Astronomy 162 – Winter Quarter 2006
Homework #2

Due in class Monday, January 30

Instructions

This handout is just a worksheet: homework answers must be turned in on the bubble sheets provided. You can pickup additional bubble sheets during class.

Using a #2 pencil only (no pens), please fill in the following info:

1. Your full name, **last name** first, first name last, and remember to bubble in the letters.
2. Bubble in the 5-digit homework code, **12221,** on the form under "Identification Number" in columns A-E (lower left-hand corner of the form). Do **not** enter your Student ID or any other info into this area, just the 5-digit homework code.
3. Bubble in your answers under questions 1-5 in the fields provided on the form.

Please turn in your homework in person during class on Monday, January 30.
No late homework will be accepted.

This homework assignment consists of the 5 questions below. Each question has equal weight.

1. A Main-Sequence O star has a temperature of 60,000K while on the Main Sequence. When it runs out of Hydrogen in its core, it will evolve across the H-R diagram at constant Luminosity to become a Red Supergiant with a temperature of 3000K. How much will its radius grow?

   a) 160,000× larger
   b) 400× larger
   c) 20× larger
   d) It will be the same radius as before.

2. A 0.1 M_{sun} Main-Sequence red dwarf star has a Luminosity of 10^{-4} L_{sun}. When it runs out of core Hydrogen and becomes a Red Giant, it will have a Luminosity of 10^{2} L_{sun}, but be about the same temperature. How much will its radius grow?

   a) 10× larger
   b) It will be the same radius as before.
   c) 1,000,000× larger
   d) 1000× larger

3. Evil aliens bent on mischief find the cosmic fuse box and turn off the Sun's core nuclear fusion. What would we see happen to the Sun?

   a) The Sun will explode as a Supernova
   b) The Sun will shine for about 1 Myr until the last photon from the core can random walk to the surface, and then it will go dark
   c) The Sun will keep shining about the same by the Kelvin-Helmholz Mechanism for about 30Myr
   d) The sun will immediately go dark

(turn over)

4. Why are there so few hot, massive O-type Main Sequence stars in the sky?

   a) They are all intrinsically low luminosity and very hard to see.
   b) They are rare and evolve very rapidly.
   c) Their evolution occurs only buried deep inside Giant Molecular Clouds
   d) They evolve so slowly that few have had time to form yet.

5. The amount of time a star spends on the Main Sequence is determined by the Main Sequence Lifetime, t_{ms}:

$$t_{MS} \propto 1/M^3$$

   The Sun has a mass of 1 M_{sun}, and a Main-Sequence Lifetime of t_{ms}=10Gyr. How long will a 0.5 M_{sun} star live on the Main Sequence?

   a) 80 Gyr
   b) 20 Gyr
   c) 8 Gyr
   d) 2 Gyr