

WAMC Lesson Plan

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Lesson Title: 2-3 (or 2-7) Food Truck Challenge

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Text: Financial Algebra STEM Correlation: Lesson Length: 1 period

Big Idea (Cluster):

Mathematics K–12 Learning Standards: A.CED.2, F.IF.4, F.IF.5, F.IF.7a, S.ID.6

Mathematical Practice(s):

Make sense of problems and persevere in solving them

Reason abstractly and quantitatively

Model with Mathematics

Construct viable arguments and critique the reasoning of others

Attend to precision

Use appropriate tools strategically

Look for and make use of structure

Content Objectives: Understand the slope of the demand curve

Determine the maximum profit and the price at which that maximum is attained

Language Objectives (ELL):

Vocabulary: Demand, Profit, Revenue, Expense

Connections to Prior Learning: Learning about business decisions based in qty, supply, demand, etc.

Questions to Develop Mathematical Thinking:

- What price would maximize profit based on our market research?

Common Misconceptions:

- The more you sell, the higher your profit.

Assessment (Formative and Summative):

- Formative: See if they filled out the table correctly and came up with the right conclusion.

Materials:

- Calculators, Excel if you want to keep track of multiple classes

Instruction Plan:

Introduction: See below

Explore:

When I observe students:

Questions to Develop Mathematical Thinking as you observe:

Answers:

Summarize:

Career Application(s):

- Business, pricing objects

Leadership/21st Century Skills:

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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

Introduce the lesson by talking about food trucks and how they sell food.

Consider a grilled cheese sandwich with slices of bacon selling on a food truck.

Describe a fair or another local event that would have have some food trucks. You are getting hungry and the grilled cheese sandwich appeals to you.

Have students think in their mind the maximum amount they would pay for a grilled cheese sandwich from the food truck.

Have students stand up to the side of the room in line if they are willing to pay \$1 for that sandwich. Record the count on the board.

Now, increasing the price by \$0.50 have students sit down when the price exceeds their amount. Continue to record the number of people who would pay the price for the sandwich.

If you have multiple periods, you can add up the data upon for all the classes as the day goes on.

You will have a table such as this:

Price	Qty	Profit
\$1	30	
\$1.50	30	
\$2	30	
\$2.50	30	
\$3	30	
\$3.50	27	
\$4	25	
\$4.50	25	
\$5	23	
\$5.50	22	
\$6	20	
\$6.50	19	
\$7	15	
\$7.50	12	
\$8	9	
\$8.50	6	
\$9	5	
\$9.50	3	
\$10	2	
\$10.50	0	
\$11	0	

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You now have market research. Assume it costs \$1.00 to make each sandwich. Students are to determine the price that will yield the greatest profit. They should come up with a price that will maximize profit by filling out the table as below:

Price	Qty	Profit
\$1	30	0
\$1.50	30	15
\$2	30	30
\$2.50	30	45
\$3	30	60
\$3.50	27	67.5
\$4	25	75
\$4.50	25	87.5
\$5	23	92
\$5.50	22	99
\$6	20	100
\$6.50	19	104.5
\$7	15	90
\$7.50	12	78
\$8	9	63
\$8.50	6	45
\$9	5	40
\$9.50	3	25.5
\$10	2	18
\$10.50	0	0
\$11	0	0

We can see that \$6.50 will give the best profit for this research. Answers will vary depending on your own market research.

Students can graph profit vs price.

After discussion, you can show video clip at this link: <https://youtu.be/koeJziWZVSM>

Notice the grilled cheese truck has a huge line so they raise their price significantly to slow down the line and raise profits.

Discussion questions:

Would the "best price" answer change if the cost of making each sandwich changed? (No, as long as it changed consistently.)

How could you get more accurate market analysis? (Hone in on the target number by using increments of \$0.25, Keep track of current sales and adjust accordingly, Ask more people for their opinion)

If you were the food truck owner, name some things you can try to increase profits. (Lower costs by changing or negotiating with distributor or buying in bulk, Increase demand, Keep marketing stats and adjust price as necessary.)

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What are some ideas to increase demand for your product? (Advertise, go out and market your truck, Give free samples, Find a better parking spot if things are slow, Serve people faster so they don't need to wait very long.)

Challenge: Enter the price and qty data between \$2.00 and \$10.50 into a calculator and determine the regression line. This is the equation of the demand function. What is the correlation coefficient? How strong is the correlation? Try using a regression quadratic and see if you can improve the correlation coefficient.

$$y = 43.16 - 4.14x$$

$$y = -.12x^2 - 2.57x + 38.45$$

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