



EGG DROP CHALLENGE

ENTRIES OPEN APRIL 15, 2019- JULY 10, 2019



BRAINSTORM & DESIGN LESSON

EGG DROP BRAINSTORM

It's brainstorm time! Think about different design factors before building your egg drop invention. Students will explore egg protection, materials, structural integrity, impact absorption, drag, and balance/orientation.

FOR THE CLASSROOM

POSSIBLE APPROACH
FOR THE CLASSROOM



LESSON LENGTH
1, 30-60 MINUTES



OBJECTIVE
EXPLORE FACTORS TO CONSIDER
FOR YOUR EGG DROP BUILD



MATERIALS
PEN, PAPER, COMPUTER,
INTERNET

VOCABULARY:

- Brainstorm
- Structural Integrity
- Impact Absorption
- Air Resistance
- Drag
- Balance
- Orientation



PROCEDURE

1) DOWNLOAD AND TEACH THE [EGG DROP BRAINSTORM POWERPOINT](#): We have provided a Future Engineers PPT. Feel free to customize it to suit your teaching needs.

2) ACTIVITY ONE: BRAINSTORM

Put your students in groups and have them research and brainstorm the following categories to guide them through their egg drop invention design & build. These brainstorming topics build on the science lesson for this challenge.

- **Materials:** You can use paper plates, straws, balloons, paper cups, rubber bands and tape, but the smaller your design, the more points you will get. Think about what materials you will pick and how you will use them. Will you use them as is, or alter them to get the results you want?
- **Egg Protection:** Egg shells are delicate. How will you distribute the force to protect your egg from getting poked, prodded or pierced upon impact? (Remember! You need to show the intact egg shell at the end of your egg drop video, so make sure any egg protection is removable.)
- **Structural Integrity:** How will your design keep its shape? How will it securely hold your egg? Will it be built to be hard like a tank? Or soft like a pillow? Or a little bit of both?
- **Impact Absorption:** How will your design absorb the force of impact? How fast will your egg come to a halt when it hits the ground? Will you use crumple zones or perhaps a different method to break the fall?
- **Air Resistance:** Drag is a force due to air resistance, which in the case of an egg drop will directly oppose the weight of your payload. Will you try to use air resistance as part of your design? If so, how? If not, why?
- **Balance & Orientation:** Is balance important to your egg invention? What about orientation? Is there a specific way it should land? Is there a specific orientation that the egg should be placed in your design?



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LESSON PLAN CONTINUED

EGG DROP BRAINSTORM

PROCEDURE

3) ACTIVITY TWO: SKETCH YOUR EGG DROP PAYLOAD (DESIGN)

Have your students use the information they gathered from the brainstorming session to sketch out a design of their egg drop build. Be sure to review the contest rules and design guidelines.

BACKGROUND INFORMATION

BRAINSTORM

Here are some basic rules to follow when conducting a brainstorm in the classroom with a small or whole group of students:

- There are no wrong answers
- Try to get as many ideas as possible
- Record all ideas
- Do not express your evaluation on any idea presented until after all ideas are shared

NEXT GENERATION SCIENCE STANDARDS

MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed, object, tool or process such that an optimal design can be achieved.

MS-PS2-1 Motion & Stability: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

PS2.A: Forces and Motion

- For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction.

MS-PS3-2 Energy: Develop a model to describe that when the arrangement of object interacting at a distance changes, different amounts of potential energy are stored in the system.

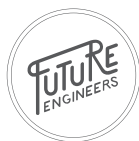
PS3.A Definitions of Energy

- A system of objects may also contain stored (potential) energy, depending on their relative positions.

PS3.C Relationships Between Energy and Forces

- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object.

MS-PS3-5 Energy: Construct, use and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.



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BRAINSTORM & DESIGN WORKSHEET

WHAT WILL YOU BUILD?

Use the brainstorming categories to explore different aspects of your design. Come up with ideas, evaluate the pros and cons, and then sketch your egg drop invention.

Brainstorming Categories:

Below are some brainstorming topics to consider.

MATERIALS



You can use paper plates, straws, balloons, paper cups, rubber bands and tape, but the smaller your design, the more points you will get. Think about what materials you will pick and how you will use them. Will you use them as is, or alter them to get the results you want?

EGG PROTECTION



Egg shells are delicate. How will you distribute the force to protect your egg from getting poked, prodded or pierced upon impact? (Remember! You need to show the intact egg shell at the end of your egg drop video, so make sure any egg protection is removable.)

STRUCTURAL INTEGRITY



How will your design keep its shape? How will it securely hold your egg? Will it be built to be hard like a tank? Or soft like a pillow? Or a little bit of both?

IMPACT ABSORPTION



How will your design absorb the force of impact? How fast will your egg come to a halt when it hits the ground? Will you use crumple zones or perhaps a different method to break the fall?

AIR RESISTANCE



Drag is a force due to air resistance, which in the case of an egg drop will directly oppose the weight of your payload. Will you try to use air resistance as part of your design? If so, how? If not, why?

BALANCE & ORIENTATION



Is balance important to your egg invention? What about orientation? Is there a specific way it should land? Is there a specific orientation that the egg should be placed in your design?





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Sketch Your Design:

Use the space below to sketch the design for your egg drop invention

