Nasco Education

LESSON PLAN

FCS

Developed with Sharon Davis, FCS Teacher, Program Staff - Home Baking Association

A baker's dozen lab: Whole grain baking

Volume 16 | Gr. 6–8

National FCS Standards

2.5.1 Analyze the use of resources in making choices that satisfy needs and wants of individuals and families.

8.5.3 Utilize weights and measurement tools to demonstrate knowledge of portion control, proper scaling, and measurement techniques.

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

9.5.6 Conduct sensory evaluation of food products.

9.6.7 Implement procedures that provide cost effective products.

14.3.1 Apply various dietary guidelines in planning to meet nutrition and wellness needs.

The whole grain baking lesson is an excerpt from:

Whole Grain Baking, *A Baker's Dozen Labs* by the Home Baking Association that features 13 labs, each with three skill levels; ingredient science; and career, community, and computer connections teaching multiple 2008 National FCS Education Standards. The labs were developed and tested by FCS teachers and baking professionals. For more information or to order *A Baker's Dozen Labs* (**WA27798**), go to nascoeducation.com.

Materials list (per lab team)

- Breakfast food label (granola bar, toaster pastry, cereal)
- 8" x 8" x 2" baking pan
- Mixing bowl and stirring spoon
- Standard measuring spoons
- Dry and liquid measuring cups
- Recipe, nutrition facts, and ingredients for ABC Breakfast Bars (p. 3)
- Wire cooling rack
- Electronic scale

Download and copy-ready resources

- *Types of Flour* fact sheet > www.wheatfoods.org
- *What's in a Kernel?* video > namamillers.org/consumer-resources/what-is-milling/
- Breakfast research report and Go with the Whole Grain teaching kit > www.bellinstitute.com

Objectives

Students will...

- Preset oven racks, use electronic scales, use baking measurement tools, and preheat ovens for baking
- Apply principles of food safety, *mise en place* (French for "everything in place") and preparation skills to bake a whole grain breakfast bar
- Create a product food label including name, ingredient list, net weight, and whole grain weight per serving
- Calculate ABC Breakfast Bar's cost per serving, compare nutrient facts and costs to similar commercial products
- Conduct a consumer tasting survey as part of promoting "healthy food starts" with a school group

Day 1

Whole grain knowledge and baking foundations (15 minutes)

1. Assign students to bring a breakfast food label with the price (granola bars, cereals, breads/bagels, toaster pastries, etc.). Need: ingredient list, nutrition facts, product name, and net weight.
2. Post, copy, and review the *What's in a Kernel?* video and teaching tools from www.bellinstitute.com to define and illustrate whole grain terms: whole grain, bran, germ, endosperm, de-germinated, enriched flour, granola.

Baking skill building activity – Why do bakers weigh ingredients? (25 minutes)

1. Ask students to state their "hypothesis" on why bakers prefer to weigh ingredients.
2. Using dry measuring cups, have students each measure 1 cup whole wheat flour and 1 cup oatmeal.
3. Demonstrate how to use electronic scale if needed.
4. Have each student weigh 1 cup of flour and 1 cup of oatmeal to compare their weights. How much variation in weight is there between students?
5. Bakers bake in large quantities. How much difference would there be between each baker if they measured instead of weighing 5 lbs.?

Take home assignment: Complete Measure UP! worksheet (p. 6) or go online for the activity at www.homebaking.org.

Day 2

Consumers and breakfast – Count the costs for health, wellness, and $$$

1. Distribute breakfast food labels and ABC breakfast bar recipe (p. 3). Locate the cost, ingredient list, nutrition facts, product name, and net weight. (1 ABC bar cost = 16¢)
2. Use the ingredient lists and labels to see if each food is whole grain and if it contains bran, germ, de-germinated cornmeal, enriched flour, or granola. How many grams of whole grain does each product provide? How much whole grain is the minimum people need? (48 grams or more)
3. Compare breakfast products Nutrition Facts labels and adjust to compare some serving sizes.
4. What ABC breakfast bar ingredients provide whole grain? (whole wheat flour, wheat flakes, Ultragrain®)
5. Weigh all the whole grain dry ingredients in the bar recipe.
6. How much whole grain will an ABC breakfast bar provide?
7. (about 8 grams or ½ serving whole grain)
8. Could the ABC breakfast bar carry the Whole Grain Stamp? (yes – over half the grain is a whole grain)

Critical thinking

- What does breakfast or "morning nutrition" provide that is so important? (Carbs for brain and muscles to perform; control weight; get enough calcium, iron, fruits, whole grains, and less fat.)
- List reasons people skip breakfast or choose less healthy food/drinks? (sleep deprived, not hungry yet, no time)

Baking skill builder – Prepare to bake breakfast bars (20 minutes)

1. Have each lab team read the recipe, assemble the tools, preset the oven racks to correct position to be ready to bake (*mise en place*), wash fruit and carrots.
2. Confirm with Q&A the function of the ingredients in the bar and list together 10+ nutrients they contribute.

Day 3

Bake ABC breakfast bars (Preparation, 10–15 minutes; baking, 30 minutes)

1. Give students scales to weigh and record the weight of each ingredient on the formula/recipe. Apply the correct tools and method to measure the ingredients.
2. While the bars bake and students are cleaning up, have lab teams create a product name and list benefits of their product. To whom and where would they advertise their product?
3. Each team should create a food label for their breakfast bar using their product name, the recipe to write an ingredients list, the net weight of the baked bars and each bar.

Ask: What is the difference between a recipe and an ingredient list on a food label? (Food company recipe formulations are proprietary.)

Day 4

Bake the ABC breakfast bars (Preparation, 10–15 minutes; baking, 30 minutes)

1. Cut bars into 12 per pan. Weigh all the bars; what is the recipe's "net weight," and one bar's serving weight?
2. Calculate the cost of one ABC breakfast bar. Compare the cost with the same size serving of a commercially made product.
3. Use A Matter of Taste lab evaluation form (p. 5) and evaluate the bars. Share the food labels from each team.
4. What might prevent a family from making this nutritious "grab and go" breakfast? What are the benefits of do-it-yourself or making your own breakfast bars, wrapping them, and freezing them "ready-to-eat?"

FCCLA Service Learning Community Connections: Building Better Morning Nutrition

Problem to Impact: Many students don't eat a nutrient-rich breakfast.

- Can the FCS class sell a target group on better morning nutrition? Create a three-point plan and implement it with the target group. Measure practices before and after.
- Conduct the promotion working with the food service director, a classroom, an athletic team, or a before- or afterschool program.
- Plan how to offer 100–200 sample-sized bars using safe food sampling methods. (See www.fightbac.org.) Prominently post the ingredient list.
- Have the sampling group complete A Matter of Taste forms. Calculate the results. A 60% approval rate or higher means the product would "sell." If less, product changes are needed.
- Create and post a flip video demonstrating key baking skills.
- Plan a Great American Breakfast Bake Sale.

Careers and Tech Exploration: Explore the test kitchen website links at www.homebaking.org/members and careers in grain science at: www.grains.k-state.edu.

ABC breakfast bar recipe

Makes 12, 2.7 oz. (75 g) bars

Ingredients	Measurements	Weight
Whole wheat flour	¾ cup	_____ oz. (_____ g)
All-purpose flour	¼ cup	_____ oz. (_____ g)
Brown sugar, packed	¼ cup	_____ oz. (_____ g)
Ground cinnamon	1½ tsp.	_____ oz. (_____ g)
Baking powder	1 tsp.	_____ oz. (_____ g)
Baking soda	½ tsp.	_____ oz. (_____ g)
Salt	¼ tsp.	_____ oz. (_____ g)
Whole wheat flakes, crushed	1 cup	_____ oz. (_____ g)
Milk, 1%	1 cup	_____ oz. (_____ g)
Eggs, large	2	_____ oz. (_____ g)
Apple, small, cored & grated	1	_____ oz. (_____ g)
Banana, medium, ripe, mashed	1	_____ oz. (_____ g)
Carrot, medium, grated	1	_____ oz. (_____ g)
Raisins/dried fruit, conditioned	½ cup	_____ oz. (_____ g)
Nuts, chopped, or mini chocolate chips	⅓ cup	_____ oz. (_____g)

Directions:

1. Preheat oven to 375° F. Lightly grease an 8" x 8" square baking pan.
2. Condition raisins or dried fruit: Cover raisins/dried fruit with water. Drain.
3. Measure, then crush whole wheat flakes; grate apple and carrot; mash banana; chop and measure nuts or mini chocolate chips.
4. In a medium bowl, combine the flours, sugar, cinnamon, baking powder, baking soda, and salt with a wire whisk to blend well.
5. In a small bowl, combine thoroughly milk, eggs, carrot, banana, and raisins. Add chopped nuts or mini chocolate chips as desired.
6. Combine moist ingredients with dry mix. Bake at 375° F for 25–30 minutes, until golden.
7. Cool bars on wire cooling rack; cut into 12 bars. Determine the average net weight of the 12 bars.

Nutrition Facts

Serving Size (75g)
Servings Per Container

Amount Per Serving

Calories 140 — Calories from Fat 30

	% Daily Value*
Total Fat 3.5g	5%
Saturated Fat 0.5g	3%
Trans Fat 0g	
Cholesterol 35mg	12%
Sodium 160mg	7%
Total Carbohydrate 24g	8%
Dietary Fiber 3g	12%
Sugars 13g	
Protein 4g	

Vitamin A 25% • Vitamin C 2%
Calcium 8% • Iron 10%

*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

Source: Home Baking Association, A Baker's Dozen Labs, Lab 2, www.homebaking.org
Recipe used with permission from The Sugar Association, www.sugar.org

Baking glossary

All-purpose flour: Wheat flour milled from hard wheat or a blend of soft and hard wheat. Used in homes for some yeast and quick breads, cakes, cookies, pastries, and noodles. All-purpose flour may be whole wheat, bleached or unbleached, and enriched with four vitamins (niacin, riboflavin, folic acid, and thiamin) and iron.

Bran: The outer layers of a kernel of grain that lie just below the hull. Whole grain flour is about 14.5% bran. Bran adds dietary fiber, multiple nutrients, and antioxidants.

Degerminated: To remove the germ portion of a grain kernel, leaving bran and/or endosperm.

Endosperm: The starch granules in grain embedded in gluten-forming proteins from which flour or meal is produced. 80–85% of a wheat kernel is endosperm. (See kernel of wheat illustration at right.)

Flour: Flour is a major ingredient in most baked goods. Although wheat flours are the most common and often essential flour to a product's quality, flour may be produced from many kinds of grains, potatoes, legumes, beans, and seeds. Example: Flour may be made from amaranth, brown or white rice, buckwheat, corn, oats, spelt, teff, quinoa, rye, sorghum, soybeans, and more. View grain milling at www.namamillers.org.

Food label: The label on food products with specific information required by the Food and Drug Administration such as Nutrition Facts, an ingredient list, the manufacturer, net weight, and dates. For more about Food Labeling go to www.fda.gov

Granola: Cereal mixture of toasted rolled oats, barley, or other grains, plus dried fruits, seeds, nuts, and sweeteners.

Kernel of wheat
www.wheatfoods.org

Gluten: A protein found in wheat and other cereal flours that form the structure of the bread dough. It holds the carbon dioxide (CO2) produced by the yeast and expands during fermentation. Gluten is developed when flour is combined with water and liquids, mixed, and kneaded. It provides the elasticity and extensibility (stretch) in bread dough. Glutenin and gliadin form gluten.

Gluten-free: Grains, meal, mixes, or flours that do not contain gluten or the components of gluten, the peptides glutenin and gliadin. Some gluten-free grains or flours include amaranth, rice, corn, milo, sorghum, soy, and potato. For a complete list visit the Celiac Sprue Association's website at www.csaceliacs.org. For additional gluten-free baking resources and ingredients go to www.argostarch.com, www.bettycrocker.com, www.bobsredmill.com, www.foodallergy.org/recipes, www.hodgsonmill.com, www.homebaking.org, www.kingarthurflour.com, www.landolakes.com, www.rabbitcreekgourmet.com, www.redstaryeast.com, www.wheatfoods.org.

Ingredient list: Ingredients making up a food and appearing on a food label in order, most to least.

Net weight: The weight of the contents in a package, excluding the packaging weight; the edible portion's weight.

Preheat: Heating an empty oven to the recommended temperature before placing the product to be baked in it.

Serving: A specific amount of food adequate for nutrition management and health. Serving sizes vary and guidelines are offered on recipes or the Nutrition Facts Label.

Whole grain: Using rolled or milled whole kernels of any grain (such as barley, corn, oats, wheat, rice, rye, sorghum, etc.) in a food. A food must be 51% or more whole grain to carry a whole grain label and may contain 8 g (½ serving), 16 g (1 serving) or more whole grain. Currently a minimum of 3 servings or 48 g whole grain is recommended. More resources at: www.bellinstitute.com, www.wheatfoods.org, and www.wholegrainscouncil.org

Whole wheat flour: Flour produced from the whole kernel of wheat—bran, germ and endosperm. Whole wheat flour is made from six classes of soft or hard wheat that may be red or white wheat varieties. Whole wheat flour may be coarsely to very finely milled. Whole wheat flour may also be labeled stone ground or graham flour.

Source: Home Baking Association Glossary, www.homebaking.org

A Matter of Taste — **lab evaluation form**

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Variable flour/meal used in lab test: _____

	Very Acceptable	Just OK	Not Acceptable
Top and bottom crust	Evenly golden Not burned or pale	Edges browned	Very pale appearance Greasy or doughy Brown on only top OR bottom
Volume	Doubled in height	Raised somewhat	No change in volume/flat
Interior crumb	Moist, tender Not too dry	Moist and doughy Oily or greasy to eat	Dense, wet crumbly, or too dry Not baked completely
Flavor	Rich, a little sweet Wheaty, pleasant	Pleasant flavor	Too much oil or fat flavor Coats mouth; unpleasant
Keeping quality after 1 day	Still flavorful Good aroma/flavor	Edible But not best	Crumbly or off flavor Fat flavor; dry or tough

Evaluation form

Product tasted: _____ Lab group: _____ Date: _____

I think the food product tastes:

_____ very good _____ good _____ OK _____ improvements needed

The food tastes: _____ just right _____ 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 good

The food looks: _____ yummy _____ OK _____ improvement needed

I would enjoy eating this food again: _____ yes _____ no _____ maybe

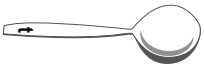
Comments: _____

Measure UP! — **worksheet**

Name _____ **Date** _____ **Class** _____

Baking requires the most accurate measurements possible so the product turns out the same each time. Scales are most accurate. It is always best to use the fewest number of measuring steps or units possible for the most accuracy. EXAMPLE: It is more accurate to measure ¾ cup flour with ½ cup + ¼ cup (I+K) than it is to use ¼ + ¼ + ¼ (K+K+K). Also, it's best to measure liquids with a liquid cup unless the recipe calls for less than 4 tablespoons (¼ cup).

A. tablespoon



B. teaspoon

C. ½ teaspoon

D. ¼ teaspoon

E. electronic scale

F. liquid measuring cup

G. hand

H. 1 cup

I. ½ cup

J. ⅓ cup

K. ¼ cup

L. ⅛ cup

Directions:
For each ingredient listed, write in the blank the combination of letters you would use for the BEST way to measure that ingredient. In some cases, two answers may work. List all the best options. Use the Measurement Guide for equivalents and abbreviation help.

1. _____ 1 cup sugar
2. _____ 1 large egg
3. _____ 1½ tablespoons oil
4. _____ 4 tablespoons oil
5. _____ 2¼ teaspoons dry yeast
6. _____ ⅔ cup cornmeal
7. _____ 2 tablespoons corn starch
8. _____ dash nutmeg
9. _____ 4 tablespoons corn syrup
10. _____ 1 lb. powdered sugar
11. _____ 1 medium zucchini
12. _____ ½ cup moist raisins
13. _____ 3 tablespoons flax meal
14. _____ 3 teaspoons baking powder
15. _____ ½ cup butter/4 oz.
16. _____ 1½ cups (6 oz.) grated cheese
17. _____ 1 pkg. (7 g) active dry yeast
18. _____ 3 medium apples (1 lb.)
19. _____ 1, 11-oz. spice muffin mix
20. _____ ¾ teaspoon ground cinnamon
21. _____ ½ cup baking cocoa
22. _____ 8 oz. cheddar cheese
23. _____ 1, 15-oz. can pumpkin
24. _____ 1, 12-oz. pkg. chocolate chips
25. _____ ⅓ cup brown sugar
26. _____ 6 oz. water
27. _____ ¾ cup baking mix
28. _____ 2 tablespoons butter
29. _____ 2 egg whites/2 oz.
30. _____ 115 g pastry flour
31. _____ ⅓ cup oil
32. _____ a pinch of salt
33. _____ ¾ cup milk
34. _____ 1 cup applesauce
35. _____ 4 cups (312 g) rolled oats
36. _____ ⅓ tablespoon baking soda

Measure UP! — **answer key**

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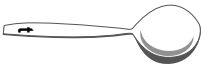
Name _____ **Date** _____ **Class** _____

Baking requires the most accurate measurements possible so the product turns out the same each time. Scales are most accurate. It is always best to use the fewest number of measuring steps or units possible for the most accuracy. EXAMPLE: It is more accurate to measure ¾ cup flour with ½ cup + ¼ cup (I+K) than it is to use ¼ + ¼ + ¼ (K+K+K). Also, it's best to measure liquids with a liquid cup unless the recipe calls for less than 4 tablespoons (¼ cup).

A. tablespoon



B. teaspoon

C. ½ teaspoon

D. ¼ teaspoon

E. electronic scale

F. liquid measuring cup

G. hand

H. 1 cup

I. ½ cup

J. ⅓ cup

K. ¼ cup

L. ⅛ cup

Directions:
For each ingredient listed, write in the blank the combination of letters you would use for the BEST way to measure that ingredient. In some cases, two answers may work. List all the best options. Use the Measurement Guide for equivalents and abbreviation help.

1.	**H**	1 cup sugar	13.	**L+A**	3 tablespoons flax meal	25.	**J**	⅓ cup brown sugar
2.	**G**	1 large egg	14.	**A**	3 teaspoons baking powder	26.	**F**	6 oz. water
3.	**A+B+C**	1½ tablespoons oil	15.	**G (1 stick)**	½ cup butter/4 oz.	27.	**I+K**	¾ cup baking mix
4.	**F (¼ cup)**	4 tablespoons oil	16.	**E or H+I**	1½ cups (6 oz.) grated cheese	28.	**G**	2 tablespoons butter
5.	**B+B+D or G**	2¼ teaspoons dry yeast	17.	**G or E**	1 pkg. (7 g) active dry yeast	29.	**G or E**	2 egg whites/2 oz.
6.	**J+J**	⅔ cup cornmeal	18.	**G or E**	3 medium apples (1 lb.)	30.	**E**	115 g pastry flour
7.	**L**	2 tablespoons corn starch	19.	**G**	1, 11-oz. spice muffin mix	31.	**F**	⅓ cup oil
8.	**G**	dash nutmeg	20.	**C+D**	¾ teaspoon ground cinnamon	32.	**G**	a pinch of salt
9.	**F (¼ cup)**	4 tablespoons corn syrup	21.	**I**	½ cup baking cocoa	33.	**F**	¾ cup milk
10.	**E**	1 lb. powdered sugar	22.	**E**	8 oz. cheddar cheese	34.	**F or H**	1 cup applesauce
11.	**G**	1 medium zucchini	23.	**G or E**	1, 15-oz. can pumpkin	35.	**E**	4 cups (312 g) rolled oats
12.	**I**	½ cup moist raisins	24.	**G**	1, 12-oz. pkg. chocolate chip	36.	**B**	⅓ tablespoon baking soda