

The Standards for Mathematical Practice describe the skills that mathematics educators should seek to develop in their students. The descriptions of the mathematical practices in this document provide examples of how student performance will change and grow as they engage with and master new and more advanced mathematical ideas across the grade levels.

MP.1 Make sense of problems and persevere in solving them.

Students apply their understanding of various functions to real-world problems. They approach complex mathematics problems and break them down into smaller problems, synthesizing the results when presenting solutions.

MP.2 Reason abstractly and quantitatively.

Students deepen their understanding of transformations of graphs by changing the form of rational function $y(x) = a(x)/b(x)$, where $a(x)$ and $b(x)$ represent polynomials and $b(x)$ is not 0, to reveal and interpret the key features of the function.

MP.3 Construct viable arguments and critique the reasoning of others.

Students continue to reason through the solution of an equation and justify their reasoning to their peers. Students defend their choice of a function when modeling a real-world situation.

MP.4 Model with mathematics.

Students apply their new mathematical understanding to real-world problems, making use of their expanding repertoire of functions in modeling. Students also discover mathematics through experimentation and by examining patterns in data from real-world contexts.

MP.5 Use appropriate tools strategically.

Students continue to use graphing technology to deepen their understanding of the behavior of polynomial, rational, square root, and trigonometric functions.

MP.6 Attend to precision.

Students make note of the precise definition of complex number, understanding that real numbers are a subset of complex numbers. They pay attention to units in real-world problems and use unit analysis as a method for verifying their answers.

MP.7 Look for and make use of structure.

Students see the operations of complex numbers as extensions of the operations for real numbers. They understand the periodicity of sine and cosine and use these functions to model periodic phenomena.

MP.8 Look for and express regularity in repeated reasoning.

Students observe a pattern that powers of the imaginary number i cycles through the same four outcomes, i , -1 , $-i$ and 1 , since $i^4 = 1$ and any power of i with an integer exponent that is a multiple of 4 has a value 1.

$$\begin{array}{ll} i = i & i^5 = i \\ i^2 = -1 & i^6 = -1 \\ i^3 = -i & i^7 = -i \\ i^4 = 1 & i^8 = 1 \end{array}$$

Students use this observation to make a conjecture about any power of i .