Astr 01 **HW 05: The Earth-Moon System** Name_____

Show ALL work for full credit. Each problem 2 pts unless otherwise noted.

1) Our Earth is about four times larger than the Moon in diameter.

2) Greenhouse gases in our atmosphere trap just enough heat to keep the Earth's oceans liquid.

3) A seismograph could register P but not S waves from an epicenter on the opposite side of the Earth.

4) There is no evidence for plate tectonics on the Moon today.

5) Early telescopic observers thought the lunar mare were seas of water; today we know they are not liquid water but molten basalt, long ago frozen out.

6) The lunar mare are younger than any of the craters that sit in them.

7) The crust on the near side of the Moon is on average thinner than the crust on the far side, due to our tidal pull on the Moon.

8) Today most scientists favor the capture theory of the Moon's origin, since it would explain why the Moon still orbits in the ecliptic plane, as do other planets.

9) What is true of the Moon's orbital and rotational periods?
   A) The orbital period is longer.
   B) The orbital period is greatest at full moon.
   C) The rotational period is longer.
   D) They are equal.
   E) The rotational period varies with the Moon's phase.

10) Almost all of our atmospheric gases lie in the
   A) ionosphere
   B) mesosphere
   C) troposphere
   D) ozone layer
   E) stratosphere

11) The critical part of the atmosphere for protecting life on the ground from excessive ultraviolet radiation is the
   A) ionosphere.
   B) troposphere.
   C) ozone layer.
   D) hydrosphere.
   E) stratosphere.

12) Without the greenhouse effect operating in our atmosphere,
   A) the ozone layer would not be weakening.
   B) the ice in the polar regions would have melted long ago.
   C) the Earth would have become much more like Venus long ago.
   D) we would not have to worry about any warming problems in the future.
   E) Earth would have an average temperature of –23 degrees Celsius.

13) The major presence of water detected on the Moon is in
A) the puffs of steam seen coming from some still active lunar volcanoes.
B) the floors of deep craters in the polar regions, as ice deposits that never thaw.
C) the flows of mud seen on the walls of some craters.
D) faint clouds of ice in the thin lunar atmosphere.
E) the mare.

14) The average rate of erosion on the Moon is far less than on Earth because
A) the Moon lacks wind, water, and an atmosphere.
B) the Moon is much younger than the Earth.
C) the Moon's mare long ago dried up, so there is no more wave erosion there.
D) the Moon's magnetic field protects it from the solar wind better than ours does.
E) the crust of the Moon is much denser than the Earth's crust.

15) In noting that the Earth is "differentiated," we mean that
A) the Earth's magnetic field varies at different locations on the globe.
B) the Earth is very different than any other planet we study.
C) the radioactive heating in the core is increasing with time.
D) the density increases as you descend downward toward the core.
E) the density of oceanic basalt is less than that of granite on the mountain tops.

16) Which of these is NOT a result of plate tectonics?
A) the San Andreas Fault
B) the Grand Canyon
C) the Andes
D) the Philippine Trench
E) the Mid–Atlantic Rift

17) The presence of a magnetic field is a good indication that
A) the Earth's interior must be completely molten to the center.
B) the Earth has a liquid metal outer core, spinning rapidly as it rotates.
C) the Earth's interior is similar to Mercury's, as both have fields.
D) a huge iron meteorite lies somewhere high up in the mantle, not in the core.
E) the Earth's interior has had time to solidify, with a rigid bar magnet created.

18) When strong solar winds are displaced poleward by our magnetic fields, we get
A) hurricanes in the tropics.
B) droughts and dust bowls in the American West.
C) intense auroral displays.
D) the Van Allen radiation belts.
E) sunspots.

19) The region in which charged particles are trapped by our magnetic fields is the
A) exosphere.
B) Van Allen radiation belt.
C) ionosphere.
D) Aurora.
E) ozone layers.

20) Earth's magnetic field
A) is weakening the Van Allen radiation belts.
B) is a remnant of the solar nebula's magnetic field.
C) is the force behind plate tectonics.
D) prevents charged particles in the solar wind from reaching the surface.
E) lines intersect the atmosphere at the equator.

21) The Sun reinforces the Moon's tidal pull during _____ tides.
A) quarter B) neap C) slack D) spring E) ebb

22) The ozone layer blocks much of the Sun's _____ radiation.
A) ultraviolet B) X-ray C) gamma ray D) infrared E) radio

23) The most abundant gas in the Earth's atmosphere is
A) watervapor B) nitrogen C) hydrogen D) helium E) oxygen

24) Weather always occurs in the lowest layer of the atmosphere, the
A) mesosphere.
B) stratosphere.
C) ionosphere.
D) troposphere.
E) thermosphere.

25) The oldest rocks found on the Earth's surface date back about _____ billion years.
A) one B) two C) three D) four E) 4.5

26) The Moon's spin-orbit resonance shows it is _____ with the Earth.

27) The difference in the Moon's gravitational force on the near and far sides of the Earth produces a(n) _____.

28) The _____ in our atmosphere is the result of photosynthesis by plants.

29) The Moon lacks an atmosphere because its surface gravity is only _____ the Earth's.

30) The water that has been detected on the Moon lies at its _____.

31) Our molten core is believed to consist primarily of the element _____.

32) The _____ seismic waves can pass through both solid and liquid portions of the Earth's interior, and be detected on the other side of the globe.

33) Where is the newest material in the Earth's crust found?

34) Note at least three surface features that are driven by plate tectonics.

35) Why is the Moon heavily cratered but Earth is not?

36) Explain how crater counts allow us to estimate the ages of surfaces throughout the solar system.