The *Math Midway* and the Common Core State Standards

The exhibits and activities at the *Math Midway* are designed and created to quickly engage learners in doing, in thinking about, and in understanding mathematics. The exhibits stimulate inquiry, spark curiosity, and foster precisely the mathematical practices that the new Common Core State Standards (CCSS) are advocating for learning mathematics.

Math Midway activities are exploratory, hands-on, interactive, and open ended. Interaction with the exhibits provides rich opportunities for all students to develop those important processes and proficiencies articulated in both the National Council of Teachers of Mathematics (NCTM) Standards and the CCSS. By exciting student curiosity and creating enthusiasm, these activities foster and cultivate behaviors of practicing mathematicians and scientists. Quickly captivating both body and mind, the *Math Midway* presents experiences, puzzles, surprises, and problems that itch for explanation. The exhibits further encourage sense-making and nurture perseverance in trying to resolve situations or solve problems. Many exhibits require abstract and/or quantitative reasoning as well as constructing, sharing, and then critiquing arguments. The activities involve participants in mathematical modeling, using appropriate tools, attending to precision, looking for and using structure, and finding regularity and patterns in repeated reasoning.

Briefly, here is how some of the *Math Midway* activities foster the Mathematical Practices advocated in the CCSS.

CCSS asks math educators at all levels to help students become mathematically proficient. This means that students not only make sense of problems but also persevere in solving them. Almost all activities at the *Math Midway* will involve your students in problem solving in ways that keep them engaged until they've succeeded. Students will walk the No Left Turns maze over and over because they know at a gut level that they will solve it eventually... and they do.

At the exhibit Pirate X and Lady Y, students balance a pirate ship to keep it from sinking. They model this situation with mathematics and then use quantitative reasoning to keep the ship afloat and level. The Organ Function Grinder offers the opportunity for more abstract reasoning as students create functions that will transform a given input into a desired output.

The exhibits at the *Math Midway* encourage the type of social interaction that fosters meaningful mathematical discussion among students. Amazing Acrobats and Miles of Tiles, among others, encourage social interaction, friendly argument, and listening and giving feedback to the hypotheses of others. In this way, students develop critical thinking skills.

To model with mathematics means to find mathematical meaning beneath the surface of a problem situation, examine and manipulate the problem to find an abstract solution, and at the same time apply that solution to a given situation. Pirate X and Lady Y encourages such practice. Students seek and find ways to balance the ship and represent their solutions with equations. Simplifying those equations leads to additional learning.

Different exhibits offer multitudes of mathematical tools to use in strategic manners. From the manipulatives of Miles of Tiles where learners study and create their own tessellations to the calculators of the Organ Function Grinder to the various mirrors of Mirror Morph, Funny Face, and Coffee Cup Curves (to name three), students work with math tools as they solve problems.

Students appreciate that attending to precision is important in several exhibits where small perturbations can affect results, even cause large distortions. The Mysterious Harmonograph, Plant the Daisy, and Magician and the Moon are some of the exhibits that relate to this mathematical practice.

Looking for patterns and structure is an important mathematical practice. Several exhibits underscore this behavior, including Mathematical Monkey Mat, Number Line Tightrope, Polyhedral Puzzle Plaza, and Ring of Fire. As important as seeing pattern and structure is seeing regularity and repetition in thought processes. Opportunities to express regularity and repetition abound at the *Math Midway* in exhibits such as Roller Graphicoaster, Pedal on the Petals, Organ Function Grinder, and Amazing Acrobats. Some of the *Math Midway* exhibits also involve evaluating and improving intermediate results.

These mathematical practices encourage general mathematical proficiency. Each of the *Math Midway* exhibits is also associated with one or more specific mathematical content area(s). The exhibits are designed to permit access at many different levels of sophistication. Topics including counting and cardinality, number and operations, algebraic reasoning, measurement, data, geometry, proportionality, and probability are addressed in the exhibits in an enjoyable and immersive way. Creative teachers can find many ways to link the exhibits of the *Math Midway* to their units of study, from 7th grade study of cross-sections with the Ring of Fire to high school study of functions with the Organ Function Grinder or Roller Graphicoaster.