

## FAMILY SCIENCE/MATH NIGHT LESSON PLAN

**Activity title (catchy!): Gravity, Air & Eggs!**

**Topic: Science/Physics/Technology**

**Presenter's name: \_\_Tim Gessler\_\_\_\_\_ Age Group: \_\_gr. 3-4\_\_\_\_\_**

### **Sources Consulted:**

1. An adaptation of an AskEric lesson plan found on the AskEric website. Lesson Plan #AELP-PHS0002. The lessonplan can be found under Lesson Plans, Science, Physics, "What makes a Parachute Float Slowly Down"?
2. Zoom Science Activity Guide: "Things you Build: Protection"
3. Encarta Web pages concerning, Gravity, air resistance, and parachutes for background information.

### **Objectives**

*After this presentation, students will be able to:*

**The primary objective is for students and parents to have fun, think and be creative.**

1. Predict how a parachute works.
2. Draw a design of a parachute.
3. Construct a parachute that will be able to slow the fall of several pennies in a cup (about 20 pennies) and an egg (hopefully the egg will not break!).
4. Explain how a parachute creates air resistance to slow objects falling by gravity.

### **List of All Materials Needed** (include quantities):

A chair or ladder for height when dropping eggs (about 10 feet minimum drop height).

For each group of 2-3 students: Several design sheets to record designs, 4 pieces of string (45cm long), one egg (in a plastic bag) , assorted pieces plastic, fabric, paper, and "shopping size" plastic bags (for parachute materials should be about 24" X 24") Small scissors for each table.

Stopwatch (this is optional)

Trashcan lined with a large plastic bag.

Large plastic tarp to drop eggs on

Data Sheets

### **Room Arrangement or Special Needs:**

Desks arranged so students/parents can sit in groups of four.

On Blackboard write these instructions:

## Engineering Design Process – Design A Parachute!

1. Draw parachute design on paper
2. Construct design
3. Test design.
4. Evaluate design (did it work?)
5. Try a new design
6. Test your best design with the egg.

### Lesson Overview:

Ask students what they could do to prevent the egg from breaking.....compare to jumping out of an airplane. Design a parachute to slow the egg's fall!

Tell students that they will use the engineering design process (above) to design their parachute. They will first draw the size and shape of their parachute on a sheet of paper. Students will cut their parachute out according to their design. Students will construct their parachutes and attach the cup of pennies to it. They will test each parachute design with their cup of pennies attached. Several test "drops" may be required as students seek to improve the shape or material of their parachute. These test "drops" should be timed and the results recorded on their design data form. Students will seek to improve their results each time.

After the students have created a parachute they believe will support the weight of an egg, they will attach the egg (in a Ziploc plastic bag) to the final design parachute. This egg will then be "test dropped" to determine if their parachute will slow the fall of an egg enough to prevent the egg from breaking.

Time	Introduction: (yourself, assistant, family science night, topic, attention-getter):
0-5 MIN	<p>Introduce assistant and myself.</p> <p>Introduce family science night and the Western Upper Peninsula Center for Science and Math.</p> <p>Explain that the primary focus of Family Science night is for students and parents to have fun working together, to think, and be creative. All people are naturally curious and that curiosity is important in understanding how science works. Tonight we will all be design engineers, aeronautical design engineers!</p> <p><b>Activities:</b></p> <p>Several preliminary activities will be positioned at tables for students/parents to work on before the formal presentation begins. Preliminary activities will include: Breakfast Lift-Hands Off, Build A Platform, and Toothpick Puzzles. Should start activity on time, as the testing takes considerable time.</p>
5-10 MIN	<p>My attention getter is to drop an egg (in a plastic bag) from 8-10 feet. I will ask the students if there is anything we could do to slow the fall of the egg so it does not break?</p> <p>After the introductions and attention getter, we will discuss with the students the concepts of gravity, air resistance, and how parachutes can slow a falling object (like an egg or a person) enough so that they are not injured or damaged when they land on</p>

	the ground.
<b>10-20 MIN</b>	<p>Students will work alone or in groups of 2. The students will then begin designing their parachutes. We will encourage them to experiment with different shapes, sizes, and materials of parachutes so they can see how the shape/size/material will affect the rate and direction at which the object falls. Through Q &amp; A we will get students to tell us what design characteristics might affect the parachute.</p> <p>The students will construct, test, and record the results of their first parachute design. Students will be asked why it is important to record observations.</p>
<b>20-35 MIN</b>	<p>After some discussion about the results of the first parachute design tests, we will ask students to choose/construct their “best” parachute capable of supporting the weight of an egg. As these parachutes are completed, the students will test drop (from 8-10 feet) each parachute in front of the classroom where we will record the results and determine if the egg broke.</p> <p>Real life examples of the parachute principle at work will also be discussed. Such as how parachutes are used for people, animals, and equipment that is dropped out of airplanes. How parachutes have also been used to slow the return of spacecraft to the earth.</p> <p>What “drop time” is needed to prevent the egg from breaking in its fall?</p>
<b>35-38 MIN</b>	<p><b>Summary (Q &amp; A)</b> I will ask students questions about what they learned in this activity:</p> <ul style="list-style-type: none"> <li>▪ What is gravity? Air resistance?</li> <li>▪ How can a parachute be used to slow the fall of an object through the air?</li> </ul> <p><b>Take Home Handouts:</b></p> <p>The students will be able to take home their parachutes, and their design sheets with the records of their results.</p>
<b>38-40 MIN</b>	<p><b>Cleanup:</b> Students will need to put their take-home materials into a paper bag. The broken eggs will need to be discarded in a trash can. This trash can should be removed from the classroom at the end of the night.</p>
<b>40-45 MIN</b>	<p><b>Safety Considerations:</b> Note that students should not try to make a parachute for themselves at home. Parachutes for people are very carefully designed, made and packed. Novices should NOT make his or her own parachute.</p> <p><b>Filler:</b> Age-appropriate family science scavenger hunt where students/parents move about the room and ask questions of each other.</p>