Packaging Lesson Plan

1. **Course Title:** Technology Education in Grades K-12

2. **Teacher:** Cary Dunn, Jr.

3. **Grade Level:** 6-8

4. **Lesson Title:** Paper Packaging Design

5. **Lesson Length:** 20 minutes

6. **State Standards of Learning (SOL):**

    a. Math (Virginia SOL's)

        - 6.7: The student will use estimation strategies to solve multistep practical problems involving whole numbers, decimals, and fractions (rational numbers).

        - 6.10: The student will estimate and then determine length, weight/mass, area, and liquid volume/capacity, using standard and nonstandard units of measure.

        - 6.13(a): The student will estimate angle measures, using 45°, 90°, and 180° as referents, and use the appropriate tools to measure the given angles.

        - 8.9: The student will construct a three-dimensional model, given the top, side, and/or bottom views.

    b. Science (Virginia SOL's)

        - PS.10: The student will investigate and understand scientific principles and technological applications of work, force, and motion.

7. **Standards for Technological Literacy (*SfTL*):**

    a. *SfTL* 3 R – Requirements are the parameters placed on the development of a product or system.

    b. *SfTL* 8 E – Design is a creative planning process that leads to useful products and systems.

    c. *SfTL* 8 F – There is no perfect design.

    d. *SfTL* 8 G – Requirements for a design are made up of criteria and constraints.

    e. *SfTL* 9 F – Design involves a set of steps, which can be performed in different sequences and repeated as needed.

    f. *SfTL* 9 H – Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.

    g. *SfTL* 9 I – Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.

    h. *SfTL* 9 K – A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

i. *SfTL* 10 F – Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.

j. *SfTL* 11 J – Make 2D and 3D representations of the designed solution.

8. **Behavioral Objectives:**

At the conclusion of the design module, the students will be able to:

a. Understand the various ways paper board is cut and folded into a carton package.

b. Develop a dimensioned fabrication drawing that also lists the fabrication process.

c. Construct the package in accordance with the directions indicated on their own drawing.

d. Demonstrate an understanding of the fundamental principles of package manufacturing.

e. Effectively document the processes and outcomes in their Web Portfolio of their work on this Design Brief.

9. **Content Outline:**

a. Background

- Paper sacks/bags;

- Corrugated paper board;

- Cardboard package manufacturing;

b. Technological processes

- Assessment (research);

- Development (design);

- Production / Construct (manufacturing);

- Testing and Modification;

- Final Production;

- Final testing (successful end procuct);

c. Parameters of Design Brief

- Develop the most efficient package possible that contains and successfully holds an 8" length of 2x4 pine during testing.

- Students will conduct the testing by standing 10 feet apart and tossing the package to each other at least twice.

- Design and construction will follow the "Design Criteria/Constraints" section of the Design Brief.

- Prepare three different design sketches and assemble models of these for experimentation and testing. Prepare one sketch of the final design prior to constructing the final model.

d. Design steps
- Identify the problem (assess, research);
- Generate ideas through research and brainstorming (development);
- Explore possible solutions (design);
- Construct prototype models for experimentation and testing (manufacture);
- Develop a package that successfully holds its contents.

10. **Procedures:**

Time	Procedure
5 min.	**Set-Induction**
	1. Briefly explain the relationship of technology and manufacturing.
	2. Explain the lesson objectives and the use of ideas therein to construct a model of a paper board carton package.
15 min.	**Body of the lesson**
	Using PowerPoint, give a lesson covering package history, variety of packaging, and package manufacturing.
	1. Package history.
	2. Package uses.
	3. Technology processes used.
	4. Package production/manufacturing.
	5. Concepts of "self-locking" package construction.
5 min.	**Design Brief**
	1. Pass out the Design Brief.
	2. Discuss the Design Brief with the class.
	3. Ask if there are any questions before continuing.
	Conclusion (For this EDCI lesson assignment)
	1. Have students begin Design Brief in the production lab.
	2. Identify points of failure. Discuss possible solutions.

11. Evaluation:

    1. Cardboard uses the following design concept for added strength:

        a. Tempering

        b. Glued paper particle boards

        c. Corrugated paper board

    Answer: c

    2. Name the device around which paper board is wrapped during assembly

    Answer: A blank

    3. List two advantages of using paper as a package material:

    Possible answers: 1) Ease of recycling, 2) Economic, 3) Weight [low], 4) Can be folded and "self-locked"

12. Instructional Aids or Resources:

    a.   PowerPoint presentation;

    b.   Handouts;

    c.   Poster board;

    d.   Shipping paper.

13. Safety Guidelines: List any safety issues that you need to address to safely prepare them for the lab work that accompanies this lesson.

    a.   Keep long hair, loose clothing, jewelry, and dangling ovjects away from the tools.

    b.   Follow project guidelines.

    c.   Do not overcrowd the work area.

    d.   Use tools and equipment safely in the construction of the prototype.

    e.   Give an overview of the proper use of Buster (tester).

    f.   Buster must be operated in the presence of the instructor.

14. Interdisciplinary Connections:

    a.   Math: Measurement, angle geometry;

    b.   Science/Physics: load, impact;

    c.   Social Studies: Societal impacts of paper packaging.

    d.   Language Arts: Students will write about their "reflections" and "findings" from the Design Brief activity in their portfolios.

15. Technology and Culture:

    a.   Students will brainstorm the societal impacts of the use of paper for packaging.

    b.   Students will brainstorm examples of products that are "over-packaged".

16. Diversity:

    a.   Special needs students will receive individual assistance as required, preferably during the model building phase.

17. Reflection:

    a.   Students will reflect upon the technological principles that encompass the paper packaging manufacturing process.

    b.   Students will record their reflections in writing in their portfolio.

18. References:

    a.   Howard, M. (2003). Vocational Information Center. *Career Activities and Vocational Lesson Plans*. Retrieved 8/2/2004. http://www.khake.com

    b.   Weyerhaeuser Corporation (2001). *Pulp, Paper, and Packaging Board*. Retrieved 8/7/2004. http://www.weyerhaeuser.com/ourbusinesses/pulppaperpckging/containerboard/default.asp

    c.   Econocorp, Inc. *Econoseal Product Line.* Retrieved 8/7/2004

    http://www.econocorp.com/products.html