**Goals:** Enact the five practices with teachers as students; look at a quadratic pattern. Meta-teaching: let them know why we chose this task, and then discuss why we are doing what we are doing and what decisions we need to make as we make them. Identify (out loud) the SMP we see, and connect our implementation of the task back to the ‘what research says’.

**Mathematical goals:** Understand structure of quadratic functions, and explore equivalent expressions; distinguish and relate expressions, equations, and functions, recursively defined functions, second common differences, and connect to the CCSS. Standards addressed:

A-SSE.1, A-SSE.3, F-IF.3, F-IF.5, F-IF.7a, F-IF.8, F-BF (also, to some extent: F-IF.2, F-IF.4, F-IF.6)

**Instructional goals:** Solving problems in multiple ways to make connections is a way to teach for coherence. Identify how the math in the task addresses the content of the standards.

**Time:** 2.25 hours

**Materials:** Staircase task sheets (3 per person), poster paper, markers, blank 8.5x11 sheets, 4-5 copies of the Task analysis

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| On Pp:  Staircase task: before starting to answer the questions, look at the SMP and identify which ones you will most likely use while solving the problem.  Then, slowly and carefully, find as many ways as you can to solve the task.  Reflect on the strategies you are using, and their relation to the SMP.  Leave your rule in a form that shows how you thought about it.  Illustrate your rule in your diagram, table, or graph. | Set-up and time to work (35 minutes)  Distribute one sheet per person (same task on both sides of sheet) |
| On Pp:  As a group, write each of your rules on a blank sheet of paper in large print with a marker. Put the illustration that shows how you derived your rule on a large sheet of paper.  Put them in the corresponding boxes. | Matching (25 minutes)  Label one box ‘rule’ and the other box ‘illustration’  Have peer teachers and leaders walk around and check off the solutions, then create a couple not created by teachers.  Label the rules with letters and the illustrations with numbers. |
| First individually, then in your groups, decide which rule goes with which diagram. Justify mathematically.  Which solutions used similar mathematical ideas? Explain. | Tape rules and solution methods to the wall and have two teachers go up and explain their illustrations without giving their rules.  Have groups match the rules with the diagrams.  Have the teachers put their rules with their solutions. |
| Which solutions would you have students present in class if your lesson purpose was:  Seeing structure?  Equivalent expressions?  Compare recursive and explicit forms of functions?  Understand the growth pattern of a quadratic function?  Discuss use of SMP | Goal of this next part is to think about and discuss out loud, selecting, sequencing, and connecting the solutions based on purpose.  Write down the sets of tasks they describe to use in the next step. |
| Suppose your students came up with solutions (name 4 that are identified for the same purpose), what order would you have them present their solutions and why would you choose that order? | Suppose your students came up with solutions (name 4 that are identified for the same purpose), what order would you have them present their solutions and why would you choose that order? |
|  | Debrief:  Reflect on how we used this task with you, teachers. How could you use this task with student?  How could your use support students’ sense-making and mathematical power? |
| Respond anonymously to:  A colleague tells you that she is going to use a rich task with her honors class, but that she would never use it with her 'low' class. What could you say to her? | Reflection (on individual sheets of paper):  Now that you’ve experienced learning through some rich tasks, answer the following question. |