

Distances In Light Years - Activities (Ages 16-18)



Today we are going to investigate:

- The definition of a light-year
- Why this unit is used to measure distance
- The distance to several bright stars in light-years
- Other units used to measure distance to stars

1

Activities

The closest star to Earth is the Sun. It is about 93 million miles (150 million km) from our planet. In 1838 the distance to another star was measured for the first time by German astronomer Friedrich Bessel. Bessel found that the distance to the nearby star 61 Cygni was 660,000 times the Earth to Sun distance.

Question: Calculate this distance in miles or kilometres. Based on your answer, do you think miles or kilometres are useful units for measuring distances beyond the Solar System?

2

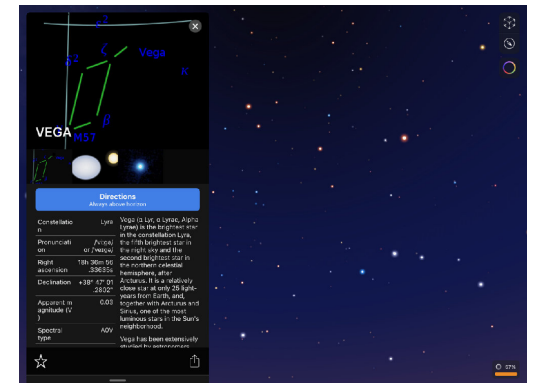
By the middle of the 19th Century astronomers were using another unit to measure these distances. This unit is called the **light-year**. It is defined as the distance light travels in a year.

Question: The speed of light is about 300,000 km per second. Calculate how far a light-year is in km. Why do you think this unit is based on the speed light travels at?

3

The two closest stars to our Solar System are Proxima Centauri and Rigil Kentaurus. Find these stars in Night Sky (use Search to find it if you need to) and open the Information Tile to learn more about these stars.

Question: How far away are these stars in light-years? Rigil Kentaurus is better known by another name, what is this alternative name?



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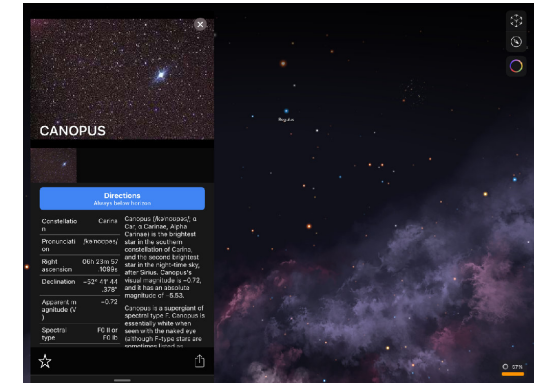


4 Here is a list of some of the brightest stars we can see from Earth in order of decreasing brightness: Sirius, Canopus, Vega, Arcturus, Capella and Rigel. Find these stars in Night Sky and use their Information Tiles to compare their distances in light years.

Questions: Arrange these stars in order of distance in light years. Are the brightest stars also the closest stars? What does your answer tell you about how much light each star emits?

5 Astronomical distances are enormous by everyday standards so units can be modified. Thousands of light years can be written as kilo-light-years (kly), and millions of light-years as Mega-light-years (Mly). Many astronomers prefer to use an alternative unit to measure the distance to stars. This is the **parallax second** (or **parsec**). A parsec is approximately equal to 3.26 light-years.

Question: The most distant object humans can see without a telescope is Messier 31, the Andromeda Galaxy. Find this object in Night Sky and use its Information Tile to find its distance in Mly. What is this distance in parsecs?



What we have discovered:

- Astronomers use light-years as unit of distance measurement
- This unit is defined as the distance light travels in a year
- The closest stars to our Solar System are just over four light-years away
- The parsec is an alternative unit of distance used in astronomy