

Escanaba's "Walk of the Planets"

A Scale Model of the Solar System

We live on the Earth, the third planet from the Sun. The distances between the planets are vast: so great that they are hard to imagine without a scale of reference. To help you, **we shrank the Solar System!**

In 18- blocks (1.3 miles) you can walk what took the Voyager probes 20 years to travel. We set the scale of our model by shrinking the Sun to a 1 foot diameter sphere: One foot = 865 thousand miles—the diameter of the Sun. At this scale the Earth we stand on is just a tiny 1/10 inch wide ball, 107 feet away from the Sun.

Station #1: The Sun.



Active Sun, NASA-SDO 2011

At the center of the Solar System sits the Sun, an 865 thousand mile diameter ball of searing hot hydrogen gas. 109 Earths could line up along its equator. The Sun contains 750 times the mass of everything else in the Solar System. Everything revolves around it—planets, moons, asteroids, comets, etc. At its surface the temperature is over 9,900 degrees, Fahrenheit. In its extremely dense core, the Sun burns Hydrogen, fusing 700 million tons of it into Helium *every second* at an astounding 27million degrees F! It has been doing this for about 4.6 billion years, and will continue for perhaps another 5 billion. All our energy comes from the Sun. Its heat drives Earth's water cycle and weather. Without it, we would not exist.

Station #2: Mercury, First Planet.

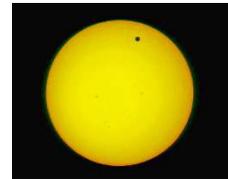


Mercury, Messenger-NASA

The closest planet to the Sun is tiny Mercury. Orbiting just 36 million miles from our Daystar, this rocky ball is only 3032 miles in diameter—smaller than some moons.

Its ancient, cratered surface looks much like our Moon, with deep basins and craggy mountains. Only two probes have visited this barren and airless world, where temperatures swing from over 800F in full sunlight to -300F in some deep shadowed craters at the poles. If your eyes are sharp, try spotting its small, bright disc just after sunset or right before dawn. Binoculars help, but be careful **not** to look at the Sun.

Station #3: Venus, Earth's Twin?



Transit of Venus, 6-5-12 R. Luchay, DAS. Escanaba, MI

In size, (7300 miles dia.) Venus is nearly Earth's twin. But there the similarities end. Venus orbits the Sun in 224 earth days at 67 million miles, on the inner edge of the zone where water can be a liquid. Being 28% closer to the Sun it receives far more energy than Earth, causing a runaway "greenhouse" effect. At its surface the Russian *Venera* landers found temperatures of 900F. Venus is the only planet that turns slowly backwards on its axis, so that the Sun rises in the West and sets in the East. A day on Venus (117 Earth days) lasts more than half its year (224 Earth days). Shrouded in clouds of CO₂, it rains sulfuric acid there. A truly alien world.

Station #4: Earth, Our Blue World.



Earth, N. America, NASA Goddard Space Flight Ctr.

The Earth is the only place we know of with oceans of liquid water on its surface. Orbiting the Sun 93 million miles away, it takes sunlight 8 minutes to reach us. The Earth has hosted life for over 3/4ths of its 4.6 billion years. Yet, we have only seen our world as a beautiful ball floating in the vastness of space for a few decades. Earth's large Moon raises tides in the oceans and stabilizes its 23 degree axial tilt. These effects probably helped advanced life forms get a foothold and thrive here. When the Earth, Moon & Sun line up just right, we see an eclipse, an awe inspiring event for intelligent life on Earth.

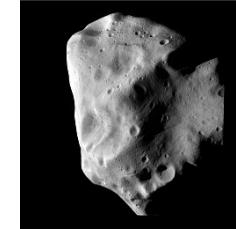
Station #5: Mars, the Red Planet.



Mars, 1997 Hubble NASA

Known as the Red Planet, Mars orbits 141 million miles from the Sun. It is the first planet on our Walk with a year longer than Earth's, at 687 days. Mars is a little more than half as large as Earth, with far less mass. Through a small telescope one can see ice caps at its poles, and watch large dust storms form as its seasons change. We now know that Mars once had flowing water on its surface, and there is ice beneath the sand. But Mars is a cold, freeze-dried place today, with average temperatures of -67F. Mars is red, because it's rusted, with iron oxides and perchlorates locked in its toxic soil. It's the most studied planet in the Solar System.

Station #6: The Asteroid Belt.



Asteroid Lutetia, Rosetta Craft, ESA, 7-10-10.

A Broad band of rocky leftovers from the formation of the Solar System orbits roughly 300-million miles from the Sun. Some, like Ceres and Vesta are solid, rocky dwarf planets up to 600 miles in diameter. Most are smaller fragments that never coalesced into a planet, or are the rubble left after billions of years of collisions. A few have orbits that cross Earth's. The dinosaurs were probably killed by a big one that hit Earth 65-million years ago. In 2013 a small one, just 55 feet wide, exploded over Chelyabinsk, Russia breaking glass and toppling brick walls-- injuring about 1500. It reminded us that while truly vast, the space between the planets is not completely empty.

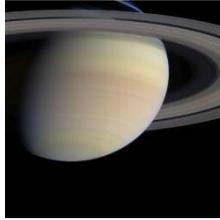
Station #7: Jupiter, King of Planets.



Jupiter, 1-29-03 Cassini- NASA

The largest planet in the Solar System, Jupiter is a gas giant, 11x the size of Earth (88,750 miles dia). Made up mainly of hydrogen gas, it's considered by some a "failed star." Taking 12 of our years to make one orbit 485 million miles from the Sun, it spins so fast that its day only lasts 10 hours. This causes it to bulge a bit at the equator. A giant hurricane, "The Great Red Spot," has raged in its clouds for over 400 years, driven by the planet's internal heat and intense winds. Jupiter has over 65 moons, the most famous being the 4 that Galileo spied in 1609.

Station #8, Saturn, Ringed Planet.



Saturn, July 2004-Cassini, NASA-JPL, close approach.

Considered the most beautiful planet in the Solar System by many, the Ringed Planet is also the

second largest, at 74,000 miles diameter. Made up mainly of hydrogen gas, it is so light it would float in water! Even though they are only a few hundred feet thick, its icy rings are so bright that they can be seen in just 10x50 binoculars. Small backyard telescopes reveal the Cassini division in the rings, while large 'scopes can show subtle details in the pale yellow clouds—All this from 887 million miles. One Saturn year = 29.5 Earth years, but its day zips by in just 10.25 hours. Upwards of 60 moons, large and small complete its retinue, including giant Titan, one of the largest in the Solar System.

Station #9, Uranus, Rolling Orb.



Uranus, Hubble- 2004.

Only one Earth probe, Voyager 2 has visited the remote outer planets Uranus and Neptune. With an orbit averaging 1.785 billion miles from the Sun,

Uranus appears in a good sized telescope as only a small blue-green dot. Rolling around its orbit nearly on its side, this giant ball of rock, water and methane gas is 19x as far from the Sun as the Earth. On Uranus, summer and winter each last more than 40 years! Tenuous rings, likely composed of the icy debris of comets that ventured too close and were torn apart, were discovered by Voyager 2 in 1986.

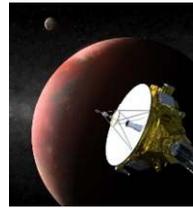
Station # 10, Neptune, 8th Planet.



Neptune, Hubble Heritage

The final planet in our Solar System is Neptune. A gas giant similar to Uranus in size and composition, at 30,750 miles in diameter, it is 4x as big as the Earth. With an orbit averaging 30x as far from the Sun as Earth, its year lasts 164.79 Earth years. Galileo actually saw Neptune in 1613 but failed to recognize it as a planet. It had to wait two centuries to be discovered in 1846. Neptune's largest moon, Triton orbits the planet backwards, and has surface features and an orbital tilt that cause some to theorize that it may be a Kuiper Belt Object, similar to Pluto that was captured by Neptune's gravity. Triton is massive and cold enough to hold an atmosphere, one of just a few moons to do so.

Station #11, Pluto- Planet or KBO?



Pluto, New Horizons, 2015.

Slowly drifting in a highly inclined, elongated orbit at the outer fringes of the Solar System, 3.67-billion miles from the Sun is a tiny, reddish brown sphere of ice and rock just 1435 miles in diameter. Its comet-like path takes it out far beyond Neptune for most of its 248 year journey around the distant, dim Sun. Tagging along is a retinue of at least 5 satellites. Charon, the biggest, is fully half its size. Discovered by Clyde Tombaugh in 1930, Pluto was considered the 9th planet until recently. Now it's thought to be the first of many others from the vast Kuiper Belt, and will be the first one we will reconnoiter in 2015.

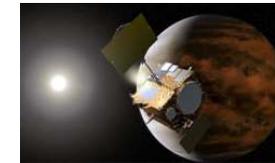
Station #12: Voyager 1, & Beyond...



Voyager at the Edge, NASA Artist.

Launched in late 1977, the twin Voyager probes were sent to explore the outer planets. They took advantage of a unique planetary alignment, using Jupiter's gravity to fling them outward into the depths of interplanetary space at record speeds. In May 2013, 35 years after launch, Voyager 1 was 124x as far as the Earth is from the Sun—about 12 billion miles. Its' radio signals, travelling at the speed of light, take 17 hours to reach Earth. When we built the Walk of the Planets in 2002, we placed Voyager 1 where it would have been in 1997, 20 years after launch. To find its 2013 location at this scale, drive west about 2.5 miles from the Sun until you pass the Riverside GM auto dealership on US-2/41. Still sailing- on at nearly 1-million miles a day, Voyager 1 will soon cross into Interstellar Space, beginning a new phase of human exploration.

If you continued driving west at our scale, you would arrive at the distance of the closest star system to ours, Alpha Centauri (6.4 Light Years or 24 Trillion miles) out in the Pacific Ocean, North of Hawaii. *Bon Voyage!*



Walk of the Planets brought to you by: **DAS, Delta Astronomical Society, City of Escanaba, The Wm. Bonifas Fine Arts Center and Your Gifts.** Send to: **DAS, 330 So 16th St, Escanaba, MI 49829.**

Comments: dyoung@chartermi.net.

Escanaba's Unique

WALK OF THE PLANETS

A Scale Model Of The Solar System



The Solar System, Comparative Sizes. NASA Illustration.

Left to Right: Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto.

Starting at the Sun and walking west...
In the next 18 blocks—about 1.3 miles-- you will be able to experience the vast size of our Solar System.

Each foot that you walk will be equal to 865 thousand miles—the diameter of the Sun.

The Walk of the Planets is a self-guided tour of the Solar System, including the 8 Major Planets, Asteroids and Pluto, the first Kuiper Belt Object, discovered in 1930 by American Astronomer, Clyde Tombaugh.

Learn more at: www.nasa.gov/jpl, www.space.com, www.hubblesite.org, and: www.deltaastro.info.

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