Fourth Grade
Higher-Order Thinking Lesson 11
Date: 4/23/08
Approximate Time: 50 minutes

Learning Objectives:
The student will be able to -
1. Find multiple solutions to an open-ended problem.
2. Determine the unit costs of different items.
3. Solve an open-ended, multi-step problem with constraints.
4. Create a word problem.

Language Objectives:
The student will be able to –
1. Provide mathematical and non-mathematical explanations for the following words: costs, at least, the least, and each.
2. Use mathematical and non-mathematical language to create a reasonable word problem.

Materials:
1. Hot Dog Bun problem
2. Hot Dog Bun manipulatives
3. Think Cards

Previous Day:
Students independently completed the "Hot Dog Buns" prompt and reflection. Students circled difficult words from the prompt and restated the question in their words. This is a follow-up lesson that uses one of the prompt's questions as a transition.

Procedures:
1. Transition from yesterday's prompt to today's lesson. Connections? What will we learn today? How will we build from yesterday?
2. Hand out prompt. As whole-class, complete language review. Students circle the following words: costs, at least, the least, and each. Discuss what each of these words mean in this context. Ask students to provide descriptions of these words in other contexts too.
3. Go over how to create a word problem (#6 on worksheet). Provide students with a model.
4. Remind students of checkpoints and class norms and expectations. Assign pairs.
5. Monitor and guide students as necessary during pairs work. Provide manipulatives and think cards as needed. Checkpoints. Guiding questions: How can you back up your answer? How do you know? Is there a difference between "the least" and "at least"? (~30 minutes)
6. Whole-class reflection. Discuss: What did you learn from this lesson? What was difficult about this lesson? Why? What did you enjoy about today's lesson? Why?
7. Collect worksheets.

Assessments:
1. observations
2. Hot Dog Bun problem (scored against rubric)
3. pair and whole-class discussions
4. checkpoints

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Hot Dog Buns

Hot dog buns are sold in packages of 8 and packages of 12.

- The package of 8 costs $1.00
- The package of 12 costs $1.20

1. Show **three** different ways you could buys packages to get at least 40 buns.

Way 1:	Way 2:
Way 3:	

2. With which way do you spend the least amount of money? _____

3. Suppose you cannot spend more than $4.60. Show how you will buy at least 40 buns. Explain in words how you got this answer.

_____

_____

_____

_____

4. For the package of 12 buns, figure out how much **each** bun costs. Show your work below.

5. Do you think **each** bun from the package of 8 will cost more or less than **each** bun from the package of 12? Explain your reasoning.

_____

_____

_____

_____

6. Create a **reasonable** word problem that can be solved using the constraints listed below. Then have other students solve the word problem.

   • Hot dog buns are sold in packages of 8 or packages of 12
   • The package of 8 costs $1.00
   • The package of 12 costs $1.20

_____

_____

_____

_____

_____

Think Card 1	**Think Card 2**
How many hot dog buns could you buy with $10? Which packages would you buy if you wanted to spend the least money?	Which packages would you buy if you wanted exactly 100 hot dog buns? (Think about how you could use the solution from yesterday's problem when you had to buy exactly 40 buns.)
Think Card 3	**Think Card 4**
Think about two shopping trips where you buy only hot dog buns. Is it possible to spend the same amount of money during each shopping trip but end up with a different number of hot dog buns? Explain this with an example.	Create a word problem using the following constraints: - Hot dog buns are only available in packages of 12. - You need to buy at least 50 hot dog buns. Next, solve your word problem.
Think Card 5	**Think Card 6**
Use the prices for 8 and 12 buns to help you figure out a reasonable price for a package of 4 hot dog buns. **EXPLAIN** your reasoning.	The grocery store is having a sale: Buy one package of 12 buns then get a package of 8 buns for half off!!! If you buy 36 buns in packages of 12, how many packages of 8 could you buy for half price? How many **total buns** would this give you? How much will you pay for all of these buns?