Introduction to Three-Dimensional Geometry

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Name: _____

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Example 1. Define the following terms and draw a picture of each one.

- Solid
- Polyhedron

• Vertex

• Edge

- Face
- Space Diagonal
- Net
- Prism
- Triangular Prism
- Rectangular Prism

- Cylinder
- Pyramid
- Square Pyramid
- Triangular Pyramid (Tetrahedron)
- Cone
- Sphere

- Hemisphere
- Regular Tetrahedron
- Cube (Regular Hexahedron)
- Regular Octahedron
- Regular Dodecahedron
- Regular Icosahedron

Example 2. Explain why the analogy

shape : polygon :: solid : polyhedron

makes sense.

Example 3. Look at the list of solids in Example 1.

- Which ones are prisms?
- Which ones are pyramids?

Shape	Faces	Edges	Vertices
Triangular Prism			
Rectangular Prism			
Pentagonal Prism			
Hexagonal Prism			
Triangular Pyramid			
Square Pyramid			
Pentagonal Pyramid			
Hexagonal Pyramid			
Regular Tetrahedron			
Cube			
Regular Octahedron			

Example 4. Fill in the following table.

Regular Dodecahedron

Regular Icosahedron

Add the number of faces and vertices for each polyhedron. Do you notice any patterns?

Example 5. Is the following a net of a cube? Why or why not?



Example 6. How many diagonals are there in a cube?

Example 7. Someone cut a cylindrically-shaped cake using three straight cuts. What is the maximum possible number of pieces that the cake could have been cut into?

Example 8. A regular octahedron is folded from the net shown. What number shows on the top when the face numbered 1 is on the bottom?



Problem 1. A solid has the following net.



Find its number of vertices, number of edges, and number of faces.

Problem 2. When the following net is folded into a cube, what letter is on the face opposite N?



Problem 3. How many diagonals are there in a hexagonal prism?

Problem 4. Is it possible to cut a cube so that the exposed face is:

- A triangle?
- A quadrilateral?
- A pentagon?
- A hexagon?

Problem 5. A solid has twelve faces, all of which are equilateral triangles. Find its number of edges and its number of vertices.

Problem 6. Find as many different nets of a cube as you can. (Hint: there are eleven. It helps to physically cut some nets out of paper and then fold them.)