November 30, 2012

Riverpoint Advanced Math Project Algebra

Welcome!

- Sit with teachers who teach the same grade level as you do, and who you do not already know!! Introduce yourselves.
- Make sure you have your copy of the CCSS-M available (if you have one).
- We'll start at 7:45.

Notable number: Together, the teachers in this project have **633 years** of teaching experience!!

Feedback (no need to write name):

On the sheet of green paper provided, please answer:

1. Have you used anything from the first two workshops? If so, how did it go?

2. How did your first PLC meeting go? (e.g. Did you have problems finding a time to meet? Were you able to do what you needed to do? Any other issues?)

Goals for today:

- Look at the structure of the CCSS-M.
- Do a math task to focus on A-SSE.
- Revisit cognitive complexity in terms of tasks you have used in your classrooms.
- Revise a task to have higher level cognitive complexity, and think about it in terms of student evidence for TPEP.
- Discuss students' motivation to learn mathematics.
- Work with your PLC on a Focus Topic

Phil Daro, on CCSS-M writing team

- http://www.youtube.com/watch?v=B6UQcwzyE1U

Discuss with your group:

- What struck you as most important from the ideas presented by Phil Daro? Why?
- How does it fit with what you already know about the standards?

Design and language of the CCSS-M

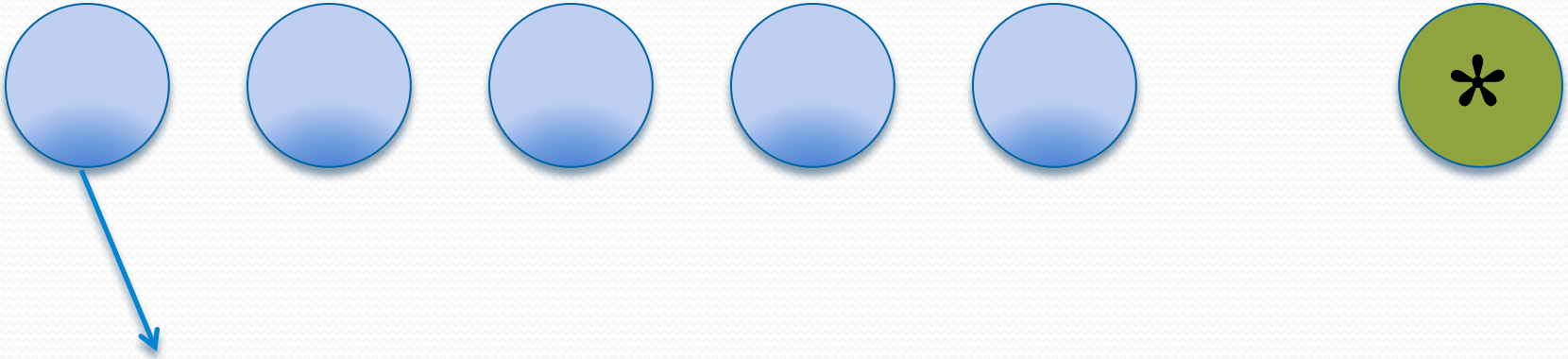
- Conceptual categories (for high school)
- Domains
- Clusters
- Standards

See examples on document camera

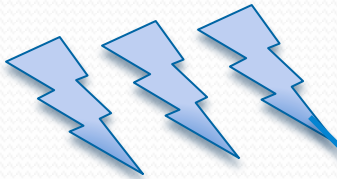
One way to think about this…

- Conceptual Categories have Domains
- Domains have Clusters
- Clusters have Standards

Conceptual Categories



Domains (boxes)



Clusters (bold)

5.
6. Standards

Task One – On your own

- Conceptual categories (for high school)
- Domains
- Clusters
- Standards

Task: In three minutes create two different organizational structures to demonstrate these relationships

Task Two– As a group

Task: Look at the bottom of page 65: for the following description that begins with:

5. Prove that, given a system…

Identify the four elements (*Conceptual Category, Domain, Cluster and Standard*) that this statement is associated with.

Task Three – As a group

- Conceptual categories (for high school)
- Domains
- Clusters
- Standards

Task: Read the cluster 'Interpret the structure of expressions' on p. 64. What domain and conceptual category is this cluster in?

Task Four – As a group

- Conceptual categories (for high school)
- Domains
- Clusters
- Standards

Task: Turn to page 63. Identify the elements (*Conceptual Category*, *Domain*, *Cluster and Standard*) visible on this page.

Task Five – As a group

Look back at the organizational structures you created for Task One.

In your groups, choose the one example that:

- Communicates relationships most clearly
- Is the best mix of: concise, detailed and precise

Find the standard

- You have 9 math problems that are all from 6-8th grade Equations and Expressions or Algebra Seeing Structure in Expressions.
- Work with your group to order them in the order you think students would encounter them in 6th-9th grade.
- Find the grade level, domain, cluster, and standard for each problem.

Four Features of the CCSS-M

- **Focus** means attending to fewer topics in greater depth at any given grade level, giving teachers and students time to complete that grade's learning.
- **Rigor** means balancing conceptual understanding, procedural fluency, and meaningful applications of mathematics. Here the word rigor is used not in the way that mathematicians use it, to indicate a correct and complete chain of logical reasoning, but in the sense of a rigorous preparation for a sport or profession: one that exercises all the necessary proficiencies in a balanced way.

Standards for Mathematical Practice (SMP)

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Compare and contrast

- Read SMP 7: Look for and make use of structure on p. 8 of your standards and compare and contrast it with A-SSE.

Coherence

- **Coherence** means attending to the structure of mathematics and the natural pathways through that structure, where “natural" means taking into account both the imperatives of logic and the imperatives of cognitive development in designing the sequence of ideas. Since these two imperatives are sometimes in conflict, attaining coherence is a complex exercise in judgment, requiring a certain amount of professional craft and wisdom of practice not easily obtained from any one source.

matics

Come up with an example

- Think of an example from your own math experiences or from your work with students in which a mathematical procedure or concept was disconnected from other ideas you learned, but later you realized they were connected. Share with your group.

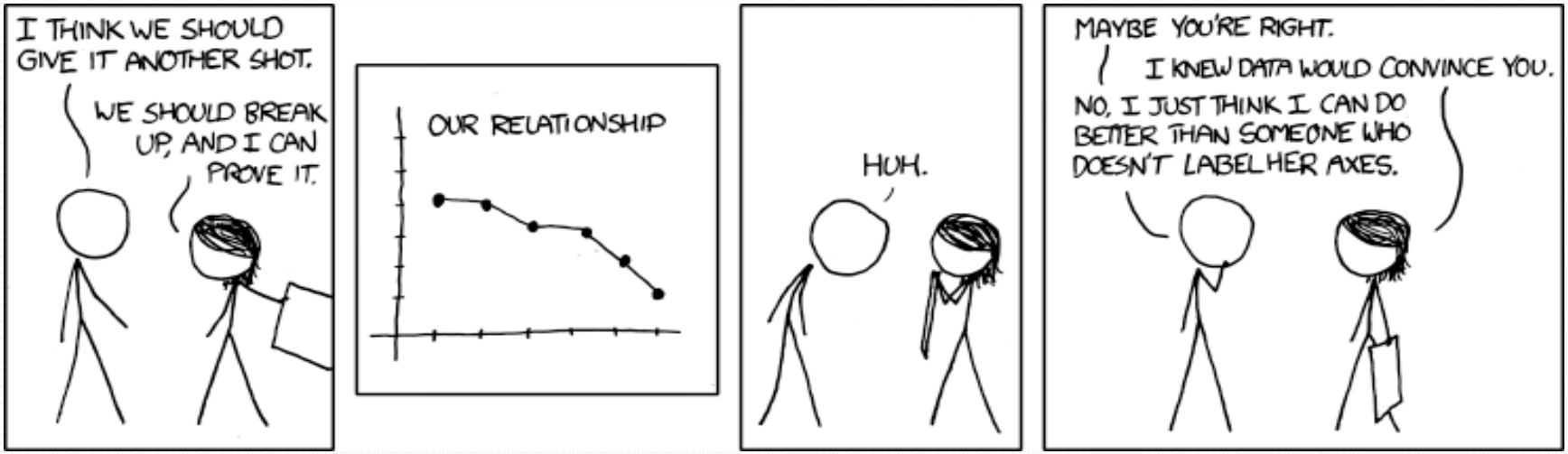
Goals for this activity:

- Provide a basic understanding of terminology and design of the CCSS-M (domains, clusters, standards, conceptual categories)
- Start understanding the key characteristics of the CCSS-M (i.e. focus, coherence, rigor, SMP)
- Consider coherence at a deeper level.

- What questions do you still have?

Let's do some math!!

- Move to sit with your own PLC



Goals:

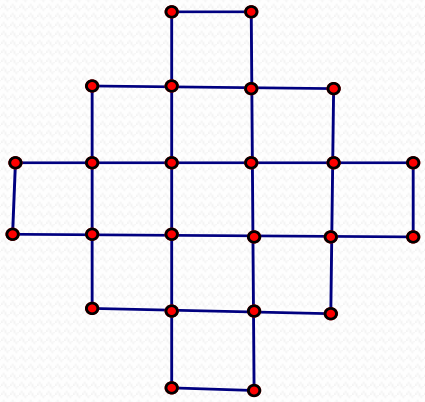
- Experience and reflect on how pattern tasks can be used to support students' development of Seeing Structure in Expression (A-SSE).
- Specifically:
  - A-SSE.2: Use the structure of an expression to identify ways to rewrite it.
  - A-SSE.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- Consider how the mathematical practices support this learning:
  - SMP 2: Reason abstractly and quantitatively,
  - SMP 7: Look for and make use of structure, and
  - SMP 8: Look for and express regularity in repeated reasoning.

Urban Sprawl

Write a numerical expression for the number of unit squares in Figure 2.

Your expression should show how you counted the squares.

When your group is ready, share your methods.



Equivalence of expressions

How many different expressions did your group find?

Compare the expressions to understand each others' ways of counting, and check to see if the expressions are equivalent.

What ways of checking equivalence did you use?

Creating new expressions

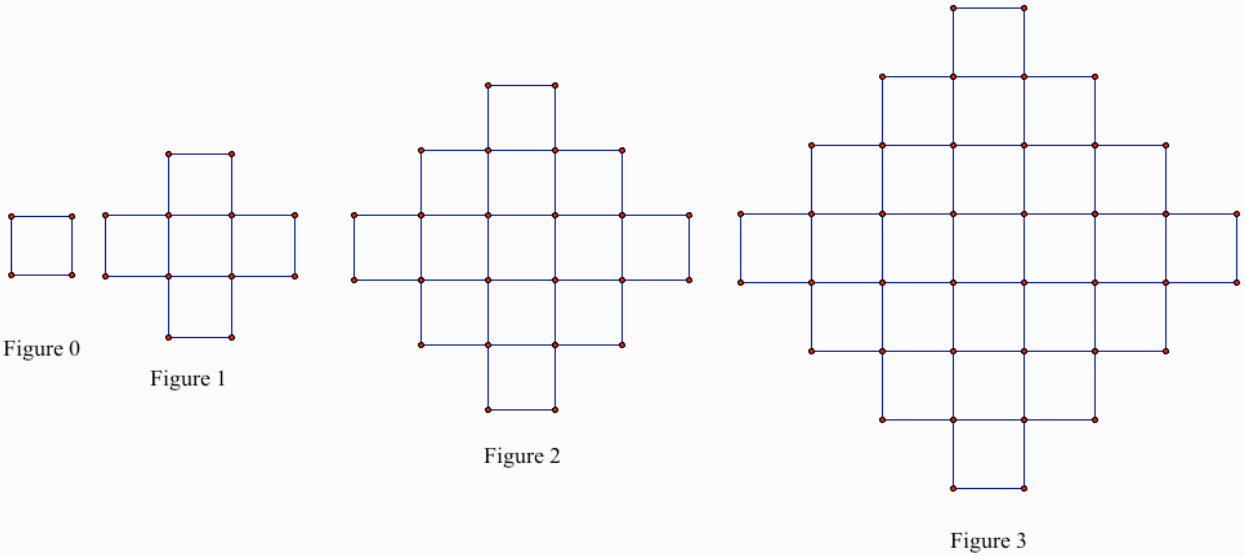
- Use the blank Figure 5s on the back to determine how a student who wrote $2[n(n+1)]+1$ might have counted the squares. Is this the only possibility?
- Rewrite the expression in a different way and try to determine how a student who wrote the expression this way might have counted the squares.

Revisiting the standards

- Read A-SSE.2 and A-SSE.3 and discuss how your work on this task relates to these two standards. Be ready to share your thoughts with the group.
- In general, how does the implementation of this task relate to the Domain A-SSE?
- How did you use SMP 2, 7, and 8? Be specific.

Compare to previous task:

- The Following diagrams represent the first four figures in a pattern. What mathematical questions could arise from this?



Changes

- We decided to not make it so open (when it is more open, people think about counting segments, perimeters, vertices, changes in number of squares).
- We decided not to have a sequence of figures, because people tend to focus on differences between the numbers of squares in successive figures, and they also tend to create a table and look only at numbers.
- We were careful to word the directions so that the focus was on expressions that communicated ways of seeing the figures, instead of asking you to 'find the number of unit squares in Figure n'.

Reflection

- On the pink half-sheet
  - What new ideas do you have about teaching SSE in your classrooms?
  - What questions do you still have about SSE?

Take a 15-minute break
Snacks are in the back;
Regroup into your PLCs, but split into groups of 3-4.

Revisiting Cognitive Complexity

Goals:

- Deepen our understanding of the cognitive complexity involved in a task.
- Connect these understandings to our own classrooms.
- Think about the role of the SMP in increasing cognitive complexity.
- Design a Level 3 task and consider its implementation in terms of TPEP criteria.

Josh's Question:

- Does each problem have a unchangeable complexity? Or does the complexity of a problem change based on its delivery, framework, scaffolding, experience of the student, or any other factor?

CC Sharing Protocol:

- Choose a timekeeper
- Each person chooses a Level 2 task
- Share
- Listen
- Repeat
- Discuss: What is the difference between a Level 2 and a Level 3? What types of student thinking are elicited at each level?

Revise a task to be Level 3

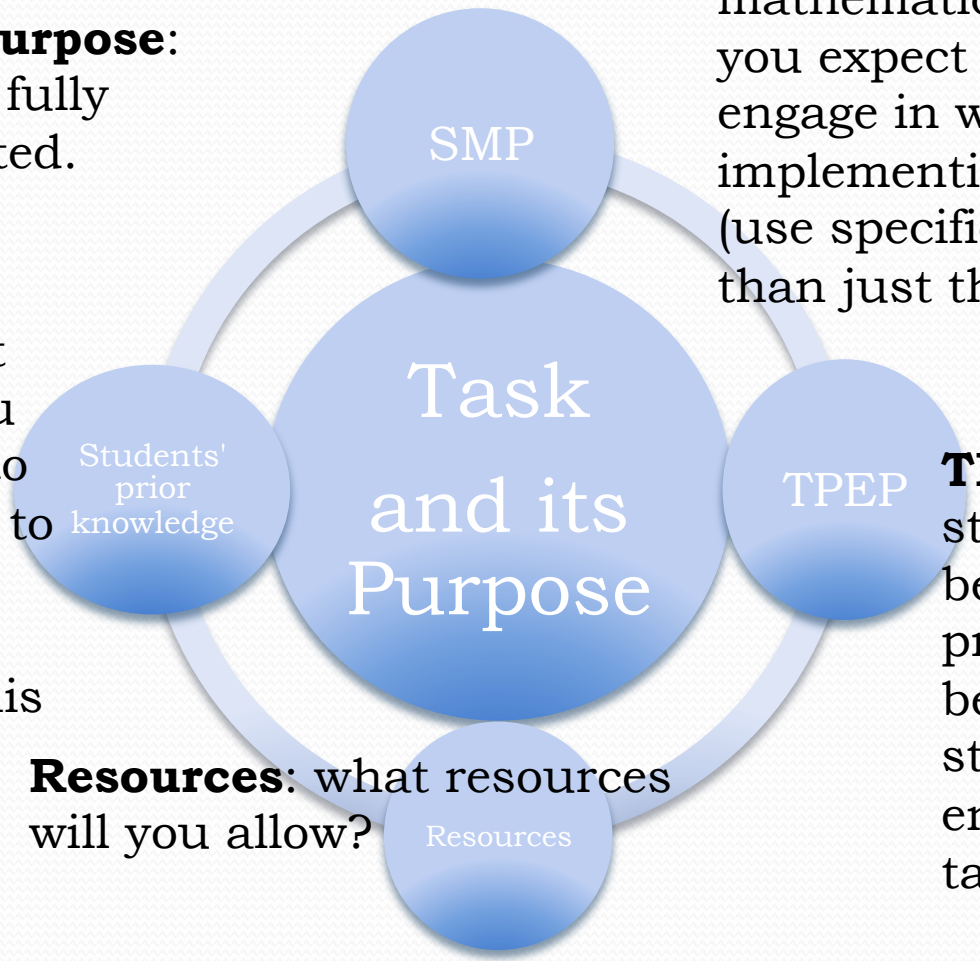
- As a group, choose one of the tasks presented in your group to alter to become a Level 3 task, and alter it to become a Level 3.
- Consider: students' prior knowledge, resources, standards for mathematical practices, and student evidence for TPEP.
- Create a poster that will help other groups understand your thoughts and decisions.

Create a poster with these components:

Task and its purpose: The task itself, fully and clearly stated.

SMP: what standards for mathematical practices do you expect students to engage in while implementing this task? (use specific bullets rather than just the SMP title)

Students' prior knowledge: what knowledge do you expect students to have and be able to use in this task? What new knowledge will this new task add to students' prior knowledge?"



Resources: what resources will you allow?

TPEP: What student behaviors and products would be in evidence if students engaged in this task at a Level 3?

Level THREE

- -REQUIRES reasoning, planning, using evidence, and a higher level of thinking than the previous two levels.
- -**INDICATOR** REQUIRES students to explain their thinking.
- -activities that require students to MAKE CONJECTURES
- -complex and abstract cognitive demands.

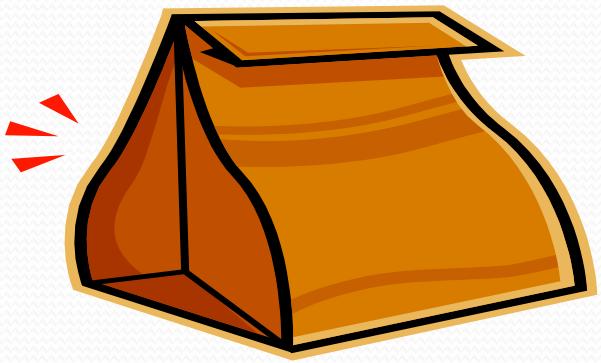
Gallery Walk

- Look at a handful of the posters (10 minutes)
- Partner with someone else in your group and as you look at posters, look for similarities and differences in the ideas between your poster and their poster. What themes arise? What new ideas arise?

Lunch!

Create groups for discussion:

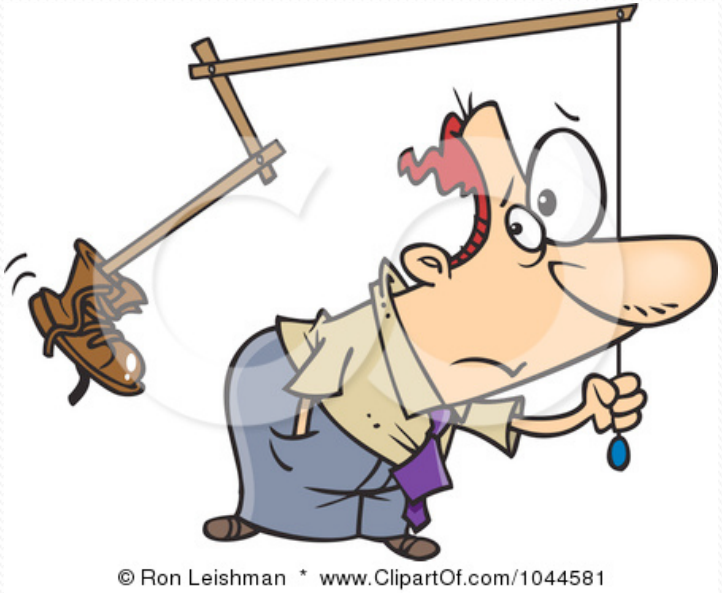
- Create a linear expression in x (no other variables) and write it on a 3 by 5 card.
- Line yourselves up from least to greatest when x=-10.



Discussion

Using a protocol meant to uncover our assumptions, we will explore the question:

What motivates middle and high school students to learn mathematics?



PLC work time

- Goal is to consider your 'focus topic' in light of cognitive complexity, standards for mathematical practice, and seeing structure in expression.
- Revisit the norms to make sure everyone has a voice.
- If you need more structure, take a moment to create it (e.g. choosing someone to record the group's decisions)

Stages

- Stage 1: Understanding your focus area
- Stage 2: Examining the tasks in light of the CCSS-M, CC, SMP, and A-SSE
- Stage 3: Examining the tasks in light of student development of the ideas and the logic of the mathematics.

- Turn in your recording sheet at the end of this time. If you want it returned before January, write a note and we'll scan and send it to you.

Take a Little Break

Review what we've discussed:

- Understand the structure of the CCSS-M.
- Implement a math task to focus on A-SSE.
- Revise a task to increase the cognitive complexity.
- Consider the task in light of SMP and student evidence.
- Discuss students' motivation to learn mathematics.
- Work on your 'Focus area' in terms of the CCSS-M.

Homework (about 2 hours)

Individually:

- Moodle: help us all get to know each other!!

PLC:

- Stage 2 of your PLC work.

Please record the date and time you met; we need to collect this for evaluation purposes!!

Evaluations

- Thank you, as always, for your feedback candor and thoroughness!