Subject: Mathematics

Grade Level: Seventh grade

Title: *The Big Sale Lesson Plan*

Alignments:

    Eligible Content: M7.A.2.2.3

    Key Words: ratio, proportion, means, extremes

Vocabulary:

- *ratio: a relationship or comparison of two quantities*
- *proportion: a statement between two equal ratios*
- *means: refers to the denominator of the first ratio and the numerator of the first*
- *extremes: refers to the numerator of the first ratio and the denominator of the second*

Objectives:

- Students will use proportions to determine if two quantities are equivalent, such as prices of items of different size at a grocery store.

Essential Question:

- How does an understanding of equivalent ratios help us to analyze and make conclusions about a real world situation?

Duration: 40-45 minutes

Materials:

- computers with Internet access
- copies of worksheet "Which Option is a Better Deal?"

Instructional Procedures:

W: "While grocery shopping, there are always many different options, of the same type of food, that we must choose from. We have the ability to choose from twelve versus twenty-four cans of soda, eight versus twelve ounces of peanut butter, and it is up to us to determine which option gets us more for our money."

H: Present students with the warm-up worksheet: "Which Option is a Better Deal?" - While shopping at the grocery store, you are presented with the option of buying a dozen cookies for $4.20 or buying nine cookies for $3.15. Which option is a better deal?

Allow students the opportunity to complete the warm-up on their own, while making sure that they are explaining their reasoning for why they believe the deal they have chosen is the "better deal."

Once students have completed the warm-up, pull the class back together for a discussion.

"Which option did you decide is the better deal and more importantly *how* did you decide it was the better deal?"

Possible Student Response 1: "Both options are the same. I set up a proportion using both situations and then multiplied the means and extremes. The products were equal, showing that the two scenarios are equal."

$$\frac{\$4.20}{12} = \frac{\$3.15}{9} \quad \rightarrow \quad \begin{array}{c} 9 \times 4.20 = 12 \times 3.15 \\ 37.8 = 37.8 \end{array}$$

Possible Student Response 2: "Neither Option A nor Option B is a better deal. Both options have equivalent fractions and evaluate to the same value, therefore making the two scenarios equal."

$$\frac{\$}{cookie} = \frac{\$4.20}{12} = \$.35 \qquad \& \qquad \frac{\$}{cookie} = \frac{\$3.15}{9} = \$.35$$

$$\text{Therefore,} \quad \frac{\$4.20}{12} = \frac{\$3.15}{9}$$

"Exactly. When deciding which option is a better deal, we are making a comparison of two scenarios and also a comparison of two quantities. A comparison of two quantities is known as a ratio, and can be set up using a colon, using the word "to", or most often by using a fraction.

Then, when we have two equivalent ratios, we have a proportion. A proportion is a statement between two equivalent ratios.

Both a ratio and a proportion are helpful for us to use in order to determine the best options when we are buying groceries, or any product."

"In this situation, what are the ratios comparing?"

Possible Student Response: "The ratios are comparing the amount of the item to the cost."

"Right, and what does the proportion show us?"

Possible Student Response: "The proportion shows us that the two situations are equal and that one option is not better than the other."

"Exactly, so it is extremely important for us to be able to write ratios for the two given situations and then set up a proportion to determine if the ratios are equal. If they are not equal, then we know that one option is better than the other.

Lets say that the two scenarios are not equal.   Then, how could we determine which option is better?"

E: Present students with the comparison scenario below.

While at the grocery store, you are given the option of buying 12 ounces of ketchup for $2.79 or 20 ounces for $4.29. Which option is the better deal?

Allow students a few minutes to work together to figure out which option is the better deal. Once most students have completed the task, pull the class back together to discuss their findings.

"Are the two options in this scenario equal? *How* do you know?"

Possible Student Response: "No, the two situations are not equal. I know that they are not equal because if you write the ratios comparing the price of the ketchup compared to the number of ounces you are getting, the two ratios are not equal."

$$\frac{\$2.79}{12} = .23 \qquad \& \qquad \frac{\$4.29}{20} = .21$$

$$\text{Therefore,} \quad \frac{\$2.79}{12} \neq \frac{\$4.29}{20}$$

"If we know that the two scenarios are not equal, how can we determine which is the better deal?"

Possible Student Response: "We can determine which option is better by comparing the cost per unit. For instance, in this situation, twelve ounces costs $.23 per ounce and

twenty ounces costs $.21 per ounce. Therefore, we know that buying the twenty ounce ketchup bottle is the better deal."

"Great! So we can determine if the situations are equal by setting up a proportion and multiplying the means and extremes. Then, if the two scenarios are not equal, we can then determine the better deal by comparing the cost per unit for each scenario.

It is now time for you to go grocery shopping and determine the best option when presented with two different situations."

Have students visit the website http://wpsu.org/games/load_market.swf to access "The Big Sale Interactive" and begin to practice using proportions to determine the better deal when presented with two options. Have students record their work so that they may revisit any errors and so that they can prove their conjectures.

R: As students are working on the Big Sale tasks, monitor student performance. Visit each student and have them explain their thinking and assist students who may be struggling to correctly identify which option is the better deal. You will be able to see the percentage of questions that the students are correctly answering in the bottom right corner of the screen.

Sample questions to ask students while they are working:

"Why is it necessary to determine which option is the better deal?" *(it is necessary because you want to receive the most product for the least amount of cost)*

"How do you determine which option is the better deal?" *(by setting up a proportion to determine if the situations are equivalent and then determining the price per unit)*

Once most students have had the opportunity to solve 5 - 10 deals (or have successfully solved a predetermined percentage of deals), pull the class back together review.

E: Review with students why it is necessary to determine the better deal when grocery shopping and how we can mathematically determine the better deal.

In order to ensure understanding, have students create a scenario of their own. Have them write down the situation and then solve it to determine the better deal. These problems should be collected and then could be used as a warm-up/review the following class period.

Suggested Instructional Strategies:

T: Use the activities and strategies listed below to meet the needs of your students during the year.

Routine: Emphasize proper use of vocabulary in lessons and classroom discussions. Allow students to work with partners or in small groups. Use warm-up or review activities, such as the one states above, to reinforce mathematical concepts and check for understanding.

Struggling Students: If students are struggling, group them with another student. Have the two students discuss the situations and explain to one another how to come to a conclusion or where their confusion falls. Be sure to monitor discussion and intervene if needed.

O: This lesson is designed to have students utilize ratios and proportions to analyze and make conclusions about a real world, problem situation.

Formative Assessment:

- Ongoing teacher observation during presentations of student work that supports their conclusions, independent work, student interaction, and internet activity.
- Teacher questioning

Name _____

Which Option is a Better Deal?

While shopping at the grocery store, you are presented with the option of buying a dozen cookies for $4.20 or buying nine cookies for $3.15. Which option is a better deal?
Explain.