Bastien and Bastienne
WOLFGANG AMADEUS MOZART



SCIENCE: "What's my function?"

Students will

- Understand the chemical function of the basic ingredients used in baking
- Test the batter in stages in order to hypothesize what the function of each ingredient is
- Create a foldable tie book that shows their findings

Copies for each student: "The Story of the Opera", "The Characters", Activity Worksheets 1 & 2

Copies for the Teacher: "The Story of the Opera", "The Characters", Glossary, Activity Worksheets 1 & 2, Answer Key

Getting Ready

Decide which section(s) of the lesson you wish your group to complete.
Gather materials:

- Pencils
- Paper plates
- Forks
- Electric skillet
- 1 cup flour
- 1 cup buttermilk
- 1 egg
- 2 teaspoons baking powder
- 1 Tablespoon sugar
- 1/2 teaspoon salt
- 2 Tablespoons vegetable oil

Introduction

Tell students: "In the opera *Bastien and Bastienne*, we learn that foolish Bastien leaves Bastienne for a 'city girl' who bakes a delicious chocolate cake. You might have heard your parents say 'Cooking is an art, but baking is a *science*'. Today we are going to learn about the basic chemistry of baking.

What do nails, wood, screws, cement, shingles, and bricks have in common with flour, sugar, salt, fat, liquids, eggs, and leavening agents? These seven ingredients are the basic building blocks of baking, and all serve a specific purpose in the baking process. Imagine forgetting to pour cement for a house's foundation before building the walls! What would happen? Let's see if you can figure out what the basic ingredient functions are by taste-testing our pancake batter."

Explain to the students how there are two special chemical ingredients in these pancakes. The first is Sodium Bicarbonate, better known as baking soda. It's a fast acting leavening agent that fills the gluten with air. It's also an alkaline or base. The second is buttermilk. Buttermilk is the liquid left over after churning butter. Unlike regular milk, buttermilk is slightly acidic.

The combination of the wet and dry ingredients, is really mixing an acid and base to create chemical reaction. The result? Bubbles that form to make the pancakes light and fluffy. Have the students observe the batter. Do they notice it expand?

Now you can talk about the chemical change that happens when the pancake batter cooks. By applying energy, in this case heat, we're able to change a liquid to a solid. Our buttermilk mixture becomes pancakes we can eat.

Activity:

- Set up ingredients, tools and electric skillet
- Give students paper plate, fork and Activity Sheet

****NOTE****

Be sure to make enough batter to sufficiently demonstrate with your class. The below amounts of ingredients are a guideline.

- **Round 1**: Combine 1 cup flour and 1 cup buttermilk. Make a mini-pancake the size of a quarter for each students to sample and record descriptions.
- **Round 2**: Add 1 egg to existing batter. Make a mini-pancake the size of a quarter for each students to sample and record descriptions.
- **Round 3**: Add 2 teaspoons of baking powder to existing batter. Make a mini-pancake the size of a quarter for each students to sample and record descriptions.
- **Round 4**: Add 1 Tablespoon sugar and 1/2 teaspoon salt to existing batter. Make a mini-pancake the size of a quarter for each students to sample and record descriptions.
- **Round 5**: Add 2 Tablespoons vegetable oil to existing batter. Make a mini-pancake the size of a quarter for each students to sample and record descriptions.

Guided/Independent Practice: Depending on the grade level, the ability of your students, and time constraints, you may choose to have students work as a whole class, in small groups, with a partner, or individually. You may choose to have the students add and stir the ingredients for each Round to increase student participation. Provide instruction and model the activity as needed. Have students complete the portion(s) of the Activity Sheets you have chosen with opportunity for questions.

Evaluation: Have students share their answers individually or by groups and explain why they gave their answers. The teacher may want to guide the discussion with the sample answers provided.

Prove it!

The Dallas Opera wants to see your hard work! Take pictures, or videos, of your class's work and email them to: education@dallasopera.org for a chance to be featured on The Dallas Opera Website (http://dallasopera.org/learn/) and/or at the pre-show for the Student Matinees™!

TEKS – Science

3rd Grade

112.14. b. 1 A Knowledge and Skills

Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following school and home safety procedures and environmentally appropriate practices. The student is expected to (A) demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations, including observing a schoolyard habitat

112.14. b. 2 C,D,F Knowledge and Skills
Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to (C) construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data; (D) analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured; (F) communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.

4th Grade
112.15. b. 1 A Knowledge and Skills
Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following school and home safety procedures and environmentally appropriate practices. The student is expected to (A) demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations, including observing a schoolyard habitat

112.15. b. 2 C,D,F Knowledge and Skills
Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to (C) construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data; (D) analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured; (F) communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.

5th Grade
112.16. b. 1 A Knowledge and Skills
Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following school and home safety procedures and environmentally appropriate practices. The student is expected to (A) demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations, including observing a schoolyard habitat

112.16. b. 2 A,C,D,F Knowledge and Skills
Scientific investigation and reasoning. The student uses scientific methods during laboratory and outdoor investigations. The student is expected to: (A) describe, plan, and implement simple experimental investigations testing one variable; (C) collect information by detailed observations and accurate measuring; (D) analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence; (F) communicate valid conclusions in both written and verbal forms

Correlates: Language Arts

Gardner's Intelligences: Visual-Spatial, Linguistic, Logical-Mathematical

Bloom's Taxonomy: Understand, Analyze, Create,

Sources:
Dibbern, Mary. "Bastien and Bastienne." Synopsis, The Dallas Opera, 2015.
Bastien and Bastienne Libretto
Warrack, John and West, Ewan. The Oxford Dictionary of Opera, Oxford University Press, 1992.

Online Resources:
http://www.familyconsumersciences.com/2015/06/basic-baking-ingredients-whats-my-function/ (accessed on 2/24/16)
http://www.pbs.org/parents/adventures-in-learning/2014/03/pancake-science/ (accessed on 2/25/16)
http://www.ducksters.com/science/chemistry/chemical_reactions.php (accessed on 2/25/16)

The Story of the Opera

Bastienne (soprano) has gone out to the meadow to watch over her flock of sheep. She waits for her boyfriend Bastien (tenor) and when she realizes that he has skipped their regular Saturday afternoon appointment, she is forced to admit that the rumors are true - Bastien has found another girlfriend! As she sits alone, feeling sad and mad, she hears music that announces the arrival of the great magician, Colas (bass). He has understood her predicament and offers his help.

Bastienne explains to Colas that people are talking about a new girl who has just arrived in the nearby city. The girl is rich and she fears Bastien has been lured away by her beauty, her fancy jewelry, her gigantic house, and above all, her ability to make a delicious chocolate cake! All Bastienne has to offer him is the charm of the meadows and the companionship of her sheep. Colas begs her not to waste energy being upset. He sends Bastienne away and he promises to use his magic powers to teach Bastien a lesson.

Bastien appears, but he is not happy. He has eaten so much that his stomach hurts! He has realized on his own that the city girl is not good for him and that Bastienne is his true love. Colas, determined to make sure that Bastien will never make this mistake again, tells him that it is too late; Bastienne has found another boyfriend and is no longer available. He makes Bastien swear to always be faithful, and then he recites a complicated "magic spell" ensuring that Bastien will win her back

Bastienne appears and follows Colas' instructions to pretend to reject Bastien. At the depth of despair, he threatens to run away and "jump into a lake." Bastienne pretends not to care, but as she sees how truly sorry he is, she relents and forgives him. They realize that the true magic is found in the "words that heal our hearts and help us to forgive." Colas joins them in a final song as they celebrate their understanding of the real magic, the magic of true love!

Translation and adaptation by Mary Dibbern

The Characters

Bastienne: (soprano) A young shepherdess; she loves Bastien but is worried he loves another. She turns to Colas for help to win Bastien back.

Bastien: (tenor) Bastienne's lover; he is distracted by another lady in town but he really loves Bastienne.

Colas: (bass) The village wise man and magician; he helps Bastienne and Bastien get back together.

Bastien and Bastienne

Glossary of Terms

Chemical Reaction: A process where a substance goes through a chemical change to form a different substance.

Examples: meatal rusting and wood burning

Leavening Agent: A substance used in baking that causes the dough or batter to rise. The **leavening agent** produce gas when exposed to moisture, heat, or acid that create bubbles within the dough or batter.

Example: baking soda

Acid: A chemical substance that neutralizes **bases** (alkalis)

Example: buttermilk

Base: A chemical substance that neutralizes **acids**

Example: baking soda

Gluten: A substance that makes the stretchy **texture** of dough

Function: To work or operate in a particular way

Texture: The feel or consistency of a substance

Appearance: The way someone or something looks

Name: _____ Date: _____

Bastien and Bastienne

Activity Worksheet 1

Mini-Pancake Taste Test

Instructions: Watch the demonstration, sampling each "round" of pancakes. Describe the taste, appearance, and texture of the pancakes.

ROUND 1: Ingredient(s) Added: _____

Taste: _____

Texture: _____

Appearance: _____

ROUND 2: Ingredient(s) Added: _____

Taste: _____

Texture: _____

Appearance: _____

ROUND 3: Ingredient(s) Added: _____

Taste: _____

Texture: _____

Appearance: _____

ROUND 4: Ingredient(s) Added: _____

Taste: _____

Texture: _____

Appearance: _____

ROUND 5: Ingredient(s) Added: _____

Taste: _____

Texture: _____

Appearance: _____

Bonus Activity!

Now that you have learned about the basic ingredients in baking and their function(s), you should test your new knowledge at home! With the help of a grown-up, bake your own cake or cupcakes that would rival that silly city girl's!

The Dallas Opera wants to see your delicious cakes! Take pictures of your baking process, and the final product, and email them to education@dallasopera.org for a chance to be featured on The Dallas Opera Website!

Bastien and Bastienne

Activity Worksheet 2
Mini-Pancake Taste Test

Instructions: Fill in the table labeling each panel with a basic ingredient, (Flour, Sugar, Salt, Fat, Liquids, Eggs, and Leavening Agents) and list its function(s)

Name: _____ _____ Date: _____	1.	2.
3.	**What's My Function?**  	4.
5.	6.	7.

ANSWER KEY

Bastien and Bastienne

Activity Worksheet 1

Mini-Pancake Taste Test

Instructions: Watch the demonstration, sampling each "round" of pancakes. Describe the taste, appearance, and texture of the pancakes.

ROUND 1: Ingredient(s) Added: 1 cup flour, 1 cup buttermilk

Taste: Answers will be unique

Texture: Answers will be unique

Appearance: Answers will be unique

ROUND 2: Ingredient(s) Added: 1 egg

Taste: Answers will be unique

Texture: Answers will be unique

Appearance: Answers will be unique

ROUND 3: Ingredient(s) Added: 2 teaspoons baking powder

Taste: Answers will be unique

Texture: Answers will be unique

Appearance: Answers will be unique

ROUND 4: Ingredient(s) Added: 1 Tablespoon sugar, 1 teaspoon salt

Taste: Answers will be unique

Texture: Answers will be unique

Appearance: Answers will be unique

ROUND 5: Ingredient(s) Added: 2 Tablespoons vegetable oil

Taste: Answers will be unique

Texture: Answers will be unique

Appearance: Answers will be unique

ANSWER KEY

Bastien and Bastienne

Activity Worksheet 2
Mini-Pancake Taste Test

Instructions: Fill in the table labeling each panel with a basic ingredient, (Flour, Sugar, Salt, Fat, Liquids, Eggs, and Leavening Agents) and list its function(s)

Name: _____ _____ Date: _____	1. Flour Gives structure to baked goods	2. Sugar -Provides sweetness -Tenderizes and helps crusts to brown
3. Salt -Adds flavor -Regulates yeast and inhibits certain enzymes	**What's My Function?**  	4. Fat Tenderizes baked goods and helps with leavening
5. Liquids -Moisten ingredients -Help to form gluten	6. Eggs -Incorporates air in baked goods when beaten -Adds color, flavor and structure	7. Leavening Agents -Produce gases making baked goods rise and become light and fluffy