St Aiden's Homeschool

Our Solar System

Mars

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Mars

How big is the planet?

Mars is the second smallest of the eight major planets in the Solar System. Only Mercury is smaller. It is nearly 7,000 kilometres (km) wide; just over half the width of the Earth. Its volume is about 15% of the Earth. Since a lot of the Earth is covered by water, the total surface area of the Mars is nearly as large as all of the land on the Earth. It is possible that its size may eventually prevent human colonies.

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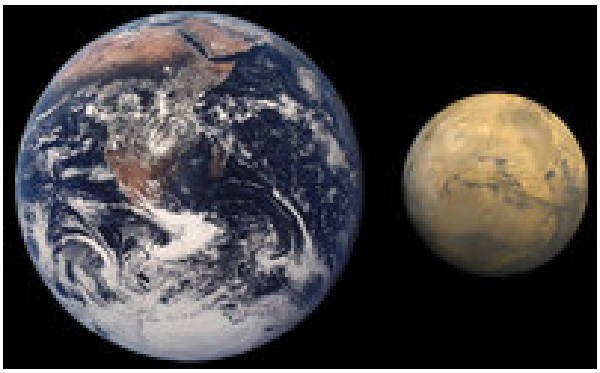
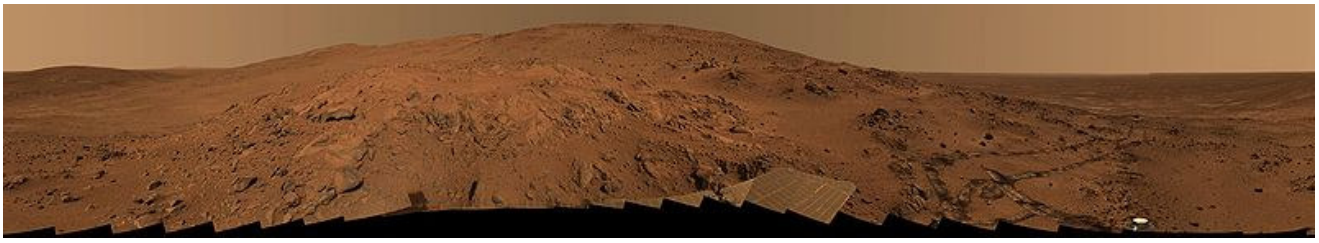
Comparison of the size of Mars and the Earth

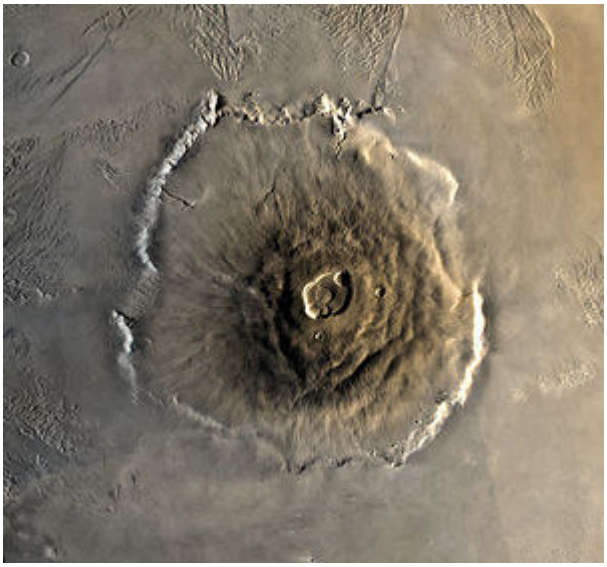


What is its surface like?



A panorama view from the Mars rover Spirit.

The surface of Mars is a lot like a desert on Earth; it is very dry and dusty, but it is also very cold. There are a lot of loose rocks and dunes of fine sand. Crater impacts mark the surface, but these are not as common as on the Moon. One of the craters is the huge *Hellas Planitia*. It is about half the size of the continental United States. The southern half of the planet has more craters than in the north. The south is also higher in elevation.



An overhead view of Olympus Mons, the highest mountain in the Solar System.

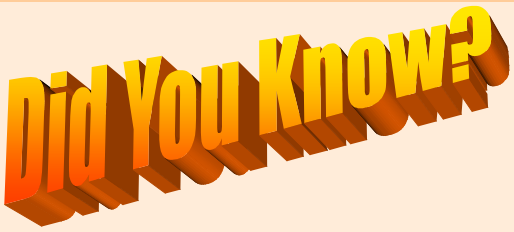
There is an area on Mars called the *Tharsis Bulge*, which has four huge volcanoes. These volcanoes have not erupted for millions of years. The largest volcano is called Olympus Mons. It is 27 km tall, making it the highest mountain in the Solar System; *much* higher than Mount Everest on Earth. It is 625 km across and takes up an area as big as the US state of Arizona. Mars also has a huge canyon called the *Valles Marineris*. It is much bigger than the Grand Canyon on Earth. It is 4000 km long, up to 7 km deep and up to 200 km wide. Scientists think that when the *Tharsis Bulge* was created, the surface of Mars cracked to form the *Valles Marineris*.

Like the Earth, Mars has ice caps at its poles. They are made from ice and frozen carbon dioxide. During the Martian winter, the southern cap grows as carbon dioxide from the atmosphere freezes. The cap shrinks again during the Martian summer.

In some places, there are dry *channels* that look like they were made by running water. So, a long time ago Mars may have had lakes and streams made of water. Now all of the water is frozen into ice under the surface.

There is an atmosphere on Mars, but it is very thin. There is also much more carbon dioxide in it than oxygen. (Oxygen is the gas we want when we breathe in; carbon dioxide the gas we get rid of when we breathe out.) So, we would need spacesuits to visit Mars. The atmosphere helps protect the surface from smaller meteorites.

When Mars comes closest to the Sun, the atmosphere can stir up storms of dust. Some of these storms are gigantic; they can cover the entire planet in clouds of dust. Dust storms on Mars can last for hundreds of days and reach wind speeds of 200 kilometres per hour. Huge storms like these have been seen from the Earth through telescopes.



Some of the meteorites found on Earth are actually pieces of the planet Mars. As of June 2006, thirty-four "Martian meteorites" have been found.

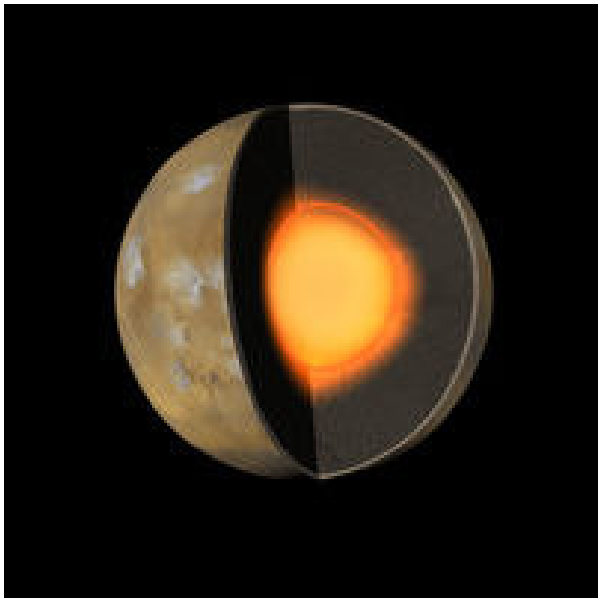
How long is a day and year on this planet?

One day on Earth is only 39 minutes and 35 seconds shorter than a day on Mars (1.026 Earth days). A year on Mars is almost two Earth years long (687 Earth days).

Much like the Earth, the axis of rotation of Mars is tilted at an angle. This tilt causes seasons on Mars as it travels around the Sun. Summer occurs on the half of the planet that is tilted toward the Sun, and winter on the other half. After half a Martian year has passed the seasons are reversed. But these seasons are about twice as long as on Earth.

What is it made of?

The outer, rocky surface of Mars is called the crust. Most of the crust is made from basalt, a type of rock made when lava grows cold.

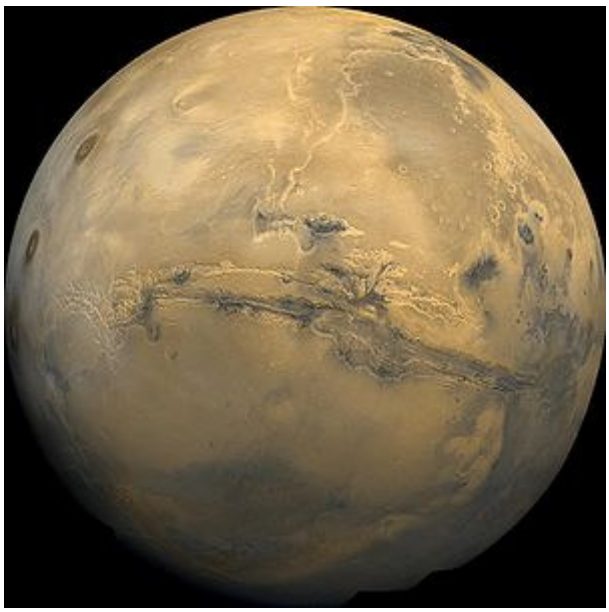


Like the Earth, Mars has a thick layer of rock below the crust called the mantle. The mantle is much hotter than the crust, and the mantle rock is partly molten. But the crust on Mars has grown thick, so the lava from the mantle no longer reaches the surface. There are volcanoes on Mars, but they are no longer active.

At the centre of Mars is a core made of the metals iron and nickel. If Mars were the same size as the Earth, the core of Mars would be smaller then the Earth's core. So a larger amount of Mars is made out of rock. Because rock is lighter than the metals in the core, Mars has a lower density than the Earth.

How heavy would I be on Mars?

Detailed picture of Mars



If you were on Mars, you would be lighter, as Mars' gravity only has a force about two fifths as strong as the that of Earth's. You could lift objects that weigh almost three times as much compared to similar objects here on the Earth. You could jump up almost three times higher, and it would take much longer to fall to the ground from the same height.

Even though it looks as though you would be like a comic-book hero on Mars, there are some things you couldn't do. Although a big rock would *weigh* less and you could pick it up, it would still have the same *mass*. If you tried to catch it, it would knock you over, and if it landed on you it would crush you. A car on the surface of Mars would need the same amount of power to speed up, although going uphill would be less of a problem. It may, however, need more room to stop. Because of the reduced gravity a vehicle would not "grip" the ground on Mars as strongly, but the constant mass would keep the vehicle moving just as strongly, making it easy to go into a skid.

Who was it named after?

In Roman mythology, Mars was the god of war and agriculture. The planet Mars was named this because Mars is red like blood.

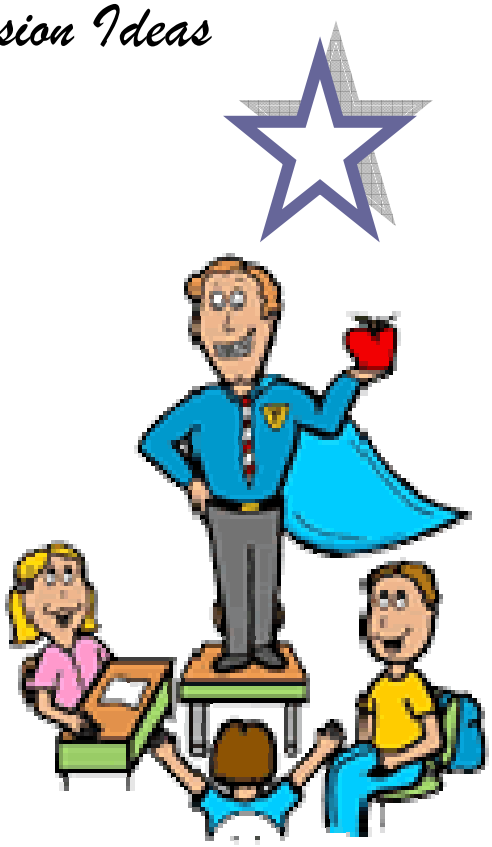
Mars : Fast Facts

The temperature on Mars can be very, very cold. On its warmest day, Mars can still be a very cold place. At the top and bottom of the planet are poles just like on Earth. During the Martian winter, ice caps can be seen at the poles.

Space probes have landed on Mars. These probes were sent on a fact-finding mission by the United States. They performed experiments on the Martian dirt and atmosphere. The dirt was found to contain clay which was rich in iron. The iron is what gives Mars its red colour.

Mars has many craters which were formed by meteorites or asteroids hitting it. Mars also has some of the tallest volcanoes and some of the deepest valleys in our solar system. Mars has two moons, Phobos and Deimos which have unusual shapes. Scientists think these potato-shaped moons were once asteroids captured by Mars' gravitational pull .

Parent/Teacher Discussion Ideas



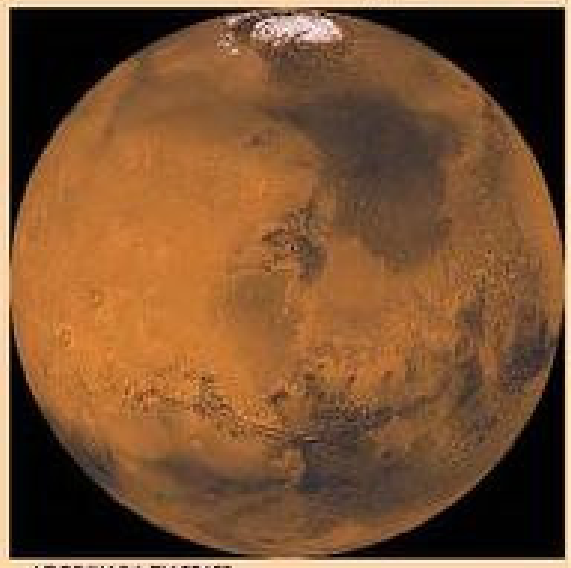
Before space exploration, Mars was considered the best candidate for harboring extraterrestrial life. Astronomers thought they saw straight lines crisscrossing its surface. This led to the popular belief that irrigation canals on the planet had been constructed by intelligent beings. In 1938, when Orson Welles broadcasted a radio drama based on the science fiction classic *War of the Worlds* by H.G. Wells, enough people believed in the tale of invading Martians to cause a near panic.

Another reason for scientists to expect life on Mars had to do with the apparent seasonal color changes on the planet's surface. This phenomenon led to speculation that conditions might support a bloom of Martian vegetation during the warmer months and cause plant life to become dormant during colder periods.

Fact Sheet

Mars

Fourth planet from the Sun



LBCS/NASA PIA00407

Mars was named by the Romans for their god of war because of its red, bloodlike color.

Mars was once much warmer and wetter than it is today. Mars has the largest known volcano in the solar system (Olympus Mons), and the largest known canyon in the solar system (Valles Marineris).

Mars is visible to the naked eye without the aid of a telescope; its motion against the field of background stars shows it to be a planet. The word "planet" is derived from a Greek word for "wanderer."

Orbit
1.52 astronomical units (AU) from the Sun
Earth is 1 AU from the Sun

Length of year
687.0 Earth days = 1.88 Earth years

Length of Day
24.6 Earth hours

Tilt of Rotation Axis
25.2 degrees versus 23.5 degrees for Earth

Size
Diameter: 0.53 of Earth's diameter

Surface Gravity
0.38 of Earth's gravity
If you weigh 80 pounds on Earth, you would only weigh about 30 pounds on Mars!

Mass
0.11 of Earth's mass

Surface Temperature
Mean temperature: -85 degrees Fahrenheit
Temperature extremes: -190°F (night) to 75°F (day)

Atmosphere
Mars' atmosphere is very thin, with a surface pressure about 1/200th of Earth's.
Primary components: 95% carbon dioxide, 3% nitrogen, 1.5% argon, ~.03% water (varies with season) and no oxygen. *(By comparison, Earth has 78% nitrogen, 21% oxygen, 1% argon, .03% carbon dioxide.)*

The rust colored dust on Mars makes the sky look pink. Planet-wide dust storms can black out the sky.

Surface
The surface of Mars is colored rust and red; some of the rocks are darker basalt. There are channel formations on the surface, but no surface water is possible today due to the low atmospheric pressure; it would boil off into space.

Moons
Number of Moons: 2
Phobos, 13 miles in diameter
Deimos, 7.5 miles in diameter

Past Missions
The first American spacecraft to visit Mars was Mariner 4 (flyby, 1965). Subsequent successful missions included Mariner 6 and 7 (flybys, 1969), Mariner 9 (entered Mars orbit on November 13, 1971) and the two Viking landers in 1976. Ending a long 20 year hiatus, Mars Pathfinder landed successfully on Mars on July 4, 1997.

Successful Russian missions to Mars include Mars-2 (orbiter, 1971), Mars-3 (orbiter, 1971), Mars-5 (orbiter, 1973), and Mars-6 (1973, landed capsule).

Current Missions
September 2005: The Hubble Space Telescope continues to observe Mars. At present orbiters include NASA's Mars Global Surveyor and 2001 Mars Odyssey, and the European Space Agency's Mars Express. The 2004 Mars Expedition Rovers *Spirit* and *Opportunity* landed on Mars and continue to send back geologic data and images.

NASA's Mars Reconnaissance Orbiter, launched in August 2005, will begin its active mission in November 2006, searching for evidence that water persisted on the surface of Mars for a long period of time and mapping potential landing sites for future missions.

9/19/2005

Student Activity ~ Mars

Describe Mars.

How big is it?

What is its surface like?

Why is there no life on Mars?

How many Moons does Mars have?

How long is a day and a year on this planet?

What is Mars made of?

How much would Mars' gravity pull on me?

Who is Mars named after?

Discuss important dates concerning Mars. Refer to the handout on the previous pages.