Astronomy 103: First Exam

Stephen Lepp
October 25, 2010

- Each question is worth 2 points.
- Write your name on this exam and on the scantron.

1  Short Answer
   A. What is the largest of the terrestrial planets?

2  Multiple Choice
   1. When you come to the lectures, you see me lecturing because I
      (a) emit infrared radiation
      (b) scatter infrared radiation
      (c) emit visible radiation
      (d) scatter visible radiation
      (e) refract visible radiation
   2. X-rays have shorter wavelengths than radio waves.
      (a) true
      (b) false
3. The largest optical telescopes are
   (a) 1 m
   (b) 2 m
   (c) 5 m
   (d) 10 m
   (e) 100 m

4. The diffraction limit of a telescope is
   (a) The largest a telescope of a particular wavelength can be
   (b) The smallest a telescope of a particular wavelength can be
   (c) the best angular resolution for a particular telescope
   (d) the furthest object that can be seen with a particular telescope
   (e) 73

5. Which of the following could be determined by the spectra of an object
   (a) the chemical composition
   (b) the rotation rate
   (c) the temperature
   (d) all of these
   (e) none of these

6. Where did the elements heavier than hydrogen and helium come from
   (a) the big bang.
   (b) the little bang
   (c) produced in planets
   (d) produced in interstellar gas
   (e) produced in stars
7. Why did the solar nebula heat as it collapsed?
   (a) it turned gravitational potential energy to thermal
   (b) to conserve angular momentum
   (c) to conserve linear momentum
   (d) radiation from nearby stars
   (e) converted hydrogen to helium

8. Which of the following lie just beyond Neptune in the plane of the ecliptic
   (a) Mars
   (b) Moon
   (c) Oort Cloud
   (d) Kuiper Belt
   (e) Asteroid Belt

9. According to nebular theory what are asteroids and comets?
   (a) remains of collisions among planets
   (b) remains of collisions among moons
   (c) left over from planet formation.
   (d) from volcano’s.
   (e) from vocations on mars.

10. From low to high photon energy the bands of electromagnetic radiation are
    (a) UV, radio, visible, infrared, x-ray, gamma-ray
    (b) gamma-ray, UV, visible, infrared, x-ray, radio
    (c) UV, radio, x-ray, infrared, visible, gamma-ray
    (d) radio, infrared, visible, UV, x-ray, gamma-ray
    (e) radio, UV, visible, infrared, x-ray, gamma-ray
11. Which of the following is most likely to lead to an absorption line spectrum
   (a) a very fast moving bird
   (b) a fast moving star
   (c) gas between us and a star
   (d) a star in front of some gas
   (e) large telescopes

12. When an electron in an atom goes from a high energy state to a lower state
   (a) the atom absorbs a photon of the energy difference.
   (b) the atom emits a photon of the energy difference.
   (c) the atom emits a photon of thermal energy
   (d) the electron becomes a photon of the energy difference
   (e) the atom loses half its electric charge.

13. The terrestrial worlds from small to large are
   (a) Moon, Mars, Mercury, Earth, Venus
   (b) Mercury, Mars, Moon, Earth, Venus
   (c) Mercury, Moon, Mars, Earth, Venus
   (d) Moon, Mercury, Mars, Earth, Venus
   (e) Moon, Mercury, Mars, Venus, Earth

14. What is differentiation in planetary geology
   (a) The process by which gravity separates materials by density
   (b) the process by which different types of minerals form
   (c) any process by which a planet's surface evolves
   (d) any process by which a planet evolves differently from other planets
   (e) any of these.
15. Smaller planets cool quicker then large planets because?
   (a) They form cooler
   (b) They are further from the sun
   (c) They have a larger surface to volume ratio
   (d) They have more volcano’s
   (e) Actually they cool slower

16. Why does Venus have a weaker magnetic field then Earths?
   (a) The earth is directly overhead.
   (b) Venus doesn’t have a metal core.
   (c) Venus rotates slower
   (d) Venus is hotter.
   (e) none of the above

17. Which of the following shows the greatest evidence of plate tectonics?
   (a) Mercury
   (b) Venus
   (c) Moon
   (d) Earth
   (e) Mars

18. Which of the following has the hottest surface?
   (a) Mercury
   (b) Venus
   (c) Moon
   (d) Earth
   (e) Mars
19. Which of the following has the densest atmosphere?
   (a) Mercury
   (b) Venus
   (c) Moon
   (d) Earth
   (e) Mars

20. Which of the following has the largest volcano in the solar system?
   (a) Mercury
   (b) Venus
   (c) Moon
   (d) Earth
   (e) Mars

21. Water arrived on Earth
   (a) from the initial accretion
   (b) it was accreted out of the gas
   (c) from comets during the heavy bombardment following the formation
   (d) from volcano’s
   (e) none of the above

22. The age of the solar system is approximately
   (a) 4 hundred years
   (b) 4 thousand years
   (c) 4 million years
   (d) 4 billion years
   (e) 4 trillion years
23. What kind of features may result from tectonics
   (a) mountains
   (b) valleys
   (c) volcano’s
   (d) all of the above
   (e) none of the above.

24. Surface features on Venus are known primarily from
   (a) observations by large telescopes.
   (b) rovers on the surface.
   (c) manned space missions.
   (d) UV telescopes.
   (e) radar measurements.

25. Which of the following appear to have ancient river beds?
   (a) Moon.
   (b) Mars.
   (c) Venus.
   (d) Mercury.
   (e) all of the above.

26. Why do we believe the surface of the moon and mercury are mostly
   unchanged in the last billion years.
   (a) because of the smooth polished surface
   (b) because of the heavy cratering
   (c) because of the dust on these surfaces
   (d) because of the large amounts of water
   (e) all of these
27. Which of the following are not characteristic of the inner planets
   (a) a substantial atmosphere
   (b) small compared to outer planets
   (c) solid rocky surfaces
   (d) few satellites
   (e) metallic cores

28. Which of the following is not characteristic of the outer planets
   (a) primarily made of gas
   (b) very few satellites
   (c) primarily hydrogen and helium
   (d) rings
   (e) large compared to inner planets

29. Rather than being a planet, Pluto is considered a member of
   (a) Kuiper Belt
   (b) Asteroid Belt
   (c) Oort Cloud
   (d) Moons of Neptune
   (e) Extrasolar Planets

30. Which of the following planets have rings
   (a) Jupiter
   (b) Saturn
   (c) Uranus
   (d) Neptune
   (e) all of the above
31. If we say a material is opaque to ultraviolet light, we mean that it
   (a) emits ultraviolet light
   (b) transmits ultraviolet light
   (c) refracts ultraviolet light
   (d) absorbs ultraviolet light
   (e) all of these

32. If we observe the same spectral lines in two stars with one of the stars
    rotating faster the lines in the faster rotating star will be
   (a) redshifted
   (b) blueshifted
   (c) greenshifted
   (d) narrower
   (e) broader

33. You are currently emitting electromagnetic waves of what type
   (a) mostly radio
   (b) mostly infrared
   (c) mostly visible
   (d) mostly UV
   (e) not emitting any radiation.

34. The moon is emitting in what band
   (a) mostly radio
   (b) mostly infrared
   (c) mostly visible
   (d) mostly UV
   (e) not emitting any radiation.
35. Which of the following planets doesn’t rotate in the same direction as it orbits the sun

(a) Mercury
(b) Mars
(c) Jupiter
(d) Uranus
(e) Neptune

36. Potassium-40 has a half-life of 1.3 billion years, if we start with 100 atoms, how much is left after 2.6 billion years?

(a) 100 atoms
(b) 50 atoms
(c) 25 atoms
(d) 1/16 of 100 atoms
(e) none.

37. Erosion is more effective on Earth then Mars or Venus because of

(a) Earth is bigger.
(b) Earth is smaller
(c) Earth is hotter
(d) Earth is colder
(e) Earth has water

38. The core and the mantle on earth are kept hot primarily by

(a) accretion
(b) differentiation
(c) chemical energy
(d) radioactive decay
(e) atoms and molecules.
39. Subduction is where
   (a) The densest material sinks to the center
   (b) One plate slides under another
   (c) the plates pull apart
   (d) the gasses get added to the gas giants
   (e) none of these

40. Which planet has the most extreme seasons?
   (a) Venus
   (b) Earth
   (c) Jupiter
   (d) Uranus
   (e) Pluto

41. In what way is Pluto more like a comet then a planet
   (a) It is made of rock and ice.
   (b) It sometimes enters the inner solar system.
   (c) It has a long tail.
   (d) It is further then average.
   (e) It has a moon.

42. One big advantage to flyby missions is they cost less then orbiting missions, mostly because
   (a) of the extra weight of the instruments to keep in orbit
   (b) of the extra fuel needed to land on the planet.
   (c) because the fuel needed for getting into orbit means a larger takeoff weight
   (d) of the manpower needed to fly the satellite in orbit.
   (e) of the manpower needed for extra design problems.
43. The age of the Solar System is found by
   (a) radioactive dating of ancient artifacts
   (b) studies of the historical record
   (c) radioactive dating of meteorites
   (d) the solar nebular model
   (e) none of these

44. The Moon is believed to have formed as a result of a collision of a massive object with earth
   (a) true
   (b) false

45. In the solar nebula the frost line determines where rocky material forms
   (a) true
   (b) false

46. Jupiter is the largest planet
   (a) true
   (b) false

47. Grass is green because it absorbs colors other than green.
   (a) true
   (b) false

48. The shorter the wavelength of a photon the lower its frequency.
   (a) true
   (b) false

49. The terrestrial planets are all closer to the sun than the gas giants.
   (a) true
   (b) false