

Patterned Polyhedrons



Target Grade: Grade 10

Goal (Terminal Objective): Students will create a 3-dimensional model of a polyhedron with geometric inspired surface design.

Objective: By applying mathematical principles of geometry, which is a math class typically taken at the grade 10 level, students will construct a creative, artistic polyhedron.

National Standards:

Visual Arts Grades 9-12 Content Standard 1: Understanding and applying media techniques and processes

Visual Arts Grades 9-12 Content Standard 2: Using knowledge of structures and functions

Visual Arts Grades 9-12 Content Standard 3: Choosing and evaluating a range of subject matter, symbols, and ideas

Visual Arts Grades 9-12 Content Standard 6: Making connections between visual arts and other disciplines – Math (Geometry) cross curriculum connection

Purpose: By applying geometry, both in 2-dimensions for surface design and 3-dimensions for the construction process of a polyhedron, students will create an original artistic geometric sculpture. Students will apply the principle of repetition to achieve balance, unity, and rhythm in their sculpture. Students will demonstrate understanding of color harmonies when choosing a color pallet for their construction.

New Vocabulary: polyhedron, sculpture in-the-round

Materials: cardstock or tag board, polyhedron patterns (see link in references), and the following Sargent art supplies:



#22-7236 36 ct. Colored Pencils



#22-1403 8 g. Washable glue sticks



#22-1507 6 ct. Metallic Fine Point Peggable Carton Markers



#22-7244 144 ct. Graphite Pencils



#36-1012 36ct. Pink Eraser Bes Buy Pack

Time: approximately 3-4 class periods

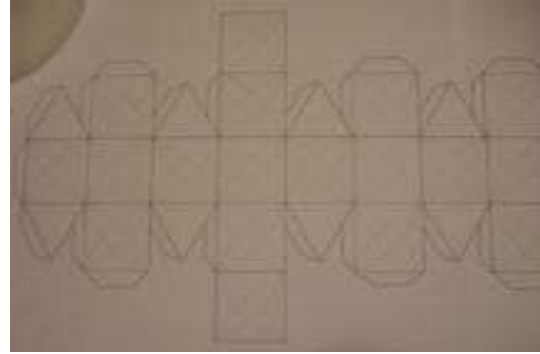
Instruction and Motivation (Set): Begin by introducing what a polyhedron is and the vast assortment of forms available to construct from a pre-existing pattern. Inform the students that if a simple form is chosen to construct, the surface pattern must be more elaborate, but if a more challenging form is chosen to construct, the surface pattern can be a little simpler. Discuss where we witness geometry in our everyday life and in nature. Discuss with the students characteristics of art that is geometric in nature. Allow the students to browse a variety of polyhedron patterns and decide which one they would like to construct. Reiterate that geometric design principles will also be applied towards surface decoration of their polyhedron.

Instruction:

- 1) Upon choosing a polyhedron pattern, either print it out on cardstock or transfer the pattern to tag board by hand.
- 2) Before cutting the pattern out, draw a geometric inspired design on it and color it completely with Sargent colored pencils. Add metallic accents with Sargent liquid metal markers. Emphasize repetition and unity when drawing the pattern and choosing colors.



drawing geometric design on pattern using a template for an arc



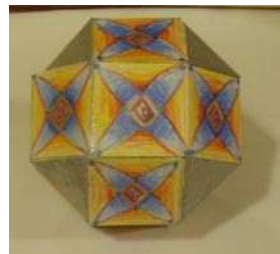
pattern shown with design drawn on it

3) Upon completion of coloring the entire surface design, cut out the pattern.



cutting pattern out

4) Score the fold lines lightly and begin folding all lines. Glue together side by side, holding for a bit as each section dries. It will be very important to cut straight and fold accurately, so the final polyhedron form fits together correctly.



finished, fully constructed and decorated polyhedron

Activities:

(1) Guided Practice:

- Students spend time sorting through the vast number of polyhedron patterns available to them.
- Students plan out a geometric surface design. Tracing paper, templates, etc. may be used to achieve consistent repetition and unity.
- Students choose a pattern and draw an individual, creative geometric pattern on the surface.
- Students finish construction of the 3-dimensional polyhedron by gluing

it together carefully and accurately.

(2) Independent Practice and Check for Understanding:

(a) Teacher circulates and helps students with questions along the way.

(b) Teacher offers individual help with surface design and color

choices. **(3) Closure:**

(a) Students present their final polyhedron sculptures by name to the class and reflect on challenges along the way.

(b) The finished polyhedrons look fantastic when hung from the ceiling of the classroom for display.

Evaluation:

Level One -- The finished polyhedron very successfully demonstrates the student's understanding of geometric surface design and 3-dimensional construction. The student has shown ability in accurately cutting and constructing a regular geometric form. The student has shown a high level of creativity in completing the polyhedron with an original surface design and color choices. Color blending has been achieved beautifully. Overall craftsmanship is outstanding.

Level Two -- The finished polyhedron successfully demonstrates the student's understanding of geometric surface design and 3-dimensional construction. The student has shown decent ability in accurately cutting and constructing a regular geometric form. The student has shown creativity in completing the polyhedron with an original surface design and color choices. Color blending has been achieved. Overall craftsmanship is good.

Level Three -- The finished polyhedron demonstrates fair understanding of geometric surface design and 3-dimensional construction. The student has shown fair ability in accurately cutting and constructing a regular geometric form. The student has shown minimal creativity in completing the polyhedron with an original surface design and color choices. Color blending is minimal. Overall craftsmanship is fair.

Level Four -- The finished polyhedron demonstrates poor understanding of geometric surface design and 3-dimensional construction. The student has shown poor ability in accurately cutting and constructing a regular geometric form. The student has shown no creativity in completing the polyhedron with an original surface design and color choices. Color blending doesn't exist. Overall craftsmanship is lacking.

Extension:

A follow-up activity could be to have students choose a classmate's polyhedron and do a drawing of it from direct observation. This is good practice in depicting 3-dimensional forms in 2-dimensions.

Resources:

<http://www.korthalsaltes.com/> (a great online resource for FREE polyhedron patterns)

<http://employees.csbsju.edu/mwenninger/2002.html>

<http://www.mi.sanu.ac.yu/vismath/hartex/index.html>

<http://www.mathaware.org/mam/03/essay2.html>

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