



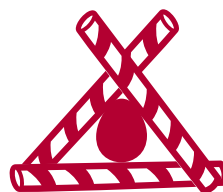
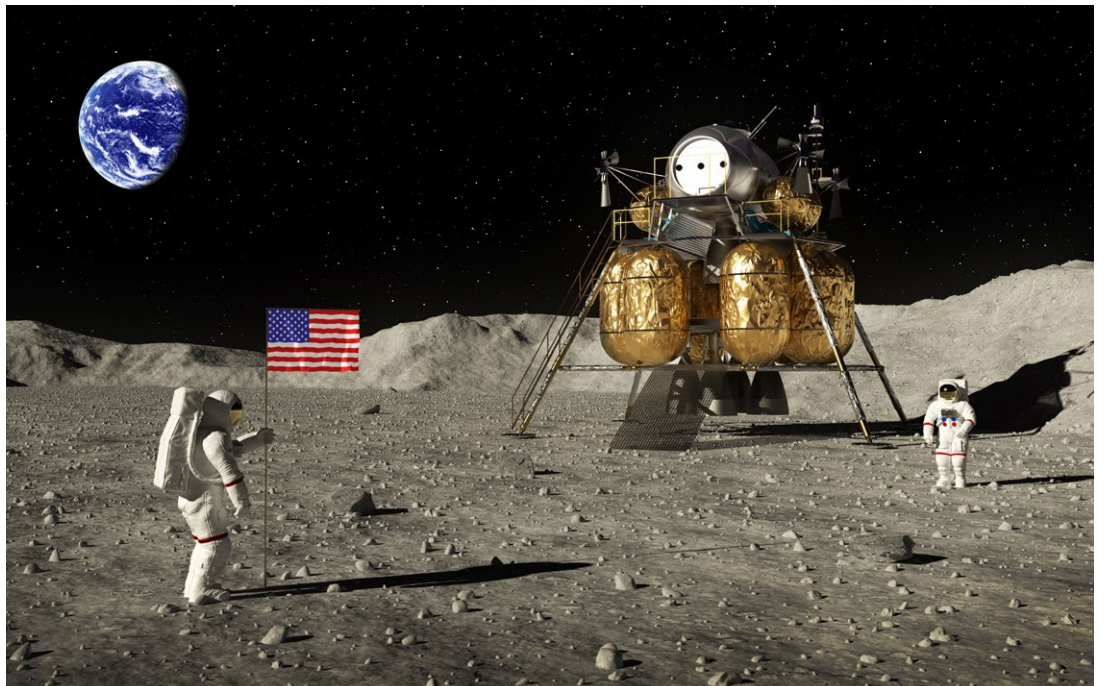
Aim

To introduce the challenges facing spacecraft engineers regarding the need to develop protective landing systems by making an eggcellent spacecraft

Introduction

Touchdown, the final phase of a planetary landing, is a very critical moment and a huge challenge.

When landing safely on the moon, spacecraft need to decrease from a speed of 6000km/h to just a few km/h. The landing system needs to absorb the impact of touchdown so that the spacecraft remains intact. Engineers design spacecraft that weigh as little as possible. Heavier craft not only cost more to launch and manoeuvre in space, but they also have greater impact forces on landing. Spacecraft engineers often build models which allow experimental testing until a successful mock landing is achieved.



In association with

Equipment

- One egg
- Scales
- Stiff card
- Paper cups
- Paper plates
- Marshmallows
- Cotton wool
- Bubble wrap
- Tissue Paper
- Balloons
- Corks
- Elastic bands
- Stiff wire
- Straws
- Foil
- Sticky tape
- Stapler
- Scissors
- Measuring tape

Instructions for building your spacecraft

- 1 Working in teams, build a spacecraft that can land safely without breaking its cargo of an egg. **Your spacecraft must:**
 - Be built using only items from the equipment list
 - Not exceed 450g
 - Not exceed 25cm x 25cm x 25cm
 - Survive a descent of 2 metres
- 2 In your teams, discuss your ideas, sketch out your designs and then test them. **Remember:**
 - Think about reducing descent speeds by using shock-absorbing systems like springs, airbags, cushions or parachutes
 - Test from progressively greater heights until you achieve a safe touchdown from the target height of 2 metres
 - Test, fail, evaluate, design – this is all part of engineering



Useful links

- Artemis Mission: Returning to the Moon <https://tinyurl.com/37x5x1g2>
- Delivering cargo to the Moon <https://tinyurl.com/thn7zyp6>
- 3-2-1 Drop !!! <https://tinyurl.com/rdwxt5np>
- Perseverance Rover's Descent and Touchdown on Mars <https://tinyurl.com/b1grygb1>



Next steps

- Make a presentation explaining the different designs that you tried. Focus on what didn't work and what you learned from it
- Think about the engineering process: **test, fail, evaluate** and **redesign**. What personal attributes would engineers benefit from in order to keep going? List at least three