



ALL LEARNERS NETWORK

Math for Every Student

Middle School Tasks

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Goals

- To engage in problem solving
- To explore ways to modify problems for menu



All Learners Lesson Structure

- Launch
- Main Lesson
- Menu
- Closure



Main Lesson: All Means All

- Inclusion
- Grade level lesson that is instruction for all
 - Challenges: contexts, numbers, concepts that all can access.
 - Discourse is essential.
 - What are students doing during the lesson? What are they thinking about? What are they talking about?



The Role of Problem Solving

- Students develop their understanding of concepts by working and solving mathematically rich problems. *Problem solving is not an application of what they have already learned: it is a major vehicle for building new meaning.*

Hyde, A. A. (2009). *Understanding middle school math: Cool problems to get students thinking and connecting*. Portsmouth, NH: Heinemann.

High Quality Tasks....

- Allow entry to the mathematics at a low level (all students can begin the task) but also has a high ceiling (some students can extend the activity to higher-level activities)
- Ask the problem before teaching the method,
- Have the potential to broaden students' skills and/or deepen and broaden mathematical content knowledge,
- Have the potential to reveal underlying principles or make connections between areas of mathematics,
- Engage students in explaining the meaning of the result.

Lannin, J. K., Chval, K. B., & Jones, D. (2013), Boaler, J. (2016), Piggott, J. (2011).

ALN Problem Solving Protocol

- Chorally read the problem.
- Ask, “What is this problem trying to figure out?”
 - This can be written on the board for everyone or each learner can write it on their paper. Have students rephrase into their own words.
- Ask, “What would an answer to this problem look like?” You can also ask, “What would a wrong answer look like?”
 - Identify the correct unit.
 - Probe for reasonableness.
- Brainstorm potential strategies.
- Express encouragement and ambivalence about each suggestion.



Apples and Bananas

Apples cost \$0.80 each and bananas cost \$0.60 each.

- a) Make a list or table of the different combinations of apples and bananas that would cost exactly \$20. How many combinations are there?
- b) Make a graph on a separate piece of graph paper that conveys the situation in this problem. Make sure you label the axes and use an appropriate scale.
- c) Write an equation that states that the total price of apples (a) and bananas (b) is exactly \$20.



Menu

- Look at the Menu Tasks
- Examine the:
 - Choice of numbers
 - Questions



Desert Island

After being shipwrecked on a desert island, a small group of vacationers finds a large supply of chocolate chip cookies in a tiny hut. The hungry people start working through the cookie supply on the day they arrive and they eat the same number of cookies every day. After 7 days, there are 246 cookies left. After 16 days, they are down to 138 cookies.

- a) Write an equation that expresses the number of cookies remaining, N , as a function of the number of days since they were shipwrecked, D .
- b) Make a graph that conveys the situation in this problem. Make sure you label the axes and use an appropriate scale.
 - i) What is the y-intercept and what does it represent in the problem?
 - ii) What is the slope of the line you graphed and what does this number represent in the problem?
 - iii) What is the x-intercept and what does it represent in the problem?
- c) If the vacationers started eating the cookies on a Monday, on what day of the week will they run out of cookies?



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