Short Answer

1. The average intensity of the Sun's radiation at the surface of the Earth is 1.37×10^{3} W m $^{-2}$.

   Calculate (a) the luminosity and (b) the surface temperature of the Sun.

   The mean separation of the Earth and the Sun = 1.50×10^{11} m, radius of the Sun = 6.96×10^{8} m, Stefan–Boltzmann constant = 5.67×10^{-8} W m $^{-2}$ K $^{-4}$.

2. The radius of star A is three times that of star B and its temperature is double that of B.

   Find the ratio of the luminosity of A to that of B.

3. The light from a star at a distance of 70 ly away is received on Earth with an apparent brightness of 3.0×10^{-8} W m^{-2}. Calculate the luminosity of the star.

4. The luminosity of a star is 4.5×10^{28} W and its distance from the Earth is 88 ly.
   Calculate the apparent brightness of the star.

5. The apparent brightness of a star is 8.4×10^{-10} W m^{-2} and its luminosity is 6.2×10^{32} W.
   Calculate the distance to the star in light years.

6. Two stars have the same size but one has a temperature that is four times larger.

   a Estimate how much more energy per second the hotter star radiates.

   b The apparent brightness of the two stars is the same; determine the ratio of the distance of the cooler star to that of the hotter star.

7. Two stars are the same distance from the Earth and their apparent brightnesses are 9.0×10^{-12} W m^{-2} (star A) and 3.0×10^{-13} W m^{-2} (star B).

   Calculate the ratio of the luminosity of star A to that of star B.

8. Take the surface temperature of our Sun to be 6000 K and its luminosity to be 3.9×10^{26} W.

   Find, in terms of the solar radius, the radius of a star with:

   a temperature 4000 K and luminosity 5.2×10^{28} W

   b temperature 9250 K and luminosity 4.7×10^{27} W.