

# Cradle of Aviation Egg Drop



## The Egg-citing Challenge Description



The goal of this challenge is to design and build a device that will allow a raw chicken egg to survive a fall of approximately 18 feet for the 1<sup>st</sup> and 2<sup>nd</sup> graders or 30 feet for the 3<sup>rd</sup>-5<sup>th</sup> graders and 6<sup>th</sup>-8<sup>th</sup> graders. Use the following information to help you brainstorm your design and the best materials to use.

- Eggshells are remarkably strong. If you hold an egg in the palm of your hand and try to crush it by wrapping your fingers around it and squeezing, you will find that it takes a large force to crack the shell. However, the shell can be broken rather easily by hitting a small area with a hard object. Therefore, you need to protect your egg from very large forces applied all over and from moderate forces applied to small areas of contact.
- Falling objects are pulled toward the earth by the force of gravity. The farther they fall, the faster they will be going when they stop. When an egg reaches the floor after an 18 foot drop it will be going approximately 36 feet per second and will be stopped very suddenly when it hits the floor (this is called the impact). Its speed when it hits the floor is about 24 miles per hour.
- An unprotected egg falling 18 feet onto a hard surface will encounter the worst situation—a very large force applied to the small area where the egg first contacts the floor. The large force arises because the egg is going fast and because it is stopped suddenly. The egg will break!
- An additional factor is the mass of the egg and its package. This plays a role, since the mass of the falling object affects the impact force. By requiring that all entries use chicken eggs, we can assure that the mass of each egg is essentially the same. That is why other kinds of eggs are not allowed. But the packaging material adds mass, and that must be a consideration when the package is designed. The two things you can do to reduce the force on the egg are to slow the egg down and lengthen the time of impact. You can design a package that will do either or both of these things.