



The Perfect Pringle Packing Challenge - 2013

Objective: The goal for this activity is to mail a single Pringle's brand potato chip through the U.S. Postal Service and have it arrive to the school in one whole piece. You will be tasked with minimizing size and weight and maximizing distance traveled.

The Pringle potato chip was chosen because of its uniform shape and thickness. It must be a standard size Original Flavor unaltered Pringle potato chip. Finally, to receive any credit, the chip must be consumed to demonstrate that it has been unaltered after it has been judged. You must use a whole, unbroken chip to start with!

Challenge Guidelines:

1. The package must be rectangular in shape so that its volume can be easily calculated by using the volume of a rectangular box. Do NOT use mailing envelopes (padded or unpadded) or mailing tubes.
2. Maximum mass of package plus chip is 112 grams. The postal service uses English units. 112 grams is equal to about 4 ounces. When you take your package to the post office, it cannot weigh more than 4 ounces or you will have to change your package.
(NOTE: The postal service gives a wide variance on what they call 4 ounces, so beware!)
3. The packaging material may NOT be of the commercial variety. Packing peanuts, bubble sheets, Styrofoam pellets, etc., will be grounds for disqualification. The packaging material must be obtained from recycled materials found around the house. Pre-made boxes may be used.
4. The delivery date to the school must be before the first day of school Wednesday, August 21, 2013. To ensure credibility, the student must provide an original receipt from the post office showing the mailing date, etc. Write your name on the receipt and plan to turn it in on the first day of class. Failure to provide a receipt will make the package ineligible for bonus points. If the package is mailed to a relative/friend and then returned to the school, all mailing receipts must be provided. If the package is mailed one way from a distant location, receipt from that location is required. The distance traveled will be calculated from receipts and postmarks.

5. The package must be mailed through the United States Postal Service using regular First Class mail (not insured - not priority)!! No other mailing service (such as UPS) can be used!

6. The package is to be addressed to:

Mr. Skinner, Great Mills High School, 21130 Great Mills Rd, Great Mills, MD, 20634.
The return address should be to the student and clearly labeled on the package.

7. On Judgment Day, (Thursday August 22, 2013) the package will be opened by the student (after the package mass and volume have been determined). The chip must be completely removed from the package unbroken. After judging, the potato chip must be consumed by the student or a volunteer to prove that it is unaltered.

Scoring:

Four measurements must be collected in order to score a package for the Pringles Challenge.

1. Mass - measured in g to at least 3 significant figures
2. Volume - measured in cubic centimeters to at least 3 significant figures
3. Distance traveled - measured in km as the crow flies
4. Intactness score of the chip as determined according to the chart below

Perfectly Intact	Like it just left the factory	100 Points
Slightly Damaged	Cracked in two pieces	90 Points
Chipped Chip	Cracked into three or four pieces	80 Points
Split Chips	Cracked into less than 10 pieces	70 Points
Significantly Damaged	Chipped and/or cracked into less than 20 pieces	60 Points
Pringle Dust	Too many pieces to count (more than 20)	50 Points

Overall Score

The overall score of the package will be used to compare packages. The formula to calculate the overall score will be as follows:

$$\text{Overall Score} = \frac{(\text{Intactness Score} \times \text{Distance Traveled in km})}{(\text{Mass in g} \times \text{Volume in cc})}$$

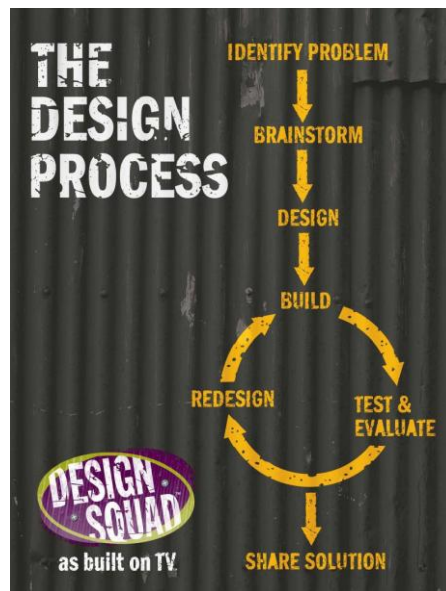
Example:

- a) A perfect chip = Intactness of 100
- b) Mass = 256 grams
- c) Distance Traveled = 625 km
- d) Volume = 250 cc

$$\text{Overall Score} = (100 \times 625) / (256 \times 250) = 0.977$$

Lab Report Guidelines:

Along with the mailing of the Pringles package you will be required to complete entries in your engineering notebooks that document the design process (shown below) that you used while completing the project.



1. Your notebooks must be turned in the first day of school.
2. Your notebook should have specific entries titled: Identify Problem, Brainstorm, Design, Build, Test & Evaluate, and Redesign. You do not need an entry for share solution.
3. Entries in the engineering notebook should be titled, signed, and dated.
4. You should not put multiple days on a single page. Each day's entries get their own page.
5. Use these entries to record all of your ideas and processes. Think of it as a way of telling the story of the process you went through to come up with your final design.

Bonus Points:

- The Largest over score is worth 10 bonus points, second place 5 bonus points.
- The least massive successful (unbroken chip) package is worth 10 bonus points, second place 5 bonus points.
- The smallest volume successful package (unbroken chip) is worth 10 bonus points, second place 5 bonus points.
- The greatest distance successful package (unbroken chip) is worth 10 bonus points, second place 5 bonus points.