Support Worksheet – Option E, Worksheet 1

1 State the difference between a constellation and a stellar cluster. [2]

2 Describe the nature of a star. [2]

3 State the source of energy in a star. [1]

4 Suggest how a star manages to be in equilibrium without collapsing under its own weight. [2]

5 Define the luminosity of a star and state two factors that affect the luminosity of a star. [3]

6 Two stars have the same surface temperature but star X has double the radius of star Y. Calculate the ratio of luminosities $\frac{L_X}{L_Y}$. [2]

7 Two stars have the same radius but star X has double the surface temperature of star Y. Calculate the ratio of luminosities $\frac{L_X}{L_Y}$. [2]

8 Define apparent brightness. [1]

9 Two stars have the same luminosity but the distance from Earth to star X is double the distance to star Y. Calculate the ratio of apparent brightness $\frac{b_X}{b_Y}$. [2]

10 Two stars have the same apparent brightness but the distance from Earth to star X is double the distance from Earth to star Y. Calculate the ratio of luminosities $\frac{L_X}{L_Y}$. [2]

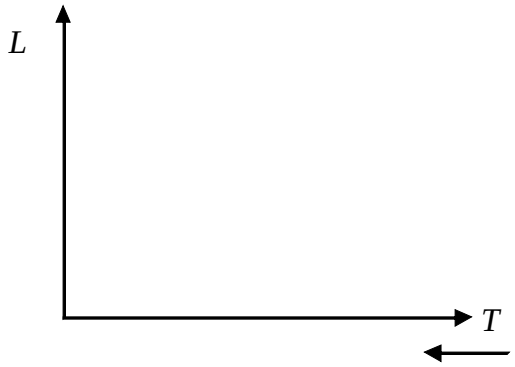
11 Calculate the distance to a star whose luminosity is 4.5×10^{28} W and its apparent brightness is 6.2×10^{-12} W m^{-2}. [2]

12 The peak wavelength in the spectrum of a star is 520 nm. Calculate the surface temperature of the star. [2]

13 State one property of a star that is determined by its spectral class. [1]

14 State the spectral class of our Sun. [1]

15 Complete the HR diagram below to show



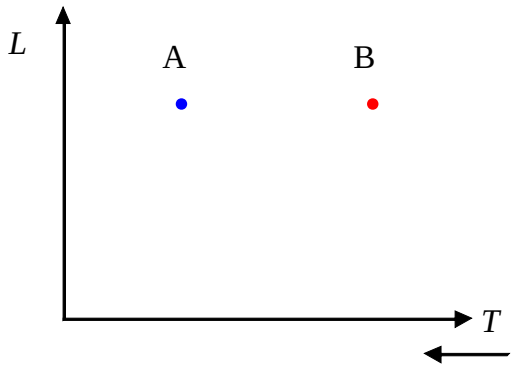
a the main sequence [1]

b the white dwarf region [1]

c the red giant region [1]

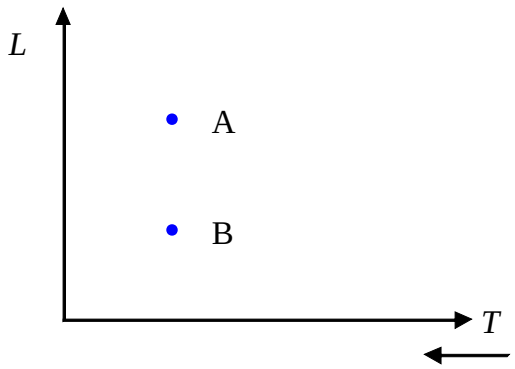
d Cepheid variables. [1]

16 Two stars, labelled A and B are shown in the HR diagram below.



State and explain which star, A or B, has the greater radius. [2]

17 Two stars, labelled A and B are shown in the HR diagram below.



State and explain which star, A or B, has the greater radius. [2]

18 Describe how the stellar parallax method may be used to determine the distance to a star. [3]

19 Suggest why the stellar parallax method is limited to distances of about 300 pc for Earth-based telescopes but can be extended to 1000 pc for satellite-based telescopes. [2]