MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which major atmospheric component is chiefly a product of life processes? 1) ______
   A) carbon dioxide
   B) nitrogen
   C) oxygen
   D) hydrogen sulfide
   E) water

2) The presence of a magnetic field is a good indication that: 2) ______
   A) a huge iron meteorite lies somewhere high up in the mantle, not in the core.
   B) the Earth’s interior is similar to Mercury’s, as both have fields.
   C) we have a liquid metal outer core, spinning rapidly as we rotate.
   D) the Earth’s interior has had time to solidify, with a rigid bar magnet created.
   E) the Earth’s interior must be completely molten to the center.

3) A region where a denser basaltic plate is subducted under a continental one is: 3) ______
   A) the Mid-Atlantic Rift.
   B) the Nazca Trench.
   C) the San Andreas Fault.
   D) the Himalayas.
   E) Hawaii.

4) What is true of spring tides? 4) ______
   A) There would be one high and one low tide each day.
   B) The third quarter Moon would be high overhead at dawn.
   C) The Moon’s phase will be first quarter.
   D) The difference between low and high tides would be smallest.
   E) The difference between low and high tides would be greatest.

5) Compared to the density of water, our Earth averages: 5) ______
   A) about 4 times denser, similar to Mars.
   B) about 5 times denser, like the Mercury and Venus.
   C) about 3 times denser, much like our Moon.
   D) about 10 times denser, due to our core of iron and nickel.
   E) about the same density, similar to Saturn.

6) Within Earth’s atmosphere, in which layer does convection occur? 6) ______
   A) the stratosphere
   B) the ionosphere
   C) the troposphere
   D) convection occurs in all layers of Earth’s atmosphere
   E) the mesosphere

7) This design involves only one optical surface, a concave mirror. 7) ______
   A) prime focus reflector
   B) refractor
   C) Cassegrain reflector
   D) Newtonian reflector
8) As the solar nebula contracts due to gravitation, the cloud __________
A) becomes more spherical in shape.
B) begins to cool.
C) expands.
D) changes direction of motion.
E) spins faster.

9) The Kuiper Belt is an "outer asteroid belt" consisting of what types of solar system bodies? __________
A) terrestrial planets
B) meteoroids
C) asteroids
D) jovian planets
E) icy cometlike bodies

10) The "Grand Tour" of all four jovians was conducted by: __________
A) Voyager 1 and 2 both.
B) Pioneer 11.
C) Galileo.
D) Voyager 2.
E) Cassini.

11) The convex secondary mirror in this design focuses light down through a hole cut in the concave primary mirror. __________
A) Newtonian reflector
B) Cassegrain reflector
C) refractor
D) interferometer
E) prime focus reflector

12) A telescope with a 60 mm objective lens collects how many times as much light as does your eye's 6 mm exit pupil? __________
A) 5X  B) 10X  C) 250X D) 25X  E) 100X

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

14) Objects in the Kuiper belt __________
A) are the sources of long-period comets.
B) lie beyond the orbit of Neptune, and close to the ecliptic.
C) lie beyond the orbit of Neptune and perpendicular to the ecliptic.
D) are in random orbits at all inclinations to the ecliptic.
E) are dense, like the iron meteorites.

15) What is the goal of comparative planetology?  
A) to find which planets will be most suitable for future colonization  
B) to find out how our own solar system compares with extrasolar ones  
C) to help plan future visits by unmanned probes, orbiters, and rovers  
D) to determine the origin and evolution of the solar system  
E) to use planetary positions to foretell the future

16) Why are most large telescopes reflectors, not refractors?  
A) Large, very clear lenses are harder to cast than more tolerant mirror blanks.  
B) Large lenses deform under their own weight, but mirrors can be supported.  
C) Large mirrors need only one optical surface, achromats four surfaces to grind.  
D) Reflectors do not suffer from chromatic aberration like refractors do.  
E) All of the above are correct.

17) The Mariner 10 spacecraft visited which bodies in the solar system?  
A) Mars and Mercury  
B) the jovian planets  
C) Mars and Jupiter  
D) Mercury and Venus  
E) Venus and Mars

18) The most important advantage of CCDs over film is that  
A) they record colors better than film can.  
B) their images do not have to be developed as film does.  
C) they record much more light in a given exposure time.  
D) they can cover larger areas of the sky than film can.  
E) their images never fade, as film can.

19) The jovian planets  
A) have satellite systems with less than 4 moons.  
B) all lie less than 5 AU from the Sun.  
C) are all much more dense than any of the terrestrials planets.  
D) all spin slower than the earth.  
E) all have rings around their equators.

20) Within Earth's atmosphere the ozone layer is located  
A) between the stratosphere and the mesosphere.  
B) in the stratosphere.  
C) in the mesosphere.  
D) in the troposphere.  
E) between the troposphere and the stratosphere.

21) The region around Earth where the magnetic field traps charged particles is the:  
A) ozone layer.  
B) corona.  
C) exosphere.  
D) Van Allen Radiation Belts.  
E) aurora borealis and aurstralis.
22) What aspects of the planets orbits are nearly the same for most planets? 22) ______
A) shape and tilt from the ecliptic
B) orbital period and distance from the Sun
C) shape and distance from the Sun
D) orbital period and shape
E) tilt from the ecliptic and distance from the Sun

23) The amount of diffraction a telescope creates depends upon: 23) ______
A) the types of glass used in the achromat.
B) the magnification of the eyepiece.
C) the wavelength and the diameter of the telescope objective.
D) whether the telescope is a refractor or a reflector.
E) the transparency of the atmosphere.

24) Which of the following have an icy composition? 24) ______
A) most asteroids
B) comets
C) the surface of Mars
D) meteorites and most asteroids
E) meteoroids

25) The principal greenhouse gases in our present atmosphere are: 25) ______
A) sulfuric acid vapor and carbon dioxide.
B) hydrogen and helium.
C) methane and ammonia.
D) hydrogen sulfide and carbon disulfide.
E) water vapor and carbon dioxide.

26) The Arecibo radio telescope is laid out like which optical telescope design? 26) ______
A) grazing incidence reflector
B) prime focus reflector
C) Cassegrain reflector
D) Newtonian reflector
E) Coude reflector

27) Which parts of the Sun’s radiation are responsible for heating Earth’s surface? 27) ______
A) the x-ray and the gamma ray
B) the ultraviolet and the visible
C) the visible and the infrared
D) the infrared and the high energy particles
E) the radio and the ultraviolet

28) Mercury’s most unusual orbital feature, as compared to the other planets, is 28) ______
A) the size of its orbit.
B) its orbital period.
C) the size of the planet.
D) that it has no moons.
E) the shape of its orbit.

29) What is the percentage of Earth’s atmosphere (by volume) that is carbon dioxide (CO₂)? 29) ______
A) 0.03  
B) 3  
C) 78  
D) 0.9  
E) 21

30) Which of these devices helps correct coma in fast reflectors?  30) ____
A) achromatic doublet  
B) star diagonal  
C) Cassegrain secondary mirror  
D) Newtonian secondary mirror  
E) Schmidt corrector plate

31) In which part of the electromagnetic spectrum have astronomers been unable to get any information?  31) ____
A) microwaves  
B) X-rays  
C) gamma rays  
D) ultraviolet  
E) We now can access information in all spectral lengths.

32) This design combines the radiation from two different telescopes to greatly enhance resolution via computer synthesis.  32) ____
A) Newtonian reflector  
B) interferometer  
C) prime focus reflector  
D) refractor  
E) Cassegrain reflector

33) Which design has a convex primary mirror and flat secondary mirror, with the eyepiece located on the top side of the telescope tube?  33) ____
A) interferometer  
B) prime focus reflector  
C) Newtonian reflector  
D) Cassegrain reflector  
E) refractor

34) Which type of telescope has the simplest light path?  34) ____
A) Cassegrain reflector  
B) prime focus reflector  
C) single lens refractor  
D) achromatic refractor  
E) Newtonian reflector

35) In noting that our world is “differentiated,” we mean that:  35) ____
A) the Earth’s magnetic field is different now in polarity than it was 700,000 years ago.  
B) radioactive heating in the core is at a slower pace than when the Earth was new.  
C) the density of its materials decreases as you go downward toward the core.  
D) the Earth has evolved in a different pattern than any other planet.
E) the iron and nickel core is denser than the silicate mantle and crust.

36) Our best close-up views of the jovian moons came from the many passes by: 36) ______
A) New Horizons.
B) Voyager 2.
C) Cassini.
D) Galileo.
E) Global Surveyor.

37) In order to determine the mass of a planet by applying Newton's laws of motion and gravity, the planet must have 37) ______
A) a known size and distance from Earth.
B) planets further from the Sun than itself.
C) a solid surface.
D) rings.
E) moons.

38) A major advantage of a Newtonian reflector over a refractor is 38) ______
A) the central hole in the mirror is smaller.
B) there are only two lenses to grind.
C) the elimination of chromatic aberration.
D) the elimination of the secondary mirror.
E) its compact size.

39) The Kuiper Belt is found where in the solar system? 39) ______
A) between the orbits of Mars and Jupiter
B) sixty degrees ahead or behind Jupiter
C) beyond the orbit of Neptune
D) among the orbits of the terrestrial planets
E) between the orbits of Jupiter and Uranus

40) The critical part of the atmosphere for protecting life on the ground from excessive ultraviolet radiation is the: 40) ______
A) stratosphere.
B) ozone layer.
C) troposphere.
D) hydrosphere.
E) ionosphere.