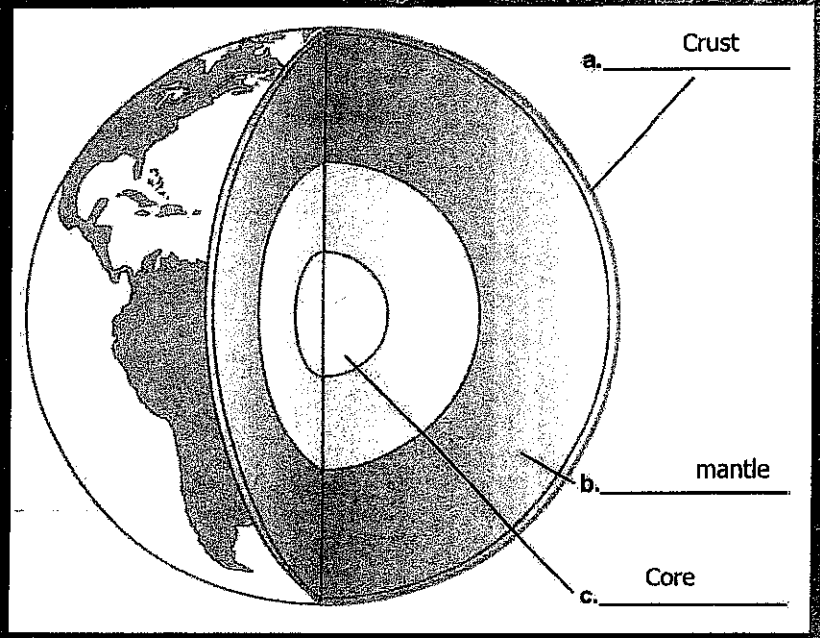
The Inner Planets

- The inner planets are called the **terrestrial planets**
- The inner planets are more like one another than they are like the outer planets. For example, the inner planets all have rocky surfaces.

Earth

- **Earth is unique in our solar system in having liquid water at its surface.**
- Earth has three main layers. The surface layer is the crust. Below the crust is the mantle. At Earth's center is the core.

- Most of Earth's surface—about 70 percent—is covered with water. Earth is the only planet with liquid water on its surface.
- Earth's gravity holds onto most gases. The gases around Earth make up Earth's atmosphere.



Inner Planets

Essential Questions

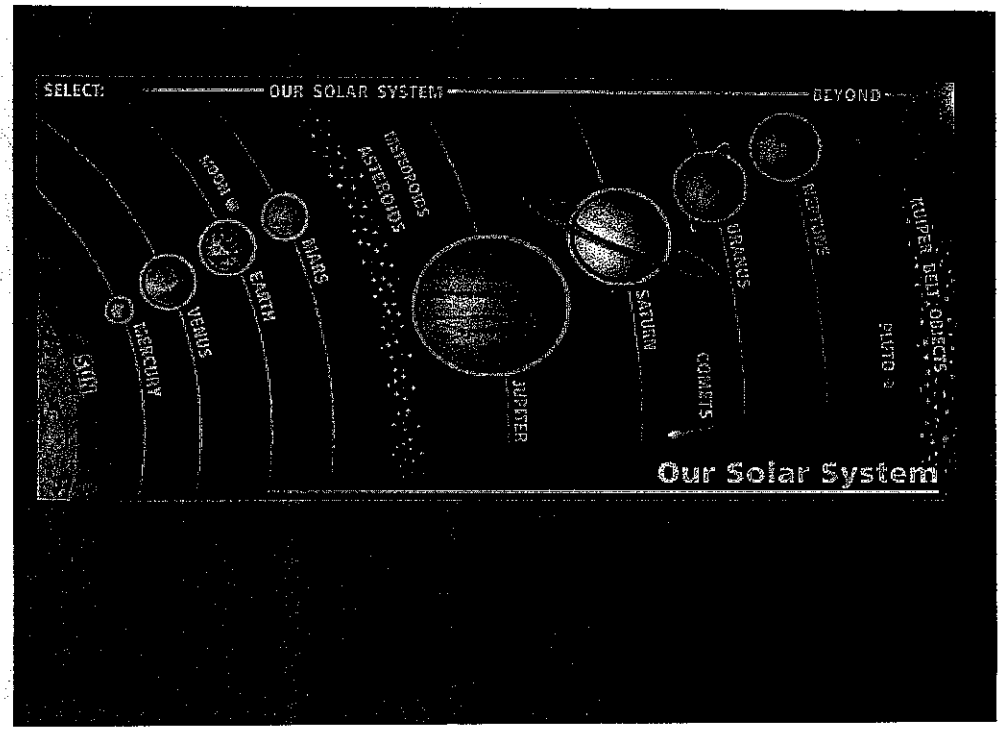
1. What characteristics do the inner planets have in common?

2. What are the main characteristics that distinguish each of the inner planets?

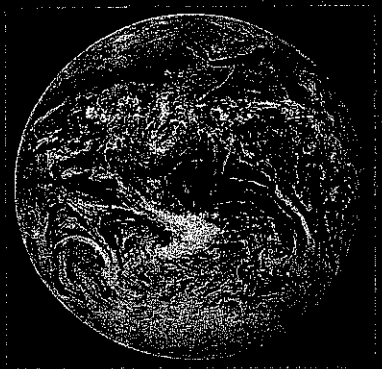
The Inner Planets

The four inner planets are small and dense and have rocky surfaces.

The four planets closest to the sun are called the inner planets. The four inner planets are Mercury, Venus, Earth, and Mars.



Earth



Earth's atmosphere contains 78% nitrogen, 21% oxygen, and less than 1% Carbon dioxide, argon and methane. The reflection of the ocean causes the sky to be blue.
Earth is the only planet that contains vegetation and signs of life.
75% of Earth is covered with water.

Planet Facts:

- **Solar Distance** Earth is 149,600,000 km from the Sun.
- **Revolution Period** 365.2 5days
- **Rotation Period** 23.9 hours
- **Equatorial Diameter** 12,756
- **Gravitational Pull** .98 (your current weight)
- **Satellites** The Moon

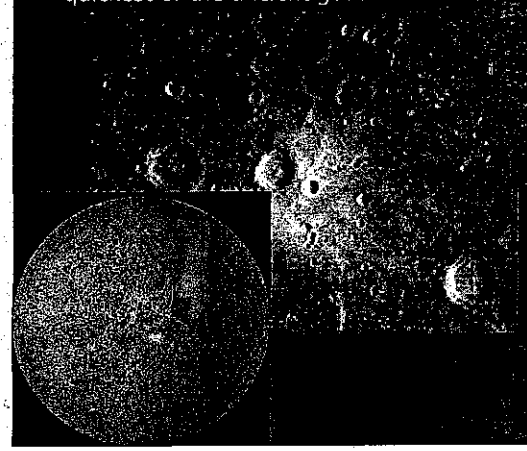
Mercury

- **Mercury is the smallest terrestrial planet and the planet closest to the sun.**
- Mercury is the closest planet to the sun. Mercury is the smallest of the inner planets. It is not much larger than Earth's moon.

- Mercury has almost no atmosphere because it has very weak gravity.
- Mercury has extreme temperatures on its surface. It is very hot during the day and very cold at night.

Mercury

Mercury is the closest planet to our Sun.
It is named for the ancient Roman god of trade and profit.
Legend says Mercury's winged sandals gave him super speed.
Mercury the planet is super fast, too. It zips around the Sun every 88 days, faster than any other planet. No wonder it got its name from the quickest of the ancient gods.



Mercury's surface is similar to that of Earth's moon, with a history of heavy cratering followed by volcanic filling.

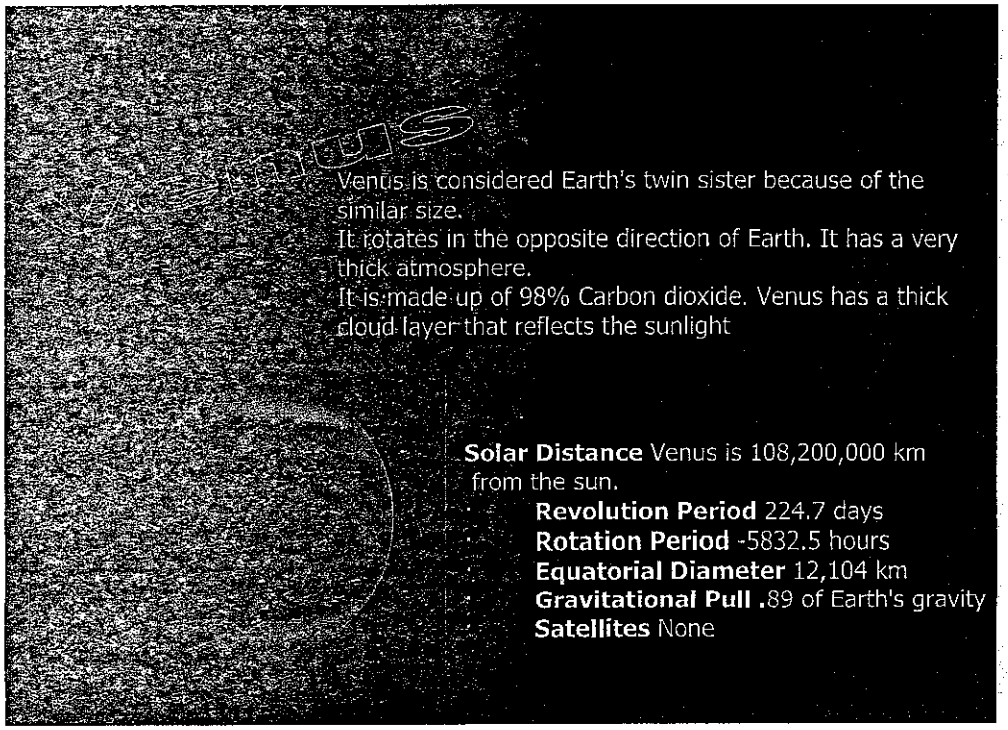
The atmosphere of Mercury is very thin and allows lots of heat during the day.

It cools down quickly at night.
Mercury is covered by craters.
The largest of a crater is called the Calonis Basin.

Venus

- **Venus's density and internal structure are similar to Earth's. But, in other ways, Venus and Earth are very different.**
- Venus is very much like Earth in size and mass.

- Venus's atmosphere is very thick. It is always cloudy on Venus.
- Venus has the hottest surface of any planet. Venus's atmosphere traps the sun's heat. The trapping of heat by the atmosphere is called the **greenhouse effect**.



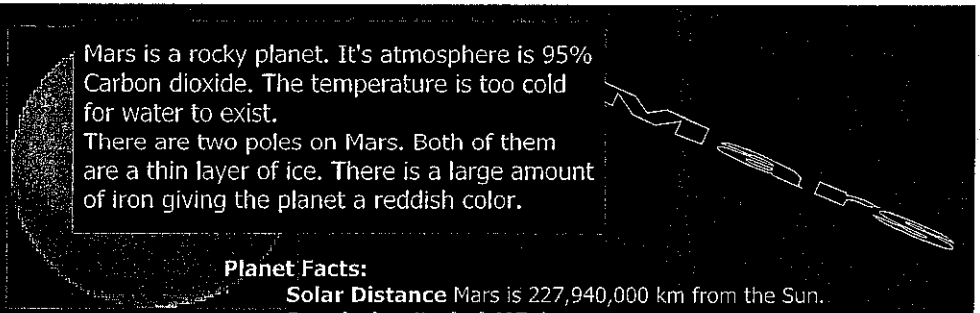
Mars

- **Scientists think that a large amount of liquid water flowed on Mars's surface in the distant past.**
- Mars is called the "red planet" because it looks red from Earth.

- The surface of Mars has huge canyons and ancient coastlines. Scientists think that liquid water may have formed these features. There is no liquid water on Mars's surface now.
- Mars has two very small moons. They are called Phobos and Deimos.
- Many space probes have been sent to Mars.

Life on Mars?

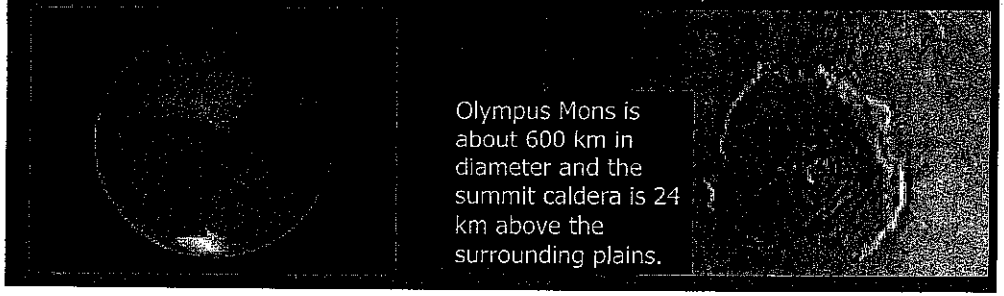
- Scientists found no sign of life on Mars.
- There is a possibility life once existed since frozen water can be found in the northern icecap. The southern icecap has frozen carbon dioxide.
- Since the atmosphere is so thin, Mars temperature always stays below 0 degrees C.



Mars is a rocky planet. It's atmosphere is 95% Carbon dioxide. The temperature is too cold for water to exist.
There are two poles on Mars. Both of them are a thin layer of ice. There is a large amount of iron giving the planet a reddish color.

Planet Facts:

- **Solar Distance** Mars is 227,940,000 km from the Sun.
- **Revolution Period** 687 days
- **Rotation Period** 24.6 hours
- **Equatorial Diameter** 6794 km
- **Gravitational Pull** .37 of Earth's gravity
- **Satellites** Mars has 2 satellites and they are Phobos and Deimos



Olympus Mons is about 600 km in diameter and the summit caldera is 24 km above the surrounding plains.

Essential Questions

1. What characteristics do the inner planets have in common?

Small and dense; have rocky surfaces

2. What are the main characteristics that distinguish each of the inner planets?

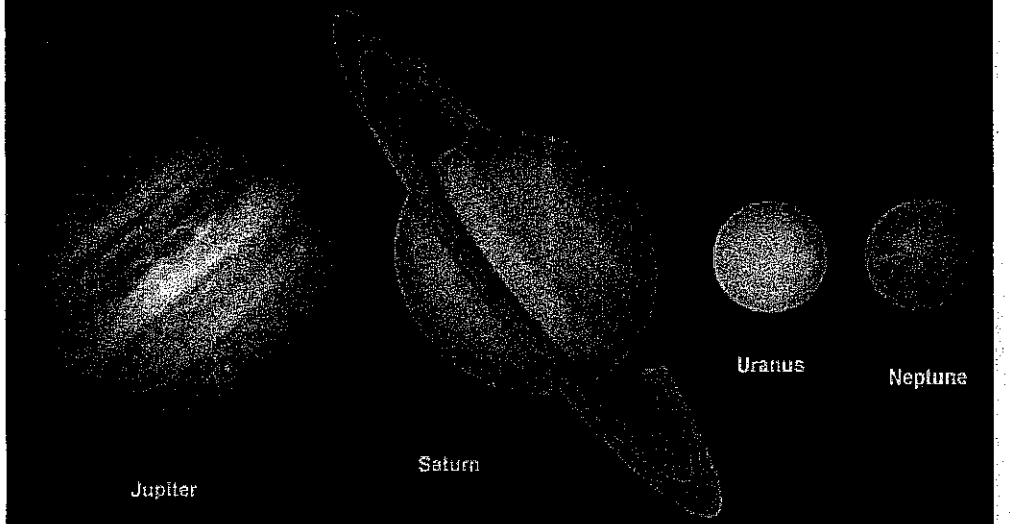
Mercury- smallest and closest to the sun; no moons of its own

Venus – similar to Earth in its structure; rotates from east to west; atmospheric pressure is 90 times greater than Earth

Earth- only one with liquid water and life; rich in oxygen

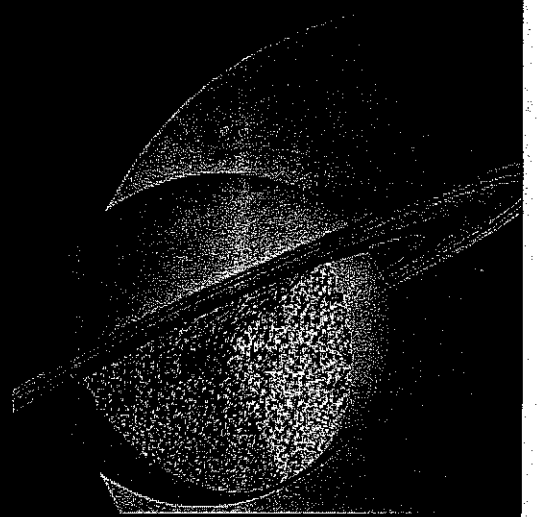
Mars- called the red planet because it's covered in red dust; atmosphere is mostly carbon dioxide

THE OUTER PLANETS

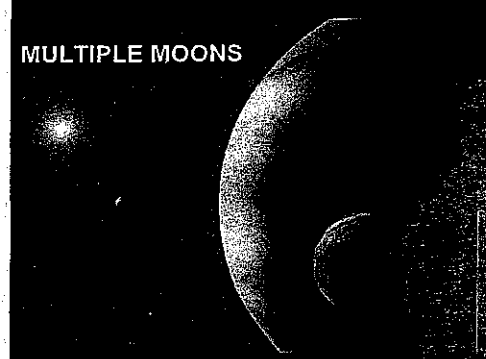


- The first four outer planets- Jupiter, Saturn, Uranus, and Neptune- are much larger and more massive than Earth, and they do not have solid surfaces. Because these planets are so large, they are often called "gas giants."

- Like the sun, the gas giants are composed mainly of hydrogen and helium. Because they are so massive, the gas giants exert a much stronger gravitational force than the terrestrial planets. These planets have thick atmospheres because gravity keeps these gases from escaping into space.



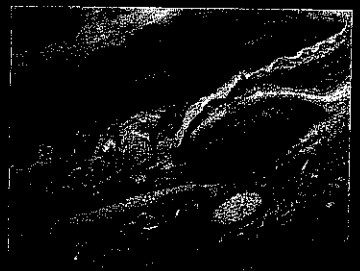
- All of the gas giants have many moons and are surrounded by a set of rings. A ring is a thin disc of small particles of ice and rock.

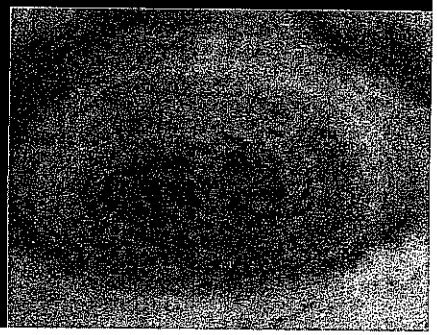


JUPITER

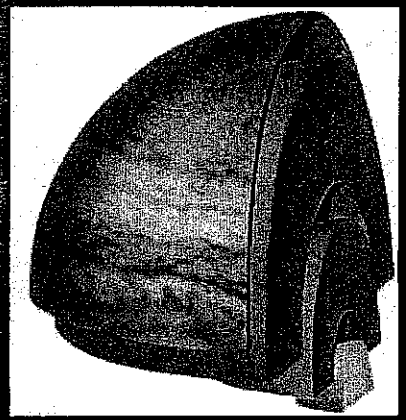
- Jupiter is the largest and most massive planet.

- Jupiter has a thick atmosphere made up mainly of hydrogen and helium. A well known feature on Jupiter's surface is its great red spot, a storm that is larger than Earth! Similar to a hurricane on Earth, Jupiter's storm has swirling winds that blow up to hundreds of kilometers per hour. On Earth, hurricanes usually weaken as they pass over land. Jupiter has no land to weaken the storm.

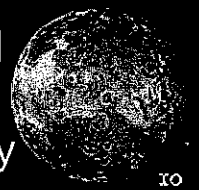


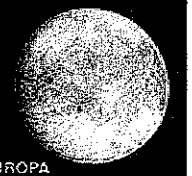


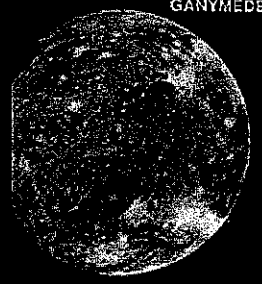
- Astronomers think that Jupiter has a dense core of rock and iron at its center. A thick mantle of liquid hydrogen and helium surrounds this core.

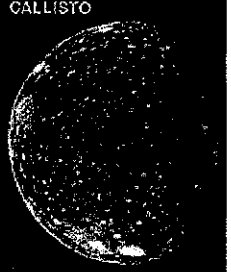


- Jupiter has four large moons- Io, Europa, Ganymede, and Callisto. They are all larger than Earth's moon, but are all very different from each other. Jupiter also has dozens of small moons that have been discovered in the past few years.



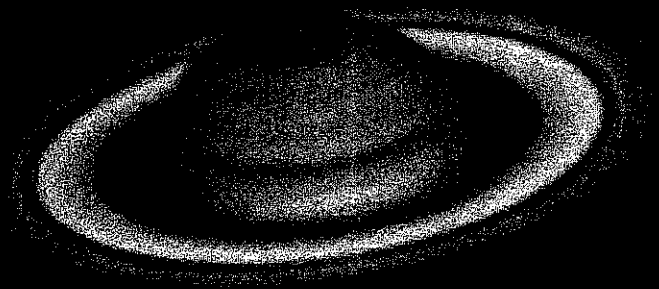




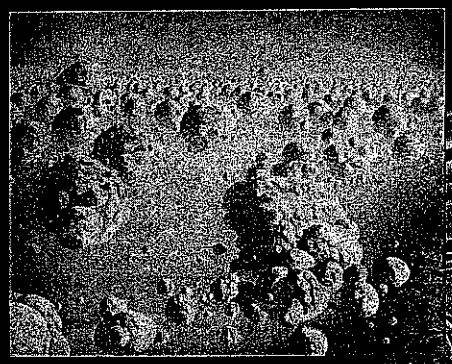


SATURN

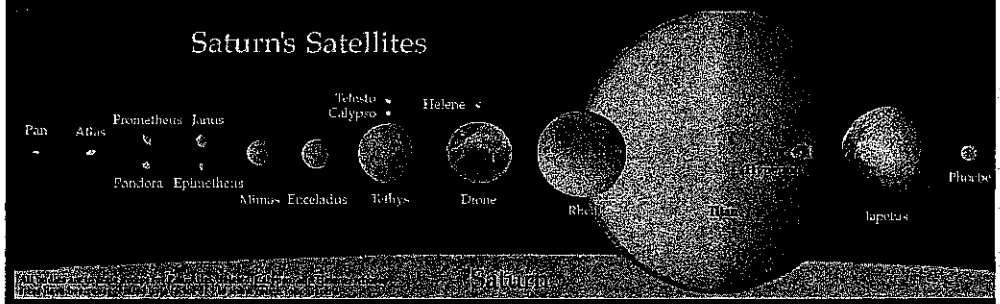
- Saturn is the second largest planet in the solar system. Like Jupiter, Saturn has a thick atmosphere made of mostly hydrogen and helium. Saturn's atmosphere also contains storms and clouds, but they are not as big as Jupiter's.



- Saturn has rings around it that are made of chunks of ice and rock, each traveling in its own orbit around Saturn. Saturn has the most spectacular rings of any planet. Saturn's rings are broad and thin, like a CD.



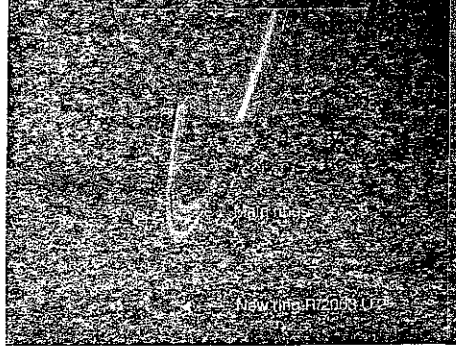
- Saturn's largest moon, Titan, is larger than the planet Mercury. Four other moons of Saturn are each over 1000 kilometers in diameter!



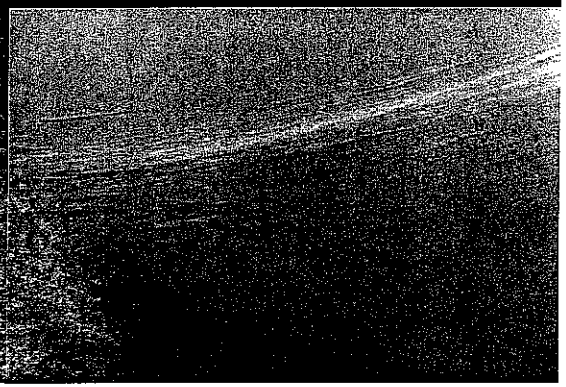
URANUS

- Uranus is about 4 times the diameter of Earth, but is still much smaller than Jupiter and Saturn. Uranus is a very far from the sun, making it colder than Saturn, and is surrounded by a group of thin, flat rings that are much darker than Saturn's rings.

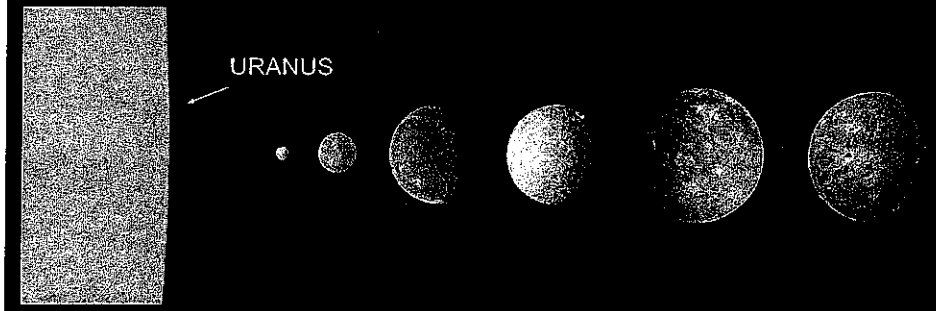
- Uranus has few clouds on its surface and rotates in about 17 hours (Earth rotates every 24 hours). Uranus's axis of rotation is tilted at an angle of about 90 degrees from the vertical (top to bottom rather than side to side).



CLOUDS ON URANUS

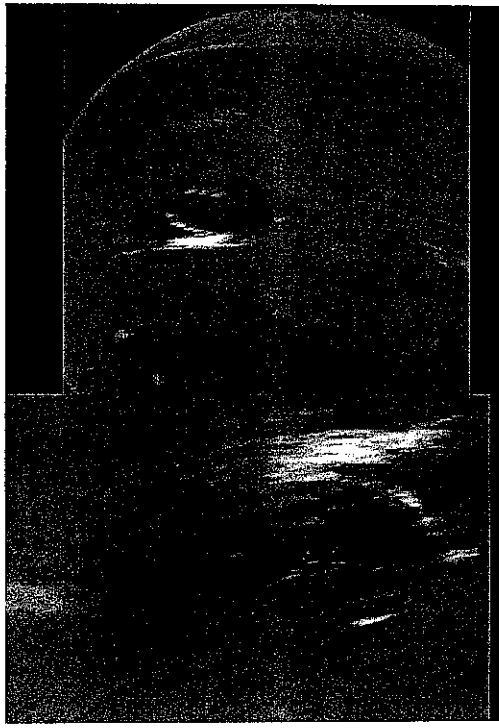


- Uranus's five largest moons have icy, cratered surfaces. They also have lava flows on their surfaces, suggesting that material has erupted from inside each moon at some time. Astronomers have recently discovered more moons around Uranus, for a total of at least 27.



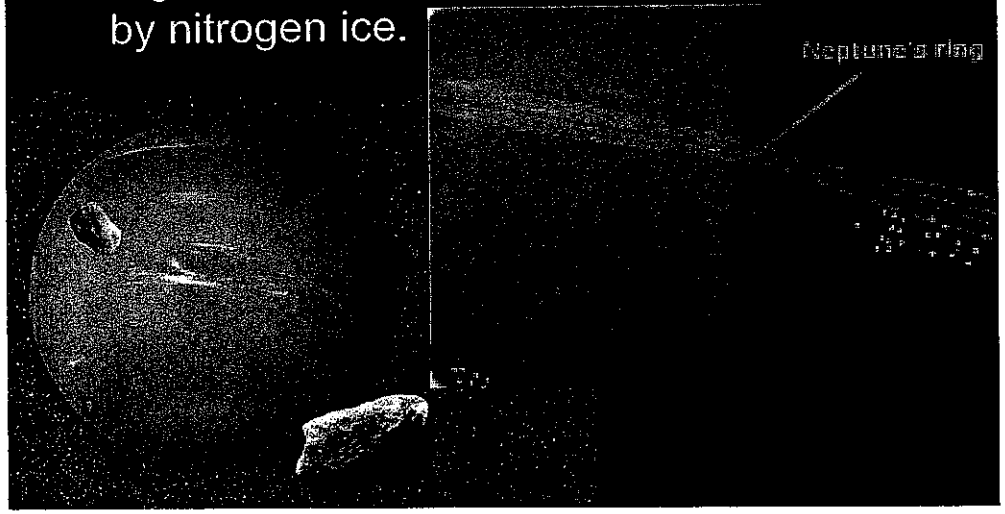
NEPTUNE

- Neptune is a cold, blue planet. Its atmosphere contains visible clouds. Scientists think that Neptune is slowly shrinking, causing the interior to heat up. As this energy rises to Neptune's surface, it produces clouds and storms in the planet's atmosphere.



- Like Jupiter's giant red spot, Neptune also had a great dark spot at one time. The great dark spot was probably a storm; however the storm did not last very long. Since then, other small spots and regions of clouds on Neptune also seem to come and go.

- Astronomers have discovered at least 13 moons orbiting Neptune. The largest moon, Triton, has a thin atmosphere. A region near Triton's south pole is covered by nitrogen ice.



The Inner Planets

★ The Inner Planets are:

1.
2.
3.
4.

★ They are the _____ planets to the sun.

★ Astronomers call them the " _____ planets" because they have solid, _____ surfaces.

★ The Inner Planets are very _____. More dense than the outer planets.

★ Each of the four inner planets has many surface _____.

The Outer Planets

★ The Outer Planets are:

1.
2.
3.
4.

★ They are the _____ planets from the sun.

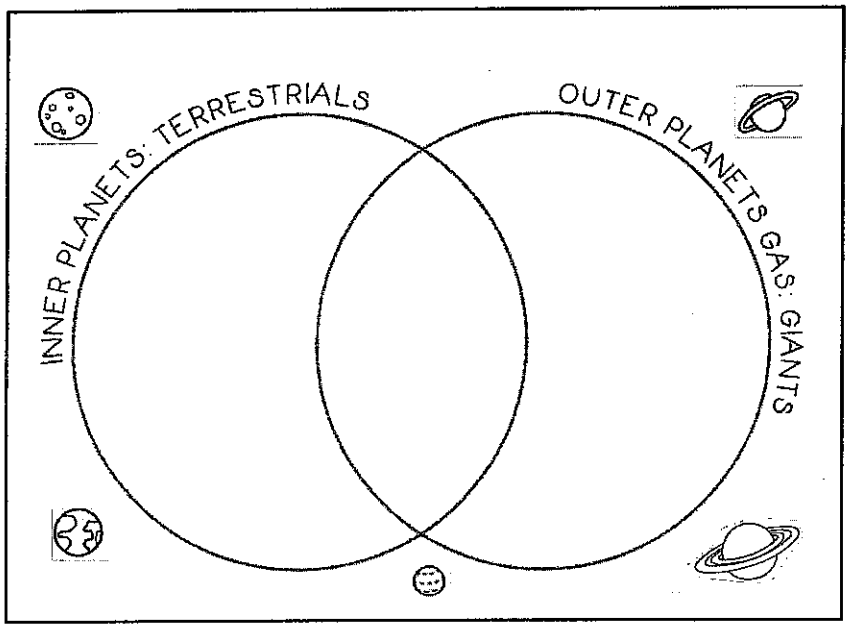
★ The Outer Planets are also called "____ _____" because they, are made primarily of gases and liquids.

★ They are much _____ than the Inner Planets.

★ Since the Outer Planets are farther from the sun, the gravitational pull from the sun is _____ .

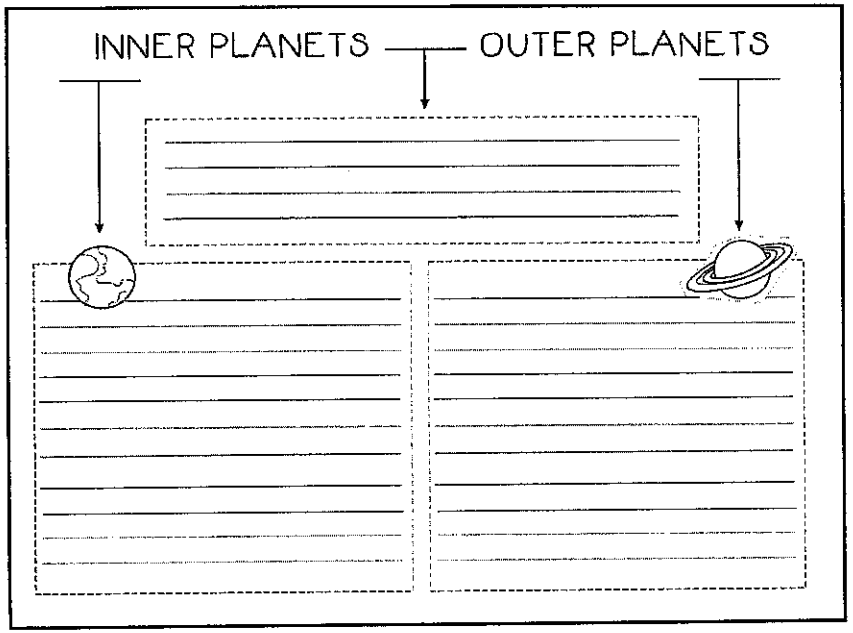
★ It takes these planets _____ to orbit the sun.

VENN DIAGRAM AND SUMMARY OF INNER + OUTER PLANETS



Activity 1:

Identify the differences and similarities of inner and outer planets using the Venn Diagram. (With answer key)

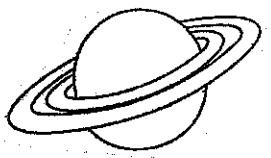


Activity 2:

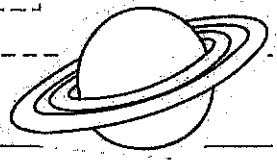
Write a short summary describing terrestrial planets vs. gas giants.

INNER PLANETS: TERRESTRIALS

OUTER PLANETS GAS: GIANTS



INNER PLANETS — OUTER PLANETS



POSSIBLE ANSWERS