



# WHY BAKE?

*lab one*





## WHY BAKE?

### Lab 1

**Baking is Science...Tech...Engineering...Art...Math...  
Cultural Literacy...History...Family and Community  
Service...Clean Label... Resourceful...Deliciousness**

“The preparing, cooking, and sociable eating of food are so central to the human experience that the culinary arts may well be what made us human in the first place...There is no record anywhere of any people who have lived without cooking.” Richard W. Wrangham, Professor of Anthropology at Harvard University. p. 57. *Lost Recipes*, by Marion Cunningham.

Locate Family & Consumer Sciences Education Standards 3.0 (2018), STEAM and P21 connections to this lab in the Appendix.

**Introduction:** Bakers produce everything from the every-meal staples to the highly crafted bread, pastry or dessert. A fresh-baked bread or dessert adds warmth to the humblest of meals – whether home-prepared, carried in, or eaten out. The skill of baking can build relationships, wellness, and wealth.

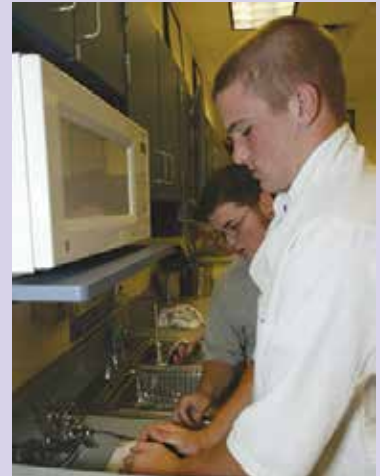
### People bake to:

- Show people they love or care about them
- Celebrate
- Craft a personal artisan “touch” in a high-tech environment
- Bring freshness, flavor, appeal to daily life
- Add value, quality, nutritious ingredients
- Save money, prepare locally and save fuel, reduce packaging, time
- Control ingredients to produce a “clean label” food and substitute ingredients

### Terms and Techniques

**Baker Terms:** Look up these terms in the Glossary and know their meaning.

A baker’s dozen	Equipment	Oven mitt
Apron	Ingredient	Pantry
Artisan	Lab	Sanitary
Bake	<i>mis en place</i>	Scoop
Cut-in	Muffin	Teamwork



High school Family & Consumer Sciences baking lab.

### Experiential Learning

1. Do it—Experience the activity.
2. What happened—Share publicly the results, reactions, observations.
3. Critical thinking—Process by discussing, looking at the experience, analyzing and reflecting. Use critical thinking skills to problem-solve poor outcomes together.
4. Connect it—Generalize to connect the experience to real-world examples.
5. Now what—Apply what was learned to a similar or different situation; practice.

Adapted from Cooperative Extension System Curriculum Handbook. 1997. University of MN. St. Paul, MN.

## A, B, C's for baking educators. Baking is:

**Affordable.** Flour, water, yeast or baking powder and salt—add a little butter, shortening or oil, egg, cocoa and sugar—and students can learn the history and science of everything from ancient breads to lava cakes! Equipping the lab need not be enormously expensive. Early baking was done on flat rocks! Simple baking can be taught on griddles or skillet with a few tools, water, and in under an hour of time.

**Basic** to human needs. At every level, hands-on baking foods labs move the student toward the goal: peak of Maslow's Hierarchy of Human Needs.

Source: Accessed world wide web: [simplypsychology.org/maslow.html](http://simplypsychology.org/maslow.html)



**Comprehensible.** Students understand the value, enjoy the fresh sensory qualities, embrace the resourcefulness, welcome the cultural opportunities and extend the skills and knowledge in their homes, communities and workplace.

## Outcomes:

1. Identify five or more benefits baking provides individuals, families and communities.
2. Recognize current bakers as professionals in small and large businesses.
3. Relate baking to four or more components of a healthful, meaningful lifestyle.
4. Cite three career or personal goals or skills students will gain from baking labs.
5. Identify a dozen or more tools used in the baking labs.
6. Teachers identify existing food skills students possess to organize and prepare one of the five Strawberry Muffin Top baking lab options.
7. Assess the results of the baking lab using *A Matter of Taste* evaluation forms.
8. Select a local baker, culinary writer, well-known home baker or caterer and invite them to discuss how and why they bake.
9. Find, try and write down a baking recipe that is a favorite or looks good. Include steps to make it "food safe" as you write the instructions.



## For Teacher:

- **Preview *Why Bake?*** – a research-based PowerPoint for educators and students available at [HomeBaking.org](http://HomeBaking.org).
- **Preview** how and why baking helps make meals happen. Prepare 5 reasons learning food skills, preparing and eating meals together makes a life-long difference for your students. Choose resources or sites to help:
  - FCCLA@TheTable, [fcclainc.org/programs/fccla-at-the-table.php](http://fcclainc.org/programs/fccla-at-the-table.php)
  - NoKidHungry, [cookingmatters.org](http://cookingmatters.org)
  - [TheFamilyDinnerProject.org](http://TheFamilyDinnerProject.org)
- List local professionals and home bakers who could speak to the students. The baker may be in the school's cafeteria, a 4-H foods leader, FCCLA member, well-known home baker, caterer, baker or restaurant owner. No one local? Have questions ready and call, email or chat with King Arthur Flour Baker's Hotline. Call 855.371.2253 or log on at [kingarthurfLOUR.com/bakers-hotline](http://kingarthurfLOUR.com/bakers-hotline).



- **Review recipe writing styles** and select the style you will require students to use. Two guides include [wikihow.com/Write-a-Recipe](http://wikihow.com/Write-a-Recipe) and [thedailymeal.com/how-write-recipe](http://thedailymeal.com/how-write-recipe). Ask the student to prepare the recipe at home from the recipe they wrote to double check it's accuracy and take at least one picture to go with the written recipe.

#### Assign students to:

1. Describe how they will create their Baker's Portfolio—digital or physical binder?
2. Write down or type (not downloaded) a favorite baking recipe to share with the class from family, friends, community group or test kitchen web-site. Great baking resources and web-sites are listed in Lab 13. (NOTE: Students gain "mise en place" organizational and functional literacy skills from the task of recipe writing.) A source credit line must be included.
3. Read handouts for the lab and assign terms and techniques from Glossary.

- **Provide to students for their Portfolios::**

Found in the Appendix:

*A Matter of Taste* Lab Evaluation Forms  
*Baking Food Safety 101* Guide  
 Baking Lab Equipment List  
 Baking Lab Rubric (how lab scores determined)  
 Baking Skills Check List  
 In Baker's Terms Glossary  
*Safe Kitchen* Check List  
 Washing Hands  
 What is Gluten Infographic

Found Online at [WheatFoods.org](http://WheatFoods.org)

*Gluten and the Diet*, (Professional Resource)  
*Gluten Intolerance and Wheat Allergies*

- Prepare two or three 18x13-inch baking sheet pans of baking tools/equipment for the Skill Drill. Include:
 

electronic scale	whisk
stirring spoon	mixing bowl
measuring spoons	liquid measuring cup
dry measuring cups	level tool
bowl scraper	batter or dough scoop
pastry blender	custard cup
egg separator	pastry brush
bread loaf pan	food thermometer
oven mitt	baker's apron or jacket
parchment sheet	mixer attachments

- **Review muffin method and tips:**

*A Baker's Dozen DVD*, Section 11 - Liquids  
 Baking Tips & How-Tos/Baking Basics/Muffin Tips,  
[dominosugar.com](http://dominosugar.com)

## Take 10 Skill Drills

1. Assemble a dozen or more baking tools on a sheet pan. Have the students list on a sheet of paper, the name of each tool on the sheet pan and one ingredient and/or technique for which the tool would be used.
2. Do again verbally, having one student ask and another student point to the tool and tell how it's used.
3. On a separate piece of paper, write two paragraphs about Why You Bake OR Want to Learn. This may include:  
 Paragraph One: What baked foods you enjoy from traditions or in everyday life.  
 Paragraph Two: Three skills or short term goals you have for the class.
4. Do the Listening for Directions activity (Appendix) to improve your *mis en place* skills.

## Computer Lab:

Assignment Options:

- "Why Bake?" PowerPoint, [HomeBaking.org](http://HomeBaking.org), as a computer lab. Require students to list the top reasons why people bake and what benefits are gained from baking.
- Take virtual bakery tours on Discovering America's Bakeries, The Baking Channel, [bakemag.com](http://bakemag.com).
- Visit one of the Baker Blogs to "learn" why people bake, what they're learning and baking. Blogs are listed in Lab 13 or can be located by choosing a Member and visiting their web-site.
- Visit [bakemag.com](http://bakemag.com) by Sosland to learn the latest in ingredients and events in the commercial baking world.
- View how to "cut-in" butter, shortening or margarine – Go to on-line Glossary, Cut-in entry, [HomeBaking.org/glossary/old\\_glossary.html#C](http://HomeBaking.org/glossary/old_glossary.html#C)
- Buff muffin skills. *Baking Tips & How-Tos/Baking Basics/Muffin Tips* at [chsugar.com](http://chsugar.com), [landolakes.com](http://landolakes.com), or [dominosugar.com](http://dominosugar.com).
- Download Educator Award winning lesson by Katie Brouwer, *The Muffin Man & the Healthy Kids Act*, [HomeBaking.org](http://HomeBaking.org).
- February 20 is National Muffin Day. Learn five interesting facts about Muffin history to share, [foodtimeline.org/foodfaq2.html#muffins](http://foodtimeline.org/foodfaq2.html#muffins).

# Baking Lab: Why Bake? Strawberry Muffin Tops



This introductory baking experience will inspire questions and help students see the skills and knowledge baking encompasses! Each lab will bake Strawberry Muffin Tops, with a “Why Bake?” variation! The Strawberry Muffin Tops photo can be seen on the Lab One divider.



## For Teacher:

This lab is an applied pre-test for all levels of baking students—first, intermediate and advanced. It incorporates introductory baking ingredient use, fundamental baking measurements and production methods.

Use the Baking Lab Rubric to consider students’ current skill levels and to help in selecting the baking lab level (First, Intermediate or Advanced Experience).

## Before you begin:

- Read the control Baking Lab 1 recipe with the students. For first time bakers, discuss or do together mis en place steps for the recipe.
- Provide the students with basic method demonstrations as needed (cutting-in butter; use of scales or dry and liquid measuring tools; mixing; how to scoop same-sized muffin tops).
- Use this lab as an opportunity to introduce the Baking Lab Rubric criteria, *Baking Food Safety* and *Kitchen Safety* guidelines, and your protocol for how to work with equipment, each other and clean up labs.
- Use student list and the Lab Rubric to note the skill levels of students as they work.
- Provide copies of *A Matter of Taste* form—one for each product students will sample.
- Assign Lab teams.

**All labs will prepare Strawberry Muffin Tops. Each lab’s focus is on one reason why people bake, and bakes a variation for “I bake ....”**

**Lab 1:** for enjoyment....freshness, flavor, appeal, esteem

**Lab 2:** to show kindness, affection, celebrate

**Lab 3:** to offer nutritional value, for health and wellness

**Lab 4:** for resourcefulness (save \$\$\$, packaging, shipping, to be locally produced)

**Lab 5:** for special dietary needs (less sodium, ingredient allergies, whole grain). Choose one special option per lab.

## Lab Supply List:

- Baking aprons, hair ties, caps or covers
- Ingredients for each lab to prepare one of five recipes
- Dried fruit for Lab Three, if no in-season fruit or locally grown fruit is available
- Allergy ingredient option(s) for Lab 5 – Gluten-free baking mixture (prepare own, or purchase all-purpose gluten-free flour blend, including xanthan gum—see Glossary); flax meal, soy or rice milk
- Medium mixing bowl
- Stirring spoon
- Fork or wire whisk
- Large (2 cup/16 oz) liquid measuring cup
- Pastry cutter, knives or food processor with steel blades
- Two baking sheet pans and wire cooling racks per lab
- Parchment or pan spray
- Muffin batter scoop (¼ cup, #16/2 oz) dipper/scoop or scant 1/3 cup (#12) dipper
- Ingredient note: May use fresh fruit in season, cake and pastry canned filling (such as Solo™) or fruit preserves
- Ovens
- Serving tools or gloves for baked product

On-line how-to-mix muffin batter  
[HomeBaking.org](http://HomeBaking.org). Select Cornbread video.



Strawberry Muffin Tops, Courtesy Clabber Girl

## Baking Lab 1: Fresh is Best!

### Strawberry Muffin Tops

Yield: 12 muffin tops, (2.9 oz/81g each)

Ingredients	Measurement	Weight
All-purpose flour	1 ¾ cups	7.75 oz/220g
Sugar, granulated	1/3 cup	2.3 oz/65g
Baking powder	1 ½ teaspoons	0.25 oz/7g
Baking soda	½ teaspoons	2.5g
Salt	¼ teaspoons	1.5g
Unsalted butter, cold	4 tablespoons (1/2 stick)	2 oz/57g
Large egg	1	2.6 oz/50g
Buttermilk*	3/4 cup	7 oz/200g
Fresh strawberries, sliced	1 ½ cups	8 oz/227g
Strawberry cake/pastry filling** or preserves	about 4 tablespoons	3 oz/85g

**\*Buttermilk option:** Stir together 2 teaspoons lemon juice or vinegar plus milk to make 3/4 cup

**\*\*** Such as Solo™ Cake and Pastry Filling

#### Directions:

- Preheat oven to 425°F. Line two baking sheets with parchment paper OR lightly oil or spray.
- In medium mixing bowl, whisk to combine the flour, sugar, baking powder, baking soda, and salt.
- Cut the cold butter into small pieces (about 8); toss pieces with the dry mixture and cut-in the butter until it resembles coarse bread crumbs. (This step may be done in the food processor, with two knives or a pastry blender.)
- In a 2-cup liquid measuring cup, measure milk and add egg; use a fork or wire whisk to thoroughly blend the buttermilk and egg.
- Toss the sliced berries lightly with flour mixture. Make a “well” or divot in the center of dry mixture. Add the beaten egg and buttermilk mixture.
- Use a large spoon to turn and combine the dough until it forms a slightly sticky dough ball. You won’t knead this dough. If the dough is too wet to form a dough ball, add another 2 tablespoons of flour sprinkled over the surface. Stir again just to bring the dough into a ball.
- Scoop dough onto prepared baking sheets, ~6, #16 (1/4 c.); scoops per pan, 1 ½ inches around each muffin top.
- Gently press a thumb-sized indentation in center of the top with a small spoon and drop a generous rounded teaspoon of fruit filling or preserves in the indentation.
- Bake for 18 minutes or until golden. Cool briefly on wire cooling rack and serve.

Recipe courtesy of Clabber Girl, [clabbergirl.com](http://clabbergirl.com)

## Baking Lab 2: Celebrate!

### Streusel Strawberry Muffin Tops

Add these special treatments for celebrations.

- Prepare streusel mixture to sprinkle on the Strawberry Muffin Tops before baking.
- Prepare a confectioner’s drizzle and drizzle over each muffin top before serving.

#### Streusel Topping

Yield: Streusel to top 12 muffin tops

Ingredients	Measurement	Weight
Brown sugar	½ cup, packed	3.25 oz/92g
All-purpose flour	1/3 cup	1.4 oz/40g
Ground cinnamon	1 ½ teaspoons	5g
Ground nutmeg	¼ teaspoon	0.75g
Butter, cold, cut in pieces	¼ cup	2 oz/56g
Chopped nuts (optional)	½ cup	2 oz/56g

#### Confectioners Drizzle:

Powdered sugar	½ cup	2 oz/56g
Milk	2 to 3 teaspoons	0.75 to 1 oz/28g
Vanilla extract	½ teaspoon	2g

Stir until smooth; drizzle from a pointed spoon over the cooled muffin tops.

Drizzle Recipe courtesy of [Karosyrup.com](http://Karosyrup.com)

#### Strawberry Muffin Tops (without Streusel and Drizzle)

Nutrition Facts	
Serving Size (81g) Servings Per Container	
Amount Per Serving	
<b>Calories 150</b>	<b>Calories from Fat 40</b>
<b>% Daily Value*</b>	
<b>Total Fat 4.5g</b>	<b>7%</b>
Saturated Fat 3g	15%
Trans Fat 0g	
<b>Cholesterol 30mg</b>	<b>10%</b>
<b>Sodium 200mg</b>	<b>8%</b>
<b>Total Carbohydrate 26g</b>	<b>9%</b>
Dietary Fiber 1g	4%
Sugars 12g	
<b>Protein 3g</b>	
Vitamin A 4%	Vitamin C 20%
Calcium 4%	Iron 6%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.	
Calories: 2,000 2,500	
Total Fat	Less than 65g 80g
Saturated Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300 mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4	

- Prepare muffin tops and streusel topping.
- Sprinkle muffin tops with streusel at Step 8, just before baking.
- Prepare drizzle while tops bake; just before serving, drizzle baked muffin tops lightly, using a fork or pointed spoon.

## Baking Lab 3: Nutrition Plus!

Add whole grain value, vegetable oil and reduce the sodium as Dietary Guidelines for Americans encourages. Prepare to:

- Compare whole grain nutrition facts labels with Lab One, original Strawberry Muffin Tops, p. 5.
- a **similar weight** muffin made from a mix, and/or a commercial muffin or muffin top.
- **“Reduced sodium”** muffin tops must have 25% less sodium than the original. Is this true about the muffin tops you prepared? (Compare Facts labels. A: yes)
- **“Low sodium”** foods can have 140 mg or less sodium per serving. Do Whole Grain Strawberry Muffin Tops qualify as “low sodium?” (A: yes)
- Could you sell Whole Grain Tops in school as a Smart Snack product? (A: Yes, if you use substitute 1 T. butter and 3 T. vegetable oil in the recipe.)

## Whole Grain Strawberry Muffin Tops

Yield: 12 muffin tops, (2.8 oz/79g each)

Ingredients	Measurement	Weight
Whole wheat flour	1 cup	4 oz/115g
Rolled oats, quick or old-fashioned	½ cup	1.5 oz/35g
All-purpose flour*	1/4 cup	1 oz/28g
Sugar, granulated	1/3 cup	2.3 oz/67g
Baking powder	1 ½ teaspoons	0.25 oz/7g
Baking soda	½ teaspoon	2.5g
Salt	Pinch (1/16 teaspoon)	0.75g
Unsalted butter, cold	2 tablespoons/1/4 stick	1 oz/28g
Vegetable oil	2 tablespoons	
Large egg	1	2.6 oz/50g
Buttermilk**	3/4 cup	7 oz/200g
Fresh strawberries, sliced	1 ½ cups	8 oz/227g
Strawberry cake/pastry filling*** or preserves	about 4 tablespoons	3 oz/85g

\*All-purpose flour may be Ultragrain® flour

\*\*Buttermilk option: Stir together 2 tablespoons lemon juice or vinegar plus 1% or skim milk to make 3/4 cup

\*\*\* Such as Solo™ Cake and Pastry Filling

### Directions:

1. Preheat oven to 425°F. Line two baking sheets with parchment paper OR lightly oil or spray.
2. In medium mixing bowl, whisk to combine the flours, oatmeal, sugar, baking powder, baking soda, and salt.
3. Cut the cold butter into small pieces (about 8); toss pieces with the dry mixture and cut-in the butter until it resembles coarse bread crumbs, using two knives,

pastry blender or food processor.

4. In a 2-cup measuring cup, measure milk and add egg; use a fork or wire whisk to thoroughly blend the buttermilk and egg.
5. Toss the sliced berries lightly with the flour mixture. Make a “well” or divot in the center of the dry mixture. Add the beaten egg and buttermilk mixture.
6. Use a large spoon to turn and combine the dough until it forms a slightly sticky dough ball. You won’t knead this dough. If the dough is too wet to form a dough ball, add another 2 tablespoons of flour sprinkled over the surface. Stir again just to bring the dough into a ball.
7. Scoop the dough onto the prepared baking sheets, 6 scoops per pan, with 1 ½ inches around each muffin top.
8. Gently press a thumb-sized indentation in center of the top with a small spoon and drop a generous rounded teaspoon of preserves or jam in the indentation.
9. Bake for 18 minutes or until golden. Cool briefly on wire cooling rack and serve.

Whole Grain  
Strawberry Muffin Tops

Nutrition Facts	
Serving Size (79g) Servings Per Container	
Amount Per Serving	
<b>Calories 160</b>	<b>Calories from Fat 45</b>
<b>% Daily Value*</b>	
<b>Total Fat 5g</b>	<b>8%</b>
Saturated Fat 2g	<b>10%</b>
Trans Fat 0g	
<b>Cholesterol 25mg</b>	<b>8%</b>
<b>Sodium 140mg</b>	<b>6%</b>
<b>Total Carbohydrate 25g</b>	<b>8%</b>
Dietary Fiber 2g	<b>8%</b>
Sugars 12g	
<b>Protein 3g</b>	
Vitamin A 2%	Vitamin C 20%
Calcium 6%	Iron 4%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Saturated Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300 mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4	

## Baking Lab 4: Going Green Strawberry Muffin Tops

Prepare the Strawberry Muffin Tops, using locally produced or in-season ingredients to reduce transportation costs. Locally produced ingredients may be fresh, frozen or dried fruits, herbs, milk, eggs, wheat flour, butter or any of the ingredients listed!

### Additional Option:

Substitute 1 cup conditioned dried fruit such as raisins, craisins, dried cherries, blueberries, and 1 T. fresh herb like lavender, if desired. Snip or dice into smaller pieces as needed.

- **How to condition dried fruit:** Cover dried fruit in room temperature tap water (~80° F) for 5 to 10 minutes; drain off water. Measure dried fruit; place remainder in sealable food container or plastic bag. Store refrigerated.
- Proceed with recipe as directed.



## Baking Lab 5: Baking for Special Needs

Prepare Strawberry Muffin Tops. Each lab should use the original recipe and choose only ONE of these three Special Needs substitutions:

- 1. Lactose allergy:** Replace the dairy buttermilk with 1 tablespoon lemon juice + soy or rice milk to equal 1 cup. Stir well.
- 2. Egg allergy:** Replace 1 large egg with 1 tablespoon flax meal + 3 tablespoons water OR ¼ cup soft silken tofu.
- 3. Prepare gluten-free** baking mixture below to replace all-purpose flour one for one (use 1¾ cup mix instead of all-purpose flour.) Freeze mix that is not needed.

→ Food allergies and Celiac are serious illnesses. Learn more, at [acaai.org/allergies/types/food-allergy](http://acaai.org/allergies/types/food-allergy); [NationalCeliac.org](http://NationalCeliac.org), and Glossary, Gluten Free, [HomeBaking.org](http://HomeBaking.org).

## Gluten-Free Baking Mix:

Recipe and tips courtesy of Land O'Lakes, [landolakes.com](http://landolakes.com)

Ingredients	Measurement
Brown rice flour	2 cups
Potato starch	2/3 cup
Tapioca flour	1/3 cup
Xanthan gum	1 teaspoon

Whisk or blend with mixer wire attachment. Yield: 3 cups

## Gluten-free baking tips

1. Gluten-free flours may require more chemical leavening, but not more yeast to compensate for the lack of elasticity. If you convert a recipe to gluten-free, you may need to add about 25% more baking soda or baking powder than what is called for in the original wheat version.
2. Use an electric mixer—either stand or hand-held, to help prevent clumping that can occur when you use gluten-free flours.
3. Gluten-free batters tend to be sticky. You may need to scrape the sides of the mixing bowl often.
4. Be sure to use good measuring techniques and quality, standard measuring spoons and cups. A slight measuring mistake can alter the texture and lead to a gummy, undesirable result.
5. Gluten-free baked goods may stick more to the pan. To prevent batter from sticking to surfaces and pans, use non-stick pans or line your pans with parchment paper.
6. When using a gluten-free flour, store it in the freezer in a resealable plastic freezer bag to maintain quality. Always let the flour come to room temperature before using.
7. Baked goods with gluten-free flours taste best when eaten warm from the oven but they also freeze well. Wrap small amounts of the baked product in plastic food wrap and place in a resealable freezer bag or a tightly covered container. Thaw only what you plan to use.

## Gluten-free (GF) Substitutions

Gluten provides the structure for baked goods. GF products will not bake the same.

Chef Stephanie Petersen, Culinary Specialist with Panhandle Milling Company, Dawn, TX, provides tips for baking gluten-free.

### 1. Know your grains, seeds and starches

#### Contain gluten:

- Wheat, its six classes, ancestors and products: einkorn, spelt, khorasan wheat, faro, durum, semolina, bulgur, farina, and grano. *The amount of gluten in wheat varies by class—hard or soft—and the production year.*
- Barley, rye, and triticale

#### Gluten-free (GF):

- Amaranth seeds (when popped, great in breads, cakes, cookies)
- Beans—garbanzo (chickpea)
- Brown rice flour, whole grain version, used like white rice flour, as basic flour for GF baking; bland and blends well with other GF flours
- Buckwheat, taste and texture like wheat in breads, cakes, cookies
- Corn, potato, and tapioca starches
- Cornmeal and corn flour—yellow and white
- Flax seed meal (seeds must be ground to be digested)
- Millet, mild, sweet nut-like
- Oats and oat flour—naturally GF; look on label for “certified gluten-free” (produced in a gluten-free mill)
- Peas, lentils, soy (legumes) stronger flavor or aftertaste
- Sorghum, white or red—use no more than 30% in GF flour blends
- Teff—a grass seed; most often used in cookies, cakes, tortillas, flat breads

#### Whole Grain Gluten-Free Blend

Makes 7 1/2 cups

3 cups sorghum flour  
2 cups brown rice flour  
2 cups tapioca starch/  
flour

1 cup cornstarch or  
potato starch  
2 T xanthan gum  
1 T sea salt

Blend well, store sealed,  
refrigerated.

Chef Stephanie Petersen  
[PanhandleMilling.com](http://PanhandleMilling.com)

### 2. No one GF flour will do the trick for avoiding dense

**GF results.** Use a blend of no more than 30% of any one GF flour, less than 20% of millet and garbanzo beans.

Refrigerate all GF flours—return to room temp before using and whisk to remove lumps.

### 3. Include gum for structure.

Add xanthan or guar gum when GF flour blend does NOT contain it. How to use?

Whisk the gum in with the other dry ingredients OR it may be mixed into the oil or butter.

- Xanthan gum for baking and yeast breads—Per cup of GF flour blend: Cookies: 1/4 tsp; Cakes/pancakes: 1/2 tsp.; Quick breads: 3/4 tsp. Yeast breads: 1 to 1 1/2 tsp.; Pizza dough: 2 tsp.
- Guar gum is best for those with severe allergies to corn and soy; improves texture and elasticity. Per cup GF flour, whisk in for cookies, 1/4-1/2 tsp; cakes/pancakes, 3/4 tsp; quick breads, 1 tsp; and yeast breads 2 tsp - 1 T.

Find ingredients and learn more about GF baking: [argostarch.com](http://argostarch.com); [landolakes.com](http://landolakes.com); [breadworld.com](http://breadworld.com); [hodgsonmill.com](http://hodgsonmill.com); [kingarthurfLOUR.com](http://kingarthurfLOUR.com); [panhandlemilling.com](http://panhandlemilling.com); [redstaryeast.com](http://redstaryeast.com)



## Consumer Sensory Evaluations: A Matter of Taste

On baking day do a sampling and evaluate their product. Each lab should:

1. Have *A Matter of Taste* forms (p. 9) and pencils for each student in the class to evaluate the lab's product.
2. Display one uncut Strawberry Muffin Top and cut small samples from the rest for the whole class to try.
3. As the students try each lab's product sample, write the Lab Number or product name on *A Matter of Taste* Evaluation form and complete it as they sample.
4. Gather all the evaluations for each lab.
5. Clean up.
6. Tally Consumer Sensory Evaluations. Discuss *Why Bake?* labs.
  - Tally the evaluations for each lab. Calculate the percentages for each question on the *A Matter of Taste* form.  
Example: I would enjoy eating this product again.  
—15 yes out of 18 students  
— Set up the problem: Tally number over total surveys returned: 15/18  
15 students said yes, divided by 18 total evaluations = 83%  
— What it means: A 60% or higher rating on a category requires no more improvement  
Lower % ratings mean an improvement is needed.
  - Have each lab discuss and suggest their ideas for product improvement in categories below 60%.
  - Self-evaluate their lab team, using the Baking Lab Rubric. How did they rank their performance in the lab? Write their questions or suggestions on the back of the rubric.

### Critical Thinking:

Use the *Baking Lab Rubric* and the *A Matter of Taste* forms (tallied and summarized by each lab) for this discussion.

Each lab:

- Prepare verbal or written comments/summary based on each of the Baking Lab Rubric categories. Student lab teams should assign ratings and state questions or suggest improvements they would make in the next labs.
- Report on their product's *A Matter of Taste* evaluation forms tally and consumer ratings.
  1. How did their muffin top rate for customer appeal on *A Matter of Taste* forms? (A: A 60% or higher ranking in any category means the product would sell.)
  2. What could be improved? (A: Give each lab opportunity to report based on their responses.)
  3. Do you think making the muffin tops yourself was a cost savings? (See Text box at right)
  4. Was the time it took to prepare them a problem?
  5. What resources have been saved by Doing-It-

Yourself? (A: Fuel to transport prepared dough or products up to 1500 miles.)

6. Gluten-free and lactose-free products will not look or taste the same as a wheat-based product—but are the products you baked acceptable? If not, what most needs improvement?
7. What other ways can costs and natural resources be saved when making a baked item at home or for a baking business? (A: These may include: Preheat oven, and load it quickly; store product in reusable storage containers; bulk purchase ingredients; no national brand advertising costs; no outer hard plastic or cardboard packaging; more net weight product for half the cost; real fruit, butter—not flavorings; properly storing ingredients to prevent waste.)
8. What benefits were gained by making the product yourself? (A: May include highest quality ingredients; freshness; nutrition; control of ingredients; less packaging; save \$\$\$.)
9. What other specialty baked goods are in demand? (A: vegan, organic and GMO free) What do these terms mean? Would they be more costly?
10. Visit [foodinsight.org](http://foodinsight.org) for additional consumer surveys.

### DIY Costs and Benefits:

**Lab 1 – Fresh is Best** Muffins: cost about \$.30 each—\$3.60 for a dozen, using fresh in-season strawberries, (Fresh-baked muffin tops may cost \$3-\$4.50 each in a coffee shop.)

**Lab 2 – Celebrate!** Streusel: Cost = \$0.40 each for the extra drizzle and streusel with nuts. A beautiful treat that's even good for you!

**Lab 3 – Nutrition Plus** The muffin is nutritious as it is, with fresh fruit and low fat buttermilk and moderate amounts of fat, sodium and sugar. Whole grain is an easy variation and does not cost much more.

**Lab 4 – Going Green** Save on refrigeration/freezer trucking by being locally baked. Many products are trucked over 1500 miles when prepared and shipped in. When fruit is in season, buy local if possible; dried fruit may cost more than fresh with the exception of raisins.

**Lab 5 – Bake for Special Needs** Foods specially made for food allergies may cost 10 X more, or more! Purchasing ingredients to bake them yourself saves \$\$\$ on shipping, packaging, and the products will be fresher.

**Bake for Special Markets too.** A vegan muffin top may be made using the egg substitutions and the lemon juice option to sour soy or rice milk. For Non-GMO, remember, wheat flours are ALL Non-GMO, read labels for other ingredients. Get the FACTS about GMOs: [foodinsight.org/search/node/GMOs](http://foodinsight.org/search/node/GMOs).

## Local Connections: Get to Know a Baker

Invite a professional baker, avid home-baker (adult or teen), catering baker, supermarket baker, school food service baker, or baking teacher to come to the class.

1. Have students prepare questions to ask the baker ahead of their presentation.
2. Encourage the guest baker to demonstrate at least one specialty of theirs—shaping, signature bread or pastry, local cultural specialty.
3. Ask the baker how they got started baking and 5 things students can do now to gain skills in baking, food knowledge, and managing costs.
4. Have the baker highlight the food safety, handling and sales regulations they follow, and new baking trends they are following.
5. If possible, have the bakers who come to discuss how they develop and test a new product.
6. If no local baker is available— Go on-line, Computer Lab (p. 3) references.  
C&H Sugar – [chsugar.com](http://chsugar.com) and [dominosugar.com](http://dominosugar.com)  
Meet the Test Kitchen professionals at [landolakes.com](http://landolakes.com)  
King Arthur Flour Baker's Hotline – [kingarthurfLOUR.com](http://kingarthurfLOUR.com)  
National Festival of Breads – [nationalfestivalofbreads.com](http://nationalfestivalofbreads.com)



Photo courtesy of Connie Nieman, FCS Baking Science Teacher, Olathe North H.S, Kansas

## A MATTER OF TASTE Lab Evaluation Form



### How to use Evaluation Form:

- 1) Tally each category – taste, color, aroma, appearance, would eat again.
- 2) Calculate the percentages marking each category – Example: 8 out of 15 surveyed thought it very good=53%
- 3) Each overall category needs at least a 60% consumer positive approval before the product will sell.

Product Name Tasted: \_\_\_\_\_ Lab group: \_\_\_\_\_ Date: \_\_\_\_\_

I think the food product tastes: \_\_\_\_\_ very good \_\_\_\_\_ good \_\_\_\_\_ okay \_\_\_\_\_ improvements needed

The food tastes: \_\_\_\_\_ savory \_\_\_\_\_ sweet \_\_\_\_\_ bitter \_\_\_\_\_ salty \_\_\_\_\_ sour \_\_\_\_\_ not what I expected

The color is: \_\_\_\_\_ great \_\_\_\_\_ too pale \_\_\_\_\_ too dark \_\_\_\_\_ not right for the product

The aroma (smell) is: \_\_\_\_\_ inviting \_\_\_\_\_ too strong \_\_\_\_\_ too weak \_\_\_\_\_ not inviting

The food looks: \_\_\_\_\_ yummy \_\_\_\_\_ okay \_\_\_\_\_ improvement needed

The portion size is \_\_\_\_\_ just right \_\_\_\_\_ too small \_\_\_\_\_ larger than needed

I would enjoy eating this food again: \_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ maybe

Comments: \_\_\_\_\_