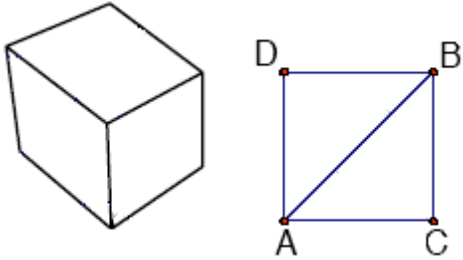


Worksheet

Rhombic Dodecahedron – Hidden Within or Surrounding the Cube?

Name _____

Consider a cube with one face $ADBC$.



1. How many faces does the cube have? _____ edges? _____ vertices? _____
2. Each face has _____ diagonals. Total face diagonals per cube? _____
3. Diagonal (\overline{AB}) and adjacent edges (\overline{AC} and \overline{CB}) form what type of geometric figure? _____ Are all such figures of the cube congruent? _____ Why? _____
4. Assuming an edge length of 2 units, calculate the length of each face diagonal. _____
5. When 6 congruent square pyramids are put together with their apexes inward they form a cube as shown below. The non-base edges of the pyramids form the interior diagonals of the cube and are _____ as long as a lateral edge of each pyramid.



Square Pyramid



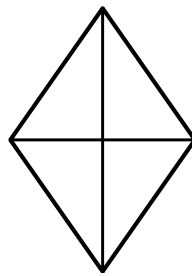
Cube Formed by Square Pyramids

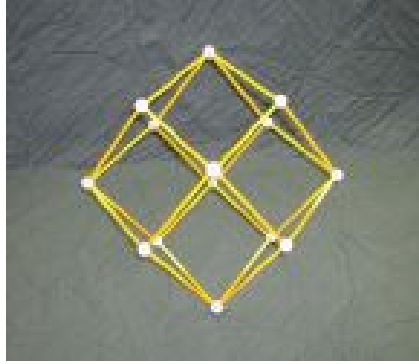
6. Look at the above diagram of the square pyramid and use the Pythagorean Theorem to find each length.

Length of edge of base	2 units
Length of altitude of pyramid	
Length of altitude of lateral face	
Length of lateral edge of pyramid	

7. When the cube is surrounded by a jacket of 6 square pyramids, a new polyhedron is created. How many faces does it appear to have? _____ What are the measures of the dihedral angles formed where three faces meet at a vertex on the new polyhedron? _____
8. Show/explain with words or diagrams why the triangles of two adjacent pyramids create a flat rhombic face of the new polyhedron.

9. Use the diagrams below to help calculate the lengths of the long and short diagonals. You may also find the Zome™ tool model/straw model helpful.





Length of edge	
Length of short diagonal	
Length of long diagonal	

9. The rhombic dodecahedron packs space. Put together several of the rhombic dodecahedrons to see this amazing property. Explain in words and/or diagrams why you think this works.

11. Show your calculations for each of the following.

a. Find the volume of the cube. _____

b. Find the volume of the square based pyramid using at least two techniques.

c. Find the volume of the rhombic dodecahedron.
