

CASCADE K-8
COMMUNITY SCHOOL
Creativity • Innovation • Excellence

Project #1: Package the Pringle Challenge

Required for all grades 6-8 Students

Objective:

Students will design and test a package to safely ship a single Pringles Potato Chip through the US Postal Service to a family member (not in Washington State). Upon arrival, the chips will be evaluated and scored according to the process described below.

Goal:

To engineer the package to have the smallest mass and volume, while protecting the chip so it arrives at its destination undamaged.

Rules:

1. Students will use 1 (regular) Pringles Potato Chip.
2. No substance may be applied to the chip, or the chip altered in any way.
3. The chip must be recoverable and edible (but please don't eat it!) when received by the family member.
4. Students will work individually (with minimal assistance from others) to design and test the package.
5. No pre-made Pringles or any type of pre-made containers should be used (i.e. specially designed Pringles containers for lunch boxes, Pringles can, etc.)
6. All packages must be sent via the US Postal Service – First Class Mail. Packages sent using any other carrier will be disqualified.
7. There is a 3" x 5" minimum limit on the size of the package, and a fussy postman may reject a smaller package. (However, in the past, many packages smaller than 3" x 5" have been delivered, so getting a small package through the mail is part of the challenge).
8. Package must be clearly labeled on the outside with the your name. If special unpacking instructions are needed they should also be included.
9. Each of your family members receiving the package must have an email address you can provide to Becca and Trinh so that they can send scoring info.
10. You may write only "Fragile" or "Handle With Care" on the package – nothing else other than your name and the address.
11. It is your responsibility to assure the package is sent in a timely manner and that it is received by your family member before the assignment is due.

Scoring:

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

1. Mass - -measured in kg to at least the thousandths place (to the gram)
2. Volume – measured in cubic centimeters to at least the hundredths place

3. Intactness of the chip as determined by the evaluating person/family, according to the rubric.

Measuring Mass:

If your family has a food scale, you can use that if it measures in grams, otherwise Becca has digital scales and will be available July 18th from 10:30 - 2:30 at the school, and two dates in August to be announced on her SWIFT page by August 1st

Measuring / Calculating Volume:

Below find the formulas for the volume of a rectangular solid, a triangular solid and a cylinder. If your mailer is an irregular shape, you should estimate whether it is closer to a rectangular solid, a triangular solid or a cylinder and use that formula. Note: an irregular shape may cost more to mail with USPS – be sure to check with the post office.

Rectangular Solid: $l \times w \times h$

Triangular Solid: $\frac{1}{2} l \times w \times h$

Cylinder: $\pi r^2 h$

Overall Score:

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

$$\text{Overall score} = \frac{\text{Intactness Score}}{(\text{Mass in kg} \times \text{Volume in cc})}$$

Example:

- (a) A perfect chip = Intactness of 100
- (b) Mass = 256 grams or 0.256 kg
- (c) Volume = 250 cc (2.5×10^2)

$$\text{Overall score} = (100 / (.256 \times 250)) = 100/64 = 1.56 \text{ (when rounded to 3 significant figures)}$$

Write-Up/Report:

Use the Technical report template available on the STEAM website <http://learn.shorelineschools.org/cascadek8/steam/documents>

Share:

You will be asked to share what you've made and see what other students have built upon returning to school in September. *Your assignment is due Friday, September 14th, 2012.*

During the summer, you may send sketches, post photos/videos of your invention by sending it to rebecca.drury@shorelineschools.org or trinh.pham@shorelineschools.org

Links:

We will be attempting to create an online scoring rubric that scorers can log in and report their scores. We will let you know when this is available.

Scoring Rubric

Student: Complete the mass and volume section of this rubric before sending your package in the mail. You will need to submit this completed rubric.






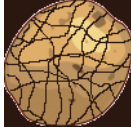
Scorer: Complete this rubric and return it to the student. If you are able to take photos of the package when you receive it and go through its content, it will be very helpful for the student to see the results of his/her packaging.

Date package was received: _____

Describe any damage to the package: _____

Mass of the package (mass in kg): _____

Volume of the package (in cubic centimeters): _____

CHIP STATUS	DESCRIPTION	PICTURE	POINTS
Perfectly Intact	Like it just left the factory		100 points
Slightly Damaged	Cracked, but still in one piece		50 points
Chipped Chip	Broken along the edges, but less than 5 pieces		20 points
Split Chip	The chip is broken into two fairly equal pieces		20 points
Significantly Damaged	Chipped and/or cracked into less than 20 pieces		10 points
Pringle Dust	Too many pieces to count (more than 20)		5 point

Any additional comments about the chip?