

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Design Brief: Egg Drop Challenge

**Context:** The year is 3022. Humans have successfully set up a colony on Mars and have begun terraforming the planet. The latest transport of workers from Earth has just arrived but unfortunately, they had an unwanted passenger, Influenza! The Martian government knows they will need millions of eggs to create flu vaccines, but the only chicken farm is in orbit around the planet, and their delivery rocket is broken.

**Challenge:** You must design a vessel capable of protecting an egg from a 12 Foot 6 inch fall. Materials are scarce on your space station, and you have a lot of eggs to ship to the surface, so bonus bragging rights will be awarded for the lightest vessel, as well as the smallest. We want these eggs to land where they're needed to combat the flu, so a bonus mark will be awarded if your vessel lands on the target in the testing area.

### Resources:

- Mark Rober Egg Drop Video: <https://www.youtube.com/watch?v=nsnyl8llfH4&t=1s>
- Internet

### Materials and Equipment:

- One regular sized chicken egg (provided)
- Various materials available in the shop (provided)
- Any other materials brought from home
- 3D printers and laser cutters are available

### Rules:

- The egg may not be physically altered in any way
- The contraption may not be controlled by an operator in any way once released, this includes radio control

**Testing:** Contraptions will be dropped from the mezzanine in B117 (12'6" fall) into a trash can. Each contraption will have three eggs available and therefore up to three official tests.

**Test Date:** TBD



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## **Egg Drop Challenge: Research Assignment**

1. Why is an egg shaped like an egg?
  
2. What is potential energy?
  
3. What is kinetic energy?
  
4. How does knowledge of kinetic and potential energy apply to the egg drop?
  
5. What is drag?
  
6. How can you create drag?
  
7. On the back of this page, sketch five different potential designs. Discuss your designs with a classmate. Choose your favorite design and add extra detail to that design. Start thinking about what materials you will use? Do you need any tools? How long do you think it will take?

# Egg Drop Challenge Evaluation Rubric

Student					
	4	3	2	1	0
<b>Preparedness and Time Management</b>	Used time very efficiently, always on time and prepared for class.	Was mostly on task with some distraction. Usually prepared for class.	Procrastinated somewhat, but the project was completed on time. Frequently unprepared for class.	The project was late but still was completed. Always unprepared for class.	The project was not completed.
<b>Safety Practices</b>	All safety rules were followed.	Student followed most safety rules.	Student attempted to follow safety rules but failed to meet several.	Student failed to follow a significant number of safety rules.	Student was not safe enough to participate in class.
Project					
	4	3	2	1	0
<b>Construction</b>	Neat construction and assembly. Excellent attention to detail.	Good construction and assembly, good attention to detail.	Adequate construction, little attention to detail.	The design looks like a last-minute project.	The design was not completely put together.
<b>Planning</b>	Plans were developed enough to be followed exactly.	Plans were followed but were slightly incomplete.	Plans needed heavy modification to be followed.	Plans were created but not followed.	No plans were created.
<b>Design</b>	Design was unique and original.	Design has been used before but with a creative twist.	Pre-existing design but with some improvements.	Pre-existing design with minimal modification.	Pre-existing design was exactly copied from elsewhere.
<b>Use of technology</b>	3D printed parts were effectively implemented into the design as the best solution to a problem.	3D printed parts mostly served their function.	3D printed parts served their function poorly.	3D printed parts were present but served no other function other than decorative.	3D printed parts were absent.
<b>3D modeling</b>	Student has shown excellent use of 3D modeling software.	Student has shown reasonable use of 3D modeling software.	3D modeling was attempted but models were very basic.	3D modeling was attempted but no parts were created.	No 3D modeling was used.
<b>Bonus mark awarded for hitting the floor target!</b>			<b>Function</b>	The egg was protected.	The egg was not protected.

Total \_\_\_/30

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## **Egg Drop Challenge: Project Reflection Assignment**

### **Test your design:**

1. Describe how you tested your prototype.
  
  
  
  
  
  
  
  
  
  
2. If your design worked, describe how. If your design didn't work, describe why not.
  
  
  
  
  
  
  
  
  
  
3. What changes did you make after your initial prototype to improve your results?

### **Reflection:**

1. Describe how you would further improve your design.
  
  
  
  
  
  
  
  
  
  
2. Compare your contraption to the lightest and smallest designs. What were the main differences?
  
  
  
  
  
  
  
  
  
  
3. What did you find to be the most difficult part of this challenge? How did you overcome this difficulty?

## **How to facilitate the brainstorming and design process**

I would start by watching the mark rober egg drop video as a class. While they're watching, they could start filling out the research assignment. On the back of the research page, students will draw five different designs that they might like to build. Students will discuss their designs with a classmate, and then will each choose one of their designs to explore further. They should start thinking about what materials and tools they'll need, how long it will take, etc...

## **How to test the egg drop contraptions**

At the college, the contraptions will be tested by dropping them from the top of the stairs in B117. In another school, this could be done from a tall ladder, inside or outside. If the testing is done outside, I'll have to contend with the weather but the custodians will probably like me more. If I have a really good head custodian and principal, I might even be able to get on the roof to drop the contraptions. If the testing is indoors, a good idea is to have a target that students are encouraged to hit. This hopefully will mean I don't have to clean up as much of your room.