

How to Survive on Mars

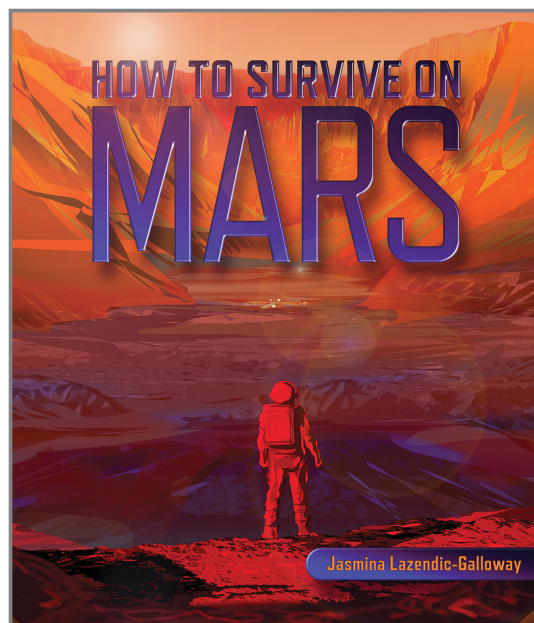
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RECOMMENDED FOR: Mid to Upper Primary



SYNOPSIS

Get ready for lift-off on a Martian adventure!

Have you ever imagined living on another planet? What about Mars? With not enough air to breathe, sunlight to keep us warm, or any available food and water, life on Mars is going to be a challenge ... but it just might be possible! Take a journey to the Red Planet in *How to Survive on Mars*. Discover natural wonders like ancient polar ice caps, the highest volcano in the solar system and a 45-kilometre-wide impact crater that was once a Martian lake.

Packed with stunning photographs, fun activities and quizzes, this book will show you what you need to do to survive on Mars! Join scientists, engineers, archaeologists, ethicists and science-fiction writers for a space exploration adventure.

ABOUT THE AUTHOR

Jasmina Lazendic-Galloway is an astronomer and educator. A passionate science communicator, she has appeared on numerous television and radio shows, written popular science articles and led a popular online course about Mars. She is a member of the National Space Society of Australia.

STUDY NOTES

- Mars is currently known as the robot planet, since machines are the only inhabitants there. Watch this short clip about preparing and landing the first airborne rotorcraft, or helicopter, on Mars. Remember that some of the images in this clip are not actual records, but are animated renditions of what it will look like on the surface. Keep an eye out for the Perseverance rover (at 2'45"), the actual device on which the Ingenuity Mars helicopter hitched a ride for its journey to the surface of the planet. <https://mars.nasa.gov/mars2020/multimedia/videos/?v=442>
 - Can you see where the energy comes from to give this helicopter its lift? How long has it taken the scientists to design, engineer, fabricate, test and program this Mars aircraft?
- Using the information in Chapters One, Four and Five, discuss the differences between Earth and Mars and, as a class, create a comparison table (or illustrative mind map) on the whiteboard. Address elements such as size, length of orbit and rotation, gravity, the presence and state of water, atmosphere, moons, mass, surface temperature, sunsets, magnetosphere, geology, distance from our Sun and seasons.
- Look at the posters in the book that are advertising various employment opportunities. Are you surprised at the variety of specific occupations and tasks that will be required when humans reach Mars? Which ones appeal to you

at the moment? Can you think of other jobs that will need to be performed there, including in STEM areas (hint: look at the Martian profiles for inspiration)?

- Living on Mars, even for only 2 years, would mean some of your five senses would need to adjust to less (or different) input. What things would you miss seeing, touching, tasting, hearing and smelling? Is there some way you can think of to accommodate this if you were on a Mars mission?
- The book explains that it takes approximately 7 months to get to Mars and about 3 days to get to the Moon from Earth. Calculate how many trips to the Moon it would take to travel the same distance as Mars is from Earth. Since Mars travels in an orbit that differs from Earth's, that means it is sometimes much further away from Earth, so now figure out how many trips to the Moon it would take if the travel time to Mars was 9 months.
- Chapter Nine of the book is titled 'Living sustainably and ethically on Mars'. How are the two concepts, sustainability and ethics, connected? What responsibilities do we have to future generations, to people who have not yet been born? In this context, what arguments are there to support the expense of sending people to Mars?
- Looking at pictures in a book is a great way to get an idea about what Mars is like, but to get a better understanding, visit the MicroObservatory website at: <https://mo-www.cfa.harvard.edu/OWN/>. [MicroObservatory](https://mo-www.cfa.harvard.edu/OWN/) is a network of robotic telescopes, developed by scientists and educators at the Harvard-Smithsonian Center for Astrophysics (Massachusetts, USA) for NASA, that can be controlled over the internet. Click on the 'Control telescope' tab and you will see a list of targets. Click on 'Mars Observe' to request your image. You will be asked to select some settings for the telescope—experiment with the settings to see what is different between the images. Then click 'Continue' and 'Submit' and wait a few days to get an email pointing you to your data. On the website, under 'Analyze Images', you can also find instructions on how to view the telescope images and create finished images. You can practise on existing images while you're waiting on your data.
- Write the following topics on pieces of paper, duplicating enough so that each student (or group of students) can pick one out of a hat:
 - asteroids
 - atmosphere
 - bacteria
 - chemical energy
 - dust
 - elements
 - food
 - fuel
 - heat
 - hydrogen
 - International Space Station
 - minerals
 - orbiter
 - regolith
 - rovers
 - water
 - Then ask students to use the index in the book to find and locate the information. Once they have sourced their information, ask them to combine and summarise that information into a couple of paragraphs and report back to the class on what they've gathered.
- Find the definitions of the following words using what you have read in *How to Survive Mars*:
 - Payload (What a rocket carries)
 - Sublimate (Turn from a solid directly into a gas)
 - Extremophile (Something that lives in an extreme environment)
 - Comet (A small celestial body)
 - Scrubbing (Removing harmful gases)

- Gravity (The force that keeps our feet on the ground)
- Ozone (This atmospheric layer is protective)
- Polymers (The building blocks of some human-made materials)
- Element (A group of two or more atoms)
- Solvent (Something that dissolves substances)
- Planetesimal (Tiny planet-like body)
- Lander (A space craft that lands)
- Astrobiology (The study of life on planets)
- Wavelength (The distance between two peaks of a wave)
- Atom (The smallest part of an element)
- Habitat (Natural living environment)
- Fibre (Indigestible part of a plant).