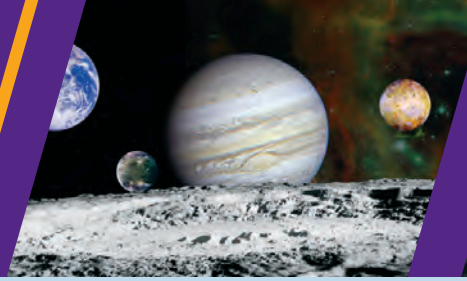
# SPACE ACE



## ASK A SPACE SCIENTIST

Our universe is full of mysteries, and some of the most mind-boggling are in space. Curious kids asked questions, and we sent them to two space scientists. Have questions about space? Send them to brilliant@usbnc.org (with your name and age).

**How does being in a suit prevent outer space from freezing you?** – Lena, age 10

Hi, Lena,
Being in a spacesuit is like being in a thermos bottle. The vacuum of space acts as one of the best insulators we know of, so the issue is not freezing, but getting too hot. Spacesuits use a special system that allows water to escape into space, which carries away our body heat. This process is called **sublimation**, and it happens when water ice evaporates into space. –Don

Don Pettit (left), Russian cosmonaut Oleg Kononenko (center), and Dutch astronaut André Kuipers wear their spacesuits on the International Space Station in 2012.

**Is it possible to farm in space? What kind of farming is already happening?** – Emma, age 10

Hi, Emma,
We can grow plants in space now, mostly for experiments, using **hydroponics** or **aeroponics**, where plants are grown without soil. It would be expensive to carry soil into space. We are still a long way from farming and growing crops, but I am certain that one day we will be doing that in space. –Don

### COSMIC QUIZ

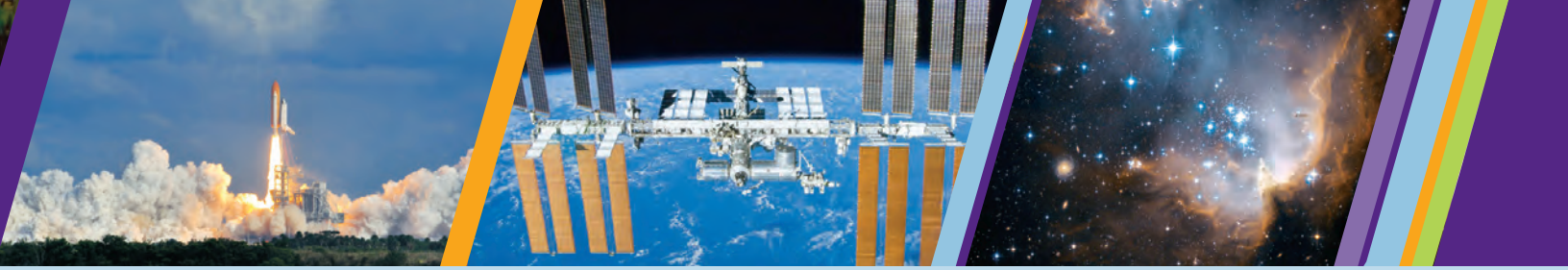
When a star doesn't glow steadily, but gets brighter or dimmer, it's called a:

A) Waffling White Dwarf
B) Fickle Fireball
C) Variable Star
D) Ping Pong Star

The star V838 Monocerotis



Images: NASA; Jose Antonio Perez; 25krunya; NASA/Bill Stafford; NASA/JSC; NASA, ESA, H. Bond (STScI)



## How has exploring space helped us back on Earth? —Tristan, age 15


NASA's digital image sensor is one of its most popular spinoffs so far, equipping cameras, high-definition (HD) video, and other technology.

Hi, Tristan,
That is an excellent question! Because it is so challenging to leave the Earth and explore space, it has inspired many engineers and inventors to find new ways to do things. Thousands of inventions and technologies that were originally developed for space missions have found their way into our everyday lives—they're called "spinoffs." Some spinoffs that had their start in NASA's space program are memory foam, now used for mattresses and pillows; miniature image sensors, now in smartphone cameras; wireless headsets, originally used when astronauts went to the moon; thermometers that take your temperature without touching you; and many, many others. NASA estimates that each dollar spent on space exploration generates over three dollars in benefits to the economy. Space exploration also inspires youth to dream big and to do what hasn't been possible before. That's the reason that I became an aerospace engineer! —Steve

## BACK IN TIME

Dr. Shannon Lucid's 1978 astronaut class was the first to include women. She's the only American woman to work on:

A) The Russian space station Mir
B) The International Space Station
C) A space shuttle
D) Mars

**DON PETTIT** is an active NASA astronaut who has been on three flights to the International Space Station. He lived there for over a year in total and spent 13 hours on spacewalks. While aboard, he sent videos to Earth and even invented a zero-G coffee cup. An avid photographer since sixth grade, he took thousands of photos from space and published his favorites in the book *Spaceborne* in 2016.

**STEVE SCOTTI** is *Brilliant Star*'s STEM Education Advisor and a Distinguished Research Associate at NASA Langley Research Center in Virginia, U.S. His background is in developing lighter, stronger materials and structures for aircraft and spacecraft. Watching the first astronaut launched into space inspired his interest in space exploration, and he enjoys sharing his enthusiasm about science and space with kids.

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