

AST 301
Homework #7
Due Friday Oct. 29

1. The Sun radiates about 4×10^{26} Watts of power from its surface.
 - a) If the Sun generates the same amount of power by nuclear reactions that it radiates from its surface, how many Joules of energy does it generate each second?
 - b) A typical photon radiated from the surface of the Sun has about 4×10^{-19} Joules of energy. About how many photons are needed to make one Joule of energy?
 - c) About how many photons are radiated by the Sun each second?
 - d) For every four hydrogen atoms converted into one helium atom inside the Sun, two neutrinos are created and about 4×10^{-12} Joules of energy is generated. How many helium atoms are made for each Joule of energy generated?
 - e) About how many helium atoms are made inside of the Sun each second? About how many neutrinos are created each second?

2. If you lie outside on a summer day, the power in the sunlight hitting you is about 1000 Watts.
 - a) Using the numbers given in question 1, about how many sunlight photons are hitting you each second?
 - b) How many helium atoms were made each second to generate the power hitting you?
 - c) How many neutrinos from the Sun pass through you each second?
 - d) Why haven't you noticed all of those neutrinos?