



# Ingredient Superheroes!

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**Introduction:** “Students often do not understand each ingredient’s function in a baking recipe, do not take measurement and preparation methods seriously and assume the recipe will turn out as planned. The result? If we have 5 or 6 lab groups we get 5 or 6 different end products with the exact same recipe.”

**Baked products must be reliably the same to maximize resources invested, avoid waste and serve or sell well.**

- Delaine Stendahl, from an HBA Educator Award winning lesson plan

## STRATEGIES

1) Students research baking ingredients’ functions before baking begins through student-lead research and creative presentations that incorporate literacy and art.

Two strategies:

- Create a **RAFT**:  
**Role:** Yeast  
**Audience:** Classmates  
**Format:** Story Telling  
**Topic:** What happens when you were mixed with water, sugar, flour and salt?



- Create a **Superhero comic** using a baking ingredient.

2) Students measure and evaluate results of various measurement methods, bake a recipe and determine weights to convert to a formula.

3) Students apply knowledge and skills by baking with younger students.



Sugar 101: Farm to Table ([sugar.org](http://sugar.org))

## MEASURABLE OBJECTIVES

The students will:

- Demonstrate personal hygiene, sanitation, baking food safety practices, and safety in the lab.
- Identify proper measuring tools and measure ingredients correctly.
- Use communication, problem solving, and teamwork skills to prepare recipes for consumers.
- Troubleshoot issues in baking that may occur along the process of the project.
- Develop skills and confidence in baking products of quality.
- Produce from a lab recipe a standardized baking formula by applying math skills and scale use to replace standard measuring cups, spoons for consistent cookie dough production.
- Identify developmental reading and kitchen skills relative to young children.
- Apply their communication, problem solving, and teamwork plans to work with young children in baking their product (gingerbread cookies).



Whitehall H.S. Bakers in lab

## Family & Consumer Sciences Standards (2018, 3.0) Nat'l Association of State Administrators of Family & Consumer Sciences, [nasafacs.org](http://nasafacs.org)

### 1.0 Career, Community & Family Connections

1.2 Demonstrate transferable knowledge, attitudes and technical and employability skills in school, community and workplace settings.

### 2.0 Consumer and Family Resources

2.1 Demonstrate management of individual and family resources such as food...time, human capital

### 4.0 Education and Early Childhood

4.2 Analyze developmentally appropriate and culturally responsive practices to plan for early childhood education and services

4.4 Demonstrate a safe and healthy learning environment for children, youth and adults.

### 7.0 Family and Human Services

7.1 Analyze career paths within family and community services

7.1.1 Explain the roles and functions of individuals engaged in family and community services careers

7.1.2 Analyze opportunities for employment and entrepreneurial endeavors.

### 8.0 Food Production and Services

8.2 Demonstrate food safety and sanitation procedures

8.5 Demonstrate professional food preparation methods and techniques for all menu categories to produce a variety of food products that meet customer needs.

8.5.3 Utilize weights and measurement tools to

demonstrate knowledge of portion control and proper scaling and measurement techniques.

8.5.10 Prepare breads, baked goods and desserts using safe handling and professional preparation techniques.

### 9.0 Food Science, Dietetics & Nutrition

9.2 Apply risk management procedures to food safety, food testing, and sanitation

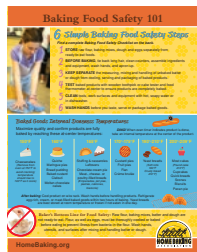
9.2.5 Demonstrate practices and procedures that assure personal and workplace health and hygiene.

Career Pathways  
Through FCCLA  
[fcclainc.org](http://fcclainc.org)



## CLASS PLAN (See *Resources* section, page 4, for links)

### Day 1: Lab Safety, Baking Food Safety, *mise en place*, Clean up



Depending on lab length, students measure ingredients and produce a recipe. We prepared Best Brownies. (Short lab times, students measure ingredients, bake next day.)

**Activity:** View video *Did You Know? Flour Food Safety*

### Day 2: Product Comparison—The Big Deal about Measurement

- Bake brownie; discuss how everyone measured ingredients.
- Remove brownie from the pan in one piece and weigh. Record the weight of each lab's brownie. Portion the brownie, and reserve one equal-sized portion in each lab to use for conclusions.
- Sensory analyze: Use *A Matter of Taste* form to evaluate.
- Record the weight of each lab's brownie on board for Day 3.

The image shows two forms. The top one is "A MATTER OF TASTE Evaluation" with fields for Name, Date, and a grid for recording sensory analysis results. The bottom one is "Baking Science Lab Variations Evaluation" with columns for Lab, Volume, Weight, and Color, and rows for Lab 1 through Lab 5.

*Kitchen Science: Baking for Special Needs, p. 4*

### Day 3: Accurate Measurement, Quantity Food Production and Quality Assurance

(For baking with young children component, contact the group you will work with to schedule ahead.)

Compare brownies from previous day:

- Why are they different?
- Which product overall had the best results?
- Why did the products vary when everyone had the same recipe?
- Why did the weights of the final product vary? Shouldn't they have been the same?
- What techniques did your group use to measure the recipe's main ingredients? Flour? Sugar? Cocoa? Fat?

**Activity: Scoop, Spoon, Scale.** Students record the weight of one cup of flour using different measuring techniques. Assign five students five different techniques, including the correct one. (20-25 minutes)

### Day 4: Weight Vs. Volume

Review the results from the various ways to measure flour in **Scoop, Spoon, Scale.**

**Activity:** View YouTube video *Weight vs. Volume in Measurement* from Joy of Baking (10:30 minutes)

Closure: What would be the best measuring techniques to use in our lab? Why?

Key concepts to discuss:

- Methods used to prepare brownies
- Measurement in commercial settings
- Volume vs. weight
- Ease and speed of measurement
- Confirm technique to measure accurately with liquid and dry measuring tools when no scales are available.



*Kitchen Heals Soul Blog*  
([kitchenhealsoul.com](http://kitchenhealsoul.com))

Resource: **Baking Basics: How to Measure**

### Days 5-6: Recipes vs. Formulas

Introduction: (3-5 minutes) Review *Weight vs. Volume in Measurement* video from Joy of Baking.

- What did Stephanie Jaworski say about measurement in her video?
- Why was it better to weigh ingredients than to use volume measurement?
- Measuring cups do not always measure equally. Compare by weight 1 cup of water measured in three different liquid measuring cups.

Today we are going to learn the difference between a **recipe** and a **formula**. Does anyone have an idea what the difference might be?

**Activity:** Students will read the blog *The Difference Between a Recipe and a Formula*, by Webb Girard. Identify 3-5 differences to discuss. (45 minutes)

**Activity:** Watch video *Math Meets Culinary Arts, Chapter 2: Bakers Percentage* from MATH@WORK (begin at 4:48 for baker's percentage portion).

- Definition of **baker's percentage:** In baking formulas primarily based on flour, each ingredient's weight is measured as a percentage of the total flour weight (100 percent) [homebaking.org/glossary/#b](http://homebaking.org/glossary/#b)

Closure: (3-5 minutes) What is baker's percentage? Why is it used? (A: *It is the most accurate way to write the formula; it is easier to increase or decrease the quantity produced.*)

## Day 7-8: Ingredient Superheroes

Introduction: We've been talking about how bakers measure accurately for consistent products. Today we explore the "super powers" of common ingredients used in baking. We will:

- Identify 10 baking ingredients.
- Name the functions of fat, sugar, flour, eggs, and what the leavening will be.
- Explore the **Types of Sugar**. Several types are used in baking! Which types will you use?



**Activity:** Access **Baking Substitution Science** to learn or review the functions of many baking ingredients.

**Activity:** Students choose one ingredient to create an **Ingredient Superhero** poster that conveys its baking role.

### Ingredient Superhero Rubric

Area	Saves The World (5 pts)	Comes Close (3 pts)	Loses Title (1 pt)	Never Showed Up! (0 pts)	POINTS
Name of Hero	Fits the ingredient and its functions	Fits ingredient but only some of the function	Fits ingredient or function but not both	No attempt to be creative in naming ingredient	
Image of Hero (You can create online or draw your own!)	Colorful, superhero-like, reveals ingredient strength to transform product	Missing one detail	Missing two details	Needed more effort to create the image, color or strength	
Background	Color and texture create a SUPER superhero poster	Needs more to be complete	Solid color (not white)	Plain background, nothing added—just white paper	
Content (value x4)	Portrays all the powers of this ingredient in food production; portrays any ways in which the product has weaknesses or loses its power (such as another ingredient)	Missing a minor detail in power of the ingredient	Come on, did you really research this? Your Superhero deserves better! You underestimated their powers!	Missing content; you need to redo this assignment! You missed the purpose of your superpowers or "created" your own artificial powers it does not possess!	
Use of Time (value x3)	On task always	On task mostly	Off task a lot	Teacher babysat you	

## Day 9-10: Students Become Local Superhero Ingredient Action Figures (Bakers)!

Challenge the students to become ingredient action heroes by planning an interactive baking time with a younger group of students or an out-of-school group.

Who do they want to invite to bake? Parents could also be included for a multi-age experience.

Make the plan. Design a meaningful baking project to identify and include:

1. Solving a problem
2. Sharing experience and expertise
3. Teaching others
4. Raising awareness
5. Changing behavior

Students create and issue the invitation to come and bake with the class and communicate with all who need to be consulted.

Choose, read and bake a control recipe to prepare to bake with others. We chose **Gingerbread Cookies...** because they're action figures! (35 minutes)

*Introduce "whole grain rich" baking! These cookies are great made with half whole wheat flour and half all-purpose flour!*

Prepare the dough and refrigerate.

Review **Ten Tips for Baking, Thrill of Skill** and **Baking Food Safety 101**

- Identify three learning objectives for the activity.
- Who will do each step of the baking – a student leader or the children?
- What behaviors do you want to teach/model and expect?

Assemble equipment and ingredients needed.

### Lab Equipment for Each Team:

Measuring cups (liquid and dry measures)	Stand mixers/hand mixers
Measuring spoons	Rubber scrapers
Electronic food scales	Turners/spatulas
Mixing bowls	Sheet pans
Custards cups	Parchment paper
Food tray to hold <i>mise en place</i> ingredients	Spatulas or bench scrapers for leveling off ingredients
Rolling pins	Food service gloves
Cookie cutters	Food storage bin(s)

### Ingredient Superhero Project Supplies:

Markers	Poster or construction paper
Crayons	Glue
Colored pencils	Glitter
Highlighters	Rulers

## Day 11-12: Students set-up, bake with guests



Complete the lab activity set-up. High school students instruct the elementary children in hand washing and bring them to their assigned group table to roll out, cut out, pan, and bake their cookies. Correct children for food safety issues and assure no children eat dough, lick fingers, etc.

All students clean up lab/table area. Everyone washes hands. High school students walk their group of elementary children through the kitchen to see baked cookies, enjoy a sample, and return them to their classroom.



If parents are included, consider setting up decorating stations so families can decorate action figures together!

### RESOURCES:

Beginning bakers: Get Started at [HomeBaking.org/getting-started/](http://HomeBaking.org/getting-started/)

**A Bakers Dozen Labs** (Glossary and Resources Appendix) [homebaking.org/wp-content/uploads/2019/07/hbalab-tableofcontents.pdf](http://homebaking.org/wp-content/uploads/2019/07/hbalab-tableofcontents.pdf)

**A Bakers Dozen: Lab 1 (full lesson)** [homebaking.org/wp-content/uploads/2019/11/HBA-Lab-1-Why-Bake-1.pdf](http://homebaking.org/wp-content/uploads/2019/11/HBA-Lab-1-Why-Bake-1.pdf)

Purchase **A Bakers Dozen Labs** [homebaking.org/shop/](http://homebaking.org/shop/)

**Baking Food Safety** links [homebaking.org/baking-food-safety/](http://homebaking.org/baking-food-safety/)

#### Day 1:

**Video: Did You Know? Flour Food Safety** [namamillers.org/wp-content/uploads/2017/08/RHflourSafety\\_ENG\\_CNMA-NAMA2.mp4](http://namamillers.org/wp-content/uploads/2017/08/RHflourSafety_ENG_CNMA-NAMA2.mp4)

**Brownies: Preparing and Baking Brownies** [chsugar.com/baking-tips-how-tos/how-to-make-perfect-brownies/preparing-and-baking-brownies](http://chsugar.com/baking-tips-how-tos/how-to-make-perfect-brownies/preparing-and-baking-brownies)

**Best Brownies recipe** [allrecipes.com/recipe/10549/best-brownies](http://allrecipes.com/recipe/10549/best-brownies)

#### Day 2:

**A Matter of Taste Sensory Analysis Form** (Kitchen Science, Baking for Special Needs pg. 4) [homebaking.org/wp-content/uploads/2019/07/final\\_kitchenscience.pdf](http://homebaking.org/wp-content/uploads/2019/07/final_kitchenscience.pdf)

#### Day 3:

**Scoop, Spoon, Scale** (5-Minute Baking Activities) [homebaking.org/wp-content/uploads/2019/07/spoon-scoop-scale-sample-1.pdf](http://homebaking.org/wp-content/uploads/2019/07/spoon-scoop-scale-sample-1.pdf)

**Level-headed Measurement** (5-Minute Baking Activities) [homebaking.org/wp-content/uploads/2019/07/levelheaded\\_measuring-1.pdf](http://homebaking.org/wp-content/uploads/2019/07/levelheaded_measuring-1.pdf)

#### Day 4:

**Video: Weight vs. Volume in Measurement** (Joy of Baking) [youtube.com/watch?v=nF3vFMYOM8Y&t=11s](http://youtube.com/watch?v=nF3vFMYOM8Y&t=11s)

**Volume vs. Weight: What's The Big Deal?** [kitchenhealssoul.com/weight-vs-volume-whats-the-big-deal/](http://kitchenhealssoul.com/weight-vs-volume-whats-the-big-deal/)

**Baking Basics: How to Measure** [youtube.com/watch?v=OYU942728FM](http://youtube.com/watch?v=OYU942728FM)

#### Day 5:

**The Difference Between a Recipe and a Formula** [culinex.biz/blog/culinex-news-events/blog/why-you-need-know-the-difference-between-a-recipe-and-a-formula](http://culinex.biz/blog/culinex-news-events/blog/why-you-need-know-the-difference-between-a-recipe-and-a-formula) by Webb Girard

**Video: Math Meets Culinary Arts, Chapter 2: Bakers Percentage** (MATH@WORK) begin at 4:48 for bakers percentage portion [youtube.com/watch?v=yD1i3RRV2zg](http://youtube.com/watch?v=yD1i3RRV2zg)

#### Day 7-8:

**Types of Sugar** [sugar.org/sugar/types](http://sugar.org/sugar/types)

**Baking Substitution Science** [homebaking.org/wp-content/uploads/2019/07/baking\\_webinar.pdf](http://homebaking.org/wp-content/uploads/2019/07/baking_webinar.pdf)

#### Create a Superhero Comic:

**My Superhero** [creativeeducator.tech4learning.com/2013/lessons/My-Superhero](http://creativeeducator.tech4learning.com/2013/lessons/My-Superhero)

**Creating Comics in the Classroom** [creativeeducator.tech4learning.com/2019/articles/five-ideas-for-creating-comics-in-the-classroom](http://creativeeducator.tech4learning.com/2019/articles/five-ideas-for-creating-comics-in-the-classroom)

#### Day 9-10:

**Purposeful Design Projects** [creativeeducator.tech4learning.com/2019/articles/purposeful-design-projects-throughout-the-curriculum](http://creativeeducator.tech4learning.com/2019/articles/purposeful-design-projects-throughout-the-curriculum)

**Gingerbread Cookies recipe** [kingarthurfLOUR.com/recipes/gingerbread-cookies-recipe](http://kingarthurfLOUR.com/recipes/gingerbread-cookies-recipe)

**Ten Tips for Baking** and **Thrill of Skill** [homebaking.org/wp-content/uploads/2019/07/thrill\\_ten\\_steps-2.pdf](http://homebaking.org/wp-content/uploads/2019/07/thrill_ten_steps-2.pdf)

**Baking Food Safety 101** PDF guide, steps and internal temperature chart [homebaking.org/wp-content/uploads/2019/07/bakingfoodsafety101-2.pdf](http://homebaking.org/wp-content/uploads/2019/07/bakingfoodsafety101-2.pdf)

#### Other Resources:

Career Pathway Connections PDF [fclclainc.org/sites/default/files/Career%20Exploration%202019-2020.pdf](http://fclclainc.org/sites/default/files/Career%20Exploration%202019-2020.pdf)

RAFT Strategies [k12teacherstaffdevelopment.com/tlb/how-to-use-the-raft-strategy-in-the-classroom-to-develop-reading-and-writing-skills](http://k12teacherstaffdevelopment.com/tlb/how-to-use-the-raft-strategy-in-the-classroom-to-develop-reading-and-writing-skills)

Graphic Organizer [graphicorganizer.net/index.php?v=home&go\\_view=edit](http://graphicorganizer.net/index.php?v=home&go_view=edit)

Rubric Maker [rubric-maker.com](http://rubric-maker.com)

Read Across America [ReadAcrossAmerica.org](http://ReadAcrossAmerica.org)