



The First Martian? - Teacher's Notes

STEM Awareness



Mars



Earth

Mars is slightly more than half the size of Earth. It is a rocky planet and its surface has signs that liquid water once flowed across it. This suggests that, like Earth, this planet may once have supported an atmosphere and possibly life. Indeed there may still be life if liquid water is trapped within the soil. (See end of teacher notes)

For this activity students view

https://www.ted.com/talks/nagin_cox_what_time_is_it_on_mars

We recommended that students read the question sheet before viewing the video to help focus their attention on information they might need.

Mars Time



When you are trying to contact someone on the other side of Australia or on the other side of Earth, you have to consider what is the difference in time between here and there. A lunchtime call from here will wake a caller in the UK at 4am. If you call a shop in Sydney at 4pm in the afternoon WA time it is liable to have closed one or two



Santos & ESWA supporting earth science education



The First Martian? - Teacher's Notes

hours ago.

If we are communicating with another planet on another orbit it becomes even more difficult because our days are of different lengths.

How long is one day (one rotation) on Earth? 24 hours

How long is one day (one rotation) on Mars? 24 hours ~40 minutes

Rovers need to shut down at night. Why? Needs to recharge her batteries and weather the cold martian night

Why does Nagin need to know when it is night on Mars? She works the 'martian night shift'

If it is nightfall at 5.00pm (Earth time) on the first day, at what time will night fall happen on Mars the second day? 5:40pm

What does Nagin use to remind her about local time on Mars? The Mars watch

Mars Language

The engineers had to invent a new language for Mars time so they could all mean the same thing.

What name did the spacecraft engineers give for a day on Mars? Sol, (Tosol (today), Yestersol (yesterday) and Nextersol or Solorrow (tomorrow))

Why do you think that they gave it this name? To stop confusion between Earth and Mars days





The First Martian? - Teacher's Notes

What word is used for today on Mars? [Tosol](#)

Why do you think they used this word? [To make it clear it is a Mars day](#)

Why do you think that the "Mars Rover" people developed different words from the space probe people? [Local language](#)

Helping the Mind Cheat the Body

Because times can become markedly out of synch, engineers can trick their bodies into feeling night is day, or day is night. What tricks can they use? [Put the blinds down \(no natural light\), foil the windows](#)

How does this difference in time affect the families of the Mars rover engineers? [They have to live on 'Mars Time' too](#)

After Viewing

Can you think of other people on Earth who do not have their meals or sleep at the same time as their neighbours? [Nurses and doctors on night shift, truck drivers on night shift, etc. etc.](#)

Do you think the people who work on Mars time should call themselves Martians? Explain why. [Answer will vary](#)

STEM Careers

We talk of how we need to study STEM subjects in school to be able to get an interesting job later.

What does STEM stand for? [Science Technology Engineering and](#)



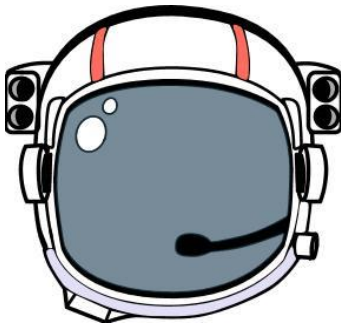


The First Martian? - Teacher's Notes

Mathematics

Does Nagin use STEM every day in her work? *Yes. Science comes up with ideas to test, Engineers design the equipment, Technology makes the equipment work and Mathematics provides the language (measurements) that they all use.*

Did you think this was an interesting talk? Explain your answer. *Answer will vary*



Some of your students may have seen the movie "The Martian" about an Astronaut who is stranded on Mars and how he has to "Science" his way out of his predicament until he is rescued. One factor wasn't explored however, the difference in time between the day and night of the astronaut based on Mars and the rescuers on Earth.

Extension for Experts



Jupiter is more than eleven times the size of Earth.

1 day on Jupiter lasts 9 hours and 56 Earth minutes.

If you start with daybreak on both planets being at 6am Earth time on Saturday, after 3 Jupiter days, what will the day and time on Earth?

9 hours and 56 minutes = 596 minutes

$3 \times 596 \text{ minutes} = 1,788 \text{ minutes} / 60 = 29 \text{ hours and } 48 \text{ minutes} = 1 \text{ day } 5 \text{ hours and } 48 \text{ minutes}$

Sunday at 11:48am





The First Martian? - Teacher's Notes

Extra information

Three billion years ago Mars had liquid water, which has since disappeared. Scientists suggested that carbon dioxide in its early atmosphere built up the heat from a weaker Sun and the water boiled away. Probes have detected no carbon dioxide in the present weak atmosphere. Curiosity rover has investigated Gale Crater, which was thought to be an ancient lake. No traces of carbonates were found in the rocks; this is not what scientists were hoping for. If the data does not support the hypothesis we need to rethink the evolutionary history of Mars and test again.

