

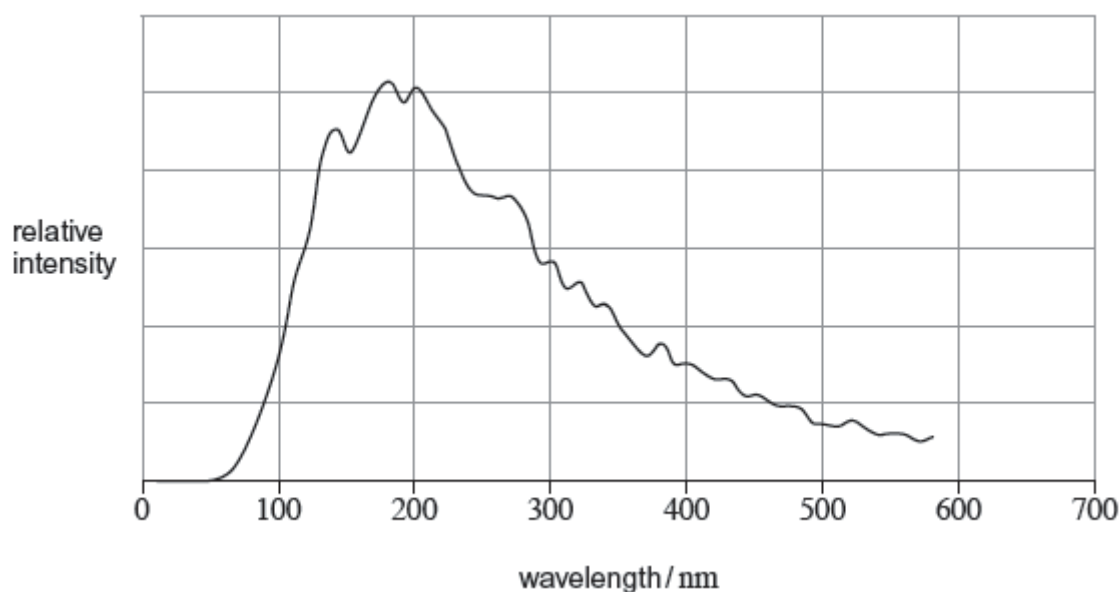
Name of the Student: _____

Max. Marks : 26 Marks

Time : 26 Minutes

Q1.

The graph shows the variation of intensity with wavelength for the star 40 Eridani B.



- (a) (i) Calculate the black body temperature of 40 Eridani B.

State an appropriate unit for your answer.

temperature = _____ unit _____

(3)

- (ii) 40 Eridani B has a total power output of 4.2×10^{24} W.

Calculate its radius.

radius = _____ m

(2)

- (b) (i) Which of the following regions of the Hertzsprung-Russell diagram does 40 Eridani B belong to?

Tick (✓) the correct answer.

main sequence	
dwarf star	
giant star	

(1)

- (ii) Give reasons for your answer to part (i).

(2)

(Total 8 marks)

Q2.

- (a) Draw a ray diagram for an astronomical refracting telescope in normal adjustment. Your diagram should show the paths of **three** non-axial rays passing through both lenses. Label the principal foci of the two lenses.

(3)

- (b) The Teapot Giant Telescope in Berlin is the longest moveable refracting telescope on Earth. Some of its properties are summarised below:

distance between the objective lens and eyepiece lens = 21 m

angular magnification = 210

objective lens diameter = 0.68 m

- (i) Calculate the focal lengths of the eyepiece lens and objective lens of the Treptow Giant Telescope.

eyepiece lens focal length _____ m

objective lens focal length _____ m

(2)

- (ii) Early telescopes had very small diameter objective lenses. State **two** advantages of using an astronomical telescope that has a large diameter objective lens when making observations.

Advantage 1 _____

Advantage 2 _____

(2)

- (c) The images formed by refracting telescopes can suffer from chromatic aberration.

Draw a labelled diagram to show how a converging lens causes chromatic aberration.

(1)

(Total 8 marks)

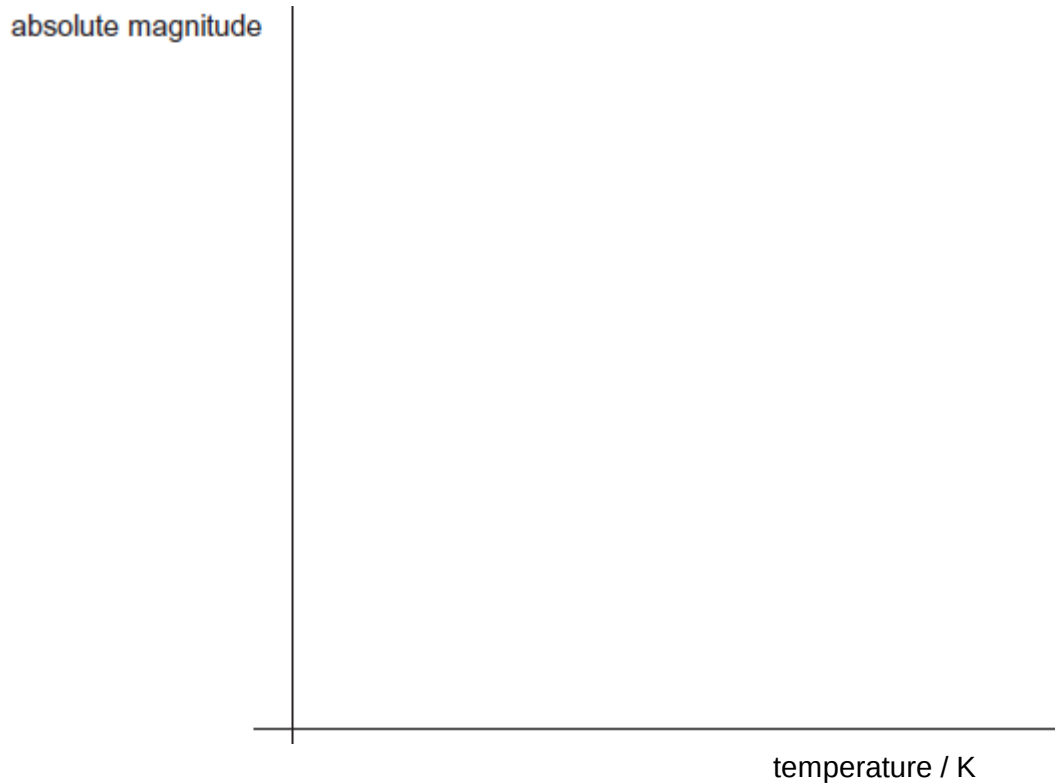
Q3.

- (a) Define the term absolute magnitude.

(1)

- (b) The figure below shows the axes of a Hertzsprung-Russell diagram.

Mark suitable scales on the absolute magnitude and temperature axes.



(2)

- (c) Label a possible position of each of the following stars on the diagram above:

- (i) the Sun

(1)

- (ii) star W, which has the same intrinsic brightness as the Sun, but has a significantly higher temperature

(1)

- (iii) star X, which has a similar spectrum to the Sun, but is significantly larger

(1)

- (iv) star Y, which is significantly larger than the Sun and has prominent absorption lines of neutral atoms and titanium oxide (TiO) in its spectrum.

(1)

- (d) How does the diameter of star W, in part (ii), compare with the diameter of the Sun? Explain your answer.

(3)
(Total 10 marks)