portion of your answer into seconds by multiplying it by 60. Round to the nearest second.

NCTM Problem Solving Build new mathematical knowledge through problem solving.



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

Chapter Summary

There are three different cooking techniques: dry, moist, and combination cooking. The cooking technique, temperature, and cooking time affect nutritive value, texture, color, aroma, and flavor. Dry techniques include baking, roasting,

sautéing, stir-frying, pan-frying, deep-frying, grilling, and broiling. Moist cooking techniques include boiling, simmering, poaching, and steaming. Combination cooking techniques include braising and stewing.

Content and Academic Vocabulary Review

1. Create multiple-choice test questions for each content and academic vocabulary term.

Content Vocabulary

- dry cooking technique (p. 376)
- evaporate (p. 376)
- moist cooking technique (p. 376)
- combination cooking (p. 376)
- coagulate (p. 378)
- pigment (p. 378)
- caramelization (p. 379)
- bake (p. 382)
- carryover cooking (p. 382)
- smoking (p. 382)
- roasting (p. 383)
- sear (p. 383)
- basting (p. 383)
- open-spit roast (p. 383)
- sautéing (p. 384)
- stir-frying (p. 384)
- wok (p. 384)
- frying (p. 384)
- dredging (p. 384)
- breading (p. 384)
- batter (p. 384)
- heat lamp (p. 384)
- pan-fry (p. 384)
- deep-fried (p. 385)
- recovery time (p. 386)
- grilling (p. 386)
- griddle (p. 386)
- broiling (p. 387)
- boiling (p. 389)
- boiling point (p. 389)
- convection (p. 389)
- blanching (p. 390)
- shocking (p. 390)
- parboiling (p. 390)
- simmering (p. 391)
- reduce (p. 391)
- poach (p. 391)
- steaming (p. 391)
- braising (p. 392)
- deglaze (p. 392)
- stewing (p. 394)

Academic Vocabulary

- subject (p. 378)
- enhance (p. 379)
- effect (p. 382)
- delicate (p. 384)
- submerged (p. 389)
- extracted (p. 392)

Review Key Concepts

2. **Compare and contrast** different cooking methods.
3. **Explain** how cooking affects a food's nutritive value, texture, color, aroma, and flavor.
4. **Demonstrate** dry cooking techniques.
5. **Demonstrate** moist cooking techniques.
6. **Describe** combination cooking techniques.

Critical Thinking

7. **Imagine** that a coworker has cooked a meal. The piece of cooked meat is tough and grayish-brown color, and the vegetables are limp and colorless. What has gone wrong during cooking?
8. **Explain** how you should prepare an extra-lean pork loin roast to avoid it becoming dry and tasteless.
9. **Imagine** that a food critic is coming to your restaurant. What would you tell your staff about cooking to ensure good flavor, nutritive value, texture, color, and aroma?
10. **Describe** the advantages of having a variety of cooking techniques on a restaurant menu. Is it possible to have too many techniques represented?

Academic Skills

**English Language Arts**

- 11. Interpret Cooling Methods** Obtain a cookbook or a cooking magazine that has at least 10 recipes. Read through the book or magazine and review the recipes. Choose 10 recipes and identify the cooking techniques used in each. For each recipe, list the cooking technique, whether it is moist or dry, and how you think the technique will affect the dish's color, texture, aroma, and flavor.

NCTE 3 Apply strategies to interpret texts.

**Social Studies**

- 12. Equipment Advances** Choose one cooking technique and conduct research to discover how the equipment used for that cooking method has changed over time. Create a time line with brief descriptions of the changes in the equipment used. How has the changing equipment improved that cooking technique?

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

**Mathematics**

- 13. Fill a Fryer** Oscar has just purchased a new deep fryer for his restaurant. The fryer holds 60 pounds of cooking oil. But Oscar's containers of cooking oil on hand were measured in volume (gallons), not weight. If the oil has a density of 7.5 pounds per gallon at room temperature, and a 4-gallon container of oil costs Oscar \$38.75, how much will it cost to fill up the fryer?

Math Concept Weight vs. Volume A liquid's weight and volume are related to each other by a concept called density, which is the ratio of its weight to its volume at a particular temperature. Use the formula $\text{weight} = \text{density} \times \text{volume}$.

Starting Hint First, determine the total volume of oil that Oscar will need by rearranging the formula above to solve for volume. Use the total weight and density given in the problem. Then, find the number of containers that Oscar will need by dividing the total volume by 4. Multiply the number of containers by the cost per container.

NCTM Problem Solving Apply and adapt a variety of appropriate strategies to solve problems.

Certification Prep

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

- 14.** Which of the following uses a combination cooking technique?
- braise
 - stir-fry
 - poach
 - grill
- 15.** At what temperature does water begin to boil?
- 100°F
 - 132°F
 - 200°F
 - 212°F

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

Test-Taking Tip

Building your vocabulary will help you take tests. Practice new vocabulary and concepts with other students until you understand them all.

Real-World Skills and Applications

Self-Management Skills

- 16. Work with Time Constraints** Imagine that you have only 30 minutes to prepare a meal. Your main ingredient will be chicken. What cooking methods could you use to prepare the chicken in time? Which methods would retain the most nutritional value? What could you add to the meal to increase its nutritional value? Write a one-page report to describe your cooking method choices.

Communication Skills

- 17. Watch a Cooking Show** Watch a cooking show. Look for the particular cooking technique that the host uses. Take notes on what the host is doing and what you learned about that technique from the show. Give a five-minute oral presentation to the class to explain what you learned about the cooking technique. Turn in your notes to your teacher.

Technology Applications

- 18. Create a Web Site** As a class, plan and design a Web site that explains the different cooking methods. Make sure it contains basic instructions for each method. If possible, create recipes for a few or all of the techniques that you describe on the Web site. You may also want to photograph the steps of the techniques to illustrate the instructions.

Financial Literacy

- 19. Cost Ingredients** Ordering chicken precooked will cost you \$3 per pound of chicken. Ordering uncooked chicken and having the staff cook it will cost you \$2 per pound, including labor. How much money will you save having the staff cook the chicken if you need 25 pounds?

Culinary Lab

Cook a Meal

- 20. Use Cooking Techniques** Working in teams, during this lab you will prepare a three-course meal that involves dry, moist, and combination cooking techniques.
- Choose your courses.** Follow your teacher's instructions to form teams. As a team, determine which five menu items you will prepare, and which cooking technique you will use for each food item. When you choose cooking techniques, consider nutritive value, texture, color, aroma, flavor, appearance, and cooking time.
 - Gather ingredients.** Determine the list of ingredients needed to prepare the menu items. Gather those ingredients at your work station.
 - Make a schedule.** Develop a workflow and preparation time schedule for team members to follow when they prepare menu items.
 - Cook and serve your meal.** Once your schedule is set, cook your menu items and serve the meal to the other teams. On a piece of paper, create a rating chart to evaluate each team's meal.

Use the culinary skills you have learned in this chapter.

Create Your Evaluation

Create a chart to evaluate food items for texture, color, aroma, flavor, and appearance. Use this scale:
1 = Poor; 2 = Fair; 3 = Good; 4 = Great
Discuss amongst yourselves and then with the class how each item rated in the different categories and which technique produced the best food.