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Implementing Math Practice Standards

Monster Math Methods (4th grade):

- **Explain your thinking**
  - Each week, students work on a challenge problem. Students who explain their thinking clearly (using pictures, words, and numbers) but don't necessarily correctly solve the problem are entered into a prize drawing.
  - Students prepared lesson plans to teach multiplication, taught their lesson to a 3rd grader, and reflected on their success.

- **Use what you know to solve what you don't know.**
  - Students begin with smaller and/or easier problems to tackle larger problems.
  - We frequently ask students to identify situations where they've used what they know to help them.

- **Does it make sense?**
  - We discuss using estimation to arrive at a "good guess," and analyze how the estimate compares to students' answers.
  - Students are expected to check their work using an alternate strategy (e.g., adding back up to check the answer to a subtraction problem).

- **Persevere: if you don't get it the first time, back up and try again.**
  - We dance to James Brown's song.
  - If a student is hesitating to continue working on a problem, we ask them what happens if you don't get it the first time, which usually encourages them.

- **Be efficient: use a small number of accurate steps.**
  - We compare and analyze different strategies for solving problems, and encourage students to discuss which methods are and aren't efficient (e.g., breaking up a big multiplication problem into two smaller problems is efficient, whereas using repeated addition is inefficient.)

Translating to other ages:

- Similar discussions can be had with students about what it means to communicate mathematics effectively, e.g., using equations, complete sentences, and diagrams; presenting work as a logical, step-by-step argument; determining if all necessary details are presented so that someone else can understand and reproduce the work.

- The teaching activity can be adapted so that students teach a partner about an unfamiliar topic and reflect on what contributed to the success of their partner's understanding.

- Students can be asked to break down difficult problems into smaller steps, and clearly explain how the easier steps can be put to together to obtain the full solution.

- Challenge problems (chosen at an appropriate level of difficulty) can be regularly distributed, with an emphasis placed on the mathematical thinking process and problem-solving skills.

- Students can keep a math journal to record mathematical work, answers to challenge problems, reflect on instances in which they employ good habits of mathematical thinking, etc. Writing fluently about mathematics and mathematical thinking encourages students to integrate literacy and math skills.

- The standard “model with mathematics” can be motivated by connecting mathematical operations and topics with real-world examples and projects. Students can discuss the power of translating a real-world situation into mathematical language, performing an analysis, and translating back to make inferences about the original problem.