Some physical quantities

distance $\rightarrow$ $d_\odot = 1.5 \times 10^8$ km $= 1$ AU

Mass $\rightarrow$ $M_\odot = 2.0 \times 10^{33}$ g

radius $\rightarrow$ $r_\odot = 7.0 \times 10^{10}$ cm

$\therefore$ Mean density of the sun,

$$\rho = \frac{\text{mass}}{\text{Volume}} = \frac{M_\odot}{\frac{4}{3}\pi R_\odot^3} = \frac{3 \times 2 \times 10^{33}\ \text{g}}{4\pi \times (7 \times 10^{10}\ \text{cm})^3}$$

$= 1.4$ g/cm^3 ~ Not much than that of water

The bolometric Solar Luminosity $= L_\odot = 3.8 \times 10^{33} \frac{\text{erg}}{\text{sec}}$

$$\left\{ \text{and flux} = \frac{\text{luminosity}}{\text{Emanating area}} \right\}$$

$$\therefore f_\odot\ (\text{flux}) = \frac{L_\odot}{4\pi d_\odot^2} = 1.4 \times 10^6\ \text{erg sec}^{-1}\ \text{cm}^{-2}$$

$= 1.4$ KW m^{-2} $\rightarrow$ SOLAR CONSTANT

The effective temperature of sun $= T_{E_\odot} = 5800\,K$.

$\Big\{$ From Wien's Law, a typical photon has a energy of 1.4 eV
so from total flux, we can get photon flux $\Big\}$

$$f_{\odot,\text{photon}} \approx 1.4 \times 10^{6} \frac{\cancel{erg}}{s \cdot cm^2} \cdot \frac{1}{1.4\,\cancel{eV} \times 1.6 \times 10^{-12}\,\cancel{erg}}\,\cancel{eV}$$

PHOTON FLUX $= 6.3 \times 10^{17}\ sec^{-1}\ cm^{-2}$

From, radioactive dating,

$t_\odot = 4.5 \times 10^{9}$ years

and central density and temperature is

$\rho_c = 150\ g\ cm^{-3}$

$T_c = 15 \times 10^{6}\ K$