WAMC Lab Template
Math Concept(s): Ratios, Proportions and Similarity
Source / Text: ME!
Developed by: Travis Finfrock E-Mail: tfinfrock@eagles.edu Date: Summer Conference 2022

Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan
Lab Title: *Cookie Bake Off*

Prerequisite skills: Multiply fractions, simplify fractions, convert volume to mass

Lab objective: Students will bake exactly 4 symmetrical cookies from a recipe that bakes more than 12 cookies.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*
Mathematics K–12 Learning Standards:

- CCSS.MATH.CONTENT.7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- CCSS.MATH.CONTENT.7.RP.A.2.B Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- **MP.4** Model with mathematics. *(HS-PS1-8)*
- CCSS.MATH.CONTENT.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Standards for Mathematical Practice:

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
- CCSS.MATH.PRACTICE.MP4 Model with mathematics.
- CCSS.MATH.PRACTICE.MP6 Attend to precision.

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- **RST.9-10.7** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. *(HS-PS1-1)*
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K-12 Science Standards

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Technology

- 3.c. Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.

Engineering

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Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

- ☐ Global Awareness
- ☒ Financial/Economic/Business/Entrepreneurial Literacy
- ☐ Civic Literacy
- ☐ Health/Safety Literacy
- ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving
- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration
- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
- ☐ Access and Evaluate Information
- ☐ Use and manage Information

Media Literacy
- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
- ☒ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction
- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural
- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability
- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility
- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Ingredients
  - Flour
  - Sugar
  - Vanilla
  - Egg
  - Baking Soda
  - Baking Powder
  - Chocolate Chips
  - Salt
- Baking Equipment
  - Sink
  - Soap
  - Sponge
  - Oven
  - Baking Sheet
  - Mixing Supply (Bowl, measuring spoons, mixing spatulas)
  - Scales

Set-Up Required:

- Schedule class in Foods Lab
- Alert office to class location in food lab
- Make sure equipment is functioning
- Supplies are available

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

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Cooperative Learning:

- Students will work in pairs to alter recipe assemble ingredients, mix ingredients, and bake cookies. Pairs will share an oven with another pair of students.

Expectations:

- Students will be able to convert recipes using their knowledge of multiplying and dividing ratios to create equivalent proportions.

Timeline:

- 5min- Safety procedures
- 5 min- Convert recipe
- 5 min- mix ingredients
- 15 min- bake
- 10 min- cool cookies/ clean station
- 15 min- Display cookies, Judge cookies, Award Best Look and Best Taste

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Use proportions for scaling applications

Career Applications

- Creating scaling models in engineering, design, architecture, baking, cooking

Optional or Extension Activities

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WAMC Lesson Plan

Name(s): Travis Finfrock
Email Address: tfinfrock@eagles.edu
Lesson Title: Cookie Bake Recipe Prep
Date: 6/22/2022
Text: N/A STEM Correlation: Science, Tech Lesson Length: 50min

Big Idea (Cluster): Ratios and Proportions

Mathematics K–12 Learning Standards:

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- **MP.4** Model with mathematics. *(HS-PS1-8)*
- CCSS.MATH.CONTENT.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Mathematical Practice(s):

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
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Content Objectives:	Language Objectives (ELL):
Students will be able to use ratios to create equivalent proportions.	Students will be able to use vocabulary correctly to describe the process of altering their recipes
Vocabulary: - Ratio - Proportion - Equivalent	Connections to Prior Learning Students will use their knowledge of multiplying and simplifying ratios.
Questions to Develop Mathematical Thinking: • How do we use an original recipe and adapt it to create a smaller amount of cookies? • Do we want to reduce the quantities for all ingredients? • How much do we reduce the recipe? • How do we know how much we need reduce the recipe by? • How can we convert volume to weight?	Common Misconceptions: • We will be subtracting quantities rather than multiplying or dividing. • We will be adding to convert from volume to mass.

Assessment (Formative and Summative):

- Formative Assessment: Worksheet to adapt an original recipe for 36 cookies to bake 6 cookies

- Summative Assessment: Will involve solving proportions involving similarity, solving for a variable when ratios are involved.

Materials:

- Computer
- Projector
- Worksheet: *Cookie Bake Prep*
- Pencil
- Calculator

Instruction Plan:

Introduction:

1. Have the learning target posted on the board in the back of the room.
2. Warm-up Activity (Multiplying and Dividing ratios)
3. Pass out the *Cookie Bake Prep* worksheet
4. Introduce the concepts involved
5. Equate to the Great British Baking Show

Explore:

1. As a class discuss how we reduce a recipe and figure out our "Magic Ratio"
2. Work through the first ingredient myself while the class watches
3. Have a student volunteer walk us through the second ingredient's conversion
4. Have a student volunteer solve the third ingredient on the front board
5. Have students work in their table groups to convert the rest of the recipe

When I observe students:
Students should be cooperating to solve the ratios and assisting each other when necessary. There should be moments of independent and collaborative work but no students should be staring blankly at their paper or refusing to help their table partners

Questions to Develop Mathematical Thinking as you observe:

- How do we use an original recipe and adapt it to create a smaller amount of cookies?
- Do we want to reduce the quantities for all ingredients?
- How much do we reduce the recipe?
- How do we know how much we need reduce the recipe by?
- How can we convert volume to weight?

Answers:

- We divide it or only use a small portion
- Yes because we want the same recipe just less of each
- Multiply/divide all ingredients by the proportion of the new quantity/original quantity
- New quantity/original quantity
- Multiply by density (grams per cup or teaspoon)

Summarize:
To create a proportional ratio you must multiply/divide by a ratio.

Career Application(s):

- Creating scaled models, baking, cooking in quantities

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