BECOMING MATHEMATICALLY PROFICIENT

The Common Core State Standards For Mathematical Practice

This book focuses on helping you use some very specific Mathematical Practices. The Mathematical Practices describe ways in which mathematically proficient students should increasingly engage with mathematics throughout the year.

Make sense of problems and persevere in solving them:

Making sense of problems and persevering in solving them means that you can solve realistic problems that are full of different kinds of mathematics. These types of problems are not routine, simple, or typical. Instead, they combine lots of math ideas and real-life situations. You have to stick with challenging problems, trying different strategies and using all of the resources available to you.

Reason abstractly and quantitatively:

Throughout this course, you are first introduced to new math ideas by discovering them through real-life situations. Seeing math ideas within a context helps you make sense of things. Once you learn about a math idea in a practical way, you are able to think about the concept more generally, or "**reason abstractly**." At that point, you are often able to use numbers and math symbols to represent the math idea. This is called "**reasoning quantitatively**."

Construct viable arguments and critique the reasoning of others:

An important practice of mathematics is to **construct viable arguments and critique the reasoning of others**. In this course, you regularly share information, opinions, and expertise with your study team. You and your study teams use higher-order, critical-thinking skills any time you provide clarification, build on each other's ideas, analyze a problem and come to consensus, and productively criticize each other's ideas.

Model with mathematics:

When you **model with mathematics** you are taking a complex situation and using mathematics to represent it, often by making assumptions and approximations to simplify the situation. Modeling allows you to analyze and describe the situation and make predictions. For example, you model when you write an equation, or make graphs or tables or diagrams, to describe a situation. In situations involving the variability of data, you learn that although a model may not be perfect, it can still be very useful for describing data and making predictions. In the process of analyzing, you go back and improve your model by revising your assumptions and approximations.

Use appropriate tools strategically:

Throughout this course, you have to **use appropriate tools strategically**. Examples of tools include rulers, scissors, diagrams, graph paper, blocks, tiles, calculators, computer software, and websites. Sometimes, different teams decide to use different tools to solve the same problem. Frequently, the lesson concludes with a discussion about which tools are most efficient and productive to solve a given problem.

Attend to precision:

To **attend to precision** means that when solving problems, you need to pay close attention to the details. For example, you need to be aware of the units, or how many digits your answer requires, or how to choose a scale and label your graph. You may need to convert the units to be consistent. Other times, you need to go back and check whether a numerical solution makes sense in the context of the problem.

You need to **attend to the precision** when you communicate your ideas to others. Using the appropriate vocabulary and mathematical language can help to make your ideas and reasoning more understandable to others. This is an important academic and mathematical skill.

Look for and make use of structure:

Looking for and making use of structure is an important part of this course. By being involved in analyzing the structure and in the actual development of math concepts, you gain a deeper, more conceptual, understanding than just being told what the structure is and how to do problems. You often use this practice to bring closure to an investigation.

There are many concepts that you learn by looking at the underlying structure of a math idea and thinking about how it connects to other ideas you have already learned. For example, you use area models to understand the structure of multiplying binomials and connecting that structure to the Distributive Property. You understand the underlying structure of $y = mx + b$ by analyzing growth and starting point of linear functions.

Look for and express regularity in repeated reasoning:

Look for and express regularity in repeated reasoning means that when you are investigating a new mathematical concept, you notice if calculations are repeated in a pattern. Then you look for a way to generalize the method to other situations, or you look for shortcuts. For example, when working with negative or fractional exponents, you repeat exponent patterns that you already know to construct a method for simplifying these types of exponent problems.

