

普通天文學 二〇一三年秋 期中考
2013.11.14 10:00~11:50

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 does a 1 NT coin subtend an angle of 1 arcsecond across?
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 in the optical wavelengths (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. One solar day is longer than one sidereal day by about 4 minutes. Explain why this is the case.
6. The hydrogen atom emits a photon of wavelength of 656.3 nm for an $n = 3 \rightarrow 2$ quantum transition (the Balmer alpha line). For a galaxy known to recede from us at a speed of 300 km/s, at what wavelength is its Balmer alpha line expected?

二、翻譯並解釋下列名詞（每小題 4 分）

- (1) celestial sphere; (2) meridian; (3) light year; (4) Polaris;
- (5) Universal Time; (6) vernal equinox; (7) ecliptic; (8) parallax;
- (9) great circle; (10) chromatic aberration