# A09
# Cosmology
## The Universe

James Webb Telecope

# Topics

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# The Astronomical Unit (AU)

# Astronomical Unit (AU)

The astronomical unit (AU) is the average Earth-Sun distance and a unit of length defined to be exactly equal to 149,597,870,700 m, or around 150 million km.

It is a convenient unit for measuring distances within our solar system.

It takes light around 500 seconds, 8 mins 20 seconds, to travel 1 AU.

# Pluto

# Pluto

Pluto was discovered in 1930 and was the ninth planet in our solar system until 2006 when it was redefined as a dwarf planet due to its small size. Pluto is actually smaller than Earth's moon.

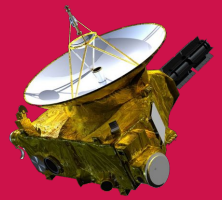
Pluto orbits the Sun between 30 and 49 AU due to its eccentric, or oval shaped, orbital path.

It resides in the Kuiper Belt.


Pluto

# Dwarf Planets

# Dwarf Planets



In 1801 planet like spheres like Ceres and others were discovered in the area between Mars and Jupiter. By 1851 our solar system had 23 planets! As a result, the terms asteroid was created for small such bodies.

The term dwarf planet began being used in 2006 for larger bodies that were smaller than planets. So far we have found ten.


10 Dwarf Planets

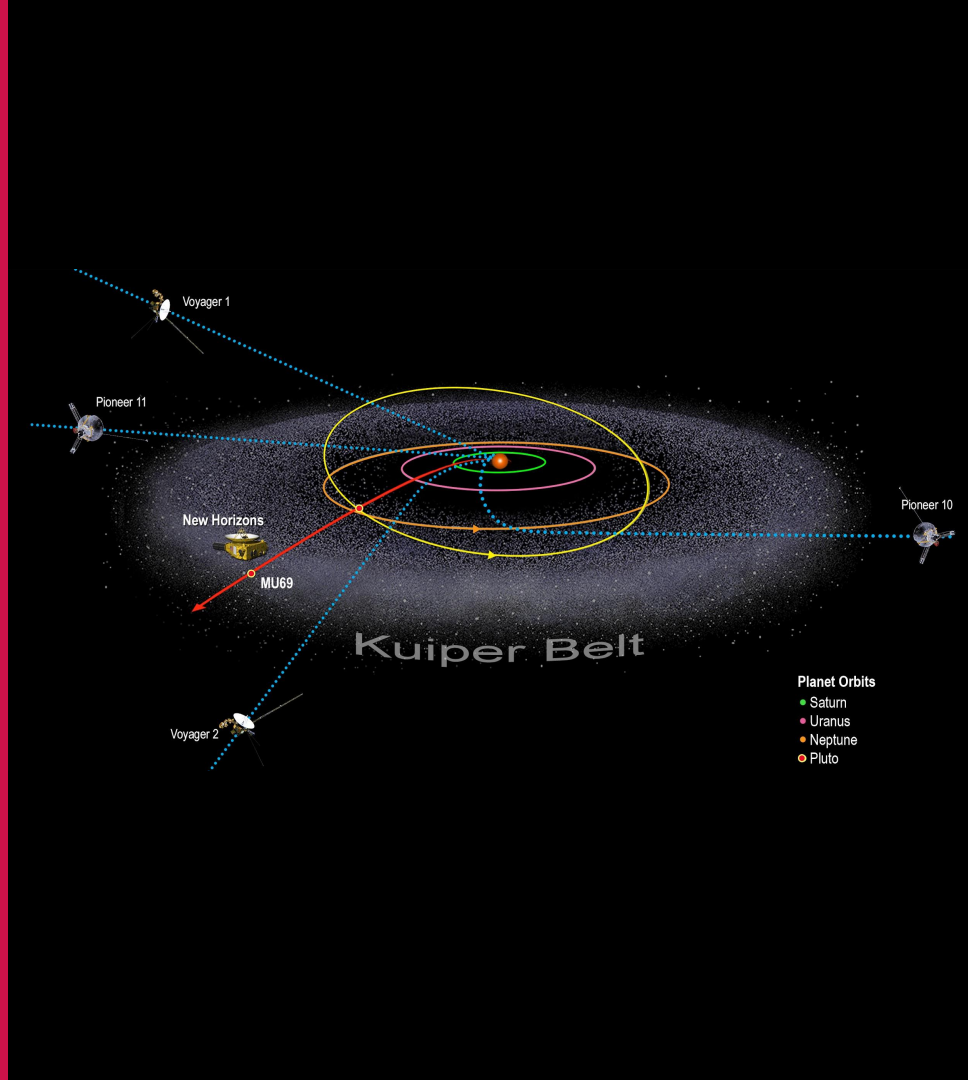
# The Kuiper Belt

# The Kuiper Belt

The Kuiper Belt is named after astronomer Gerard Kuiper who predicted its existence in 1851.

It wasn't discovered until 1992, lying beyond the orbit of Neptune, 30 to 50 AU from the Sun.

It is believed to contain asteroids, dwarf planets and moons largely made of ice and it is where comets come from.

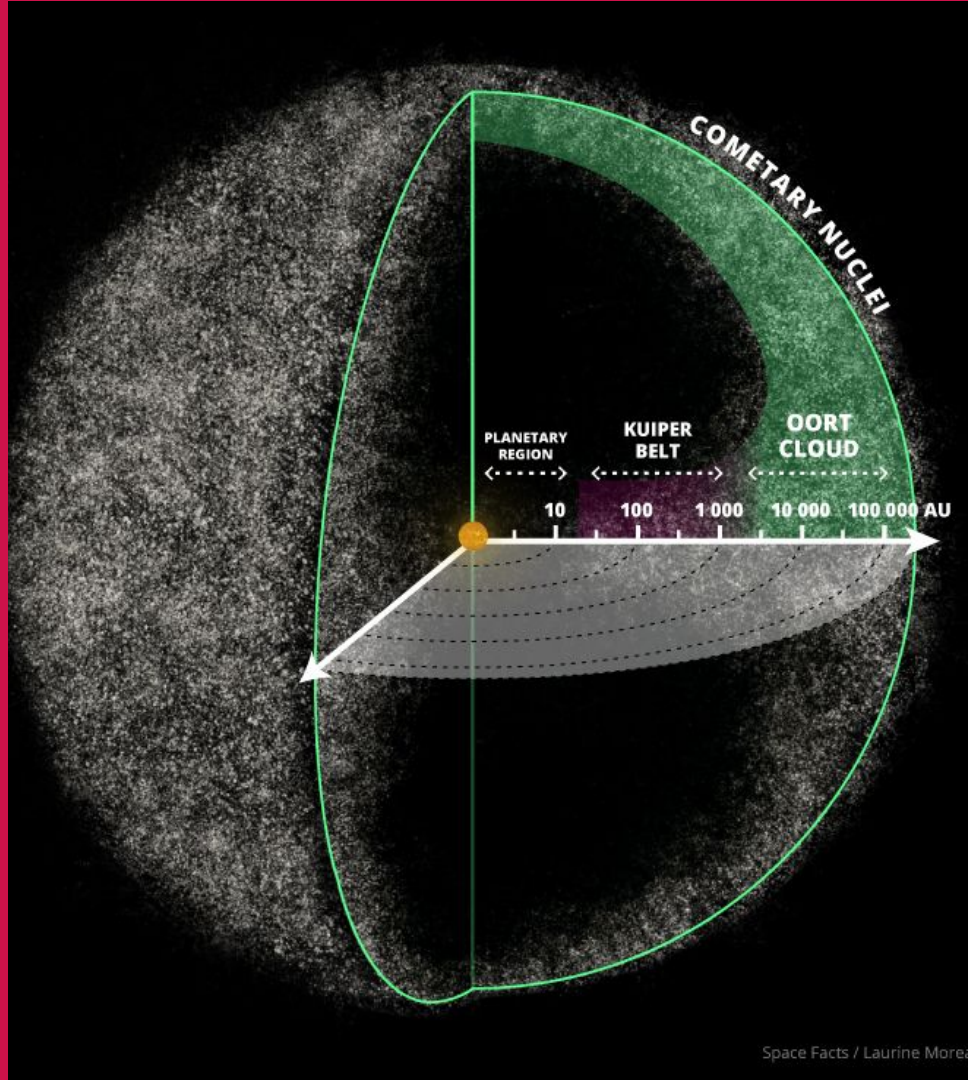


# The Oort Cloud

# The Oort Cloud

The Oort cloud is theorized to be a vast cloud of billions, or trillions of icy comet-like pieces of space debris, surrounding the Sun at distances ranging from 2,000 to 200,000 AU.

The concept of such a cloud was proposed in 1950 by the Dutch astronomer Jan Oort, in whose honor the idea was named.




Kuiper Belt & Oort Cloud

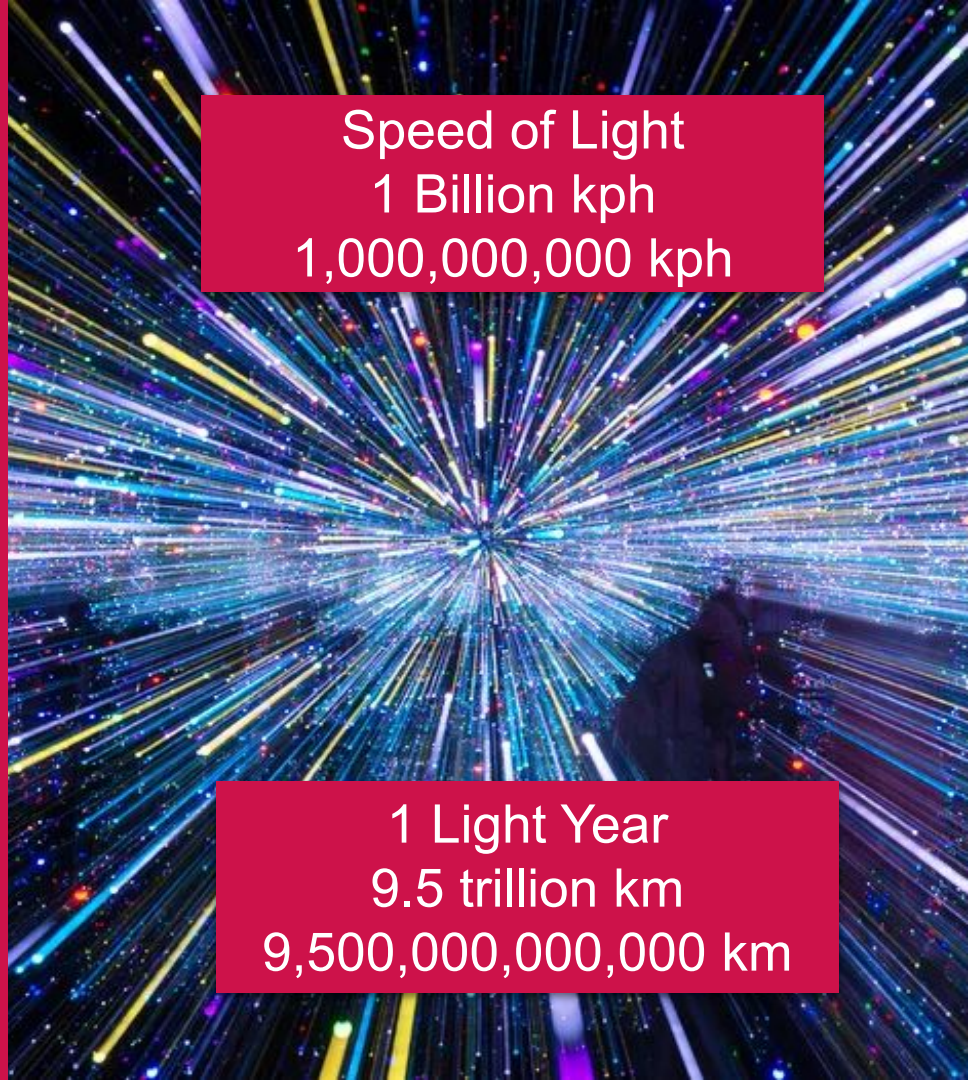
# Light Speed & Light Year

# Light Speed & Light Year

Light travels through space at around 1 billion kph, or 300 million metres per second. It travels a little slower in air and slower still in water but still extremely fast.

A light year is the distance that light travels in 1 year.

- 1.079 billion km in 1 hour.
- 25.896 billion km in 1 day
- 9,458.514 billion km in 1 year.



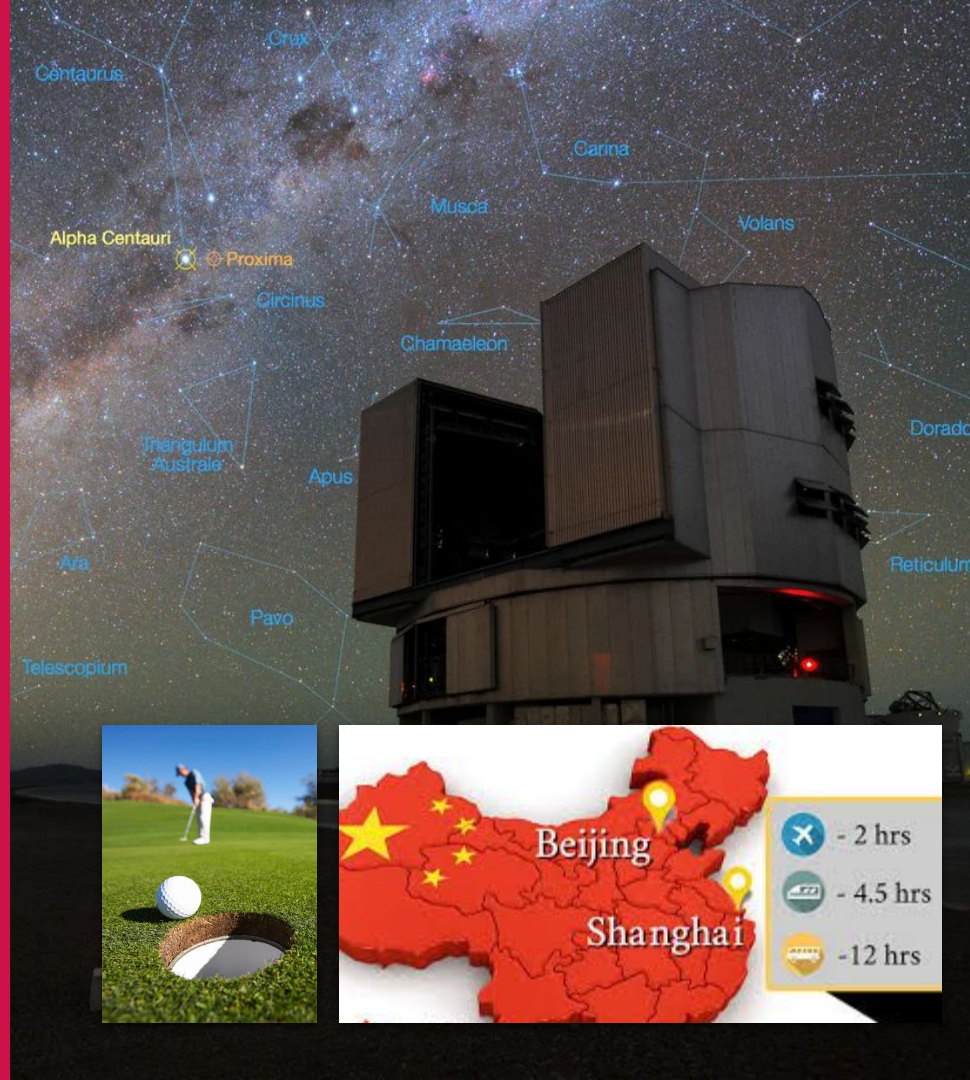

Speed of Light

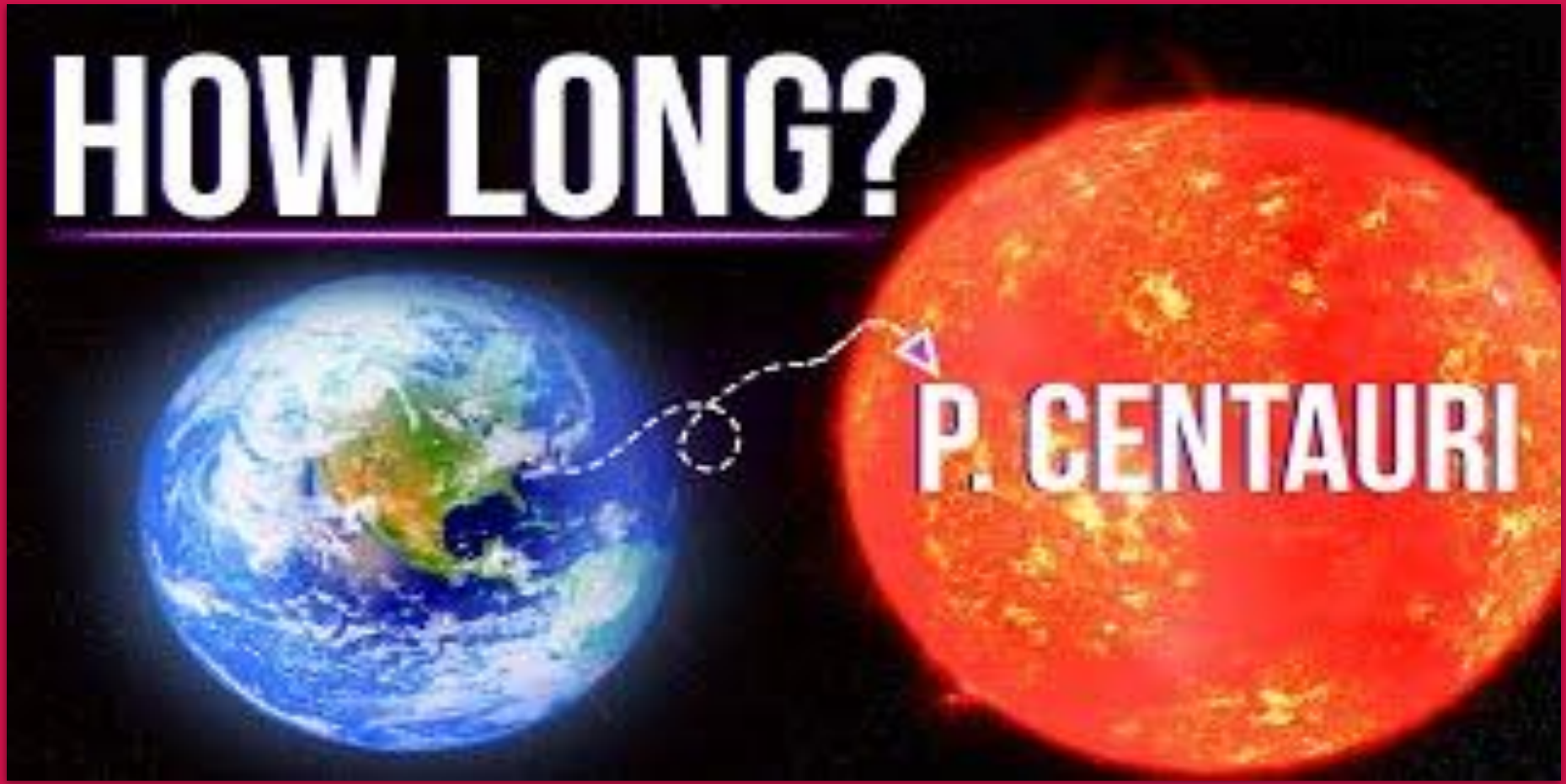
# Proxima Centauri

# Proxima Centauri

Proxima Centauri, also called Alpha Centauri C, is the closest other star to our planet at 4.2 light-years from Earth.

If the Earth were the size of a grain of sand in the grass, 4 m from the Sun, the size of a golf ball, on a putting green in Beijing, then the next nearest star, Proxima Centauri, would be in Shanghai, 1200 km away.






Proxima Centauri

# The Milky Way Galaxy

# The Milky Way Galaxy

The group of stars, or galaxy, that our Sun belongs to is called the Milky Way galaxy.

There are around 400 billion stars, in a swirling mass around the centre.

If the Milky Way were the size of China, or Australia, or the USA then our entire solar system would fit onto the end of your finger.

The Milky Way Galaxy

# The Observable Universe

# The Observable Universe

The observable universe, or just everything that we can see, is a ball-shaped region of the universe consisting of all matter that can be observed at the present time; the light from these objects has had time to reach us since the Big Bang.

It is about 14 billion light years across, or 9 x $10^{23}$ km containing and estimated 200 billion galaxies.

The Observable Universe


# The End