**Activity 8.2.5 Independent Investigations of Dimensions**

1. Extend the tables in Activities 8.2.3 and 8.2.4 to the fifth and sixth dimensions.

2. Construct a three-dimensional model of a hypercube.  Demonstrate where all the vertices, edges, faces, and spaces are.

3. A triangle is sometimes called a 2-simplex and a tetrahedron a 3-simplex.   Make a chart for the simplex family similar to the one you made for squares and cubes.  Then predict the number of vertices, edges, faces and spaces for a 4-simplex.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Figure | Dimensions | # of vertices | # of edges | # of faces | # of spaces |
| point |  |  | --- | --- | --- |
| segment |  |  |  | --- | --- |
| triangle |  |  |  |  | --- |
| tetrahedron |  |  |  |  |  |

4. Extend the concepts of prism and pyramid to the fourth dimension.  What are characteristics of hyper prisms and hyper pyramids?

5. Find computer-generated images of four-dimensional figures on the internet.  What insights do you gain by viewing these images?

6. Read *Sphereland: A Fantasy About Curved Spaces and an Expanding a* 1965 novel by [Dionys Burger](http://en.wikipedia.org/wiki/Dionys_Burger). Compare the world the author describes with Abbott’s *Flatland*.

7.  In Einstein’s theory of special relativity the fourth dimension is time.  Research this theory and explain how it works.

8. Some scientists believe the universe has more than 3 spatial dimensions.  Research their ideas.