# Celebrating Our Schools

## Bancroft Middle School

Principal: Valentin del Rio

# Bancroft PBL

The New Egg Drop Project

# This is what the Egg Drop Project used to look like …

## 16th Annual 7th Grade Egg Drop

**Date:** Wednesday, September 21st
**Time:** During 7th Grade Science
**Purpose:** To build a device which will protect a chicken egg from a two story drop.

**RULES**

1. Students must use **RAW** chicken eggs (no boiled/frozen eggs).
2. Cost of material used in device must not be more than $5.00 (household items are best).
3. Egg device must be able to fit into the standard laundry basket (about 17" x 10 x 11") that will be used to lift the packages.
4. Device including egg must not weigh more than 3 pounds.
5. ***Judges have the right to reject any package if a mess or injury is possibl***

**DID YOU KNOW ..... ??????????????**

According to the *Guinness Book of World Records*, the greatest height from which a fresh egg has been dropped to earth without breaking is **700** feet! This was accomplished by David S. Donoghue on October 2, 1979 from a helicopter over the Tokyo Golf Course.

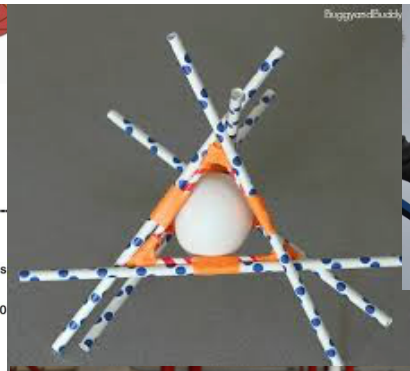
**Poster projects are due on Thursday, September 22nd**

Check these websites for ideas and information:

http://www.montshire.org/eggdrop/rules.html

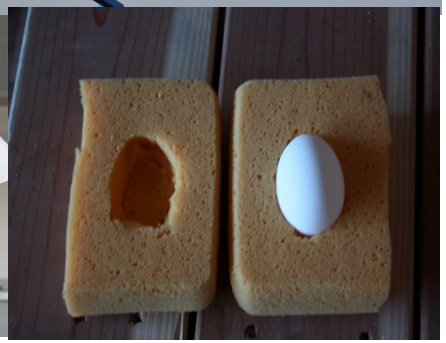
http://www.niemworks.com/else/eggdrop.html

http://www.youtube.com/watch?v=h7N5drzgluo&feature=related.htm&fmt=22









## Egg Drop Poster Project

**DUE: Thursday, September 22nd**

**Purpose**: The goal of this poster write-up is to summarize and communicate the steps of the scientific method.

**THE FOLLOWING SECTIONS ARE REQUIRED:**

**Title and Your Name**: this needs to be BIG, so that it is easy to read.

**Question**: what was the question that led you to build an egg drop device?

**Observation Drawings**: please include a detailed drawing of your device including the egg-speriment measurements we gathered in class (length, width, weight, volume, temperature, etc.)

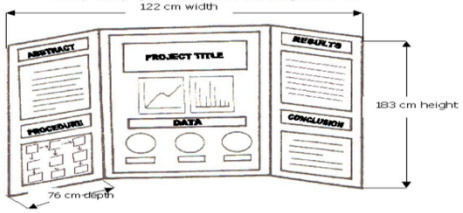
**Hypothesis**: must be written in the correct ***IF…Then* format**.

**Test Hypothesis**: pictures or notes taken from your practice test(s) at home.

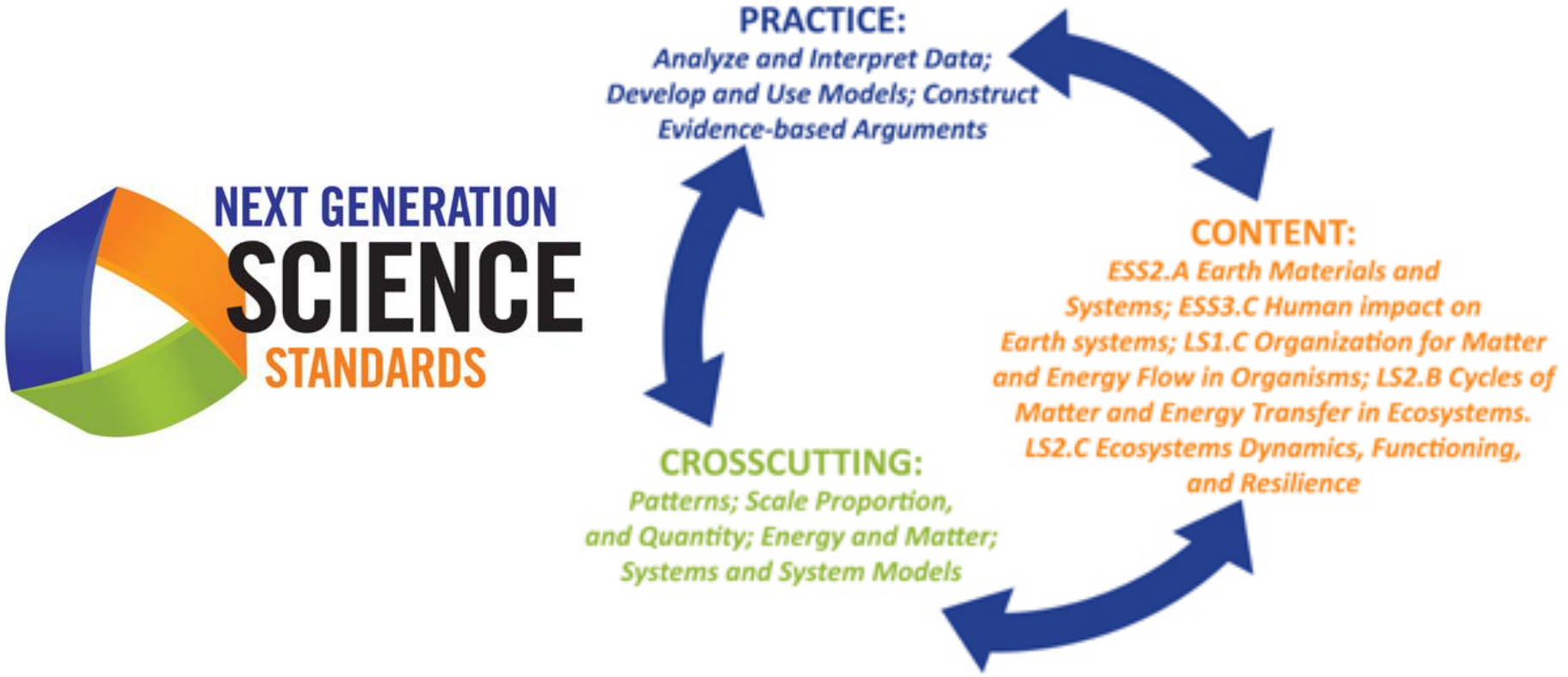
**Analyze Results**: did your egg survive or break? How many others survived or broke? What happened to your device? Include observations you made of your own and other people's devices during the drop.

**Conclusion**: what did you learn? A few ideas…what did you learn about the device you made?...the materials you used?...the process of testing it then making changes?... what would you change if you did it again?...what did you learn from watching other egg drop devices?

***Your poster project should look something like this…***



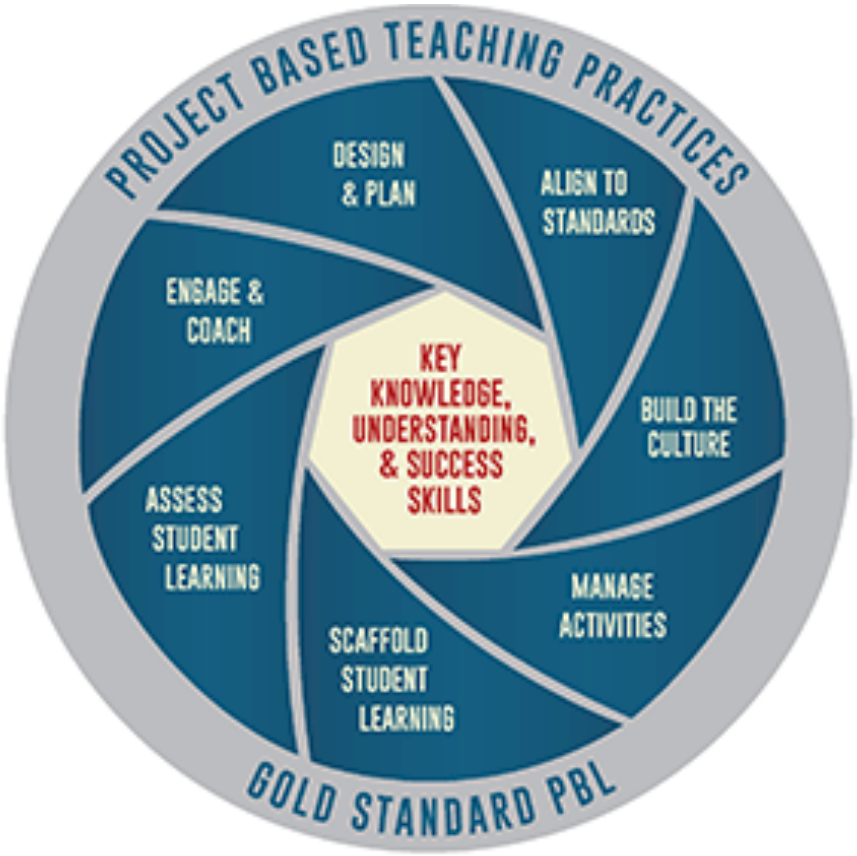
# And then this happened ….

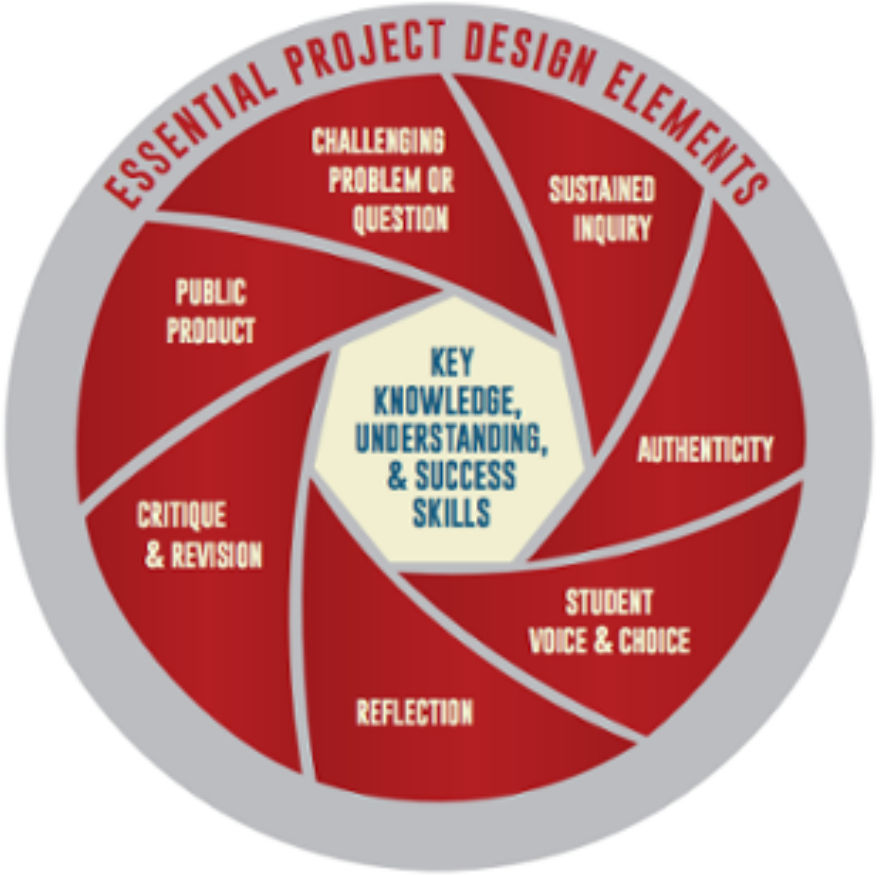


# And this happened …



# And this happened...



# And finally, this happened …









# Now the classic Egg Drop Project looks like this …



# And community leaders ...






# To New Science Standards …

## 2-ESS1 Earth's Place in the Universe

### Performance Expectations
Students who demonstrate understanding can:

**2-ESS1-1.** Use information from several sources to provide evidence that Earth events can occur quickly or slowly. *[Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]*

### Common Core State Standards Connections:

**ELA/Literacy**

**RI.2.1** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
**RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)
**W.2.6** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)
**W.2.7** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
**W.2.8** Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)
**SL.2.2** Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)

**Mathematics**

**MP.2** Reason abstractly and quantitatively. 2-ESS1-1)
**MP.4** Model with mathematics. (2-LS2-1),(2-LS2-2)
**MP.5** Use appropriate tools strategically. (2-LS2-1)
**2.MD.D.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS2-2)

### Disciplinary Core Ideas

**ESS1.C: The History of Planet Earth**
• Some events happen very quickly; others occur very slowly over a time period much longer than one can observe. (2-ES

### Science and Engineering Practices

**Constructing Explanations and Designing Solutions**
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evid and ideas in constructing evidence-based accounts of natura phenomena and designing solutions.
• Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1)

### Crosscutting Concepts

**Stability and Change**
• Things may change slowly or rapidly. (2-ESS1-1)

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## MS-ETS1 Engineering Design

### Performance Expectations
Students who demonstrate understanding can:

**MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

**MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

**MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

**MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

### Disciplinary Core Ideas

**ETS1.A: Defining and Delimiting Engineering Problems**
• The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

**ETS1.B: Developing Possible Solutions**
• A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)
• There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)
• Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)
• Models of all kinds are important for testing solutions. (MS-ETS1-4)

**ETS1.C: Optimizing the Design Solution**
• Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)
• The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)

### Science and Engineering Practices

**Asking Questions and Defining Problems**
Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.
• Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1)

**Developing and Using Models**
Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

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## 5-PS2 Motion and Stability: Forces and Interactions

### Performance Expectations
Students who demonstrate understanding can:

**5-PS2-1.** Support an argument that the gravitational force exerted by Earth on objects is directed down. *[Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]*

### Common Core State Standards Connections:

**ELA/Literacy**

**RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-PS2-1)
**RI.5.9** Integrate information from several texts on the same topic in order to write or speak **about the subject knowledgeably. (5-PS2-1)**
**W.5.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1)

### Disciplinary Core Ideas

**PS2.B: Types of Interactions**
• The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)

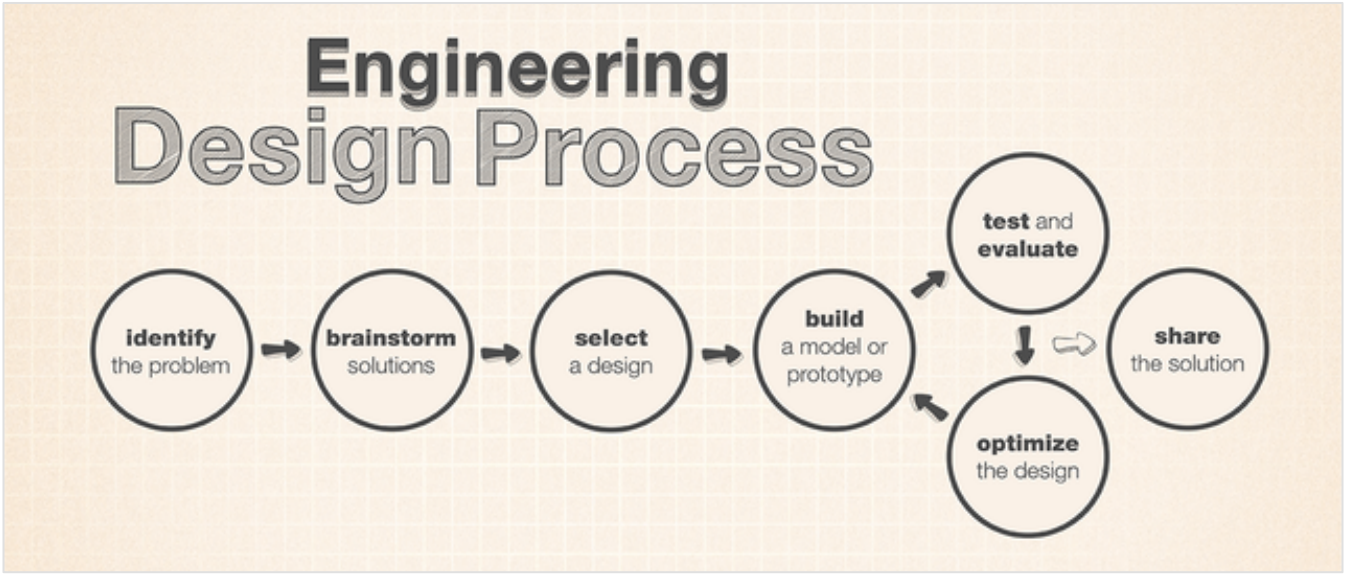
### Science and Engineering Practices

**Engaging in Argument from Evidence**
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).
• Support an argument with evidence, data, or a model. (5-PS2-1)

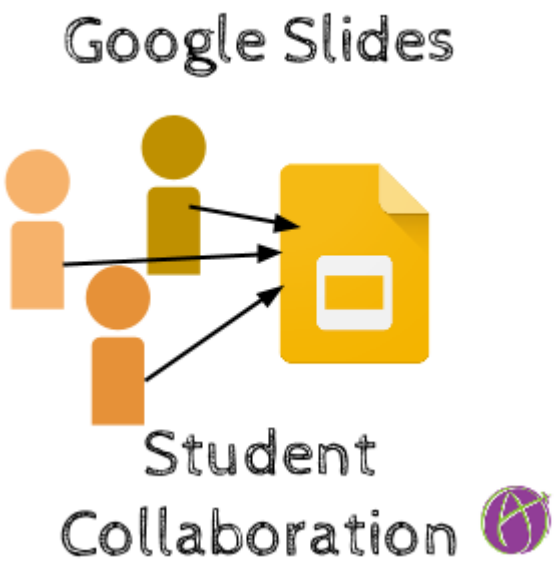
### Crosscutting Concepts

**Cause and Effect**
• Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

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# And 1:1 technology ...



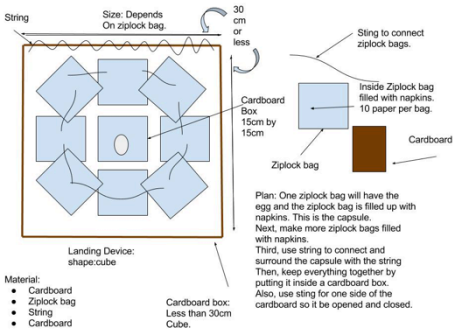




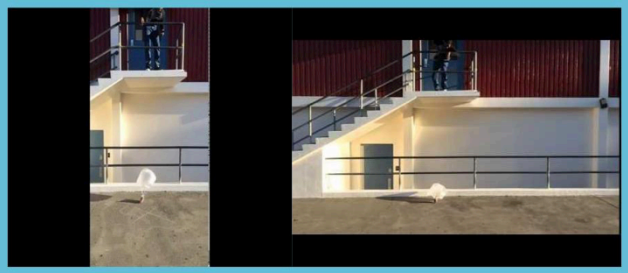


# To create a whole new type of Egg Drop Project …

In the egg drop project air resistance, compression, and tension were used. Air resistance was used by putting a parachute on your project to catch air and make the project fall slower. Compression was applied by using cereal, packing peanuts, or bubble wrap. Tension was used by putting popsicle sticks on the bottom of your project to absorb the force of the impact of your drop. The force that worked the best to resist the force of gravity was air resistance. The parachute made the project have a slow fall and because of that there was less of an impact force. Also most of the people who used a parachute during the drop didn't end up with a broken egg.




## The Drop



## Forces Data

| | |
|---|---|
| 1. **Mass** of container plus egg (kg) | The mass of the container plus the egg is 0.1171 kg. |
| 2. **Distance** of Drop (m) | The distance of the drop was 3 meters. |
| 3. **Time** of Fall (s) | The time of the fall was 1.67 Seconds. |
| 4. **Acceleration** of unprotected egg (in m/s) **Versus** **Speed** of your project (in m/s) | My project traveled 8.0035929 m/s slower than an unprotected egg. |
| 5. **Speed** of egg (in m/s) | The speed of an egg is 9.8 m/s. |
| 6. **Force** of your container at impact (Newtons) | The force of my container at impact was 10.604786 N. |



During my egg drop Newton's 1st Law of Motion was applied when the egg hit the ground because it shows that an object will keep moving until an opposite force acts on it. Newton's 2nd Law was applied because lighter projects would fall slower than heavier projects which will reduce the force of the impact. Newton's 3rd Law was applied with my parachute because the air was pushing up on the parachute which caused the parachute to go up.

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Thank you

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