



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Madison A. Elliott	Project Number 36705
Project Title Less Is More: A Geometric Analysis of the Environmental Impact and Cost of Inefficient Product Packaging	
Objectives/Goals The purpose of this project was to determine if product packaging designs keep production materials and costs to a minimum, while also reducing the products' environmental footprint. We live in a world that has an exponentially growing human population and a limited amount of natural resources. Simple changes to the way we package materials can have a tremendous impact on limiting the usage of resources and also limiting the amount of waste that needs to be dealt with. Abstract The purpose of this project was to determine if product packaging designs keep production materials and costs to a minimum, while also reducing the products' environmental footprint. We live in a world that has an exponentially growing human population and a limited amount of natural resources. Simple changes to the way we package materials can have a tremendous impact on limiting the usage of resources and also limiting the amount of waste that needs to be dealt with. Methods/Materials I tested the efficiency of various commercial items (rectangular prisms and cylinders) by changing the dimensions of the objects. The new dimensions allowed the object to have the least amount of waste, and retain the same volume as the original. My two main focuses were the Coca-Cola can and Kellogg's Cereal box, but I also tested many other commercial items. Results After I found the most efficient dimensions of each item, I found that each item wasted a significant amount of materials. The Coke can wasted 4.5 percent material, and the Kellogg's box wasted 20 percent material. (These items were my main focuses of this project) Conclusions/Discussion I proved that my hypothesis was correct through a series of mathematical tests of each of the commercial items, and discovered that many companies enlarge their surface area to get maximum advertisement space. Simple changes to the way we package materials can have a tremendous impact on limiting the usage of resources and also limiting the amount of waste that needs to be dealt with. A 4.5 percent savings many not sound like a lot, but when multiplied by the billions of products sold annually, this translates to enormous savings of resources and waste. My ultimate goal is to, at a minimum, change the way one product is packaged.	
Summary Statement By testing each commercial item, I found that product packaging today is enlarged for advertisement and can be improved.	
Help Received My math teacher assisted me with the beginning mathematical concepts/formulas	