**The Amazing Egg Drop CHECKER**

**An Engaged Learning Workshop**

[Dr. Susan Belgrad, Professor of Elementary Education
Educational Design and Learning Consultant](https://www.csun.edu/~sb4310/index.htm)

**Learning about Constructivist Practices by Engaging in Them**



Grade Level: Upper Elementary

 Identified Standards: (Led by Checker)

CCSS:

NGSS



**Objectives:****CHECKER**

*At the conclusion of this lesson, students will be able to:*

*1. Name and explain the steps of the scientific process
       2. Name and explain the steps of engineering design
 3. Successfully design and construct an egg-protection device
 4. Identify the laws of motion that affect the performance
 of their craft
 5. Identify the level of cooperative and intelligent behavior that
 team members contributed to the activity
 6. Analyze and draw conclusions about laws of science based on the
 results of the egg-drop experiment*

**Instructions:**

In this lesson you will use teamwork to design a container that would protect a raw egg as it falls to the ground from a height of 8 feet. Your team will receive an egg and a selection of materials. You will be given time to brainstorm how you might construct a protective mechanism for dropping your egg without breaking it. You are only allowed to use the designated materials within the time-frame allotted. It will be important to work well with your teams in analyzing the materials you are given and predicting which materials will safely protect your egg during its descent**.**

   

**Team Roles: CHECKER**

**1.  Materials Manager - the person whose birthday is the nearest in the future. Picks up, manages, and returns all materials.**

**2.  Checker - the person to the right of the materials manager; makes certain all tasks are carried out correctly, answers team questions and seeks out assistance when team requests it.** *This person leads the group in identifying the NGSS and CCSS that are met in the activity*. **Also responsible for navigating to the websites identified by the instructor to check for resources explaining the outcomes of their trials;**

**3.  Encourager - the person to the right of the Checker; responsible for establishing and keeping a positive team spirit. This person may also become the Traveler or Spy;**

**4.  Reporter/Recorder - the person to the right of the Encourager; responsible for taking down (or entering into the computer) the team brainstorming notes and the selections for assembling the protective mechanism as well as recording the results of the team trials. This person will also report the findings of the team.**

**5.  If there are five team members the fifth person will be the reporter.**

**After your team has assigned and reviewed the roles, the materials manager can pick up the team materials.**

**Materials MATERIALS MANAGER**

**1. One egg for every group of students**

**2. One piece of newspaper for every group of students**

**3. One foot of tape for every group of students**

 **4. Some materials you may choose are cardboard, cotton,
 Styrofoam, tape, glue, socks, empty paper roll, and
 straws.**

**5.  Garbage bags are used for the trials to prevent spillage.**

**The trials will occur in the classroom or a designated area
 outside or in stairwell.**

**In your design PLAN, you should choose one or two VARIABLES and test the results of these variables on your craft. Your design must not include changing the egg in any way (no tape on the egg, no nail polish on the egg, no hollow eggs...). You will be asked to write a lab report with all the standard sections and produce a final product to describe your work. In this project, you should be trying to apply some of the knowledge about motion.**

   

**Part I. (10 minutes)**

**Once the team has taken time to read the egg-drop instructions and look over the materials, they will brainstorm ideas on how to create the most protective mechanism.**

**After brainstorming, the checker makes sure everyone’s idea is discussed and the most agreed-upon plan will be selected. The checker may consult with other groups if their teams wish.**

**Part II. (15 minutes)**

**When the team has decided upon the design plan, they may begin to construct their mechanism. Following the construction, the group then chooses a SLOGAN for their group and selects an ENERGIZER which they would like the group to give them as they complete their drop.**

**The encourager leads the cheer following the group’s presentation**

**Part III. (10 minutes)**

**When all teams have completed their crafts the instructor will provide a plan for each team’s opportunity to test their design at the “drop” site.**

**Following the concluding drop, each of the groups will review the results and hypothesize why the mechanisms performed as well or poorly as they did. The materials manager returns the supplies and picks up the egg drop lab sheet. The group discusses the analysis and work together to individually complete each sheet.**

**Part IV Processing: Each team assesses the quality of the work their team accomplished in the egg activity.**

**Part V. Evaluation**

 **TEAM ANALYSIS AND RESULTS  RECORDER**

****

1.      Did the craft survive the fall from the stairs?

2.    What was successful in the design of the craft?

 3. What were the variables that you considered most important?

 One: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Two:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What would you change about your craft if you did the experiment again?

 4. As the egg drops, what type of energy conversion is taking place? Explain

  **OBSERVER**

***The Amazing Egg Drop* COOPERATIVE GROUP CHECKLIST**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Group Member Name*** | ***Encouraging*** | ***Attentive Listening*** | ***Working toward Consensus*** | ***Staying with the group***  |
| https://www.csun.edu/~sb4310/The%20Amazing%20Egg%20Drop_files/image009.jpg |   |   |   |   |
| https://www.csun.edu/~sb4310/The%20Amazing%20Egg%20Drop_files/image009.jpg    |   |   |   |   |
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**Scoring Key 0 Never  Sometimes + Frequently**

 **ENCOURAGER**TO PROMOTE a Learner-Centered Classroom, these tools are excellent in engaging students in kinesthetic activity (that relieves fatigue from mental work) and promotes a highly social, caring community.  Some of my favorites are listed below.  I am always adding new ones, so keep checking this page!

|  |  |
| --- | --- |
| Silent Cheers | Energizers |
| The Rainbow Cheer --Also  the "Hoo--Hah!" --wave arms back and forth overhead | The Round of Applause |
| The Sitting O (Ovation)-- form an overhead circle with your arms while sitting. | The Top Dog (Arsenio) |
| The Standing O (Ovation) --form an overhead circle with your arms while standing. |  Roller Coaster |
| The Microwave  (wave little fingers only) |  Sprinkler |
| The Stamp of Approval--use your fist to stamp inside your other palm | The Seal of Approval |
| Eskimo Hello  -  Shake both hands over your head |  The Egyptian |
| Clam Claps-- Pincher with both hands to thumbs |  Triple YES Cheer |
| The Wow Cheer -- Form "w's" with fingers on both hands--Form O with your mouth and place fingers on either side of face to form WOW |   |
| The Wave-- Also the Fish--  use a wavy up and down motion with your hand |  |

**INSTRUCTOR**

**Egg Drop Data:**


|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Team Number/Name** | **Package** | **Parachute** | **Trial Success Y/N** | **Variables Considered in Design** |
|  Group 1 |   |   |   |  |
|  Group 2 |   |   |   |  |
|  Group 3 |   |   |   |  |
|  Group 4 |   |   |   |  |
|  Group 5 |   |   |   |  |
|  Group 6 |   |   |   |  |
|   |

**Scoring Rubric for Team Performance
of Amazing Egg Drop**

Performance Criteria:
1.  Team engaged in brainstorming; analyzed ideas and selected design plan collaboratively
2.  Team made predictions regarding motion, acceleration and air resistance.
3.  Team successfully completed construction of craft
4.  Team correctly identified and considered key variables in activity and laboratory report

|  |  |  |  |
| --- | --- | --- | --- |
|    | **Not Yet**brokenegg.jpg**1** | **Almost There**crackedegg.jpg**2** | **Got It!!****https://www.csun.edu/~sb4310/The%20Amazing%20Egg%20Drop_files/image001.gif****3** |
| **Brainstorming; analyzed ideas and selected plan** | No evidence that the team brainstormed and analyzed several plans | Team clearly brainstormed and analyzed several plans before selecting construction plan | Team brainstormed several good ideas, engaged in analysis and selected an effective construction plan |
| **Made predictions regarding motion, acceleration and air resistance** | No evidence of predictions regarding motion, acceleration and air resistance | Team shows good evidence of predictions regarding motion, acceleration and air resistance | Excellent evidence of predictions regarding motion, acceleration and air resistance |
| **Completed construction of container** | Team demonstrated an inability to construct a container in the time allotted | Team effectively used the time allotted to create a well-designed container | Team effectively used the time allotted to create a well-designed container |
| **Correctly identified variables in laboratory report** | Lab report was incomplete, failed to address variables and/or had incorrect information  | Lab report  is complete, addresses variables and provides correct information  | Lab report  is very well written, addresses variables, provides correct information and presents valid conclusions |
| **TOTAL TEAM POINTS** |   |   |   |
| **TOTAL TEAM SCORE** |  |

##  RECORDERSample of Egg Drop Project Write-up

Step 1: Identify the problem [What is your problem?]

    The problem in this situation is that each group must design a device to protect an egg from a drop using only one sheet of newspaper and one foot of tape.

Step 2: Hypothesis [What is your hypothesis? Please illustrate on back of page]

I hypothesize that a parachute design will protect the egg from breaking in the fall.  This design will have four long thin strips of paper attached to the remaining four corners of the newspaper and then to the egg.



Step 3: Trial/Test [Materials manager is responsible for deploying the drop]

(no written work for this step)

Step 4: Evaluate [Determine how variables affected the success or failure of your craft—what design modifications would assist you in improving your craft?]

(Example:  "My design was successful in protecting the egg.  Other parachute designs were also successful.  Other designs involving wrapping the egg in newspaper were, for the most part, not successful.  The results of my classmates were as follows:

Parachutes-  Number broken: 2     Number not broken: 6
Crafts- Wrapping egg in newspaper- Number broken: 5   Number not broken: 1

Step 5: Conclusion

   I conclude that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the best way to protect the egg from a fall.  It had a far better success rate than the \_\_\_\_\_\_\_\_\_\_\_\_\_.