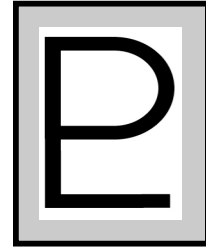


## Station # 9 Pluto

Congratulations - you have arrived at the outer region of our solar system!



*The scale for the Anchorage Light Speed Planet Walk was chosen so that each step you take equals the distance light travels in one second (300,000 km or 186,000 miles).*



Can you mathematically determine how many steps a person would take if they walked the entire distance from the Sun sign downtown to the Pluto sign at Kincaid. Consider that light travels 300,000 km per second, the person takes one step per second, and Pluto is 5900 million km away.

*(Hint: Take the distance in km and divide by the speed in km/second.)*

Rounding your answer to the nearest whole step, approximately how many steps does it take to travel from the Sun model downtown to the Pluto sign here at Kincaid? \_\_\_\_\_



Pluto and Beyond - Read the information on the Pluto and Beyond Pluto signs. In the table below, record information about each of these topics:

Pluto	Kuiper Belt	Oort Cloud	Beyond...



### Pairs Share-Pairs Compare:

- Find a partner and take turns sharing the information that you gathered in the table above. After sharing, decide on 3 pieces of information to share.
- Find another pair and take turns sharing 3 pieces of information with that pair.
- As a group of four, decide on 3 intriguing pieces of information you would like to share with the whole group.



## Pluto Station #9

### Last but Least Last...

- ✓ **Planet** - Pluto is the last planet in the solar system and the last to be discovered.
- ✓ **Relic** – Pluto and its moon, Charon, may be leftover material from the formation of the solar system and may hold secrets about how planets form.
- ✓ **Visited** - Pluto is the only planet that has not been visited by a spacecraft. The New Horizons mission to Pluto and beyond is scheduled for launch in 2006 and will fly by Pluto in 2015.

### Least...

- ✓ **Planet** – At one-sixth the size of Earth, Pluto is smaller than all the other planets and seven of their moons, including ours.
- ✓ **Conventional orbit** – While most planets orbit in the same plane, Pluto's orbit is tilted 17° from this plane. Its orbit is also extremely elongated, causing its distance from the Sun to range between 30 and 50 Astronomical Units (one AU is the distance between the Earth and the Sun). For part of its year, Pluto is actually closer to the Sun than Neptune.
- ✓ **Known** – Little is known about the littlest planet. Astronomers hope the New Horizons mission will solve some of Pluto's mysteries.
- ✓ **Distance between a planet and its moon** - Pluto and Charon, locked together like two spinning dancers, always face each other. Charon never changes position in Pluto's sky and vice versa.

(Pluto information continued on the next page)



## ***Planet or Comet?***

Pluto is composed of rock and ice, unlike the other outer planets. If Pluto were discovered today, we might consider it a giant comet rather than a planet. A thin atmosphere forms as Pluto approaches the Sun, then it condenses to methane and nitrogen "snow" when farther away. This is typical behavior of comets as they approach and recede from the Sun. The International Astronomical Union, however, has voted, and Pluto will keep its status as a planet.

## **Discovering Pluto**

Pluto was the first and only planet to be discovered by an American, Clyde Tombaugh, a 24-year-old lab assistant who was hired by Lowell Observatory to search for "Planet X," a presumed giant planet orbiting beyond Neptune. Tombaugh painstakingly compared images of the sky taken several weeks apart. On February 18, 1930, Tombaugh discovered a tiny object that had changed position between two images. Although it was too small to be "Planet X," it was a new planet. We now know that there never was a "Planet X," and Pluto's discovery was serendipitous!

## **Caption**

These are the discovery images of Pluto, showing the tiny planet's movement against the background of distant stars. Pluto is the only object whose position changes.

## **Pluto, Charon, and the USA**

This image shows the approximate size of Pluto and Charon by overlaying them on a map of the United States. Pluto is 1,400 miles in diameter and Charon is 730.

## **Beyond Pluto**

Congratulations on completing the Anchorage Light Speed Planet Walk! A steady pace from the Sun Station to Pluto should have taken you approximately 5 ½ hours.

However, if you think your tour of the solar system ends here, you are in for a shock. The planets orbit the Sun relatively close in. The farthest planet, Pluto, orbits at a distance of 40 Astronomical Units (one AU is the distance from the Earth to the Sun). Yet, the Sun's influence extends another 100,000 AUs!

(more information on the next page)



## So what's out there?

### **The Kuiper (KYE per) Belt**

Beyond Neptune, and extending 50 AU from the Sun is a disk-shaped belt containing millions of small, icy bodies or comets. The Kuiper belt is the source of short-period comets, those whose orbits are less than 200 years. The largest object in the Kuiper Belt is, in fact, Pluto!

### **The Oort Cloud**

A vast spherical cloud of comets extends to the end of the Sun's gravitational influence, 100,000 AU. This is over half the distance to the nearest star, Alpha Centauri. Long period comets, those whose orbits are greater than 200 years, arise from the Oort Cloud.

**Comet Caption:** Comet Hale-Bopp probably arose from the Oort cloud.

### **Beyond the Beyond**

If you wish to continue your journey beyond the solar system, you'll need to pack some supplies and a few extra pairs of hiking boots. If it took you 5 ½ hours to reach Pluto, it will take you (and a light beam):

4 years	to the next star, Alpha Centauri
27,7000 years	to the center of our galaxy
100,000 years	to cross the length of our galaxy
2,400,000 years	to the nearest galaxy, Andromeda
5,000,000,000 years	to the most distant galaxies seen by the Hubble Space Telescope

### **As far as we can see: The Hubble deep field**

This famous image covers a tiny speck of the sky, but is one of the deepest images ever taken, looking back to when the Universe was only 10% of its current age. Gazing into this small field, Hubble uncovered a bewildering assortment of over 1500 galaxies in various stages of evolution.

