

# The Spark

Magazine

PUZZLES, QUIZZES, OUTDOOR LEARNING

ISSUE  
No8

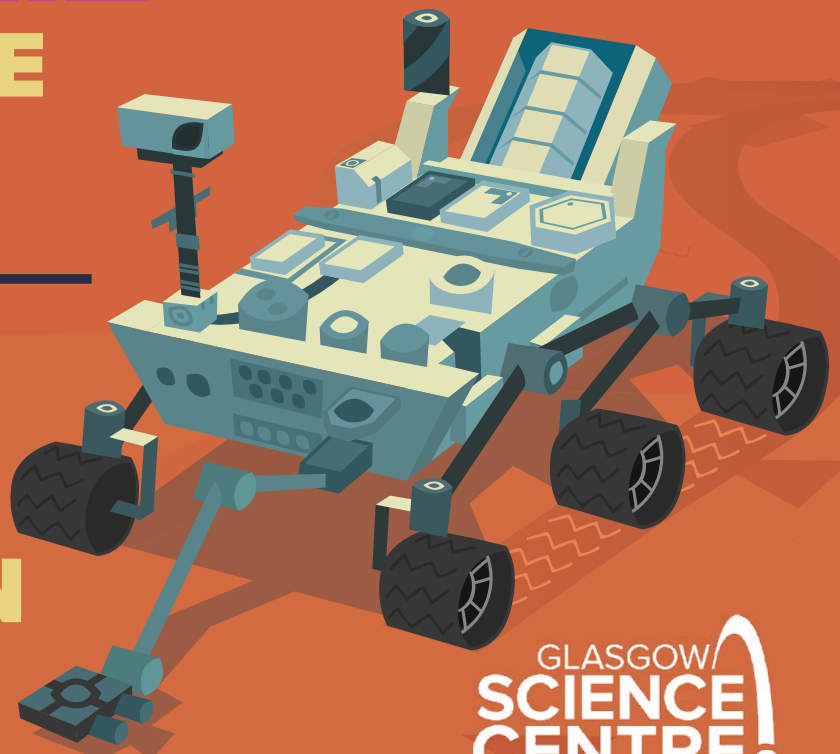
MAKE YOUR OWN  
MARS ROVER

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WONDER AT THE  
WEBB SPACE  
TELESCOPE

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MEET A  
SATELLITE  
TECHNICIAN



GLASGOW  
SCIENCE  
CENTRE!

# Inside

This issue

## SHARE YOUR PICS WITH US



If you try any of our activities this week, please show us how they turned out. Send your favourite pictures to [contact.us@gsc.org.uk](mailto:contact.us@gsc.org.uk) or share with us on our social media channels with #GSCAtHome. We'll print a selection of your pictures in the next magazine.

Share on social #GSCAtHome  
email to [contact.us@gsc.org.uk](mailto:contact.us@gsc.org.uk)

## WELCOME

Welcome to this special edition of The Spark where we are focusing on space exploration to celebrate World Space Week!

There are exciting activities for you to try at home, fascinating facts to ponder over, and puzzles and quizzes to challenge your family.

Let's find out about the new technologies that allow us to explore our world and beyond - from space! This week we will be meeting a satellite technician, finding out about the James Webb Space Telescope and investigating how rovers search for signs of life on Mars.

You can watch our space-themed videos that go along with the activities on the Glasgow Science Centre Facebook page or YouTube channel.



Best wishes,  
Glasgow Science Centre

Could you take on a space mission?  
Launch yourself over to:  
[www.destinationspace.uk](http://www.destinationspace.uk)



## A MESSAGE FROM OUTER SPACE

You've received a message from outer space, but it's in an alien language you don't recognise! Some letters have been decoded.

Can you decipher the message?

DID YOU KNOW?

The United Nations has an Office for Outer Space Affairs. It promotes international cooperation in the peaceful uses of outer space.

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G E I

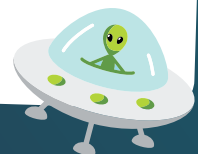
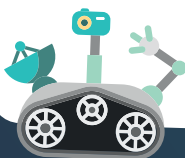
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greetings earthlings thank you for the rovers please visit Mars



# FAMILY QUIZ

All questions linked to activities in this issue

Answers on  
back page

**DID YOU  
KNOW?**

A Spaceport is a bit like an airport, but where spacecraft can take off or be launched into space.

The UK's first spaceport will allow rockets to launch small satellites into orbit.

## QUESTIONS

1. Where is the UK's first spaceport to be located?  
(a) Cornwall, England (b) Snowdonia, Wales  
(c) Shetland, Scotland (d) Sutherland, Scotland
2. How much taller can astronauts get when they are in space?
3. Which space agency is developing the James Webb Space Telescope? (a) NASA (b) The European Space Agency  
(c) Canadian Space Agency (d) All three
4. True or False. Spaceports for orbital launches are often located on western coasts so they can take advantage of the Earth's rotation.
5. How fast will the Rosalind Franklin Rover be able to travel?  
(a) 5km per hour (b) 14km per hour (c) 19km per hour (d) 22km per hour
6. True or False. Astronauts get Puffy Face Bird Leg Syndrome when they spend a long time in space.
7. What was the name of the first satellite to be successfully launched into orbit? (a) Sputnik (b) Suputnyk  
(c) Lloeren (d) Satellit
8. How far away from Earth will the James Webb Space Telescope orbit?
9. True or False. More small satellites are built in Glasgow than anywhere else in Europe.
10. What parts of the spectrum of light will the James Webb Space Telescope 'see' in? (a) Gamma-ray (b) Visible  
(c) Ultraviolet (d) Infra-red

## I'M A... SATELLITE TECHNICIAN

**HINT**

You may find some answers throughout this magazine or in our #GSCatHome videos.

### Meet Liam Quinn

Liam works in Glasgow for Spire, a company that builds and manages a network of small satellites that collect data about the earth and space.

"At Spire, we get to plan, build, test, and be the last hand on our satellites before they get launched into space. We build 3U CubeSats, which are a special class of satellite that are only 10x10x30cm wide! Knowing our satellites then go on to track ships, planes, weather and more for the benefit of humanity is really morally fulfilling. I have a Masters in Electrical and Mechanical Engineering, but I work alongside people in my team who work at Spire through an apprenticeship which is such an awesome opportunity that I'd push anyone to consider. Technical skills play a deceptively small part in our roles, compared to having the personal skills of collaborating, planning, and "spinning plates" (doing multiple tasks at a time)."

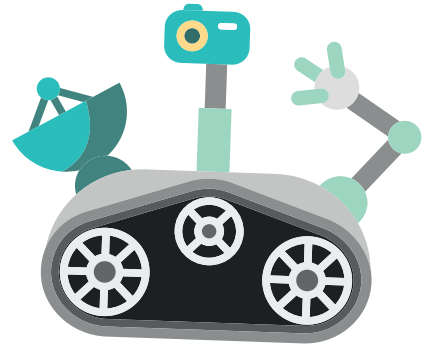
**Fun Fact:** Glasgow is the largest manufacturer of small satellites in Europe - we went from ships to spaceships!

**Skill/Party trick:** I can whistle two tones at once, though with great power comes great responsibility to not annoy your workmates with it!



# ACTIVITY

## Make Your Own Mars Rover



### What will you do?

Rovers are an invaluable tool to help us explore distant planets with extreme environments while we stay safe here on Earth. In this activity you will think about what kind of on-board equipment makes for a good rover and make your very own to explore Mars! You will also learn about the European Space Agency's (ESA) Mars rover, Rosalind Franklin, which will be heading up to Mars in 2022 to look for signs of life. Grab a short list of household supplies and follow along as we build our rover!

**Make sure you have adult supervision before starting.**

### What will you need?

Clean recycling to construct your rover

e.g. egg carton, cereal box, yoghurt pot, paper straws, pipe cleaners, cardboard.

Tin foil

Round pencils or skewers

Glue

Sticky Tape

Scissors

Coloured pens and pencils,  
or anything else you might like to use for decoration



### How to build your own Mars rover

**Step 1.** Before you start construction, you may want to decorate the body and individual parts of your rover. An egg carton or cereal box would make a good rover body.

**Step 2.** The Rosalind Franklin rover travels around on six wheels. How do you want your rover to move around? Wheels, legs or treads? Once you've decided, make them from your clean recycling. You could have wheels or treads made from cardboard or legs made from straws or pipe cleaners.

**Step 3.** Fix your wheels, legs or treads to the side of the rover with sticky tape or glue. If you want wheels that turn, use a skewer or round pencil threaded through each wheel and the body of your rover.

**Step 4.** The Rosalind Franklin rover has a panoramic camera sitting on a mast above the body to 'see' what is around it. How will your rover 'see'? Construct a camera - a small yogurt container, or egg carton 'cup', would make a good-sized camera.

**Step 5.** Fix your camera to your rover using sticky tape or glue. (If you want it to be on a mast like the Rosalind Franklin rover you will need to first fix the camera to a straw or pencil).

**Step 6.** The Rosalind Franklin rover will get the energy it needs to move around and explore Mars by using solar panels. Cut cardboard pieces for solar panels to power your rover, and cover with tin foil.

**Step 7.** Fix the solar panels to the rover with sticky tape or glue. Make sure they are in the best place to capture all the Sun's energy!

**Step 8.** What are we sending our rover up to explore? The Rosalind Franklin rover has an onboard drill to dig under the surface of the red planet. To create your drill, wrap some tin foil around the end of a paper straw.

**Step 9.** Fix your drill to your rover using sticky tape or glue.

## Congratulations, you have made your very own Mars Rover!

### More to try

This is your very own rover to explore Mars. Have a think about what you would like to look for on Mars, and what equipment you might need. Get creative, make and add any equipment you think you'll need.

Give your rover a name – maybe you have been inspired by a scientist or explorer, or something you know about Mars?

### Fun facts

The Rosalind Franklin rover has been designed and made in the UK, and is named after a British chemist, Rosalind Franklin.

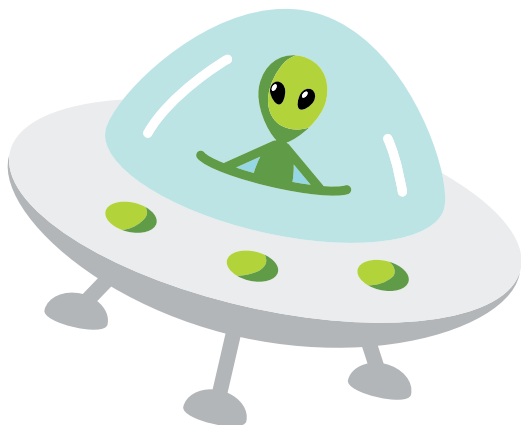
The rover is 1.5 metres long and 1.2 metres across (not including its solar panels). It moves around on six wheels, all of which can be steered and driven individually.

The on-board drill can penetrate below the surface of Mars to collect rock samples that have been shielded from the extreme environment at the surface. The samples will be analysed by the rover, giving scientists a unique opportunity to look for organic material, otherwise known as signs of life, on Mars.

The rover is loaded with multiple cameras to aid navigation. It has a 360-degree panoramic camera to take photos and create a map of the surface of Mars. Collision avoidance cameras on the front of the rover help it to avoid any hazards while navigating the varied terrain on Mars.

Solar panels mounted to the top of the rover convert the Sun's heat and light energy into usable electricity to power the rover.

To find out more about the Rosalind Franklin rover, visit: [www.esa.int](http://www.esa.int)



## ACTIVITY

# Make the Mirror from the James Webb Space Telescope



The James Webb Space Telescope (Webb) is due to be launched into space in 2021, and will make observations from a point in space 1.5 million km from Earth! Webb collects light with 18 hexagonal primary mirrors made into a concave shape (like the inside of a bowl), which focuses the light onto a secondary mirror and then onto the sensor. The mirrors for Webb are designed to fold in at the sides so that it can easily fit into the rocket for launch, and will unfold its mirrors before starting to take observations.

## What will you do?

Oh no! Webb is about to launch, but the mirrors have fallen apart! Can you place the mirror pieces back together in time for launch?

**Make sure you have adult supervision before starting.**

## What will you need?

- Puzzle pieces and outline as provided
- Scissors

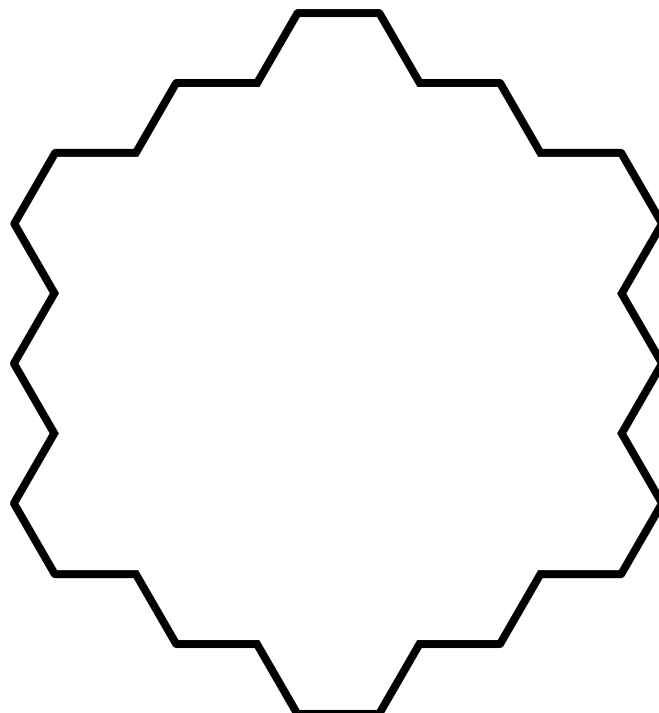
## How to do this activity

**Step 1.** Use scissors with help from an adult to cut out the puzzle pieces.

**Step 2.** Work out how to arrange the pieces inside the outline below to fit the mirrors back together again.

**Step 3.** Well done! The telescope can now launch into space!

Outline



## More to try

■ Take the puzzle apart and see if you can get anyone else to do it. Time each other and see who is the fastest.

## Fun facts

We have been using telescopes in space for over 50 years! These orbiting observatories have the advantage of not having to peer through the Earth's atmosphere, which distorts the view from the surface.

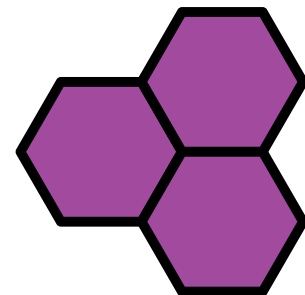
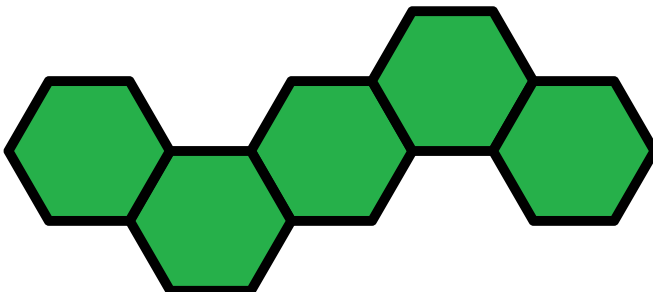
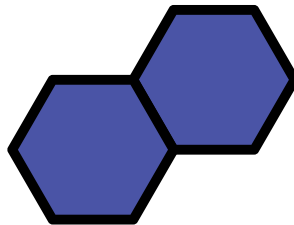
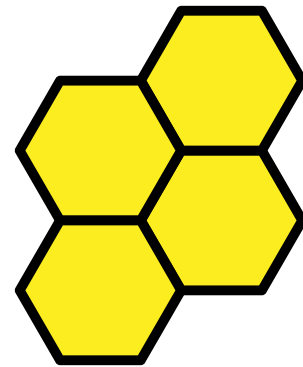
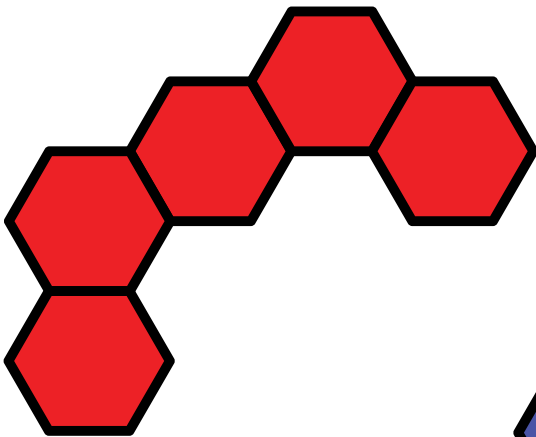
Webb will mostly look at the universe in infrared light, a type of light just beyond red in the spectrum. We can't see it with our eyes, but it is given off by anything that's warm, including you!

Infra-red light travels further through space than visible light, meaning Webb will see further into space. Light takes time to reach us across the vast distances of space, which means the further you look into space, the further back in time you look! Webb will be able to peer over 13.5 billion years into the past, viewing some of the first galaxies after the Big Bang.

Webb's mirrors are 6.4 metres across (about half the length of a Glasgow Subway carriage), larger than that of any space telescope in history.

Webb's enormous sunshield will keep the mirrors at  $-233^{\circ}\text{C}$ . That's pretty cool.

## Puzzle Pieces (to be cut out)



Share pictures of your Webb mirror with us on social media using [#GSCAtHome](https://twitter.com/GSCAtHome): [contact.us@gsc.org.uk](mailto:contact.us@gsc.org.uk)



# ABOUT US

We're back! Get your dose of socially distanced science fun this October half term.

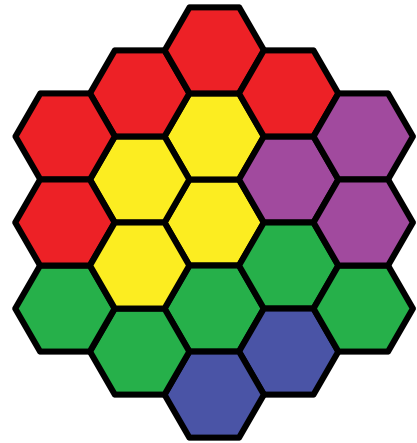
Travel from Earth to Space online with all new #GSCAtHome videos this October, or visit us! Glasgow Science Centre is open again and our brand new exhibition - Idea No59 is ready for you to explore. Please note we have additional measures in place to ensure everyone has a safe yet fun time when they visit. As we're operating at a reduced capacity and timed entry, you must book online in advance.

Glasgow Science Centre is a registered Scottish charity SC030809.

For more information and bookings, visit: [glasgowsciencecentre.org](http://glasgowsciencecentre.org)

## ACTIVITY 2 SOLUTION

Make the Mirror from the James Webb Space Telescope



Scotland's largest indoor Halloween party is moving online this year and into your home - it's like a bumper and spooky edition of GSC At Home! To find out more, please visit: [glasgowsciencecentre.org](http://glasgowsciencecentre.org).



## QUIZ ANSWERS



1. d) The UK's first spaceport is to be located in Sutherland, Scotland. To be specific, the A'Mhoine peninsula in the Highlands.
2. Without Earth's gravity pulling on their bodies and compressing their spines, astronauts' bodies relax and stretch out. This means that astronauts can grow up to two inches taller in space! It doesn't last though - astronauts slowly go back to their normal height back on Earth with its pesky gravity.
3. d) All of these space agencies are funding the telescope together. However, thousands of scientists from all over the world have been working on it. The James Webb Space Telescope is a truly international project.
4. False. Spaceports are often on eastern coasts to take advantage of the Earth's west to east rotation, and therefore reduce fuel usage. It also means rockets will often be taking off over water, which increases safety.
5. b) The Rosalind Franklin Rover will be able to travel at 14km per hour!
6. True. Your legs begin to get smaller and your upper body and head begin to swell due to the extra fluid, which would usually be pulled down into your legs by Earth's gravity, but instead gets pumped up to your head by your heart. Scientists call this Puffy Face Bird Leg Syndrome.
7. a) Sputnik, named after the Russian word for satellite. It was launched on 4 October 1957 from the Baikonur Cosmodrome in the Kazakh Republic, which was then part of the Soviet Union. (The other options are the words for 'satellite' in other languages.)
8. The James Webb Space Telescope will be 1.5 million km from Earth towards Mars.
9. True. Our city builds more small satellites than anywhere else outside the United States.
10. The James Webb Space Telescope will 'see' in b) Visible and c) Infra-red. Infra-red is invisible to the human eye, but we can feel it as heat.

## WE WANT YOUR FEEDBACK

### We would love to hear what you think!



We hope you liked this issue, but if you didn't, what could we change? What other things would you like to see? What topics are you most interested in?

Send your favourite pictures to [contact.us@gsc.org.uk](mailto:contact.us@gsc.org.uk) or share with us on our social media channels with #GSCAtHome.

With support from the Inspiring Science Fund provided by BEIS, UKRI and Wellcome.

Destination Space week on #GSCAtHome is supported by the UK Association for Science and Discovery Centres and the UK Space Agency.



### KEEP IN TOUCH



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