# Guiding Principles for Mathematics Programs in Massachusetts

The following principles are philosophical statements that underlie the pre-kindergarten through grade 12 mathematics standards and resources presented in this Framework. These principles should guide the design and evaluation of mathematics programs. Programs guided by these principles will prepare students for colleges, careers, and their lives as productive citizens.

## Guiding Principle 1

Educators must have a deep understanding of the mathematics they teach, not only to help students learn how to efficiently do mathematical calculations, but also to help them understand the fundamental principles of mathematics that are the basis for those operations. Teachers should work with their students to master these underlying concepts and the relationships between them in order to lay a foundation for higher-level mathematics, strengthen their capacity for thinking logically and rigorously, and develop an appreciation for the beauty of math.

## Guiding Principle 2

To help all students develop a full understanding of mathematical concepts and procedural mastery, educators should provide them with opportunities to apply their learning and solve problems using multiple methods, in collaboration with their peers and independently, and complemented by clear explanations of the underlying mathematics.

## Guiding Principle 3

Students should have frequent opportunities to discuss and write about various approaches to solving problems, in order to help them develop and demonstrate their mathematical knowledge, while drawing connections between alternative strategies and evaluating their comparative strengths and weaknesses.

## Guiding Principle 4

Students should be asked to solve a diverse set of real-world and other mathematical problems, including equations that develop and challenge their computational skills, and word problems that require students to design their own equations and mathematical models. Students learn that with persistence, they can solve challenging problems and be successful.

## Guiding Principle 5

A central part of an effective mathematics curriculum should be the development of a specialized mathematical vocabulary including notations and symbols, and an ability to read and understand mathematical texts and information from a variety of sources.

## Guiding Principle 6

Assessment of student learning should be a daily part of a mathematics curriculum to ensure that students are progressing in their knowledge and skill, and to provide teachers with the information they need to adjust their instruction and differentiate their support of individual students.

## Guiding Principle 7

Students at all levels should have an opportunity to use appropriate technological tools to communicate ideas, provide a dynamic approach to mathematic concepts, and to search for information. Technological tools can also be used to improve efficiency of calculation and enable more sophisticated analysis, without sacrificing operational fluency and automaticity.

## Guiding Principle 8

Social and emotional learning can increase academic achievement, improve attitudes and behaviors, and reduce emotional distress. Students should practice self-awareness, self-management, social awareness, responsible decision-making, and relationship skills, by, for example: collaborating and learning from others and showing respect for others’ ideas; applying the mathematics they know to make responsible decisions to solve problems, engaging and persisting in solving challenging problems; and learning that with effort, they can continue to improve and be successful.