Standards for Mathematical Practice - Third Grade Specific

Mathematical Practices are listed with each grade's mathematical content standards to reflect the need to connect the mathematical practices to mathematical content in instruction.

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

Students are expected to:

1. Make sense of problems and persevere in solving them.
In third grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Third graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.

2. Reason abstractly and quantitatively.
Third graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities.

3. Construct viable arguments and critique the reasoning of others.
In third grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.

4. Model with mathematics.
Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Third graders should evaluate their results in the context of the situation and reflect on whether the results make sense.

5. Use appropriate tools strategically.
Third graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper to find all the possible rectangles that have a given perimeter. They compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles.

6. Attend to precision.
As third graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the area of a rectangle they record their answers in square units.

7. Look for and make use of structure.
In third grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).

8. Look for and express regularity in repeated reasoning.
Students in third grade should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, "Does this make sense?"

Third Grade Team Homework:

- **Watch this video** with your grade level teammates- Watch #20, *Shapes From Squares*. http://www.learner.org/resources/series32.html#program_descriptions (yes, it is old, yet provides a good look at a problem-based setting)
  Once the video has begun, you can hover the cursor over the screen and right click- you now have a zoom option for full screen so it is easier to view as a group.
- **Answer the questions** at the end of the video with your colleagues.
- The students began with a few simple instructions and one rule before beginning to work in teams. What routines and rituals had to be understood, modeled, and practiced prior to attempting this type of task? Can you find similar routines and rituals described in the GPS frameworks? How is this classroom organized so that students can explore in this way?
- There are many mathematical opportunities beyond geometry in this task. How could you build on what students learned in this session? What should come before this task? What could come next?
- How did the teacher help the student who had difficulty determining the number of sides on a shape?
- The teacher calls the rhombus a diamond. Which term do you think should be used?
- How can you use what you noticed in this video to help students become proficient at the mathematical practice standards?
- What do you think was the most important part of the lesson?

- **Try the task** used by this teacher with your students. This could be done as a small group activity with a parapro, coteacher, or parent guiding one group while the teacher guides the other.
  Here's a quick overview: Remember, the teacher used questions and observations to guide the process, and did not do the work for the students. They decided how they would begin within their teams, and they decided how to work within the parameters given by the teacher. They had to figure out ways to meet the teacher's challenge and record their discoveries. She also challenges them to organize their thinking. This situation requires students to engage in the mathematical practices.

  Start with exploration. Allow students to make sense of what you are asking them to do, and to explain their understanding to each other.

  Compare notes with your colleagues. How did it go? What did you notice about your students? Were students able to record and explain their work? How could this lesson be extended? How can you create productively problematic situations for your students?