Activity 2.1 Puzzle Design Challenge Brief

PLTW Gateway

Client **Fine Office Furniture, Inc.**

Target Consumer **Ages: Middle-school age**

Designer _____

Problem Statement

A local office furniture manufacturing company throws away tens of thousands of scrap ¾ inch hardwood cubes that result from its furniture construction processes. The material is expensive, and the scrap represents a sizeable loss of profit.

Design Statement

Fine Office Furniture, Inc. would like to return value to its waste product by using it as the raw material for desktop novelty items that will be sold on the showroom floor. Design, build, test, document, and present a three-dimensional puzzle system that is made from the scrap hardwood cubes. The puzzle system must provide an appropriate degree of challenge to middle school students.

Criteria and Constraints

- The puzzle must be fabricated from 27 ¾ inch hardwood cubes.
- The puzzle system must contain exactly five puzzle parts.
- Each individual puzzle part must consist of four to six hardwood cubes that are permanently attached to each other.
- At least two puzzle parts must be made up of six hardwood cubes.
- No two puzzle parts can be the same.
- The five puzzle parts must assemble to form a 2¼ inch cube.
- Some puzzle parts should interlock.
- Students in grades 4–9 should need an average of _____ minutes/seconds to solve the puzzle. (Fill in your target solution time.)
- Adults should need an average of _____ minutes/seconds to solve the puzzle. (Fill in your target solution time.)

Deliverables

Use your Gateway Notebook to write a detailed description of the Design Process. Summarize your work during each step of the process. Include documentation (written work, sketches, CAD drawings, images) to support your discussion. Your documentation must include the following information located in the appropriate Design Process step:

- Puzzle Design Challenge Brief (Activity 2.1 Part 1)
- Brainstorming of possible part combinations (Activity 2.1 Part 2)
- Multiview sketch, fully dimensioned, of each of the five puzzle parts in your design (Activity 2.1 Part 3)
- Isometric view of each puzzle part using computer-aided design software (Activity 2.2 Part 3 and Project 2.3)
- Prototype (and image) of your puzzle (Project 2.3)
- Statistics related to the solution time of your puzzle (Project 2.3)