My Drift

Title: MARS

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I was watching 60 Minutes a few Sundays ago, and they had this billionaire named Elon Musk on who plans to send astronauts and normal people to Mars in a few years (2024). Musk is CEO of Tesla Motors and SpaceX.

SpaceX's Falcon 9 rocket lifts off from NASA's Kennedy Space Center, sending NASA astronauts into orbit in a Crew Dragon capsule

Yes, on 29 May 2020, SpaceX launched two NASA astronauts (Bob Behnken and Doug Hurley) to the International Space Station becoming the first company to send humans into orbit on a commercial spaceship. The Falcon 9 rocket's liftoff from NASA's Kennedy Space Center in Florida at 3:22 p.m. ET (9:22 a.m. Hawaii Time) marked a feat that Americans hadn't been able to do since NASA retired the space shuttles in 2011: sending astronauts into orbit from a U.S. launch pad rather than relying on the Russians.

This sparked my interest, so I watched another 60 Minutes interview with Dr. Robert D. Braun, Director for Planetary Science at NASA. This interview was conducted by Anderson Cooper.

NASA is heading back to Mars with a new rover searching for signs of past life

The space agency is making final preparations for what one official calls "probably the most complex" scientific mission NASA has ever undertaken.

If you're tired of being cooped up and yearning for a get-away, have we got an adventure for you. It's a new mission to Mars, NASA's most ambitious one yet. The goal is to land a new vehicle, a high-tech rover, to search for signs of ancient life on the Red Planet and, eventually, bring that evidence back to Earth. Unmanned spacecraft have been exploring and photographing Mars for decades. But no one's ever discovered clear signs of life there, or anywhere else in the universe. NASA scientists now believe they've found a perfect place to look. Coronavirus could have derailed the whole mission, but so far, the launch is still on schedule. Blast off is schedule for 17 Jul 2020. Given all that's already happened, this new rover's name seems particularly appropriate: Perseverance.

It'll take seven months and a journey of hundreds of millions of miles for perseverance to get to Mars, the planet whose reddish hue, caused by rust particles in the rocks and soil, led the Romans to name it after their god of war. Today, the surface of Mars is a radiation-filled desert. It's a freezing minus 80 degrees Fahrenheit on the average. There are windswept sand dunes and outcroppings of rock that could easily be mistaken for parts of Arizona or

southern Utah. Some of those rocks hold clues that suggest Mars may have been a lot like Earth billions of years ago, with lakes and rivers of water and the building blocks of life.

The new Perseverance rover is a robotic scientist weighing 2,260 pounds

No one has ever brought back anything from Mars. This will be the first!

Nearly eight years and $2.5 billion have been spent building Perseverance. Bobby Braun told us that if NASA misses a narrow three-week window to launch that begins on July 17, 2020, it could cost half a billion dollars more and years of work. Because of the motion of the Earth and Mars about the sun, you can only send a spacecraft from Earth to Mars once every 26 months. And if we miss that window, we would have to wait 'til 2022 to try it again.

Four previous Mars rovers have paved the way for this mission. The last rover, named Curiosity, has been on Mars for eight years, sending back images like the one on the right while exploring an area known as the Gale Crater. But Perseverance is the first rover specifically outfitted to collect retrievable samples.

Gale Crater

Perseverance is equipped with 25 cameras, two audio mics, and seven scientific instruments, many of them specifically designed to detect faint traces of ancient life on the surface of Mars. But the rover will also be testing out new technologies that astronauts may someday need to explore Mars and return back to Earth.

Scientists think there might have been life on Mars a long time ago – like 3 billion years ago. This life is probably not actual Martians, but most likely single cell organisms.

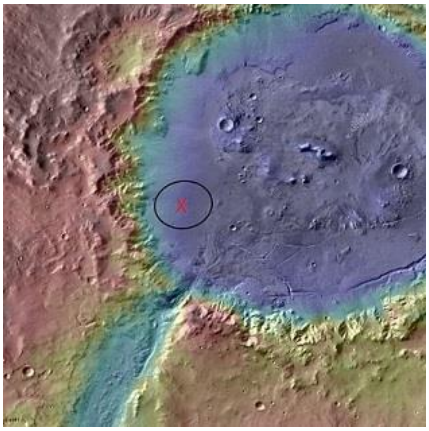
The rover also has this small helicopter which it can drop on the surface of Mars. The helicopter, which weighs 4 pounds and features propellers 4 feet in diameter. The helicopter is controlled by the Rover Perseverance – not NASA.

Mars Rover Perseverance Helicopter

If it works, it would be the first vehicle ever to fly in the atmosphere of another planet. This $23 million helicopter can fly up to 90 seconds per charge.

Okay, here is the plan in simple terms:

1. **On 17 Jul 2020, NASA will launch a spacecraft containing the Perseverance Rover and helicopter to Mars.**
2. **It will land on Mars' Jezero Crater on 18 Feb 2021.**
3. **NASA scientists will decide where Perseverance goes and what kind of rock samples it'll collect.**
4. **The rover will explore the area for at least two years.**



Jezero Crater

5. **The rover's helicopter will fly around looking for good spots to dig.**
6. **The rock samples perseverance collects will be left on the surface of Mars in airtight sealed tubes.**
7. **In a few years, a new rover will arrive on Mars to fetch the rock samples.**
8. **This new rover will put the rock samples on a small rocket ship and launch them into orbit around the red planet.**
9. **Another spacecraft will already be waiting there in orbit, and the samples will be passed to it in a container the size of a soccer ball.**
10. **The samples will then be transported back to our atmosphere and dropped off on Earth.**

Hey, sounds pretty easy to me. Right!!

Did you know that there been 56 unmanned Mars missions (starting in 1960) so far, of which 26 have been successful — a testament to the difficulty in reaching the red planet? I didn't know any of these things.

Up to now, there has been four (4) main types of Mars missions that include:

- **Flyby**
- **Orbiter**
- **Lander**
- **Rover**

Here is a summary of the Mars missions up to this date:

- **The Soviet Union conducted the first five (5) Mars missions starting on 10 Oct 1960. All failed to make it to Mars.**
- **The first U.S. NASA attempt was on 5 Nov 1964 – It also failed. However, on 28 Nov 1964, the U.S. launched the first successful mission to Mars with a flyby of Mars on 15 July 1965.**
- **On 19 May 1971, the Soviet Union successfully launched an Orbiter that entered orbit on 27 Nov 1971 and operated for 362 orbits.**
- **On 28 May 1971, the Soviet Union successfully launched the first lander on Mars which landed on 2 December 1971. The first partial image (70 lines) was transmitted but contact was lost 14.5 seconds after transmission started.**
- **On 30 May 1971, the U.S. successfully launched an Orbiter that entered orbit on 14 Nov 1971 – it was deactivated 516 days after entering orbit.**
- **In August and September 1975, the U.S. Viking 1 and 2 successfully completed four (4) missions to Mars (2 Orbiters and 2 Landers).**

- **On 4 Dec 1996, the U.S. successfully launched the first rover on another planet - it operated for 84 days. Rover name was Sojourner.**
- **In June and July 2003, the U.S. successfully launched two more rovers on Mars - Rover names were Spirit and Opportunity.**
- **In Mar 2004, the European Union successfully launched a Flyby to Mars. This was the first country other than the Soviet Union/Russia and the U.S. to reach Mars.**
- **On 5 Nov 2013, India got into the act when they successfully sent an Orbiter to Mars.**

Here is the MARS MISSIONS Scoreboard:

Country	Attempts	Successful	Failed
Soviet Union / Russia	21	3	18
United States NASA	28	20	8
ESA European Union	4	2	2
ISRO India	1	1	0
ISAS Japan	1	0	1
CNSA China	1	0	1
Total	56	26	30

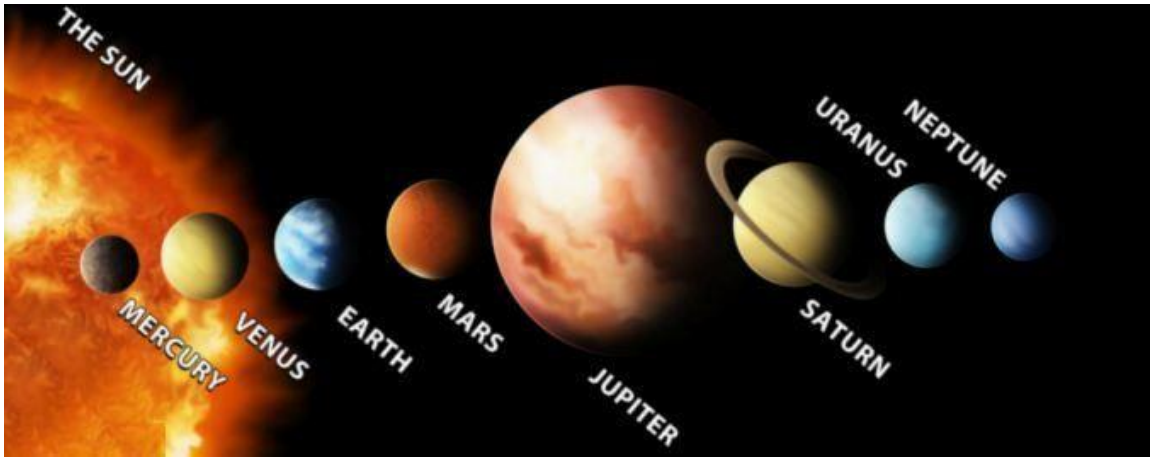
Future Missions

We already talked about the U.S. NASA and SpaceX missions. Others include:

- **17 Jul 2020 - United Arab Emirates – Orbiter**
- **23 Jul 2020 – China – Orbiter/Lander/Rover**
- **17-31 Jul 2020 – European Union / Russia – Lander/Rover**
- **17-31 Jul 2020 – Japan – Orbiter**

Mars Information and Facts

But first, do you remember all the planets in our solar system?



There are currently 8 planets. But, for most of my life there were 9 planets. Pluto was a favorite planet for many people because it was the solar system's outermost planet and was considered a celestial oddball. It had the most elliptical and tilted orbit of any of the 9 planets. The Lowell Observatory discovered the ninth planet (Pluto) on March 13, 1930. But then on August 24, 2006, the International Astronomical Union (IAU) voted to reclassify Pluto, changing its status from a planet to a dwarf planet. This made a lot of people unhappy!

What do Mars and Earth have in common?

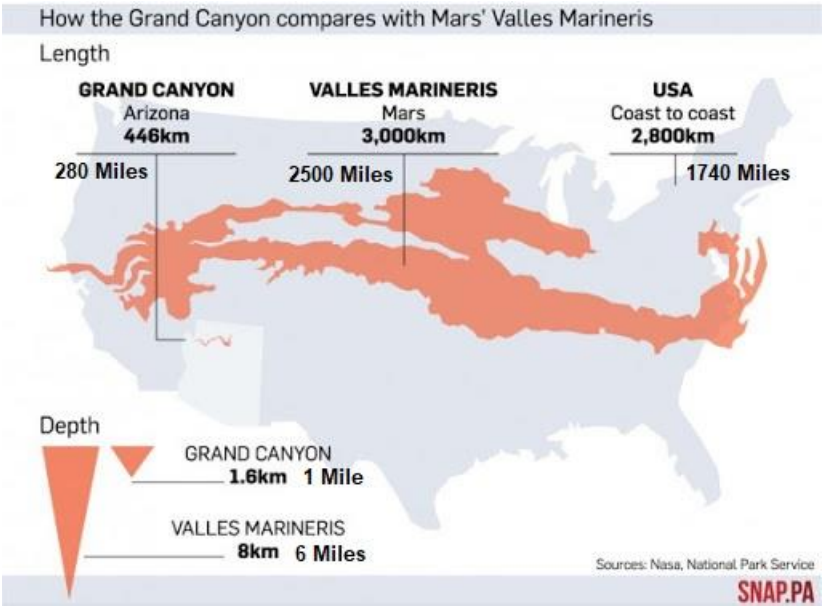
- **Mars is the second closest planet to Earth, besides Venus, averaging 225 million miles apart between the furthest and closest points in its orbit. However, between 17-31 Jul 2020, Mars makes its closest approach to Earth. That is the point in Mars' orbit when it is only 35.8 million miles away.**

- **Both Mars and Earth rotate and revolve on an axis. Earth tilts at 23.5 degrees, while Mars tilts slightly more at 25.2 degrees.**
- **Both Earth and Mars have four seasons each. The temperature on Mars can reach a high of about 70 degrees Fahrenheit at noon, at the equator in the summer to a low of about -225 degrees Fahrenheit at the poles.**
- **The length of a day on Earth is 24 hours and slightly longer on Mars at 24 hours, 37 minutes. A year is 365 days on Earth, while almost double that at 687 "Earth Days" on Mars.**
- **The atmosphere of Mars is 95 percent carbon dioxide and .13 percent oxygen and other gases. Earth's atmosphere is more dynamic and composed of 78 percent nitrogen and 21 percent oxygen and other gases.**
- **The surface of Earth has landforms including the sea and land with mountains, valleys, craters, and volcanoes. Mars also has valleys, craters, and volcanoes, but doesn't have the water Earth does.**
- **Mars and Earth have approximately the same landmass. Even though Mars has only 15% of the Earth's volume and just over 10% of the Earth's mass, around two thirds of the Earth's surface is covered in water.**
- **Mar's surface gravity is only 37% of the Earth's (meaning you could leap nearly three times higher on Mars).**

Mars is home to the tallest mountain in the solar system
Olympus Mons is a very large shield volcano that has a height of nearly 13.6 miles or 72,000 feet as measured by the Mars Orbiter Laser Altimeter. Olympus Mons is about two and a half times Mount Everest's height (29,029 feet) above sea level.

Mars is also home to the deepest, longest valley in the solar system

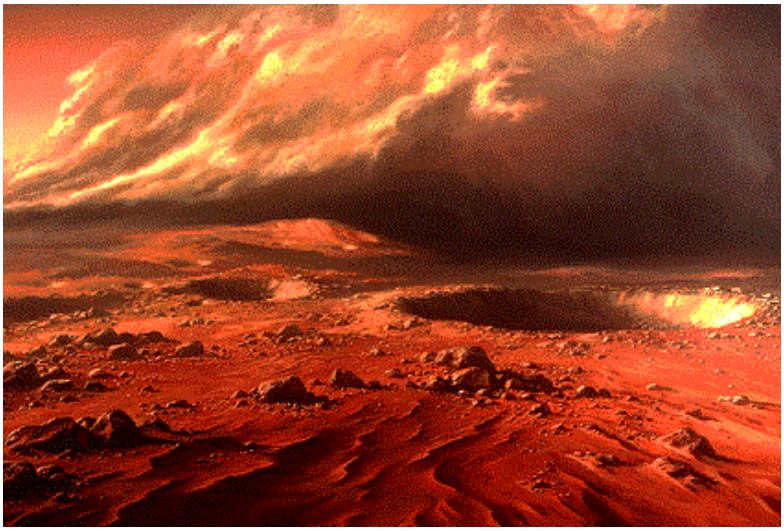
Valles Marineris system of valleys — named after the Mariner 9 probe that discovered it in 1971 — reaches as deep as 6 miles and runs east-west for roughly 2,500 miles, about one-fifth of the distance around Mars and close to the width of Australia.



Valles Marineris Valleys

Mars has the largest dust storms in the solar system

During the summer, dust storms can cover the entire planet. The seasons are extreme because its elliptical (oval-shaped) orbital path around the Sun is more elongated than most other planets in the solar system. On Mars, the Sun appears about half the size as it does on Earth.



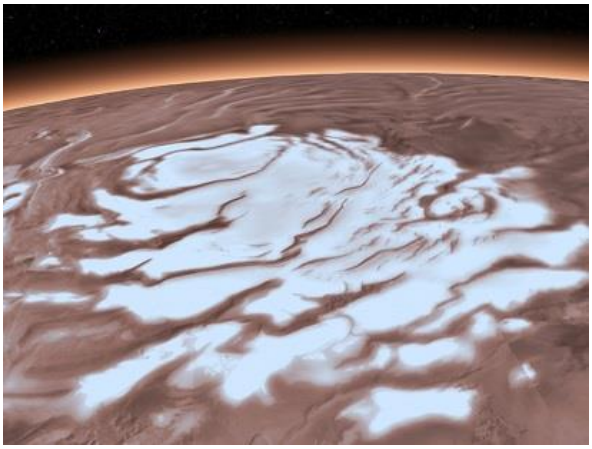
Mars Dust Storm

The number of craters on Mars varies dramatically from place to place, depending on how old the surface is. Much of the surface of the southern hemisphere is extremely old, and so has many craters — including the planet's largest, 1,400-mile-wide Hellas Planitia — while that of northern hemisphere is younger and so has fewer craters. Some volcanoes also have a few craters, which suggests they erupted recently, with the resulting lava covering up any old craters. Some craters have unusual-looking deposits of debris around them resembling solidified mudflows, potentially indicating that the impactor hit underground water or ice.

Hellas Planitia Basin Crater

Mars Polar Caps

Vast deposits of what appear to be finely layered stacks of water ice and dust extend from the poles to latitudes of about 80 degrees in both hemispheres. These were probably deposited by the atmosphere over long spans of time. On top of much of these layered deposits in both hemispheres are caps of water ice that remain frozen year-round.

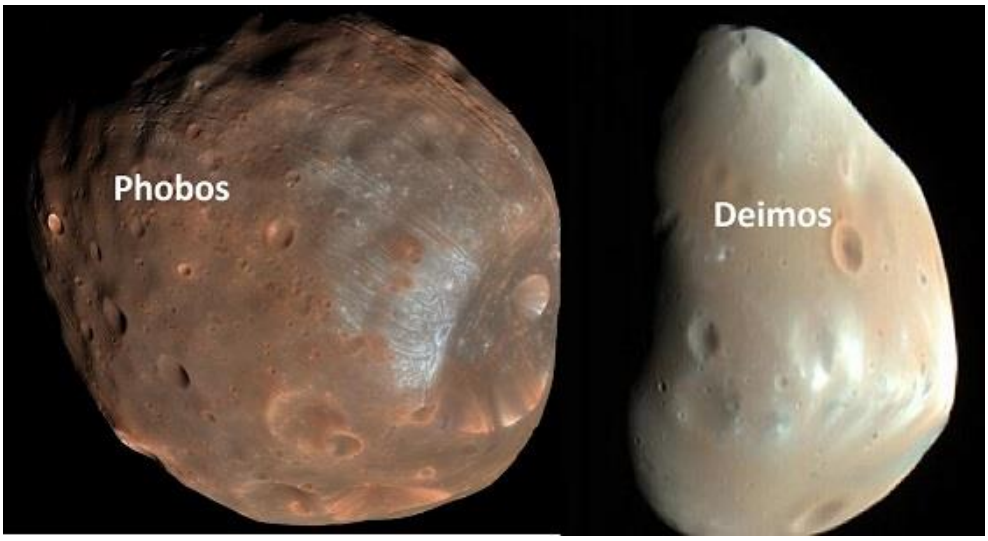


Mars South Pole Ice Cap

Additional seasonal caps of frost appear in the wintertime. These are made of solid carbon dioxide, also known as "dry ice," which has condensed from carbon dioxide gas in the atmosphere. In the deepest part of the winter, this frost can extend from the poles to latitudes as low as 45 degrees, or halfway to the equator. The dry ice layer appears to have a fluffy texture, like freshly fallen snow.

Mars Moons

Mars' moons are among the smallest in the solar system. Phobos is a bit larger than Deimos, and orbits only 3,700 miles above the Martian surface. No known moon orbits closer to its planet. It whips around Mars three times a day, while the more distant Deimos takes 30 hours for each orbit. Phobos is gradually spiraling inward, drawing about six feet closer to the planet each century. Within 50 million years, it will either crash into Mars or break up and form a ring around the planet.



Mars Moons

Mars Would Kill Unprotected People Quickly

There are a lot of unpleasant scenarios for somebody who took off their helmet. First, Mars is usually pretty cold; its average temperature is -80 degrees Fahrenheit at the mid-latitudes. Second, it has practically no atmosphere. The air pressure on Mars is only 1% of what we have (on average) on the Earth's surface. And third, even if it did have atmosphere, the composition is not compatible with the nitrogen-oxygen mix humans require. Specifically, Mars has about 95% carbon dioxide, 3% nitrogen, 1.6% argon and a few other elements in its atmosphere. Yes, you would die in a few minutes!

NASA concept for first Humans on Mars with a Habitat and Rover

So, do you want to sign up for the first human SpaceX mission to Mars in 2024? If so, you need to take a lot of books and magazines along for the 7 months 100+ million-mile trip. This might help take your mind off the fact that most missions to Mars fail. Your body may end up floating around in space for all eternity. But, just in case you do make it to the surface of Mars, don't forget your coat because it is very cold up there!

MARS is an interesting planet. Hope you learned some things. I did!

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