

# Effective Mathematics Teaching and Learning

An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically.

*Principles to Actions* (NCTM, 2014, p. 7)

## North Carolina Professional Teaching Standards

**STANDARD I:**  
Teachers demonstrate leadership.

**STANDARD II:**  
Teachers establish a respectful environment for a diverse population of students.

**STANDARD III:**  
Teachers know the content they teach.

**STANDARD IV:**  
Teachers facilitate learning for their students.

**STANDARD V:**  
Teachers reflect on their practice.

**STANDARD VI:**  
Teachers contribute to the academic success of their students.

### Teaching Practices

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning & problem solving.
3. Use & connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning mathematics.
8. Elicit & use evidence of student thinking.

### Mathematical Practices

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

The *North Carolina Professional Teaching Standards* provide a comprehensive picture of teaching, and a common language with which to talk about it. The *Mathematics Teaching Practices* represent a core set of high-leverage practices and essential teaching skills necessary to promote deep learning of mathematics. The *Mathematical Practices* represent what students should be doing as they interact with and learn mathematics content. Together, these represent the framework and practices critical to supporting student (and teacher) engagement and meaningful mathematics learning.

### All teachers must:

- Create a safe, nurturing, and engaging environment that supports collaboration and risk-taking.
- Select tasks that require a high level of cognitive demand and provide multiple entry points through the use of varied tools and representations.
- Anticipate what students might struggle with during a lesson and design questions that scaffold students' thinking, without stepping in to do the work for them.
- Praise students for their efforts in making sense of mathematical ideas and perseverance in reasoning through problems.

### All students must:

- Take responsibility for making sense of problems by drawing on and making connections with their prior understanding and ideas.
- Struggle at times with mathematics tasks but know that breakthroughs often emerge from confusion and struggle.
- Ask questions, respond to, and give suggestions to support the learning of their classmates.
- Accept and expect that their classmates will use a variety of solution approaches and that they will discuss and justify their strategies to one another.

### Questions for instructional conversations and reflection:

1. What should students **know** (*knowledge of content*) and **be able to do** (*show they understand content through engagement in Mathematical Practices*) in this lesson?
2. For this lesson, which 1-2 *Mathematical Practices* are you planning to feature in this lesson? Why (based on the learning target) are you electing to focus on these *Mathematical Practices*?
3. Which *Teaching Practices* will you leverage to achieve your instructional goals for this lesson?