

**The Metamo4ic Math Center**  
**Math on the Move - Middle School Math Matinee**  
**Program Information and Guidelines**

**\$400.00 - 2 hour program**

**\$500.00 - 3 hour program**

**\$700.00 - full day (3 two-hour programs or 2 three-hour programs)**

- Each game/activity can accommodate up to 8 students.
- The program can accommodate up to 120 students.
- Educators will select the games/activities based on their students' needs and number of students participating in the program. (Please refer to the table below)
- Students will rotate into each game/activity for 30 minutes.
- Educators are responsible for grouping their students into teams/groups based on their own objectives and their students' needs.
- One parent/adult volunteer is required for each game/activity.
- Educators will receive complete program instructions, guidelines, instructional strategies, and instructions for Parent volunteers describing their duties prior to the program.
- A large open area is preferred, but several classrooms will work if there is no large area available.

Whenever possible, we are glad to work with schools and educators to fine-tune our programs to meet extenuating circumstances.

- **Nim** - Nim games are believed to be of ancient Chinese origin. There are many different versions of Nim. Nim is a two person game that uses a specific number of objects that decrease as each player removes pieces from the game board. These games provide middle school students with opportunities to explore game theory, a growing branch of mathematics. Although it is possible to win this game by chance, logic skills are needed to develop strategies that will always allow a player to remove the last piece. Students will be problem solving to determine the "always win strategy."
  - Nim with 10 Objects
  - Nim with 12 Objects
  - Nim with Rows
  - Piling Up Nim

- **Native American Game Sticks** - This game involves probability and statistics. The probability is more complex than it seems at first. Students spin the sticks and score points based on how the sticks fall to the floor. Students will be asked to figure out how many different combinations the sticks may fall. To extend the activity the students can also figure out how many distinct ways (permutations) are possible.
- **Kalah** - Kalah originated in Egypt around 3,500 years ago. Hundreds of variations of this game are played around the world, and many people know this game as Mancala. It is a game of numerical and logical skill. Students must use strategy, mental math, see patterns, anticipate outcomes of moves, and grasp visual representations of numbers.
- **Hex** - The object of Hex is to be the first player to make a continuous pathway from one side of the board to the opposite side. At the same time, each player must also try to prevent his or her opponent from building a pathway. Hex is a strategy game that also involves spatial visualization. Students must use logic, problem-solving skills, and examine and try to predict their opponent's possible moves.
- **Alignment Games** - To play these games students must think strategically. They must evaluate the advantages and disadvantages of moving pieces, predict and anticipate their opponent's moves, decide to block an opponent or work to form a winning formation. Students use logic, spatial visualization, and game theory.
  - Nine Men's Morris
  - Three Men's Morris
  - Pong Hau K'I
  - Mu Torere
- **Roll It, Build It, Solve It** - This game works with numbers and building equations. Students roll giant foam dice, build equations with what they have rolled, and then solve the equations. The game can be differentiated by adding or removing the variable die, exponent die, negative exponent die, or negative number die.
- **Tangible Tangrams** - Students work to assemble the tangram pieces into the original square shape. Students will have opportunities to complete other provided puzzles. Students gain experience with rotation, reflection, transformation, symmetry, and congruency.

- **Measure Up and Sort Out** - Students gain experience measuring angles with a 4-foot protractor. Students will work with two-dimensional giant-sized polygons to classify, observe, and create rules that apply to those polygons.
- **Car Wars** - Students measure piping and build a small car. Students will determine if their car is built correctly from a key. Finally, students will push the car and time how long it takes it to roll from one point to another. The students will measure the distance and then calculate the speed of the car.
- **Puzzling Pentominoes** - Students use 6" square tiles to work to create the 12 different Pentominoe shapes and then work to solve Pentominoe puzzles. Students use spatial imagery and problem solving skills.
- **Metamo4ic Math Game** - Each game board is 5 feet square. The Metamo4ic Math Game provides students the opportunity to:
  - build equations
  - practice using the order property
  - practice all mathematical operations
  - work with fractions
  - work with exponents
  - work with negative exponents
  - develop strategies to build high scoring equations
  - see the equal sign as a balance between two numerical entities

The game is differentiated by removing game tiles from play (for example, negative exponents, exponents, or fraction tiles). Each student scores the equation he/she placed on the board and keeps his/her score throughout the game.
- **Arrolle Cinco Dados** - Roll 5 dice. Players will have to decide how to best score the five dice using:
  - 5!
  - The distributive property
  - Multiplication
  - Adding/subtracting
  - Place Value
- **Head 4 Home** - Players move their 4 pawns around the board by adding, subtracting, multiplying, or dividing the numbers on the dice. The winner is the first player to bring their 4 pawns home.

- **Connect 5** - Players roll giant-size dodecahedron dice and choose numbers to cover on the game board of numbers 1-144. The students may choose to add, subtract, multiply, or divide the numbers on the dice. The students are challenged to figure out why this game is difficult to win and develop strategies to make the game simpler to win.
- **Polyhedron Origami** - Students use small squares of paper to problem-solve and figure out other ways to fold the paper in  $\frac{1}{2}$  other than corner-to-corner or up and down. Students also have the opportunity to use giant-size paper and follow directions to construct a polyhedron of their choice.

<b>Program</b> Please Note: Students will not visit each activity. In a 2-hour program, students visit 4 activities. In a 3-hour program, students visit 6 activities.	<b>Accommodates up to 48 students</b>	<b>Accommodates up to 56 students</b>	<b>Accommodates up to 64 students</b>	<b>Accommodates up to 72 students</b>	<b>Accommodates up to 80 students</b>	<b>Accommodates up to 88 students</b>	<b>Accommodates up to 96 students</b>	<b>Accommodates up to 104 students</b>	<b>Accommodates up to 112 students</b>	<b>Accommodates up to 120 students</b>
<b>Two-Hour Program Number of Activities</b>	6	7	8	9	10	11	12	13	14	15
<b>Three-Hour Program Number of Activities</b>				9	10	11	12	13	14	15

GLEs - State of Missouri Game/Activity	Number and Operations	Algebraic Relationships	Geometry and Spatial Relationships	Measurement	Data and Probability	Show-Me-Standards
<b>Nim</b>		1C; 3A; 4A	2A; 3A; 3B; 4B		4A	The following standards apply to all games and activities: 1.6; 2.3; 3.1; 3.2; 3.3; 3.4; 3.6; 3.7; 4.1; 4.4; 4.6; 4.7; M1-6
<b>Native American Sticks</b>	3E	4A; 1C			1A; 1C4A	
<b>Kalah</b>		4A; 1C	3B; 4B		4A	
<b>Hex</b>		4A; 1C	4B		4A	
<b>Alignment Games</b>		4A; 1C	4B		4A	
<b>Tangible Tangrams</b>			1A; 1B; 3A; 3B; 3C; 4B	2A; 2B; 2D; 2E		
<b>Measure Up Sort Out</b>			1A; 1B; 3A; 3B; 3C; 4B	1A; 2A; 2B; 2C; 2D; 2E		
<b>Car Wars</b>	3C; 3D	2B; 4A	1B; 3A	1C; 2A; 2D	2A; 2B	
<b>Puzzling Pentominoes</b>			1A; 1B; 3A; 3B; 3C; 4B	2A; 2B; 2D; 2E		
<b>Roll It, Build It, Solve It</b>	1B; 1C; 1D; 2B; 2C; 2D; 3C; 3D	2A; 2B; 3A; 4A				
<b>Metamo4ic Math Game</b>	1B; 1C; 1D; 2B; 2C; 2D; 3C; 3D	2A; 2B; 3A; 4A				
<b>Arrolle Cinco Dados</b>	1A; 1C; 2B; 2C; 3C; 3D	2A; 2B; 3A			4A	
<b>Head 4 Home</b>	1A; 1B; 1C; 2B; 2C; 3C; 3D	2A; 2B; 3A			4A	
<b>Connect 5</b>	1A; 1C; 2B; 2C; 3C; 3D	2A; 2B; 3A			4A	
<b>Polyhedron Origami</b>			1A; 1B; 3A; 3B; 3C; 4B			