

Unit Name: **Ship the Chip**

Time Frame: **2-3 periods**

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## UNIT

Subject: **Science/LAL /Social Studies**

Country: USA

Course/Grade: **5th**

State/Group: NJ

School: Egg Harbor Township School District

### **Materials:**

1 10x13 envelope

3 plain paper

2 card stock

2 scissors

1 ruler

8 cotton balls

2 glue sticks

2 yards of string

3 rubber bands

10 paper clips

8 toothpicks

1 8x12 sheet of foil

10 popsicle sticks/tongue depressors

10" of scotch tape

1 Scale

### UNIT SUMMARY:

Engineers often work with marketing, sales, and perhaps a creative department when recommending packaging requirement for a product. Good packaging must protect the product, eliminate any damage while moving, shipping, or storing the products, and also make the product attractive if it is to be displayed in a consumer environment such as a grocery store, hardware store, or department store. For this reason, packaging is a critical part of a product's design and engineering process, and engineers must take many factors into consideration including appearance, function, and costs.

Engineers have to consider the durability, cost, and performance of different materials when designing products and the package they will ship or be displayed in. Many factors will help determine which materials to use, such as how long the package will be on the product, how fragile or expensive the product is, and whether exposure to temperature or humidity would impact the performance of the product.

## UNIT RESOURCES:

Internet Resource Links:

<http://www.teacherstryscience.org/lp/ship-chip>

<http://teachers.egfi-k12.org/activity-package-the-pringle/>

<http://www.sciencespot.net/Media/chiprulesB.pdf>

<http://www.mrsthall.com/Projects/PotatoChipChallenge2008.pdf>

## STAGE ONE

### GOALS AND STANDARDS:

SCIENCE:

<http://www.nextgenscience.org/sites/ngss/files/5%20combined%20DCI%20standards%206.13.13.pdf>

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

MATHEMATICS:

MP.2 Reason abstractly and quantitatively

MP.5 Use appropriate tools strategically.

ELA:

CCSS.ELA-Literacy.W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

CCSS.ELA-Literacy.W.5.1b Provide logically ordered reasons that are supported by facts and details.

Goals:

Students work in small groups to design and construct a package to safely ship a single Pringles Potato Chip through the internal school mail to another school. Upon arrival, the chip must be edible, and your design will be evaluated and scored according to the process described.

As a result of this lesson, students will:

- Learn about engineering product planning and design.
- Learn about meeting the needs of society.
- Learn about teamwork and working in groups.

## ENDURING UNDERSTANDINGS

As a result of this activity, students should develop an understanding of:

- Package design planning and testing
- problem solving
- teamwork

**ESSENTIAL QUESTIONS:** What is the best and most effective packaging material when shipping fragile material? How can something be constructed to fill this need while being cost-effective and efficient?

**KNOWLEDGE AND SKILLS:** Students will learn how to work with others and consider other ideas when working together.

## STAGE TWO

### PERFORMANCE TASKS:

Students must work in teams of "engineers" who have been given the challenge of designing the smallest, lightest package of all the engineering teams in your classroom that will protect a single potato chip shipped through the internal mail system at school. The arriving chip must be edible and will be evaluated and scored according to the process described below.

## STAGE THREE

### LEARNING PLAN:

1. Divide students into groups of 3-4 students, providing a set of materials per group.
2. Explain that students must work in teams of "engineers" who have been given the challenge of designing the smallest, lightest package of all the engineering teams in your classroom that will protect a single potato chip shipped through the internal mail system at school. The arriving chip must be edible, though students shouldn't eat them after their journey through the postal system. This rule simply prevents students from applying any substance to the chip to make it stronger.
3. Students will first meet, plan, and draw their planned package.
4. Next, students construct their packages and provide them to you for shipping.
5. Once all packages have arrived at the school, students will weigh, measure, and evaluate the contents of the packages, using the designed scoring system.
6. Students complete evaluation and reflection sheets, and then present their reflections to the class.

\*\*\*Reference Internet Resource Links on page 2 for variations to project.

## Tips:

1. Be sure each package has a unique code on the outside to identify which team created it.
2. The teacher needs to select chips (potato, corn, other) that are similar, or better yet, identical in size, weight, and thickness to ensure the project is fair to all.
3. All packages should be shipped from the same location on the same day at the same time.
4. Packages may be marked fragile.
5. Develop a plan ahead of time for having your class measure the volume and mass of the sealed package as it returns.
6. It is the responsibility of the teacher to make sure that incoming packages are fairly evaluated. Select honest and responsible people to measure and check the package and its contents, and tell them to gently open the package. If you trust your class, they can check each others packages, but it may be better to have a different group of students do the measuring, perhaps in a math class.

## ASSESSMENT:

These reflective questions will help assess student understanding:

1. What was one thing you liked about your design? What is its main weakness?
2. What is one thing you would change about your design based on your experience?
3. Are there algebraic and physical principles that can be applied to this activity?
4. How would you modify the instructions to create a better experience for the participants?

## EXTENSION:

- Write a three to five paragraph essay about a packaging design that you think could be improved to either reduce the amount of plastic or other materials used, or take up less space on store shelves.
- Write a three to five paragraph essay describing your packaging, the strategy behind your design, the result of the shipping on your chip, and any design changes you would make to improve your results.