

1 Seeing stars

Our sun radiates light energy at a rate of $P_{\text{sun}} = 4 \times 10^{26}$ J/s. Assume that most of this energy is yellow light. Estimate how far away a star like the sun could be from Earth and still be seen by an unaided human eye. Assume the diameter of the pupil is 8 mm when dilated (looking at the night sky).

Sense making: Most stars we see in the sky are hundreds of light years away. What does this say about the luminosity (total power of visible light) from most of the stars that we see?

Reminder: a photoreceptor in the eye requires about 500 photons within a 30 ms time period to observe something.