

Review for 6-week Exam (Monday, October 9th in class): this is a closed-book exam.

- Appendix A: Powers-of-ten notation, significant figures and rounding. Units of measurement: meter, kilometer, kilogram, astronomical unit, light year.
- Chapter 1: Angular distance and size: box 1.2. Celestial sphere, apparent motions of stars. Motion of Sun relative to “fixed stars”, ecliptic plane; Moon motion relative to stars, phases and eclipses; planet motions.
- Chapter 2: Only 2.3 – explaining planet motions in an Earth-centred planet system.
- Chapter 3: Planet motions in Sun-centred system: conjunction, opposition, retrograde motion, phases of Venus. Kepler's laws of planet motion.
- Chapter 4: Galileo: inertia and force, Box 4.1. Newton's 3 laws of motion; Newton's law of gravity, finding the mass of planets, Box 4.3.
- Chapter 5: Atoms (5.1): protons, neutrons and electrons. Light (5.3): speed, frequency, wavelength, electromagnetic spectrum. Box 5-2: energy of light. Spectral lines (5.2): each atom makes its own lines; Kirchhoff laws.

Formulas: these will be given on the exam. You don't need to memorize them, but make sure you understand them.

a^3 (in AU) = P^2 (in years) for planets circling the sun

$$P^2 = a^3 \left[\frac{4\pi^2}{G(m_1 + m_2)} \right] \text{ or } \frac{a^3}{P^2} = \frac{G(m_1 + m_2)}{4\pi^2}$$

Light: $c = f \times \lambda$

$E = f \times h = h \times c/\lambda$

1 nanometer (nm) = 10^{-9} meters

1 AU = 150 million km

Perimeter of circle = $2\pi r$; area = πr^2

SAMPLE TEST QUESTIONS

Read your notes, then try these questions. Check the text to see if you were right. Before trying to answer questions about how the stars, moon, sun and planets appear from Earth, draw a diagram of what is going on.

- If a star rises at 10:00 PM on February 1, about what time would it rise on March 1? (Hint: how many months would you have to wait to see it rise at exactly the same time again?)
 A. 9:00 PM B. MIDNIGHT C. 8:00 PM D. 11:00 PM
- With respect to the background stars, the Sun appears to move
 A. eastward about 13° per day C. eastward about 1° per day
 B. westward about 13° per day D. westward about 1° per day
 (Think: how long does it take to come back in front of the same stars again?)

3. The changing phases of the moon are primarily caused by
 - A. the rotation of the Earth
 - B. the moon's orbital period being equal to its period of rotation
 - C. the orbit of the Earth about the Sun
 - D. the orbit of the moon about the Earth

4. Retrograde motion of a planet is when a planet
 - A. moves from east to west among the stars
 - B. rises in the west, sets in the east
 - C. rises in the east, sets in the west
 - D. moves from west to east among the stars

5. When Mars is in retrograde motion as observed from Earth its phase is
 - A. full
 - B. new
 - C. crescent
 - D. 1st quarter

6. In the **geocentric (Earth-centered)** model for the solar system, we should never see
 - A. Mars high in the sky at midnight
 - B. A transit of Venus
 - C. Retrograde motion
 - D. Venus in 'nearly full' phase

7. Dione, a satellite of Saturn, is about as far from Saturn as the moon is from The Earth. Yet it takes Dione only about 3 days to orbit Saturn once. Assuming it takes the moon 30 days to orbit Earth, how massive is Saturn related to Earth?
 - A. about 100 times as massive
 - B. about 10 times as massive
 - C. the same mass
 - D. about one-tenth as massive
 - E. about one-hundredth as massive

8. The Earth's diameter is about 13,000 km and the Moon is about 400,000 km away. As seen from the Moon, the Earth covers an angle on the sky of
 - A. $1/2^\circ$
 - B. 1°
 - C. 2°
 - D. 8°

9. An asteroid in a circular orbit at 9AU from the Sun would have a period of
 - A. 729 years
 - B. 81 years
 - C. 27 years
 - D. 9 years

10. A hydrogen atom contains
 - A. 1 proton (p), one neutron (n), orbited by one electron (e)
 - B. one p and one n orbited by two e
 - C. one e and one n, orbited by one p
 - D. one p, orbited by one e
 - E. A and D are both possible

11. In a vacuum, radio waves and X-rays
 - A. have the same wavelength
 - B. have the same frequency
 - C. have the same energy
 - D. have the same speed

12. Compared to a photon of blue light with a wavelength of 400 nm, a photon of red light with a wavelength of 800nm has
 - A. twice as much energy
 - B. half as much energy
 - C. four times as much energy
 - D. one-quarter as much energy