Lesson 1.4 – Puzzle Cube

Concepts

1. Three-dimensional forms are derived from two-dimensional shapes.
2. The results of the design process are commonly displayed as a physical model.
3. Engineers develop models to communicate and evaluate possible solutions.
4. Geometric and numeric constraints are used to define the shape and size of objects in Computer Aided Design (CAD) modeling systems.
5. Design engineers use CAD modeling systems to quickly generate and annotate working drawings.
6. Packaging not only protects a product, but contributes to that product's commercial success.

Performance Objectives

It is expected that students will:

- Brainstorm and sketch possible solutions to an existing design problem.
- Select an approach that meets or satisfies the constraints given in a design brief.
- Create simple extruded solid Computer Aided Design (CAD) models from dimensioned sketches.
- Generate dimensioned multiview drawings from simple CAD models.
- Measure and Fabricate parts for a functional prototype from the CAD multiview drawings.
- Assemble the product using the CAD modeling software.
- Test and evaluate the prototype and record results.
- Apply geometric and numeric constraints to CAD sketches.
- Identify the purpose of packaging in the design of consumer products.

Essential Questions

1. Why is a design process so important to follow when creating a solution to a problem?
2. What two-dimensional shapes are most often associated with three-dimensional forms?
3. What is the difference between a geometric constraint and a numeric constraint?
4. Why would you create a prototype of a product before the actual production takes place?

Key Terms

Annotate	**Assembly Drawing**	**Computer-Aided Design or Computer-Aided Drafting (CAD)**
Design Brief	**Design Statement**	**Extrusion**
Geometric Constraint	**Logo**	**Manufacturer's Joint**
Marketing	**Mock-up**	**Model**
Numeric Constraint	**Origin**	**Packaging**
Plane	**Prototype**	**Scale Model**
Scoring	**Solid Modeling**	**Three-Dimensional**
Two-Dimensional		

Instructional Resources

PowerPoint® presentations

- Marketing

Word Documents

- Project 1.4.1 Puzzle Design Challenge
- Activity 1.4.2 Puzzle Part Combinations
- Activity 1.4.3 Puzzle Cube Package
- Project 1.4.1 Puzzle Design Rubric
- Activity 1.4.3 Puzzle Cube Package Rubric
- Activity 1.4.2 Isometric Graph Paper
- Sketched Puzzle Parts Example
- **Lesson 1.4 Key Terms and definitions in Excel**
- Isometric graph paper
- Orthographic graph paper

Reference Sources

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