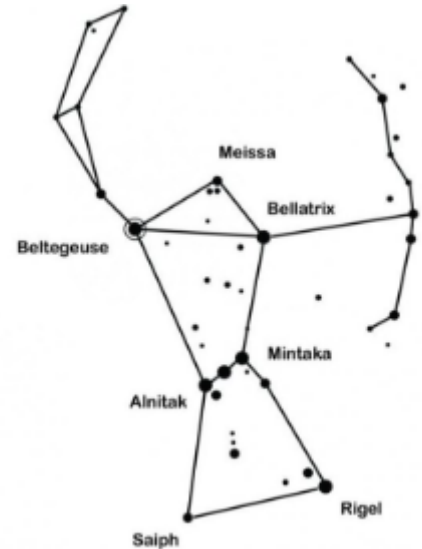




1) Betelgeuse is a star in the constellation of Orion. It is a distance of 5.2×10^{18} m away from the Sun.

- Calculate the distance the star is in light years.
- Rigel is another star in the constellation. It is 860 light years from the Sun. Calculate the distance in metres.
- Which star above does the light take the longest to reach us.

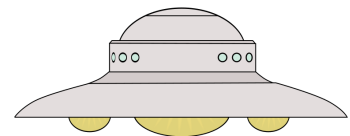


2) A futuristic spacecraft's commander sends a message to the Earth.
"We are just one light day away from Earth Base"

- Determine the distance in metres the spacecraft is from Earth.
- Later on in the journey the commander indicates that the spacecraft is just 5 light minutes away from the Earth Base.
Determine if the spacecraft is nearer to the Earth than the Sun.
[Sun's distance from Earth is 1.5×10^{11} m]

3) An interstellar spacecraft has a speed of $0.9c$. This means it has a speed of $9/10$ the speed of light.

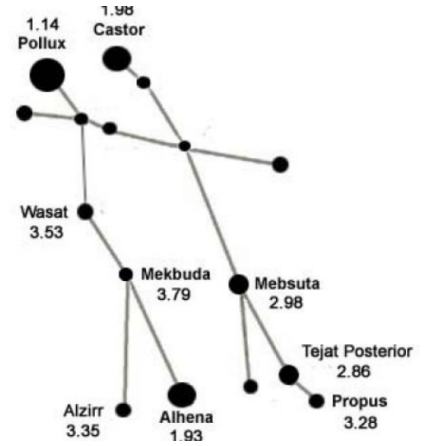
- Determine the speed of the spacecraft in metres per second.
- How many years will it take the spacecraft, travelling at this speed, to reach a star 4 light years in the distance?



4) The distance in light years to the Andromeda galaxy is 2.5 million light years.
Determine the distance to this galaxy in metres.

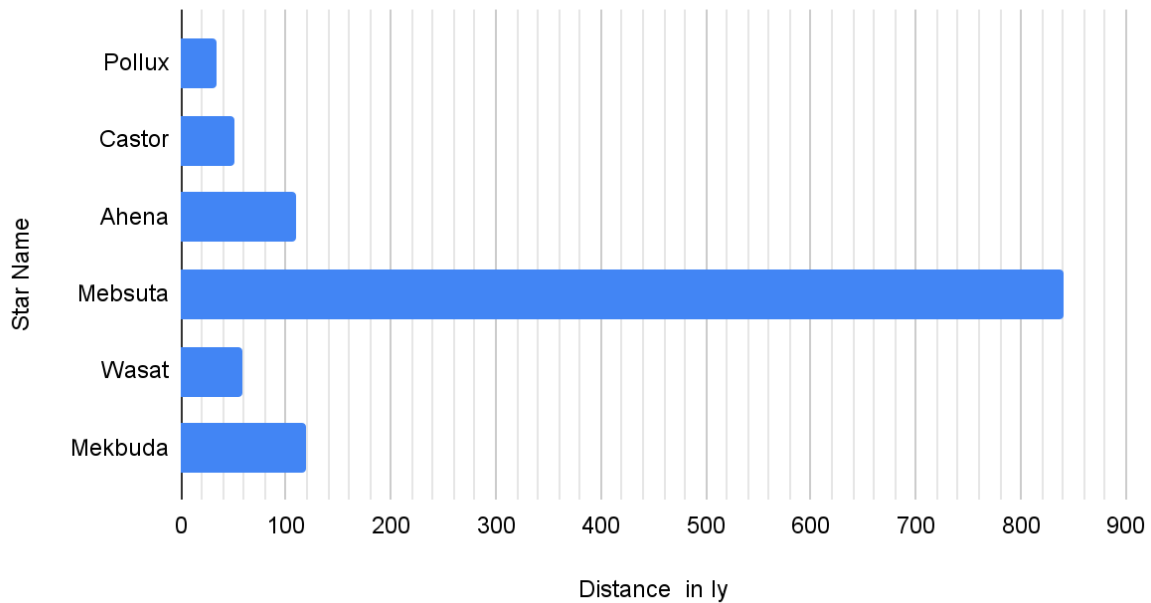
- 5) Calculate the distance represented by a light
- second
 - minute
 - hour
 - day

- 6) The constellation Gemini (The Twins) is shown. The stars are labelled with numbers representing how bright they appear. Polux is brighter than Wasat. So the smaller the number the brighter the star.



The distances in light years of the stars in the constellation are given below.

Distance in light years from Earth



- Which star in the constellation is closest to Earth?
- Which star's light takes approximately 100 light years to reach Earth?
- Mabsuta is 840 light years from Earth. Determine this distance in metres.
- Determine the distance the star Wasat is from the Earth in light years and also its distance in metres.

Answers

- 1 a) 550 light years
b) 8.17×10^{18} m
c) Rigel
- 2 a) 2.6×10^{13} m
b) 9×10^{10} m
- 3 a) 270 million metres per second or 2.7×10^8 m/s
b) 4.4 light years
- 4 2.4×10^{22} m
- 5 a) 3×10^8 m
b) 1.8×10^{10} m
c) 1.08×10^{12} m
d) 2.6×10^{13} m
- 6 a) Pollux
b) Athena
c) 7.98×10^{18} m
d) $60 \text{ ly} = 5.7 \times 10^{17} \text{ m}$