

LessonTitle: Three Dimensional Shapes		Pre 8.4
Utah State Core Standard and Indicators Pre-algebra Standard 4 Process Standards 3-5		
Summary		
In this lesson, students construct and classify geometric solids.		
Enduring Understanding	Essential Questions	
Three dimensional shapes, geometric solids, can be classified using the shape of the base and the number of faces, vertices and edges.	How do we communicate about 3D shapes or geometric solids?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> Observing and classifying geometric solid characteristics 		
Assessment		
<ul style="list-style-type: none"> Have students keep a record of learning associated with defining and classifying quadrilaterals. This includes the Geometric solid characteristic sheet (below) as well as the record of terms from Pre 7.3. 		
Materials: Geometric solid building materials (see below), worksheets, centimeter graph paper, Classify and Capture game cards.		
Launch		
Explore		
<ul style="list-style-type: none"> How do you classify geometric solids? What are the similarities and differences among different prisms, pyramids and cylinders? What are regular polyhedra? 		
Summarize		
Apply		

Directions: Students should continue to record their learning on the record of learning sheet from lesson 7.3. Students can also use the _____

1) Students construct three dimensional figures using materials such as Geofix shapes and Polydrons. They might also use coffee stirrers, toothpicks, or straws to form edges and gumdrops, marshmallows, or raisins for the vertices. See lessons found in NCTM's [Navigating Through Geometry](#)

- I Took a Trip on a Train, pages 69-70 and on the CD-Rom accompanying the book.
- Constructing Three Dimensional Figures pages 71-72 and student worksheet pages 116-117.

2) Using centimeter graph or isometric dot paper, have student groups draw nets for all geometric solids found on the "Characteristics of Geometric Solids" worksheet (see below). To prepare to draw the nets, have each group cut open an empty cereal box, cutting along the edges in order to maintain one large flat surface. Then draw the nets for the polyhedra.

Then complete the worksheet. Students may find this easier if they build the shapes first using straws, marshmallows etc. SAVE THESE NETS for finding surface area and volume.

3) In order to play the Classify and Capture Geometric Solids game (see below), student groups should construct an example for each of the attribute cards—can include those done for #2 above. Perhaps student groups could exchange sets of constructed shapes for playing the game. See directions in lesson 7.0 and polyhedron card set 3 below. (Taken from an article in Mathematics in the Middle School, NCTM, February 2003)

3) For further visualization and 3D shape spatial experience, access these lessons from NCTM's [Navigating Through Geometry](#).

- Isometric Explorations, pages 65-66 and student pages 113-114
- Cross Sections of Three Dimensional Shapes, pages 67-68 and student page 115.

4) Drawing 3D constructions on Isometric Dot Paper. Have students build simple constructions using 4-8 linking cubes or other cubic blocks. Then have them draw the constructions from top, front, side, and back views. Like any artist, this enables students to see more than they normally do.

Characteristics of Geometric Solids

Geometric Solids	Shape of Base(s)	Number of Faces	Number of Vertices	Number of Edges
1) Large Square Prism				
2) Small Square Prism				
3) Large Rectangular Prism				
4) Small Rectangular Prism				
5) Pentagonal Prism				
6) Large Triangular Prism				
7) Small Triangular Prism				
8) Square Pyramid				
9) Triangular Pyramid				
10) Large Cylinder				
11) Small Cylinder				
12) Cone				

In the mid-eighteenth Century, a Swiss mathematician named Leonard Euler discovered a relationship between faces and vertices and edges.

Use the data from the chart above to discover Euler's Formula. Use the first nine solids listed in the table. Show all work below.

Classify and Capture Geometric Solid card set

Prisms	Not Prisms	Right Prisms
Pyramids	Not Pyramids	Not Right Prisms
Cylinders	Not Cylinders	Cones
Right Pyramids	Not Right Pyramids	Not Cones
Right Cylinders	Not Right Cylinders	Right Cones
Not Regular Polyhedra	Regular Polyhedra	Not Right Cones
Triangular Prisms	Square Prisms	Rectangular Prisms
Triangular Pyramids	Square Pyramids	Rectangular Pyramids
Semi Regular Polyhedra		