4TH GRADE 4-H

ELECTRIC EGGS AND PARACHUTES

Two Days Of Soft Landings

Materials Needed:

Per Team: three Chinese food takeout boxes, 1 30 gal. plastic garbage bag, 24 feet of string (lightweight), and 3 paper towels.

To share with class: masking tape, scissors, single, hole punch, 2 accelerometer "eggs," and new AAA batteries (4).

Day #1 Procedure:

1. As an introduction to the experiment, show this video on parachutes and drag: www.youtube.com/watch?v=Ab_g5sLoXoY

2. Have students make 4 holes, one on each top corner of their food box (use hole punch). Repeat this on two more boxes.

3. Have students make three parachutes (cut as squares), of differing sizes, out of the garbage bag. Make sure that the size of each parachute is at least 6 inches (on all sides of the square) larger than the preceding parachute. (For example, if the first parachute was 6 inches on each side, the next parachute should be no smaller than 12-inches on each side, and the third should be no smaller than 18-inches on each side.) Remind students that they only have one garbage bag, so, don't waste plastic by cutting a parachute out of the middle of one side.

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4. Have Students cut 12 strings, approximately 2-feet long.

5. Allow students to tie one end of each string to the corner of a parachute and the other end to one of the holes in a food box. Repeat with the other two boxes.

6. Mark each box with the size of the parachute attached. For example, mark the box "6," if it is attached to a 6-inch per side parachute.

7. Have the team predict which parachute will deliver the egg with the "softest landing."

8. Place the accelerometer in the plastic "egg." Make sure that the battery pack is attached and the batteries are good. Push the left button on the accelerometer to change the readout to "0." Close the egg.

9. Put the plastic egg into one of the team's boxes (under the parachute).

10. Hold the parachute by its middle and have an adult) drop it from a ladder, stairway, gym seats, etc.

For More Information Contact:
Bill Decker
4-H Regional Educator--Discovery Projects
wdecker@purdue.edu

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11. Once the parachute lands, open the box and carefully read the result through the egg.

12. Have each team write its results on the table provided.

13. Place the "egg" in the next box for testing. It should automatically read the next drop.

End Day #1

If you have extra time, this is a good chance to talk about the 4-H Aerospace project, parachutes on Mars landers, etc.

Day #2

Give each team 3 paper towels. Tell them that they can use those towels in any way they like (in/on/through the box) in order to provide the egg a better landing. Have them make the change to one box and test that box with all three parachutes. Have the students write down their result in the third column of the table.

After discussing improvements that students could still try, ask the following questions:

1. "Why did a larger parachute make the egg fall slower?" (Answer: A larger parachute has more air resistance than a smaller chute; thus, it falls slower.)

2. "Why could a redesign of the box have helped the egg fall slower?" (Answers will vary, however, something should be discussed about the paper towel slowing the egg down, before it hits the bottom of the box. They could also note that the box absorbed some of the force.)

3. And one to really make them think, "Would using a parachute work well on the Moon?" (Answer: NO! There is not enough atmosphere (air) to cause much "air resistance." Thus, the parachute would not slow down the load very much. Of course, due to lower gravity on the moon, the egg would not have fallen as fast.)

If you have extra time, play this video: www.youtube.com/watch?v=nsnyl8llfH4 . It is high-school level; so, you may need to stop it and explain a few times. Mark Rober, the speaker, is the "CrunchLabs" guy. So, some of your students might recognize him.

Indiana Standards:

3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5—ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

4-H Project: Aerospace

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4-H Regional Educator--Discovery Projects
wdecker@purdue.edu

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Egg Drop Tests—Parachute and Cup Drop		
Parachute Size	Accelerometer Reading	Accelerometer Reading With Paper Towels

Accelerometer Hints!

Once you flip the black 0n/Off switch to “On” at the battery case, it should be running. An LED will light up on the Microbit. Pressing the button (front-side left) should give you a reading of “0.” If someone hits the button on the back, the code will be lost.

If this is the case, logon to microbit.org, pair the bit to your computer (using the cord), and download this file:

https://makecode.microbit.org/S51462-64854-21227-83983

You may need to click on “simulator” at the top of the page to get the download button.