GEORGIA MIDDLE SCHOOL Instructional Resources

CAREER, TECHNICAL, & AGRICULTURAL EDUCATION

ENGINEERING & TECHNOLOGY

COURSE: Exploring Engineering and Technology

UNIT 2: Bottle It Up

INTRODUCTION

Annotation:

In this unit students will design a label for a beverage in order to better understand the importance of the engineering process in the design of products.

Grade(s):

X	6th
	7th
	8th

Time:

Sixteen 50 minute class periods

Author:

Sony Gala

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided appropriately. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation. Many students (both with and without disabilities) who struggle with reading may benefit from the use of text reading software or other technological aids to provide access to printed materials. Many of these are available at little or no cost on the internet.

FOCUS STANDARDS

GPS Focus Standards:

ENGR-EET-3- Students will explain the engineering design process.

a) Examine the engineering design attributes

b) Demonstrate the principles of research and design

ENGR-EET-4- Students will demonstrate an understanding for a technological world through hands-on projects.

a) Apply the engineering design process

ENGR-EET-7- Students will develop leadership skills and work ethics.

a) Demonstrate work ethics within the classroom and lab environment.

GPS Academic Standards:

M6M2- Students will use appropriate units of measure for finding length, perimeter, area and volume and will express each quantity using the appropriate unit.

a. Measure length to the nearest half, fourth, eight and sixteenth of an inch.

M6G1- Students will further develop their understanding of plane figures.

c. Interpret and sketch simple scale drawings.

National / Local Standards / Industry / ISTE:

ENGR-STEM 3 – Students will design technological problem solutions using scientific investigation, analysis and interpretation of data, innovation, invention, and fabrication while considering economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints.

ENGR-STEM 4 – Students will apply principles of science, technology, engineering, mathematics, interpersonal communication, and teamwork to the solution of technological problems.

ENGR-STEM 5 – Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.

UNDERSTANDING & GOALS

Enduring Understandings:

- The engineering design process is used in the real world to solve problems.
- Relate to a popular local product and some of the careers related to designing the product.
- Recognize the place of packaging and design in marketing a product.

Essential Questions:

- How is the engineering design process used in designing and developing a product?
- Why are logos and brand names important?
- What makes a product attractive to a consumer?

Knowledge from this Unit:

- Students will be able to list the steps in the engineering design process.
- Students will be able to distinguish between trademarks, registered and copyrights.
- Students will be able to explain placement, balance and basic measurements related to design.

Skills from this Unit:

- Students will use graphic and draw tools in Microsoft Office.
- Students will demonstrate time management skills.

ASSESSMENTS

Assessment Method Type:

_____ Pre-test
_____ Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
__ Unit test
_X_ Group project
_____ Individual project
_X_ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
_X_ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
_X_ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
_X_ Observe students role playing
_____ Peer-assessment
__ Peer editing and commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
_X_ Dialogue and Discussion
__ Student/teacher conferences
_X_ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
_____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
_____ Post-test

Assessment(s) Title:

Informal report of the problem solving process
Soda bottle with label

Assessment(s) Description/Directions:

Include all research information, ideas, sketches and drawings.
Laminated color label wrapped around a plastic soda bottle. Soda bottle with color water.

Attachments for Assessment(s):

Bottle it Up Grade Sheet

LESSON PLANS

1. **Identify the Standards. Standards should be posted in the classroom for each lesson.**

ENGR-EET-3- Students will explain the engineering design process.
a) Examine the engineering design attributes
b) Demonstrate the principles of research and design

ENGR-EET-4- Students will demonstrate an understanding for a technological world through hands-on projects.
a) Apply the engineering design process

ENGR-EET-7- Students will develop leadership skills and work ethics.
a) Demonstrate work ethics within the classroom and lab environment.

2. **Review Essential Questions.**

- How is the engineering design process used in designing and developing a product?
- Why are logos and brand names important?
- What makes a product attractive to a consumer?

3. **Identify and review the unit vocabulary.**

a. Model
b. Prototype
c. Design Portfolio
d. Logo
e. Trademark
f. Registered trademark
g. Barcode
h. Recycle
i. Ingredients
j. Nutrition facts

• LESSON 1: INTRODUCE STUDENTS TO THE STEPS TO PROBLEM SOLVING (DAY 1)

1. Use the PowerPoint-**ENGR 6-2 Steps to Problem Solving**, let students copy the seven steps.

2. Discuss each step with the students.

3. Inform students that they will create a design portfolio. This portfolio contains all steps.

4. Students may maintain a folder to keep their information.

5. Each step should be hand written and all drawings and sketches must be in pencil. Drawings should be in color where required.

• LESSON 2: INTRODUCE STUDENTS TO THE "BOTTLE IT UP" PROJECT (DAY 2)

1. Show PowerPoint – **ENGR 6-2 Bottle It Up,** slide 2
   - Discuss the standards with students.

2. Show slides 3 – 5 and discuss the problem, restrictions and constraints. Create a scenario for the students. Talk to them about the role of a graphics designer. If possible, show students examples of what the final product will look like.

3. Students will form teams of two and begin steps 1 and 2 of the problem solving process.

• LESSON 3: STEP 3 (DAY 3)

1. Show PowerPoint **ENGR 6-2 Bottle It Up**, slide 6

2. Discuss design criteria in detail, allow time for questions.

3. Discuss tools and materials that students will use. Ask students to bring in empty plastic soda or water bottles.

4. Let teams work on step 3 of the problem solving process. Remind teams that they must maintain all their written work in their binders.

• LESSON 4: STEP 3 (DAY 4)

1. Allow students to look up definitions – they may use a dictionary or the Internet. Discuss the vocabulary and the importance of trademarks and logos. If time permits, allow students to look up different logos using a search engine.

• LESSON 5: STEP 4 – BRAINSTORMING (DAY 5)

1. Show PowerPoint **ENGR 6-2 Bottle It Up**, slide 7

2. Each person on the team will generate his/her own ideas. Encourage students to work on their own. Inform them that once they complete step 4 they will be allowed to share their ideas with the rest of the group.

• LESSON 6: STEP 5 – FINAL SOLUTION (DAY 6)

1. Show PowerPoint **ENGR_6-2_Bottle_It_Up**, slide 8.

2. Teams will decide on the final design and turn it in for approval from the teacher. The logo, name and design criteria must be evident. Logo, drink name etc must be in color.

• LESSON 7: LOGISTICS (DAY 7)

1. Upon approval of final design, assign each team a work area; find a place to store the empty bottles. Use masking tape to label each bottle. Ask each group to peel off the original label and store it safely in their binder.

2. Discuss methods to save their work on the computer.

3. Show and discuss slide 9-10 in the PowerPoint **ENGR_6-2_Bottle_It_Up**.

4 If time permits allow students to explore the *Insert Shapes* in MS Word.

   Note: Remind students that they are not to use any clipart nor download any images from the Internet for this project.

• LESSON 8: LABEL DIMENSIONS (DAY 8)

1. Show and discuss slide **ENGR_6-2_Bottle_It_Up**, slide 11-13
   (It would be best to show step by step directions on an overhead projector.)

2. Ask students to draw a table similar to the one on slide 11. Provide students with rulers to measure the dimensions of the original label and complete the table.

3. Help each group with page layout setup if needed.

• LESSON 9: LOGO DESIGN AND NAME (DAY 9)

1. Show and discuss slide **ENGR_6-2_Bottle_It_Up,** slide 14.
   (It would be best to show step by step directions on an overhead projector. Show students how to group and format objects.)

2. Students will create the logo and name of drink.

3. Constant monitoring is very important.

4. Save files before the end of each class.

• LESSON 10: LOGO DESIGN AND RECYCLE SYMBOL (DAY 10)

1. Show and discuss slide –"**ENGR_6-2_Bottle_It_Up**" slide 14
   (It would be best to show step by step directions on an overhead projector.)

2. Students will complete their logo design and also work on creating the recycle symbol.

3. Constant monitoring is very important.

4. Save files before the end of each class.

• LESSON 11: MOTTO AND CONTACT INFORMATION (DAY 11)

1. Show and discuss slide **ENGR_6_2_Bottle_It_Up**, slide 14
   (It would be best to show step by step directions on an overhead projector.)

2. Students will create the motto and add contact information.

3. This is a good time for each group to use step 2 as their checklist and mark off completed items.

4. Save files before the end of each class.

• LESSON 12: BARCODE LABEL AND INGREDIENTS LIST (DAY 12)

1. Show and discuss slide **ENGR_6-2_Bottle_It_Up,** slide 15
   (It would be best to show step by step directions on an overhead projector. Show how to format lines.)

2. Remind students to group objects before they resize them.

3. Students will create a barcode and begin creating an ingredients box.

4. Save files before the end of each class.

• LESSON 13: NUTRITION TABLE (DAY 13)

1. Show and discuss slide –**ENGR_6-2_Bottle_It_Up,** slide 15

2. Ask students to create an object to match the nutrition facts table from their original label

3. Font, lines and formatting should compare to the original.

4. Save files before the end of each class.

• LESSON 14: NUTRITION TABLE CONTINUED (DAY 14)

1. Show and discuss slide **ENGR 6-2 Bottle It Up,** slide 15
2. Ask students to create an object to match the nutrition facts table from their original label
3. Font, lines and formatting should compare to the original.
4. Save files before the end of each class.

• LESSON 15: PRINTING AND PREPARATION (DAY 15)

1. Show and discuss slide **ENGR 6-2 Bottle It Up,** slide 16
2. Monitor groups as they print their labels, cut out the labels and color the backgrounds if needed. Students will turn in the labels for lamination.
3. Let students fill up bottles with water.

• LESSON 16: FINAL (DAY 16)

1. Show and discuss slide **ENGR 6-2 Bottle It Up,** slide 16
2. Monitor students as they add food color to their bottled water to get the desired color.
3. Each team must turn in the problem solving steps 1-5, stapled.

• ATTACHMENTS FOR LESSON PLANS

Bottle it Up PowerPoint
Grade Sheet PowerPoint
Steps to Problem Solving PowerPoint

• NOTES & REFLECTION:

Allow students to explore logos of different companies – this helps them generate ideas.
Good idea to collect toilet tissue rolls and cardboard flats ahead of time. School office may have print paper box lids; they work very well as cardboard flats.

Create a station for students to mix food colors for their bottles. Keep paper towels handy for a quick clean up.

An optional attachment is included for this lesson, **ENGR 6-2 Logos of Companies and Organizations**. This PowerPoint explains was makes a great logo and the four major factors that define a memorable logo. The PowerPoint also includes a Logo Recognition Activity for the students to do in class.

CULMINATING PERFORMANCE TASK

Culminating Unit Performance Task Title:

Create a label for bottled water.

UNIT RESOURCES

Materials & Equipment:

- Clean empty plastic soda or water bottles with label intact
- Ruler, pencils, copy paper, transparent tape
- Color pencils, crayons, markers
- Microsoft Word, Internet access
- Color printer, laminator
- Food color and water

21st Century Technology Used:

X	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System	X	Desktop Publishing		Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email		Website		