

AST 301

Review questions and topics for Exam #2

Exam date: Friday Oct. 14

1. What is a photon? What is an electromagnetic wave? How are the photon and wave pictures of light related?
2. If the wavelength of a light wave is doubled, how does the frequency change? How does the energy of a photon change? How does the number of photons needed to make one Joule of energy change?
3. Make a sketch of an atom, labeling its parts.
4. How do the wave properties of electrons result in only certain electron orbits being allowed in an atom? How does the fact that only certain electron orbits can occur result in photons of only certain wavelengths being emitted by an atom?
5. Describe emission and absorption line spectra and the conditions under which each occurs.
6. Describe black body radiation and the relations between a) temperature and the power emitted, and b) temperature and the wavelengths of light emitted.
7. Describe the Doppler shift. If the observed wavelength is 1.1 times the emitted wavelength, what does this tell you about the motion of the source or observer?
8. How terrestrial planet surface features are formed
9. Mass, volume, and density: a clue to a planet's composition
10. Asteroids and comets: description and origin
11. What must a theory of planetary origin explain?
12. Nebular theory of planetary origin:
  - Gravitational contraction
  - Rotational flattening
  - Accretion to form planetesimals
  - Collisions of planetesimals to form planets
13. Formation of giant planets
  - Importance of frost line
  - Core accretion vs. gravitational instability
14. Age of the solar system: how it is determined
15. How can we use the concept of thermal equilibrium to calculate the temperature of the surface of a rock orbiting the Sun?
16. How does the result depend on the distance of the rock from the Sun?
17. How does the Earth's atmosphere affect the surface temperature of the Earth?
18. Why do Venus and Mars have such different surface temperatures?
19. How are we changing the Earth's atmosphere, and how do we think this will affect the surface temperature?