

# A travel guide to Mars

India's Mars Orbiter Mission is due to reach its final orbit around Mars on September 24. Here is a quick look into the red planet



*Kasei Valles, a giant system of canyons, shows traces of ancient water channels and meteor impacts on Mars.*

PHOTO: NASA/JPL/ARIZONA STATE UNIVERSITY, R. LUK

## ASTROPHYSICAL SERIES: PART - 1

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Imagine a vast barren desert of red dust and rocks, sand dunes swept by the winds, incredible canyons and the tallest mountain of the Solar System. Imagine a world where you could effortlessly jump 3 meters high, climb down steep craters, and set foot on everlasting carbon dioxide ice, that turns into vapour instead of melting. Welcome to planet Mars, one of our nearest neighbours!

Like Earth, Mars orbits around the Sun. But Mars is further away from it, so the Sun appears smaller in the Martian sky. It would take around nine months to reach Mars from Earth, and communications with Earth would be delayed because of the distance, as it is impossible to send messages at a speed higher than the speed of light. It takes 8 minutes for the light from the Sun to cross the distance between Sun and Earth, and it would take up to 20 minutes for a message from Earth to reach Mars. Can you imagine a conversation where

- Mars is home to the tallest mountain of the Solar System, Olympus Mons, and to a 7km deep canyon named Valles Marineris, which is more than 4,000 km long.
- Water on Mars and Earth probably comes from asteroids made of ice travelling from the edge of the Solar System.
- In Hindu astrology, Mars is named Mangala and also associated with war. It is often identified with Kartikeya.
- Mangalyaan, launched on 5 November 2013, will observe the surface of Mars and study its atmosphere.

you have to wait that long to hear your interlocutor's answers?

### Rust and volcanic rocks

Mars was named after the Roman god of war because of its blood red colour in the sky. It is due to a thin layer of rust that formed on the iron-rich soil of the planet. But if you walk on Mars your footprints would remove the rust and reveal underlying black volcanic rocks. Mars is home to the tallest mountain of the Solar System, Olympus Mons, which is a gently sloped volcano. This gigantic mountain is 21,229 m

high, more than twice as high as Mount Everest. But the climb wouldn't be as tiring as in the Himalayas: the gravity on Mars is only one third of Earth's, so



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you would jump three times higher than usual!

It wouldn't be wise to step out without a proper space suit though. Mars atmosphere is indeed very thin, and almost en-

tirely made of carbon dioxide. Earth atmosphere was probably similar very long ago, but the first living organisms on Earth consumed the carbon dioxide to produce the oxygen we now breathe. On Mars, even some clouds are made of carbon dioxide!

Warm clothes are also advisable, as the temperatures on Mars are low and can vary dramatically between day and night. They can reach a pleasant 20°C at noon during summer, fall to -70°C the next night, and be as

low as -150°C in winter. A thin layer of frost usually forms during the night, and there are everlasting carbon dioxide ice caps in the polar regions. The sharp differences of temperature can generate big dust storms. Dust storms on Mars can cover the entire planet and last for months.

Mars once had rivers, lakes, and maybe even oceans like the Earth does. But water did not remain liquid very long, and is now trapped as ice mixed with dust at the poles and inside the rocks. Today we can only see traces of the ancient dried-up water channels, which constitute an amazing sight! Mars shows an example of a planet that once looked very much like Earth before the apparition of life, but then evolved differently to become a harsh and hostile environment. Would you like to visit it if it were possible?

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