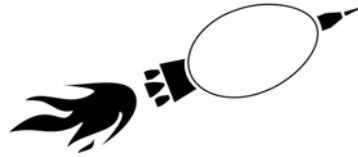


# Eggnaut



Your mission, should you choose to accept it, is to design and build a vehicle that will protect your Eggnaut from the perils of re-entry. The objective is to have your Eggnaut survive the fall without a crack.

Ages 5 - 11	Ages 12-15	Materials
4	2	21 x 29,7 cm sheets of standard printing paper
25	20	Drinking straws of any size with at least a 13 cm length
25	20	Popsicle or craft sticks/wood splints/tongue depressors
150 cm	100 cm	String of any size
150 cm	100 cm	Masking tape of any size
5	5	Rubber bands of any size
1	1	Raw grade A egg
1	1	Pair of scissors

## The Rules

- The re-entry system must fit inside  
*Primary* - a space of 30 cm x 30 cm x 30 cm  
*Lower secondary* - a space of 20 cm x 20 cm x 20 cm
- Parachutes or helicopters are allowed.
- A plumb line can be used to target the re-entry vehicle onto the recovery zone.
- All parts of the re-entry system must be above the re-entry orbital height of  
*Primary* - 2 to 3 m  
*Lower secondary* - 3 to 5 m
- The re-entry system's mass must not exceed  
*Primary* - 400 gr  
*Lower secondary* - 400 gr
- It must land as close as possible to the centre of the re-entry zone.
- You do not have to use all of the materials listed.

## Questions to Consider

- How can I design my re-entry system (capsule) to protect the eggnaut?
- What can I design into my re-entry system to make sure it lands in the centre of the target area?
- How am I going to slow it down?
- Which of Newton's Laws of Motion are at work on the capsule and eggnaut?

5. Draw a plan of your system and explain how it is going to work and why.
6. Report your test results and  
*Primary* - why they happened and how you could fix them.  
*Lower secondary* - why you think they occurred and what you could do to improve your design.

### **The egg landing pad: exercise for upper secondary**

#### The Problem

Your team is to design and build a scale landing pad to be used in case of an emergency extraction from the new eggonaut orbital system. The landing pad must prevent a raw eggonaut from breaking after it has accelerated under the force of gravity for a distance of one metre or more.

#### Materials

- 10, 21 x 29,7 cm sheets of notebook or copy paper
- 30 cm of masking tape
- A RAW eggonaut (grade A large egg)
- Plumb line for aiming (metre stick)
- Modelling clay (50 to 60 g. lump as a practice egg; dents = cracks)
- Triple beam balance

#### Specifications

1. You may use only the materials listed; you do not have to use all of them.
2. Egg landing pads must stand by themselves. They cannot be taped to anything or held by anyone.
3. A cracked egg is a broken egg. If the egg bounces off the landing pad or the landing pad falls over, allowing the egg to touch the floor, the egg is considered broken.
4. No parachutes or wings are allowed.
5. Use any technique that you may have learned in any science or mathematics class that will aid you in constructing the pad.
6. When you have completed the task, you will hand in a report that will have a drawing with a written description of your design with a prediction of how it will function. Repeat the results of the tests. Make suggestions on how to improve your design and explain exactly how these changes will function. You will also calculate the speed at which the egg is hitting the landing pad and the force of the impact of the egg on the landing pad. Show your work and include the formulas.
7. Your design will be scored on how successful you are in the egg drop and your report.

*Source: Spaceweek International*