

AST104 Sp04: WELCOME TO EXAM 2

Multiple Choice Questions: Circle the best answer choice. Read all answer choices before making selection. (No credit given when multiple answers are circled.)

1. Which dominates the atmosphere of Venus?
 - a. nitrogen
 - b. carbon dioxide
 - c. oxygen
 - d. ozone
 - e. benzene
2. Which best characterizes the correct chronological order of stages of planet development?
 - a. differentiation, cratering, flooding, slow surface evolution
 - b. cratering, differentiation, slow surface evolution, flooding
 - c. cratering, differentiation, flooding, slow surface evolution
 - d. flooding, differentiation, cratering, slow surface evolution
 - e. the stages occur in different orders for every planet
3. The flooding stage of planet formation for Earth is associated with
 - a. ocean formation
 - b. plate tectonics
 - c. cratering
 - d. filling of basins with lava
 - e. a and d
4. As a black body is heated, the frequency at which its brightness is the maximum will
 - a. decrease
 - b. increase
 - c. stay the same but the wavelength will increase
 - d. stay the same but the wavelength will decrease
 - e. none of the above
5. Compared to a similar star at rest, the light received from a star moving away from us is
 - a. ionized
 - b. shifted to shorter wavelengths
 - c. collisionally broadened
 - d. shifted to longer wavelengths
 - e. undetectable
6. What is true about nuclear fusion?
 - a. it occurs inside stars and inside planets
 - b. it occurs inside the sun but not in other stars
 - c. it occurs in planets but not in stars.
 - d. it occurs in the sun and stars but not in planets
 - e. involves the splitting of atomic nuclei into smaller nuclei
7. Atoms with an unequal number of protons and electrons are called
 - a. isotopes
 - b. isobars

- c. ions
 - d. isocharges
 - e. excited atoms
- 8.** For which of the following would the Doppler effect NOT be useful?
- a. determining the speed at which a star is moving toward us
 - b. determining the speed at which a galaxy is moving away from us
 - c. determining internal properties of the Sun using helioseismology
 - d. determining how fast a star is moving across the sky
 - e. understanding the broadening of a spectral line
- 9.** Consider a star embedded at the center of a large low density spherical gas cloud. From which view would we see an absorption spectrum?
- a. looking through the cloud with the light bulb along our sight line
 - b. looking through the edge of the cloud with the light bulb not along our sight line
 - c. along all lines of sight through the cloud
 - d. both a and b
 - e. none of the above
- 10.** An astronomer looks at a the spectrum of a distant source. She sees only very bright lines. What is most likely the cause of what she sees?
- a. a low density cloud of gas illuminated by a nearby star with the cloud, but not the star in her line of sight
 - b. a cloud containing only fully ionized hydrogen
 - c. a low density cloud of gas illuminated by a nearby star with both the star and cloud in her line of sight
 - d. she is looking at the moon
 - e. a cloud containing only electrons
- 11.** What is true of sunspots?
- a. they are hotter than the surrounding solar surface
 - b. they are the same as spicules in the chromosphere
 - c. they are regions of strong magnetic fields
 - d. they represent shock waves in the solar corona
 - e. a and c
- 12.** What is true about the Zeeman effect?
- a. it describes the shift of a spectral line due the motion of the emitting source toward the observer
 - b. it describes the splitting of a single spectral line into multiple lines when the emission source is magnetized
 - c. the weaker the magnetic field the stronger the Zeeman effect
 - d. it drives the solar wind
 - e. b and c
- 13.** The solar photosphere is
- a. cooler than the solar corona
 - b. less dense than the solar corona
 - c. hotter than the solar corona

d. the main source location of solar X-ray emission

e. a region of volcanic activity on the sun

14. What is true about craters?

a. the more craters on a moon's surface, the older the surface

b. craters result from volcanoes

c. the more craters on a planet's surface the younger its surface

d. planets do not have craters

e. a and d

15. One star has a temperature of 50,000K another star has a temperature of 5000K. What is the ratio of the energy emitted per unit time per unit area of the cooler star compared to that of the hotter star?

a. 0.01

b. 10^{-4}

c. 10

d. 1000

e. 1/10

16. Which play(s) a significant role in the differentiation stage of planet formation?

a. gravity

b. radioactive decay

c. glaciation

d. plate tectonics

e. a and b

17. Small planetessimals grow more slowly than large ones because

a. large planetessimals move faster in their orbits

b. small planetessimals move faster in their orbits

c. small planetessimals have weaker gravity and attract less material

d. small planetessimals cool more slowly

e. none of the above

18. The oxygen in Earth's atmosphere primarily comes from

a. plants

b. dissociation of water

c. dissociation of carbon dioxide

d. fossil fuels

e. out-gassing of rocks during Earth's formation

19. Which helps explain why Venus' atmospheric flow patterns are more ordered and less broken up into smaller cyclonic storms than Earth's ?

a. Venus is farther from the sun

b. Venus has a cooler atmosphere than Earth

c. Venus rotates more slowly

d. Venus has a stronger magnetic field than Earth

e. a and b

20. Which of the following is true of our solar system?

a. Not all known planets orbit in the same direction around the sun.

b. Not all planets spin in the same direction as they orbit.

c. It has an equal number of stars and planets.

d. There is no evidence for liquid water having ever existed on any planet other than Earth.

e. It is less than 1 million years old.

21. Which is NOT true in a comparison between Mars and Earth?

a. Mars has larger isolated shield volcanoes than Earth.

b. Mars likely cooled more slowly than Earth

c. Mars has less evidence for plate tectonic motions, consistent with having a thicker crust.

d. Like Earth, there are ices on the polar caps of Mars

e. Unlike Earth, liquid water has not yet been detected on Mars.

22. In the atmosphere, ---- helps block harmful ultra-violet radiation from the sun that can cause skin cancer.

a. oxygen (O_2)

b. nitrogen (N_2)

c. carbon dioxide (CO_2)

d. ozone (O_3)

e. ammonia (NH_3)

23. The energy that drives crustal plate motion and forms mountain ranges on Earth comes mainly from

a. heat from gravitational energy release

during Earth's formation, and radioactive element decay

b. the steady supply of solar radiation that heats the Earth's surface from above

c. tidal forces from the moon

d. human activity and burning fossil fuels

e. the orbital energy of the Earth moving around the sun

24. Which of the following is NOT involved in producing the aurorae on Earth?

a. solar wind

b. Earth's magnetic field

c. quantum mechanics and excited atoms

d. tidal gravity forces

e. Earth's dynamo

25. The lunar highlands

a. are older than the lunar maria

b. are covered with regolith

c. are made primarily of iron oxide

d. show few craters

e. a and b

26. The moon is no longer geologically active because

a. it rotates too slowly

b. it is so small that it cooled quickly

c. it is too large to be geologically active

d. it does not have surface oceans

e. it never had enough radioactive elements

27. Lobate scarps are

- a. sinuous rilles on the moon
 - b. large volcanoes on Venus
 - c. a new British rock band from Liverpool
 - d. dark and light variations on the solar surface
 - e. crust wrinkles on Mercury
- 28.** The remarkable fact that a Mercury day lasts two Mercury years
- a. means that the spin period of Mercury must be longer than its orbit period
 - b. is the result of tidal interactions between Mercury and its moons
 - c. is a result of Mercury's strong magnetic field
 - d. results because Mercury's rotation period is 2/3 of its orbit period
 - e. requires general relativistic corrections to Newton's gravity theory to be explained
- 29.** Tidal forces are the reason why
- a. smaller objects in the solar system tend to be less geologically active
 - b. most planets and the sun have magnetic fields
 - c. the same side of the Moon always faces Earth
 - d. Mars is presently dry
 - e. solar flares erupt on the sun
- 30.** Which of the following characteristic(s) of the moon support(s) the large impact/ejected ring model of the moon's formation?
- a. the measured angular momentum of the Earth-moon system
 - b. moon is poor in iron
 - c. moon composition is similar to Earth's mantle
 - d. the moon lacks volatile elements
 - e. all of the above
- 31.** The point on a planet most directly illuminated by sun is called the
- a. equator point
 - b. perihelion point
 - c. sub-solar point
 - d. node point
 - e. zenith point
- 32.** Venus is most similar in mass and density to which solar system object?
- a. Jupiter
 - b. Phobos
 - c. Mars
 - d. Deimos
 - e. Earth
- 33.** Earth's crust _____ Mars' crust
- a. is younger than
 - b. contains less liquid water than
 - c. is currently less geologically active than
 - d. all of the above
 - e. none of the above
- 34.** The moons of Mars are
- a. composed primarily of iron and nickel
 - b. composed primarily of frozen water and carbon dioxide

- c. are not spherical because their small size provides too little gravity to make them so
- d. orbiting Mars in retrograde motion
- e. formed from material ejected from volcanoes on Mars

35. Which is the best explanation for the present scarcity of liquid water on Mars?

- a. water vapor was released from the impact that formed its moon Phobos
- b. Mars formed in a part of the solar nebula devoid of hydrogen
- c. the needed hydrogen escaped after the solar UV radiation broke down water molecules
- d. thirsty Martians drank it all
- e. Mars formed in a small part of the solar nebula devoid of hydrogen

36. Which is NOT a characteristic of nuclear fusion?

- a. fusion of hydrogen produces Helium
- b. fusion occurs at high temperatures because energy is needed to overcome the Coulomb barrier between atomic nuclei
- c. Uranium 235 decays by nuclear fusion
- d. fusion produces many elements heavier than helium in stars
- e. none of the above

37. Which one of the following is not directly associated with magnetic fields?

- a. the mechanism by which a navigation compass works
- b. sunspot cycle
- c. solar flares

- d. solar prominences
- e. limb darkening

38. Unlike Venus, Mars has avoided a runaway greenhouse effect primarily because

- a. it is nearer to the sun
- b. it has a weaker magnetic field
- c. it has absolutely no carbon dioxide
- d. its weaker gravity keeps its atmosphere at a much lower density
- e. it has more ozone

39. What is NOT true about a comet passing near the sun?

- a. the comet's tail always points away from the sun
- b. the comet's tail always points toward the Earth
- c. sometimes the comet's tail points away and sometimes toward the sun
- d. comet transits by the sun only happen during a solar or lunar eclipse
- e. b, c, d

40. An astronomer measures the light from two objects A and B and she finds that they are both blackbodies. If the peak in the observed emission of A is at wavelength 1000nm and the peak of B is at 200nm, then what is the ratio of their photospheric temperatures?

- a. $T_A/T_B = 5$
- b. $T_A/T_B = 1/5$
- c. $T_A/T_B = 25$
- d. $T_A/T_B = 1/25$

e. $T_A/T_B = 1/625$

True or False:

41. Blue stars are hotter than red stars.
42. The solar nebula from which the planets formed was primarily composed of nitrogen and oxygen.
43. Mountain ranges on Earth are the result of crustal plate motions.
44. Shield volcanoes on Earth are typically larger than those on Mars.
45. The fractional abundance of various ionization states in stars (and thus the spectral sequence) is determined mainly by the star's temperature.
46. The average density of the sun is smaller than the average density of Earth even though its mass is larger.
47. Convection helps transport heat from the interior of the sun to its surface.
48. The present strength of the magnetic field of Venus suggests the presence of a vigorous dynamo.
49. The study of seismic waves that pass through the Earth's interior has revealed that the Earth has an inner core of solid Iron and Nickel.
50. Being hotter, Venus has more liquid water on its surface than Earth.

Answers

- | | |
|------|-------|
| 1.B | 28.D |
| 2.A | 29.C |
| 3.E | 30.E |
| 4.B | 31.C |
| 5.D | 32.E |
| 6.D | 33.A |
| 7.C | 34.C |
| 8.D | 35.C |
| 9.A | 36.C |
| 10.A | 37.E |
| 11.C | 38.D |
| 12.B | 39.E |
| 13.A | 40. B |
| 14.A | 41. T |
| 15.B | 42. F |
| 16.E | 43. T |
| 17.C | 44. F |
| 18.A | 45. T |
| 19.C | 46. T |
| 20.B | 47. T |
| 21.B | 48. F |
| 22.D | 49. T |
| 23.A | 50. F |
| 24.D | |
| 25.E | |
| 26.B | |
| 27.E | |