WHY: “This program is based on my experience that students have little knowledge of their ability to make simple, impressive, quality food products. Knowing that eggs are an inexpensive source of quality protein and nutrients AND have many uses makes them a culinary essential. Students buy pre-packaged food, which contributes to overall decline in health. We know our nation is at risk of obesity for today’s youth. Students can build confidence in their ability to make food. They can follow directions and prepare foods that are healthy. My school has a high population of children in poverty. Learning to use eggs is one resource for them to provide more economical choices in their family.”
---Delaine Stendahl

WHO: Food Science & Nutrition course students, grades 9-12

WHAT: The roles of eggs in food preparation, scientific function of eggs and safe food preparation
- Eggs are an emulsifier in the production of Muffins and Pound Cake
- Egg is used as a coagulant (thickener) and texture agent to prepare Lemon Curd
- Eggs are leavening in the preparation of Angel Food Cake, Popovers, and Dutch Babies
- Eggs provide nutrition and a rich food history

HOW: Students are able to see direct application of ingredient, and science concepts through the production of the food products. Students will apply math, community service, team and management career skills as they select a charity or need and the recipes to prepare bake, cost and label for sale or donation.

The Power of Eggs Objectives
Students will
- Practice personal hygiene, sanitation, and food safety in lab
- Use communication, problem solving, and teamwork skills to prepare simple recipes using eggs in cooking and baking
- Identify and apply proper measuring tools and methods
- Identify scientific role of eggs in food product production
- Evaluate food products prepared in class and the function of eggs in each recipe
- Produce, cost/price, label and sell baked goods to raise funds for a local charity or donate their products to a charity
- Engage in reflective practices re: egg baking lessons and experience

Tools & Ingredients for:

Demonstrated recipes--
Pound cake, lemon curd, popovers, angel food cake

Lab/team recipes--
Muffins, popovers, Dutch Baby

Equipment per lab team
Liquid and dry measuring cups
Measuring spoons
Mixing bowls, non-plastic Scoops (dishers)
12-cup muffin tin
(2 ½ -in wide X 1 ½ -in deep)
Electric mixer
Rubber scrapers
Baker scraper or spatula level
9 or 10-inch cast iron skillet
Angel food cake pan
1½ qt. saucepan
Citrus juicer
Spoons
Serving plates and utensils
Cake knife
Wire cooling racks

Teacher Note: The complete lesson includes pre- and post-assessments, handouts and discussion questions at end of lesson or located at Educator Resources, www.homebaking.org
The Power of Eggs Family and Consumer Sciences Education Standards
Found at www.nasasfacs.org

7.0 Family & Community Services
7.1 Analyze family and community career paths
7.1.1 Explain career roles and functions of individuals engaged in family and community services
7.1.2 Analyze opportunities for employment and entrepreneurial endeavors

8.0 Food Production & Services
8.2 Demonstrate food safety and sanitation procedures
8.2.5: Practice good personal hygiene/health procedures, including dental health and weight management and report symptoms of illness.
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 portion control, proper scaling and measurement knowledge and 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 to assure personal and workplace health and hygiene.

Day 1-Introduction to Egg Functions in Food Preparation

Introduction 5-10 minutes: Set the stage by cracking an egg on a small dessert dish or in a bowl. Instruct the students on the parts of the egg.

Teacher: Eggs can be found in most recipes we bake.

Q: What are reasons for including eggs in a recipe?
(A: To add nutrients, to help ingredients hold together, to emulsify, to improve texture, to leaven, and improve product browning/color)

Activity-Video 30 minutes:
Introduce Alton Brown Good Eats video, Egg Files and highlight
- how eggs are processed and graded
- why eggs are an important recipe ingredient
- what functions eggs have in baking/cooking

Activity Large Group Discussion-5-10 minutes: Follow the video with discussion of Egg Files I Video Questions. (Questions found end of lesson or at www.homebaking.org, Educator Resources)

Closure 5 minutes: After DVD finishes, ask for Exit Ticket responses on one thing they learned today regarding eggs.

Teacher Note: Prior to the start of the lesson, students should complete pre-assessment on eggs.


Source: http://ruralris.com/tag/egg/
Day 2-Muffin Lab, Eggs as a Coagulant/Binding Agent

**Introduction 3-5 minutes:** Announce lab teams. Quick reminders of lab procedures, time frame for preparation and cleanup.

**Activity 35-40 minutes until the end of class:**
1. Students prepare for lab-hair restraint, apron, hand washing
2. Student lab teams read recipe, divide tasks, measure and prepare muffins. Recipe: *Blueberry Muffins*
3. **Whole grain variation:** Use 3T. melted butter for 2 T. oil; use 3/4 cup whole wheat flour and 1 cup of all-purpose flour in place of 1 ¾ cups all-purpose flour
4. Students place muffins in oven and set timer. While baking, students clean up kitchen.
5. Remove muffins from oven when done, cool pans on wire racks.
6. Remove muffins from pans in 10 minutes, and package in paper sacks for transport.

**Baking Science Extra!** Kitchen Science: Baking for Special Needs Explore results when one or more egg substitutes are used and compared with the control recipe. Use lab rubric and A Matter of Taste forms, p. 4.

**Closure:** Teacher conducts inspection of kitchens for lab dismissal.

Day 3-Demonstratton of Eggs as an Emulsifier and Texture Agent

**Introduction 5-8 minutes:** Teacher introduces interactive teacher-student demonstration with eggs as *emulsifying* and *texturizing* agent

**Key Concepts discussed by teacher include:**
1. Emulsification, (define) http://www.homebaking.org/glossary/old_glossary.html#E
2. Separating eggs, importance of no yolk getting in the whites
3. Tempering of eggs

**Time Management Goal:** To get both recipes prepared, with cake in the oven and the lemon curd prepared and put in a bowl, covered and refrigerated. Both products sampled the following day in class.

**Review** Pound Cake and Lemon Curd recipes to be prepared today

**Recipe options** include home measurements or culinary weights

- **Pound Cake (Alton Brown)** OR **Pound Cake from King Arthur Flour**
- **Lemon Curd, (Alton Brown)** OR www.chsugar.com/recipe/lemon-curd-filling

**Students:** Tie hair, wash and help with the demonstrations making it possible to complete both recipes in one class period.

**Discussion points during interactive lab demonstration:** Cover *Baking Food Safety 101* never eat raw batter; take internal temperatures for doneness

**Baking History:** Enjoy learning more about the history of Pound Cake

https://whatscookingamerica.net/History/Cakes/PoundCake.htm

**Culinary Art:** See Land O'Lakes test kitchen’s many "designer pound cakes" and Buttery Pound Cake.
Day 4- Eggs as a Leavening Agent

Introduction 3-5 minutes: Teacher announces another demonstration featuring another powerful egg function - leavening.

Time Management Goal: Get the cake in the oven; sample Day 3 products
Pre-portion samples before class to ensure time to assess the products.

Activity 15-20 minutes: Teacher shares recipe; demonstrates preparation of Angel Food Cake
(Find additional demonstration questions in complete on-line lesson, Homebaking.org, Educator Resources)

Key Concepts to discuss: Be sure to discuss
- a fat-free environment when whipping egg whites
- beaten egg white soft and stiff peak stages
- denaturation of proteins
- folding of the dry ingredients into the beaten egg whites,
- tartaric acid (cream of tartar) role in stabilizing egg white foams

Sample and evaluate Pound Cake and Lemon Curd (10 minutes)
1. Use A Matter of Taste form, p. 4, Kitchen Science lesson
2. Identify the functions of eggs in the products’ finished characteristics.

Day 5- Eggs as a Leavening Agent
Teacher demonstrates Popovers and Angel Food Cake

Teacher Note: Have Popover ingredients pre-measured and ready for the demonstration prior to class.

Introduction: (3 minutes) Teacher announces Popover demonstration as another product that uses eggs as a leavening and structure.
- Ask students: Have you ever left leavening out of something you baked?
- Describe what leavening does for baked goods and why it’s important
  (A: Creates air spaces in batter; essential for heat transfer to gelatinize starch and set proteins for a light product volume and structure)

Activity: (3-5 minutes) Teacher posts or shares Popover recipe, preheats oven, and quickly demonstrates preparation and places them in the oven.

Activity: (30 minutes)
Students watch the Alton Brown Good Eats DVD, Popover Sometime and complete the video questions (end of lesson) OR view Step-by-Step directions, King Arthur recipe. While students view, the teacher will portion the angel food cake and clean up the dishes.

Closure: (5-10 minutes) Students sample Angel Food Cake and Popovers.
Use A Matter of Taste form, p. 4 of Kitchen Science lesson. Discuss likes/dislikes, and function eggs provided for cake and popover height and browning.
Introduction 3-5 minutes: Announce lab teams. Quick reminders of lab procedures, time frame for preparation and clean up. In classroom, post Alton Brown Dutch Baby recipe OR southern DutchBaby OR similar product, Lemon Puff Pancake.

Activity 35-38 minutes:
1. Students prepare for lab with hair restraint, apron, and hand washing.
2. Students work as a team to read recipe, measure, and prepare their Dutch Babies.
3. Students place Dutch Babies in oven and set timer.
4. While baking, students clean up kitchen.
5. Remove Dutch Babies from oven when done, top with lemon sugar and sample.

Explore Food Culture: Ask students: What is a Dutch Baby?

Wikipedia.org says: “A Dutch baby pancake, sometimes called a German pancake, Bismarck, or a Dutch puff, is a sweet popover that is normally served for breakfast. It is derived from the German Pfannkuchen.” More is found at https://en.wikipedia.org/wiki/Dutch_baby_pancake

Closure 2-4 minutes: Teacher conducts inspection of kitchens for lab dismissal.

Day 7- Baking for Others

Introduction: (5 minutes)
Teacher informs students that they can put their knowledge and skills to benefit others by preparing and donating baked goods to charity or hosting a class bake sale and donate their income to a local concern or need.

Activity: (30-35 minutes) Students will work as a team to
1. Select recipes to bake items to donate to charity or for a class bake sale
2. List and mise en place their recipe ingredients; from the ingredient list, price the cost of the recipe and per item cost to help determine cost for selling the products.
3. Create labels for products, including product name, net weight, ingredient list and price
4. Select a charity to donate the baked goods or the money raised from their sales.

Bake Sale Resources, Home Baking Association—Bakers lend a humane hand locally. Get a start with Bake for Funds

Bake Sale Central
Recipes for bake sales during school = Smart Snack
Home Baking Association members and their marvelous recipes and resources ready-to-bake. Additional great resources include
- Bake for Good
- No Kid Hungry Bake Sale for No Kid Hungry
- Baking the World a Better Place. Stop Hunger Now.

Closure: (5 minutes) Teacher inspects kitchens, ingredient storage and ingredients that need to be purchased for lab.
Day 8: Baking for Others/Bake Sale

Note: Bake Sale is conducted as allowed in district-teacher to determine the logistics. Take precautions to avoid allergenic ingredients for these products or clearly label before distribution or sale.

- Are Smart Snack recipes essential to in-school hour bake sale? Smart Snack Baking Recipes

Introduction 1-3 minutes: Quick reminders of lab procedures, preparation time frame, and clean-up.
- Review safe food handling guidelines, Baking Food Safety 101, and provide food-handling gloves.

Activity 35-42 minutes until the end of class:
1. Students prepare for lab with hair restraint, apron, hand washing.
2. Students work as a team to prepare their recipes/products.
3. Students bake, cool, wrap, price, and label their finished baked products for distribution or sale.
4. Teacher conducts inspection of kitchens for lab dismissal.

Follow up: Assignments to follow as homework or the next day
Include the Post-Assessment and the Reflection Assessment, (Found at end of document.)

www.practical-personal-development-advice.com

The Power of Eggs Unit Reflection

Power of Eggs Unit Reflection

Name_________________

Directions: Read each question carefully and write a reflection of your thoughts about the topic.
1. How are eggs, knowledge, and skills powerful tools?
2. While preparing, baking, and packaging your baked good for charity, what procedures did you use to ensure a safe product for the public?
3. While preparing your baked good for charity, how might portioning affect the final product and desirability of the product to the customer?
4. In comparing the products produced in class for charity, did you notice variations in quality? If so, what were they? If not, how would you describe the products produced in a technical writing example?
5. When preparing food items for a charity, what issues need consideration to ensure a successful event?
6. What did you learn about careers in the foodservice industry, or your ability to use your knowledge and skills in an entrepreneurial career?
7. Brown eggs cost more than white, what’s the difference?
The Power of Eggs Resources and Credits

Teacher Note: The complete Power of Eggs includes pre- and post-assessments, handouts and discussion questions. If they aren’t in this version, go to Educator Resources, www.homebaking.org

Websites:
Alton Brown Good Eats-Egg Files I, available on iTunes.
Alton Brown Good Eats-Popover Sometime, available on iTunes
  ▪ Bake Sale Central
  ▪ Bake for Funds
  ▪ Baking Glossary terms: Emulsify; Folding (video); Leavening
  ▪ Bread with a Twist: Soft Pretzels for bake sales
  ▪ Dough Sculpting 101 lesson (includes beautiful egg refrigerator dough recipe, shaping, Egg wash directions)
  ▪ Home Baking Food Safety 101 Kitchen Science: Baking for Special Needs lesson and A Matter of Taste p.4
  ▪ Recipes
  ▪ Smart Snack baking recipes (qualified for in-school bake sales)
  ▪ Test kitchens (explore test kitchen professionals work, videos, guides, recipes)

How to Fold in Egg Whites by the American Egg Board (See How to video, Fold, Glossary, HomeBaking.org)

Videos:
Alton Brown Good Eats-Egg Files I, available on iTunes; $1.99 @ Food Network
  ▪ You-Tube https://www.youtube.com/watch?v=Fx8ulp7UJv2s
Alton Brown Good Eats-Popover Sometime, available on iTunes.
  ▪ Eggs section features egg separating, beating yolks, stages of beating whites, folding in
How to Temper Eggs http://www.cookingchanneltv.com/videos/how-to-temper-eggs.html

Recipes used in lesson plan:
Angel Food Cake Recipe : Alton Brown : Food Network
  ▪ OR https://www.dominosugar.com/recipe/angel-food-cake
Best-Loved Blueberry Muffins from homebaking.org (Recipe section)
  ▪ OR Muffin Recipe-Teacher selection from Homebaking.org or Members test kitchens
Pound Cake from King Arthur Flour-customary measurements as well as weights
  ▪ Pound Cake Recipe by Alton Brown: Food Network
  ▪ OR, Designer Poundcakes https://www.landolakes.com/search/?s=Pound%20cakes
Lemon Curd: Lemon Curd Recipe by Alton Brown: Food Network
  ▪ OR https://chsugar.com/recipe/lemon-curd-filling-616
  ▪ OR https://www.landolakes.com/recipe/20392/tangy-lemon-curd-tart/
Popovers Recipe : Alton Brown : Food Network
  ▪ OR www.kingarthurlflour.com/recipes/popovers-recipe

Image Credits Buttery Pound Cake, https://www.landolakes.com/recipe/16631/buttery-pound-cake/
http://agromerchant.com/market/eggs/egg/
http://www.petitebakehouse.com/bakerslab
http://ruralris.com/tag/egg/
http://spicedblog.com/hazelnut-angel-food-cake.html
http://www.kingarthurlflour.com/recipes/gluten-free-popovers-recipe
http://bigrapidsdailynews.com/breaking-news/140080
http://www.practical-personal-development-advice.com/power-of-giving.html
The Power of Eggs Demonstration Discussion Questions

Angel Food Cake
1. Angel food cake is made of what part of the egg? Give the common and scientific terms. 2 pts.
   Egg White/Albumen
2. What baking function does the egg white have in an angel food cake? Leavening and structure
3. There are two basic consistencies of egg whites that are beaten in foam stages. Name them. 2 pts.
   Soft Peak and Stiff Peak
4. The first level of foam stage is identifiable by the following characteristics.
   Fluffy, somewhat white in appearance, peaks tip over
5. The second level of foam stage is identifiable by the following characteristics.
   Very white-like whipped cream, peaks will stand straight up
6. If you pass the second foam stage, the following is likely to happen.
   The whites dry out and do not fold in well, lumpy.
7. What ingredient is added as a stabilizer? Explain how it works.
   Cream of tartar. It will change the structure of the protein molecule.
8. One can tell when they reach the second stage by:
   You can turn the bowl upside down and the whites will not move or slide in the bowl.
9. If over beaten, the whites will affect the recipe because:
   Batter will be lumpy and if you continue to beat they will turn back into liquid and not able to beat up again.

Pound Cake
10. Pound cake got its name because:
    Used one pound of butter, sugar, flour, and eggs.
11. Eggs in the pound cake serve the purpose of:
    An emulsifier.
12. An emulsion means:
    The fat in the mixture will not separate out of the mixture when baked.
13. Eggs are beaten into the batter one at a time because:
    They will just slide around if added all at once, it also creates a better emulsion.

Lemon Curd
14. What part of the egg is used in lemon curd? Yolks
15. What purpose does the egg serve? Thickener, emulsifier, texturizer to make very smooth custard
16. What does ‘temper’ mean in working with eggs?. A process to combine the eggs with a hot liquid
17. Explain how to temper eggs
   Slowly add some hot mixture to the yolks while beating with a whisk. Continue to add until you have half of the hot mixture in the eggs and then add the eggs to the remaining hot mixture while whisking.
18. Why do you need to temper the eggs in lemon curd? So you do not have bits of fried egg in the custard.
19. What other products require you to temper eggs? Name 3. Ice cream, pie, puddings, sauces, Crème Brule.
The Power of Eggs Pre-Assessment

Match the following terms to the definitions, writing term in the blank ahead of its definition.

<table>
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<tr>
<th>Terms</th>
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<td>To aerate the ingredient through a mesh.</td>
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**The Power of Eggs Pre-Assessment Answer Key**

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The Power of Eggs Post-Assessment Questions
Match the following uses of eggs to the correct product.

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Eggs in this product are used to emulsify, thicken, and improve the texture.

This part of the egg contains fat and the most nutrients.

This part of the egg is the basis for making Angel Food cake.

This technique is used to keep the air in the product before baking.

The mixing bowl can be turned upside down when you have reached this stage.

This ingredient is used to stabilize an egg white foam.

This product is heavy and dense.

Another name for egg white.

This product uses tempering of the eggs.

This product uses steam and eggs for the leavening process; very little sugar.

This product uses a cast iron skillet and is baked.

Eggs are a ________ ingredient in baking.
I have the ________ to make a difference.

Post-Assessment Answer Key  Match the following uses of eggs to the correct product.

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**Custard**  Eggs in this product are used to emulsify, thicken, and improve the texture.

**Yolk**  This part of the egg contains fat and the most nutrients.

**Albumen**  This part of the egg is the basis for making Angel Food cake.

**Folding**  This technique is used to keep the air in the product before baking.

**Stiff Peak**  The mixing bowl can be turned upside down when you have reached this stage.

**Cream of Tartar**  This ingredient is used to stabilize an egg white foam.

**Pound Cake**  This product is heavy and dense.

**Albumen**  Another name for egg white.

**Lemon Curd**  This product uses tempering of the eggs.

**Popover**  This product uses steam and eggs for the leavening process; very little sugar.

**Dutch Baby**  This product uses a cast iron skillet and is baked.

Eggs are a **Powerful** tool in baking.
I have the **Power** to make a difference.
Eggs have potent powers in the culinary world. This DVD, Good Eats-Egg Files 1, will show you how eggs are processed, prepared, some of the amazing properties of eggs, and how to make lemon curd.

1. What are the two main functions of the eggshell? 2 pts.
2. What is the candling process? 2 pts.
3. What is looked for during the candling process? 3 pts.
4. Name the three grades of eggs. 4 pts.
5. What is the difference between each grade of egg? 3 pts.
6. Why does the lowest grade of egg have a yolk that moves around so much? 2 pts.
7. What is the best way to store eggs and why? 5 pts.
8. What is an epidemiologist? 2 pts.
9. What advice is given regarding the consumption of eggs that are undercooked? 4 pts.
10. How can you tell a cooked egg from a raw egg? 2 pts.
11. What is the proper way to crack and egg and why? 2 pts.
12. How much liquid should be added per egg when making scrambled eggs? 2 pts.
13. What is the impact of salt on an egg? 2 pts.
14. What happens when you use high heat for too long when making scrambled eggs? 2 pts.
15. Why should you ‘retreat from the heat’ before the eggs are completely done? 2 pts.
16. Complete the following statement: “If it looks cooked in the pan it will be ___________ on the plate.” 1 pt.
17. Why might you want to use lemon zest in a recipe? 2 pts.
18. What is the meaning of the term, ‘Nappe?’ 2 pts.
19. Why should one use an ice bath with hard cooked eggs? 2 pts.

Alton Brown Good Eats, Egg Files, Questions Answer Key

1. What are the two main functions of the eggshell? 2 pts. Food and Shelter
2. What is the candling process? 2 pts. It is looking at the egg through light for imperfections
3. What is looked for during the candling process? 3 pts. Blood spots, hairline fractures, overlarge air sacs
4. Name the three grades of eggs. AA, A, B
5. What is the difference between each grade of egg? 3 pts.
6. Why does the lowest grade of egg have a yolk that moves around so much? 2 pts.
7. The whites are thinned out from age
8. What is the best way to store eggs and why? 5 pts. In carton, rubber-banded, and set on side in refrigerator
9. What advice is given regarding the consumption of eggs that are undercooked? 4 pts. Elderly, expectant mothers, young, immunocompromised should avoid undercooked eggs
10. How can you tell a cooked egg from a raw egg? 2 pts. When spun and stopped, raw continues to move, cooked stops
11. What is the proper way to crack and egg and why? 2 pts. On flat surface, avoid shell in mixture
12. How much liquid should be added per egg when making scrambled eggs? 2 pts. 1 Tbsp.
13. What is the impact of salt on an egg? 1 pt. Causes the egg to toughen
14. What happens when you use high heat for too long when making scrambled eggs? 2 pts. The water is wrung out of the egg
15. Why should you ‘retreat from the heat’ before the eggs are completely done? 2 pts. The eggs will continue to cook by the time they are served
16. Complete the following statement: “If it looks cooked in the pan it will be ___________ on the plate.” 1 pt.
17. Why might you want to use lemon zest in a recipe? 2 pts. To intensify the flavors, and add phytochemicals to the food
18. What is the meaning of the term, ‘Nappe?’ 2 pts. It refers to the thickness of the mixture; when the back of the spoon is coated with the mixture and you take your finger and run it through the mixture on the spoon and it does not run back together
19. Why should one use an ice bath with hard cooked eggs? 2 pts. To prevent the eggs from overcooking-it will stop the cooking process
The Power of Eggs, Alton Brown Good Eats, Popover Sometime, Questions
This video shows you the powerful tool eggs are to the culinary world. It is a whole lot of science that makes the popover a wonderful addition to the meal.

1. What are the differences in AP, Bread, and Pastry flours? 3 pts.
2. What is the role of the yolk and the white in this product? 2 pts.
3. What is the leavener in popovers? 3 pts.
5. Why should you pierce the top of the popover? 1 pt.
6. What are 3 ways to use popovers? 3 pts.
7. What is Yorkshire Pudding?? 2 pts.
8. What is a Dutch Baby? 2 pts.

Good Eats, Popover Sometime, Answer Key
1. What are the differences in AP, Bread, and Pastry flours in baking? 3 pts.

Pastry flour-weak structure, products are extremely tender
Bread flour-strong and tough structure
AP flour-perfect mixture-strong and tender

2. What is the role of the yolk and the white in this product? 2 pts. Yolk tenderizes; white strengthen the product
3. What is the leavener in popovers? 3 pts. Steam from liquid and the egg
4. Why does Alton avoid the dark pan? 1 pt. The product will get too done on the outside
5. Why should you pierce the top of the popover? 1 pt. To let the steam escape after baking.
6. What are 3 ways to use popovers? 3 pts. As a bread, as a bowl, as a dessert
7. What is Yorkshire Pudding?? 2 pts. Classic supper dish
8. What is a Dutch Baby? 2 pts. A dish based on German pancakes. The batter is prepared and added to a heated cast iron skillet and then baked.