Miles of Tiles

Brief Description:
This exhibit consists of a magnetic wall and different polygons and shapes which the students use to create patterns and tessellations.

Objectives:
While students express creativity with the patterns they make at this open-ended exhibit, they learn about symmetry, tessellation, and two-dimensional geometry. Activities include making tessellations of one or more polygons, learning about Penrose tilings, exploring geometric transformations, and investigating the properties of the different polygons.

Links to Websites:
http://mathmidway.org/Training/tiles.php

http://www.tessellations.org

http://www.tessellations.org/diy-basic1.htm

http://www.cgl.uwaterloo.ca/~csk/software/penrose/

http://stephencollins.net/penrose

Vocabulary:

Area	Hexagon
Exterior angle	Interior angle
Iteration	Parallelogram
Penrose tilings	Polygon
Rectangle	Rhombus
Square	Tessellation
Transformation	Triangle

Before:
- ⊙ (*Levels 1, 2, 3*) Discuss what a tessellation is and why only certain regular polygons will tile the plane. http://www.tessellations.org

- ⊙ (*Levels 1, 2*) Expose students to different shapes with pattern blocks.

During:
- ⊙ (*Level 1, 2*) Activity: "Adding to One"
  Show example of how 4 square magnets placed together can make a larger square. (Each of the smaller squares is 1/4 of the large square.)

  Take 6 triangular magnets and place them around a point.
  What fraction is each triangle in the larger polygon? (ans. 1/6)

  Ask students to think of another available magnetic polygon that can surround a point.
  What fractional part of the "whole" is each polygon?

- ⊙ (*Level 2, 3*) Activity "Adding to 360"
  Create student groups and have them explore the different combinations of polygons that can surround a point, and ask them to discuss the fraction of the whole each type of polygon occupies. The answer will depend upon whether they count the number of polygons, the number of degrees or the area.

Discuss the interior angles of the polygons.

In groups, students explore the different combinations of polygons that can surround a point, and ask them to record the angle measurements to make sure they add up to $360°$.

- ⊙ (*Level 1, 2, 3*) Pattern-making activity
  Show an example of a tessellation.
  Send students to either side of the tile wall to extend the patterns.
  Discuss the types of symmetry and strategies for extending the pattern.

After:

- ⊙ (*Levels 1, 2*) Investigate Penrose tilings at: http://stephencollins.net/penrose and generate a Penrose tiling using an applet at: http://www.cgl.uwaterloo.ca/~csk/software/penrose/

- ⊙ (*Levels 1, 2, 3*) Make tessellating shapes in your classroom with construction paper. Use this website as a guide to help create tessellations. http://www.tessellations.org/diy-basic1.htm

- ⊙ (*Levels 2, 3*) Create a tessellation on graph paper and find the area of the creation by calculating the area of one iteration of the pattern.