Stars

Total marks:13

Q1.

Figure 18 is a diagram giving some information about main sequence stars.
Luminosity is a measure of how bright something is.
An increase in luminosity means an increase in brightness.

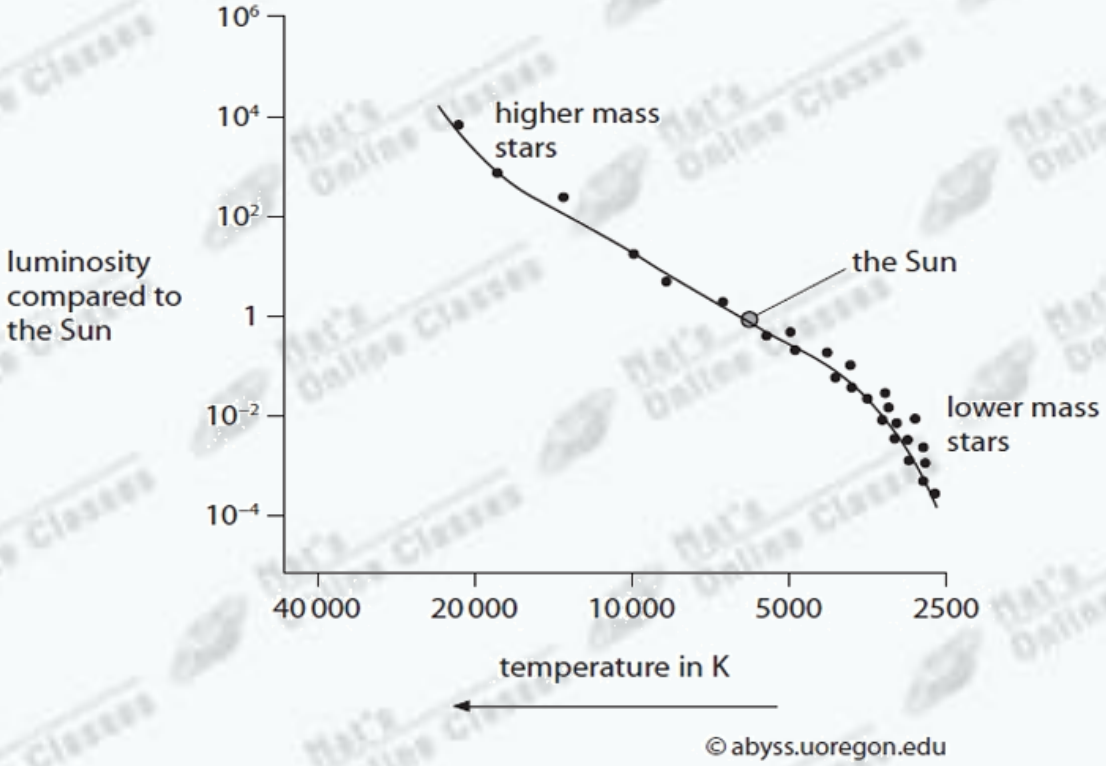

Figure 18

(i) Estimate the temperature of the Sun.

(1)

temperature of the Sun = ... K

(ii) State how the brightness of a main sequence star changes with its temperature.

(1)

.....

.....

(iii) State how the brightness of a main sequence star changes with its mass.

(1)

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.....

(Total for question = 3 marks)

Q2.

A nebula may evolve into a main sequence star, such as the Sun.

Explain how a nebula may evolve into a main sequence star.

(3)

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(Total for question = 3 marks)

Q3.

Stars may originate as a nebula.

(i) Describe the process that then occurs to produce the conditions necessary for nuclear fusion in a new star.

(3)

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(ii) The energy, E, released in nuclear fusion is equivalent to loss in mass, m, according to the equation.

$$E = mc^2$$

where c is the velocity of light.
$c = 3.00 \times 10^8$ m/s
In 1 second, the energy radiated by the Sun is 3.86×10^{26} J.
Calculate the loss in mass of the Sun in 1 second.

(2)

loss in mass = ... kg

(Total for question = 5 marks)

Q4.

A star has evolved to become a neutron star.

The mass, M, of the neutron star, of radius R, is given by

$$M = \frac{4 \times \pi \times D \times R^3}{3}$$

where D is a constant

$M = 4 \times 10^{30}$ kg

$D = 6 \times 10^{17}$ kg/m^3

Use the equation to calculate the value for R.

(2)

R = ... m

(Total for question = 2 marks)