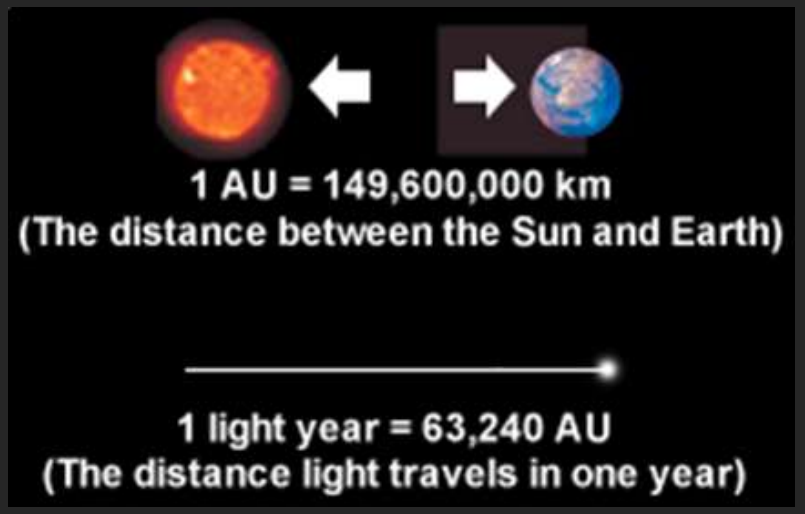
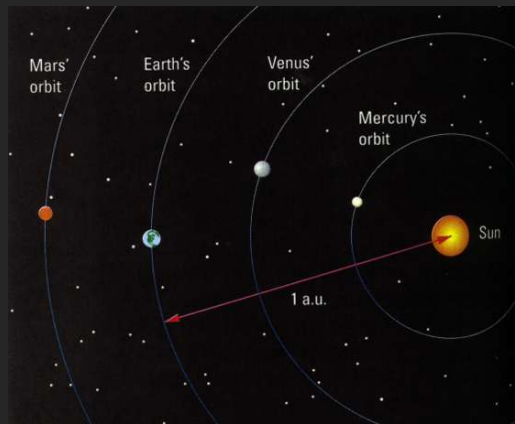
Space

- Space is HUGE!
- Distances in Space
  - Astronomical Units
  - Light Years
- The vast number of stars
- Space facts
- Voyager 1
- Space travel





The Universe

- The universe is everything that exists, including all matter and energy everywhere. **The study of what is beyond Earth is called *astronomy*!**

Images of the Universe Video

Space is Huge!
Measuring Distance in Space

- Space is so vast we cannot measure the distance using normal means (km, miles, etc.)

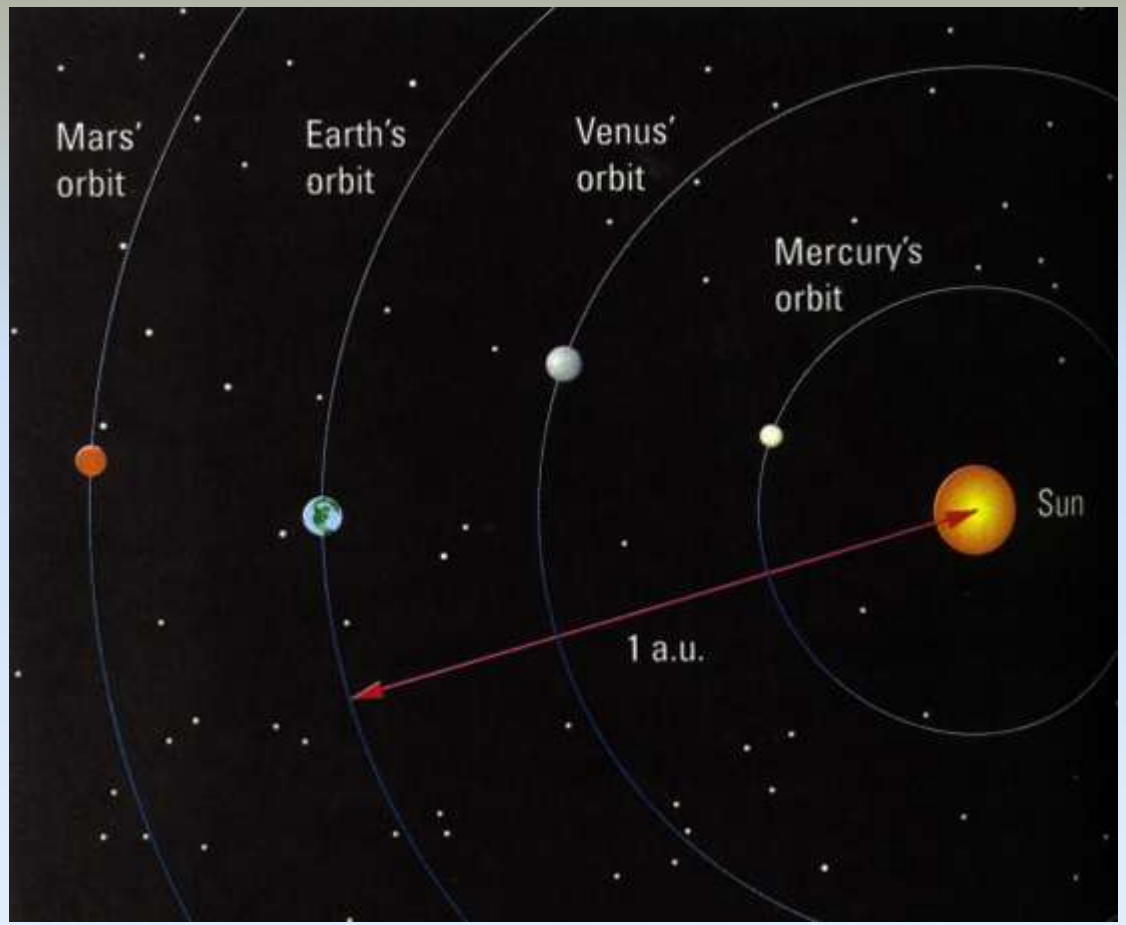
- Ex/ distance from the Earth to the Sun = approximately 150 million km, or 93 million miles and relatively speaking, the Sun is not that far away!!

- **Since Space is so vast we use Astronomical Units (A.U.) and Light Years to measure distances**

Astronomical Unit's (A.U.)

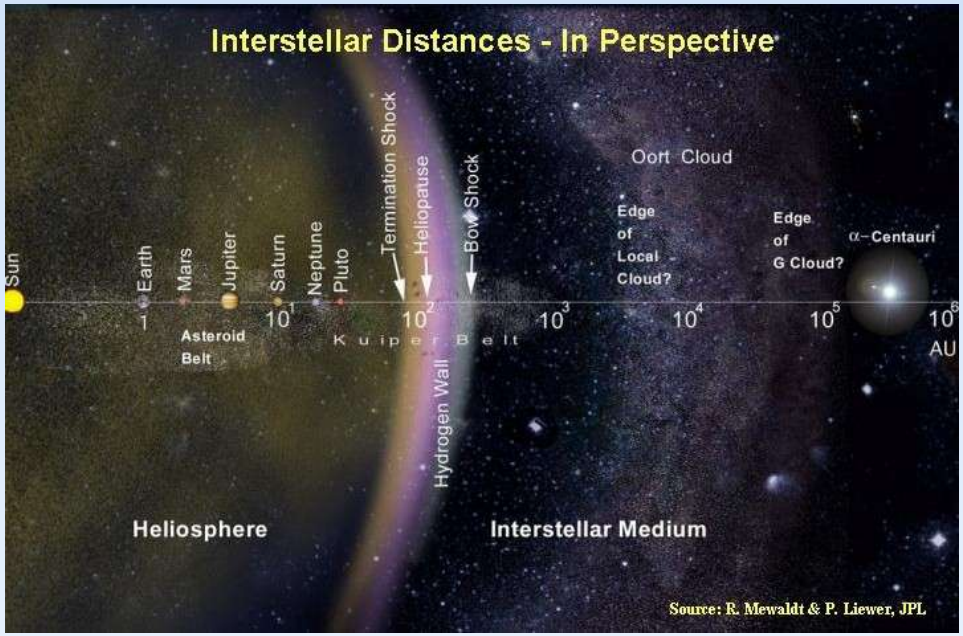
- An A.U. is the distance from the Sun to the Earth (~150 million km)

- If something is 300 million km away the distance would be **2 A.U.**



Light Year

- In Space the distances are gigantic. For example, the closest star to Earth (besides our sun) is close to **38,000,000,000,000 km (24,000,000,000,000 miles) away. That's the closest star.**



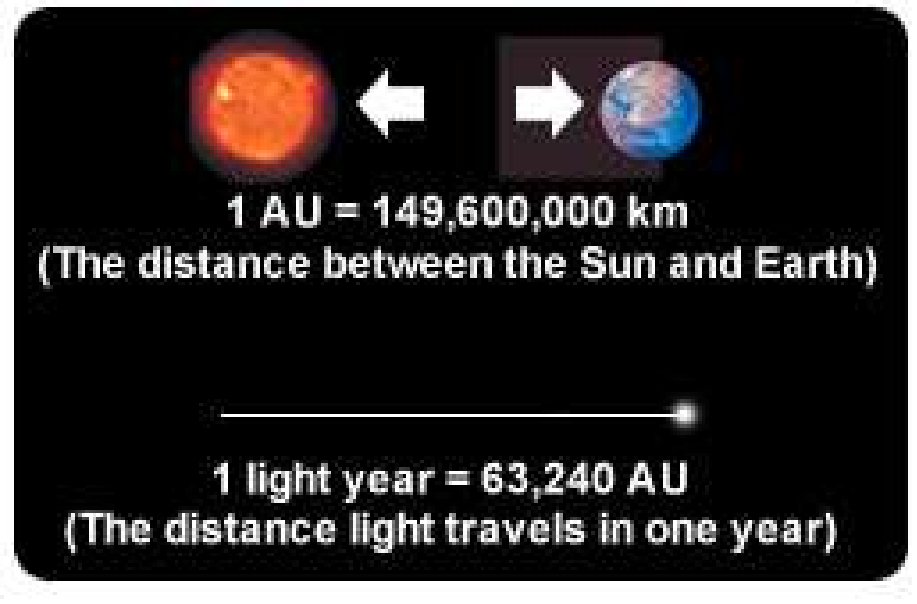
A Light Year

- So to measure really long distances, **people use a unit called a light year.**

- Light travels at 300,000 kilometres per second. Therefore, a light second is 300,000 kilometres!

- A light year is the distance that light can travel in a year or:
  - **9,460,800,000,000 km (63,072 A.U.'s)**

How Far is a Light Year?



How HUGE is Space?

Our Universe

The Vast Number of Stars!!

- It is estimated that there are about

  60 000 000 000 000 000 000 000 stars in the Universe
- All the stars in space outnumber every sound and word produced by every human that has ever lived!

1 light year = 9,460,800,000,000 km

Distance from Earth to

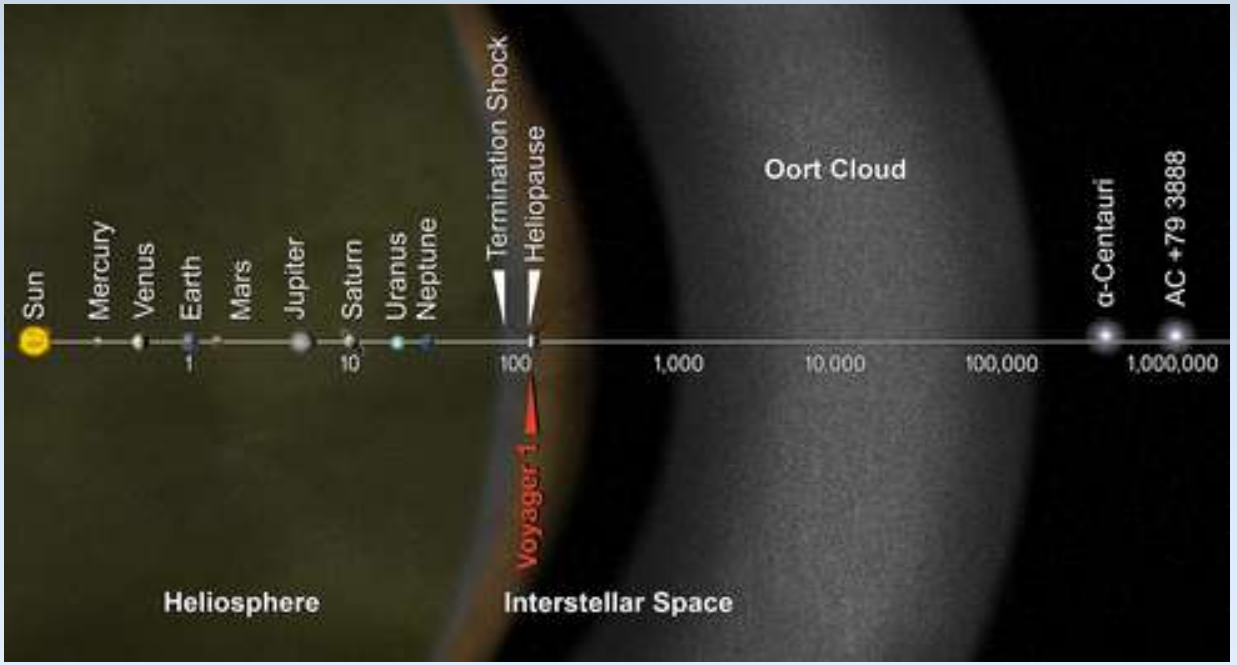
- Uranus (farthest planet in our solar system)
  = 1 607 000 000 miles = 2586215808 km
  = 17.2877849 A.U. = 0.000273369065 light years
- Alpha Centauri (nearest star) → **over 4 light years**
- the centre of our galaxy → **27,700 light years**
- Andromeda, nearest large galaxy → **2,900,000 light years**
- Furthest galaxies seen in the universe → 15,000,000,000 light years
  - If we were still using km, the distance to the furthest galaxies seen would be 145,000,000,000,000,000,000,000 km away!!

However, we don't travel even close to the speed of light

- The Voyager 1 spacecraft is heading out of our Solar System at 62,000 km per hour but even at that speed, it would take it 77,000 years to reach the nearest star. **It would take over a billion years to cross the Milky Way Galaxy**

Voyager 1

- A space probe launched in 1977 to explore the outer Solar System. In December 2013, **it was over 19 billion kilometers from the Earth (35 light hours)**



Click here to see where Voyager is now: http://voyager.jpl.nasa.gov/where/

Space Travel

- 77, 000 years is a long time to journey in a space craft
- For space exploration to be possible outside of our solar system, we need a faster way to travel

Star Trek Warp Travel