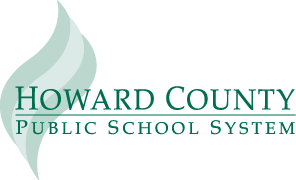
**The Standards for Mathematical Practice**

The 8 Standards for Mathematical Practice describe the behaviors of mathematically proficient students. Mathematics teachers at all levels should seek to develop these behaviors. The practices rest on “processes and proficiencies” of longstanding importance in mathematics education. These process standards and mathematical proficiencies represent the recommendations of the National Council of Teachers of Mathematics and the National Research Council respectively.

Every lesson will include some of these practices although every practice may not be represented in every lesson. Student behaviors are connected to teacher behaviors.

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

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Analyze and explain the meaning of the problem * Actively engage in problem solving (Develop, carry out, and refine a plan) * Show patience and positive attitudes * Ask if their answers make sense * Check their answers with a different method | * Pose rich problems and/or ask open ended questions * Provide wait-time for processing/finding solutions * Circulate to pose probing questions and monitor student progress * Provide opportunities and time for cooperative problem solving and reciprocal teaching |

**Practice #2 Reason abstractly and quantitatively.**

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Represent a problem with symbols * Explain their thinking * Use numbers flexibly by applying properties of operations and place value * Examine the reasonableness of their answers/calculations | * Ask students to explain their thinking regardless of accuracy * Highlight flexible use of numbers * Facilitate discussion through guided questions and representations * Accept varied solutions/representations |

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

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Make reasonable guesses to explore their ideas * Justify solutions and approaches * Listen to the reasoning of others, compare arguments, and decide if the arguments of others makes sense * Ask clarifying and probing questions | * Provide opportunities for students to listen to or read the conclusions and arguments of others * Establish and facilitate a safe environment for discussion * Ask clarifying and probing questions * Avoid giving too much assistance (e.g., providing answers or procedures) |

**Practice #4 Model with mathematics**

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Make reasonable guesses to explore their ideas * Justify solutions and approaches * Listen to the reasoning of others, compare arguments, and decide if the arguments of others makes sense * Ask clarifying questions | * Allow time for the process to take place (model, make graphs, etc.) * Model desired behaviors (think alouds) and thought processes (questioning, revision, reflection/written) * Make appropriate tools available * Create an emotionally safe environment where risk taking is valued * Provide meaningful, real world, authentic, performance-based tasks (non traditional work problems) |

**Practice #5 Use appropriate tools strategically**

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Select and use tools strategically (and flexibly) to visualize, explore, and compare information * Use technological tools and resources to solve problems and deepen understanding | * Make appropriate tools available for learning (calculators, concrete models, digital resources, pencil/paper, compass, protractor, etc.) * Use tools with their instruction |

**Practice #6 Attend to precision**

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Calculate accurately and efficiently * Explain their thinking using mathematics vocabulary * Use appropriate symbols and specify units of measure | * Recognize and model efficient strategies for computation * Use (and challenging students to use) mathematics vocabulary precisely and consistently |

**Practice #7 Look for and make use of structure**

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Look for, develop, and generalize relationships and patterns * Apply reasonable thoughts about patterns and properties to new situations | * Provide time for applying and discussing properties * Ask questions about the application of patterns * Highlight different approaches for solving problems |

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

|  |  |
| --- | --- |
| Students: | Teachers: |
| * Look for methods and shortcuts in patterns and repeated calculations * Evaluate the reasonableness of results and solutions | * Provide tasks and problems with patterns * Ask about possible answers before, and reasonableness after computations |