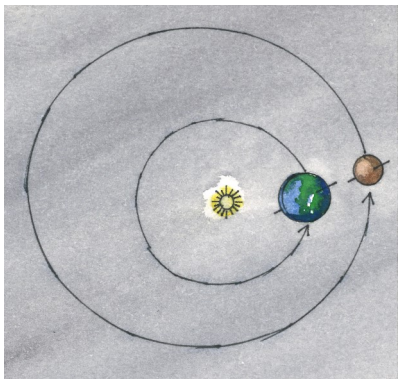
# NATURE DETECTIVES

Fall 2020

## Be Seeing You, Mars!



Mars doesn't shine very bright in our night sky usually, but this fall the planet will rival glowing Jupiter for brilliance. Mars gets a chance to shine big every couple years, and this year is one of those times. The reason Mars is growing brighter now is because Earth is about to race past it. As the distance between the two planets shortens, Mars will gradually appear brighter. Earth will draw next to Mars in October 2020, then Mars will start to fade again as Earth moves ahead.

Earth and Mars race around the sun in their separate orbits, and Earth always wins the race. Mars' path is longer because Mars is farther from the sun than Earth. And, because Mars is farther from the sun, Mars travels slower too. Earth circles around the sun almost two times for every single Mars orbit.

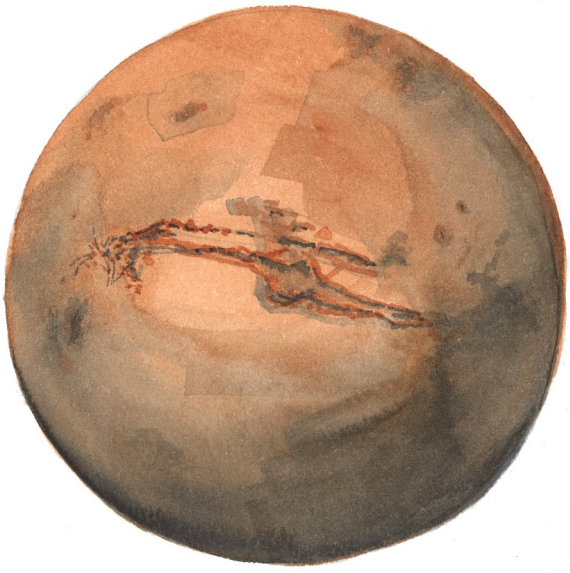
### Mars and Colorado

Colorado and Mars have a lot in common. Mars is often called the Red Planet because it glows slightly red in the night sky. The name Colorado is a Spanish word meaning colored red. The names came from the color of the rusty iron found in reddish rocks on Mars and in Colorado.

Pull Out and Save

Colorado and Mars both have mountains, ancient volcanos, some dry riverbeds, and canyons. One canyon on Mars is as long as the whole width of the United States. Mars has the tallest mountain in our solar system. It's much taller than Mount Everest, but because it has a huge base and slopes uphill gradually, you probably could walk up it like any hiking trail. If it wasn't on Mars, that is!

Comparisons between Colorado and Mars are limited because Mars is a cold, rocky desert where life as we know it doesn't exist.
Mars is a truly out-of-this-world, inhospitable place. It will take an amazing amount of research, effort, and invention to get people to Mars and back to Earth safely. Living on Mars would be even more challenging.



Canyon Valles Marineris on Mars is almost four times longer than the Grand Canyon.

## Scoping Out Mars

Humankind has been studying the Red Planet for at least 4000 years. Today, robotic spacecraft are orbiting the planet, and robotic all-terrain vehicles called rovers are exploring Mars and sending back photos and data. We've learned a lot about Mars.

Mars tilts at about the same angle as Earth as it rotates on its axis, so like Earth Mars has seasons. Because the planet takes twice as long to go around the sun as Earth, its seasons are longer. Mars also has weather, including wind. Mars rotates on its axis at about the same speed as Earth so Mars experiences one day and one night in about 24 hours, nearly the same length of time as on Earth.

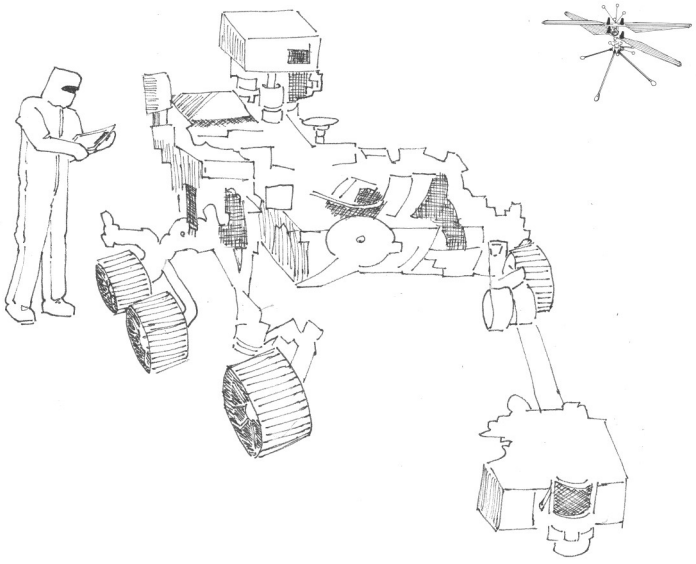
Mars has almost no atmosphere with no breathable oxygen. The lack of an atmosphere makes Mars even colder than its fourth place location from the sun would make it. Earth's atmosphere holds heat from the sun's radiation, but Mars doesn't have enough atmosphere to keep the sun's warmth. The average temperature on Mars is minus 81° Fahrenheit.

The data from Mars shows evidence the planet once had more atmosphere and flowing rivers and even lakes. Now there are only the thinnest clouds holding moisture, and perhaps some salty water remains underground. Any surface water would freeze and evaporate.

## Smaller Yet Bigger…What?

Mars is half the size of Earth, but it has about the same amount of land surface. Remember Earth has a lot of water in oceans, lakes, and rivers covering the surface. Exploring the entire land mass of Mars is the same as exploring every mile of every country on Earth. The robotic rovers on the Martian surface have covered a tiny fraction of the total planet. Now NASA hopes to test a machine on Mars that might lead to future flying machines capable of exploring vast areas including mountain tops and canyons.

## Hello Perseverance, the New 2020 Rover



Perseverance is a car-sized rover designed to explore Martian rocks, dirt, and air in an area that has some of the oldest rocks on the planet. Looking for signs that teeny microscopic life once existed on Mars is part of its mission. Perseverance carries a small robotic helicopter to try out on Mars. The little helicopter might give insight into ways of exploring longer distances and rougher terrain in the future.

**Travel to Mars…Want to Go?**

It is a long way to Mars so the trip would be best planned for a time when Earth and Mars are closest together in their orbits around the sun. At the speed of our fastest spacecraft flying today, it will take six months to reach Mars.

An opportunity for a return flight to Earth, when the orbits of the two planets are again close, would be at least a two-year wait. The return flight would take another six months. Human health is a worry during all that time away from Earth's normal gravity and atmosphere.

**Hazards of Being on Mars**

Without a protective atmosphere and magnetic field, Martian hazards include dangerous radiation from the sun, and space matter such as asteroids and comets hurling to Mars' surface instead of burning up as they do in Earth's atmosphere.

The Martian climate is unkind to humans and to equipment. Wind on the planet kicks up a lot of dust, and that dust even colors the sky. The particular way Earth's atmosphere scatters the rainbow hues of light from the sun makes our sky appear blue. Without a light-scattering atmosphere, the Martian sky often looks reddish with the sun shining on wind-blown reddish dust in the air. Other times the sky may appear tan in areas where there is brown dust. All that dust can be a hazard. Dust storms and whirling dust devils on Mars may clog sensitive equipment and coat space suits. Astronauts could track dust on their boots inside their spacecraft.

Extreme cold would be a challenge. The temperature on Mars can be as warm as 70º Fahrenheit, but it can be as unimaginably cold as minus 225º Fahrenheit.

**Stories of Martians**

One hazard humans won't have to worry about on Mars is running into a Martian. Stories of intelligent beings on Mars began with an imperfect new invention combined with people's creative guesses.

Back in the 1800s telescopes were invented, giving people a closer look at the surface of Mars. But the view through early scopes wasn't exactly sharp. A few people thought they saw straight lines on Mars that looked similar to irrigation canals. What a discovery… farmers on Mars! Well, no–just a fuzzy view of natural features of the Martian landscape that excited the human imagination.

**Birthdays on Mars?**

Our year is based on the length of time it takes Earth to orbit the sun. Mars takes almost twice as long to orbit the sun. Hmmm. Does that mean you would be half as old on Mars, and could only celebrate your birthday every other year?! How old are you right now in Martian years?

**Stars Appear to Stay in Place, and Planets Seem to Wander**

Stars are so incredibly far away, even though they are always moving, they appear to stay in place in our sky. As the Earth turns and orbits, our view of them changes during the day and the season, but their places seem fixed in relationship to each other. Constellations and star patterns don't wander around, bumping into other star patterns in our view of them. Planets do appear to wander through different star patterns over time in the night sky. Planets seem to wander because they are so much closer to us than stars, and they are orbiting the sun along with Earth.

The same stars we see from Earth are visible in the Martian night sky, except Earth would appear similar to a star just as on Earth the planet Mars looks starlike.

**Tracking Mars**

You can keep an eye on Mars, and see how it moves through its orbit around the Sun. Go to this website: www.skymaps.com and download the latest issue of the evening sky map. It will show you where Mars is in the sky. Keep an eye on Mars each week, and in a month, notice where Mars is in relation to the stars around it. How much has it moved? What direction is it going? Look for Jupiter and Saturn too. Which planets seem to move faster? Remember that Jupiter and Saturn are much farther from the Sun.

**Nine Planets in Order from the Sun**

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Can you quickly recite their order from the sun from memory? A saying to help remember something is called a **mnemonic**.

Here are a couple mnemonics to help remember the planets. Every upper case letter (capital letter) represents a planet in both of these mnemonics.

**M**y **V**ery **E**ducated **M**other **J**ust **S**erved **U**s **N**oodles (or if you prefer, **N**achos)
or another one...
**M**y **V**ery **E**asy **M**ethod: **J**ust **SUN** (Remember every upper case letter is a planet.)

What mnemonic would **you** create to remember the order of the planets in our solar system?

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