

PHYSICS 2204
Egg Crash!
Designing a Collision Safety Device

Purpose

* To design, build, test and evaluate a “safety device” to protect an egg during a collision with a hard surface

* To use this collision to increase student understanding of Gravitation Potential energy, kinetic energy, changing momentum, impulse, impact force, and impact time



Student Name: _____

Date: _____

Group Members: _____

1. Take the following measurements

Mass of structure without egg = _____ grams or _____ kg

When you get your egg, it will be in a plastic bag. Leave it in your plastic bag, even when it is in your egg drop device. This will make it much less messy to clean up.

Measure your egg: Mass of egg = _____ grams or _____ kg

Add to find: Total mass of egg + container = _____ grams or _____ kg

2. Record the dropping distance

Height = _____

3. Did your egg break? _____

A = egg doesn't break B = egg cracks C = egg leaks D = parts go flying

4. Calculate the Gravitation Potential Energy (Relative to the floor)

5. Where would the structure have its maximum kinetic energy? Identify the amount of kinetic Energy at this point. (Assume conservation of Energy)

6. Compute the maximum speed at which the structure will hit the floor?

7. What is the initial momentum of the structure?
8. What is the final momentum of the structure?
9. Calculate the change in momentum for the structure as it hits the floor.
10. What impulse did your device experience as it hit the floor?
11. It takes approximately an average force of 25 newtons to break an egg. What is the minimum time needed to decelerate your egg from its average speed to a stop without breaking? Show your work!
12. Draw a large diagram (or a photo) of your Collision Safety Device in the space below.
13. Describe your team's Collision Safety Device, the reasoning behind your design, and its performance during the various collisions. Refer to your diagram.
14. Explain how your Collision Safety Device is similar to an airbag in preventing injuries. Use the terms momentum impulse, impact force, and impact time in your response.
15. If you could build Egg Crash safety Device again would you change anything? If yes what would it be?