

# COOL SCIENCE EXPERIMENTS:

## *"The Collection of Cool Experiments"*

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### **Summary:**

Students will utilize the Scientific Method to develop a hypothesis, run experiments and evaluate results.

### **Main Curriculum Tie:**

Science: 4th-6th Grade

### **Materials:**

Depending on the assignment, students will need a variety of supplies for building and testing.

### **Instructional Procedures:**

1. In advance, write the assignment sheet and hand out to students. Also hand out the attached sample of a completed assignment (i.e. Egg Drop), or another such example.
2. Break the students into teams. Explain the assignment and answer any questions.
3. Have students submit their hypothesis and written outline of their procedure and plan for experimentation (turned in by end of first week of assignment).
4. Give students the two following weeks to complete the experimentation process.
5. Give students one more week to assemble their report (including a written report with photos and display poster or other physical display).
6. Spend two or more class periods having the students give an oral report of their testing and results.

### **Assessment Plan:**

Students will be graded on creativity, time and effort, and presentation.

The assignments can be displayed in the classroom and hopefully, the best of them saved and sent to [boomtownschool@visitboomtown.com](mailto:boomtownschool@visitboomtown.com)

# The Egg Helmet Experiment

by Brittany L., Researcher, for Mr. Clark's 5th Period Science Class  
Tests conducted on 5-7-05

## Research Question:

Can a protective "helmet" be designed that will prevent an egg from breaking when dropped?

## Hypothesis:

**Criteria 1.** The egg must be prevented from moving inside the container; otherwise, gravity will cause the egg to move to the bottom or side of the container where the egg will break on impact.

**Criteria 2.** The egg must be surrounded by material that will counteract the effects of momentum.

## Materials:



*Design 1. Jar with foam rubber.*



*Design 2. Pumpkin ball with batting, egg-carton and packing tape.*



*Design 3. Cardboard box with bubble wrap, rubber bands and packing tape.*

## Procedure:

**Step 1.** Assemble the egg helmet designs.

**Step 2.** Run three drop tests on each design from three different heights.

**Step 3.** Record results, draw conclusions.

## Variables:

**Manipulated variable:** Different materials were used to protect the egg.

**Responding variable:** Three different heights were used for each egg drop. The heights were eight feet, fifteen feet, and approximately twenty-five feet.

**Controlled variable:** Whether or not the Large AA egg breaks.

## Assembly Process:

**Design 1:** Cut egg-shaped hole in each side of two pieces of foam rubber. Taped pieces together. Inserted end of foam into peanut butter jar. Placed egg inside of foam. Pushed foam into jar. Screwed on lid.

**Design 2:** Cut plastic handle off of plastic pumpkin. Cut small pieces of batting and stuffed into bottom of pumpkin. Cut styrofoam egg carton and taped egg inside of the pieces. Placed egg in the middle of the pumpkin. Packed batting all around and up to the top of the pumpkin. Sealed the top with styrofoam and tape.

**Design 3:** Wrapped egg inside of bubble wrap with rubber bands. Stuffed cardboard box half full with bubble wrap. Placed bubble-wrapped egg in box. Finished stuffing box with bubble wrap. Taped box close.



*Egg Helmets during assembly.*



*Egg Helmets completed and ready for testing.*

## **Ran Egg Drop Tests:**

1. Climbed up ladder and dropped egg helmets from an eight foot ladder onto an asphalt surface.
2. Climbed onto roof of house and dropped egg helmets from fifteen feet onto asphalt.
3. From roof, threw egg helmets approximately twenty-five feet into the air and down onto asphalt.

## **Observations:**

At eight feet, none of the eggs were broken. At fifteen feet, the cardboard box landed with a soft sound and a small bounce. The peanut butter jar and plastic pumpkin landed hard and loud and then bounced and rolled. The egg inside the pumpkin was broken. The styrofoam around the egg was removed and cotton balls were added to the batting inside the pumpkin. The added protection did not change the result at twenty-five feet. The egg in the plastic pumpkin broke a second time. The egg in the peanut butter jar and cardboard box easily survived all three drops.

The jar and box were subjected to extra strenuous testing. They were thrown down hard on the ground, kicked, thrown at least fifty feet, and a dog retrieved the jar and carried it around in its mouth. The egg in the cardboard box survived. The egg in the peanut butter jar was broken.

## **Conclusions:**

Of the three designs, the combination of the cardboard box and bubble wrap provided the most effective shock-proof egg helmet.

## **Inferences about conclusion:**

The best helmet was the box because of the bubble wrap and the soft outer layer of the box that helped to dull the fall. Wrapping the egg in more bubble wrap kept it from moving when dropped. The bubble wrap acted like miniature air bags, just like the larger ones used to prevent injuries to people during a car crash. The cardboard has air between the layers of paper. The shock of the impact is distributed across the surface

of the box. The box also has air pockets inside of the box caused by the wrinkled up bubble wrap. The combination of bubble wrap and cardboard provided a way for the egg to transfer its momentum to the soft materials surrounding it without breaking.

**Recommendations:**

The best way to keep an egg from breaking is to surround the egg with air. Bubble wrap and cardboard provide two ways to cushion an egg with air.



*Eight foot drop.*



*Fifteen foot drop.*



*Twenty-five foot drop.*





*Design 1 (peanut butter jar) survived all three drops.*



*Design 2 (plastic pumpkin) failed after only the first test.*



*Design 3 (the box and bubble wrap) survived all three tests - and more!*

<b>DISTANCE</b>	<b>Peanut Butter Jar</b>	<b>Plastic Pumpkin</b>	<b>Cardboard Box</b>
8 feet	Egg survived	Egg survived	Egg Survived
15 feet	Egg survived	Egg scrambled	Egg Survived
25 feet	Egg survived	Egg fried	Egg Survived

