

Distances to the Stars

One neat thing about light-years is that it is like looking back in time.

The distance to the stars is extremely big. The unit that we use to measure large distances is the light-year.

The light-year is the distance that light travels in one year. Light travels at an enormous speed in space, about 300 000 km per second. So in one year it can travel about

1 lightyear = 9.46×10^{12} km.

How to calculate kilometers using light years?

If a star is 8.2 light years away, how many Km is this?

$1 \text{ Light year} = 9.46 \times 10^{12} \text{ Km}$
 (Handwritten notes: $\times 8.2$ with a red arrow pointing to 8.2 light ; $\text{EXP } 12$ under 10^{12} ; $\times 8.2$ with a red arrow pointing to the right)

$$8.2 \text{ light years} \times \frac{9.46 \times 10^{12} \text{ km}}{1 \text{ light year}} = 7.7572 \times 10^{13} \text{ Km}$$

$$1 \text{ light year} = 9.46 \times 10^{12} \text{ km}$$

a) If a star is 1.419×10^{14} km away,
How many light years is this?

$$1 \text{ Light year} = 9.46 \times 10^{12} \text{ km}$$

$$\frac{1.419 \times 10^{14} \text{ km}}{9.46 \times 10^{12} \text{ km}} \times 1 \text{ Light year} = 15 \text{ Light years}$$

b) If a star is 22 light years away, then
what is the distance in km?

$$1 \text{ Light year} = 9.46 \times 10^{12} \text{ km}$$

$$22 \text{ Light year} \times \frac{9.46 \times 10^{12} \text{ km}}{1 \text{ Light year}} = 2.0812 \times 10^{14} \text{ km}$$

500 cm to ___ m

$$1 \text{ cm} = 10 \text{ mm}$$

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$500 \cancel{\text{ cm}} \times \frac{1 \text{ m}}{100 \cancel{\text{ cm}}} = 5 \text{ m}$$

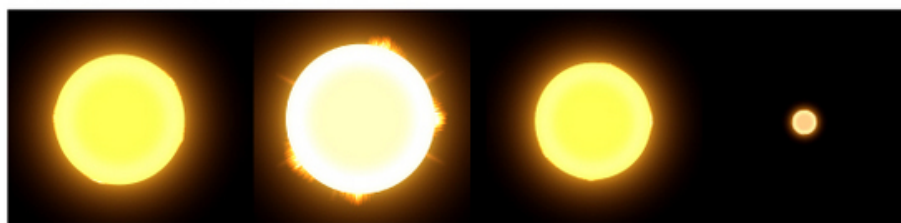
Fun Note:

The light that we see from the star Alpha Centauri tonight left the star 4.3 years ago. So the light takes 4.3 years to reach earth.



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STARS COMPARED




Sun	Alpha Centauri A	Alpha Centauri B	Proxima Centauri
SPECTRAL TYPE (SUN = G2 V):	G2 V	K1 V	M5.5 Ve
MASS (SUN = 1):	1.1	0.97	0.12
LUMINOSITY (SUN = 1):	1.52	0.5	0.0017
DISTANCE FROM EARTH (LIGHT-YEARS):	4.37	4.37	4.24

ALPHA CENTAURI B'S EARTH-SIZE PLANET

Astronomers at the European Southern Observatory announced in Oct., 2012 the discovery of a planet similar in size to the Earth orbiting Alpha Centauri B. The planet, called Alpha Centauri Bb, is too close to its star to be habitable, but it is the closest alien world yet found.

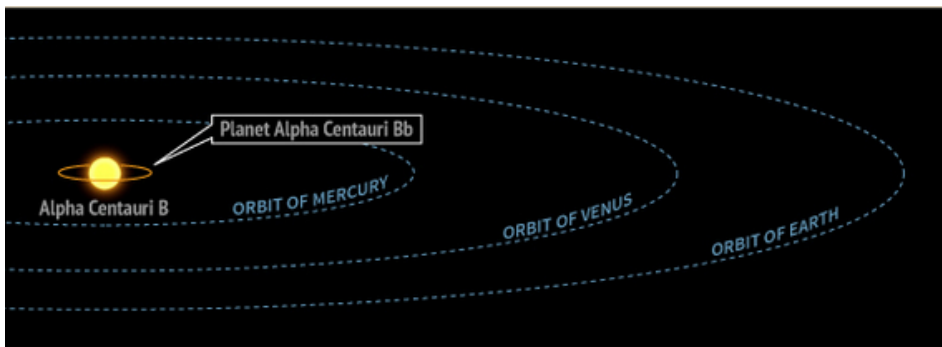


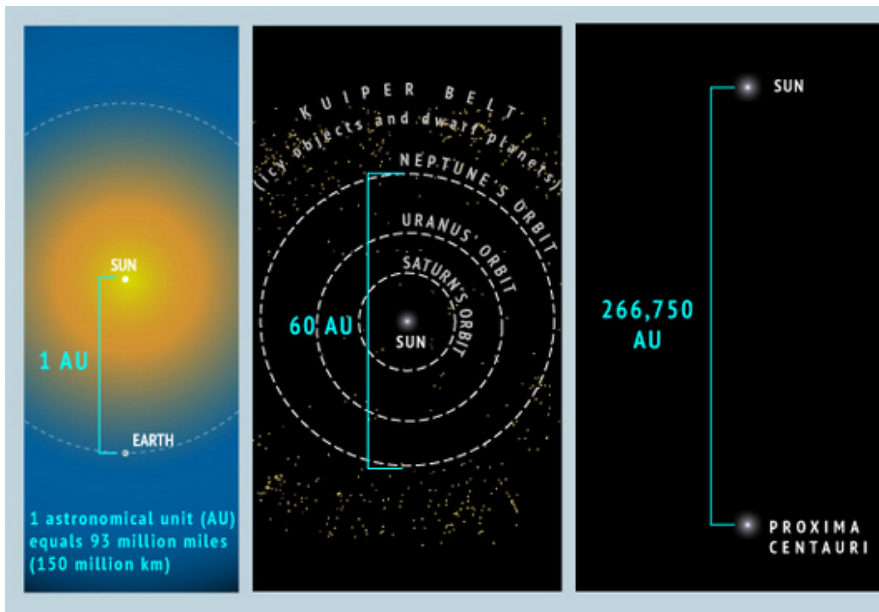
Alpha Centauri Bb



Earth

MASS (EARTH = 1):	1.13	1.0
DISTANCE FROM PARENT STAR:	3.6 million miles (6 million kilometers)	93 million miles (150 million km)
LENGTH OF YEAR (EARTH DAYS):	3.2	365.3





- The Crab supernova remnant is about 4,000 light-years away.
- The Milky Way Galaxy is about 150,000 light-years across.
- The Andromeda Galaxy is 2.3 million light-years away.

Distance from Earth to Proxima Centauri, the next nearest star



red dwarf

~40,000,000,000,000 km

or

~4.24 light-years

The Sun: An Important Star

the amazing sun
(6:50)

- closest star
- brightest object in the sky
- The sun has been producing energy for about 5 billion years already, and they predict that it will produce energy for another 5 billion years before it runs out of fuel.