

Space: Its Light, Its Shape.

Chapter 14: The Hypersphere

Assignment: For

- Read Chapter 14.
- Though everyone is responsible for reading all of the material and for working out all of the exercises, teams have been assigned specific material and exercises for which they are responsible in class presentations. You may want to come to class early to firm up and smooth out the exercises with your teammates.

Team 2: Define a topological and geometric circle, two-sphere and three-sphere.

Team 3: How might A Square visualize a two-sphere?

Team 4: Generalize the method above to describe how we might visualize a three-sphere.

Team 1: Present Exercise 14.3.

Team 2: How can Flatlanders visualize the two great circles that come from intersecting with the coordinate planes?

Team 3: Describe how Figure 14.5 gives us a way to visualize four “great two-spheres” in a three-sphere. What is each “slice” of a three-sphere?

Team 4: Describe what a piece of an unstretchable three-sphere looks like in Euclidean three-space. What do cross sections of this look like?

Team 1: What can we say about the angles of polyhedra in a three-sphere? What can we say about the angles of polyhedra in hyperbolic three-space?

Team 2: If we assume that our universe is a three-sphere, how can we measure its curvature?

Team 3: Present Exercise 14.4.

Team 4: Describe Projective three-space. Is it orientable or non-orientable? Explain.

Team 1: Present Exercise 14.5.

Team 2: Present Exercise 14.6.