

Assignment # 6
Due Friday, November 6, 2009

Instructions

On this and future assignments, please write your name on all pages and staple all pages together. Write very clearly!

Please be sure to explain your answer to all word problems briefly but carefully, and to show all your work on the calculations. The grade on each problem will reflect more the verbal explanations and the calculations shown rather than the final answers given in the back. (In fact, the answers to most of the quantitative questions from the book are given in the back and I'll give you the answers to most of my quantitative questions right on the assignments).

You may work with others on the homework problems, but you must write them up yourself, using your own words and calculations. If you hand in a paper nearly identical to someone else's, neither of you will get any credit because we won't know whether or not you actually did the work.

Also, the solutions will be shown on our class website very soon after the due date: <http://www.ucsb.physics.edu/~astro1/fall2009>. Partly for this reason, we **cannot accept late homework! (Only exception: if you have an emergency and tell me before the due date).**

We will only grade a few problems in detail for 10 points and check to see if you've made a reasonable attempt on the others for the remaining 5 points.

SHOW ALL WORK

1. We'd like you to help us pick a date for our observing night. It's very important to have a crescent moon, for several reasons: the Moon is awesome in a telescope; it looks best when illuminated from the side (straight-down illumination as when the Moon is full doesn't show the nice shadows that help us get a feeling for the 3-dimensional aspect of the surface; and a full Moon would be so bright it'd be hard to see anything else.

Now do we want a waxing crescent or a waning crescent? Specifically, when does the waxing crescent Moon rise and when does it set?

On approximately what date should we schedule our observing?

2. Describe in at least 5 excellent sentences the world's current efforts to rein in the emission of greenhouse gases.

3. Describe in at least 5 excellent sentences the effects of global warming on the arctic and antarctic regions as of right now. One great place to look is the website for the Intergovernmental Panel on Climate Change. What is the nature of the IPCC?

4. Describe Jupiter's two inner big moons Io and Europa. Jupiter's strong gravity squeezes these moons tidally and keeps them warm. Why is Europa considered a good place to look for alien life forms?

5. The very bright star Rigel (left foot of Orion the Hunter) has a parallax of 0.0042 arcseconds. What is the distance to Rigel? [~ 240 parsecs] The apparent brightness is measured with a telescope to be around $8 \times 10^{-9} \text{ W/m}^2$. Using the inverse square law, calculate Rigel's luminosity. [$5.4 \times 10^{30} \text{ W}$] Rigel has a surface temperature of 15,000 K. Use this and the luminosity to calculate its radius. [$1.2 \times 10^{10} \text{ m}$] Compare the radius and luminosity of Rigel to those of the Sun.