

Astronomy 1020 Exam 1 Review Questions

1. What is meant by the scientific method? Describe the differences between science and pseudoscience. Give some examples of pseudoscience. What is the language of science?
2. What are the 3 unit systems of measure? What are the 3 basic units of measurement in the SI system?
3. Describe Kepler's 3 laws of planetary motion. Define the following: semimajor axis, semiminor axis, perihelion, aphelion, and eccentricity.
4. The evil Death Star has gone into an elliptical orbit about the Sun with an eccentricity of 0.90. At its closest approach to the Sun, it comes within 0.5 AU from our star. What is the orbital period of the Death Star?
5. Describe Newton's 3 laws of motion and Newton's law of gravity.
6. The brightest star in the α Cen triple-star system (star "A") is the same size as the Sun ($D_{\odot} = 1.39 \times 10^9$ m). This star is 4.3 ly from the solar system. What is the angular size of α Cen A as seen from Earth?
7. Name the 7 regions of the electromagnetic spectrum from shortest to longest wavelength and from highest to lowest energy.
8. A photon has a frequency of 5.00×10^{14} Hz, what is its wavelength? (Hint: $c =$ speed of light $= 3.00 \times 10^8$ m/s.)
9. What is meant by thermal equilibrium? What type of spectrum does an object in thermal equilibrium emit? What is meant by hydrostatic equilibrium?
10. What is blackbody radiation? What is Wein's law? What is the Stefan-Boltzmann law? A star emits most of its light at 4000 \AA , what is its temperature? If this star is 10 times bigger than the Sun, what is its luminosity with respect to the Sun?
11. What is more energetic, a blue or a red photon? How about an X-ray versus an infrared photon? Why do you say this?
12. Describe the 3 layers of the solar atmosphere.
13. What are the 3 mechanisms in which heat energy can propagate? Describe them in detail and give examples of each mechanism.
14. Describe the interior structure of the Sun. What is the difference between a convective zone and a radiative zone?
15. Why does the Sun shine? What are the two different reaction chains in which hydrogen fuses into helium? Which does the Sun use and why?

16. What is helioseismology and the solar neutrino problem?
17. What is the difference between astronomy and astrophysics? Why are these both sciences yet astrology is not?
18. What is an Astronomical Unit, a parsec, a light year, and an Ångstrom (be precise)?
19. Whose observations did Kepler use to formulate his 3 laws of planetary motion? Of what planet were these observations made? Why was Kepler so interested in geometric solids?
20. Who is considered the father of experimental physics? Who was the first person to use a telescope to study the cosmos? Why did these observations get this person in trouble with church authorities?
21. List and describe all of Newton's contributions to astronomy and physics.
22. If two stars have the same diameter, yet one is twice as hot as the other, which one is brighter or are they both the same brightness? If one is brighter, by how much? How did you determine this?
23. What is the name of the science that describes the interaction of light with matter? What is a photon?
24. What is the solar constant? What is meant by hydrostatic equilibrium?
25. What is the solar wind (be specific) and what causes it?