



**What Are Standards for Mathematical Practice?** There are eight Standards for Mathematical Practice. These standards describe the processes and proficiencies students must develop as they experience the different grade-level content standards. This month we will focus on Mathematical Practice 4: *Model with Mathematics*.

**What is a Model?** In Kindergarten and 1<sup>st</sup> Grade, students often use toothpicks, coins, beans, blocks, and other objects to model their thinking. As students move to higher grade levels, their models become drawings, tally marks, charts, and graphs.

**What Do Models Look Like?** You may find your own students creating models as part of homework assignments. They may be asked to solve a problem to which they have already memorized the answer ( $4 \times 3 = 12$ ) and to include a model to show what  $4 \times 3$  actually means. The models they create show how well they understand a concept.

- If a student has memorized  $4 \times 3 = 12$ , but he or she creates this model, it is clear that the student is not modeling the concept.

$$\star\star\star\star \times \star\star\star = \star\star\star\star\star\star\star\star\star\star\star\star\star\star$$

- If the student has memorized  $4 \times 3 = 12$ , and creates the model shown here, it is clear that the student understands the concept.

$$\begin{array}{ccc} \star\star & \star\star & \star\star \\ \star\star & \star\star & \star\star \end{array}$$

**What Are the Keys to Using Models Successfully?** Students who use models well:

- Create models that make sense to them:
  - Use circles, tally marks, graphs, or objects
- Make connections between the problem, its solution, and the model:
  - If the problem is  $3 + 5$ , students draw three objects and five more objects.
  - Students count to find the solution 1, 2, 3, 4, 5, 6, 7, 8.
- Explain orally, or in writing, how the model supports the solution:
  - Students explain that 3 objects added to 5 objects results in a total of 8 objects.
  - Students may label their model to help connect the problem and the model.
- Change their models to reflect feedback or new understandings:
  - Students erase, X-out, add to, or re-label their model to show there was a problem with their original model.

