Figure 4.2 Mathematics Lesson

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Grade 7 -9 Units

Quadratic Relationships

Title/Topic/Theme: Finding the profits within businesses

Skill/Content:

- Students will analyze the quantities and identify patterns to complete a table.
- Students will identify the maximum value within a table.
- Students will write the patterns as equations and graph on graphing calculator and draw it on notebook paper.
- Students will create a situation reflecting the equation patterns.
- Students will define a quadratic relationship based upon the activity.

CCSSM Standards:

- A-CED 1
    - Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.
- F-IF 4
    - Interpret functions that arise in applications in terms of the context.
      4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★
- F-IF 7a
    - Analyze functions using different representations.
      7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
      a. Graph linear and quadratic functions and show intercepts, maxima, and minima

Cultural Learning Standards:

- Students understand that they are learners, central to the learning process.
- Students know and expect that families and community play a significant role in the educational process.

- Students are able to analyze social, political, and economic events in order to understand their contexts and underlying causes.
- Students can think and act for themselves—producing their own answer, solutions, and meanings in the form of quality work.

Vocabulary: (should be posted)

- Increasing, decreasing,
- maximum, minimum,
- relationship,
- quadratic,
- quantities,
- interpret,
- key features

Essential Questions:

- How are profits determined by businesses?
- How much are we willing to pay for items that are sold in our neighborhood stores sold by foreigners?
- How can our schools prepare us to identify those store owners who want to take advantage of us?
- If you had a business in your own community, how would you establish your prices that are manageable by your community and also allow you to make a profit?

Objective Results:

Students will discuss the essential questions; they will critically read a short story, and understand the implications about the United States and their influence on foreigners (especially the Asians) and their relationships with the Black community.

Bridge/Connections:

Students will do a quick write up- listing their reactions to the article and making suggestions of steps that African Americans should take to avoid future foreigners from taking advantage of Blacks or how there can be a better relationship between the foreigners and the Black community especially the Black women.

They will then move into the mathematics utilizing quadratic relations to determine how prices are raised for maximum profit and they should consider how much they are willing to pay for the articles that they want to buy.

Materials/Resources:

Article: "**Asians Pimping the Black Community especially Black Women"**
http://thyblackman.com/2012/04/30/asians-pimping-the-black-community-especially-black-women/
Students Journals
Quadratic Relationship worksheet
Graphing calculator

Invitation into the lesson:

Ask students about their experiences with ladies (old and young) buying human hair for their usage. Ask them about the race of the people who own the beauty supply stores and their attitudes toward Black shoppers. Ask them what they think about these people going to school to learn how to deal with Black people. After a short discussion, let them know that we will do a short reading that will give us background on this situation. Pass out copies of "**Asians pimping the Black Community, especially Black women."**

Learning Process/Resources:

1. After the Opening of the lesson discussing the essential questions, the teacher would allow the students small amounts of time to do a quick write up about their reactions to the article. They will think about their suggestions during the work time period.
2. The teacher will walk the students through the first table and using the graphing calculator to graph the quadratic relations from the pattern given above the table.
3. The teacher would ask for restatements of the process to check for understanding of completing the table.

Work Time/Embedded Assessment:

4. Then the teacher would ask the students to answer the questions alone. They will do so again with a partner to compare and discuss their answers.
5. Teacher would walk around the room checking the students' responses and listening to their conversations and their use of the posted vocabulary.
6. Teacher may engage with each pair of students to check for understanding and their thinking about their suggestions for the Asians pimping the Black community.

Closing/Wrapping UP:

1. The students do not have to complete the entire sheet during class. The discussion can start as soon as two to three problems are done by the students. Make sure the students make use of the vocabulary from the lesson and from the article.
2. Based upon the work the teacher saw during the work time, call up one to three students to explain their written answers, emphasizing the maximum values. They would next explain how much they would pay for the items, and why they chose that amount.
3. Based upon the discussion of the essential questions, students will add the racial description of the possible owner of each category for the table that they completed and their relationship with Black People. They can finish this task for homework.
4. Reconvene the whole group for the first four questions and have them share their suggestions about the store owners.

Homework/Extension:

1. The problems that were not completed during class would be completed as homework.
2. Give a short paragraph on the importance of learning information like this to help the families and people in the Black community.
3. Conduct a census of the stores in their neighborhood (zip code or main street or neighborhood stores).

Quadratic Relationships

1) a) 44 add by 2 b) 28 subtract by 1

African Americans in Chicago have a barber shop and beauty salon on almost every block on their main streets. The Asians own the beauty supply stores where Black women have to go to buy the human hair to "get their hair did." One Korean who owns a beauty supply store is going to raise his prices. He has an average of ***28 customers*** *per day* buying human hair and he ***charges $44*** *per small bag of hair*. He has determined that if he raised his prices by $2, he would lose one customer. Complete the table below to determine how much he can increase his charge to ***maximize*** what he collects. Circle the entries bringing about the maximum amount.

Amount Charged	$44	$46	$	$50	$52	$	$	$58	$
Number of Customer	28	27	26				14		
Amount collected	$	$		$					

1) How do the listing of numbers in each row compare to each other?

_____
_____
_____
_____

2) Rewrite the quantity relationship (44 add by 2) and (28 subtracted by 1) over the table as (44 +2X) and (28 –X) and graph it on the graphing calculator. Draw the general shape of the graph on this paper. Identify where your maximum amount collected is located on the graph. Set your windows properly to see the entire graph.

3) Which set of numbers relate to this graph? Explain why you chose that set of numbers.

_____
_____
_____
_____
_____

4) Explain what you think is a quadratic relationship.

_____
_____
_____
_____
_____
_____

5) After you have determined the maximum profit a company can raise to get their profit, determine whether you would pay that amount. Explain why you decided on that amount.

_____
_____
_____
_____
_____

Use the pattern above to complete the tables below and create a situation for one of the following sets. Also sketch the shape of the graph for each set using the model in problem number 1. Place the names of the types of quantities you are using in the first column.

2) a) 68 add by 3 b) 34 subtract by 1

	68								
	34								

After you have determined the maximum profit this company can raise to get their profit, determine whether you would pay that amount. Explain why you decided on that amount.

_____
_____
_____
_____
_____

3) a) 45 add by 4 b) 40 subtract by 2

	45								
	40								

After you have determined the maximum profit this company can raise to get their profit, determine whether you would pay that amount. Explain why you decided on that amount.

_____
_____
_____
_____
_____

4) a) 25 add by 2 b) 25 subtract by 1

	25					
	25					

After you have determined the maximum profit this company can raise to get their profit, determine whether you would pay that amount. Explain why you decided on that amount.

_____
_____
_____
_____