Reclaiming Lost Ground:
Research-based Interventions for Under-prepared Algebra Students
MMC 2011 Conference of Workshops — Saturday, February 5, 2011

Opener: Consider the following problem.

> Write an algebraic rule to describe the relationship between the number of sides of a polygon, ***n***, and the number of diagonals that can be drawn from one vertex, ***d***.
>
> Use ***n*** as the independent variable, and express your rule using function notation.
>
> Explain how you found the rule.

Work on the problem. (How are you approaching it? What ideas is it connected to?)

Then, think of your students.
What are some challenges 9th-grade students would face in solving a problem like this?

Eight key findings research tells us: Learners should…

- Engage with **challenging tasks** that involve **active meaning-making**.
- **Connect** new learning with prior knowledge and, in the process, **address misconceptions**.
- Acquire **conceptual knowledge** as well as skills to help them **organize** their knowledge, **transfer** it to new situations, and **acquire** new knowledge.
- Socially construct knowledge through **talk, activity, and interaction** around **meaningful problems**.
- Receive **timely feedback** so they can revise their work, thinking, and understandings.
- Employ **metacognitive awareness** of their performance.
- **Practice** the skills, concepts, and principles they learn in tasks and situations both **close** to the original learning situation and **distant** from it.
- Understand that **intelligence is malleable**, not fixed, and recognize the roles of effective effort, attribution of effort, sense of belonging, and motivation in learning mathematics.

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Activity 2.1 Opener: Generalizing a dot pattern

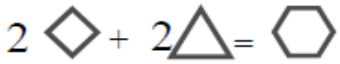
A sequence is shown in picture form. Assume that the sequence continues to grow in the same way. Study the pattern. Then complete the following tasks.

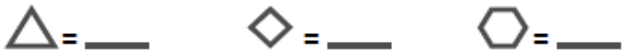
1. Organize the information for the figures into an input-output table.

Figure number, ***n***	Number of dots, ***d***

2. Write an input-output rule for the table. Your rule should use the variables ***n*** and ***d***.

Shape Equations #5

Clue 1 	**Clue 2** 
Clue 3 	**Clue 4** 



Your thinking:

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Activity 12.1 Opener: Return of the shape equations

Work on the following problems in your activity book.

1. Evaluate $ab + 2c$ when $a = -2$, $b = 3$, and $c = 5$.

2. Following is a set of three shape equations. The value for each shape is constant in the three equations. Find the values for the shapes. Then explain your reasoning.

Mathematical Task A

Martha was re-carpeting her bedroom, which was 15 feet long and 10 feet wide.
How many square feet of carpeting will she need to purchase?

Mathematical Task B

Ms. Brown's class will raise rabbits for their spring science fair. They have 24 feet of fencing with which to build a rectangular rabbit pen in which to keep the rabbits.

1. If Ms. Brown's students want their rabbits to have as much room as possible, how long would each of the sides of the pen be?

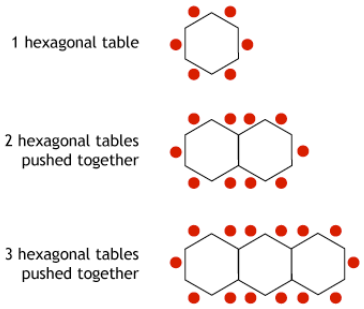
2. How long would each of the sides of the pen be if they had only 16 feet of fencing?

3. How would you go about determining the pen with the most room for any amount of fencing? Organize your work so that someone else who reads it will understand it.

(from Stein, Smith, Henningsen, & Silver, 2000, p. 2)

The Banquet Table Problem

Erlinda and Chris continue their work on the dance committee. Erlinda just found out the hall where the tables will be located is long and narrow. There is not enough room to spread the tables out. Chris suggests pushing the tables together in a row. He makes diagrams showing the arrangements of tables and chairs.



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Thank you!