

Astronomy 162 – Winter Quarter 2006  
Homework #1

Due in class Wednesday, January 18

**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, **11111**, 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 Wednesday, January 18. Extra time is being given because there is no class on Monday, Jan 16 (Martin Luther King's Birthday)

**No late homework will be accepted.**

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

1. Two stars are the same size. One star has a temperature of 50,000 K, the other has a temperature of 5000K. Compared to the cooler star, the hotter star must be
  - a) 10 times more luminous and bluer.
  - b) 10 times more luminous and redder.
  - c) 10,000 times more luminous and redder.
  - d) 10,000 times more luminous and bluer.
2. How far away do I have to go in parsecs in order for the Sun to appear to be 1 Trillion ( $10^{12}$ ) times fainter than it appears from Earth? Use the approximation 1 parsec = 200,000 AU.
  - a) 1 parsec
  - b) 1,000,000 parsecs
  - c) 5 parsecs
  - d) 50 parsecs
3. The star in the end of the handle of the Big Dipper (Eta Ursa Majoris) has a proper motion of about 0.13 arcseconds/year. The Big Dipper is about 25 degrees across on the sky. How long should it take for this star to cross the Big Dipper as seen from Earth (pick the closest answer)?
  - a) 690,000 years
  - b) 69,000 years
  - c) 6,900,000 years
  - d) 69 years

**Note:** 1 degree = 3600 arcseconds.

(turn over)

4. A star has a parallax of 0.005 arcseconds. What is the distance to this star in parsecs?
- a) 20 parsecs
  - b) 200 parsecs
  - c) 500 parsecs
  - d) 50 parsecs
5. Newton's version of Kepler's Third Law is pretty complicated looking, but you can simplify it by adopting the right units. If you measure period (P) in years, semi-major axis (a) in AU, and masses in Solar Masses, the formula becomes:

$$P^2 = \frac{a^3}{(M_1 + M_2)}$$

Using this formula, answer the following question:

Two identical-mass stars ( $M_1=M_2$ ) orbit each other about their common center of mass with an orbital semi-major axis of  $a=1$  AU and a period of  $P=0.5$  years. What is the mass of each star?

- a) 0.5 Solar Masses
- b) 4 Solar Masses
- c) 2 Solar Masses
- d) 1 Solar Mass