**Egg Drop Project**

**Objective**: To create a container that will protect an uncooked egg from the impact of a 2nd story drop.

**Directions:** Each student (or pair of students) will design and build an egg container at home and on the work day. ***No extra time will be*** ***allotted to build.*** On the drop day, your teacher will provide one egg for each student. Each container will be dropped from the 2nd floor. Prizes will be awarded!

**Rules: Please read carefully.**

1. You may work on your own or with a partner. Outside help should be minimal (ie: your dad cannot design and build your project for you).
2. Your container must fit in a 12” x 12” x 12” box.
3. The mass of the container matters. A lighter container will get more points (see break down below).
4. Your container must fall to the ground. No parachutes, wings, or propellers (or anything else meant to increase air resistance).
5. No substance may be molded to form a “pod” or capsule around the egg. (No peanut butter,

jelly, goo, etc.)

1. No foreign substances may be applied to the egg itself.
2. You must build a container. No putting eggs in a big sponge or pillow and calling that your project.
3. Your egg must be secured inside your container. If the egg falls out during the drop you will lose points.
4. There must be easy access to the place where the egg will be located. No building will be allowed on drop day. You will only get 5 minutes to secure your egg in your container.
5. You have a budget of $10 MAX. You should use things around your house and only spend money if you really need to.

**Any violation of the rules will result in loss of points. If a rule is unclear to you, please clarify BEFORE drop day.**

**Project Steps and Points:**

**All work should be typed, excluding the diagram of design.**

1. **Design (5pts)**: Create a labeled diagram for your top design idea. Write 2-3 sentences explaining why you think your design will work and why you choose the specific materials. It’s OK if you end up changing your design along the way. ***Due Date: \_\_\_\_\_\_\_\_\_\_\_***
2. **Drop Day! (10pts):** ***Due Date: \_\_\_\_\_\_\_\_\_\_\_***
	1. Each container will be measured and weighed prior to the drop. **(5pts)**
		1. Containers bigger than 12x12x12 will **be disqualified.**
		2. Mass points: **5pts** for 0g<m<100g; **4pts** for 100g<m<200g; **3pts** for 200g<m<350g;

**2pts** for 350g<m<450g; **1pt** for m>450g

* 1. Egg condition points **(5pts)**
		1. Eggs which survive without any cracks will receive **5pts.**
		2. Eggs with only very small cracks (nothing dripping out) will receive **4pts.**
		3. Completely cracked or smashed eggs will receive **2pts**.
		4. If the egg falls out of the container, you will **receive 1pt.**
	2. Any other violation of the rules will result in the **loss of** **2pts**/violation.

**Bonus Points (+2 each)**

*\*\*Lightest Surviving Containers* (2 from each class)\*\**Least Measured Force\*\*
 \*\*Most Durable\*\**

1. **Data Analysis and Reflection (10pts)**: In 3-5 paragraphs discuss the following (please type this and submit online)
	1. Design Reflection **(2pts)**
		1. Summarize how you decided upon your final design and reflect on any changes you made to your final design.
		2. How did your research influence your design?
		3. Explain how you built your container and any issues you came upon as you were building.
		4. Did you do any practice drops before drop day?
	2. Reflecting on The Drop **(2pts)**
		1. What happened on drop day?
		2. Why do you think your container had this result?
		3. If you could do this project again, what would you change, and why?
	3. Applying the Calculations **(6pts)**
		1. Discuss the physics behind your egg’s drop by calculating the final velocity before striking the force plate, calculating the egg’s momentum, and time of impact of each egg individually. Show your work for ALL calculations.
		2. In a paragraph, Explain how concepts such as ***force, velocity, mass, position, time, momentum, impulse, and acceleration*** were components of this project. Make sure to explain the relationship between force and time and how it relates to impulse. Underline each of the bolded words in your conclusion. This is an important part of your conclusion. Take your time explaining the physics behind the project and do quality work.

***Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_***

***Partner’s name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**TURN IN THIS RUBRIC!!!!!!!!!!!!!**

|  |
| --- |
| **Egg Drop Grading Rubric** |
| **Assignment** | **0 1 2** |  **3 4** | **5** |
| ***Design***  | Design is not present or severely lacks in evident effort and thoughtful planning. | Design shows effort in thoughtful planning but diagram could be improved with labels and/or consideration of fall. | Design is clear and does an excellent job of diagramming a thoughtful and precise design that considers the mechanics of the egg and fall. |
| ***Drop Day - Mass*** | **2pts** for 350g<m<450g; **1pt** for m>450g | * + 1. **4pts** 100g<m<200g; **3pts** 200g<m<350g;
 | 0g<m<100g;  |
| ***Drop Day - Egg Condition*** | Completely cracked or smashed eggs will receive **2pts**. If the egg falls out of the container, you will receive **1pt.**  | Eggs with only very small cracks (nothing dripping out) will receive **4pts.**  | Eggs which survive without any cracks will receive **5pts.**  |

|  |
| --- |
| ***Data Analysis and Reflection*** |
|  | ***Design Reflection*** | Design reflection does not answer all questions or lacks in detail and thoughtfulness. **(0-1pt)** | Design reflection answers all questions and does so thoughtfully and thoroughly. **(2pts)** |
|  | ***Reflecting on the Drop*** | Reflection does not answer all questions or lacks in detail and thoughtfulness. **(0-1pt)** | Reflection answers all questions and does so thoughtfully and thoroughly. **(2pts)** |
| ***Applying the Calculations (i)*** | All work is not shown **(0pts)** or work is shown but many errors were made **(1 pt)** | All calculations are shown but some mistakes are made. **(2pts)** | All calculations are shown fully and are correctly done. **(3pts)** |
| ***Applying the Calculations (ii)*** | Not all concepts are discussed and many mistakes are made, making it difficult to demonstrate understanding of relationships between terms. **(0-1pt)** | All concepts are discussed and with some mistakes or some detail lacking in making connections between terms. **(2pts)** | All concepts are discussed and accurately described and critical thinking is demonstrated by detailing relationships between the terms. **(3pts)** |