Junk Food Junction: What's Your Function?

Functions (Domain and Range)

Brittany VanCleave, Amber Stokes
Published by *K20 Center*

Grade Level	8th – 9th Grade	**Time Frame**	1-2 class period(s)
Subject	Mathematics	**Duration**	70 minutes
Course	Algebra 1, Pre-Algebra		

Essential Question

How can you represent and describe functions?

Summary

This lesson breaks down the components of a function through the metaphor of a function "machine." Students will design their own function vending machines, identify the products they will sell and the prices of those products, and evaluate each others' machines to build a function from the information provided, identifying the domain and range and independent and dependent variables.

Snapshot

Engage

Students brainstorm ideas for a vending machine.

Explore

Students discover patterns by playing the Function Machine game.

Explain

Students develop an understanding of the components of a function: domain, range, independent variables, and dependent variables.

Extend

Students create advertisements for their vending machines, incorporating the various function components.

Evaluate

Students engage in a Gallery Walk to view other students' advertisements and evaluate the functions for the various vending machines.

Standards

Oklahoma Academic Standards for Mathematics (Grade 8)

PA.A.1.1: Recognize that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable.

Oklahoma Academic Standards for Mathematics (Grade 8)

A1.F.1.2: Identify the dependent and independent variables as well as the domain and range given a function, equation, or graph. Identify restrictions on the domain and range in real-world contexts.

Attachments

- 3-2-1—Junk Food Junction - Spanish.docx
- 3-2-1—Junk Food Junction - Spanish.pdf
- 3-2-1—Junk Food Junction.docx
- 3-2-1—Junk Food Junction.pdf
- Function Machine—Junk Food Junction - Spanish.docx
- Function Machine—Junk Food Junction - Spanish.pdf
- Function Machine—Junk Food Junction.docx
- Function Machine—Junk Food Junction.pdf
- Lesson Slides—Junk Food Junction.pptx
- Vending Machine Advertisement—Junk Food Junction - Spanish.docx
- Vending Machine Advertisement—Junk Food Junction - Spanish.pdf
- Vending Machine Advertisement—Junk Food Junction.docx
- Vending Machine Advertisement—Junk Food Junction.pdf
- Vending Machine Gallery Walk—Junk Food Junction - Spanish.docx
- Vending Machine Gallery Walk—Junk Food Junction - Spanish.pdf
- Vending Machine Gallery Walk—Junk Food Junction.docx
- Vending Machine Gallery Walk—Junk Food Junction.pdf

Materials

- Lesson slides (attached)
- 3-2-1 handouts (attached; cut so that each student receives a half sheet)
- Function Machine handouts (attached; one per student)
- Vending Machine Gallery Walk handouts (attached; one per student)
- Copy paper, or copies of the Vending Machine Advertisement handout (attached; one sheet per student)
- Markers or colored pencils
- Sticky notes (one per student)
- Devices with Internet access

Engage

Use the attached **Lesson Slides** to guide the lesson, beginning with **slide 2**. To start the activity, write the following question on the board: *If you could create any vending machine, what would the product be, and how much would it cost?*

Pass out a copy of the **3-2-1** handout to each student. Students will work individually to brainstorm ideas for their own vending machines, using the 3-2-1 prompts to help guide their thinking. Students should consider what products they want to sell and the cost of those products. They should also consider the more unique and creative aspects of the machine, such as the colors, lighting features, and payment methods.

Teacher's Note: Brainstorming Session

Students should not actually build their vending machines right now. This is simply a time for them to brainstorm and think about what they want in their vending machine and how they want it to operate.

Explore

Go to **slide 3**. Assign each student a partner, make sure each pair has access to an Internet-connected device, and pass out copies of the **Function Machine** handout. Have students access the Function Machine game from the Math Playground website. Walk students through how to set up the game, and play a round or two with them until they feel comfortable navigating the game independently and begin seeing the pattern. Give the pairs time to play three or four more rounds on their own. As they play, have them write their input and output and the function on the handout.

Teacher's Note: Function Machine

The Function Machine requires Adobe Flash Player, and you might need to unblock or download Adobe Flash Player before using the site. The game has two modes, beginner and advanced. The beginner mode uses simple patterns to create a function, while the advanced mode uses more complex patterns. We recommended that students start with beginner mode, but if the game is too easy for some of the pairs you can have them switch to advanced mode. After students select Beginner or Advanced, they can adjust different settings, such as the max number and the activity level. You can also decide whether you want students to create their own input or have the computer generate it for them. If the function gets too complicated, students can reset the board.

Explain

Go to **slide 4**. After students have had opportunities to play a few rounds of the Function Machine game, come back together for a whole-class discussion. Ask each pair to talk about the different functions they created, and then have them answer the question, *Based on your experience with the Function Machine activity, how would you define 'function'?*

Write student answers on the board, and then, as a whole class, narrow down the ideas into a few bullet points.

Teacher's Note: Construction Of Knowledge

This is an opportunity for the students to create their own definition of what a function is. By allowing them to discover the definition on their own, you are helping them build ownership in their learning.

Now that you have a working definition of a function, it's time to dive into the components of a function. Go to **slide 5**, where there is a chart set up with one column being the domain and the other column being the range. As you did with the definition of a function, work with the class to develop definitions for "domain" and "range." To guide students toward the definitions, consider adding examples to the slide or using the function machine to find the domain and range for different functions.

Go to **slide 6**. Repeat a similar process to define "independent variable" and "dependent variable."

Teacher's Note: Additional Slides

How you go about completing the Explain activity is open for interpretation. The goal is for you to identify the gaps in understanding that you observed during the Explore activity and eliminate those gaps now. Add more slides if you need more room for examples or create definitions. Do what you need to do for your students to succeed!

Extend

Go to **slide 7**. Students will now return to the vending machine ideas that they proposed on their 3-2-1 handouts and create advertisements for their vending machines. Advertisements should include all of the following:

- The name of the vending machine
- A picture of the vending machine
- A description of the products being sold
- The cost of the products
- A pitch explaining why someone would want to buy the products

Emphasize the importance of the product and cost in students' advertisement design. Let them know that they will be identifying the domain and range and independent and dependent variables for their peers' (function) vending machines. So, they need to include enough information to enable other students to write a function based on their products. For example: "If I put one dollar in, I get two pieces of candy. If I put two dollars in, I get four pieces of candy."

Teacher's Note: Number Of Products

When instructing students how many products to include in their vending machines, it's up to you whether to have them stick with one product for a simpler function or include two or three products for more of a challenge. Use your knowledge of your students as a guide here.

Optional Tech Integration

Canva and Piktochart are both great options if you would like to have students employ technology to create their advertisements.

After students have had time to work on their advertisements, pass out a sticky note to each student. Ask students to write down the function for their own machines, and then put the sticky note away for use as an answer key later in the lesson.

Evaluate

Go to **slide 8** and pass out copies of the **Vending Machine Gallery Walk** handout. Have class members post their completed advertisements on the wall around the room (or display them on their devices). Students will complete a Gallery Walk to evaluate other students' vending machine creations by identifying the domain and range and independent and dependent variables. Students will also create a function based on the input and the output of each vending machine.

When students have finished filling in their handouts, conclude the lesson by having students get out their sticky notes and share the functions for their own vending machines in order for the other students to check their work.

Resources

- K20 Center. (n.d.). 3-2-1. Strategies. https://learn.k20center.ou.edu/strategy/117
- K20 Center. (n.d.). Canva. Tech Tools. https://learn.k20center.ou.edu/tech-tool/612
- K20 Center. (n.d.). Gallery walk/Carousel. Strategies. https://learn.k20center.ou.edu/strategy/118
- K20 Center. (n.d.). Piktochart. Tech Tools. https://learn.k20center.ou.edu/tech-tool/2394
- Math Playground, LLC. (2020). Function Machine. https://www.mathplayground.com/functionmachine.html