

普通天文學 二〇一四年秋 期中考
2014.11.27 10:10~11:50

不可以使用任何參考資料；也不可以使用計算機

一、問答題：每題 10 分

1. The 1 NT coin has a diameter of 2 cm. At what distance (in km) does a 1 NT coin subtend an angle of 1 arcsecond across? The naked eye has an angular resolution of about $1'$. What the linear length (in cm) does this angle correspond to at the distance to the Moon (an average geocentric distance of 380,000 km)?
2. The *Hubble Space Telescope (HST)* has a mirror with a diameter of 2.4 m. What is the optical diffraction limit (in unit of arcseconds) of the *HST* if observing at the wavelength of 500 nm? The *James Webb Space Telescope (JWST)* is the next generation space telescope, whose primary mirror has a diameter of 6.5 m. Compare the light-gathering power and the angular resolving power between the *HST* and the *JWST* at the same observing wavelength.
3. How does the Earth's atmosphere affect ground-based astronomical observations? In what way does the adaptive optics improve the image quality of a ground-based telescope? What are the advantages and disadvantages of a space observatory? What about a lunar-based telescope?
4. The surface of the Sun radiates at a temperature of about 5800 K. What is the wavelength for which the Sun has its most intensive radiation? What about for the Earth which has an average temperature of 15°C ?
5. The hydrogen atom emits a photon of wavelength of 656.3 nm for an $n = 3 \rightarrow 2$ quantum transition, i.e., the Balmer alpha line. For a galaxy known to recede from us at a speed of 600 km/s, at what wavelength is its Balmer alpha line expected?
6. Pluto used to be classified as a planet, but now belongs to a new class called "dwarf planets". Explain the reasoning of this reclassification. In addition to Pluto, name another dwarf planet.

二、翻譯並解釋下列名詞（每小題 4 分）

- (1) celestial sphere; (2) meridian; (3) Moon illusion;
- (4) constellation; (5) ecliptic; (6) sidereal time;
- (7) vernal equinox; (8) ??; (9) jovian planets;
- (10) chromatic aberration