NATURE DETECTIVES

Would You Like to Live on the Moon?

The moon would be a convenient place to live if you were an astronomer studying the stars and the planets. As Earthlings, our view of outer space is a little hazy because we view all worlds beyond Earth through our atmosphere. The view of outer space from the moon is much clearer because the moon has practically zero atmosphere.

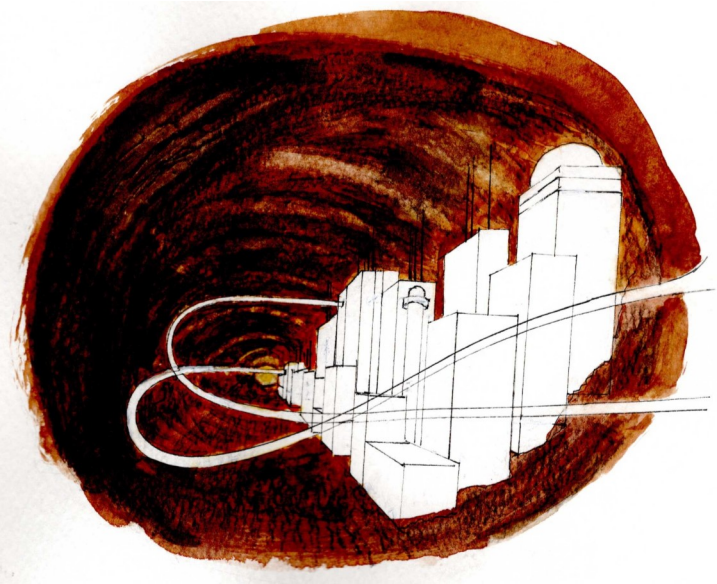
Moon inhabitants would have an advantage also when blasting off to explore other regions of outer space. Part of the challenge of launching from Earth is escaping Earth's atmosphere and gravity.

Viewing outer space from moon-based telescopes and getting a boost rocketing off to explore the universe from the moon would be exciting indeed. But the lack of an atmosphere also poses huge problems for humans. No atmosphere means no oxygen. Moon inhabitants would have to provide their own oxygen to breathe.

Pull Out and Save

Without an atmosphere there is no wind or weather on the moon, but wild temperature swings from too hot in the sun to too cold in the shade can vary by 400 degrees! Earth's atmosphere also protects Earthlings from space dust and space rocks that zing around in the universe. These are called **meteoroids**, and moon inhabitants would have to figure out how to avoid getting hurt by them. Radiation from the sun is another hazard to overcome without a protective atmosphere.

Building a Comfy Moon City



Some scientists are studying the possibility of building a moon city inside a **lava tube**. Lunar lava tubes formed eons ago when volcanos flowed on the moon. A hard, thick crust formed like a roof on some of the lava flows, and when the lava flow stopped and drained away, a deep, empty tube remained.

Researchers are studying a tube that might be big enough to house a whole city. The opening on the moon's surface could have a closeable entry so humans inside might live and work in a safe, oxygenated environment without wearing spacesuits. Inside would be safe from meteoroids too. Maybe one day you'll live there or visit a friend on the moon.

Moon Facts

At around 239,000 miles away, the moon orbits Earth at a distance 1000 times farther away than the International Space Station's orbit around Earth. The moon is about 400 times smaller than our sun, but it looks nearly the same size in the sky. That's because it is about 400 times closer to us than the sun.

Earth is around four times bigger than the moon. To get an idea of the distance between Earth and the moon and the relative size difference, put a basketball down in a big area. The basketball represents Earth. With a long tape measure, find a spot 23 feet and 9 inches away from the middle of the basketball. Place a tennis ball in that spot to represent the moon. You are now looking at the relationship in size and distance between the moon and Earth.

The Moon Rocks

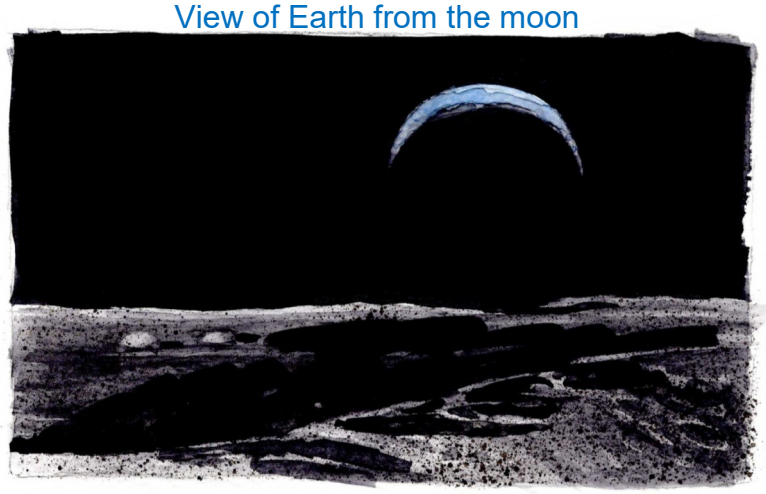
Moon rock

Rocks, metals and some trapped gases make up the moon. Water is predicted to be frozen in places too. The moon contains rocks found on Earth, but it also has rocks we don't have on Earth. Hundreds of billions of years ago, when the planets were young, the moon may have been a part of Earth that broke off in a collision between Earth and another planet-sized body.

Gravity pulls us down to Earth and is six times stronger than gravity on the moon. In less gravity, things weigh less. If you weigh 60 pounds, you'd only weigh 10 pounds on the moon.
You could also jump higher and throw balls farther, but without air (atmosphere) you couldn't make a Frisbee fly in a curve on the moon.

With no weather on the moon, there is no erosion from wind or water to blow dust around and roll rocks. Dust particles on the moon have sharp edges and carry a static charge. They stick on everything and would be a big hassle for moon residents.

View of Earth from the moon



Our sky on Earth looks blue and bright because of the way our atmosphere scatters light from the sun.

If you stand in a shady spot on the moon and look away from the sun, you see a dark, black sky even while the sun is lighting the moon's surface.

To read a book about living on the moon, check your library for Max Goes to the Moon: a science adventure with Max the Dog by Jeffrey Bennett.
For more facts on the moon, look up the NASA website NASA.gov
or this page https://www.nasa.gov/audience/forstudents/index.html.

Many Moons Ago

The moon has always fascinated human beings. Over the eons, people observed and studied this brightest object in the night sky. They realized the moon appeared and reappeared in a predictable pattern over time. They named full moons for things that usually occurred during each particular month.

June's full moon was sometimes called *Strawberry Moon*. A full moon in July was named *Thunder Moon* by some and *Hay Moon* by others. *Grain Moon* was in August. Maybe *School's Out Moon* would be a good name for a full moon in May.

You probably know the moon glows because it reflects light from the sun. On a full moon night, moonlight or moonshine (reflected sunlight bouncing off the moon's surface) is bright enough to light your way. On the moon you can see reflected sunlight bouncing off the Earth. It is called earthshine.

The Moon's Rotation and the Moon's Orbit Take Equal Time

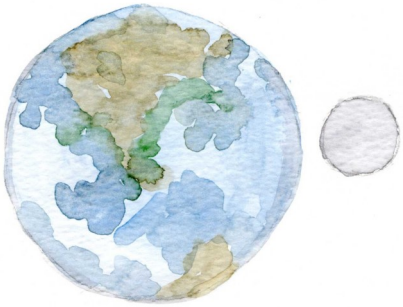
Earth spins around (rotates) in 24 hours. During that 24 hours, people experience day and night every place on Earth, just at different times. (If it is noon in Denver for instance, it is 5:00 the next morning in Sydney, Australia.)

It takes the moon a whole month to rotate. During that month, the moon "day" and moon "night" are much, much longer everywhere on the moon than day and night on Earth. Each "daytime" on the moon is about two weeks long!

The same half of the moon is always facing us. We have photos taken by spacecraft of the half of the moon we can't see from Earth. The far side is always turned away because the moon orbits Earth in the same amount of time as it takes to rotate, about a month.

To get a sense of how this can be, do the following moon/earth activity. Place your basketball "earth" or anything else you want to represent Earth in the center of a room. You pretend to be the moon. Face the "earth" and keep facing it as you circle completely around it. You have rotated and orbited "earth."

Repeat your orbit, and notice that sometimes your back faces one side of the room and sometimes your front faces that same side of the room. Your "moon body" slowly rotated while your "moon body" also orbited your "earth."

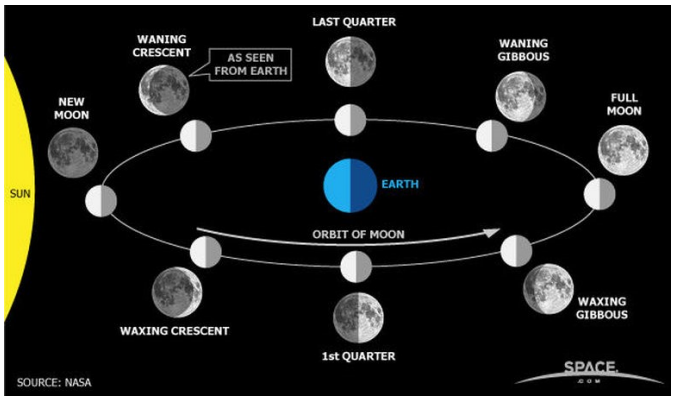


Relative sizes of the Earth and the moon

Sherlock Fox says it is fun to study the moon through binoculars. You can see the gray blotches of old lava-filled craters and the light-colored, higher grounds speckled with craters.
If you look at the moon around twilight, you see the most details.

It's Just a Phase

Our moon goes through different phases throughout the month, and this has to do with where it is around the Earth in its orbit. If the moon is between the Earth and the sun, we can't see it because the sun is too bright, and we are only facing the moon during the day (new moon).
If the Earth is between the sun and moon, we see the moon at night and the sunlight reflects off the entire side of the moon facing us, so it's big and bright (full moon).
The moon is also on a tilted orbit around the Earth so it is usually slightly above or below the earth, which is why we don't have a lunar eclipse every month.



Waxing means the light on the moon is getting brighter. (Think about when you put wax candles on your birthday cake—the more candles, the more light!)
Waning means decreasing.

Remember this fun saying:
Light on the right, the moon is getting bright.
Light on the left rim, the moon is getting dim.

Happy Birthday Apollo 11!

On July 20, 2019 it will be exactly 50 years ago that people first set foot on the moon. Astronauts Neil Armstrong and Buzz Aldrin planted the first footprints in moon soil. A third astronaut was with them—Michael Collins. He stayed in the command module while the other two were on the moon so he could pick them up when they left the moon surface. A total of 12 astronauts walked on the moon by the time the Apollo missions ended in 1972.

It took about three days to get to the moon. The astronauts lived in the command module on their journey—kind of a cone-shaped flying office. It was less than 13 feet wide, and all three astronauts lived there together, eating, working, and sleeping in that small space. Measure your bedroom and see how wide it is. Then imagine your furniture, food pantry, work equipment, and two friends sharing that space with you for three days. It's a good way to practice your patience!

To celebrate the progress achieved through human flight, Neil Armstrong took pieces of wood and a piece of fabric from the Wright brothers' original plane with him on Apollo 11. Armstrong and the Wright brothers were all from Ohio.
If you were going on a mission to the moon or to Mars, what would you take with you to represent our path to the future?

Astronaut on steps of Lunar Lander

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