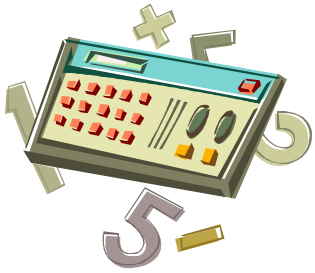
Algebra/Geometry Institute Summer 2004



Lesson Plan 1

Faculty Name: Julie Avent
School: H.M. Nailor Elementary, Cleveland, MS
Grade Level: 6th Grade

1 Teaching objective: The students will explore the relationships of three-dimensional figures, including vertices, faces, and edges using manipulative materials (2d).

2 Instructional Activities:

- The teacher will (TTW) remind the students that the definition of a two-dimensional object is a flat surface that has height and width, but no depth, whereas a three-dimensional object has or appears to have, height, width, and depth.
- TTW pass a two-dimensional African mask and a three-dimensional African mask around the room in order for the students to feel the difference between two-dimensional and three-dimensional objects.
- TTW tell the students that now they will create a three-dimensional object, which is also called a polyhedron.
- TTW tell the students they will be divided into five groups according to the polyhedron that is given to them and they will color, cut, and glue their own 3-D shape.
- TTW place the students into groups by passing out one of five polyhedron nets to every student and everyone that has the same shape will work in the same group.
- TTW ask the students to identify the shape the polyhedron is made up of.
- TTW pass out crayons, scissors, and glue for the students' to use in order to create their 3-D shape.
- TTW allow time for the students to create the polyhedron.
- TTW assess the students' understanding of the activity by walking around and observing the students.
- TTW use polyhedrons already constructed to name each part of all the polyhedrons: the flat surfaces are called the faces, the point where three or more edges come together is called the vertex or vertices, and the line segments where two shapes come together are called the edges.
- TTW pass out a chart for the students to use in order to find a relationship between the faces, vertices, and edges.
- TTW tell the students to count the number of faces, vertices, and edges on their polyhedron they have constructed and record answers in the chart.

Polyhedron Chart

Polyhedron Name	Faces	Vertices	Edges
Tetrahedron (pyramid)			
Hexahedron (cube)			
Octahedron			
Dodecahedron			
Icosahedron			

- TTW will allow the students ample time to fill the information in on the chart for their particular polyhedron.
- TTW have one person from each group stand and tell the number of faces, vertices, and edges for their shape.
- TTW tell the rest of the students to fill the information in on the chart as each group presents.
- TTW allow each group ample time to determine a relationship or pattern between the faces, vertices, and edges between all the shapes.
- TTW assess the students' understanding of the activity by walking around and observing the students.
- TTW have each group designate one person to be the speaker and they will stand to tell the relationship between the faces, vertices, and edges.
- TTW tell the students there is a formula created by a man named Leonhard Euler that is used to determine the relationship between the faces, vertices, and edges: F + V= E + 2.
- TTW ask one student to come to the board to demonstrate how the formula works by using one of the polyhedra in the polyhedron chart.
- TTW have the whole class use the formula with the other four polyhedrons in the polyhedron chart.
- TTW assess the students' understanding of the activity by walking around and observing the students.

3 Materials and Resources:

- Two and Three-Dimensional African Masks
- Polyhedron Nets (Tetrahedron, Hexahedron, Octahedron, Dodecahedron, Icosahedron) For the patterns of the tetrahedron, octahedron, dodecahedron, and icosahedron go to: http://www.harcourtschool.com/teacher_resources/math/pdfs/net_gr8.pdf
- Polyhedron Chart
- Scissors
- Glue
- Crayons

Hoffer, A.R., Koss, R., Beckman, J.D., Duren, P.E., Hernandez, J.L., Schlesinger, B.M., Wiehe, C. (1998) . Focus on Geometry. (pp. 410-411). Addison Wesley Longman.

Larson, R.E., Boswell, L., Stiff, L. (1995). Geometry: An Integrated Approach. (pp. 587-589). D.C. Health and Company

Jenkins, L., Laycock, M., McLean, P. (1988). Geoblocks and Geojackets. (Metric ed.). (pp. 66-67). Activity Resources Company.

4 Assessment: The teacher will assess the students' understanding of the lesson by walking around and observing. The teacher will also take shorthand notes in order to have a record to refer to later. While the teacher is observing the students, he/she will look for the following things:

- all students are staying on task
- all students have an understanding of the activities
- all students are working cooperatively