Astronomy 161 – Introduction to the Solar System
Autumn Quarter 2006
Homework #4

Due Monday, November 13 in class

Instructions:

Answer the 5 questions on the scantron form provided with the handout. This handout is just a worksheet: we will only accept homework on scantron bubble sheet.

On the bubble sheet, please fill in the following info:

1. Your full name, **last name first**, first name last, and **remember to bubble in the letters!**

2. Use only a black **Number 2 Pencil**, no pens or other markers, please.

This homework is due on Monday November 13 in class. No late homework will be accepted.

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

1. The planet Mongo emits a continuous blackbody spectrum with maximum brightness at a wavelength of 58000nm in the far infrared. Applying Wein's Law, what is Mongo's approximate surface temperature?

    a) 50K
    b) 290K
    c) 300K
    d) 500K

2. Hostile space aliens make the Sun's surface 5 times hotter than it is now, but leave everything else (mass, radius, etc.) the same. As seen from Earth, the Sun will now appear to be

    a) 5 times brighter
    b) 25 times brighter
    c) 125 times brighter
    d) 625 times brighter

3. Friendly space aliens chase off the hostile ones, but can't do anything about the Sun's new hotter temperature. Instead, they offer to move the Earth into a new orbit where the amount of sunlight will be the same as it was before the hostile space aliens did their nasty trick in Problem 2. What is the semimajor axis of Earth's new orbit?

    a) 5 AU
    b) 10 AU
    c) 25 AU
    d) 50 AU

Please turn over...

4. Astronomers in California are working on designs for a giant 30-meter diameter reflecting telescope called the TMT (Thirty Meter Telescope). The Hubble Space Telescope has a primary mirror that is 2.5-meters in diameter. How much more light can this new 30-meter telescope collect than the Hubble?

    a) 12 times more light
    b) 30 times more light
    c) 144 times more light
    d) 900 times more light

5. The Illudium atom has 3 electron energy levels, shown at the right. The energy difference between levels 1 and 2 is exactly **2× larger** than the energy difference between levels 2 and 3. The wavelength of a photon emitted by an electron jumping from level 2 to 1 is 600nm. This means that the wavelengths of the photons emitted when an electron makes the 3→1 and 3→2 jumps will be _____ and _____, respectively.

    a) 300nm, 900nm
    b) 400nm, 1200nm
    c) 900nm, 300nm
    d) 1200nm, 400nm

Energy Levels of 36Illudium