CHAPTER 33

## Chapter Overview

### Introduce the Chapter

In this chapter, students learn that eggs are a versatile, nutritious, economical addition to meals. Students examine how eggs and egg substitutes fit into a healthful meal, learn how to select, store, and prepare eggs, and explore the valuable properties of eggs that allow them to function as binders, emulsifiers, and leavening agents in foods.

### Build Background

Ask students to brainstorm recipes made with eggs, such as cake, custard, bread, omelet, and so on. Then ask students: How do you think eggs contribute to these recipes? Ask volunteers to share their responses with the class.

*Activate Prior Knowledge*

### Explore the Photo

**Caption Answer** Answers will vary but may include cakes, egg bread, noodles, fried or scrambled eggs, egg salad, deviled eggs, or meatloaf.

**Discussion** Ask students: What is the value of eggs in a healthful diet? (Answers will vary, but may include: Eggs are a good source of protein, but provide many other important nutrients that are vital for the health and maintenance of our bodies, such as vitamins A, B, and D, iron, calcium, phosphorus, and other trace minerals.)

*Writing Activity*

### Varied Sentence Structures

This activity prompts students to write a paragraph that describes eggs or an egg dish they like and include at least three different sentence structures.



CHAPTER 33

# Eggs

*Writing Activity*

### Varied Sentence Structures

**Enjoying Eggs** Good writing features sentences that have different structures. For example: "Rosie gathered the eggs in a basket" has a different sentence structure than "Using a basket, Rosie gathered the eggs." In what other ways can sentence structures be varied? Write a paragraph that describes eggs or an egg dish you like. Include at least three different sentence structures.

**Writing Tips** Follow these steps to write a variety of sentences:

- Avoid starting several sentences with the same word.
- Use punctuation correctly to combine some short sentences together.
- Include both long and short sentences in your writing.

*Activate Prior Knowledge*

**Thousands of Uses** Eggs are a great source of protein. *What is your favorite recipe that contains eggs?*



## CLASSROOM Solutions

### Print Resources

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

### Technology Resources

**Presentation Plus!** provides visual teaching aids for every section.

**Online Learning Center** includes resources and activities for students and teachers.

**TeacherWorks Plus** is an electronic lesson planner that provides instant access to complete teacher resources in one convenient package.

# Reading Guide

## Before You Read

**Preview** List three questions you have about eggs. As you read, write down the answers to your questions.

## Read to Learn

### Objectives

- **Identify** and describe three important parts of an egg.
- **Describe** the nutrients found in eggs.
- **Explain** how to safely store eggs.
- **Summarize** why eggs act as a binder.
- **Describe** how beating affects egg whites.
- **Identify** the steps for making an omelet.

### Main Idea

D Eggs are a nutritious, economical, and versatile food that can be eaten alone and used in many recipes.

### Content Vocabulary

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

- air cell
- albumen
- yolk
- chalazae
- coagulate
- emulsifier
- soufflé
- soft peaks
- stiff peaks
- shirred eggs
- omelet
- frittata
- custard
- quiche
- meringue
- weep
- beading

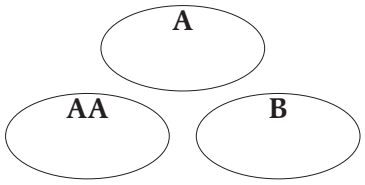
### Academic Vocabulary

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

- ruptured
- sieve

### Graphic Organizer

Use a graphic organizer like the one below to take notes about the uses and characteristics of grade AA, A, and B eggs.




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

### Academic Standards

NCLB

**English Language Arts**

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

**Mathematics**

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

**Science**

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

**Social Studies**

**NCSS VII F Production, Distribution, and Consumption** Compare how values and beliefs influence economic decisions in different societies.

**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*



# Reading Guide

## Before You Read

Point out to students that, in addition to being useful in a variety of cooking applications and recipes, eggs can also be cooked in their own shells and eaten alone.

## D Develop Concepts

**Main Idea** Discuss the main idea with students. Ask students: Can you name different ways eggs are cooked? (Answers will vary but may include: Poached eggs, fried eggs, scrambled eggs, and hard boiled eggs.)



## FOCUS

### Bell Ringer Activity

**Egg Performance**

Ask students to brainstorm the meals that included eggs that they have had over the last few days. Were the eggs poached or scrambled? Part of an omelet or soufflé? Write the foods or dishes on the board and point out to students that eggs perform many functions that make them useful in a variety of cooking applications. Then ask students: If you had to choose a favorite recipe made with eggs, which would you select and why?

## Preteaching Vocabulary

Read the definitions of the vocabulary aloud. As you read each definition, ask students to write a sentence using each vocabulary word.

## Graphic Organizer

The graphic organizer is also on the TeacherWorks CD.

(The portion of the diagram where all three ovals overlap should contain the following: all three grades of eggs have the same nutritional value. The portion of the diagram where AA and A overlap should contain the following: have a thicker white; useful when appearance is important; use to make fried or poached eggs. The portion of the diagram devoted only to B grade should include the following: use in baked goods when appearance does not matter.)

NCLB **NCLB** connects academic correlations to book content.

TEACH

### Discussion Starter

**Brown vs. White** Ask students: Do you consider a brown egg to be more nutritious than a white egg? Why or why not? Do you think shell color can affect flavor or cooking qualities? (Answers will vary, but students may say they do not think that shell color is related to an egg's nutritional content, flavor, or cooking qualities. Others may say that they are unsure. Point out that the breed of the hen determines the shell color and that it has no affect on nutritional content, flavor, or cooking qualities.)

### U Universal Access Visual Learners

**Parts of an Egg** Obtain a printable version of the parts of an egg (as shown in Figure 33.1) that does not label each part. Distribute copies to students and ask them to identify the parts that they know. Read the paragraphs under the section titled Nutrients in Eggs aloud. Have students conduct research to find out how the body benefits from the nutrients provided by eggs. Ask volunteers to share their findings. Ask students: Why do you think an egg's yolk contains more vitamins and nutrients that the white of the egg? (Answers will vary, but may include: protein helps to builds muscles and body tissues and provides energy; iron helps carry oxygen to blood; vitamin A helps keep eyes and skin healthy; give normal vision and clear healthy skin; vitamin D helps maintain proper levels of calcium to build and maintain bones.) ELL

## The Structure of Eggs

Eggs are one of nature's most versatile, nutritious, and economical foods. Besides being tasty, they perform important functions in recipes. Most eggs eaten in the United States come from hens, or female chickens.

An egg has several parts, which are shown in **Figure 33.1**. The hard shell is porous and lined with membranes. A pocket of air, also known as the **air cell**, lies between these membranes at the wide, round end. As an egg ages, this air cell gets larger. The inside of an egg also contains these three parts:

**Albumen** The thick fluid commonly known as egg white is **albumen** (al-'byü-mən). Albumen gets thinner as an egg ages. Very fresh eggs have cloudy-white albumen.

**Yolk** The round yellow portion of an egg is the **yolk**. It is encased in a thin membrane and floats within the albumen. The yolk flattens as the egg ages. Its color depends on the hen's diet. Hens that are fed yellow cornmeal or marigold petals produce deeper yellow yolks than those fed white cornmeal. Artificial color additives are not allowed in chicken feeds. Eggs sometimes have a red spot near the yolk, which means that one or more small blood vessels in the yolk have **ruptured**, or broken. The egg is still safe to use.

**Chalazae** The two, thick, twisted strands of albumen that anchor the yolk in the center of an egg are called the **chalazae** (kə-'lā-ˌzē). They are not the beginning of an embryo. The thicker and more prominent the chalazae, the fresher the egg.

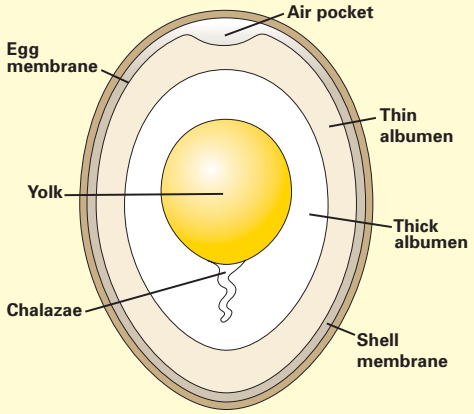
**Reading Check** **Explain** What makes some egg yolks a different shade of yellow than others?

## Nutrients in Eggs

Eggs are an excellent source of protein and vitamin $B_{12}$. Both the white and the yolk contain proteins. Eggs also contain other B vitamins as well as vitamins A and D, iron, calcium, phosphorus, and other trace minerals. The egg is one of very few natural sources of Vitamin D. A large hen's eggs are only about 80 calories each.

**Figure 33.1 Parts of an Egg**

**Egg Basics** These are the basic parts of an egg. *What is the albumen commonly called? What is the purpose of the chalazae?*




U



**Figure 35.1 Parts of an Egg**

**Caption Answer** The albumen is commonly called egg white. The purpose of the chalazae is to anchor the yolk in the center of the egg.

**Discussion** Ask students: What part of the egg floats in the albumen? (yolk)

**Reading Check**

**Explain** The hen's diet determines the color of the yolk. Hens that are fed yellow cornmeal or marigold petals produce a deeper yellow yolk.

In general, the yolk of an egg contains more vitamins and minerals than the white. Egg yolks are one of the few foods that are a natural source of vitamin D. However, they also contain fats and cholesterol, so health experts recommend eating egg yolks in moderation.

The color of an egg's shell is not related to its nutrients, flavor, or cooking qualities. The breed of hen determines the color of the egg's shell.

**Reading Check** **Identify** Which part of an egg is generally more nutritious?

## Selecting and Storing Eggs

Eggs are perishable and breakable, and should be selected and handled with care. Always get refrigerated eggs, and buy them by the sell-by date. Before buying the eggs, open the carton to inspect them. If an egg has an unpleasant odor when opened, it is spoiled. The eggs should be clean and whole, without cracks. They should not be leaking or stuck to the carton.

Eggs are sold according to grade and size standards set by the USDA. The grade and size, which are clearly marked on the package, have no relationship to each other.

### Egg Grade

A USDA grade shield on a package means that the eggs have been federally inspected for wholesomeness. The grade is determined by the inner and outer quality of the egg at the time of packaging. Workers examine egg interiors with bright lights in order to sort out unacceptable ones.

The three egg grades are AA, A, and B. Supermarkets typically carry grades AA and A. All grades of egg have the same nutritive value. However, their appearances differ after being cooked. Grades AA and A eggs have a thicker white. Use grades AA and A when appearance is important, as it is in making fried or poached eggs. Grade B eggs can be used in baked goods, when appearance does not matter.

**Be a Smart Consumer**

**A Bacteria Barrier**

While the eggshell is essential to the life of an egg, it also plays a role in protecting consumers' health. An eggshell contains up to 17,000 pores, which are protected by a coating called the cuticle, or bloom. The pores grow larger with age, however, increasing the chance for bacterial contamination. To reduce this risk, eggs are gathered soon after laying. They are washed and lightly coated with mineral oil to prevent oxygen from entering the shell. Boiling eggs strips off the oil coat.

**Challenge** Why do you think hard-cooked eggs must be eaten within a week, while fresh eggs keep for up to four weeks? Write your answer in one or more sentences.

### Egg Size

Eggs are classified into sizes by the minimum weight for a dozen, so sizes can vary slightly in the same carton. The sizes most commonly sold are medium, large, extra large, and jumbo. Most recipes assume that large eggs will be used. If you use eggs of another size, you may need more or fewer eggs for the same results.

The price of eggs depends on the size as well as the supply of various sizes. Every time you go shopping, check the unit price to determine which size is the best buy.

### Egg Storage

Eggs are highly perishable. Take eggs home right after buying and refrigerate them. Store them in the original carton rather than the egg tray in the refrigerator door, where food is exposed to warm air more often. Eggshells are porous and the eggs may lose quality after too much exposure. They also pick up aromas and flavors from other foods if they are stored uncovered or for too long.

Do not wash eggs before storing them. Washing eggs removes the protective coating that prevents bacteria from getting inside the shell.



**Be a Smart Consumer**

**Answer** Boiled eggs have had the protective coating removed, which means oxygen can enter the shell and cause the egg to lose freshness.

**Reading Check**

**Identify** In general, the yolk of an egg is more nutritious than the white.



## TEACH *cont.*

### Reading Strategy

**Create an Illustrated Guide** Ask students to create a one-page consumer's guide for selecting and storing eggs. Students should cover: Is it safe to use eggs after their sell-by date? Should eggs be washed before storing them in the refrigerator? Is it safe to use eggs that have red spots near the yolk? Encourage students to include illustrations and to use a title that will attract the reader's attention. Have each student present their guide to the class. (Guides will vary, but should be creative and describe the safety precautions consumers should observe when selecting and storing eggs.) ELL

### Critical Thinking

**Assess Egg Storage** Read students this scenario: Candace is putting her groceries away. She knows she must immediately refrigerate the dozen eggs she purchased because they are perishable, but she wants to make sure they are free of bacteria. Before putting the eggs in the refrigerator, she removes them from the carton they came in, washes the shells with warm soapy water, and puts them in the refrigerator egg tray. Ask students: Did Candace make the right decision? Why or why not? (Answers may include: Candace should not wash eggs before storing them because it will remove the protective coating that actually prevents bacteria from getting inside the shell. She should leave the eggs in their original carton If the egg tray is in the refrigerator door, it will be exposed to warm air more often and the eggs could lose their quality.)

## TEACH *cont.*

### S Skill Practice

### Guided Practice

**List** Ask students to list the ingredients that egg whites are combined with to create egg substitutes. (Lists should include the following: vegetable oils, tofu, nonfat dry milk powder, and chemical additives, including emulsifiers, stabilizers, antioxidants, and artificial colors.) L1

**Create** Ask students to create a graphic organizer to illustrate the advantages and disadvantages of using egg substitutes. (Answers may include: Egg substitutes have no fat or cholesterol, and fewer calories than whole eggs. They have less protein and phosphorous, may lack some B vitamins and usually cost more than whole eggs.) L2 ELL

**Apply** Have students write a paragraph in which they describe what egg substitutes are and why some people prefer them. How can egg substitutes be used in meals? How does the nutritional value of an egg substitute compare to a whole egg? What are some of the ingredients used in egg substitutes? If you are allergic to eggs, can you benefit from egg substitutes? (Students may say that egg substitutes are egg whites combined with other ingredients, such as those listed in the text. Egg substitutes can help people watch their fat and cholesterol intake and can be used much the same as whole eggs in cooking and baking. Most egg substitutes contain egg whites, so if you are allergic to eggs, you should not consume them.) L3

NCLB Activity correlated to Social Studies standards.

Raw eggs stay fresh in the refrigerator for up to four weeks, depending on their freshness when purchased and on the refrigerator temperature. Refrigerate leftover cooked eggs and egg mixtures immediately and use them within three days. Use hard-cooked eggs in the shell within a week.

Some recipes call for only the yolk or the white. You can refrigerate leftover raw yolks, covered with water, for two days. You can refrigerate whites, in a tightly covered container, for four days.

Handle eggs gently to prevent cracking them. Discard dirty, cracked, or leaking eggs.

### Freezing Eggs

You can freeze raw egg whites for longer storage. Place each egg white in a separate compartment of an ice cube tray. After freezing, put the frozen cubes in a tightly sealed freezer container and store in the freezer. Use two thawed egg whites to equal one large egg. Do not freeze cooked whites, because this makes them tough and rubbery.

Raw yolks need special treatment for freezing to keep them from getting thick and hard to mix after thawing. For every four yolks, beat in ⅛ teaspoon of salt. If you plan to use the yolks for a dessert, beat in 1½ teaspoons of sugar instead. Mark the container with the number of yolks and whether you added salt or sugar, then freeze them.

Never freeze whole eggs in the shell, because they may burst.

### TECHNOLOGY FOR TOMORROW

#### Egg Laying Technology

The egg may be one of nature's most perfect foods, but nature gets help from technology to keep commercial egg producers in business. Caged hens are served their food by automated feeders set on timers. The light, temperature, and humidity of the indoor environment is monitored to promote egg production. The eggs are automatically gathered by conveyor belts under the cages, and transported the eggs to refrigerated holding rooms. Within one or two days, the fresh eggs are available in your supermarket's dairy case. Because the eggs from free-range hens are produced and collected in an environment that is less structured and has less impact on the hens themselves, many consumers choose free-range eggs.

**Get Involved** Under your teacher's supervision, use the Internet to research how the living conditions of free-range hens differ from those described above. How are the eggs of free-range hens collected? Would you choose to buy free-range eggs? Why or why not?

NCLB **NCSS VII F Production, Distribution, and Consumption** Compare how values and beliefs influence economic decisions in different societies.

## Egg Substitutes

Egg substitutes are an alternative to whole eggs. Most are made by combining egg whites with ingredients such as vegetable oils, tofu, nonfat dry milk powder, and chemical additives, including emulsifiers, stabilizers, antioxidants, and artificial colors. You can use egg substitutes much the same as whole eggs. Egg substitutes are available frozen and in refrigerated liquid form.

Because they contain no egg yolks, egg substitutes have no cholesterol or fat and are lower in calories. They are a healthy alternative for people who are trying to reduce fat and cholesterol in their diet. Egg substitutes contain less protein and phosphorus than whole eggs, however, and they may lack some B vitamins. They are also more expensive than whole eggs. S

**Reading Check** **Describe** What is one step you should take before buying a carton of eggs?

## Egg Science

Eggs have certain special properties that result mostly from their high protein content. Eggs act as a binder, thickener, leavening agent, and emulsifier. You can find eggs in the ingredients list for hamburger, stew, bread and salad dressings. Understanding why they do this can help you cook successfully with eggs. U



### TECHNOLOGY FOR TOMORROW

**Answer** Findings will vary slightly, but should include that free-range hens are not kept indoors or in cages. They are allowed to roam within a confined area outdoors. They are exposed to natural light and fresh air. Students' interest in buying free-range eggs will vary, but should be supported with reasons.

**Reading Check**

**Describe** Before buying eggs, open the carton and inspect each egg.

**Coagulation**

When you cook eggs, their proteins coagulate, or change from liquid to semisolid. *What causes egg protein to coagulate?*

## Eggs as a Binder

The proteins in eggs are shaped like coils. When the proteins are heated, the coils unwind and join loosely with other proteins. The new structures form pockets that hold water. When this happens, the egg **coagulates**, or becomes firm, changing from a liquid to a semisolid or solid state. The ability of egg proteins to coagulate is what helps eggs act as a binder in foods like meatloaf, and thicken dishes such as custards and fillings.

High heat and overcooking cause an egg's protein structure to tighten and push out its water. This makes the protein tough and watery. The cooked eggs may be dry and unappetizing. Gentle cooking helps prevents these problems.

## Eggs as an Emulsifier

Egg yolks are excellent emulsifiers. An **emulsifier** is a substance that holds together two liquids that normally do not stay mixed, such as water and oil. How does this work? Proteins consist of many linked amino acids. In yolk protein, one end of an amino acid bonds with water, but the other end bonds with oil. This gives egg yolks the power to hold two ingredients together, such as vinegar and oil in salad dressing or lemon juice and oil in mayonnaise.

## Eggs as a Leavening Agent

Egg whites act as leavening agents. When you beat egg whites, air enters the mixture and a foam forms. Egg whites have large protein molecules. Beating breaks down the protein. Continued beating thickens the foam.

An egg white foam adds volume and lightness to baked products such as angel food cake and soufflés. A **soufflé** (ˌsü-ˈflā) is a baked dish made by folding stiffly beaten whites into a sauce or puréed food. It is baked in a deep casserole until it puffs up. Beaten egg whites are also used to make meringues.

# Preparing Eggs for Cooking

Egg cookery can be simple or complex. You can cook eggs alone or combine them with other ingredients in many recipes.

Some ways of preparing eggs, such as soft-boiling and hard-boiling, do not require any preparation. For most other ways of preparing eggs, such as frying and scrambling, you need to crack open the egg. For baked goods, soufflés, and other more complex dishes that include eggs as an ingredient, you may also need to separate the egg yolk from the white, and sometimes beat the whites.



## Explore the Photo

**Caption Answer** Heat causes the coil-shaped proteins to unwind and join with other proteins.

**Discussion** Ask students: What happens when egg proteins are overcooked? How can you prevent this from happening? (The egg protein structure tightens, pushing out water, which makes the protein tough, dry, and unappetizing. Gentle cooking helps to prevent these problems.)

## TEACH *cont.*

### Universal Access

**Interpersonal Learners**

**Identify Egg Functions** Have students work in groups of three or four to create a guessing game using the different properties that allow eggs to be useful in a variety of recipes (binder, emulsifier, leavening agent). On a set of index cards, have groups include pictures of recipes or write the names of recipes that use eggs. Shuffle the stack and have a student draw one card from the stack. Then have the student explain which of the different functions discussed on page 519 the eggs perform in the recipe and why. Continue shuffling and drawing cards until each student has had a turn. (Students should draw a recipe card and explain which function the eggs have in the recipe and why.) ELL

**Professional Development**

**Mini Clip**

**ELL: Understanding English Language Learners**

Ruben Zepeda, EdD, discusses the issues teachers must address when they have English learners in their classrooms.

## TEACH cont.

### S1 Skill Practice

### Guided Practice

**Identify** Ask students to identify how you should separate an egg. (To separate an egg, carefully break the egg into an egg separator and let white slip through.) L1

**Explain** Ask students to identify how you should separate an egg and explain why some recipes call for only part of an egg. (Answers will vary, but may include: To separate an egg, carefully break egg into an egg separator and let the white slip through. Some recipes may call for either the yolk or the white to perform a certain function in a recipe. For example, yolks are used in custards, sauces, mayonnaise, and pastry to help combine ingredients that would not be able to combine on their own. Because beaten egg whites are airy, they add lightness and are often added to baked items.) L2

**Apply** Have students imagine that they are preparing a recipe that asks for three egg whites. In two paragraphs, ask students to describe how to separate the eggs and explain how the way you separate an egg can keep you from ruining a recipe. Why is it important to ensure that no yolk runs into the whites? (Paragraphs will vary, but should describe how to separate the eggs, answer the above questions, and be well organized. Students may say that an egg separator helps keep the yolk from bursting and running into the white. Yolk in the white keeps it from beating properly and can ruin a recipe.) L3

**The Art of Separating**

Egg separators make it easy to separate whites from yolks. *Why is this method recommended?*

## Cracking the Shell

The first step in most egg recipes is to crack open the egg. Hold the egg in the fingers of one hand. Then rap the center of the egg once firmly against a clean surface. Some cooks use the edge of a clean bowl. Pull the two shell halves apart as though they were hinged at one side, and allow the egg to drop into the bowl.

## Separating Eggs

S1

Some recipes call for only part of an egg—either the yolk or the white. If you are not using the whole egg, you will need to separate the parts. Yolks are used in custards, sauces, mayonnaise, and pastry. Because beaten egg whites are airy, they add lightness to many baked items.

To separate an egg, carefully break it into an egg separator. An egg separator is a small device that functions like a **sieve**, or strainer, and allows the white to flow through, while leaving the yolk in the separator. An egg separator helps keep the yolk from bursting and running into the white, which can ruin a recipe. Whites that have a bit of yolk in them will not beat properly. Eggs separate more easily when cold. Refrigerate any unused yolk or white for later use.

S1

**SAFETY MATTERS**

### Banish Bacteria

Separate and cook eggs properly to protect yourself from harmful bacteria. Many cooks separate the egg white from the yolk by pouring the yolk back and forth between the two halves of the broken shell, letting the white fall into a bowl. This method is dangerous because bacteria on the shell can get into the egg. An egg separator should be used. To destroy the Salmonella bacteria that lives in some eggs, cook eggs and egg-based dishes to 160°F in the center. Raw eggs and foods that contain them, such as cookie dough, are not safe to eat.

**What Would You Do?** You prepare a recipe for brownies that calls for two eggs. After you pour the brownie mix into a baking dish, your friend says, "Yum! Let's lick the mixing bowl and spoon!"

## Beating Egg Whites

Beaten egg whites are used in many dishes. When you beat whites, the foam should rise well. It should be stable and not collapse when folded with other ingredients and when baked. How can you make this happen?

First, make sure no trace of yolk is in the white. Even a drop of the yolk's fat can keep a foam from reaching full volume. If any yolk falls into the white, refrigerate it for later use and start again with another egg white. Be sure that your beaters and bowls are clean and free of fat. Use only glass or metal bowls. Plastic and wooden bowls absorb fat, and aluminum bowls darken the whites.



### Explore the Photo

**Caption Answer** An egg separator helps keep the yolk from bursting and running into the white, which can ruin a recipe.

**Discussion** Ask students: At what temperature do eggs separate more easily? (Eggs separate more easily when they are cold.)

**SAFETY MATTERS**

**Answer** You should tell your friend to put the bowl and spoon down and wash them. Licking a mixing bowl or spoon with raw egg residue is dangerous because it could be infected with Salmonella bacteria, which can make a person very sick.

If you have time, allow the egg whites to stand at room temperature for up to 20 minutes before beating. This helps the foam reach full volume. If the egg white is cold, the protein does not break down as readily and create foam.

You can add extra ingredients to egg whites before or during beating to keep the foam stable. You can add an acidic ingredient, such as cream of tartar, before beating. Some recipes call for vinegar or lemon juice, which adds flavor. You can also add sugar along with cream of tartar for stabilization. Since sugar increases beating time, however, add it near the end of the beating process. Salt decreases foam stability. If a recipe calls for salt, add it to other ingredients rather than the whites.

### Foam, Soft Peaks, and Stiff Peaks

$S_2$

As you beat whites, their texture and color change from thick, colorless, and transparent to fluffy, white, and opaque. You can beat whites to foam, or to soft or stiff peaks. Foam is a soft, airy mass.

**Soft peaks** gently bend over like waves when you lift the beaters from the mixture. If you continue beating, you will form stiff peaks. **Stiff peaks** stand up straight when the beaters are lifted from the mixture. Stop beating when you reach this stage. Overbeating turns a foam dry, hard, and lumpy, making it fall apart. Once egg whites lose air and moisture, they cannot be used.

$S_2$

### Folding In Beaten Egg Whites

When you fold beaten egg whites into another mixture, do so gently. Stirring and beating cause loss of air and volume. Place the beaten whites on top of the mixture. Cut down through the whites with a rubber spatula to the bottom of the bowl. Drag some of the bottom mixture up the side, folding it lightly onto the whites in the middle. Turn the bowl and repeat just until the whites are incorporated.

**Reading Check** **Contrast** When beating egg whites, what is the difference between soft peaks and stiff peaks?

***Beating Egg Whites***

A recipe tells whether to beat egg whites to soft or stiff peaks. The egg whites on this lemon meringue pie have been beaten longer to create stiff peaks. *What would happen if you did not beat the egg whites long enough?*



**Reading Check**

**Contrast** Soft peaks gently bend over like waves when you lift the beaters from the mixture. Stiff peaks stand up straight when the beaters are lifted from the mixture.

## Explore the Photo

**Caption Answer** If the egg whites are not beaten long enough, the foamy mixture will be too soft to make meringue.

**Discussion** Ask students: When beating whites to foam, why is it important to make sure no trace of yolks is in a batch of egg white? (Even a drop of the yolk's fat can keep a foam from reaching full volume.)



## TEACH *cont.*

### $S_2$ Skill Practice

### Guided Practice

**List** Ask students to list three characteristics of egg whites that have been overbeaten. (Overbeating turns egg whites dry, hard, and lumpy, making them fall apart.) L1

**Compare** Ask students to explain what happens to the texture and color of egg whites when they are beaten. Have students use a Venn diagram to compare beating egg whites to soft peaks with beating egg whites to stiff peaks. (Answers will vary, but similarities may include: Soft peaks gently bend over like waves when the beaters are lifted from the mixture. Stiff peaks stand up straight when the beaters are lifted from the mixture. As you beat whites, their texture and color change from thick, colorless, and transparent to fluffy, white, and opaque.) L2 ELL

**Describe** Have students write a paragraph in which they describe what happens to egg whites when you beat them, explain the differences between foam, soft peaks, and stiff peaks, and the describe why egg whites cannot be used once they have been overbeaten. (Paragraphs will vary, but may include: As you beat whites, their texture and color change from thick, colorless, and transparent to fluffy, white, and opaque. Foam is a soft, airy mass. Soft peaks gently bend over like waves when the beaters are lifted from the mixture. Stiff peaks stand up straight when the beaters are lifted from the mixture. Overbeating turns egg whites dry, hard, and lumpy, making them fall apart.) L3

## TEACH cont.

### S Skill Practice

**Guided Practice**

**Identify** Ask students to identify one dish that they have eaten that uses a hard-cooked egg. In one sentence, students should identify the dish, and explain how and when it was served. (Answers will vary but may include: I ate deviled eggs as an appetizer at a my cousin's graduation dinner.) L1

**Connect** Have students identify five dishes that use hard-cooked eggs and connect each dish to a meal in which it might be appropriate. (Answers will vary but may include: Deviled eggs, served as an appetizer; egg salad sandwich, served as part of lunch; potato salad, served as a side dish at lunch; tomato, egg, and olive salad with gorgonzola vinaigrette, served as part of dinner; and grilled chicken cobb salad served as lunch.) L2

**Describe** Have students write one or two paragraphs in which they describe a complete and healthful meal that includes hard-cooked eggs as well as three other ingredients. Students should answer the questions: How will you cook the eggs? How will you keep the eggs from cracking? How will the hard-cooked eggs be used? What other foods will accompany the eggs? What are some of the nutrients that the various foods in the meal will provide? (Paragraphs will vary, but should answer the above questions, and be well organized.) L3

***Eggs Cooked in the Shell***

Hard-cooked eggs can be a garnish or the main part of a dish. This appetizer, called deviled eggs, uses hard-boiled eggs filled with a filling made from cooked egg yolks, mustard, and mayonnaise, and garnished with paprika. *What is a reliable way to cook eggs in the shell?*

# Cooking with Eggs

Egg cookery can be simple or complex. You can cook eggs alone or combine them with other ingredients in many recipes.

## Cooking Eggs in the Shell

S

To cook eggs in the shell, place a single layer of eggs in a saucepan. Add water to at least 1 inch above the eggs. Cover the pan and bring the water to a boil. Turn the heat off as soon as boiling begins. On an electric range, remove the pan from the heating element to prevent further boiling. Let the eggs stand, covered, in the hot water. Allow 12 minutes for medium-size eggs, 15 minutes for large eggs, and 18 minutes for extra large eggs. Do not let the eggs cook for less than 12 minutes, because harmful bacteria may survive.

When eggs are done, immediately pour off the hot water and run cold water over them or place them in ice water to stop the cooking process and cool them. Refrigerate them in their shells until you are ready to serve them.

Have you ever seen a hard-cooked egg yolk that has a gray-green surface? The color is a reaction between sulfur in the white and iron in the yolk. Cook eggs no longer than necessary to prevent this color change S

### Preventing Cracking

Eggs sometimes crack as they cook because the air inside the eggs expands as it heats. This usually happens when eggs are overheated or cooked for too long. Cooking eggs in more than one layer in a saucepan can also cause cracks when eggs bump together. An egg that cracks during cooking is safe to use, as long as you serve it right away. Never prick the egg with a pin or thumbtack before cooking to release the air. A small hole can create hairline cracks that allow bacteria to enter after the egg has been cooled and saved for later use.

R

### Peeling Eggs Cooked in the Shell

To peel a medium-cooked or hard-cooked egg, gently tap the egg all over to crack the shell. Then roll the egg lightly between your hands to loosen the shell. Peel the shell away, starting at the wide end where the air cell is located. Hold the egg under cold running water to help ease off the shell. Fresh eggs are harder to peel than older eggs. This is because the air cell enlarges and the egg contents shrink as eggs age.



### *Explore the Photo*

**Caption Answer** Put eggs in a pan with water and bring the water to a boil. Turn the heat off and let the eggs stand in the hot water for 12 to 18 minutes.

**Discussion** Ask students: Why might eggs cooked in the shell crack during cooking? (Air inside expands as it heats; eggs cooked in layers may bump together.)

You can use peeled hard-cooked eggs in many ways. You can chop them, slice them, or cut them into wedges. You can add them to salads and casseroles, use them in sandwiches or as a garnish, or make deviled or pickled eggs.

## Poaching Eggs

Poaching is one of many ways to cook eggs out of the shell. Poached eggs are cooked in simmering water. Like hard-boiling, this method adds no fat. Using fresh eggs and getting them to set quickly are keys to successful poaching.

To poach eggs, put water, milk, or broth in a saucepan to a depth of about 2 to 3 inches. Heat the liquid to boiling and then reduce it to a gentle simmer. Break one egg at a time into a small dish. Hold the dish close to the surface of the liquid and slip in the egg. Cook each egg until the white is completely set, about 3 to 5 minutes. The yolk should be thickened. Remove cooked eggs, one at a time, with a slotted spoon and drain for a few seconds.

Poached eggs are usually served on toast. You can also spoon cooked vegetables onto toasted English muffins and top them with poached eggs, or pour a flavored sauce, such as a cheese sauce or Hollandaise sauce, over the eggs.

## Frying Eggs

Eggs can be fried in oil, margarine, or butter or in a nonstick skillet coated with vegetable oil cooking spray.

First, heat a small amount of fat in a skillet over medium-high heat until hot enough to sizzle a drop of water. Break one egg at a time into a small bowl or custard cup. Then gently slip the egg from the bowl into the heated skillet. This technique helps prevent the yolk from breaking. Cook the eggs until the whites are completely set and the yolks have thickened. To cook the tops, baste them with hot fat, turn the egg over carefully, or cover the skillet with a lid for the last minute or two of cooking.

## Careers in Food

### Alan Vonderwerth
*Wholesale Food Buyer*

**Q: What are your primary responsibilities?**

**A:** My job is to produce a daily summary of the food needed for our culinary classes, generate a shopping list using the computer program "ChefTec," and place orders through various vendors. I order from sources throughout the country, but prefer to deal with local companies in order to help the local economy and to keep our freight costs down.

**Q: How do you become a wholesale buyer?**

**A:** I got my opportunity through my previous experience in customer service and management background. I started out as a storeroom clerk. Most companies prefer to promote from within.

**Q: What is your favorite part of your job?**

**A:** The challenge of going out and finding things I have not purchased before is a positive of this position.

**"If you enjoy working with food, you can be successful."**
— Alan Vonderwerth
*Purchasing Manager, Professional Culinary Institute Campbell, CA*

**Education and Training**
A college degree in culinary arts or business. Experience working in the food industry is also helpful.

**Qualities and Skills**
Computer skills, organization skills, flexibility, and patience are important.

**Related Career Opportunities**
Other related opportunities include restaurant manager or food and beverage manager at a hotel.





## TEACH *cont.*

### R Reading Strategy

**Graphic Organizers** Ask students to read the section titled Preventing Cracking. Have students create a spider diagram to take notes about preventing cracking. Then, while students read the section on Peeling Eggs Cooked in the Shell, have them create and fill in a similar graphic organizer. (Both graphic organizers will vary, but should include the facts listed on page 522 of the text.) ELL

### W Writing Support

**Write Varied Sentence Structures**

**Poaching vs. Frying** Remind students that good writing features sentences that have different structures. Ask students to write a paragraph that compares poaching and frying eggs. Ask them to include at least three different sentence structures. (For more tips on writing varied sentence structures, see page 514. Paragraphs will vary, but should contain a variety of sentence structures. For example, "Poaching is one way of cooking eggs out of the shell. Like poaching eggs, you break one a time when frying eggs. In both methods, eggs should be cooked until whites are completely set and yolks have thickened.")

### Professional Development

**Mini Clip**
**ELL: Language Practice**

Students of varying language proficiencies work together to review content they have read.

## TEACH *cont.*

### S1 Skill Practice

### Guided Practice

**Identify** Ask students to identify how eggs are scrambled. (Scrambled eggs are beaten and then fried in a skillet.) L1

**Create** Ask students to create a step-by-step list to illustrate the basic procedures for scrambling eggs. (Answers will vary, but may include: 1. Beat eggs with water together in a bowl. 2. Heat fat on low in a skillet. 3. Pour the egg mixture into the skillet and let it stand for 30 to 60 seconds. 4. As the mixture starts to thicken, draw an inverted turner gently through the eggs. 5. Continue this process until the eggs are thickened and there is no more liquid.) L2

**Apply** Have students imagine that they are preparing a big batch of scrambled eggs for a brunch. Have students write one or two paragraphs in which they assess the pros and cons of breaking the eggs directly into the skillet. What are the pros? What are the cons? How might this method save them time in preparation and in clean up? (Paragraphs will vary, but pros may include: it saves time in preparation because you do not have to beat the eggs in another bowl and then transfer them to the skillet, and it saves time in clean up because there are less tools that have to be cleaned. Cons may include: eggs will be less fluffy and have streaks of white and yellow, and when breaking eggs directly into the skillet, you might get shells in the eggs.) L3

For an interesting variation on fried eggs, make a hole in a slice of bread or frozen waffle and place it in a greased, heated skillet. Break the egg into the hole and fry. Fried eggs can also be served in a sandwich or on top of steak, hash, or vegetables.

## Scrambling Eggs

Scrambled eggs are beaten, then fried. To make fluffy scrambled eggs, beat eggs together with water in a bowl. Use 1 tablespoon of water for each egg. Heat a small amount of fat on low in a skillet, or use a vegetable oil cooking spray.

Pour the egg mixture into the heated skillet and let it stand for 30 to 60 seconds. As the mixture starts to thicken, draw an inverted turner gently through the eggs. This forms large curds and allows uncooked egg to flow to the bottom of the skillet. Continue this process until the eggs are thickened and there is no more liquid. Curds should be large and fluffy. Do not stir the eggs constantly. This beats out the air and moisture and creates small, tough curds.

You can also scramble eggs by breaking them directly into the skillet. When the whites begin to set, mix the eggs right in the pan and cook them until they are thickened and there is no more liquid. The eggs will be less fluffy and have streaks of white and yellow.

## Baking Eggs

Baked eggs, also known as **shirred eggs**, are eggs baked in a greased, shallow dish and often topped with a small amount of milk.

To make baked eggs, break eggs into a small bowl. Then slip them into a greased, shallow baking dish or a large custard cup. You can use individual dishes or place several eggs in one dish. If you like, top the eggs with a small amount of milk.

Preheat the oven to 325°F. Bake the eggs until the whites are completely set and the yolks thicken, about 12 to 18 minutes.

You can also bake eggs in nests of cooked vegetables, cooked grains, or in hollowed-out rolls.

## Making Basic Omelets

An **omelet** is an egg mixture formed into a large, thick pancake, usually filled with ingredients and folded. Unlike scrambled eggs, the eggs in an omelet are not stirred. A **frittata** (frē-'tä-tə) is an unfolded omelet with fillings stirred into the egg mixture.

A basic omelet, also called a French omelet, is made as follows:

1. **Mix.** Mix 2 eggs, 2 tablespoons of water, and a dash each of salt and pepper with a fork or whisk until just blended.

***The Perfect Omelet***

An omelet can have a variety of fillings, from simple chopped herbs to vegetables, meats, and cheeses. You can fold an omelet in half or just part of the way over. *Why should you preheat chilled or uncooked ingredients before adding them to an omelet?*



### *Explore the Photo*

**Caption Answer** Because fillings only have a chance to heat up slightly in the skillet when you make an omelet.

**Discussion** Ask students: What is the difference between cooking an omelet and making scrambled eggs? (Scrambled eggs are stirred; omelet edges are raised to let the uncooked portion flow beneath the pan surface, and omelets often contain fillings.)

2. **Heat.** Heat 1 tablespoon of butter or oil in an omelet pan or a skillet over medium heat until hot enough to sizzle a drop of water.
3. **Pour.** Pour in the egg mixture all at once. Allow it to flow to the edge of the pan, but do not stir. The edge should begin to set right away.
4. **Lift and tilt.** With a turner, lift just a little around the firming edge so that uncooked portions flow beneath to the pan surface. Tilt the pan as needed. Be careful not to break the mixture that has already set. Continue until the top is thickened and no visible liquid egg remains.
5. **Add filling.** Spread filling over half of the omelet.
6. **Fold.** Using the turner, fold the omelet in half or nearly so. Tilting the skillet slightly away from you and folding toward the low side may help.
7. **Serve.** Slide the omelet onto a plate and serve.

Use your imagination when deciding on omelet fillings. You can use cheese, sauces, cooked vegetables, diced or sliced fruit, or cooked diced meat, poultry, or fish. Vegetarian omelets are very popular. Small pieces of filling work best, because they are less likely to tear the omelet. Fillings only have a chance to heat up slightly, so preheat cold fillings and cook raw vegetables and meats before adding them to an omelet.

## Making Puffy Omelets

A puffy omelet is made with beaten egg whites and baked in the oven. Separate the eggs and beat the whites and yolks separately. Beating the whites makes the omelet light and fluffy. Fold the stiffly beaten whites into the yolks. Pour the mixture into a skillet with an ovenproof handle.

First, cook the mixture on top of the range, without disturbing it, until it is puffed and lightly browned on the bottom, about 5 minutes. Then move the skillet to an oven preheated to 350°F. Bake for 10 to 12 minutes or until a knife inserted in the center comes out clean.

### Science in Action — Denaturation

The protein molecules in egg whites are coiled. Beating them uncoils the molecules. This process results in denaturation, which literally means "changing the nature." When egg whites are beaten into soft peaks, they are partially denatured and retain some elasticity. If they are beaten into stiff peaks, they are fully denatured and have no elasticity.

**Procedure** Many protein-rich foods undergo denaturation, but not always through beating. Denaturation can also happen through heating, such as when liquid foods become solid. To see denaturation at work, beat the whites of two eggs until they are partially denatured. Then beat them until they are fully denatured.

**Analysis** Write your observations of how the texture and appearance of the egg whites changed as they became denatured. What is another example of a protein-rich food that undergoes denaturation?

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

NCLB

You can serve a puffy omelet folded or open-face. To serve it folded, partially cut through the center of the omelet to make it easier to fold. Add fillings and fold. With practice, you can learn to slide half the omelet onto a plate and fold the omelet by lifting the pan as the other half falls out. To serve the omelet open-face, tilt the skillet over a warm plate. Slide the omelet onto the plate. Spoon filling over the top, if desired. Cut the omelet in half or into wedges and serve immediately.

## Microwaving Eggs

Cooking eggs in the microwave oven takes special care. Eggs overcook easily, so start with the minimum time suggested and check them frequently. Pierce the yolk before cooking to break the membrane and allow heat and steam to escape. Remove eggs from the microwave while they are still moist and soft. The cooking will finish during the standing time.

You can make eggs in a variety of ways in the microwave oven.



NCLB Activity correlated to Science standards.

### Science in Action

**Answer** Students' observations may vary slightly, but should note that egg whites become foamy, more opaque, and stiffer as they are denatured. Examples of other protein-rich foods that undergo denaturation are: milk when it is heated and develops curds, milk when it is turned to cheese, or fish when it is heated and becomes firm and opaque.



## TEACH cont.

### $S_2$ Skill Practice

### Guided Practice

**Identify** Ask students to identify how an omelet is different from a fritatta. (Answers will vary, but may include: An omelet is an egg mixture formed into a large, thick pancake, usually filled with ingredients and folded. A frittata is an unfolded omelet with fillings stirred into the egg mixture.) L1

**Describe** Ask students to write a paragraph in which they describe the procedures for creating a basic omelet. (Answers will vary, but should include all the seven steps listed in the text.) L2

**Apply** Have students imagine that they are preparing a French omelet as part of a healthful Sunday brunch. Have students write one or two paragraphs in which they describe the procedures they will follow to make the omelet, what fillings they will use, and explain why they should avoid adding cold fillings and raw vegetables to their omelet. (Paragraphs will vary, but should describe the above procedures, include the fillings they use, and explain that fillings only have a chance to heat up slightly, so they should be preheated cold fillings. Raw vegetables and meats should be cooked before being added to an omelet.) L3

## ASSESS

### Quiz

Ask students to answer the following questions:

1. Define both albumen and chalazae. (The thick fluid commonly known as egg white is albumen. The two, thick, twisted strands of albumen that anchor the yolk in the center of an egg are called the chalazae.)
2. Explain why you should avoid putting a whole egg in the shell in the freezer? (You should not freeze whole eggs in the shell because they may burst.)
3. What is another term for shirred eggs, and how are they prepared? (Baked eggs are eggs baked in a greased, shallow dish and often topped with a small amount of milk. They can also be baked in nests of cooked vegetables, cooked grains, or in hollowed out rolls.)

**Fried Eggs** Break the eggs into a lightly greased dish. Gently pierce the yolks with the tip of a knife or a wooden pick. Cover the eggs and cook them at 50 percent power until they are done, about 2 to 3 minutes. Let stand, covered, until the whites are completely set and the yolks thicken, about 30 seconds to 1 minute.

**Scrambled Eggs** Pour a beaten egg mixture into a large custard cup. Cook it on full power, stirring once or twice, until almost set, about 1 to 1½ minutes. Stir. If necessary, cover and let stand until the eggs are thick and there is no more liquid, about 1 minute.

**Poached Eggs** Pour hot water into a large custard cup or a small deep bowl. Break and slip in the eggs. Pierce the yolks with the tip of a knife or a wooden pick. Cook them on full power for 1½ to 3 minutes. If necessary, let stand, covered, until the whites are completely set and the yolks thicken. Lift the eggs out with a slotted spoon, or pour the water off to serve in the custard cup.

C Remember that microwave ovens cook unevenly. Make sure the egg or any egg dish is thoroughly cooked before eating.

Never microwave eggs in the shell. Heat and steam build up inside an egg, causing it to explode.

## Custards

A **custard** is a thickened blend of milk, eggs, and sugar. It can be a base for many main dishes. Custards come in two types, soft and baked.

### Soft Custard

Soft custard, also known as stirred custard, is creamy and pourable. You can serve it as a pudding or as a sauce over cake or fruit. It is used in tarts as the sweet layer between the crust and the fruits. Soft custard is made by beating together eggs, sugar, and salt, if desired, then stirring in nonfat or low-fat milk. The amount of each ingredient determines the custard's thickness.

Cook the mixture over low heat, stirring constantly, until it is just thick enough to coat a metal spoon with a thin film. Remove from the heat to prevent overcooking. If soft custard is overcooked, it curdles. If soft custard is undercooked, it stays thin and watery. Cool cooked custard quickly by setting the pan in a bowl of cold water. Stir for a few minutes, and then stir in vanilla. You can flavor custard at this point. Add chocolate, cinnamon, or flavored syrup. You can also prepare soft custard in a double boiler.

***Quiche***

A quiche is a savory custard baked in a pastry shell. *What are the two types of custards?*



## Explore the Photo

**Caption Answer** The two types of custard are soft and baked.

**Discussion** Ask students: What is the difference between a soft custard and a baked custard? What kind of custard is used in a quiche? (A soft custard is creamy, pourable, and used as pudding or sauce. A baked custard is firm, delicate, and baked in the oven. Baked custard is used in a quiche.)

## Professional Development

### Mini Clip

**ELL: Modeling Reading Strategies**

A teacher reads-aloud to model fluent reading strategies.

**Flan**

Flan is a custard that is chilled in a small bowl that has been lined with caramel. *What happens when custard is over baked?*

## Baked Custard

Baked custard has a firm, delicate texture and is cooked in the oven. Many well-known desserts have a baked custard base, including custard pie. Flan is a Spanish custard topped with caramel sauce. Unsweetened, baked custard can be served as a main dish. **Quiche** is a pie with custard filling, containing such foods as chopped vegetables, cheese, and chopped, cooked meat.

To make baked custard, first beat ingredients as you do for soft custard. Then, instead of stirring the mixture over the stove, pour it into lightly greased custard cups or a casserole dish. Set the cups or dish in a large baking pan. Add hot water to the pan to ½ inch below the top of the custard. This insulates the custard so it will not overcook.

If custard is overbaked, it curdles. If custard is underbaked, it will not set. Bake the custard until a knife inserted near the center comes out clean. Remove the custard dish from the hot water and cool it on a wire rack for about 5 to 10 minutes. Serve it warm or refrigerate it for later.

## Meringues

**Meringue** is a foam made of beaten egg whites and sugar and used for baked desserts. Meringues are most frequently used for pie toppings and cake icings. Meringue pies are admired for the lightly browned, white topping that sits tall above a base.

Meringue can be either soft or hard. Soft meringue goes on pies and tarts and is incorporated into rice and bread puddings. Hard meringue is made into cookies and dessert shells.

To make meringue, beat egg whites along with cream of tartar until the mixture is foamy. Then gradually beat in sugar, one tablespoon at a time. Continue beating the mixture until the sugar dissolves. If the meringue feels gritty when a little is rubbed between your thumb and forefinger, not all the sugar has dissolved. It takes practice to create a successful meringue.

### Soft Meringue

Soft meringue, uses 2 tablespoons of sugar for every 1 egg white. You need about 3 egg whites to make enough meringue for a 9-inch pie. Beat the egg whites and sugar only until soft peaks form.

Spread soft meringue over hot, precooked pie filling or pudding. On a pie, the meringue should touch the crust all around the edge. Otherwise, the meringue may shrink during baking. Bake the pie in a preheated oven according to recipe directions until the peaks are lightly browned. If you overbake a meringue, a tough, chewy skin forms.

When liquid accumulates between the meringue and pie filling, the meringue is said to **weep**. This occurs because the meringue was spread on a cool filling. To avoid this, always spread the meringue on a hot filling. **Beading**, brown droplets on the surface of the meringue, may occur if the meringue is overcooked.



## Explore the Photo

**Caption Answer** A custard will curdle if it is over baked.

**Discussion** Ask students: What is the right way to spread meringue on a pie? (spread to touch crust all around the edge; spread on hot filling)

## RETEACH

### C Critical Thinking

**Analyze Microwave Cooking**

Point out to students that the text notes that cooking eggs in the microwave takes special care. Ask students: Why might it be a poor idea to hard-cook eggs in a microwave oven? Ask students to share their responses with the class. (Answers will vary, but may include: With other methods of cooking eggs in the microwave, you break the eggs and then pierce the yolk before cooking to break the membrane and allow heat and steam to escape. Because you hard-cook eggs in their shells, heat and steam will build up within the egg shell and the egg could explode.)

### W Writing Support

**Write Varied Sentence Structures**

**Making Baked Custards**

Ask students: What is a baked custard? How do you make a baked custard? How can you ensure that a custard does not curdle? Ask students to write a paragraph about making baked custards. Ask them to include at least three different sentence structures. (For more tips on writing varied sentence structures, see page 514. Paragraphs will vary, but should contain a variety of sentence structures. For example, "Baked custard is a firm and delicate blend of milk, eggs, and sugar that is baked in the oven. Many well-known sweetened and unsweetened dishes have a baked custard base. To prevent curdling, do not overcook the baked custard.")

## RETEACH *cont.*

**C Critical Thinking**

**Evaluate Information** Ask students to explain what might happen if Dave makes a chocolate pie filling on a Monday but does not top the pie with soft meringue topping until the following day? What can he do to prevent this from happening in the future? (Dave's meringue will probably weep, or accumulate liquid between the meringue and chocolated filling, because the meringue was spread on a cool filling. If Dave had spread the meringue on top of a hot pie filling, it would prevent liquid from accumulating between the meringue and pie filling.)

## ASSESS

### Study Tools

Have students go to the Online Learning Center at **glencoe.com**:

- Take the **Practice Test**.
- Download **Study-to-Go** content.

Use the **Student Activity Workbook** for additional practice.

You can also poach a soft meringue to serve on puddings or with fruit sauce. To poach meringue, pour milk or water into a large saucepan or skillet, just deep enough for the poaching process. Drop the meringue by spoonfuls into the liquid, leaving space for the meringue to expand. Simmer uncovered until firm, about 5 minutes. You may need to turn larger spoonfuls over to cook completely. Remove the meringue with a slotted spoon and drain. Serve immediately or chill for later.

### Hard Meringue

C

Hard meringue uses 4 tablespoons of sugar for every 1 egg white. Beat the egg whites and sugar until stiff peaks form.

To make meringue shells, line a baking sheet with parchment paper or foil. Use a spoon, spatula, or pastry tube to spread the mixture on the baking sheet to the desired size. Build up the edges to form rims. You can shape small individual shells or a single large one. You can also shape meringue in a pie plate to make a meringue pie crust.

Hard meringue becomes crisp by baking it at a low temperature for a long time. This allows the water to evaporate slowly, leaving the meringue light and crisp. Bake the meringue in a preheated oven at 225°F for 1 to 1½ hours. Then turn off the oven and allow the shells to dry out in the oven for at least one hour. A meringue that does not dry well may be sticky and chewy. Cool the meringue completely and then fill the shells just as you would a pastry shell.

C

To shape meringue cookies, drop the meringue onto a lightly greased or lined baking sheet with a spoon or pipe it from a pastry bag. When baked, the cookies should be crisp and dry but not browned.

### Light and Healthy Recipe

#### Vegetable Egg White Omelet

**Ingredients**

- **2** egg whites
- **2 Tbsp.** Water
- **1 tsp.** vegetable oil
- **1 Tbsp.** Julienned onion
- **1 Tbsp.** Julienned red bell pepper
- **1 Tbsp.** Julienned green bell pepper
- **1 Tbsp.** Julienned carrots

***If served with whole wheat toast and orange juice, this omelet still has all the protein necessary to make a complete meal.***

**Directions**

1. Beat the egg whites with the water until light and fluffy.
2. Heat the oil in a small pan on high heat and add the onions. Sauté for one minute.
3. Add the remaining vegetables and sauté for another minute. Remove the vegetables from the heat and set aside.
4. Lower heat to medium and cook the eggs. With a wooden spoon or spatula, lift the eggs so that all can be cooked.
5. Spread the vegetables on one side of the omelet and fold the other side over. Slide the cooked omelet onto a dish and serve.

**Yield** 1 Serving

**Nutrition Analysis per Serving**

| | |
|---|---|
| Calories | 100 |
| Total fat | 5 g |
| Saturated fat | 0 g |
| Cholesterol | 0 mg |
| Sodium | 172 mg |
| Carbohydrate | 3 g |
| Dietary fiber | 1 g |
| Sugars | 2 g |
| Protein | 11 g |



## CLOSE

**Apply Knowledge** Have students apply what they have learned by creating a poster that illustrates how an egg's proteins affect its uses in recipes. Have students share their posters with the class.

### Light and Healthy Recipe

**Recipe Prep Tip** Students can use the same ingredients to create a frittata instead of an omelet. Remind students that vegetables are cooked before the eggs are added so that they have time to cook through as they take longer to cook than the eggs.

## After You Read

### Chapter Summary

Eggs are versatile, nutritious, and economic. They are comprised of several parts. Eggs contain many valuable nutrients. They should be selected and handled with care. Eggs are available in different grades and sizes. Proper storage keeps eggs fresh. Egg substitiutes are a low-calorie, fat- and cholesterol-free alternative to eggs. Eggs have special properties that allow them to act as binders, emusifiers, and leavening agents. Some ways of preparing eggs require cracking the shell, separating eggs, or beating egg whites. Egg cookery can be simple or complex. There are numerous methods for cooking eggs.

## Content and Academic Vocabulary Review

**1.** Use each of these content and academic vocabulary words in a sentence.

***Content Vocabulary***

- air cell (p. 516)
- albumen (p. 516)
- yolk (p. 516)
- chalazae (p. 516)
- coagulate (p. 519)
- emulsifier (p. 519)
- soufflé (p. 519)
- soft peaks (p. 521)
- stiff peaks (p. 521)
- shirred eggs (p. 524)
- omelet (p. 524)
- frittata (p. 524)
- custard (p. 526)
- quiche (p. 527)
- meringue (p. 527)
- weep (p. 527)
- beading (p. 527)

***Academic Vocabulary***

- ruptured (p. 516)
- sieve (p. 520)

## Review Key Concepts

**2.** **Identify** and describe three important parts of an egg.
**3.** **Describe** the nutrients found in eggs.
**4.** **Explain** how to safely store eggs.
**5.** **Summarize** why eggs act as a binder.
**6.** **Describe** how beating affects egg whites.
**7.** **Identify** the steps for making an omelet.

## Critical Thinking

**8.** **Explain** why it is not safe for Gerard to crack eggs on the side of the mixing bowl he is using to combine ingredients.
**9.** **Conclude** why Vera's cake mix lacks volume even though she quickly stirred in beaten egg whites.
**10.** **Identify** the reasons why a poached egg dish might be featured on the "Light and Healthy" portion of a restaurant's breakfast menu.





## Content and Academic Vocabulary Review

**1.** Students should write complete sentences using each vocabulary word correctly.

## Review Key Concepts

**2.** An egg includes the following parts: albumen, a thick fluid commonly known as egg white; a yolk, a round yellow portion of an egg that is encased in a thin membrane and floats within the albumen; and the chalazae, two thick, twisted strands of albumen that anchor the yolk in the center of the egg.

**3.** Eggs contain protein, vitamin $B_{12}$, other B vitamins, and vitamins A and D. They also contain iron, calcium, phosphorous, and other trace minerals.

**4.** Refrigerate eggs right after buying them. Store them in the original carton, not in the egg tray where they will be exposed to warm air and pick up aromas from other foods. Do not wash eggs before storing them, as this removes their protective coat. Refrigerate leftover cooked eggs and egg mixtures immediately and use them within three days. Refrigerate leftover yolks covered with water for up to two days. Refrigerate whites in a tightly covered container for four days. Freeze egg whites and yolks for longer storage, but never freeze raw eggs in the shell.

**5.** The coil-shaped proteins in eggs uncoil and join loosely with other proteins when they are heated. These new structures form pockets that hold water. This is coagulation. Coagulation helps eggs to act as a binder in foods and thicken dishes.

**6.** When beaten, air pockets form in egg whites. This causes their texture and color to change from thick, colorless, and transparent to fluffy, white, and opaque. It is possible to beat whites to foam, or to soft or stiff peaks.

**7.** Mix eggs and water; heat a pan; pour in the egg mixture; lift and tilt the edge of the egg mixture as it cooks; add filling over half the omelet; fold the omelet in half; and serve.

## Critical Thinking

**8.** It is not safe because bacteria from the shells can be transferred to the bowl and into the mix of ingredients.

**9.** Vera should not have stirred the egg whites into the cake mix. She should have gently folded them in just until they were incorporated. Stirring causes loss of air and volume.

10. Poached eggs are cooked in simmering water with no added fat. Therefore, they are a lighter alternative to other breakfast options featuring fried or scrambled eggs or omelets.

**Foods Lab**

11. Teams' responses will vary depending on the ingredients they choose to add and the criteria they hope to meet. Challenges may include lifting and tilting or folding the omelet. Ways to make preparation easier may include cooking at a lower temperature or adding fewer filling ingredients.

**HEALTHFUL CHOICES**

12. Rick should choose the second carton of white grade A eggs that are crack- and odor-free. There is no nutritional difference between brown and white eggs or between grades. Dangerous bacteria pose a threat to health. For the sake of safety, the eggs that are not cracked are the best choice.

**TECH Connection**

13. Students' findings will vary depending on the culture whose cuisine they choose to research. Summaries should describe the ingredients and preparation methods for the dish, noting the role that eggs play in it.

## Real-World Skills

### Problem-Solving Skills

14. Yolanda can refrigerate the egg whites in a tightly covered container for four days. She can also freeze them by putting each white in a separate compartment of an ice cube tray. Since she is a frequent baker, Yolanda can use the egg whites later in another recipe. Many recipes for baked goods require beaten egg whites.





**Foods Lab**

11. **Make an Omelet** Preparing an omelet is often harder than it looks, and requires care and attention. The end result, however, is usually worth the effort.

**Procedure** Make a basic omelet. Choose filling and seasoning ingredients. Review the preparation steps and make a list of criteria that you think the finished omelet should meet—such as even browning or warm filling.

**Analysis** Write one or more paragraphs to answer these questions: How well did the omelet meet the criteria you listed? What was the biggest challenge. How can you make preparation easier in the future? How did the ingredients taste in the cooked omelet?

**HEALTHFUL CHOICES**

12. **The Right Dozen** At the supermarket, Rick opens one carton of brown grade AA eggs and finds that two are cracked. A second carton contains white grade A eggs that are crack- and odor-free. A third carton contains grade AA brown eggs, and one is cracked. Which is the most healthful choice?

**TECH Connection**

13. **Eggs Around the World** Eggs are regarded as a nutritious food staple around the world. Choose a culture with which you are not familiar. Under your teacher's supervision, use the Internet to research that culture's cuisine and find one interesting dish that is prepared using eggs. Write a summary of your findings and share it with the class. Is the egg used as a main ingredient or a binder, amulsifier, or thickner? Describe the ingredients and preparation method. If possible, show a picture of the egg dish.

## Real-World Skills

**Problem-Solving Skills**

14. **Preventing Food Waste** Yolanda, a frequent baker, is preparing a dessert that calls for egg yolks. After separating the eggs, Yolanda is left with several egg whites. She does not want to throw them away. How can she store them and use them later?

**Interpersonal and Collaborative Skills**

15. **Egg Examination** Follow your teacher's instructions to form pairs. Your teacher will present you with two eggs: one purchased recently, one purchased weeks ago. Crack them open onto separate plates. Take turns examining each. Work together to evaluate the eggs' freshness. What conclusions can you make and why?

**Financial Literacy Skills**

16. **Protein Foods** Compare the protein in eggs with three other protein sources. Which of the four foods has the most protein per serving? Compare cost per serving of protein. Which of the four protein sources is the least expensive? Which is the most expensive?



### Interpersonal and Collaborative Skills

15. Pairs' observations will vary slightly, but should note that indicators of an egg's age include the size of the air cell, which gets larger as an egg ages, and the chalazae, which are thicker and more prominent in a fresher egg. Pairs should determine which of their two eggs is fresher based on these indicators.

### Financial Literacy Skills

16. Students' findings will vary depending on the three other protein sources they choose to research. For example, a student may compare walnuts, cheese, pork, and eggs. The student will then have to determine what quantity of each of these foods equals one serving, and the approximate cost of each food. After determining the cost per serving of each protein source, students can list which is the least expensive, and which is the most expensive.

## Academic Skills

### Food Science

**17. Egg Thickeners** Custard is a liquid thickened or set by gentle coagulation of egg protein. It is usually baked at a moderate temperature in a water bath.

**Procedure** Combine 3 beaten eggs, 1½ cups milk, ⅓ cup sugar, 1 teaspoon vanilla in medium mixing bowl. Combine well, but avoid making air bubbles. Ladle into 6 small bowls. Bake 3 of these in a water bath at 325° for about 35 minutes, or until center is slightly jiggly. Repeat with 2 without a water bath. Bake one in a water bath at 375°. Compare the results.

**Analysis** Why are temperature and a water bath important in baking custards? What acts as the thickener for the custard?

**NCES B** Develop an understanding of interactions of energy and matter.

NCLB

### Mathematics

**18. Deviled Eggs** Wanting to make deviled eggs, Jorge takes six eggs out of a full carton and boils them. Jorge would like them to cool off for a while, so, without thinking, he places them back in the egg carton in the refrigerator. Later, when he goes to take them out, he realizes that he doesn't know which six eggs are hard-boiled, and which six are raw. What is the probability that he will select two hard-boiled eggs from the carton?

**Math Concept** **Probability** When two events are dependent (i.e., 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 egg picked, the probability that it is hard-boiled is 6/12 (or ½). However, when selecting the second egg, there will be one fewer hard-boiled egg, and one fewer egg overall.

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

### English Language Arts

**19. Egg Symbology** In many cultures, some foods are seen as symbols. Throughout history, eggs have symbolized different things to different people. Research the symbology of the egg in one culture during one time period. Summarize your findings in writing. Present them to the class.

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

NCLB

## STANDARDIZED TEST PRACTICE

**TRUE OR FALSE**

Read the statement and determine if it is true or false.

**20.** Most recipes assume that large eggs will be used.

**a.** True

**b.** False

**Test-Taking Tip** Before deciding whether a statement is true or false, read it carefully, and recall what you have learned from reading the text. Does the statement reflect what you know? Pay close attention to individual words. One word can make the difference between a true statement and a false one.



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## Academic Skills

### Food Science

**17.** The main danger with custards is overheating, causing rapid tough irreversible coagulation with separation and tunnels in the product. Low to moderate heat with a water bath is important. The thickener here is protein coagulation.

### Mathematics

**18.** Jorge has a $^{5}/_{22}$ chance of picking two hard-boiled eggs from the carton. When Jorge picks the first of the two eggs, there are 6 hard-boiled eggs, and 12 eggs overall, meaning that his probability of picking a hard-boiled egg is $^{6}/_{12}$, or ½. When he goes to select the second egg, if the first egg was hard-boiled, there will be just 5 hard-boiled eggs remaining, and 11 total eggs remaining, making the probability of picking a hard-boiled egg $^{5}/_{11}$. The probability of both events happening is ½ × $^{5}/_{11}$ = $^{5}/_{22}$.

### English Language Arts

**19.** Students' findings will vary depending on the culture and time period they choose as a context in which to research the symbology of the egg. Students should summarize their findings in their own words, and present them in a brief oral report to the class.

NCLB **NCLB** connects academic correlations to book content.

## STANDARDIZED TEST PRACTICE

**Answer**

**20.** a. True