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.

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).
Activity: View video Did You Know? Flour Food Safety

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.

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

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

<table>
<thead>
<tr>
<th>Area</th>
<th>Saves The World (5 pts)</th>
<th>Comes Close (3 pts)</th>
<th>Loses Title (1 pt)</th>
<th>Never Showed Up! (0 pts)</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Hero</td>
<td>Fits the ingredient and its functions</td>
<td>Fits ingredient but only some of the function</td>
<td>Fits ingredient or function but not both</td>
<td>No attempt to be creative in naming ingredient</td>
<td></td>
</tr>
<tr>
<td>Image of Hero (You can create online or draw your own!)</td>
<td>Colorful, superhero-like, reveals ingredient strength to transform product</td>
<td>Missing one detail</td>
<td>Missing two details</td>
<td>Needed more effort to create the image, color or strength</td>
<td></td>
</tr>
<tr>
<td>Background</td>
<td>Color and texture create a SUPER superhero poster</td>
<td>Needs more to be complete</td>
<td>Solid color (not white)</td>
<td>Plain background, nothing added—just white paper</td>
<td></td>
</tr>
<tr>
<td>Content (value x4)</td>
<td>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)</td>
<td>Missing a minor detail in power of the ingredient</td>
<td>Come on, did you really research this? Your Superhero deserves better! You underestimated their powers!</td>
<td>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!</td>
<td></td>
</tr>
<tr>
<td>Use of Time (value x3)</td>
<td>On task always</td>
<td>On task mostly</td>
<td>Off task a lot</td>
<td>Teacher babysat you</td>
<td></td>
</tr>
</tbody>
</table>

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)
- Measuring spoons
- Electronic food scales
- Mixing bowls
- Custards cups
- Food tray to hold mise en place ingredients
- Rolling pins
- Cookie cutters
- Stand mixers/hand mixers
- Rubber scrapers
- Turners/spatulas
- Sheet pans
- Parchment paper
- Spatulas or bench scrapers
- Food service gloves
- Food storage bin(s)

Ingredient Superhero Project Supplies:
- Markers
- Crayons
- Colored pencils
- Highlighters
- Poster or construction paper
- Glue
- Glitter
- 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/


Purchase A Bakers Dozen Labs homebaking.org/shop/

Baking Food Safety links homebaking.org/baking-food-safety/

Day 1:


Brownies: Preparing and Baking Brownies chsugar.com/baking-tips-how-tos/how-to-make-perfect-brownies/preparing-and-baking-brownies

Best Brownies recipe allrecipes.com/recipe/10549/best-brownies

Day 2:


Day 3:


Day 4:

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


Baking Basics: How to Measure 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 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=yD1i3RRV2zq

Day 7-8:

Types of Sugar sugar.org/sugar/types


Create a Superhero Comic:
My Superhero 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

Day 9-10:

Purposeful Design Projects creativeeducator.tech4learning.com/2019/articles/purposeful-design-projects-throughout-the-curriculum

Gingerbread Cookies recipe kingarthurflour.com/recipes/gingerbread-cookies-recipe


Other Resources:
Career Pathway Connections PDF fcclainc.org/sites/default/files/Career%20Exploration%202019-2020.pdf


Graphic Organizer graphicorganizer.net/index.php?v=home&qo_view=edit

Rubric Maker rubric-maker.com

Read Across America ReadAcrossAmerica.org