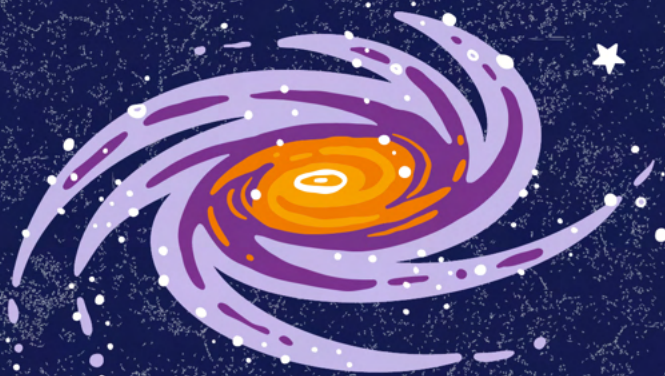


Finding My Space



Girlguiding
London and
South East England

Introduction

Lots of us learn about space in school and see exciting stories about launches and missions in the news. But how many of us are aware of how broad the space sector really is, how much it affects our daily lives, and how much we can learn from it? Through this pack you'll learn about the job possibilities that exist and see where you and your unique skill set could fit.

Abie is a spacecraft systems engineer and works on a range of missions. She works on space mission design, making sure each of the components of the spacecraft and system fit, and work together seamlessly. She has recently graduated from Durham University where she studied physics and maths, and completed her MSci dissertation in Cosmology (Theoretical Astrophysics).

“ The new space approach is all about adaptability, grit, and boldly going where nobody has gone before. We hope these activities teach you some of the skills we can all learn from the space sector and see how these could help you to find your space – in space and beyond! ”

– Abie Harvey, ambassador



Careers in space

You can pick and choose the activities in this pack to suit your unit but we recommend starting out with a quick brainstorm to see if together you can list 10 jobs in space. Once you've done some of the activities and the creative juices are really flowing, revisit your list: what else you could add to it? Use your imagination and think of which space jobs might exist in the next 10, 20 or 50 years – the opportunities are endless!

Get your mission patch!

Badges cost £1 plus postage and are available to order on our [online shop](#).



Astronauts

Astronauts get to travel to and work in space! It is probably one of the most well-known jobs in the sector. Skills that are very important for them include teamwork, flexibility and adaptability.

Mission to the Moon

In small groups, imagine you are a team of astronauts on a mission to the moon. Like any adventure, pioneering space travel is not without risk. Unfortunately, due to a landing thruster malfunction on final descent, you have drifted off course from your target destination and landed at the bottom of a crater! According to your spacecraft's location system, the supply ship that was sent up before you is a day's walk away over treacherous terrain. Luckily, you are a team of intelligent, brave, and well-trained astronauts. You can each carry 1 item from your spacecraft. Discuss as a team which items you are going to take with you as you make the hike back to the supply ship.

Supplies

- Parachute silk
- Map of the stars
- Oxygen tanks
- 20 litres of water
- Food concentrate
- 15 metres of rope
- Solar-powered radio transmitter/receiver
- Mission mascot
- Box of matches
- Portable heating unit
- Pack of dehydrated milk
- Magnetic compass
- Signal flares
- First aid kit



Once each of your teams have selected their preferred items, take a look at the end of this pack for a guide to how we think the supplies could be used!

Space medics and psychologists

We're still learning how the human body responds to extended periods in space and the long-term health and psychological impacts of isolation, radiation and microgravity.

Longer-term missions, such as those to Mars, are on the horizon. Not only does our technical equipment need to survive many months or years in the harsh space environment, but also most valuable asset: our people. It's really important that astronauts keep up healthy habits to maintain their mental and physical health during these long missions, so there are whole teams of doctors and psychologists investigating how best we can support them.

Astronauts who have been to the International Space Station or even to the Moon have found that looking back down at this tiny rock we call home can have a profound effect on their mindset and outlook on life.

Take in the view

1. Sit in silence for a minute and look at the picture on the next page, imagining you are on the Moon looking down at Earth.
2. One person reads out the following: "You're the furthest away from home that anyone has been in the history of time. It's just you and a small team of friends alone in the infinite expanse of our universe. Notice the luscious green forests and deep blue oceans. Notice how at this scale there are no physical borders between countries and how humans' daily lives and problems seem so small compared to the vastness of space. Think about how lucky we are to share this beautiful rock we call home and how we are really all just falling through space together."
3. In small groups, try some of these:
 - Think about one issue that people on Earth are facing and three actions you could take to help resolve this issue
 - Create a packing list of things you would bring on a long inter-planetary mission to keep you happy and well
 - Think of some hobbies that you would do in your spare time if you were in space
 - Create a space fitness regime that could be done in a small space in zero gravity

Take in the view



“The view of Earth from space is breathtaking, and it really shows our place in the universe. It's up to us to take care of this beautiful planet”

– Nicole Stott, space shuttle astronaut

Space lawyers and policy makers

So much of what we learn in space can help us on Earth. This is not only true for the technology and science, but also for the lessons we learn about how to collaborate on projects on a global scale, how to set policy and governance, and how to protect the environment around us.

Currently, NASA, the European Space Agency, and many national and international agencies worldwide are turning their sights on sustained human presence on the Moon, but who owns the Moon? Is it up to whoever gets there first? Should companies or governments be in charge? Who makes the rules? And what should they be? What can we do to make sure we protect the new worlds we discover?

1. Imagine you are put in charge of making the rules for a new planet that you have just discovered.
2. Draw a picture of your planet.
3. List 10 rules that everyone on it must follow.



Astrophotographers

Astrophotographers take photos of stars, planets and other celestial bodies for art or science. Have a go yourself!

1. Take a look at what you might be able to see in the sky at this time of year and follow this link to get some instructions for taking [astrophotographs on a smartphone](#).
2. Or, reach out to your local astronomy society or a friend with a telescope and see if they might be able to visit for an evening and show you what's what!
3. Don't forget to share your pictures on social media and tag Girlguiding London and South East England.



Astronomers

Astronomers study planets, stars, galaxies and other celestial bodies. Have a go at making your own constellation viewer.

Make a constellation viewer

1. On a black piece of paper, use a plastic cup to draw a circle.
2. Use the cardboard tube to draw a smaller circle in the centre of the bigger circle.
3. Cut out the larger circle and cut a few slits that reach in towards the inner circle (to help it fold down better around the cardboard tube)
4. Choose a constellation. Use the push pins to prick holes in the black paper in the shape of your constellation (you may want to put the paper on top of some cardboard).
5. Put the disc on top of the tube, fold the paper down and hold with the rubber band.
6. Tape the paper down.
7. Look through the viewer at the light and you will see the 'stars' in the shape of the constellation!

You will need

- Pictures of constellations to copy
- Cardboard tube (e.g kitchen roll inner)
- Black paper
- Elastic bands
- Sticky tape
- Push pins
- Plastic cup
- Optional: cardboard to protect surfaces when using the push pins, pens/paper/stickers to decorate



Test engineers

Test engineers are responsible for designing and conducting tests to make sure that products are of a high quality, fulfil their requirements, and meet the design specifications.

Egg landers

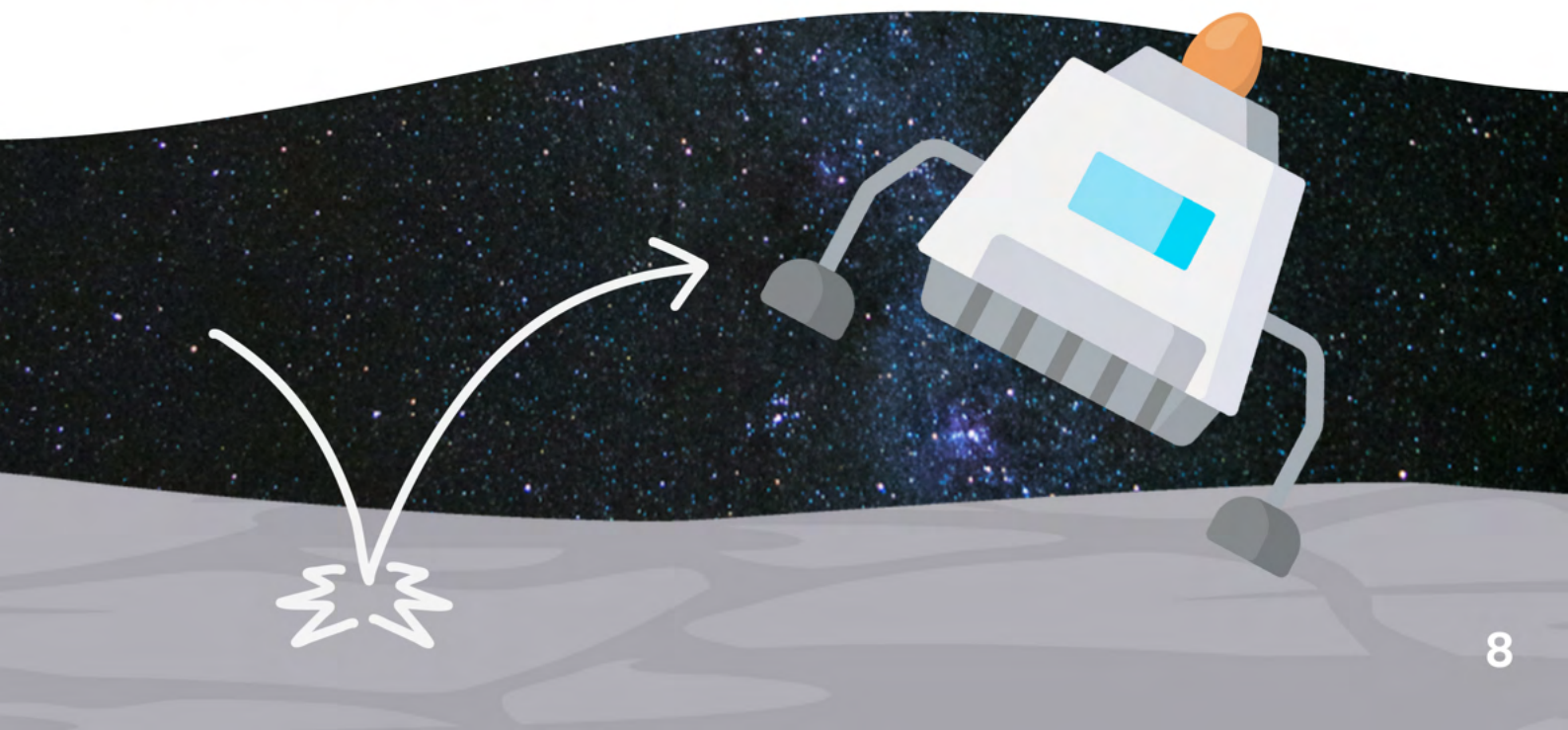
In teams, you will each design a lander capable of bringing your precious payload (a raw egg) down to the surface of the planet unharmed.

1. Give each team an egg and a some building materials (with Guides & Rangers you might want to consider giving each group a 'budget' and allowing them to 'buy' materials – with the most useful being most 'expensive')
2. Set a time limit for building and perhaps suggest drawing out a blueprint for their design before they start
3. Once the time is up, collect the egg landers and drop in turn from a height – see whose payload will survive!



You will need

- Uncooked eggs
- Clean recycling and packing materials; e.g. cardboard and plastic containers, plastic bags, bubble wrap, foam, styrofoam
- String
- Scissors
- Sticky tape
- Somewhere to drop the egg landers from (ideally where any broken eggs can be easily cleaned up!)



Ground control and spacecraft operation engineers

Operations engineers are the people on the ground who monitor and control the mission. Have a go at operating your own 'spacecraft'!

For lots of missions, regular scheduling of commands can be automated. However, for complex missions and manoeuvres and in emergency situations, the controllers on the ground send commands (known as telecommands) to the spacecraft and receive information back about the state of the spacecraft and its health (known as telemetry). This helps them to work out what needs to be done next.

Space craft operators

1. Get into pairs and stand in the biggest circle that will fit in the room, with one member of the pair in front of the other. The person in front is the spacecraft and the person behind is the operator.
2. The spacecraft must close their eyes and can only follow the instructions of the operator.
3. The operator must move with the spacecraft and give commands to the spacecraft to help them navigate to the other side of the room without hitting into any other spacecraft.
4. To make it harder you can add some obstacles in the way!

Ready for launch!

Go forward 5 steps. Then turn to your left...



Astrobiologists

Astrobiologists work with planetary and space scientists to investigate the possibility of life beyond Earth. For this activity you will investigate what it means to be 'living' and what we believe to be key requirements for life on this planet and beyond.

Life-in-a-jar

1. Leaders to prepare 3 jars for each group as follows;

Jar A) 3 tablespoons of sand

Jar B) 3 tablespoons of sand & ½ packet of active dry yeast

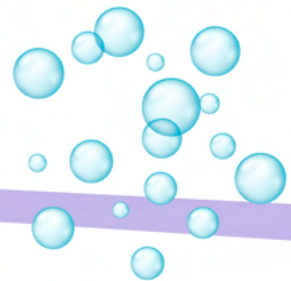
Jar C) 3 tablespoons of sand & 1 fizzing antacid tablet crushed.

2. Have a small cup ready with a few teaspoons of sugar and a container of warm tap water for each group.
3. Have the groups examine the jars using their senses (except taste!) – and assess whether they think any of the jars contain living things.
4. Add a teaspoon of sugar to each jar (the food source) and look for any changes. Note for leaders: you shouldn't see anything yet.
5. Add warm water to each jar (enough to just cover the sample) and look for changes. Note for leaders: You expect; Jar A = no activity, Jar B = will fizz (may take ~ 5 mins to start), Jar C = will fizz a lot at first, then stop.
6. Think again about which samples might contain living things and how you might tell.
7. Add a bit more sugar and warm water to the jars and see which start fizzing more vigorously. Note for leaders: Jar A = no activity, Jar B = will start to fizz again (may take ~ 5 mins), Jar C = no activity.
8. Explain that Jar C contains an antacid which fizzes when we add water as a chemical reaction occurs, but once we run out of the chemicals, it stops. Jar B however, contains yeast which is a living thing and so can be fuelled by water and food (sugar). Astrobiologists learn about what is needed to sustain life on Earth and look for these components on other planets.

You will need

(for each group):

- 3 clear containers
- Warm tap water
- 9 tablespoons of sand
- 3 tablespoons of sugar
- ½ packet of active dry yeast
- 1 fizzing antacid tablet (crushed)
- Optional: magnifying glasses



Sales, marketing & science communicators

The why of space missions is just as important as the how. In order to gain support of investors, national and international agencies, we must be able to communicate why our missions are important.

Space is full of firsts, people are constantly setting new goals and striving to achieve amazing new things. Oftentimes these goals can seem quite outlandish and almost impossible but space people persevere, pushing forwards with their grit and determination to reach new frontiers. But success isn't just about the final achievement, it's about the journey and the steps we must take to get there.

Plan your mission

1. In small groups design your own space mission;
 - Will it be manned or unmanned?
 - Where will you go?
 - What will you be looking for?
 - Most of all, why should other people be interested and support you?
2. Once you've had some thinking time in your groups, put together a pitch and present to the wider group. You can use props or make posters if you think they will help your cause.
3. Once everyone has presented, take a vote and decide on which mission you would most want to make a reality!



Answers: Astronaut Challenge

Supplies

Very useful

- Oxygen tanks – the most important thing on this list! Humans can only survive up to 3 minutes without oxygen
- Map of the stars – this map will be based on how we see the stars from the Earth, but as the Moon is relatively close to the Earth it will work the same and can be used to navigate to the supply ship
- 20 litres of water – humans can only survive 3 days without water and on the light side of the Moon you will be losing liquid very quickly so it is important to replace it!
- Food concentrate – you can survive up to 3 weeks without food, but it would make the journey very difficult, best to bring this so you can keep your energy up
- Solar-powered radio transmitter/receiver – for communicating with the supply ship
- First aid kit – it's important to maintain the health of your crew!

Useful

- Parachute silk – could be used as protection from the sun's rays
- 15 metres of rope – good for climbing out of craters and going down cliffs and could be used to tie people together if someone gets injured
- Pack of dehydrated milk – you'd be better off bringing the food concentrate
- Signal flares – quite useful but not the priority, could be used to signal to the supply ship when you get closer

Not very useful

- Mission mascot – might help to keep morale high but there are more important things on this list
- Box of matches – there is no oxygen on the Moon so you won't be able to get a match to light
- Magnetic compass – the magnetic field on the Moon is not polarized so this won't be useful for navigation in the same way as it would on Earth

It depends...

- Portable heating unit – depends on where you land, very important if you are on the dark side of the Moon, otherwise not needed