Egg drop ! or how to land a probe on Mars ?

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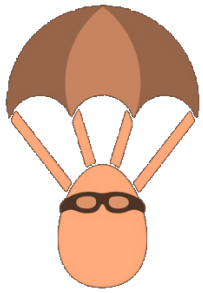
Part 1: Posing the problem
See the Mars Phoenix Video
https://www.youtube.com/watch?v=tpi-j6TXTGA

@ Why the parachute isn't enough to slow down a probe before to land on Mars ?

@ For InSight probe, retrorockets will be used (like in the Mars phoenix video). What other methods could be used ? (you can see what was used for pathfinder and curiosity for example)



Wind tunnel test of the parachute of the InSight mission

Part 2 : Egg drop
The arrival on Mars is an important and dangerous step. For the next two sessions, you have to put yourself in the place of InSight mission engineers, to build a landing system.

The goal is to launch an egg from the window of the second floor and let it land smoothly on the ground. To do this, you have an egg, a freezer bag (put the egg inside in case of failure), and some recovery material (plastic bags, carton, packagings, sponges, and so on). You can bring some recovery material from your house if you want but you must buy nothing.

Requirements specifications :
Your lander must enter in a 30 cm x 30 cm x 30 cm box.
You must use only recovery materials.

Before the final launch, it is recommended to test the lander (without the egg) many times to improve it.
Each lander will be weighed and the launch will be timed. If we have enough time, a second launch could be attempted to improve the results (priority is given in case of failure).

A success is when the egg stay in the lander until the complete stop, and there are no visible cracking on the egg. The teams will be ranked in function of the success, the mass, the size and the average speed of the lander (smaller, lighter and slower is better)

Students formular :

Name of the Team :

Size of the lander L x l x h (in cm):

Mass (with the egg) :

Fall time :

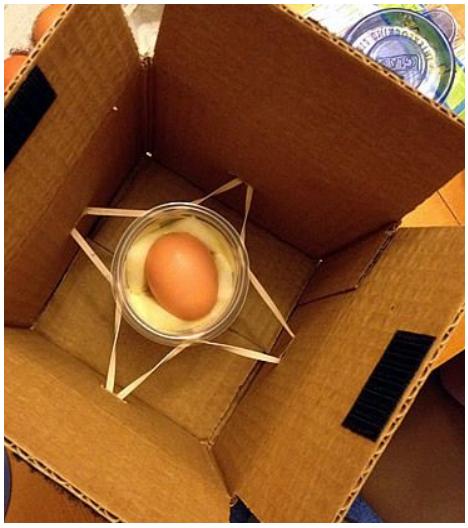
Drop height (in m) :

Average speed :

Number of attempts : Number of broken eggs :

Some examples:





with parachutes :