



## Egg Protector Project

**Objective:** Make a protective device to keep the egg shell from breaking when you drop it

**Difficulty:** Easy (Ages 8-14); Easy with help (Ages 2-8)

### Materials:

Here are some of the items and materials that can be used in the egg drop project. For a bigger challenge, limit the materials and the time. For a real challenge, try making your egg protector without using bubble wrap or balloons. Some materials you might use are:

- Raw egg
- Newspaper
- Masking tape
- Straws
- Cardboard
- Cotton balls
- Toilet paper tubes
- Socks
- Plastic bottles
- Rubber bands
- Craft sticks

### About:

Bird eggs have evolved to become self-contained life support systems. Their hard shells are still able to allow oxygen to pass through tiny pores in the calcium, and they contain all the food and water a developing chick needs.

Eggs take up a lot of a small bird's body space-- wren eggs can take up 13% of their body cavity! The eggs of a larger bird, like an ostrich, only take up about 2% of their body cavity. Different types of birds lay eggs that are more round, more like an oval, or more pointy than others.

A healthy bird's body produces calcium to cover the soft egg yolk and inner membrane before the bird lays its eggs. The egg shell is an egg's best protector, but even a tough egg from a healthy bird can break if it falls from a tree.

For this project, we'll design and make different versions of an egg protection device, using recycled materials like cardboard, cloth, straws, bottles, and rubber bands. See if you can make a protective device to keep the egg shell from breaking when you drop it. How high can you drop your egg in its protector without breaking it?

Can you make a parachute for your egg protector? Do you think it will help?

### **Procedure:**

For this project, begin by assembling the materials you want to use for your egg protector, and think about how you might use them. Will your egg protector have soft, cushiony material around the egg? Will the egg be inside a small bottle or other container inside a larger protective casing? Will you use rubber bands or string to hold the egg steady? Will you put something on the outside of the container to help act as a shock absorber and ease the impact when it hits the ground?

Sketch a few designs in your science journal. Then, start tinkering! To make this project more challenging, set a time minute, say 15 minutes, to make your finished egg protector.

You can also make the project more challenging by limiting the supplies you can use, or by limiting the weight of the final protector.

You may want to make several different variations of egg protectors and test them all to see which one works best.

When you've built your protector, take it somewhere that you can drop it from at least a 6 foot height. An adult should help if you're going to be climbing a ladder, dropping anything over a railing, or out a window. You

may want to put down a shower curtain or tarp first, to help contain any broken egg messes.

For your first test, drop the egg protector from a 6 foot height. Did it break? Record the height and result in your journal.

If your egg broke, look carefully at your protector. What can you change to try to protect the egg better next time?

You also can film the protector drop, and review the video to see if you can get any ideas about how to build another protector.

If the egg didn't break, you will test it again, this time from a 10 foot height. Record the height and result in your journal.

Keep trying, and see how high you can drop your egg protector without the egg breaking! Send us your pictures and videos of your egg drops to (contact). We love seeing your ideas!

### What's the Science?

Designing and testing an egg protector uses your engineering skills, physics and math skills. You're designing, building, testing, and modifying your designs, based on the results of your tests-- that's thinking like an engineer. The material and time limits are called constraints. Engineers have to cope with time limits and limits on materials all the time. These limitations mean they have to use good problem solving skills and a lot of creativity.

When you test your egg protector, its weight, the speed that it falls, and the time it takes it to fall will affect the force when it hits the ground. The protector's overall size and the stuff that makes it up (its **mass**) and the height you are dropping it from will determine the **potential energy** the egg has when it is waiting to be dropped.

That potential energy will decrease and its **kinetic energy** will increase once the egg is dropped, turning completely to kinetic energy when it hits the ground. Earth's **gravitational force** will pull the egg toward the ground.

What are some ways you can counteract the force when the egg protector strikes the ground? Is there any way you can slow the protector's **acceleration** when it is falling?

Take a picture of you using your science journal, and share it with us, so we can see what you made! For more engineering projects and science activities, [subscribe to our newsletter](#)! Have an adult send it to [online@scienceworksmuseum.org](mailto:online@scienceworksmuseum.org) or share it using the hashtag #ScienceWorksOnline