

## **1.1. Planet Casson**

1.2. Topology, Model, Learning Tool, Puzzle Game

1.3. Parker Ballner, Peter Tong, Ben Croisdale, Nick Gooch

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**2.1.** The concept for this game was presented by Professor Greene to model and help solve an interesting topology problem. Planet Casson is a puzzle game tackling a classic topology problem in mathematics. In the game, an arbitrary non-trivial graph is embedded on to the surface of a sphere, such that the sphere is separated into multiple faces. For each face of the sphere, there is a particle that traverses the edges of the face in a counter-clockwise direction. The particles must not collide with each other on any edge.

**2.2.** This game was designed as a learning tool for upper level high school and college students.

**2.3.** Puzzle game, learning model.

**2.4.** The goal is to help the player develop an intuition for which graphs and surface topologies this problem is solvable.

**2.5.** The basic style of this game is representing a graph in 3D space where edges are denoted as green lines and traversal objects are colored spheres.

**2.6.** This game is intended to be used as a learning tool to enhance students understanding with the help of Professor Greene.

**3.1.** The objective of this game is to minimize the number of collisions on the graph.

**3.2.** Since this is a puzzle game, game play will include phase modification and the addition of double edges and determining whether this change is effective.

**3.3.** Different graphs have different challenges and configurations that must be manipulated.

**3.4.** 3D graph with traversal objects on each face. To solve the puzzle you must rearrange the starting points of traversal objects as well as adding double edges to prevent all collisions.

**4.1.** The rules of the game are simple. You are only able to move traversals along their pre-specified paths. You cannot change the graph configuration or the number of traversals.

**4.2.** Puzzle Game

**4.3.** The physics are the rules of the game in that you can only move traversals among their cycles.

**4.6.** Chose between different graphs with a drop-down menu in the user interface.

**4.9.** We used a single scene with a drop down for switching between graphs. Upon switching a new graph will be instantly presented to the user on the same scene.

**4.10.** The only real option is choosing the model to play on and the way to configure traversers.

**4.11.** There is no saving of configurations allowed.

**6.1.** The wold is a basically a graph surrounded by a free sky box that is easily interchanged.

**8.1.** Levels are basically different graph configurations denoted by varying number of vertices and edges. This will create different faces as well as number of traversal objects.

**9.1.1.** Our interface is very simplistic. A toolbar on the main menu allows you to navigate to the game or the tutorial. Navigating to the main game we have another toolbar that lets you pause the game, switch between models, and quit the game.

**9.1.3.** Our camera is controlled through the use W, A, S and D keys to pan. Left click allows you to rotate the camera. Shift and control allow you to zoom in and out respectively.

**9.2** The player controls the game solely with mouse and keyboard. You must click edge object and traversal objects to complete the puzzle.