

In February of 1930 it was believed a ninth planet in our solar system was discovered. This so called planet became Pluto and due to many factors Pluto became classified as a dwarf planet in the year 2006. As you continue reading you will become familiar with Pluto's physical characteristics, orbit and the rule which declared it to be unsuitable to be a planet.

Pluto compared to our own Earth is relatively small. Pluto has a radius that is .18 of Earth's. The surface area is 0.033 of Earth's and a volume of 0.0059 of Earth's. The chart below gives a broader comparison of Pluto and Earth.

	Radius (km)	Surface Area (km ²)	Volume (km ³)	Mass (kg)	Density (g/cm ³)	Gravity (m/s ²)	Temperature (K)
EARTH	6371	5.1x10 ⁹	1x10 ¹²	6x10 ²⁷	5.5	9.81	287
PLUTO	1161	1.7x10 ⁷	6.4x10 ⁹	1.3x10 ²²	2.03	0.658	44

Figure 1: Physical Characteristic comparison of Earth and Pluto

In depth characteristics of Pluto is hard to compile due to the large distance between the Earth and the dwarf planet which is about thirty-eight (38) astronomical units. However, through spectroscopic analysis it is known that Pluto's surface is a high percentage (98%) of nitrogen ice as for the other composition it is methane and carbon monoxide. The outer layer of Pluto being composed mostly of frozen nitrogen brings us to the mantle. The mantle of Pluto is believed to be water ice and the core composed of rock. The dwarf planet's density of approximately 2 g/cm³ is what leads to this theoretical structure.

Pluto's atmosphere is thin and consists of nitrogen, methane and carbon monoxide just like its surface. The atmosphere varies with the dwarf planet's distance to the Sun. When Pluto is at its farthest or aphelion the atmosphere drops closer to the surface of the dwarf planet. When at its closest or perihelion the temperature increases enough to convert ice from the surface into

gas. Methane causes a green house gas effect for Pluto making the atmosphere about an average of ten (10) Kelvin higher than the surface.

The orbit of Pluto is different from the eight planets of the solar system. First off the orbit period of the dwarf planet is 248 Earth years which is by far the longest of any of the nine. Pluto is inclined at a high angle placing above the ecliptic plane of the solar system. Another characteristic of its orbit is its eccentricity. At one point in Pluto's orbit it crosses Neptune's orbit therefore being closer to the Sun.

	APHELION (AU)	PERIHELION (AU)
NEPTUNE	30.4	29.7
PLUTO	48.8	29.6

Figure 2: Comparison of Neptune and Pluto's distances from the Sun

Even though the orbits of Neptune and Pluto cross they will never come into contact because of the inclination of Pluto's orbit. The section where they cross Pluto's path is approximately 8 AU above Neptune's orbit.

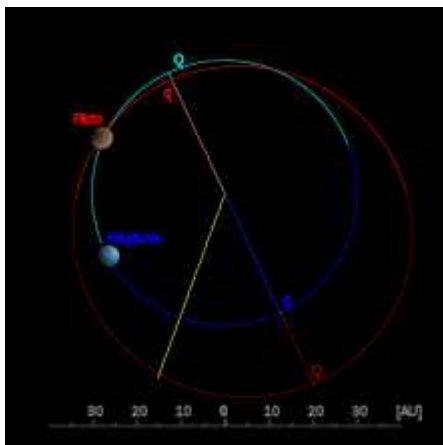


Figure 3: Image of Neptune and Pluto's orbits

Pluto has five moons or satellites. The names of these moons are Charon, Nix, Hydra, S2011 and S2012. The moons of Pluto have a shorter distance between them and their dwarf planet than other satellites do to their planet. Pluto and Charon always have the same face toward each other where ever they are in Pluto's orbit. Charon isn't much smaller than Pluto leading people to call the pair a double dwarf planet.



Figure 4: Diagram of Pluto's satellite system



Figure 5: Computerized view of Charon(left) and Sun(right) from Pluto

The first theory to the origin of Pluto was that it was believed to have been a moon of Neptune's. The thought behind it was that Neptune's other moon Triton knocked Pluto out of Neptune's gravitational pull. However, that theory was scratched after the discovery of the Kuiper Belt that is beyond Pluto. The compositions of the objects in the Kuiper Belt have similarities to that of Pluto. Therefore, leading to the conclusion Pluto steered free of the belt and traveling on an orbit of its own. Pluto is the largest of the Kuiper Belt objects that have been discovered thus far.



Figure 6: View of Pluto's orbit through the Kuiper Belt.

It was the discovery of the Kuiper Belt that brought Pluto's classification as a planet into question. Astronomers weren't sure whether to place Pluto as part of the Kuiper Belt or not. As astronomers began finding objects relatively close in size to Pluto even more people began to question. In 2005 Eris was discovered outside of the Kuiper Belt and is approximately the same size as Pluto. In 2006 the definition of what a planet is became known. The criteria's as followed:

1. The object must be in orbit around the Sun.
2. The object must be massive enough to be a sphere by its own gravitational force. More specifically, its own gravity should pull it into a shape of hydrostatic equilibrium.
3. It must have cleared the neighborhood around its orbit

Pluto satisfies the first two; however, it is not the dominant object in its area. The Kuiper Belt has objects of comparable size to Pluto. The Kuiper Belt is the main factor that keeps Pluto and for similar reasons Eris from being considered our solar systems' ninth and tenth planet respectively.