

WAMC Lab Template

Math Concept(s): Proportions, percentages, fractions, decimals – review within the first week – this is a hook lab to start out the semester (I plan on starting with Chapter 6 rather than Chapter 1)

Source / Text: *Financial Algebra*, review at start of semester

Developed by: Brynne Saskor E-Mail: brynne.saskor@shorelineschools.org

Date: Summer In-service 2013

Attach the following documents:

Lab Instructions

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Student Handout(s)

Rubric and/or Assessment Tool

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

This is a review lab for the beginning of the semester. Students work in groups to make a recipe of no-bake cookies. Students measure out the ingredients into bowls so that they can visually see the proportion of cereal to fat to sugar. After mixing the recipe students write the proportion of cereal:fat:sugar and then convert those to fractions and percentages.

Lab Plan

Lab Title: Proportions and Cookies!

Prerequisite skills: Students must be able to follow directions on a recipe, measure correctly, create pie charts, convert proportions/percentages/

Lab objective: Students will be able to convert proportions to percentages and fractions.

Standards:

CCSS-M:

- N-Q 1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- N-Q 2: Define appropriate quantities for the purpose of descriptive modeling.
- A-APR 6: Rewrite simple rational expressions in different forms.

Standards for Mathematical Practice:

- MP 1 Makes sense of problems and persevere in solving them.
- MP 4 Model with mathematics
- MP 6 Attention to precision
- MP 7 Look for and make use of structure

State Standards addressed (2008 Washington State Mathematics Standards):

- 7.6.A Analyze a problem situation to determine the question(s) to be answered.

- 7.2.E Represent proportional relationships using graphs, tables, and equations, and make connections among the representations.

Reading:

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Writing:

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Leadership/21st Century Skills:

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

- | | |
|---|---|
| <input type="checkbox"/> Global Awareness | <input type="checkbox"/> |
| <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy | <input type="checkbox"/> Civic Literacy |
| <input type="checkbox"/> Health/Safety Literacy | <input type="checkbox"/> 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 Products
- 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

- Be Self-Directed Learners

Social and Cross-Cultural

- Interact Effectively with Others
- Work Effectively in Diverse Teams

Productivity and Accountability

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

- For each group a set of: bowls, measuring cups and spoons, 9" x 13" inch pan, rubber spatula, spoon, knife.
- Ingredients: cereal, butter, peanut butter, sugar
- Microwave
- Lab sheet, recipes

Set-Up Required:

- Get food supplies
- Set up a tray for each group that includes the recipe, food supplies, cooking supplies. If you don't have trays then grocery bags will do.

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- Students are grouped at teacher discretion.

Cooperative Learning:

- Students work in groups of 2 to 4 depending on size of class and materials available.

Expectations:

- Students measure out the ingredients separately in order to see the proportions that are listed on the recipe.

Timeline:

- One block class period or two shorter periods.

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Bakers use proportions when expanding or reducing the yield of a recipe. Knowing the proportions of cereal:fat:sugar makes it easy to make more or less depending on the number of people you are planning to serve.

Career Applications

- Food service industry or any industry that changes the amount or quantity of a product based on customer needs.

Optional or Extension Activities

- If you had access to a full cooking lab this is easier seen in cookie recipes. All cookie recipes follow exact proportions of fat:flour:sugar. When comparing different cookie recipes and proportions students would be able to see that almost all cookie recipes use the same proportions with minor variations.
- Have the students identify things that come in proportions – they create their own problem or question to answer and then complete a lab.
- Create a cart of items and have the students come up with their own proportions based on what they see.

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Proportions Lab

No Bake Cookies

Names _____

Period _____

Directions:

1. Each group gets a tray with ingredients and recipe. Read through the recipe before doing anything. Split up the tasks – each person should be involved in measuring something.
2. Measure out each ingredient and place it in a bowl or on wax paper. Do not mix them together yet.
 - a. Look at the ingredients – which one has the highest proportion?
 - b. Which one has the lowest proportion?
3. Mix ingredients together following the recipe. While your no bake cookies are cooling, complete the table below. Be sure to include unit of measure.

Amount of cereal	
Amount of fat	
Amount of sugar	

- a. Write the proportion of cereal:fat:sugar. Be sure to simplify and reduce.
- b. Complete the table below.

	Percent	Fraction	Decimal
Cereal			
Fat			
Sugar			

- c. Use a pie chart to illustrate the percentage of cereal, fat, and sugar.

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4. You are having a birthday party and want to make these cookies for your friends. You need to triple the recipe.
 - a. Write the proportions of the recipe (cereal:fat:sugar) when it's tripled.

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- b. Rewrite the ingredients list below of the tripled recipe.

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5. Compare your results with another group. How do the proportions of your recipe compare to the other groups' recipes?

Council

6. Real life applications: how can the concept of proportions be used in real life?

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No Bake Cookies

2 cups Sugar

1 teaspoon vanilla extract

1/4 cup cocoa

1 pinch salt

1/2 cup milk

1/2 cup butter

1/2 cup peanut butter

3 cups quick oatmeal

1. Mix in pan: Sugar, Cocoa, Milk, Butter, Salt.
2. Heat to boiling on medium heat.
3. Take off stove and let it cool for 1 minute.
4. Add vanilla extract, peanut butter, and oatmeal. - Stir well.
5. Drop by teaspoon onto wax paper and let cool.

Peanut Butter Marshmallow Treats

Ingredients:

- 1/4 cup butter
- 1/3 cup peanut butter
- 10 oz. bag marshmallows
- 6 cups crisp rice cereal
- 24 1" peanut butter cups, unwrapped

Preparation:

Grease 13x9" pan. Combine butter, peanut butter and marshmallows in large microwave safe bowl. Microwave uncovered on high for 1-1/2 to 3 minutes, stirring after 1 minute, until mixture is melted and smooth. Stir in cereal.

Press mixture into prepared pan, using buttered hands (be careful, the mixture is pretty warm). Immediately make 24 indentations in rows in the cereal mixture using handle of wooden spoon. Press peanut butter cups into indentations. Let cool. Cut into squares with a candy in the center of each square. 24 bars

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Chocolate Crispy Rice Cereal Bars

INGREDIENTS:

- 1 cup peanut butter
- 1 cup confectioners' sugar
- 1 cup crisp chocolate rice cereal
- ¼ cup melted butter
- 1 cup semisweet chocolate chips

1 tablespoon shortening

DIRECTIONS:

1. Mix together peanut butter, confectioners' sugar, crispy rice cereal, and melted butter.
2. Roll into balls and place on wax paper til all mixture is used.
3. Melt chocolate chips and shortening together. Dip balls into this mixture, set on wax paper again and let harden.

Rice Crispy Treats

- ¼ cup butter
- 4 cups miniature marshmallows
- 6 cups **Kellogg's® Rice Krispies®** cereal

MICROWAVE DIRECTIONS:

1. In microwave-safe bowl heat butter and marshmallows on HIGH for 3 minutes, stirring after 2 minutes. Stir until smooth.
2. Add rice crispies cereal. Stir until well coated.
3. Using buttered spatula or wax paper evenly press mixture into 13 x 9 x 2-inch pan coated with cooking spray. Cool. Cut into 2-inch squares. Best if served the same day.

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WAMC Lab Template

Math Concept(s): Writing linear equations, Chapters 6 or any chapter that uses linear equations

Source / Text: *Financial Algebra*, any chapter

Developed by: Brynne Saskor E-Mail: brynne.saskor@shorelineschools.org

Date: Summer In-service 2013

Original idea by Kim (adaptation of the Barbie Bungee Jump)

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):

Students will work in groups to build airplanes, test data, record data, and write a linear equation that represents that data.

Lab Plan

Lab Title: Paper Airplane Lab

Prerequisite skills:

Students must be able to graph data in order to interpret data in order to calculate the slope of a line.

Lab objective:

Students will be able to convert data to a linear equation.

How it was modified: instead of Barbie and Ken and bungee jump distance I used paper airplanes and let the students identify what they would measure (distance, time, etc.)

Standards:

CCSS-M:

- A-CED 1: Create equations and inequalities in one variable and use them to solve problems.
- A-CED 2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- A-REI 10: Understand that the graph on an equation in two variables is the set of all solutions plotted in the coordinate plane, often forming a curve (which could be a line).

Standards for Mathematical Practice:

- MP 1 Make sense of problems and persevere in solving them
- MP 2 Reason abstractly and quantitatively
- MP 3 Construct viable arguments and critique the reasoning of others
- MP 4 Model with mathematics
- MP 5 Use appropriate tools strategically
- MP 6 Attend to precision

- MP 7 Look for and make use of structure

State Standards addressed (2008 Washington State Mathematics Standards):

- A1.1.A Select and justify functions and equations to model and solve problems.
- A1.1.B Solve problems that can be represented by linear functions, equations, and inequalities.
- A1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

Reading:

Writing:

Leadership/21st Century Skills:

<u>21st Century Interdisciplinary themes</u> (Check those that apply to the above activity.)			
<input type="checkbox"/> Global Awareness	<input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy	<input type="checkbox"/> Civic Literacy	
<input type="checkbox"/> Health/Safety Literacy	<input type="checkbox"/> Environmental Literacy		
<u>21st Century Skills</u> (Check those that students will demonstrate in the above activity.)			
LEARNING AND INNOVATION	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	Productivity and Accountability
<u>Creativity and Innovation</u>	<u>Information Literacy</u>	<u>Flexibility and Adaptability</u>	<u>Productivity and Accountability</u>
<input checked="" type="checkbox"/> Think Creatively	<input checked="" type="checkbox"/> Access and Evaluate Information	<input checked="" type="checkbox"/> Adapt to Change	<input checked="" type="checkbox"/> Manage Projects
<input checked="" type="checkbox"/> Work Creatively with Others	<input checked="" type="checkbox"/> Use and manage Information	<input checked="" type="checkbox"/> Be Flexible	<input checked="" type="checkbox"/> Produce Results
<input checked="" type="checkbox"/> Implement Innovations	<input checked="" type="checkbox"/> Media Literacy	<u>Initiative and Self-Direction</u>	<input checked="" type="checkbox"/> Leadership and Responsibility
<u>Critical Thinking and Problem Solving</u>	<input type="checkbox"/> Analyze Media	<input type="checkbox"/> Manage Goals and Time	<input checked="" type="checkbox"/> Guide and Lead Others
<input checked="" type="checkbox"/> Reason Effectively	<input type="checkbox"/> Create Media Products	<input type="checkbox"/> Work Independently	<input checked="" type="checkbox"/> Be Responsible to Others
<input checked="" type="checkbox"/> Use Systems Thinking	<u>Information, Communications and Technology (ICT Literacy)</u>	<input type="checkbox"/> Be Self-Directed Learners	
<input checked="" type="checkbox"/> Make Judgments and Decisions	<input type="checkbox"/> Apply Technology Effectively	<u>Social and Cross-Cultural</u>	
<input checked="" type="checkbox"/> Solve Problems		<input checked="" type="checkbox"/> Interact Effectively with Others	
<u>Communication and Collaboration</u>		<input checked="" type="checkbox"/> Work Effectively in Diverse Teams	
<input checked="" type="checkbox"/> Communicate Clearly			
<input checked="" type="checkbox"/> Collaborate with Others			

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

Materials

- Variety of paper and materials for making airplanes – use a variety of sizes and weights. Printer paper, construction paper, tag board, butcher paper, cardboard, popsicle sticks.
- Glue, scissors, tape, string, tape measures, stop watches
- Graph paper, lab sheet

Set-Up Required:

- Gather materials for making paper airplanes.
- Provide large space for flying and measuring

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- Each group presents their process and findings to the class.

Cooperative Learning:

- Yes

Expectations:

- Each student has a role in the lab – recorder, airplane maker, etc. Students discuss and work out the math together.
- Label all variables, be prepared to explain process.

Timeline:

- One long block period? Maybe two? Depends on how much time is spent on airplanes.

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Understanding the relationship of one thing to another and how to express that relationship algebraically.

Career Applications

- Aerospace industry

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Paper Airplane Lab

Writing Linear Equations

Names _____ Period _____

Work in a group of three to complete the following lab. Be prepared to present your process and findings to the class. Turn in lab sheet and graph paper.

Process

Each group needs to:

1. Create 3 paper airplane designs. These can be 3 completely different airplanes or you can do two modifications of an original airplane.
2. Complete 3 tests for each airplane and collect data on a graph. The data that you collect can be decided on by the group. For example, you may choose to measure weight, distance, time it takes to travel a certain distance, etc.
3. Write a linear equation expressing the data on the graph. Identify the variables of that equation.

Airplane #1

Sketch the design of your airplane below.

	Length: Width: Height: Weight:
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List the materials used to make airplane #1.

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Airplane #2

Sketch the design of your airplane below.

	Length: Width: Height: Weight:
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List the materials used to make airplane #2. How is it different than #1?

Airplane #3

Sketch the design of your airplane below.

	Length: Width: Height: Weight:
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List the materials used to make airplane #3. How is it different than #1 and #2?

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Lab Reflection and Review

1. Write the linear equation below that expresses the data on your graph. Label your variables.

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2. Explain your process. What did you graph and how did you come up with the linear equation? List each step.

Math

3. What challenges did your group encounter when writing the equation? How did you solve those challenges?

Council

4. What are some factors that may have skewed your data or made it inconsistent?

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