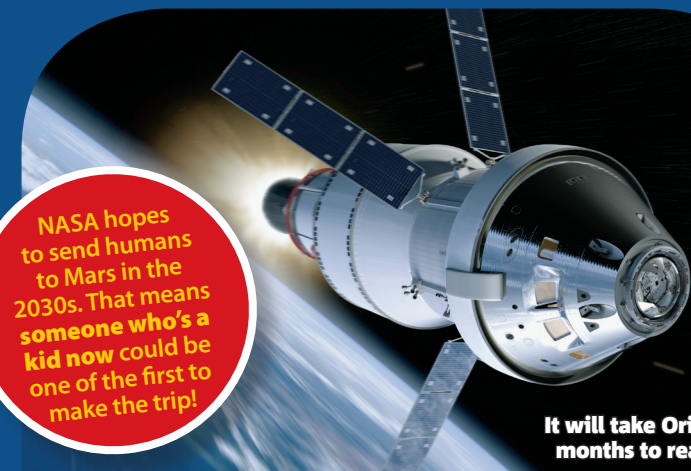


MISSION to MARS

Your guide to living on the Red Planet

 Congratulations! It's the year **2035**, and you've been selected to join NASA's newest astronaut class. Your assignment? To **travel to Mars**! Your crew will be the **first humans to set foot on the Red Planet**. We're sure you have questions. And we have the answers! Here's everything you need to know about surviving life on Mars...

HOW DO I GET THERE?



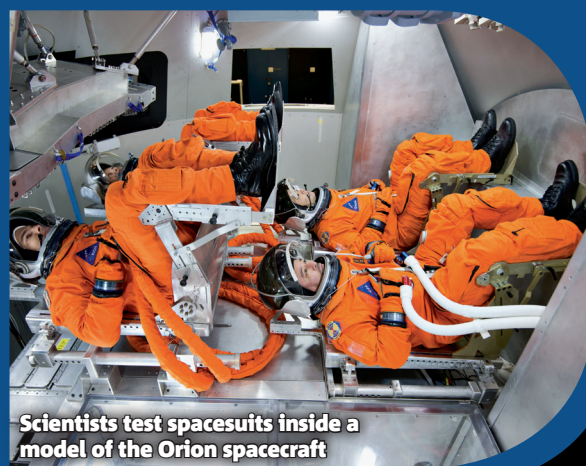
NASA hopes to send humans to Mars in the 2030s. That means someone who's a kid now could be one of the first to make the trip!

It will take Orion eight months to reach Mars

The **modern rockets** that travel to the **International Space Station** aren't powerful enough to make the **225-million-kilometre journey to Mars**. So NASA is developing a new spacecraft called **Orion**. Orion will be the fastest man-made object ever to blast through Earth's atmosphere, reaching a screaming **40,200kmph**!

At **4.8m across**, the craft is about the size of a van. But if that sounds cramped, don't worry – scientists

are investigating the possibility of hooking up Orion to a much **bigger ship in space** after it's launched from Earth. This ship doesn't exist yet – it's just one of the ideas scientists have to help make a roomier and more comfortable trip to Mars.



Scientists test spacesuits inside a model of the Orion spacecraft

WHAT DO I WEAR?

"On Mars, your space suit will be the only barrier between you and sudden death," says **Brad Holschuh**, a professor at the University of Minnesota in the USA. As well as **supplying you with oxygen** and **keeping you warm** during Mars' below-freezing nights, your space suit will protect you from the planet's **low pressure**. Without the suit, you would lose consciousness and quickly die.



A model of an astronaut wearing the BioSuit



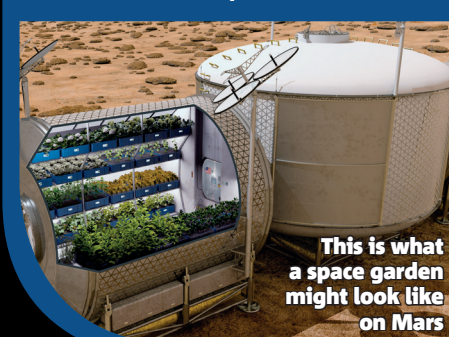
Close-up of the BioSuit

Current space suits are like **gas-filled balloons** that push against the body at the correct pressure. But the suits are **hard to move in** and astronauts fall down a lot. So Professor Holschuh and his team have worked on a new **flexible space suit** called the **BioSuit**. Astronauts press a button that sends a current through the BioSuit, adjusting the suit's smart material to the correct pressure. Clever!

WHAT DO I EAT?

Today's **freeze-dried astronaut food** is nutritious – but definitely *not* tasty! "Astronauts use a lot of spicy sauce!" says **Trent Smith**, manager of NASA's **VEGGIE project**, who's hoping to transform astronauts' pre-packaged meals of mush with **fruits** and **vegetables** grown in space.

If an astronaut tried to water crops in **zero gravity**, the water would just **float away**. So when the VEGGIE scientists launched their galactic garden to the **International Space Station** in 2014, they packed lettuce seeds inside **pillows filled with fertiliser** and a special kind of **dirt**.



This is what a space garden might look like on Mars

Astronauts placed the pillows under **LED lights** and regularly **injected** them with water, which **stuck to the dirt**, so the growing plants could slurp it up. One month later, the crew harvested the first **space salad**. Mars astronauts could use this technology to grow food in their spacecraft on the way to the Red Planet. Later, they may farm crops in Martian greenhouses (above).



An illustration shows how an astronaut could work in a Mars greenhouse

HOW DO I GO TO THE LOO?

Mars is **drier than Earth's driest desert**. So all gadgets on your space base will be designed to **conserve every single drop** of water – even from the **toilets**!

Blue Diversion toilets are currently being developed for use in **countries where water is scarce**, but similar technology will probably be used on the Red Planet too. These toilets **recycle water**, meaning after you've gone to the loo, the water from the toilet goes to the sink for you to **wash your hands**. Sound gross? The toilet



After hand washing, the water goes back into the loo, completing the cycle

water is first pumped through a **filtration system**, making it **clean enough to drink**. Phew!



WASH HERE!

SIT HERE!

WHAT IF SOMETHING BREAKS?

"When a lightbulb blows on Earth, you go to the store for a new one," says NASA planetary scientist **Chris McKay**. But on Mars, the DIY shop is millions of kilometres away. Today's astronauts bring backup parts, but they take up valuable space. So astronauts will soon use **3-D printers** to 'print out' whatever they need. They work by layering materials to build an object. Amazing!



THIS ROCKET ENGINE FUEL PUMP WAS MADE BY A 3-D PRINTER!