**Mathematical Monkey Mat**

**Basic Description:**
This whimsical mat that is the setting for the Polyhedral Puzzle Plaza provides a large-scale view of symmetry and tessellation.

**Objectives:**
At this exhibit, students can identify the points of symmetry in the mat and learn about different types of symmetry.

**Links to Websites:**


[http://www.tessellations.org/diy-basic1.htm](http://www.tessellations.org/diy-basic1.htm)

**Vocabulary:**

<table>
<thead>
<tr>
<th>Axis of symmetry</th>
<th>Dilation</th>
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</thead>
<tbody>
<tr>
<td>Hexagon</td>
<td>Line symmetry</td>
</tr>
<tr>
<td>Point symmetry</td>
<td>Reflection</td>
</tr>
<tr>
<td>Rhombus</td>
<td>Rotation</td>
</tr>
<tr>
<td>Rotational symmetry</td>
<td>Six-fold symmetry</td>
</tr>
<tr>
<td>Tessellation</td>
<td>Three-fold symmetry</td>
</tr>
<tr>
<td>Transformation</td>
<td>Two-fold symmetry</td>
</tr>
</tbody>
</table>

**Before:**

- (Level 1, 2, 3) Visit the Math Midway’s training video for the Mathematical Monkey Mat: [http://mathmidway.org/Training/monkey.php](http://mathmidway.org/Training/monkey.php)
- (Level 1, 2, 3) Learn or review the different types of symmetry by linking to: [http://www.learner.org/courses/mathilluminated/interactives/index.php#symm](http://www.learner.org/courses/mathilluminated/interactives/index.php#symm) and [http://www.teachersnetwork.org/dcs/math/symmetry/](http://www.teachersnetwork.org/dcs/math/symmetry/)
- (Levels 2, 3) Study other images to identify points of symmetry. Search the room or the internet.
  
  *What type of symmetry do these objects have?*
  
  *If it (they) exist, can you draw the line(s) of symmetry?*
  
  *Locate the points of symmetry?*
  
  *Determine the angle through which the object must be rotated in order to view the identical image?*
During:
- (Level 1, 2, 3) Look at the monkey mat and identify the points where the rotational symmetry is 2-fold, 3-fold, and 6-fold.

Answers:
2-fold symmetry point is where the ankles of the shorter legs touch,
3-fold symmetry point is where monkey elbows join,
6-fold symmetry point is where all the upturned arms meet

After:
- (Level 1, 2, 3) Create your own tessellation pattern on paper. A great interactive online tutorial is available here: [http://www.tessellations.org/diy-basic1.htm](http://www.tessellations.org/diy-basic1.htm)

- (Level 2, 3) Use Geometer's Sketchpad to create your own tessellations.

- (Level 2, 3) Investigations: examine MC Escher's work.