Astr 01 **HW 04: The Solar System** Name_____

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

1) All jovian planets have rings around their equators and at least eight moons.

2) A Kuiper Belt object was discovered that may be larger than Pluto.

3) Meteor showers are the result of collisions between asteroids.

4) Comets are not actually members of the solar system, but have been captured by the Sun.

5) The Oort Cloud lies closer to the Sun than the Kuiper Belt.

6) As a rotating gas cloud contracts, it spins faster.

7) We would expect other planets beyond our own solar system to orbit the equators of their home stars, as our own planets orbit the Sun.

8) No stars have yet been observed that have more than one exoplanet.

9) Density is defined as
   A) size divided by weight.
   B) mass times weight.
   C) weight divided by the planet's radius.
   D) mass per unit volume.
   E) weight per square inch.

10) Planetary orbits
   A) have the Sun at their exact center.
   B) are evenly spaced throughout the solar system.
   C) are highly inclined to the ecliptic.
   D) are spaced more closely together as they get further from the Sun.
   E) are almost circular, with low eccentricities.

11) The tail of a comet always points
   A) in the direction of the comet's motion.
   B) away from the Sun and disappears at perihelion.
   C) toward Earth and never varies.
   D) away from the Sun and becomes longest and brightest at perihelion.
   E) toward the Sun and disappears at perihelion.

12) Iron meteorites are believed to come from
   A) the core of a differentiated asteroid, now broken up.
   B) interstellar space.
   C) a broken up cometary nucleus.
   D) debris from the Kuiper Belt.
   E) the crust of a differentiated asteroid, now broken up.

13) Meteorites are important because
A) some come from the Moon and Mars, as well as the asteroid belt.
B) they contain pristine material from the solar nebula.
C) large ones may cause mass extinctions.
D) All of the above are true.
E) None of the above is true.

14) A meteorite is
A) an icy body with a long tail extending from it.
B) an irregularly shaped body, mostly found orbiting between Mars and Jupiter.
C) a chunk of space debris that has struck the ground.
D) a chunk of space debris orbiting the Earth.
E) a streak of light in the atmosphere.

15) The nucleus of a comet is typically
A) very durable, made of iron.
B) a few meters in diameter.
C) a few kilometers in size, and very low in density.
D) located between the orbits of Mars and Jupiter.
E) a few hundred kilometers across, and bright, shiny white from its ices.

16) If a comet's ion tail is pointing perpendicular to its direction of travel, the comet is
A) close to or at perihelion.
B) moving closer to the Sun.
C) moving away from the Sun.
D) close to or at aphelion.
E) A comet's tail never points perpendicular to its motion.

17) In terms of composition,
A) the jovian planets are more like the Sun than are the terrestrials.
B) the terrestrials are more like the Sun, since they formed close to it.
C) the Sun is unique, made of nothing but hydrogen and helium.
D) all planets are condensed from the same nebula and have similar compositions.
E) the jovian planets are made only of ice, and the terrestrials only of rock.

18) Most of the extrasolar planets found so far were detected by
A) receiving radio transmissions from them, much like Jupiter emits.
B) imaging them with the HST in the infrared, where they are easier to stop.
C) detecting the oxygen in their atmospheres spectroscopically.
D) noting the drop in the star's light as the planet transits its disk.
E) noting the Doppler shifts of the star as the planet orbits it from side to side.

19) Planetary transits of exoplanets are rare because
A) most stars are too bright for us to detect a planetary transit.
B) most extrasolar systems are not seen edge-on.
C) the Earth's atmosphere interferes with our observations of transits.
D) most exoplanets are smaller than Pluto.
E) our telescopes are not powerful enough to detect them.

20) The terrestrial planets have mantles of _____ materials and iron rich cores.

21) The _____ is a vast, spherical array of comet nuclei far beyond the orbit of Neptune.

22) The asteroids moving in the orbit of Jupiter, but 60 degrees ahead or behind it, are called the _____.

23) The asteroids moving in the orbit of Jupiter, but 60 degrees ahead or behind it, are called the _____.

24) The age of the solar system is determined with _____ dating.

25) The process by which small debris condenses into planetesimals is _____.

26) The _____ spacecraft, launched in 2009, has found hundreds of exoplanet candidates.

27) Why do we expect other solar systems to be common?

28) Why don't we see very many low–mass exoplanets?

29) Relate meteor showers to comets; explain why most are annual events.

30) Suppose an extrasolar planet's orbit around its star is edge–on to our line of sight. How is it detected, and what information can be obtained in this case?

31) Explain how the Doppler effect has been used to detect invisible planets orbiting other Sun–like stars.