

普通天文學 二〇〇八年秋 期中考
2008.11.10 15:10~16:50

不可以使用任何參考資料；也不可以使用計算機

一、翻譯並解釋下列名詞（每小題 4 分）

- (1) meridian; (2) parsec; (3) perihelion; (4) Polaris; (5) seeing;
(6) Universal time; (7) vernal equinox; (8) astronomical unit;
(9) right ascension; (10) chromatic aberration

二、問答題：每題 10 分

1. Describe Kepler's three laws of planetary motion. The third law actually applies not only to planetary motion, but to any two bodies in motion as a result of their mutual gravitational force. A pair of stars, one with a mass equal to, and the other 3 times, that of the Sun, orbit each other with a period of 4 years. Assuming a circular orbit, what is the linear separation between the stars (in km or in AU)?
2. Our university is building a telescope at Lulin Observatory in central Taiwan, which has a primary mirror of 2 m in diameter. What is the optical diffraction limit of this telescope if observing in the optical wavelengths (500 nm)? Each Keck Telescope atop Mauna Kea in Hawaii has a mirror equivalent to 10 m in diameter. Compare the light-gathering power and the angular resolving power between the Lulin 2 m and the Keck Telescope.
3. How does the Earth's atmosphere affect ground-based astronomical observations? What are the advantages and disadvantages of a space observatory? What about a lunar-based telescope?
4. The Earth radiates at a temperature of about 300 K. What is the wavelength where the Earth has its most intensive radiation?
5. Barnard's star, with a distance of 6 light years, is the third nearest star from us (what are the nearest and the second nearest stars anyway?) It has a proper motion of 10.3'' per year. Calculate the linear speed (i.e., km/s) this corresponds to. From the Doppler effect, Barnard's star is measured to have a radial velocity of 111 km/s. What is the space speed of Barnard's star relative to us?
6. On what date is the sidereal time nearly equal to the solar time? Explain your reasoning.