

RESOURCE PACK



Tim Peake invites you to take the Space to Earth Challenge

The Space to Earth Challenge uses the training programme of British ESA astronaut Tim Peake to get schools (and their students) excited about fitness and science. The project, for upper primary and lower secondary school students, takes Tim's astronaut training as its inspiration.

Tim's mission has three parts:

- Preparation for launch
- Life on the International Space Station (ISS)
- Recovery back on Earth

Tim will train two hours per day between December 2015 and May 2016, on his long duration mission to the ISS. He has to stay healthy and active so he can stay fit and health on board to do his duties and to exit the ISS capsule if there's an emergency. On his return to Earth, he'll have to continue with low intensity training to regain full fitness. Returning to full Earth gravity from zero-G in space is a huge shock to the system.

We aim to get 200 schools and 15000 young people to take up Tim's challenge in January to July 2016.

Who is Tim Peake?

Tim Peake is a family man with two sons. He was chosen from over 8,000 people who applied to join the astronaut corps.

When he's not preparing to float about in orbit, Tim enjoys a wide range of active pursuits from skiing and scuba diving to mountaineering, cross-country running and the odd marathon. He's also a qualified helicopter flying instructor, with over 3,000 hours' flying experience.

Tim served as an officer in the British Army Air Corps, before joining the Empire Test Pilots' School at Boscombe Down. He holds a BSc in Flight Dynamics and in 2006, he was awarded the British Army's Commander-in-Chief's Certificate for Meritorious Service.

Tim's preparation for life in space has involved gruelling sessions on life-size mock-ups of the ISS at The Neutral Buoyancy Lab in Houston. But he's also spent long periods living and working in some of planet Earth's most challenging environments – deep underground and under the sea.

Now he's ready to become the first British ESA astronaut aboard the ISS.



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Photography





Countdown



10 Key Messages

- 10** Space is closer than you think. British Astronaut Tim Peake has set a challenge to young people to exercise their way across 400km. That's the distance between Earth and the International Space Station.
- 9** The challenge is aimed at students aged 11-14 but anyone can take part.
- 8** You can do the challenge on your own, with your friends, with your family
- 7** Tim Peake will be exercising two hours a day in the highest, fastest-moving gym known to humanity, on board the International Space Station.
- 6** During a 90-minute training session, Tim will see a sunrise and sunset as he orbits Earth.
- 5** Tim loves triathlons and the Space to Earth Challenge is based on triathlon activities.
- 4** Tim will do high-intensity training before and during flight, but low-impact activities on his return to Earth he has to learn to walk again after floating in zero gravity, which wastes your muscles and bones away.
- 3** Tim will have the most amazing view as he exercises. You can share your view as you exercise with Tim via social media using Instagram and twitter using the #space2earth #principia
- 2** The challenge allows you to set your own milestones, from solo ones to team relays to achieve the 400 km distances.
- 1** Maths, physics, technology and creative challenges based on Tim's mission are available to extend the Space to Earth challenge beyond the physical.

The challenge is supported by the UK Space Agency, European Space Agency, British Triathlon Trust, Kings College London, University of Cambridge, University of Durham, Teesside University, Manchester Metropolitan University, The Royal Aeronautical Society, the Ideas Foundation, Queen Mary University of London, University of Manchester and the Institution of Engineering and Technology.

missioncontrol@spacetoeearthchallenge.org.uk

How can schools get involved?

We're inviting schools to organise stride/spin/swim their way across the 400 km distance from International Space Station to Earth. (Other fitness-related activities can easily be fitted into the challenge, too.)

The challenge is flexible and designed to fit a variety of settings and time slots. It's ideal for off-timetable days, weekly lessons, out-of-school clubs, community events and activities organised by junior sports leaders.

Who can take part in the challenge?

The challenge is aimed at children aged 11 to 14, but the activities can easily be adapted for younger or older students and for informal learning situations such as STEM clubs, sports clubs, and for youth clubs such as Scouts and Brownies.

The activities can be adapted for children with special needs. Schools are free to adapt any of the materials as they see fit.

We hope that teachers and parents will want to get involved in the challenge and welcome their support. Adults can help through community-based events or by organising space-themed fundraisers. Parkrun will be organised some space-themed fun runs.

Who is organising the Challenge?

The Space to Earth Challenge is led by the Ideas Foundation - a charity aiming to nurture creativity across the curriculum. The Ideas Foundation with education specialist company Venture Thinking led the outreach programme for the first British private space participant Richard Garriott.

It is supported by our partners, the British Triathlon Trust. They aim to use the engaging and varied sport of triathlon to encourage children to become more active. This not only improves their health, but also develops their social skills, increases self-esteem and nurtures good habits, such as commitment, discipline and respect.



© Chrissie Wellington

So what is a triathlon?



A triathlon is any three-part challenge. In summer, it is typically swimming, cycling and running, but it can be any combination of activities that test different muscles and body parts. It could even be an academic triathlon – combining three different subjects so you have to re-orient your mind and thinking as you make the transition from one discipline to another. For the Space to Earth Challenge, we'd love it if schools mixed sport with other subjects, to give body and mind a thorough work-out!

www.britishtriathlontrust.org

<http://britishtriathlontrust.org/kids-zone/>



© British Triathlon Trust

Why do astronauts need to exercise so much?



© esa/nasa

Astronauts need to spend up to two hours a day working out to counteract the loss of bone and muscle fibre that comes with living in microgravity. While aboard the ISS, the astronauts' bodies are at risk of:

- deterioration of weight-bearing bones and muscles
- dizziness and nausea due
- forgetting how to walk
- back pain as their height increases by several inches
- shrinking legs due to fluid redistribution
- kidney stones
- increased cancer risk due to radiation
- eye problems
- loss of blood plasma, creating temporary anaemia on return to Earth
- head congestion and puffy face caused by fluid redistribution
- whiplash and other injuries when they land back on Earth

Astronauts need to find ways counteract these threats. Exercise is important to ensure astronauts stay as healthy and strong as possible under the harsh conditions of space. We can learn about our own bodies by seeing what happens to astronauts when they don't have to load their muscles and bones as they float around in microgravity.

What types of milestones will there be?

The milestones can be adapted to different multi-sports. The challenge can be adapted to different sports and abilities

Distance	Aproximate
Soyuz rocket length	50 metres
ISS Length	75 metres
ISS width	108 metres (roughly football pitch)
Mount Snowdon	1000 metres
Felix Baumgartner jump	4000 metres
Mount Everest	8000 metres
Jumbo jet level	10,000 metres
Stratosphere	20,000 metres
First stage separation	40,000 metres
Karman line	100,000 metres
Low earth orbit	200,000 metres
ISS	400,000 metres

Time based

90 minutes	Orbit around the Earth
4 hours	Return to Earth from space
6 hours	Shortest journey for Soyuz get to International Space Station
14 hours	Typical week of exercise for astronauts on board
50 hours	Long duration journey to ISS

Intensity based and rate of perceived effort (RPE)

70 seconds from take-off to Mach 1
2 minutes to first stage rocket separation
5 minutes to second stage rocket separation
8 minutes 48 to get from Earth to orbit

Speed based based

273 metres per second	Subsonic
400 metres per second	Transonic
1500 metres per second	Supersonic
3000 metres per second	Hypersonic

All times and distance measurements are approximate

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How will the Space to Earth Challenge enrich the curriculum?

We have adopted an inquiry based approach to the resources and our experts have developed lesson plans and powerpoints to answer the following questions:

	CURRICULUM LINKS & TOPICS	CONTENT PARTNER
How does the Sun and light affect astronauts and triathletes?	radiation, energy, light, waves, material, spectrum, working scientifically, animals and their health	University of Cambridge
How can materials and new technology help protect astronauts and triathletes from danger?	everyday materials, working scientifically, electricity, electronics, textiles, technology, topical science	University of Durham
How can mathematics help us understand the space to earth challenges that Tim will face?	PE, sport, speed, distance, measurements, calculators, graphs, models	Kings College London
How do you prepare a launch and landing?	forces, biology, physics, pressure, atmosphere, weightlessness, adaptation, altitude	Laura F Thomas Consulting
How can you prepare for and track distance travelled?	PE, Geography, Maths, GPS, fair testing, coding Applications, and Technology	The Institution of Engineering Queen Mary University of London
How can creative ideas be used to create a campaign to inspire interest in space, sport and science.	persuasive writing, art and design,	Ideas Foundation
How to code and calculate your way to space.	coding, computing, mathematics, technology	Queen Mary University of London

Launch Tips to Get the Challenge Off the Ground

- Use the countdown music and live soundscapes
<http://www.nasa.gov/connect/sounds/index.html>
https://www.youtube.com/playlist?list=PLTFSjgb9dAhOJcTbR_KhKJLg4NEGpFjm4
- Show live video footage of Earth from Space
<http://www.ustream.tv/channel/live-iss-stream>
- Show timelapse movies on Earth from Space
<http://gu.com/p/4a3bk/sbl>
- Set the mood with music and video playlists from the BBC Stargazing Live and Space to Earth Challenge
<https://open.spotify.com/user/1129744379/playlist/5TEZgG128HKmkcUxcPaKHP>
https://www.youtube.com/playlist?list=PL8rEn8_oe3k6KchURAAe91zBpGvYwU4gk
- Dress up in a flight suit
- Look out for launch packs and Principia mission updates
<https://principia.org.uk/>
- Host an star party
http://downloads.bbc.co.uk/tv/stargazinglive/sgl_eventpack_with_links2013.pdf
- Create some space themed menus for lunch
- Use the event posters, and our graphics to brighten up your notice boards
- Celebrate achievement and track progress of individuals, teams and the school.
- Invite the press to share in with your milestones from launch to touchdown!

Benefits

- Share ideas and teaching approaches between departments - enrich science through sport and space and sport through science and space
- Inspire interest in fitness and potential for events with the British Triathlon Trust in your community
- Set fitness targets during the winter months
- Stimulate cross-department projects
- Fundraise potential by using the challenge for sponsorships
- Raise your school profile raising through the press and social media invite local triathletes and scientists who can talk about the different challenge.
- Link with universities and potential visiting speakers

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Space Craft

Launch your own rocket!



Space Craft

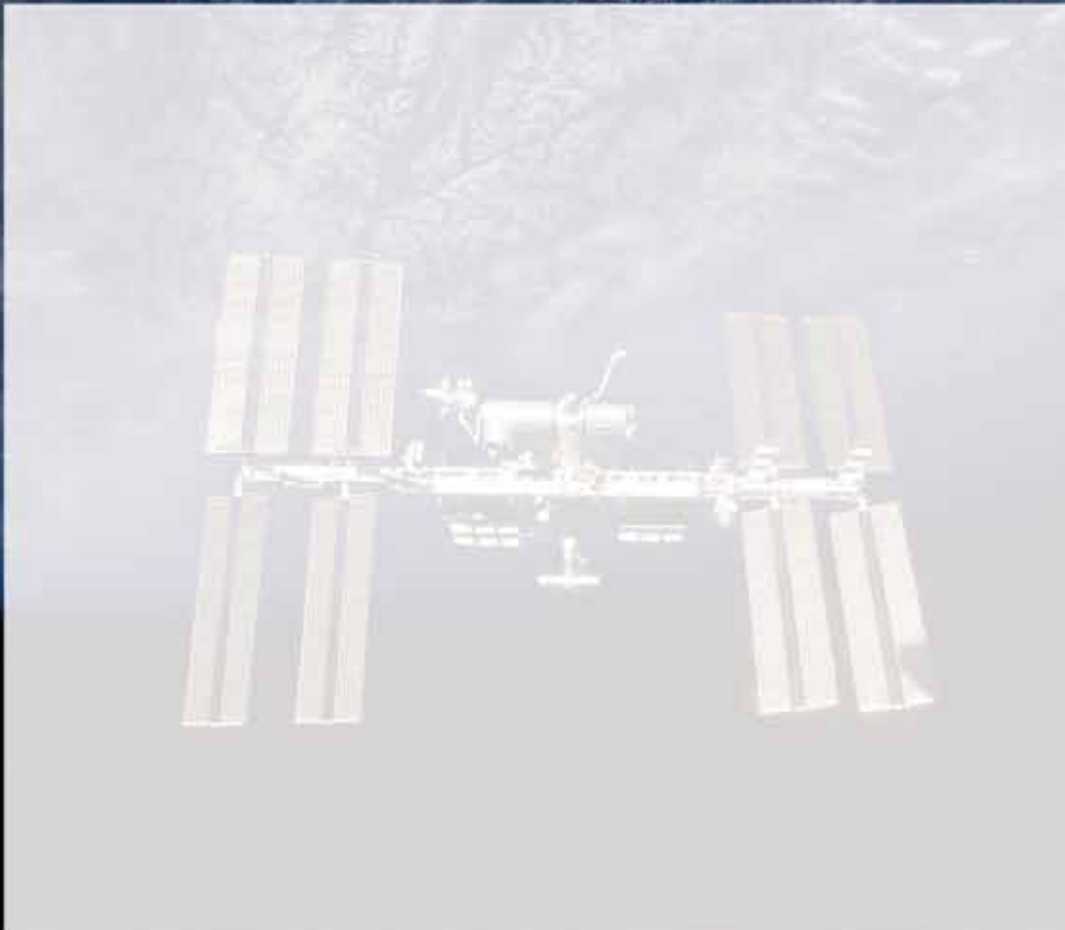
Event Cones





SPACE TO EARTH
CHALLENGE

CONGRATULATIONS FOR
JOINING THE SPACE RACE
FOR HEALTH.



STAR TRI

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SPACE TO EARTH
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TIM PEAKE INVITES YOU
TO TAKE THE SPACE TO
EARTH CHALLENGE



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UK SPACE
AGENCY

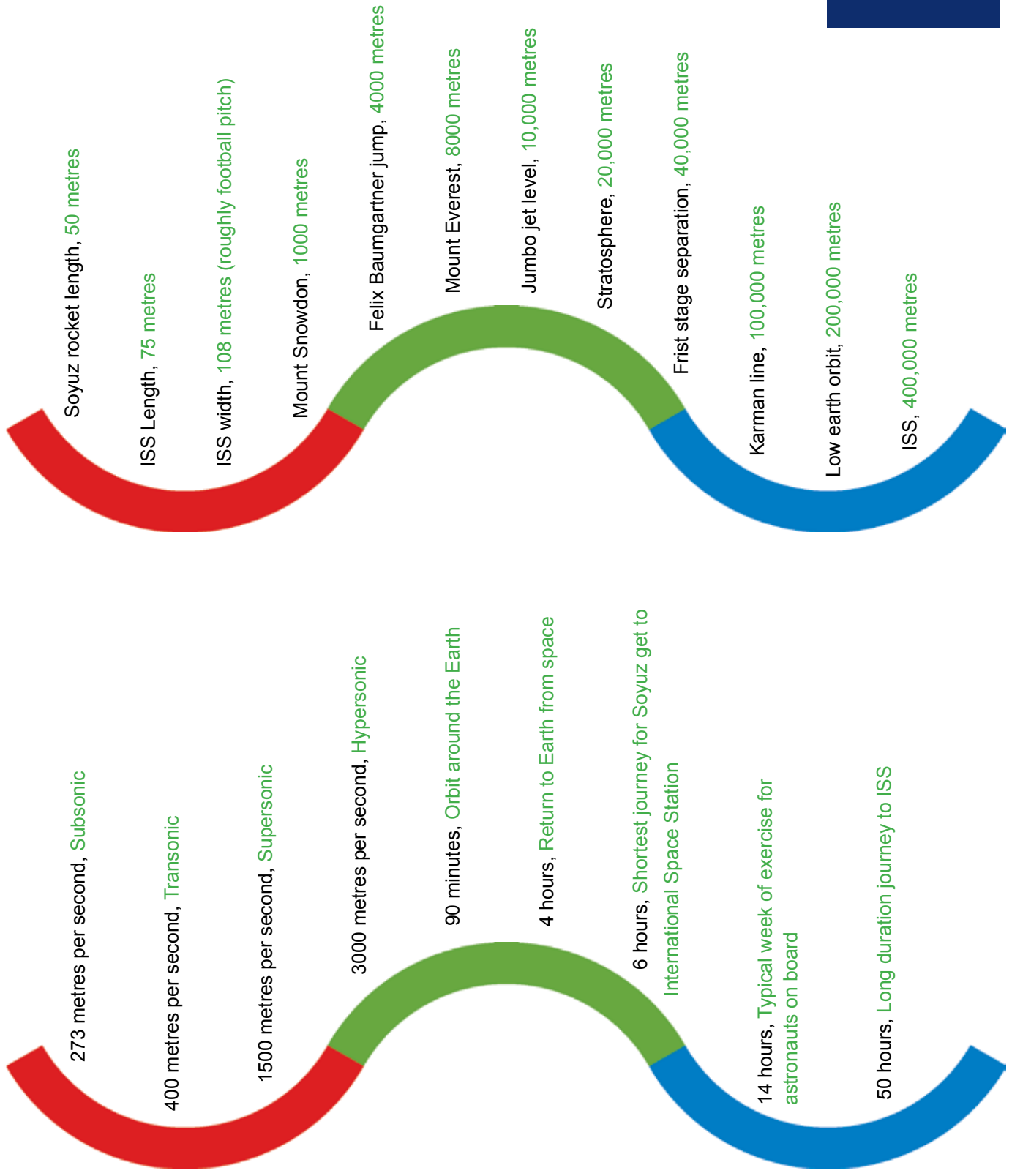
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Venture
Thinking

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Faster, higher, further.



All times and distance measurements are approximate

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TIME TRAVELLED



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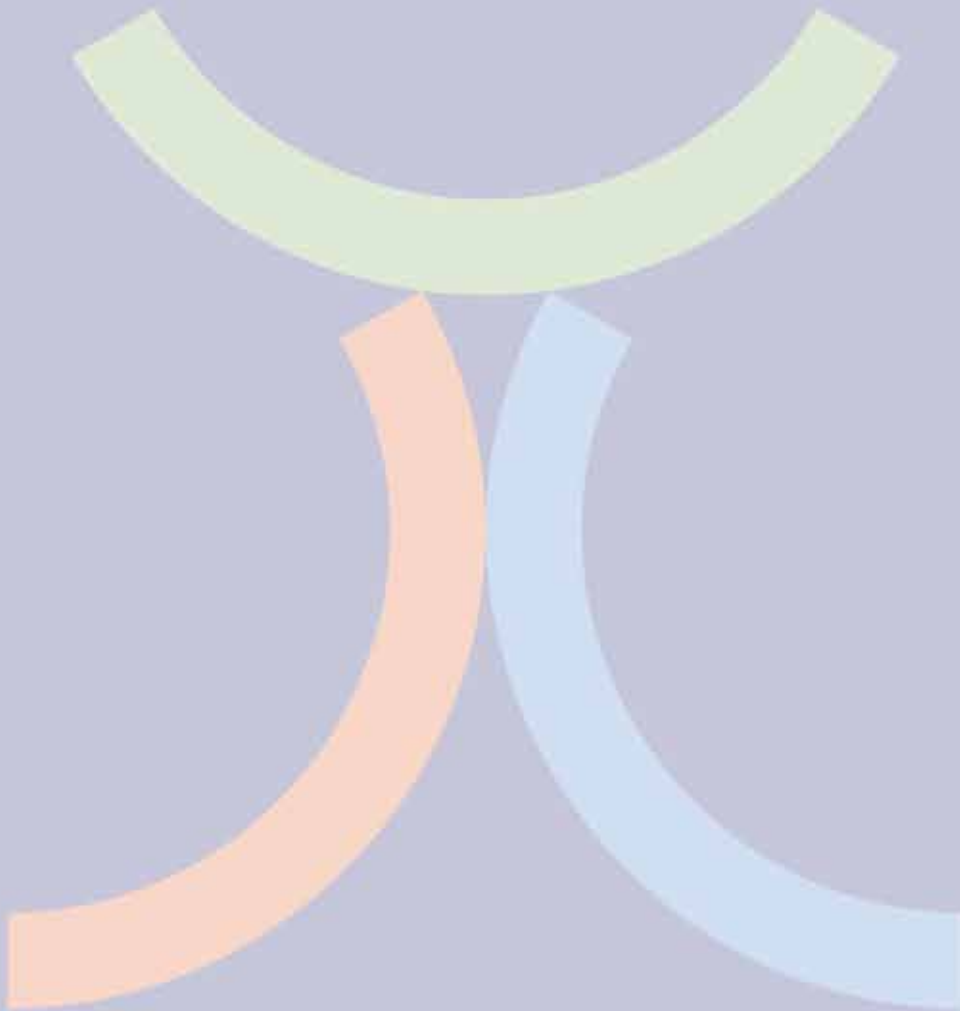
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**THE IDEAS
FOUNDATION**



What can you see through your cupola today?

“While exercising so far away in space I will have some amazing views, although I will miss the sights, sounds and fresh air of planet Earth. I hope students across the UK will join me in my training and share what they see as they work out back on Earth.” *Tim Peake*



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LAUNCH





LANDING





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