

Creating Equations- “Candy Exchange”

Math Concept(s): 1- Create equations that describe numbers or relationships
2- Represent and solve equations graphically

Source / Text: none

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Attach the following documents:

Lab Instructions

Student Handout(s) none

Rubric and/or Assessment Tool

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

Prior to lab work, students have had instruction on rates of change and direct variations.

Given the assignment to spend ten dollars on some combination of candy bars (for \$2.00) and mints (for \$1.00), students will develop a table of data as they explore what amounts of candy they can purchase with the money. From this table, students will draw a graph, plot the data, and eventually create an equation for the line that they have graphed. They will then give a short presentation of their process and results. All students will be able to answer questions regarding their process for developing their data and constructing their graphs.

Lab Plan

Lab Title: Creating Equations- “Candy Exchange”

Prerequisite skills:

- Ability to count money
- Data collection and recording
- Ability to construct tables or make lists
- Graphing skills: able to set up coordinate plane with axes labeled and scale reflected

Lab objective: SWBAT assemble a table of data, make a graph from that table, and then create an equation from the graph.

Standards:

CCSS-M:

- 1): A-CED: Creating Equations
 - Cluster: Create equations that describe numbers or relationships
 - Standard: A-CED:2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

- 2): A-REI: Reasoning with equations and Inequalities
 Cluster: Represent and solve equations graphically
 Standard: A-REI:10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

Reading:

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Standards for Mathematical Practice:

- CCSS-MP 1-8

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.
- A1.3.B: represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.

Writing:

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Leadership/21st Century Skills:

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

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

Materials

- Graph paper
- Pencil
- Play money
- Assorted candy
- Rulers

Set-Up Required:

- Bring in assorted candy and play money.
- Have graph paper and rulers available.
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Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- Groups of 3. Each group will have a store clerk, customer, and data recorder.
- Each group will present their graph and equation to the class.

Cooperative Learning:

Since we are using groups of three, the Cooperative Learning roles could be combined in this way:

- Leader= Customer
- Recorder= Recorder
- TimeKeeper/Presenter= Store Clerk

Expectations:

- The group will develop a table, graph, and equation from the collected data.
- Each student is expected to participate in his/her role,
- And help with the graphing and equation writing.

Timeline:

- 2 days

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- In what ways can data that is organized in a table or graph help you solve a real-world problem?
- If your boss asked you to analyze some data to put in a computer, would you feel confident in doing this?
- What situations can you think of where this knowledge might be useful?

Career Applications

- Storekeeper/Store Manager
- Purchasing Agents
- Wholesale Sales Representatives
- Marketing Agents

Optional or Extension Activities

- Extension 1—change the mints and chocolate bars to energy drinks (\$2.00) and water (\$1.00); all other aspects stay the same,
- Extension 2—change the energy drink and water to a piece of licorice (\$.025)and stick of gum (\$0.10).
- Another change would be that the students are given \$4.00 and must decide how many of these things they can purchase with this amount of money.
- Another extension: Given 3 or 4 items, students are asked to construct a table and spend a certain amount of money.

Students' Instructions for "Candy Exchange" Lab

You should be in a group of three!

One person will be acting as the store clerk, and s/he will distribute the candy.

One person will be the customer; s/he will handle the money and "buy" the candy.

One person will be the data recorder

You should have the following materials:

- Money= \$10.00
- Candy: 5 Tootsie Rolls and 10 Starbursts
- paper (including graph paper),
- pencils,
- rulers

Your assignment is explore how many different types of candy combinations you can buy with your budget of \$10.00.

The Tootsie Rolls cost \$2.00 and the Starbursts cost \$1.00.

Construct a data collection method that helps you keep track of your combinations of candy bars and small candies. Then use this information to draw a graph on the coordinate plane.

Then please create an equation that describes the relationship between these two types of candies in this scenario.

You will be presenting your findings and final graph at the end of the project. The rubric for your project is attached.

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Rubric for “Candy Exchange” Lab

Standards:

CCSS-M:

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

Advanced (4)	Proficient (3)	Basic (2)	Below Standard (0)
<p>Student can complete Extension Exercise #2 thoroughly and with the proficiency described below.</p> <p>Student consistently demonstrates clear and in-depth understanding of the concepts outlined previously in these ways:</p> <ul style="list-style-type: none"> • Answers more than 95% of the questions correctly, • uses correct notation in 95% of answers, • gives all final answers in simplest form (by reducing fractions and combining like terms), • and in Standard Form (when appropriate). 	<p>Student demonstrates good understanding of data collection in a table format and graphing on the coordinate plane from that data.</p> <p>Student can:</p> <ul style="list-style-type: none"> • develop a linear equation from that data or graph. • Uses all the data that has been collected in the graph. <p>Student:</p> <ul style="list-style-type: none"> • uses correct notation in at least 85% of answers, • gives some final answers in simplest form (by reducing fractions and combining like terms), • and in Standard Form (when appropriate), • may make some errors in basic math skills, but otherwise meets all terms as described above. 	<p>Student demonstrates basic understanding of data collection in a table format and graphing on the coordinate plane from that data.</p> <p>Student can develop basic elements of a linear equation from that data or graph by identifying the rate of change either from the table or the graph.</p> <p>Student:</p> <ul style="list-style-type: none"> • uses correct notation in at least 75% of answers, • may make some errors in basic math skills, but can identify the x and y axis on a graph, plot data points correctly, and discuss the rate of change relationship between the two variables. 	<p>Student demonstrates little to no understanding of data collection in a table format and graphing on the coordinate plane from that data. Student is unable to develop basic elements of a linear equation from that data or graph by identifying the rate of change either from the table or the graph.</p> <p>Student makes no use of knowledge and skills to analyze and solve problems.</p> <p>Student has not provided enough assessment evidence to make a determination.</p>

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