erikson
early mathematics education
INNOVATIONS

COMMON CORE STATE STANDARDS FOR MATHEMATICAL PRACTICE

The 8 practice standards describe the behaviors of mathematically proficient students. Mathematics teachers at all levels should seek to develop these behaviors. Every lesson should include all the practices, though any given lesson will emphasize some practices more than others. Student behaviors are connected to teacher behaviors.

Practice #1: Make sense of problems and persevere in solving them

Students:	Teachers:
• Identify the important information needed to make a plan • Monitor work throughout the process, verifying strategies and solutions • Keep trying until a clear understanding emerges • Show patience and a positive attitude	• Model how to pull out important information by asking questions and re-reading the problem carefully • Encourage the use of different strategies and give time for students to explain strategies to one another • Avoid providing too much assistance (e.g., giving answers or directing procedures) • Encourage students to continue until they are confident they have done their best

Practice #2: Reason abstractly and quantitatively

Students:	Teachers:
• Identify relevant quantitative information in a problem situation • Visualize a problem situation mentally • Represent a problem and solution with pictures, models, numbers and other symbols • Use numbers and operations flexibly	• Ask questions that help students abstract the math from problem situations • Ask students to explain their thinking, regardless of accuracy • Use thinking aloud to model reasoning • Highlight the flexible use of numbers

Practice #3: Construct viable arguments and critique the reasoning of others

Students:	Teachers:
• Communicate answers and logical thinking processes using words, pictures, acting it out, etc. • Identify confusions to discover clarity • Ask clarifying questions to improve understanding • Actively compare thoughts of others to own ideas	• Plan time for students to share and compare thinking (explain, rephrase, turn & talk, etc.) • Establish classroom norms for the safe discussion of different ideas • Model and encourage the asking of questions to clarify thinking • Use confusion as an opportunity for learning

Practice #4: Model with mathematics

Students:	Teachers:
• See and describe the relationship between a model and an everyday situation • Select and apply appropriate models to solve problems and represent thinking • Check that models accurately reflect the situation and revise as necessary	• Plan tasks and problems that involve solving equations in everyday situations (e.g., grocery shopping, sharing) • Provide time for students to share and discuss their models and how they relate to their thinking about a problem • Highlight similarities and differences between various models

Practice #5: Use appropriate tools strategically

Students:	Teachers:
• Make reasonable choices about when to use tools • Demonstrate the correct use of tools while solving problems • Learn from the use of a tool	• Provide a variety of appropriate mathematical tools and time to explore their use • Consistently model use of tools during instruction • Expect students to use mathematical tools to support their reasoning

Practice #6: Attend to precision

Students:	Teachers:
• Specify the steps involved in solving a problem • Use accurate mathematical language, including symbols, labels, definitions, and units of measure • Calculate with precision and attention to detail	• Model clarity of explanation by using explicit language and clear mathematical models • Encourage students to be specific when explaining their thinking • Have students paraphrase others' thinking to push for precision and confirmation

Practice #7: Look for and make use of structure

Students:	Teachers:
• Look for and recognize mathematical significance • Generalize relationships within and between problems (e.g., Math-to-Math connections) • Apply a new idea to related problems	• Plan tasks and problems with patterns (e.g., number strings) • Ask questions that focus students of the structure the problem • Highlight different approaches for solving a problem

Practice #8: Look for and express regularity in repeated reasoning

Students:		Teachers:
• Check work for sense, repeatedly • Notice patterns and connections that help them develop generalizations or "shortcuts" • Explain what they are doing and why it makes sense • Explain why a generalization is true and useful		• Ask about possible answers before, and reasonableness during and after computations • Use thinking aloud to model how to explain what they are doing and why it makes sense • Ask students to explain what they are doing and why it makes sense • Ask students if a generalization is always true