Amazing Acrobats

Brief Description:
This exhibit consists of model "acrobats" that are screwed together, initially to form twelve cycles of five connected figures which eventually can be connected to form a dodecahedron.

Objectives:
Here is another opportunity to explore symmetry and three-dimensional geometry, through the construction of a beautiful mathematically-based sculpture. Students can choose color patterns for the sculpture that highlight the different symmetries of the completed shape.

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

http://www.enchantedlearning.com/math/geometry/solids/Dodecahedrontemp.shtml

http://www.ii.uib.no/~arntzen/kalender/

http://web.eecs.utk.edu/~plank/plank/pics/origami/penultimate/pentagon.html

http://www.cs.utk.edu/~plank/plank/pics/origami/penultimate/dodecahedron.html

Vocabulary:
Dodecahedron	Edge
Face	Hexagon
Origami	Pentagon
Rhombus	Vertex

Before:
- ⊙ (*Level 1, 2, 3*) Make a model of a dodecahedron, which will introduce the shape of the completed exhibit sculpture. Use template at this website: http://www.enchantedlearning.com/math/geometry/solids/Dodecahedrontemp.shtml

- ⊙ (*Level 1, 2, 3*) Another website that allows you to print out a dodecahedron calendar can be found at: http://www.ii.uib.no/~arntzen/kalender/. It also allows the visitor to print out a rhombic dodecahedron calendar. Both sites give the folding directions and offer the visitor a variety of options relating to the year, language, and starting day.

  Count the faces, edges, and vertices.
  If the sculpture has 30 pieces in it, what must the pieces represent? [There are 12 faces, 20 vertices, and 30 edges, so each piece represents an edge.]

During:
- ⊙ (*Level 1, 2, 3*) Build the sculpture as a group and try to incorporate a particular color pattern, for example, make each 5 acrobat "pentagon" out of a single color.

After:

- ⊙ (*Levels 1, 2, 3*) Modular origami is an easy way to incorporate three-dimensional mathematical sculpture into your classroom. A great place to start is with a modular dodecahedron. This is made with 30 pieces of 4"x3" paper folded into "pentagon modules." The instructions for folding the pentagon module can be found here: http://web.eecs.utk.edu/~plank/plank/pics/origami/penultimate/pentagon.html

  The instructions for putting the modules together into dodecahedrons are here: http://www.cs.utk.edu/~plank/plank/pics/origami/penultimate/dodecahedron.html

  Unfolding origami creations can reveal many geometric shapes in the crease patterns.

Resources:

Polyhedron Origami for Beginners by Miyuki Kawamura
Unit Origami: Multidimensional Transformations by Tomoko Fuse