Royal Academy of Engineering

THIS IS ENGINEERING

ENGINEERING *IN THE* MOVIES

REMOVING RESISTANCE

STEM

Science, Technology and Engineering Focus

INTRODUCTION

Ever since Luke Skywalker went in search of R2-D2 in his land speeder in STAR WARS: A NEW HOPE and Marty McFly stepped on his hoverboard in BACK TO THE FUTURE 2, moviegoers have wanted to ride on air.

Magneto (the **X-MEN**'s arch enemy) uses his mutant powers to suspend metal objects in the air to defy the laws of gravity.

How are these effects created? It's not always CGI. This science and technology focused challenge will show you how it can be achieved.

Photo 12 / Alamy Stock Photo

CHALLENGE

- Teams of two
- 60 minutes
- 2/3 KS2/3
- Apprentice

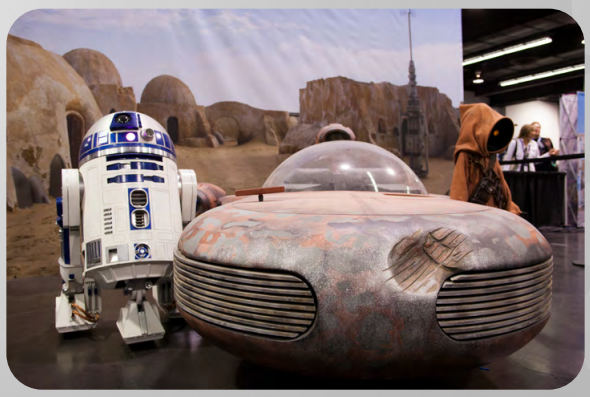
MATERIALS

- Graphite levitation kit
- A CD or DVD disc
- A balloon
- A pop-top cap from a liquid soap bottle or a water bottle
- A hot glue gun and needle

THE CHALLENGE

Understand the principles of hovering by building your own craft that can glide effortlessly across the table.

Escaping air between two flat surfaces creates a thin cushion. This cushion of air dramatically reduces the friction between the CD and the surface allowing your hovercraft to move freely over a smooth surface.



Lauren Elisabeth / Shutterstock.com

THE DEMONSTRATION

Your teacher will show you how objects hover using the graphite levitation kit provided.

This contains a small sample of pyrolytic graphite, 16 small rare earth magnets, a steel base and a pair of tweezers.

When the magnets are arranged in a matrix on the base plate, the graphite will levitate just above the surface. This demonstration of diamagnetic behaviour involves the repulsion of the graphite by both the north and south of the magnets.

THE PROCEDURE

1. Cover the centre hole of the CD with a piece of tape and poke six holes in the tape with a needle. This will slow down the flow of air and allow your hovercraft to hover longer.
2. Use the hot glue gun to secure the cap to the centre of the CD or DVD disc. Create a good seal to keep air from escaping.
3. Blow up the balloon all the way and pinch the neck of it (don't tie it).
4. Make sure that the pop-top is closed and fit the neck of the balloon over the pop-up portion of the cap (this is usually easier with two people).
5. That's it! When you are ready to commence hovering, simply put the craft on a smooth surface and pop the top open.
6. Be creative and decorate your craft.

EXTENSION

1. Does the size of the balloon affect the CD's ability to hover?
2. Does a helium balloon work better than an air-filled balloon?
3. Do larger discs make better hovercrafts (plastic picnic plates, old records)?

Watch American professional skateboarder Tony Hawk go back to the future and try out the latest hover board technology

www.youtube.com/watch?v=wCZiEtduSQg

Royal Academy of Engineering

The Royal Academy of Engineering is harnessing the power of engineering to build a sustainable society and an inclusive economy that works for everyone.

In collaboration with our Fellows and partners, we're growing talent and developing skills for the future, driving innovation and building global partnerships, and influencing policy and engaging the public.

Together we're working to tackle the greatest challenges of our age.

What we do

Talent & diversity

We're growing talent by training, supporting, mentoring and funding the most talented and creative researchers, innovators and leaders from across the engineering profession.

We're developing skills for the future by identifying the challenges of an ever-changing world and developing the skills and approaches we need to build a resilient and diverse engineering profession.

Innovation

We're driving innovation by investing in some of the country's most creative and exciting engineering ideas and businesses.

We're building global partnerships that bring the world's best engineers from industry, entrepreneurship and academia together to collaborate on creative innovations that address the greatest global challenges of our age.

Policy & engagement

We're influencing policy through the National Engineering Policy Centre – providing independent expert support to policymakers on issues of importance.

We're engaging the public by opening their eyes to the wonders of engineering and inspiring young people to become the next generation of engineers.

Royal Academy of Engineering
Prince Philip House
3 Carlton House Terrace
London SW1Y 5DG

Tel: +44 (0)20 7766 0600
www.raeng.org.uk
Registered charity number 293074