Hello, Star

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Illustrated by Vashti Harrison

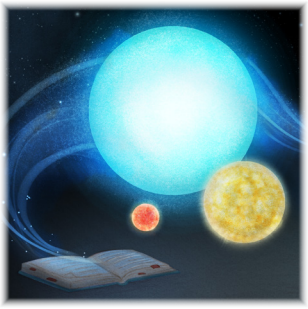
TEACHING TIPS

Terms

SUPERNOVA:

A supernova is an event that takes place when a very big star explodes at the end of its life. The light from a supernova shines as bright as an entire galaxy and can be seen from very far away. A supernova that took place in 1987 was seen on Earth from 168,000 light years away. One light year equals six trillion miles (6,000,000,000,000), so the 1987 supernova was so bright, it was seen by people on Earth from about 1,000,000,000,000,000,000 (one quintillion) miles away. Using a very powerful telescope, scientists are still able to see the remains of this supernova almost thirty years later.

BLUE SUPERGIANT:



Stars have different colors and temperatures. Blue stars are the hottest of all stars and red stars are the coolest. Our sun, a yellow star, is not as hot as a blue star and not as cool as a red star. Supergiants are one of the largest groups of stars in the universe and can be 60-80 times larger than our sun.

NEUTRON STAR:

After a star goes supernova, it leaves behind a lot of material, like stardust and gas and even newborn stars. It also leaves behind a neutron star which is a dense, heavy object that spins very fast. Using the Hubble Space Telescope, a very powerful telescope NASA launched into space and which orbits Earth, astronomers are still looking for the neutron star from the 1987 supernova.

BLACK HOLE:

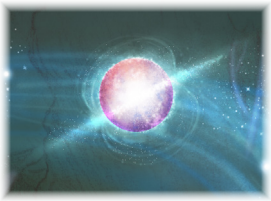
Black holes are an area of space that exist in the center of most galaxies, including our own Milky Way galaxy. We can't see black holes because everything, including light, that gets too close to a black hole gets pulled right into it. One way a black hole is created is when a very large star — bigger than our own sun — collapses in on itself. We still don't know everything there is to know about these intriguing objects, but scientists believe it's possible black holes play a part in creating new galaxies.

TELESCOPES:

Telescopes are scientific tools that make far away objects appear closer and bigger. You might have a small telescope at home that you use to look at the Moon, but astronomers have enormous telescopes as big as entire rooms or buildings that they use to examine things that are much further away from Earth than the Moon. There's even a

large telescope called the Hubble Space Telescope that orbits Earth to study deep space. In 2021 the Hubble was replaced by the James Webb Space Telescope that will be able to see even more than the Hubble can see right now.

Places



SATURN'S RINGS:

Saturn is the sixth planet orbiting the sun in our solar system. Saturn's rings, which are not solid, are made up of billions of ice-covered rocks that orbit Saturn. Some of these rocks are as tiny as dust particles and others are enormous boulders. When sunlight hits these icy rocks, they sparkle.

PLUTO'S HEART:

The New Horizons space probe reached the dwarf planet Pluto in 2015 after nine years of space travel, and it sent back pictures to Earth of what looked like a giant heart on Pluto's surface. Made up of an enormous frozen glacier that is 621 miles wide, scientists named Pluto's giant heart Sputnik Planitia after Earth's first human-made satellite, and believe it is the largest glacier in the entire solar system.

JUPITER'S STORM:

The Great Red Spot on Jupiter is a powerful storm, like a hurricane, that has been raging for hundreds of years. Based on photographs they were able to take in the 1970s, scientists believe that the Great Red Spot is getting smaller. We are learning even more about Jupiter's Great Red Spot as well as Jupiter's atmosphere, origin, and evolution from the NASA space probe Juno which launched in 2011 and arrived at Jupiter in 2016. The space probe will spend over a year sending information and photographs back to Earth to be studied by scientists. Juno's mission is an important one that will help us better understand how giant planets like Jupiter form and how our solar system came to be. At the end of its fact-gathering mission, Juno will not journey back to the scientists who launched it from Earth. Instead, on February 20, 2018, Juno slowed itself down and tumbled deep into Jupiter's high-density atmosphere where the space probe burned up and was destroyed. However, while Juno's mission must end, the knowledge gained from that mission never will, as we continue to ask questions and seek answers. UPDATE: Juno's mission was scheduled to end in 2018, but it has been extended to 2025. Juno continues to provide crucial scientific information.

Numbers

DISTANCE TO THE MOON:

It is about 238,855 miles from the surface of Earth to the Moon. However, because the Moon doesn't orbit Earth in a perfect circle, sometimes the Moon can be as far as 252,088 miles away. It took the Apollo spacecrafts 3 days to travel to the Moon from Earth.

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GRAVITY ON THE MOON:

You can't see or touch gravity, but it is the force generated by Earth's spinning that keeps everything on Earth from flying off into space. Gravity is what pulls you back to the ground on Earth after you jump. However, because the Moon has 83.3% less gravity than Earth, everything, including you, weighs less on the lunar surface. If you weigh 45 lbs on Earth, you would weigh 7.5 lbs on the Moon — that's how much a newborn baby weighs! And this difference in gravity means you can jump higher on the Moon than you can on Earth.

NUMBER OF STARS:

From Earth, we can see about 3,000 stars on a dark, clear night. However, there are so many more stars that we cannot see with our own eyes. It is difficult to know exactly how many stars there are in our galaxy, but scientists estimate there are at least 100 billion stars and at most 400 billion.

People

WOMEN ON THE MOON:

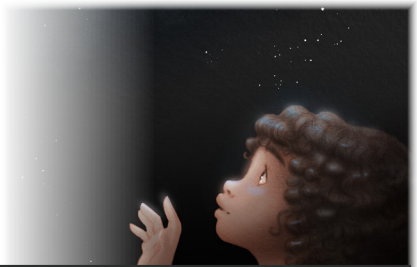
In 1963, Valentina Tereshkova of the former Soviet Union was the first woman in space, and in 1983, Sally Ride was the first American woman in space. Women astronauts and cosmonauts have taken spacewalks (Svetlana Savitakaya was the first), but no woman has walked or jumped on the moon. In fact, nobody has set foot on the moon since Captain Gene Cernan when he flew Apollo 17 in 1972. Maybe the next person to walk on the moon will be you.

WE ARE ALL MADE OF STARS:

Carl Sagan, a famous astronomer, once said: "We are a way for the universe to know itself. Some part of our being knows this is where we came from. We long to return. And we can, because the cosmos is also within us. We're made of star stuff." What Dr. Sagan meant was that elements that are found inside every human body, inside you, originally came from a star that died and exploded a long, long, long time ago.

THINK ABOUT THIS:

Inside of you are bits and pieces of stars, all working together to make you young and new and bright and strong. Ask yourself every day, "What will I do with my star stuff today?" then go out and shine.



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