

# Happy landings



## Location

Ground floor, Flight zone exhibition

## In a nutshell

What does it take to help 270 tonnes of aeroplane land safely?

## What to do

Students can discuss what physical properties the landing gear would need such as being able to be compact enough to fit into a small section of the plane, light enough to not add too much weight to the plane but strong enough to withstand large forces on a regular basis. Look at the design and consider the challenge engineers face designing and building for a particular purpose.

## Time Required

KS3 & KS4 3 minutes per student

## What's happening?

The landing gear of a passenger aircraft is a great achievement of engineering. Light enough that it only forms 5% of the planes final weight and compact enough that it squeezes into the smallest possible area of the plane; this landing gear is still strong enough to absorb the huge impact of landing whilst making any runway feel comfortable regardless of its state.

### Curriculum links

| Curriculum links |   |
|------------------|---|
| <b>KS3</b>       | <p><b>Science - Materials</b></p> <ul style="list-style-type: none"> <li>- properties of ceramics, polymers and composites (qualitative)</li> </ul> <p><b>Science - Forces</b></p> <ul style="list-style-type: none"> <li>- forces as pushes or pulls, arising from the interaction between two objects</li> <li>- forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</li> </ul> <p><b>Science - Forces and motion</b></p> <ul style="list-style-type: none"> <li>- forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>- change depending on direction of force and its size</li> </ul> <p><b>Mathematics - Number</b></p> <ul style="list-style-type: none"> <li>- understand and use place value for decimals, measures and integers of any size</li> </ul> <p><b>Design &amp; Technology</b></p> <ul style="list-style-type: none"> <li>- understand how more advanced mechanical systems used in their products enable changes in movement and force</li> </ul>  |
| <b>KS4</b>       | <p><b>Science - Forces and their interactions</b></p> <ul style="list-style-type: none"> <li>- recall examples of ways in which objects interact: by gravity, electrostatics, magnetism and by contact (including normal contact force and friction), and describe how such examples involve interactions between pairs of objects which produce a force on each object; represent such forces as vectors</li> <li>- define weight, describe how it is measured and describe the relationship between the weight of that body and the gravitational field strength</li> <li>- describe examples of the forces acting on an isolated solid object or system; describe, using free body diagrams, examples where several forces lead to a resultant force on an object and the special case of balanced forces when the resultant force is zero (qualitative only)</li> <li>- explain, with examples, that stretch, bend or compress an object, more than one force has to be applied</li> </ul> <p><b>Mathematics - Measures and accuracy</b></p> <ul style="list-style-type: none"> <li>- use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate</li> </ul> <p><b>Design and technology</b></p> <ul style="list-style-type: none"> <li>- the functions of mechanical devices, to produce different sorts of movement, changing the magnitude and direction of forces</li> </ul> |

## Relates to:

| Workshops & Theme Days  | Shows   | Trails | Other exhibits  |
|---|---|--------|---|
| <ul style="list-style-type: none"> <li>• Take off! Day (KS3 &amp; KS4)</li> </ul> | <ul style="list-style-type: none"> <li>• Launch it! (KS3)</li> <li>• Dream to fly (Planetarium, KS3 &amp; KS4)</li> </ul> |        | <ul style="list-style-type: none"> <li>• Bernoulli blower</li> <li>• Launch it!</li> <li>• Will it fly</li> </ul> |

