

Final

Astronomy 102

Fall 2005

1. The exam should take ~2 hours to complete.
2. There are 100 multiple choice questions.
3. Choose the **one** alternative that best completes the statement or answers the question.
4. If you leave the classroom during the exam, you cannot return!
5. When you are done, please *turn in this copy of the test* and leave the room quietly!
6. If you have a question, please raise your hand.
7. Have a great vacation!!!!

1. Choose the best arrangement of the following items according to size, from the smallest to the largest.
 - A. atom, planet, Sun, galaxy, cluster of galaxies.
 - B. proton, galaxy, open cluster, cluster of galaxies.
 - C. proton, star, galaxy, Solar System.
 - D. Sun, Solar System, cluster of galaxies, globular star cluster.

2. Which of the following is the *most* massive?
 - A. The Sun.
 - B. The brightest main sequence star in the Large Magellanic Cloud.
 - C. The planet Jupiter.
 - D. The neutron star at the center of the Crab Nebula.
 - E. The white dwarf Sirius B.

3. Suppose you were standing on a planet that had the *same* mass as the Earth, but whose *radius was three times larger*. Compared to the surface of the Earth, the gravitational force you would feel on the surface of the planet would:
 - A. be the same, because the masses of both planets are identical.
 - B. be 3 times weaker.
 - C. be 3 times stronger.
 - D. be 9 times weaker.
 - E. be 6 times weaker.

4. Suppose there were some remarkable breakdown in physics and the radius of the Sun instantly shrank to less than its Schwarzschild radius, without changing its mass. Which of the following would be true?
 - A. The Sun would become a black hole, because its radius was smaller than the Schwarzschild radius.
 - B. The radius of the Earth's orbit would shrink, because gravity depends on radius.
 - C. The radius of the Earth's orbit would expand, because the Earth was now farther away from most of the Sun's mass.
 - D. The Sun would still be a main sequence star, since it was still 1 solar mass.
 - E. The temperature of the Sun would be cooler, since it was now denser.

5. Why does a ball speed up when you drop it?
- A. The gravitational force increases when the ball moves closer to the Earth.
 - B. Energy is conserved, and as the ball loses gravitational potential energy it must gain kinetic energy.
 - C. Angular momentum is conserved, so the ball must speed up as it moves closer to the Earth.
 - D. The ball doesn't speed up, but moves at constant velocity because all forces cancel.
 - E. It is eager to reach the ground.
6. Another name for an isolated proton might be a
- A. hydrogen ion.
 - B. hydrogen isotope.
 - C. helium ion.
 - D. neutron.
7. If you could add a proton to an atom to create a new stable, isolated atom, you would have created
- A. a different element with a positive charge.
 - B. an isotope of the original element.
 - C. a fission reaction.
 - D. a neutron and a positron.
8. A cubic centimeter of lead has a greater _____ than a cubic centimeter of styrofoam.
- A. mass
 - B. mass density
 - C. number density
 - D. volume
 - E. more than one of the above
9. As you increase the temperature of a gas
- A. the average speed of the particles in the gas increases.
 - B. the fraction of the particles that are neutral (i.e. un-ionized) increases.
 - C. the total energy of the gas increases.
 - D. more than one of the above.
 - E. none of the above