

## LEARNING PLAN

<p><b>Exploratory Activities</b></p> <p>“Back in the Box” Puzzle consists of a cubical box that is packed with 17 tetrahedral pieces. The idea is to dump the pieces out of the box and then figure out how to fit all of them back into it again. - from Harold Jacobs’ book: <i>Mathematics, A Human Endeavor</i>, Third Edition, Freeman and Company, pp. 280-283</p>	<p><b>CONCEPT</b></p> <p><b>The Geometric Solids – regular polyhedrons (Platonic solids) and semi-regular polyhedrons (Archimedean solids)</b></p>
<p><b>Concept Development Activities</b></p> <p>1. Modeling the Platonic solids: “What would each of the five Platonic solids look like when unfolded?”</p> <p>The students will be divided into groups of three. A lottery will be drawn to assign a specific regular polyhedron for the group to build. The regular polyhedrons will be the tetrahedron, the icosahedron, the octahedron, hexahedron, and dodecahedron.</p> <p>The solids built by the groups will be hanged as mobiles from the ceiling of the classroom.</p> <p>2. "Triangular Hexahedron" - from <i>Unfolding Mathematics with Unit Origami</i> by Betsy Franco Key Curriculum Press.</p> <p>3. Create 2D and 3D shapes by Paula Maritz (web-based activity) – In this creative Math activity the students will create 2D and 3D shapes out of tooth picks and raw chick-peas. Reference:  <a href="http://www.lessonplanspage.com/MathArt2D3DShapesFromToothpicksChick-Peas48.htm">http://www.lessonplanspage.com/MathArt2D3DShapesFromToothpicksChick-Peas48.htm</a></p>	<p><b>Materials and Resources:</b></p> <p><i>Mathematics, A Human Endeavor, Third Edition</i>, by Harold Jacobs Freeman and Company</p> <p>Poster board or cardboard,          compass and straightedge          scissors, glue, paste, or cellophane tape          colored pens or pencils for decorating the solids (optional)</p> <p><i>Discovering Geometry An Investigative Approach</i> by Michael Serra, Key Curriculum Press pp. 528-530</p> <p><i>Investigating With Relational Geosolids</i> by Karen Lindebrekke and Dana Hupert, ETA Cuisenaire</p> <p><i>Unfolding Mathematics with Unit Origami</i> by Betsy Franco Key Curriculum Press</p> <p>Relational Geosolids (ETA Cuisenaire)          Nets for use with ETA Cuisenaire Relational Geosolids</p> <p>Websites:          Create 2D and 3D shapes by Paula Maritz:  <a href="http://www.lessonplanspage.com/MathArt2D3DShapesFromToothpicksChick-Peas48.htm">http://www.lessonplanspage.com/MathArt2D3DShapesFromToothpicksChick-Peas48.htm</a>          Platonic Solids  <a href="http://www.dartmouth.edu/~matc/math5.geometry/unit6/unit6.html">http://www.dartmouth.edu/~matc/math5.geometry/unit6/unit6.html</a> and  <a href="http://www.dartmouth.edu/~matc/math5.geometry/unit14/unit14.html">http://www.dartmouth.edu/~matc/math5.geometry/unit14/unit14.html</a></p>

<p><b>Basic Facts and Standard Algorithms Formalized</b></p> <ol style="list-style-type: none"> <li>1. Review of parallel, perpendicular, and skew lines as well as parallel and perpendicular planes.</li> <li>2. Building nets of geometric solids.</li> <li>3. Study of surface area and volume of solids.</li> <li>4. Familiarizing the students with the different types of polyhedrons and letting them investigate some of the solids' geometric properties.</li> <li>5. Comparing and contrasting regular from the semi-regular geometric solids.</li> </ol>	<p><b>Originality and Creativity</b> <i>Student Products</i></p> <p><b>Written:</b> Write a journal pointing out all kinds of polyhedrons you encounter in everyday life (for example, the houses you pass by on your way to school or the buildings especially in downtown Houston, objects that you see inside your homes which have polyhedral structure, kitchen wares, toys, etc...). Identify them using the naming system we established in class based on the number of faces they have. Explain different scenarios wherein you can see the uses of polyhedrons in real life, in architecture and in art.</p>
<p><b>Assessment</b></p> <p><b>Formal:</b></p> <ol style="list-style-type: none"> <li>1. Quiz on regular polyhedrons, their names and characteristics (number of faces, edges, and vertices of each), surface area and volume of solids</li> <li>2. Class assignments – worksheets based on exercises from the textbook and reference books as well as teacher-made ones.</li> <li>3. Unit test on geometric solids.</li> </ol> <p><b>Informal:</b></p> <ol style="list-style-type: none"> <li>1. Group project – performance-based, participation</li> <li>2. Poster and group presentation</li> </ol>	<p><b>Verbal</b></p> <ol style="list-style-type: none"> <li>1. Design and conduct an interview with science laboratory teachers and/or chemistry teachers asking them about where and how they make use of polyhedrons. Which kinds of molecules exhibit polyhedral structures and which kinds of polyhedrons?</li> <li>2. Present the poster made from the visual activity below.</li> </ol> <p><b>Kinesthetic</b></p> <ol style="list-style-type: none"> <li>1. The exploratory activities above.</li> <li>2. Make models of atoms which are polyhedral in structure using chick peas and toothpicks.</li> <li>3. Make some Archimedean solids.</li> <li>4. Make a work of art featuring polyhedrons.</li> </ol>
<p><b>Related TEKS</b></p> <p><b>Geometry</b></p> <p><b>e.1</b></p> <p><b>e.1.A</b></p> <p><b>e.1.D</b></p> <p><b>e.2.</b></p> <p><b>e.2.A</b></p> <p><b>e.2.B</b></p> <p><b>e.2.D</b></p>	<p><b>Visual</b></p> <p>Create a poster illustrating each of the nets of the 5 Platonic solids and drawing the resulting three-dimensional figures across them.</p>

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