

# ASTRONOMY 301, Fall 2004, QUIZ No. 1

September 9, 2004

NAME (Last, First): \_\_\_\_\_

EID: \_\_\_\_\_

## I. Circle the correct answers to the following questions. (11)

1. Our Solar System is bigger than some galaxies.
  - a. This makes sense because galaxies come in many shapes and sizes, so naturally some are smaller than our solar system.
  - b. This makes sense because the age of our Solar System has given it more time to evolve and expand than some galaxies.
  - c. This does NOT make sense because gravitational forces on the outer edge of the galaxy pull harder (making it stretch) than the gravitational forces at the edge of the Solar System.
  - d. This does NOT make sense because galaxies are made up of many stars and distance between stars is much larger than the size of the Solar System.
2. Photographs of distant galaxies show them as they were when they were much younger than they are today.
  - a. This makes sense because the speed of light is finite and we're seeing the light from these galaxies as it was when it left the source billions of years ago.
  - b. This makes sense because galaxies are very bright and astronomical objects dim with age. Because we can still see them, they must be very young.
  - c. This does NOT make sense because we can't look back in time. We can only see things as they are, not as they once were.
  - d. This does NOT make sense because the idea that a photograph can make anything look younger sounds like a bad infomercial.

3. Because nearly all galaxies are moving away from us, we must be located at the center of the universe.
  - a. This makes sense because it's what the data tells us.
  - b. This makes sense because if we were NOT at the center, we would expect some galaxies to be moving away from us more than others. Because they are ALL moving away from us, we have to be in the middle of it.
  - c. This does NOT make sense because there is no center of the Universe. Galaxies moving away from us do not imply we are at the center. Raisins on an expanding raisin cake are a good example: every raisin is moving away from everything else.
  - d. This does NOT make sense because the Universe began with the Big Bang and is continuing to expand. While we are not the center, the center exists and astronomers are in the process of figuring out where it is.
4. When I looked into the dark fissure of the Milky Way with my binoculars, I saw what must have been a cluster of distant galaxies.
  - a. This makes sense because a fissure is a gap in the dust and stars of the galactic disk, allowing a clear view of the cluster.
  - b. This makes sense because there are a lot of stars in a galaxy, hence there are a lot of stars in a CLUSTER of galaxies, making it easily visible with your binoculars.
  - c. This does NOT make sense because galaxies are so large that you would not be able to fit an entire cluster of them into your binoculars.
  - d. This does NOT make sense because a fissure is in the disk of the Milky Way Galaxy, which blocks our view. We must look AWAY from the disk to see distant galaxies.

5. Last night I saw Jupiter in the Big Dipper.
- a. This makes sense because Jupiter is very bright and hard to miss, and the Big Dipper is a big constellation so planets spend a lot of time there.
  - b. This makes sense because Jupiter is a planet and hence appears in various constellations at different times of the year.
  - c. This does NOT make sense because the stars that make up the Big Dipper are much farther away than Jupiter. It can't have traveled there.
  - d. This does NOT make sense because the Big Dipper is farther north than the zodiac on which Jupiter will ever "wander."
6. Although all the known stars appear to rise in the east and set in the west, someday we'll find a star that rises in the west and sets in the east.
- a. This makes sense because telescopes are getting bigger and better allowing astronomers to continually make surprising discoveries.
  - b. This makes sense because as the Earth precesses on its axis, the direction the stars travel will change, eventually causing astronomers to find some that rise in the west and set in the east.
  - c. This does NOT make sense because the direction the stars rise and set has to do with the Earth's rotation and nothing to do with the stars themselves.
  - d. This does NOT make sense because all single stars we see are members of our galaxy, and are all orbiting the center of the galaxy, and thus all traveling in the same direction.

7. If the Earth's orbit were a perfect circle, we wouldn't have seasons.
- a. This makes sense because the seasons are caused as the varying Earth-Sun distance due to the Earth's elliptical orbit (e.g., it's warmer in the summer when we're closer to the Sun). Eliminating this would eliminate the seasonal temperature changes.
  - b. This makes sense because the sun is the same temperature on both sides, causing the Earth's temperature to remain constant throughout the year.
  - c. This does NOT make sense because seasons are caused by local environmental effects on Earth and are not related to the Earth's movement around the sun.
  - d. This does NOT make sense because seasons are caused by the tilt of the Earth on its axis, not the shape of its orbit.
8. When I drive my car at 30 miles per hour, it has more kinetic energy than it does at 10 miles per hour.
- a. This makes sense because kinetic energy is related to the velocity in such a way that, as the velocity increases, the kinetic energy also increases.
  - b. This makes sense because by going faster, my car will go farther in the same amount of time, meaning I have more energy.
  - c. This does NOT make sense because energy is always conserved and I can't create my own energy.
  - d. This does NOT make sense because kinetic energy is related to velocity in such a way that, if the velocity increases, the kinetic energy decreases.

9. If I put an ice cube outside the space station, it would take a very long time to melt, even though the temperature in Earth orbit is several thousand degrees Celsius.
- a. This makes sense because the laws of thermodynamics state that the AMOUNT of time to melt a substance is independent of the temperature.
  - b. This makes sense because even though it's hot, the air is thin. Fewer molecules hitting the surface of the ice means it will take longer to change states (i.e., melt).
  - c. This does NOT make sense because space is a vacuum and the ice would vaporize, skipping the liquid phase all together.
  - d. This does NOT make sense because heat is heat. Simply stated, the ice cube will quickly melt because it cannot exist as a solid for long at those extreme temperatures.
10. Someday soon, scientists are likely to build an engine that produces more energy than it consumes.
- a. This makes sense because scientists are very clever and are continuously doing things that haven't been done.
  - b. This makes sense because due to the high demand for cheap ways to produce energy, the government is putting a lot of money into funding such projects of this nature, allowing for great strides recently in this area.
  - c. This does NOT make sense because the laws of conservation of energy and the laws of thermodynamics forbid the creation of energy. (You can NEVER get out more than you put in.)
  - d. This does NOT make sense because the nature of the problem is so complicated that, while research is progressing, it will still be quite sometime before the problem is solved.

11. Two ions, each carrying a charge of +1 will attract each other.
- a. This makes sense because like charges attract.
  - b. This makes sense but it really depends on the TYPE of ion, not just the sign of the charge.
  - c. This does NOT make sense because ions don't attract, regardless of their charge.
  - d. This does NOT make sense because like charges repel.

**YOUR SCORE FOR THE MULTIPLE CHOICES: \_\_\_\_\_/11**

**II. Answer the following questions using short sentences. (9)**

12. Eclipses: Why don't we see a solar eclipse at every new moon and a lunar eclipse at every full moon? Describe the conditions that must be met for us to see a solar or lunar eclipse.

(a) Describe the condition for the lunar orbit that must be met for us not to see a solar eclipse at every new moon and a lunar eclipse at every full moon. (2)

(b) In addition to (a), describe the condition that must be met for us to see a solar eclipse. (1)

(c) In addition to (a), describe the condition that must be met for us to see a lunar eclipse. (1)

### 13. Energy Conservation

(a) What is the law of the conservation of energy? (2)

(b) Using the conservation of energy, describe the energy states of a ball falling from a tree. (3)

**YOUR SCORE FOR THE SHORT ANSWER Q's:                      /9**

**YOUR TOTAL SCORE:                      /20**