Obelisk

*Artist: Sigmund Reszetnik*

Curriculum Links

Math

Visual Art

Before You Visit:

The Mathematical Problem:

An artist is looking to make a three dimensional, irregular shaped sculpture using four sides, a top, a base, and x number of polygons. His wealthy patron requires that he use at least four quadrilaterals in his sculpture to represent the four corners of his garden.

With a pencil and grid paper (or Geo-board if available), sketch out some possibilities in two dimensions for how this might look using one, two, three, and four quadrilaterals combined. Stack the quadrilaterals vertically to create different overall shapes. You will end up with four different drawings.
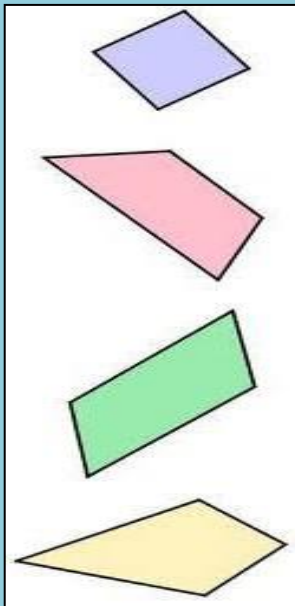
Basically, a polygon is a closed plane figure made of three or more sides.

Number of sides	Name of polygon
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon
12	dodecagon

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Development in the Classroom:

Step 1: Working either individually or in groups, have the students cut quadrilaterals from cardboard or cardstock to create three dimensional structures from the sketches they have made on graph paper.

Step 2: Each group may choose a drawing from one of the sketches and create the structure from the cardboard (template provided). Use tape to hold the forms together (aesthetics are not important at this point).

Step 3: Pay attention to balance in the structure and form, the students should experiment with different ways of placing their quadrilaterals.

Step 4: Have students display their work and decide which sculpture the patron would likely fund for building in his garden.

Step 5: Show pictures of the Obelisk Sculpture and identify the polygons.

Step 6: Have students answer the questions on the math worksheet provided below.

Materials:

- Pencil
- Grid paper or Geo-Board
- Cardboard or cardstock
- Tape
- Math worksheets

Quadrilaterals

noun\kwod-ruh-lat-er-uh\
Polygons composed of four
straight-line segments,
they can be regular shaped
(as in square), or irregular shaped,
like the sculpture "Obelisk."

Definition

Math Work Sheet: Obelisk

Name: _____   Date: _____

1. How many sides does Obelisk have?

_____

2. How many faces do we see?

_____

3. How many are there total?

_____

4. How many vertices can we see? Per side?

_____

5. How many are there total?

_____

6. How many polygons are there total in the entire Sculpture?

_____

7. What are the names of the polygons?

_____

8. **What shape is the base?**

_____

9. **What shape is the top?**

_____

10. **Are there any reflected shapes?**

_____

11. **What do you notice about side one and three? What do you notice about sides two and four?**

_____

Answers:
1. *Six (Four sides plus a top and a base)*
2. *Ten*
3. *Twelve (with the top and the base)*
4. *52, 10 on Sides 2 and 4, 16 on Sides 1 and 3*
5. *60 including 4 on the top and 4 on the base*
6. *11 including the top and base*
7. *Side 1: Four Quadrilaterals, Side 2: One Decagon, Side 3: Four Quadrilaterals, Side 4: One Decagon, Top: One Rectangle, Base: One Rectangle*
8. *Rectangular*
9. *Rectangular*
10. *Yes*
11. *They have the same amount of polygons; they are both decagons of the same shape.*

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Development in the Sculpture Park:

Have students use the pencil and thumb sitting technique to estimate measurements of Obelisk. Begin with a tree, or perhaps another outstanding monument to start with (Detroit GM tower).
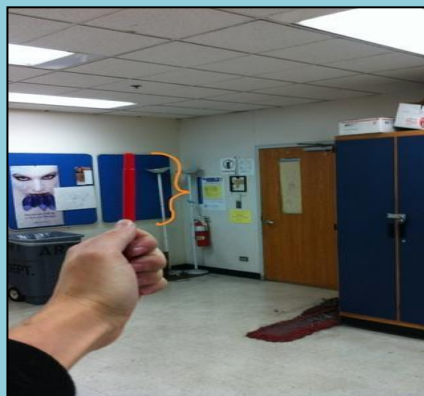

Sitting Technique for Measurement

- Hold your body rigid and extend your dominant arm (usually the right arm), pencil in your hand, to its full length

- Place your thumb against the pencil as a gauge

- Bring the pencil on a line with your eye and the object that you are measuring

- Try to find one part by which you can then measure the rest of the object

This can be called your **standard unit of measurement** and can be the unit by which all other sides and angles are measured.

- Once you find a part which to measure the rest of the parts of the object, you can then proceed to put in the object's details, still using the same scale of measurement in which you established

Using their estimates, have students measure the entire area of the Obelisk shape by calculating the polygons individually and then adding each up from top to base.
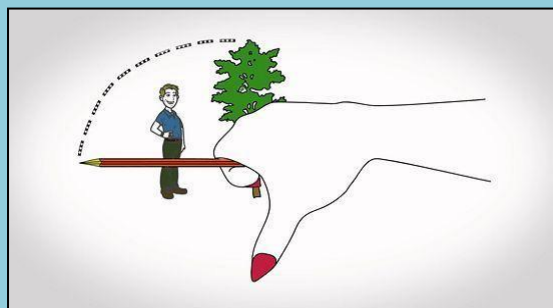
Reference 1 – "Area of Irregular Shapes" via Basic-Mathematics.com
http://www.basic-mathematics.com/area-of-irregular-shapes.html

Reference 2 – "How to Find Measurements Proportions and Angles" via DrawingHowtoDraw.com
http://www.drawinghowtodraw.com/stepbystepdrawinglessons/2010/01/how-to-find-measurements-proportions-and-angles-to-draw-with-pencil-thumb-method/

BROKEN LINK?
Search the Net:
Keywords:
"Area of Irregular Shapes"
"How to Draw"
"Step by Step Drawing Tutorials"

Materials:
- Blank white paper
- Pencils
- Calculators

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Development in the Sculpture Park Continued:

Use these pictures for reference if needed.

Side 1

Side 2

Side 3

Side 4

Closure:

Students can create patterns and designs on their sculpted pieces by using additional quadrilaterals, cut in the same size, and glued on to create a sense of balance and unity. Or students can use colours to mimic the Obelisk sculpture in monochromatic blues. To be eco-friendly, use construction paper scraps and create your own patterns that symbolize their feelings about the sculpture.

Extensions: In the Park

Geometric Dimensions Hunt:
- What other sculptures can you find that use quadrilateral shapes?
- Are there other polygons that artists employ to create their art?
- How many shapes can you see in two dimensions or in three?

Materials:

- Glue
- Pencils
- Cool coloured pencil crayons
- Cool coloured construction paper
- Scissors
- Cool coloured markers