The Earth circles the Sun in an orbit whose radius (take the orbit as circular) is 92,000,000 miles, in a time of 365 days. The diameter of the Sun is 860,000 miles. Find the mass, and the average density of the Sun. (Be sure you show how you got these numbers.)

\[
\frac{GM_s}{X^2} = \frac{m_e V^2}{X} \quad V = \frac{2\pi X}{T}
\]

\[
\frac{GM_s}{X^2} = \frac{4\pi^2 X^3}{T^2}
\]

\[
M_s = \frac{4\pi^2 X^3}{G T^2} = \frac{4\pi^2 \left(92,000,000 \times 5.28 \times 3.28\right)^3}{6.67 \times 10^{-11} \left(365 \times 24 \times 3602\right)^2} = 1.93 \times 10^{30} \text{ kg}
\]

\[
\rho_{av} = \frac{M_{s \text{ total}}}{V} = \frac{3M}{4\pi r^2} = \frac{3 \times 1.933 \times 10^{30}}{4\pi \left(\frac{860,000}{2} \times \frac{5.28}{3.28}\right)^3} = 1.39 \times 10^3 \text{ kg/m}^3
\]