Open Up Science

CAMBRIDGE SCIENCE CENTRE

In collaboration with She Speaks Science

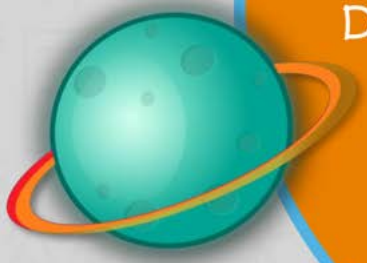
Space Special Edition

What is it like to live on Mars?

How does a star age?

Do aliens exist?

Find out more with stories, activities and puzzles inside!



Welcome!

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This week's OpenUpScience from Cambridge Science Centre is brought to you in collaboration with

She Speaks Science
(www.shespeaksscience.com)

She Speaks Science aims to increase active engagement with science by inspiring young people into Science, Technology, Engineering and Maths (STEM), and to make STEM inclusive by promoting women and minority scientists.

Our vision is a world where all scientists are valued, and where science is at the heart of society not a luxury or accessory. She Speaks Science does this through the power of story. Each storyteller *owns her story* and shares it with the world, once a month. We also run fun and engaging storytelling workshops at schools in the UK so that the youth can also *own their story* and take up STEM if they want to.

She Speaks Science is supported by the University of Cambridge and the International Astronomical Union.

These stories originally appeared on She Speaks Science. If you like them and would like to read more check out www.shespeaksscience.com
For more printable activities, go to www.bit.ly/AandS-EN

Cambridge Science Centre are proud to present three Space-related stories written by Anika Mehlis, Ghina M Halabi and Martha Irene Saladino.

Martian deserts on Earth

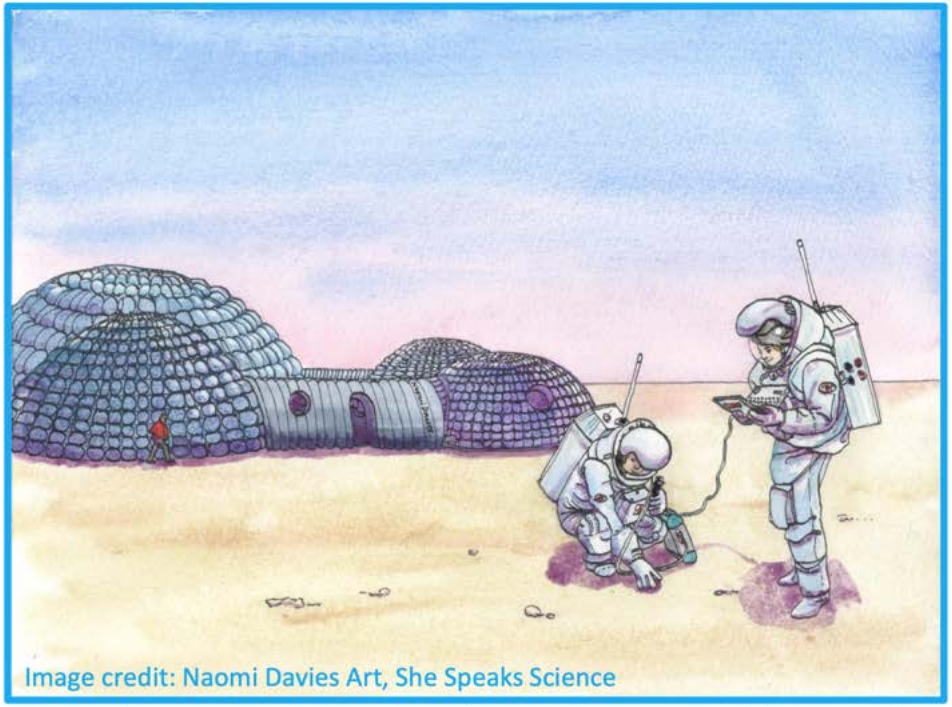


Image credit: Naomi Davies Art, She Speaks Science

As the visor closes, the head-up display of my spacesuit lights up. I know that from now on I am completely dependent on my skills, the technology of my suit and on my team if I am to live in the next few hours. After leaving our habitat, we take a look at the isolated, empty desert surrounding us while our team in the base checks our suits' measurements. With our tools carried by two rovers, we carefully pick our way through the valley leading from the base to the area we want to explore. As we follow the line on the map shown on our displays, wind blows sand into our vision. We can't hear its hiss, however, but only our own heavy breathing and voices from the headphones connecting us to each other and the base.

What sounds like a scene from the film "The Martian" actually takes place on our planet Earth, where analogue astronauts do their missions, and I am one of them. The Austrian Space Forum where I work is doing Mars analogue missions to help us explore the Red Planet in the future.

Analogue astronauts carry out spaceflight-simulations on Mars-like places on earth, like the rocky landscape of the Negev desert in Israel for example. We try out our equipment and tools. After all, we do not want to send a billion-dollar mission to Mars only to find out that we should have packed a cross-tip screwdriver instead of a hexagon one!

Did you know..?

Analogue astronauts are specially trained scientists who carry out technical tests and experiments in preparation for future human expeditions to Mars

We also look for any weak spots so that the actual mission is as safe as possible. For example, handling an astronaut who gets hurt while working or knowing what to do if we lose contact with base (there is no GPS on Mars!).

In my training I have to learn many fields of science like physics, geology and astrobiology. I also learn how to communicate, manage stress, stay fit and above all, how to operate a 50 kg spacesuit that digs into my shoulders while I try to focus on doing difficult jobs.

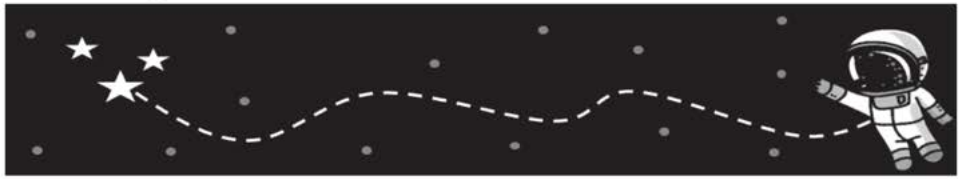
Image: oewf.org. Exploring Mars. Discovering Earth. Official Poster (c) World Space Week Association

You may be asking why bother going to space and Mars? Besides the fact that exploration is in our human nature, for me it is about understanding our planet's history and how life started. Answers to those big questions lie on far planets swimming in the huge dark universe. If we understand how planets form, how atmospheres develop and disappear, and how climate works, we can better understand our planet and all the ways we change it.

When we go to space we come back with better solutions for how to live on Earth. Above all, almost no where but in the space field do you find so many people of different genders, skin colours, religions and political beliefs working together towards a common goal.

In a few years, an astronaut's visor is not going to close in the Negev desert but on a Mars plain or valley. As I watch that historical moment on TV with my family and friends I will be happy to have helped make it happen.

Story by Anika Mehlis, an Analogue Astronaut, engineer, microbiologist and public health professional. She is mother to three daughters and holds a PADI scuba-diving license.

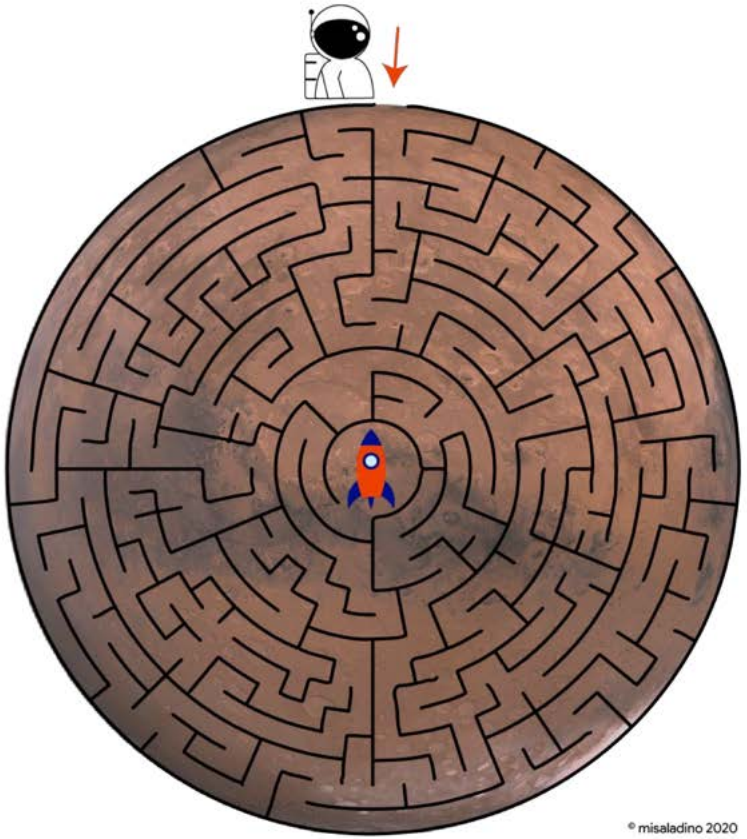


Exploring Mars – the Mars maze

What word comes to your mind when you think about Mars? "Red"? After all, Mars was named after the Roman god of war because its colour resembles that of blood.

Do you know what makes it red? It's red because it is made of iron oxide, the same component that gives hue to your blood!

In this activity, astronaut Anika is exploring Mars but got lost. Can you help her return to her Spaceship?



A journey from your backyard to the stars

When you lie down outside on a warm night staring at a sky with twinkling lights, do you think of a star's life journey? How it is born, how it lives its life, then fades away one day and gives matter back to the Universe to form new stars and planets one day?
Stars have lots of adventures from the moment they are born to the moment they die.

Image credit: NASA-Langley

In a galaxy far, far away, lives a huge cold cloud of gas and matter called a nebula, hundreds of thousands of times bigger than our Sun. This nebula gets hit by a shock wave and starts to break up into smaller clouds which get smaller and smaller because of gravity. The centre of a cloud gets hot and becomes the core of a baby star. As this baby star attracts more material, it becomes heavier.

During this time, the cloud continues to turn around the young star and forms a flat disc of gas and matter. The disc is home to little rocks that swim around and crash into each other so they become bigger and grow into planets. By studying the star we learn about how these planets form, how they look like and what they are made of. Do they have life? Do they have water or are they dry lands, burned by their star's light? To answer these questions we need to study the star.

As a star gets older, it becomes a guiding light in the dark Universe. So it can be seen with telescopes, whether it is in our galaxy or even in other galaxies many light years away. While stars light up our Universe, they give away their energy and matter into space. Their fast winds throw up the stuff that was cooked inside them which is rich in new elements. The Big Bang made the hydrogen, most of the helium and some lithium. Everything else is made in stars, like the carbon and oxygen which make our own bodies.

This is why we are made of star stuff. Can you feel our strange and amazing connection? I am sure you will never see them the same way again!

Story by Ghina M. Halabi, an astrophysicist, storyteller and public speaker working at University of Cambridge. She is founder of She Speaks Science, a social enterprise that promotes science and women in STEM with storytelling.

A star is born

Can you match the text on the left with the correct image on the right?

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1) It all begins with a giant and quiet cloud made of gas and dust.

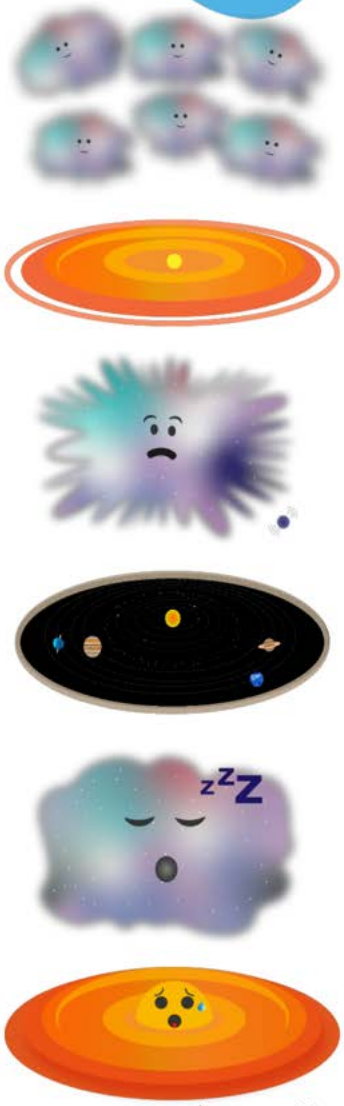
2) When something disturbs the sleeping cloud, like the sound of a dying star, the cloud awakens terrified and starts deflating.

3) The cloud then turns into small clouds from which baby stars will be born.

4) The gas in each of the clouds starts piling up until they flatten like a pancake. In their centre a huge ball of hot gas forms.

5) The ball at the centre of the pancake is about to become a baby star, but it needs more strength. So it keeps eating more material from the pancake until it turns into a hot and shining star.

6) Sometimes there are leftovers in the gas and dust pancake. These leftovers then start forming clumps that grow bigger and form planets, moons, asteroids, and comets.



The zoo of stars

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Stars come in different sizes and colours. The colour of the star depends on its temperature. A hot star is blue and a cool star is red.

Although we say "cool" star, it is not cool in human standards: it is more than a thousand times hotter than your oven when you are baking a cake!

Astronomers classify the zoo of stars into different types:
O, B, A, F, G, K, and M.
O is the hottest (blue) and M is the coolest (red).

The galaxy opposite has stars of different colours and a gigantic blackhole at the centre, use the chart below to colour the stars.

Did you know..?

- The Milky Way is the galaxy that contains our Solar System.
- The Milky Way contains over 200 billion stars, and enough dust and gas to make billions more.
- NASA's Galactic/Extragalactic ULDB Spectroscopic Terahertz Observatory (GUSTO) mission will launch in 2021 to explore the Milky Way. (https://tinyurl.com/m8e8n22)

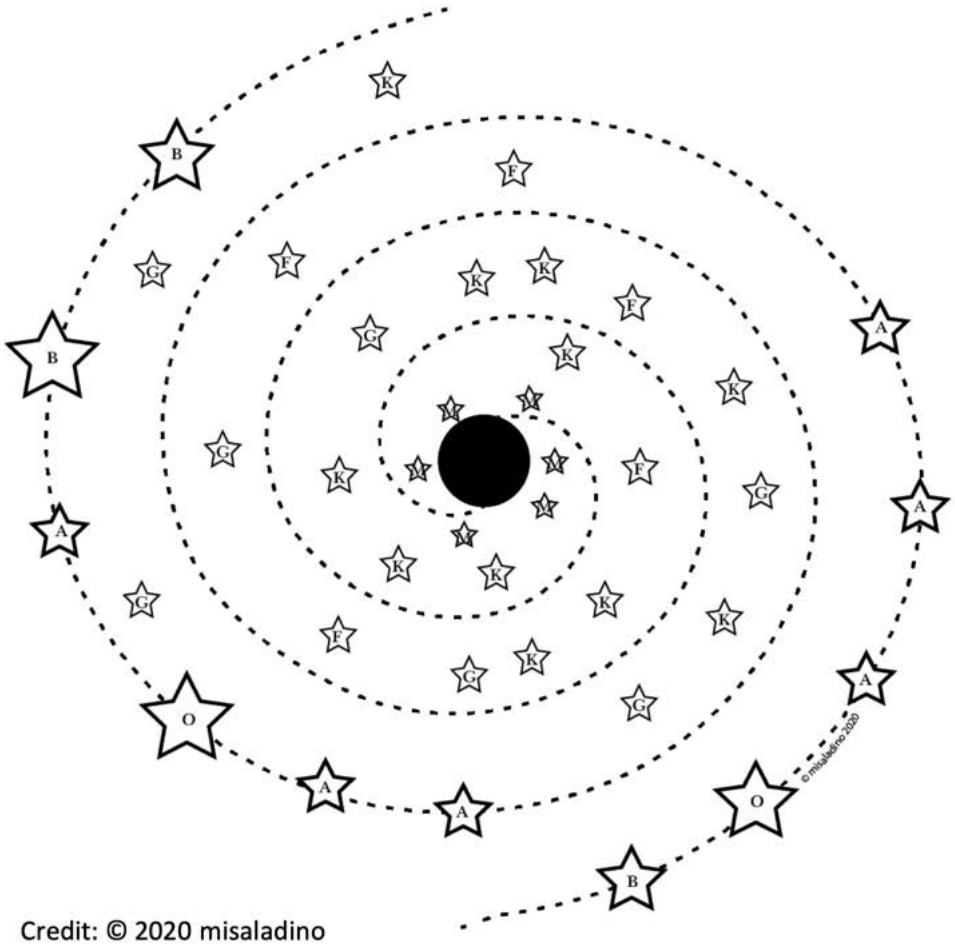
Type	Color
O	Blue
B	Medium blue
A	Light blue
F	White
G	Yellow
K	Orange
M	Red

Credit: © 2020 misaladino

The zoo of stars

Colour the stars according to their type using the colours in the table opposite.

Our Sun is a yellow star, what type is it? B or G?



Credit: © 2020 misaladino

Chronicles of the universe: The scientist, the alien, and the telescope

Have you ever seen the sparkling sky on a really dark night? How many stars can you count? 50? 200? What would you say if I told you that our eyes can see thousands of stars? The sky has more stars than all the sand grains on the beaches and deserts on our planet. Sadly, we cannot see them all because they are too dim or too far away and city lights outshine their glow.

Image credit: Martha Rosas Vilchis, She Speaks Science

Just like humans, stars have different sizes and ages. Some are old, like your granny; while others are young, like you. Some are middle-aged and small like our Sun, while others are very big. Scientists believe that some of the stars that look like our Sun can have planets like Earth. And, if those planets are warm and have water, then life could thrive.

Because there are stars much older than our Sun, scientists think that by now we should have heard from our alien neighbours, if they exist! The problem is that we haven't.

So, where is everybody?

Scientists are trying to find out.

These days, we do everything on our computers, smartphones or tablets. But if you pay attention to an old radio, you will see that to tune your favourite radio station, you have to point its antenna in the "right direction". The antenna will "catch" a signal that travels through air, and your radio will pass it to your ear in the form of music or boring news. Scientists are doing something similar to listen to aliens!

They point huge antennae towards the sky to listen for signals coming from the universe that could belong to aliens. The group of scientists that are looking for them is called SETI (Searching for Extra-Terrestrial Intelligence).

They haven't found anything so far, but they are still listening.

While scientists are looking for signs of life on other planets, we must take care of our own planet and every life on it: trees, plants, animals and other people. Remember that Earth is the only place that we know where we can survive and where life can flourish.
I bet that after knowing this you will never see the night sky the same way again. And that like me and other scientists you will also be wondering about the mysteries our universe could be hiding.

NASA's Perseverance Mars rover is due to launch in July/August 2020. Perseverance will collect rock and soil samples and look for signs of ancient life on Mars.
Scientists have discovered that the wetter conditions on Mars billions of years ago may have lasted long enough to support the development of microbial life.

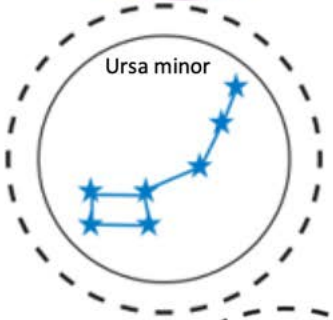
Image credit: NASA/JPL-Caltech

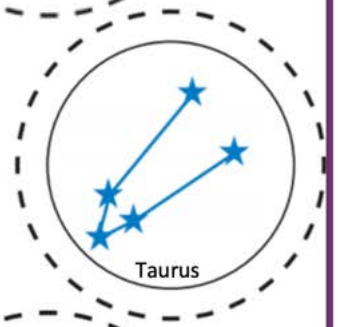
Story by Martha Irene Saladino, an astrophysicist and science communicator. For her research Martha Irene creates computer simulations of stars and planetary systems to study what happens to them as they grow old.

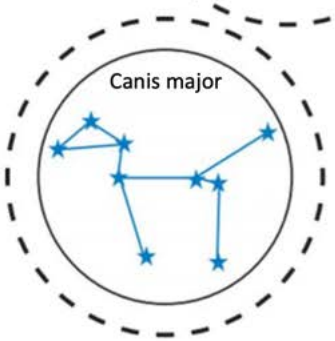
Constellation viewer

What you'll need

- Toilet roll tube painted black
- Black cupcake cases
- Scissors
- Push pin
- Glue stick
- Elastic band
- Constellation template (below)







What to do

1. Cut along the dotted line of the constellation template.
2. Glue the cut out template to the centre of the cupcake case
3. Use an elastic band to secure the cupcake case to the black cardboard tube.
4. Use a push pin to carefully punch holes where the stars are on the constellation template
5. Close one eye and use the other eye to look through the tube at the constellation. For the best effect look towards a bright window or a lamp

DON'T LOOK DIRECTLY AT THE SUN

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We always want to improve, so let us know what you liked – or didn't like – about this issue!

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Cambridge Science Centre is all about empowering children and young people to discover science for themselves through hands-on activities. While the centre isn't open at the moment, we're finding new ways to reach the families that need us most – like this magazine!

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