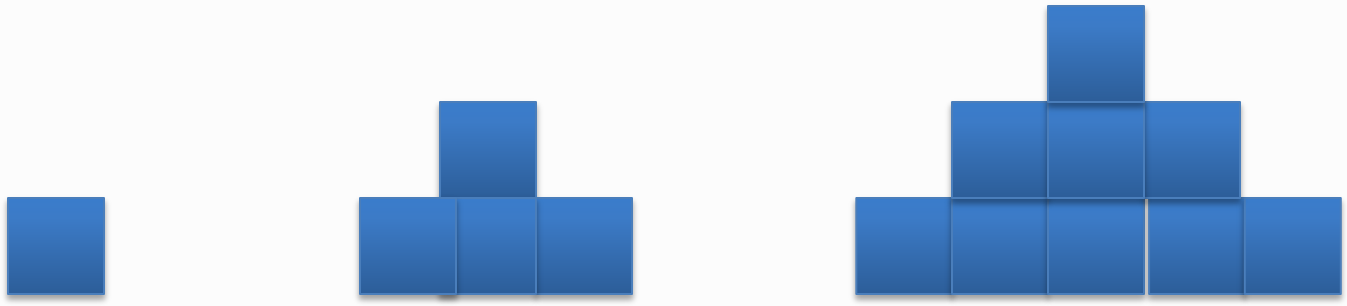
# Reflecting on Practice: Worthwhile Tasks

Session 3

Implementing Tasks: Maintaining Fidelity

# In this figure as the step changes, the _____ also changes”



Step 1 Step 2 Step 3



Peterson, 2006

# Investigate

With your partner, pick one of the attributes in our list and investigate how it changes. Make a conjecture and try to prove it. How would a graph, a table, and/or an equation support your conclusion?

(If time, explore a 2nd or 3rd property)

# *As a table, decide what your lesson goal will be*

*Possible goals:*

- Distinguish between linear and quadratic relationships
- Distinguish between closed form and recursive rules for sequences
- Interpret numerical, algebraic and geometric representations of a mathematical concept
- Describe a geometric pattern by an algebraic expression
- Recognize a quadratic relationship and be able to find a closed form rule for the relationship
- Recognize and be able to describe the components of an arithmetic sequence
- Explain what rate of change means in different situations

# Select and Sequence

As a table, keeping your learning goal in mind, select a few examples of work that you would want to have your class discuss.

Sequence the work in the order in which you want the discussion to take place and be ready to defend your choice of sequence for the discussion.

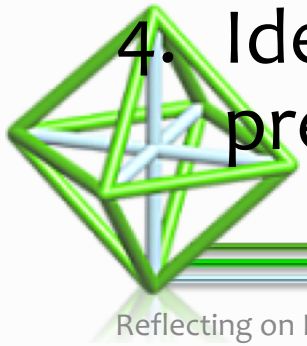
# Connections

- It is important to bring ideas together for students.

- What connections would you want students to discuss? How would you help them see those connections?

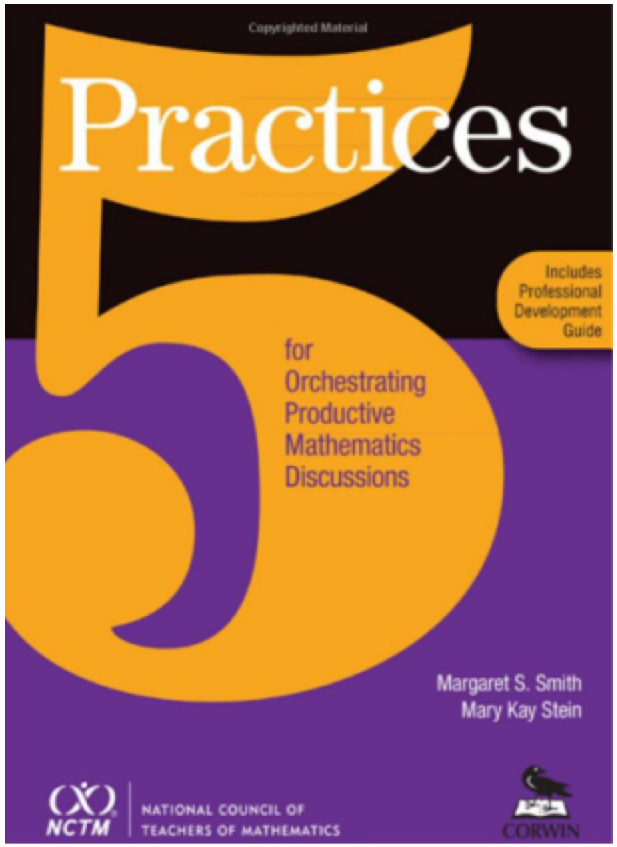
# Possible mathematical connections

1. Which changes led to linear equations and which lead to quadratic? Is there an explanation?
2. What were the advantages and disadvantages of different approaches (symbolic vs. tables vs. graphs vs diagrams)?
3. What is the distinction between patterns and proof? Is this important? Why or why not?
4. Identify where it was important to "attend to precision".



# The 5 Practices

- Anticipate
- Monitor
- Select
- Sequence
- Connect




Smith & Stein, 2011

Consider the task we just looked at and it's implementation.

**As a student**, what was useful about this task? What did you like? What didn't you like?

Consider the task we just looked at and it's implementation.

**As a teacher**, what was useful to you? What did you like? What didn't you like? What would you change? How would you change it?

# Norms!!

# Participation quiz (PCMI, 2011)

- High school algebra class working on factoring. They are being graded on how well they work together on the task not on right answers.

- As you watch, what norms are being established to encourage discussion?

# With your table group

- What explicit norms does the teacher set for student discussion?

- What teacher moves enforced the norms?

# Sociomathematical Norms - Talking About The Math

- **Explanations** consist of mathematical arguments not simply procedural summaries of the steps taken to solve the problem.
- **Errors** offer opportunities to reconceptualize a problem and explore contradictions and alternative strategies.
- **Mathematical thinking** involves understanding relations among multiple strategies.
- **Collaborative** work involves individual accountability and reaching consensus through mathematical argumentation (Kazemi, 1998).

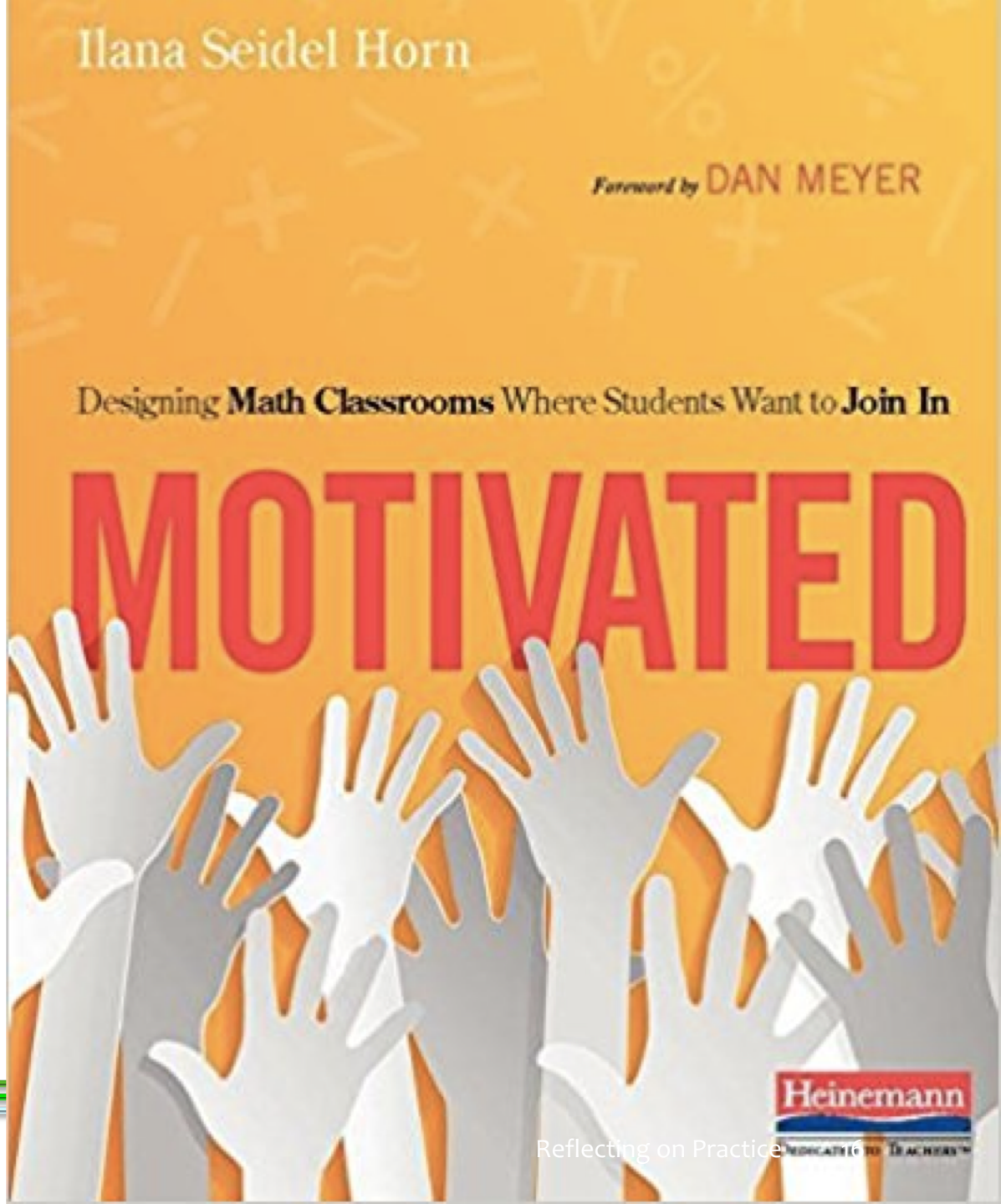
# Norms for students working together

- Take turns
- Listen to others ideas
- Disagree with ideas not people
- Be respectful
- Helping is not the same as giving answers
- Confusion is part of learning
- Say your “becauses”
- I can’t do that - YET

Horn, 2012

# Student Engagement

tinyurl.com/ishorn



# Motivational Constructs

1. Belongingness
2. Meaningfulness
3. Competence
4. Accountability
5. Autonomy

# References


- Horn, I. (2012). Strength in numbers: Collaborative learning in secondary mathematics. Reston VA: National Council of Teachers of Mathematics
- Peterson, B. (2006). Linear and quadratic change: A problem from Japan. *The Mathematics Teacher*, 100(3). Reston VA: National Council of Teachers of Mathematics.
- Smith, M., & Stein, M.(2011). *5 practices for orchestrating productive mathematics discussions.* Reston VA: National Council of Teachers of Mathematics