Astr 1010 Quiz 1 Spring 2012 Dr. Crenshaw

Name_____

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

*Choose the letter for the real motion of space from the list below that is responsible for the apparent motion of space as seen from Earth.*

A. The earth rotates once each day.
B. The earth revolves around the Sun once each year.
C. The direction of the earth's axis in space precesses with a period of 26,000 years.
D. Stars appear to move randomly in the local solar neighborhood.
E. The universe is expanding.

1) Polaris will no longer be the North Star 1,000 years from now. 1) _____

2) The Moon rises in the east and sets in the west. 2) _____

3) In the year A.D.15,000, Vega will be a better north star than Polaris. 3) _____

4) We see different constellations in the winter than we see in the summer 4) _____

5) A million years from now, Alpha Centauri will no longer be the nearest star system to our own. 5) _____

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

6) At approximately what time would a full moon be on your meridian? 6) _____
A) 9 A.M.
B) 6 A.M.
C) midnight
D) noon
E) 6 P.M.

7) How many arcseconds are in 1°? 7) _____
A) 3,600 B) 60 C) 10,000 D) 100 E) 360

8) Which of the following is largest? 8) _____
A) size of Pluto's orbit
B) distance to the nearest star (other than our Sun)
C) 1 light-year
D) size of a typical galaxy

9) How did the Ptolemaic model explain the apparent retrograde motion of the planets? 9) _____

A) It held that the planets moved along small circles that moved on larger circles around the Sun.
B) It varied the motion of the celestial sphere so that it sometimes moved backward.
C) It held that the planets moved along small circles that moved on larger circles around the earth.
D) It placed the Sun at the center so that the planets' apparent retrograde motion was seen as the earth passed each one in its orbit.
E) It held that sometimes the planets moved backward along their circular orbits.

10) Which of the following was *not* observed by Galileo? 10) _____

A) stellar parallax
B) Jupiter's moons
C) craters on the Moon
D) sunspots
E) phases of Venus

11) On a cosmic calendar, in which the history of the universe is compressed into 1 year, when did Kepler and Galileo first discover that we live on a planet in a solar system? 11) _____

A) 1 week ago
B) December 30
C) December 25
D) 1 day ago
E) 1 second ago

12) Which of the following never goes in retrograde motion? 12) _____

A) Venus B) Saturn C) Mars D) the Sun E) Jupiter

13) What is the *ecliptic*? 13) _____

A) when the Moon passes in front of the Sun
B) the Sun's apparent path through the stars.
C) the constellations commonly used in astrology to predict the future
D) the Sun's daily path across the sky
E) the Moon's apparent path along the celestial sphere

14) You are standing on the earth's equator. Which way is Polaris, the North star? 14) _____

A) The answer depends on what time of day (or night) it is.
B) 30 degrees up, due West
C) directly overhead
D) The answer depends on whether it's winter or summer.
E) on the northern horizon

15) Roughly how many stars are in the Milky Way Galaxy? 15) _____

A) 1 billion
B) 10 billion
C) 100 billion
D) 100 million
E) 100 trillion

16) The age of the universe is 16) _____
A) between 10 billion and 16 billion years.
B) between 100 billion and 160 billion years.
C) between 1 billion and 1.6 billion years.
D) between 100 million and 160 million years.
E) between 10 million and 16 million years.

17) Why do we see essentially the same face of the Moon at all times? 17) _____
A) because the other face points toward us only at new moon, when we can't see the Moon
B) because the Moon does not rotate
C) because the Moon has a nearly circular orbit around the earth
D) because the Sun illuminates only one half at a time
E) because the Moon's rotational and orbital periods are equal

18) If the Moon is relatively far from the earth, so that the umbra does not reach the earth, someone directly behind the umbra will see 18) _____
A) a penumbral lunar eclipse.
B) a partial lunar eclipse.
C) a partial solar eclipse.
D) no eclipse.
E) an annular eclipse.

19) What effect or effects would be most significant if the Moon's orbital plane were exactly the same as the ecliptic plane? 19) _____
A) Solar eclipses would last much longer.
B) Solar eclipses would be much more frequent.
C) Solar eclipses would be much rarer.
D) both A and C
E) both B and C

20) What was the phase of the moon last night? 20) _____
A) new.
B) 1st quarter.
C) blue
D) 3rd quarter.
E) full.

21) Kepler's second law, which states that as a planet moves around its orbit it sweeps out equal areas in equal times, means that 21) _____
A) a planet travels faster when it is nearer to the Sun and slower when it is farther from the Sun.
B) a planet's period does not depend on the eccentricity of its orbit.
C) the period of a planet does not depend on its mass.
D) planets have circular orbits.
E) planets that are farther from the Sun move at slower average speeds than nearer planets.

22) He discovered that the orbits of planets are ellipses. 22) _____
A) Copernicus
B) Kepler
C) Ptolemy
D) Tycho Brahe
E) Galileo

23) How did Eratosthenes estimate the size of the earth in 240 BC? 23) _____
A) by comparing the maximum altitude of the Sun in two cities at different latitudes
B) by measuring the size of the earth's shadow on the Moon in a lunar eclipse
C) by observing the duration of a solar eclipse
D) by sending fleets of ships around the earth
E) We don't know how he did it since all his writings were destroyed.

24) From Kepler's third law, an asteroid with an orbital period of 8 years lies at an average distance from the Sun equal to 24) _____
A) 8 astronomical units.
B) 2 astronomical units.
C) 4 astronomical units.
D) 16 astronomical units.
E) It depends on the asteroid's mass.

25) If the Moon is setting at 6 AM, the phase of the Moon must be 25) _____
A) first quarter.
B) waning crescent.
C) new.
D) full.
E) third quarter.

26) Which of the following has your "address" in the correct order? 26) _____
A) you, Earth, solar system, Milky Way, Local Group, Local Supercluster
B) you, Earth, solar system, Local Group, Local Supercluster, Milky Way
C) you, Earth, solar system, Milky Way, Local Supercluster, Local Group
D) you, Earth, solar system, Local Group, Milky Way, Local Supercluster
E) you, Earth, Local Group, Local Supercluster, solar system, Milky Way

27) Suppose we imagine the Sun to be about the size of a grapefruit. How big an area would the orbits of the eight planets of the Solar System cover? 27) _____
A) the size of a typical dorm room
B) the size of a western state (*e.g.* Colorado)
C) the size of a small city
D) the size of a large city
E) the size of a typical campus football stadium

28) Which of the following correctly describes the *meridian* in your sky? 28) _____

A) a half-circle extending from your horizon due east, through the north celestial pole, to your horizon due west
B) the point directly over your head
C) a half-circle extending from your horizon due east, through your zenith, to your horizon due west
D) a half-circle extending from your horizon due north, through your zenith, to your horizon due south
E) the boundary between the portion of the celestial sphere you can see at any moment and the portion that you cannot see

29) An astronomical object that generates its own light by nuclear fusion is called a 29) _____

A) moon.
B) nebula.
C) lightning bug.
D) planet.
E) star.

30) Why do we have seasons on Earth? 30) _____

A) Seasons are caused by the influence of the planet Jupiter on our orbit.
B) The tilt of the earth's axis constantly changes between 0 and 23 1/2°, giving us summer when the earth is tilted more and winter when it is straight up.
C) The earth's distance from the Sun varies, so that it is summer when we are closer to the Sun and winter when we are farther from the Sun.
D) As the earth goes around the Sun and the earth's axis remains pointed toward Polaris, the Northern and Southern hemispheres alternately receive more and less direct sunlight.

31) Which of the following statements does *not* use the term *light-year* in an appropriate way? 31) _____

A) The Milky Way Galaxy is about 100,000 light-years in diameter.
B) A light-year is about 10 trillion kilometers.
C) It will take me light-years to complete this homework assignment.
D) It's about 4 light-years from here to Alpha Centauri.
E) It will take the Voyager spacecraft about 20,000 years to travel just 1 light-year.

32) The nearest star in the sky (other than the Sun) is about how far away? 32) _____

A) 4 Astronomical Units
B) 4 million light years
C) 4 light minutes
D) 4000 light years
E) 4 light years

33) During a solar eclipse, the phase of the Moon is 33) _____

A) unknown.
B) 1st quarter.
C) new.
D) 3rd quarter.
E) full.

34) A planet with circular orbit has an orbital eccentricity of 34) _____
A) 0.5
B) 1
C) 0
D) an unknown amount
E) -1

35) When someone on the earth observes the Moon in the new Moon phase, someone on the Moon facing the earth observes the earth in the 35) _____
A) third-quarter Earth phase.
B) crescent Earth phase.
C) new Earth phase.
D) full Earth phase.
E) first-quarter Earth phase.

36) Suppose you live on the Moon. How long is a day (*i.e.*, from sunrise to sunrise)? 36) _____
A) a lunar month
B) about 18 years
C) 24 hours
D) a year
E) 23 hours 56 minutes

37) He discovered that Jupiter has moons. 37) _____
A) Kepler
B) Aristotle
C) Ptolemy
D) Tycho Brahe
E) Galileo

38) What makes the North Star, Polaris, special? 38) _____
A) It can be used to determine your longitude on Earth.
B) It is the star straight overhead.
C) It appears very near the north celestial pole.
D) It is the star directly on your northern horizon.
E) It is the brightest star in the sky.

39) When Copernicus first created his Sun-centered model of the universe, it did not lead to substantially better predictions of planetary positions than the Ptolemaic model. Why not? 39) _____
A) Copernicus placed the Sun at the center but did not realize that the Moon orbits the earth.
B) Copernicus misjudged the distances between the planets.
C) Copernicus placed the planets in the wrong order going outward from the Sun.
D) Copernicus used perfect circles for the orbits of the planets.
E) Copernicus misjudged the speeds at which the planets orbit the Sun.

40) What is an *astronomical unit*? 40) _____

A) the average distance from the earth to the Sun
B) the average speed of the earth around the Sun
C) any basic unit used in astronomy
D) the diameter of the earth's orbit around the Sun
E) the length of time it takes the earth to revolve around the Sun

Astr 1010 Quiz 2 Spring 2012 Dr. Crenshaw

Name_____

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

1) If a material is *transparent*, then it 1) _____
A) scatters light well.
B) absorbs light well.
C) emits light well.
D) reflects light well.
E) transmits light well.

2) When an electron in an atom goes from a higher energy state to a lower energy state, the atom 2) _____
A) absorbs several photons of a specific frequency.
B) can absorb a photon of any frequency.
C) emits a photon of a specific frequency.
D) can emit a photon of any frequency.
E) absorbs a photon of a specific frequency.

3) If we observe one edge of a planet to be redshifted and the opposite edge to be blueshifted, what can we conclude about the planet? 3) _____
A) The planet is in the process of formation.
B) The planet is actually two bodies, one moving toward us, the other away from us.
C) The planet is in the process of falling apart.
D) The planet is rotating.

4) What quantities does *angular momentum* depend upon? 4) _____
A) mass and velocity
B) force and radius
C) mass, velocity, and radius
D) momentum and angular velocity
E) force, velocity, and radius

5) As a thermal souce of radiation gets hotter, what happens to its color, and what happpens to the brightness of the red light that it emits? 5) _____
A) color gets bluer, red light doesn't change
B) color gets bluer, red light gets stronger
C) color gets bluer, red light gets weaker
D) color gets redder, red light get weaker
E) color gets redder, red light get stronger

6) An atom of the element iron has an *atomic number* of 26 and an *atomic weight* of 56. If it is neutral, how many protons, neutrons, and electrons does it have? 6) _____

A) 26 protons, 30 neutrons, 26 electrons
B) 26 protons, 30 neutrons, 30 electrons
C) 13 protons, 56 neutrons, 13 electrons
D) 26 protons, 56 neutrons, 26 electrons
E) 13 protons, 43 neutrons, 13 electrons

7) When an atom loses an electron, it becomes 7) _____

A) dissociated.
B) sublimated.
C) a plasma.
D) an isotope.
E) ionized.

8) What does *temperature* measure? 8) _____

A) the average size of particles in a substance
B) the average kinetic energy of particles in a substance
C) the total number of particles in a substance
D) the total potential energy of particles in a substance
E) the average mass of particles in a substance

9) The allowed shapes for orbits under the force of gravity are 9) _____

A) ellipses only.
B) ellipses and spirals.
C) ellipses, parabolas, and hyperbolas.
D) ellipses, spirals, and parabolas.
E) spirals, circles, and squares.

10) Which of the following objects is *not* a close approximation of a *thermal emitter*? 10) _____

A) you
B) a planet
C) hot, thin gas
D) a star
E) a filament in a light bulb

11) Which of the following is an example in which you are traveling at constant speed but not at constant velocity? 11) _____

A) jumping up and down, with a period of exactly 60 hops per minute
B) driving backward at exactly 50 km/hr
C) rolling freely down a hill in a cart, traveling in a straight line
D) driving around in a circle at exactly 100 km/hr
E) none of the above

12) From shortest to longest wavelength, which of the following correctly orders the different categories of electromagnetic radiation? 12) _____

A) gamma rays, X rays, visible light, ultraviolet, infrared, radio
B) radio, infrared, visible light, ultraviolet, X rays, gamma rays
C) visible light, infrared, X rays, ultraviolet, gamma rays, radio
D) infrared, visible light, ultraviolet, X rays, gamma rays, radio
E) gamma rays, X rays, ultraviolet, visible light, infrared, radio

13) Considering Einstein's famous equation, $E = mc^2$, which of the following statements is *true*? 13) _____

A) You can make mass into energy if you can accelerate the mass to the speed of light.
B) Mass can be turned into energy, but energy cannot be turned back into mass.
C) A small amount of mass can be turned into a large amount of energy.
D) It takes a large amount of mass to produce a small amount of energy.
E) One kilogram of mass represents 1 joule of energy.

14) Which of the following statements about X rays and radio waves is *not* true? 14) _____

A) X rays have higher energy than radio waves.
B) X rays have shorter wavelengths than radio waves.
C) X rays have higher frequency than radio waves.
D) X rays travel through space faster than radio waves.
E) X rays and radio waves are both forms of light, or electromagnetic radiation.

15) In which of the following cases would you feel *weightless*? 15) _____

A) while walking on the Moon
B) while falling from an airplane with your parachute open
C) while falling from a roof
D) while traveling through space in an accelerating rocket
E) none of the above

16) You are standing on a scale in an elevator. Suddenly you notice your weight *decreases*. What do you conclude? 16) _____

A) The elevator is moving at a constant velocity upwards.
B) The elevator is accelerating downwards.
C) The elevator is accelerating upwards.
D) Your diet is working.
E) The elevator is moving at a constant velocity downwards.

17) How much electrical charge does an atom with 6 protons, 6 neutrons, and 5 electrons have? 17) _____

A) a total charge of +17
B) a positive charge of +7
C) a negative charge of –5
D) a positive charge of +1
E) none of the above

18) When white light passes through a cool cloud of gas, we see 18) _____
A) an absorption line spectrum.
B) visible light.
C) an emission line spectrum.
D) thermal radiation.
E) infrared light.

19) According to the *universal law of gravitation*, if you triple the distance between two objects, then the gravitational force between them will 19) _____
A) decrease by a factor of 3.
B) decrease by a factor of 9.
C) increase by a factor of 9.
D) increase by a factor of 3.
E) decrease by a factor of 6.

20) Radiative energy is 20) _____
A) energy of motion.
B) heat energy.
C) energy used in home radiators.
D) energy carried by light.
E) energy from nuclear power plants.

21) At which lunar phase(s) are tides most pronounced (*e.g.*, the highest high tides)? 21) _____
A) full moon
B) first quarter
C) new moon
D) both new and full moons
E) both first and third quarters

22) A skater can spin faster by pulling in her arms closer to her body or spin slower by spreading her arms out from her body. This is due to 22) _____
A) conservation of momentum.
B) the law of gravity.
C) conservation of energy.
D) Newton's third law.
E) conservation of angular momentum.

23) As the Moon's orbit gets larger due to tidal interaction with the Earth, the Earth's rotation 23) _____
A) sppeds up
B) becomes erratic
C) stays the same
D) reverses
E) slows down

24) From laboratory measurements, we know that a particular spectral line formed by hydrogen appears at a wavelength of 4861 Angstroms. The spectrum of a particular star shows the same hydrogen line appearing at a wavelength of 4859 Angstroms. What can we conclude? 24) _____

A) The star is moving away from us.
B) The star is getting hotter.
C) The star is moving toward us.
D) The star is getting colder.
E) The "star" actually is a planet.

25) We can see each other in the classroom right now because we 25) _____

A) emit visible light.
B) reflect visible light.
C) emit thermal radiation.
D) emit infrared light.
E) reflect infrared light.

26) If your mass is 60 kg on Earth, what would your mass be on the Moon? 26) _____

A) 10 lb B) 60 lb C) 50 kg D) 10 kg E) 60 kg

27) Particles of light are called 27) _____

A) litons B) electrons C) neutrons D) protons E) photons

28) Suppose you drive a car at high speed on a circular race track, and a police radar set up in the center of the circle measures your speed using the Doppler effect. What will happen? 28) _____

A) The radar gun will explode.
B) No Doppler shift will occur.
C) The Doppler shift will be to shorter wavelengths
D) The Doppler shift will be to longer wavelengths.
E) The Doppler shift will indicate you're going backwards

29) The mass of Jupiter can be calculated by 29) _____

A) measuring the orbital period and distance of one of Jupiter's moons.
B) measuring the orbital period and distance of Jupiter's orbit around the Sun.
C) knowing the Sun's mass and measuring the average distance of Jupiter from the Sun.
D) knowing the Sun's mass and measuring how Jupiter's speed changes during its elliptical orbit around the Sun.
E) measuring the orbital speed of one of Jupiter's moons.

30) How much energy does a red photon at a wavelength of 800 nm (8000 Angstroms) have compared to a blue photon at 400 nm (4000 Angstroms)? 30) _____

A) half the energy
B) twice the energy
C) the same energy
D) 1/4 the energy
E) 4 times the energy

31) The *wavelength* of a wave is 31) _____

A) how strong the wave is.
B) equal to the speed of the wave times the wave's frequency.
C) the distance between where the wave is emitted and where it is absorbed.
D) the distance between two adjacent peaks of the wave.
E) the distance between a peak of the wave and the next trough.

32) *Absolute zero* is 32) _____

A) 0° Kelvin.
B) 0° Celsius.
C) 32° Fahrenheit.
D) 0° Fahrenheit.
E) 273° Celsius.

33) How are wavelength, frequency, and energy related for photons of light? 33) _____

A) Longer wavelength means lower frequency and lower energy.
B) Longer wavelength means higher frequency and higher energy.
C) Longer wavelength means higher frequency and lower energy.
D) Longer wavelength means lower frequency and higher energy.
E) There is no simple relationship because different photons travel at different speeds.

34) When a rock is held above the ground, we say it has some *potential energy*. When we let it go, it falls and we say the potential energy is converted to *kinetic energy*. Finally, the rock hits the ground. What has happened to the energy? 34) _____

A) It is transformed back into gravitational potential energy.
B) The energy goes into the ground and, as a result, the orbit of the earth about the Sun is slightly changed.
C) The rock keeps the energy inside it (saving it for later use).
D) It is lost forever. Energy does not have to be conserved.
E) The energy goes to producing sound and to heating the ground, rock, and surrounding air.

35) Grass (that is healthy) looks green because 35) _____

A) it emits green light and absorbs other colors.
B) it transmits green light and emits other colors.
C) it reflects green light and absorbs other colors.
D) it absorbs green light and emits other colors.

36) Which of the following does not have the same fundamental nature as visible light? 36) _____

A) Sound waves
B) Infrared radiation
C) Ultraviolet light
D) Radio waves
E) X-rays

Astr 1010 Quiz 3 Spring 2012 Dr. Crenshaw

Name_____

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

1) According to our theory of solar system formation, why do we find some exceptions to the general rules and patterns of the planets? 1) _____
   A) The exceptions probably represent objects that were captured by our solar system from interstellar space.
   B) The exceptions probably represent objects that formed recently, rather than early in the history of the solar system.
   C) Most of the exceptions are the result of giant impacts.
   D) The exceptions exist because, even though our theory is as correct as possible, nature never follows rules precisely.
   E) Our theory is not quite correct because it cannot explain these exceptions.

2) Volcanism is more likely on a planet that 2) _____
   A) doesn't have an atmosphere or oceans.
   B) has high internal temperatures.
   C) is struck often by meteors and solar system debris.
   D) is closer to the Sun.

3) *Olympus Mons* is a 3) _____
   A) shield volcano on Venus.
   B) shield volcano on Mars.
   C) stratovolcano on Mercury.
   D) stratovolcano on the Moon.
   E) large lava plain on the Moon.

4) Why did the solar nebula heat up as it collapsed? 4) _____
   A) Nuclear fusion occurring in the core of the protosun produced energy that heated the nebula.
   B) The shock wave from a nearby supernova heated the gas.
   C) As the cloud shrank, its gravitational potential energy was converted to kinetic energy and then into thermal energy.
   D) Collisions among planetesimals generated friction and heat.
   E) Radiation from other nearby stars that had formed earlier heated the nebula.

5) How have we been able to construct detailed maps of surface features on Venus? 5) _____
   A) by studying Venus from Earth with powerful telescopes
   B) by using radar from spacecraft that were sent to orbit Venus
   C) by landing spacecraft on the surface for close-up study
   D) by studying Venus with powerful telescopes on spacecraft that were sent to orbit Venus
   E) by making computer models of geological processes on Venus

6) Which of the following most likely explains why Venus does *not* have a strong magnetic field? 6) _____
A) It is too close to the Sun.
B) It does not have a metallic core.
C) Its rotation is too slow.
D) It has too thick an atmosphere.
E) It is too large.

7) Which of the following does *not* have a major effect in shaping planetary surfaces? 7) _____
A) volcanism
B) tectonics
C) impact cratering
D) magnetism
E) erosion

8) How do asteroids differ from comets? 8) _____
A) Asteroids are rocky bodies and are denser than the comets, which are made of icy material.
B) Asteroids are made of icy material and are less dense than the comets, which are rockier.
C) Asteroids are rocky bodies and are less dense than the comets, which are made of icy material.
D) Asteroids and comets are both made of rocky and icy material, but asteroids are smaller in size than comets.
E) Asteroids are made of icy material and are denser than the comets, which are more rocky.

9) The planet closest in size to Earth is 9) _____
A) Venus.
B) Pluto.
C) Mercury.
D) the Moon.
E) Mars.

10) *Valles Marineris* is a(n) 10) _____
A) extensive plain on Mars.
B) huge series of cliffs on Mercury.
C) large canyon on Venus.
D) large valley on the Moon.
E) large canyon on Mars.

11) Why did the solar nebula flatten into a disk? 11) _____
A) It flattened as a natural consequence of collisions between particles in the nebula, changing random motions into more orderly ones.
B) The interstellar cloud from which the solar nebula formed was originally somewhat flat.
C) As the nebula cooled, the gas and dust settled onto a disk.
D) The force of gravity pulled the material downward into a flat disk.

12) The *core*, *mantle*, and *crust* of a planet are defined by differences in their 12) _____
A) geological activity. B) strength.
C) temperature. D) composition.

13) Which of the following observations indicates that conditions on Mars may have been suitable for life in the past? 13) _____
A) Mars has two small moons.
B) There are dried-up riverbeds on Mars.
C) There is a very deep and long canyon that extends across Mars.
D) Mars has polar caps made of "dry ice."
E) There are very large extinct volcanoes on Mars.

14) The *lithosphere* of a planet is the layer that consists of 14) _____
A) material between the crust and the mantle.
B) the lava that comes out of volcanoes.
C) the softer rocky material of the mantle.
D) the rigid rocky material of the crust and uppermost portion of the mantle.
E) material above the crust.

15) How does the Sun's mass compare with that of the planets? 15) _____
A) It is a hundred times more massive than the earth.
B) It is a thousand times more massive than the earth.
C) It is a hundred times more massive than all the planets combined.
D) It is a thousand times more massive than all the planets combined.
E) It is about as massive as all the planets combined.

16) What was the *frost line* of the solar system? 16) _____
A) the distance from the Sun where temperatures were low enough for metals to condense, between the Sun and the present-day orbit of Mercury
B) the distance from the Sun where temperatures were low enough for hydrogen compounds to condense into ices, between the present-day orbits of Mars and Jupiter
C) the distance from the Sun where temperatures were low enough for asteroids to form, between the present-day orbits of Venus and Earth
D) the distance from the Sun where temperatures were low enough for rocks to condense, between the present-day orbits of Mercury and Venus
E) the distance from the Sun where temperatures were low enough for hydrogen and helium to condense, between the present-day orbits of Jupiter and Saturn

17) What is the most important factor that determines the thickness, and therefore strength, of the lithosphere? 17) _____
A) pressure
B) distance of planet from Sun
C) internal temperature
D) viscosity
E) composition

18) The nebular theory of the formation of the solar system successfully predicts all but one of the following. Which one does the theory *not* predict? 18) _____
A) the compositional differences between the terrestrial and jovian planets
B) the equal number of terrestrial and jovian planets
C) Planets orbit around the Sun in nearly circular orbits in a flattened disk.
D) the craters on the Moon
E) asteroids, Kuiper-belt comets, and the Oort cloud

19) Which of the following statements is *not* an observed pattern of motion in our solar system? 19) _____
A) All planets orbit the Sun in the same direction.
B) Almost all moons orbit their planet in the same direction as the planet's rotation.
C) Most planetary orbits lie nearly in the same plane.
D) Most planets orbit at the same speed.
E) Most planets rotate in the same direction in which they orbit.

20) Most astronomers agree that, rather than being a planet, Pluto is really just a large member of 20) _____
A) the asteroid belt.
B) the Oort cloud.
C) the Kuiper belt.
D) an extrasolar planetary system.
E) the moon system around Neptune.

21) What are the main constituents of the jovian planets? 21) _____
A) nitrogen and methane
B) rocky minerals and water, as on Earth
C) ammonia and methane
D) hydrogen and helium
E) ammonia and water

22) The most metal rich terrestrial planet is 22) _____
A) Earth.
B) the Moon.
C) Mars.
D) Venus.
E) Mercury.

23) What happened during the *accretion* phase of the early solar system? 23) _____
A) Atoms and molecules in the gas bonded together and solidified.
B) The solar nebula differentiated into metals inside of the frost line and ices beyond.
C) Particles grew by colliding and sticking together.
D) Earth gained its oceans from icy planetesimal capture.
E) Large planetesimals captured atmospheres from the solar nebula.

24) When we see a region of a planet that is not as heavily cratered as other regions, we conclude that 24) _____

A) the surface in the region is younger than the surface in more heavily cratered regions.
B) the surface in the region is older than the surface in more heavily cratered regions.
C) the planet formed after the age of bombardment and missed out on getting hit by leftover planetesimals.
D) the planet is rotating very slowly and only one side was hit by impactors.
E) there is little volcanic activity to create craters.

25) What is *differentiation* in planetary geology? 25) _____

A) any process by which one part of a planet's surface evolves differently from another part of the same planet's surface
B) the process by which different types of minerals form a conglomerate rock
C) the process by which gravity separates materials according to density
D) any process by which a planet's surface evolves differently from another planet's surface
E) any process by which a planet evolves differently from its moons

26) Where are most of the known asteroids found? 26) _____

A) in the Kuiper belt
B) in the Oort cloud
C) between the orbits of the terrestrial planets
D) between the orbits of Mars and Jupiter
E) between the orbits of the jovian planets

27) Why are the inner planets made of denser materials than the outer planets? 27) _____

A) In the beginning, when the protoplanetary disk was spinning faster, centrifugal forces flung the lighter materials toward the outer parts of the solar nebula.
B) Denser materials were heavier and sank to the center of the nebula.
C) The Sun's gravity pulled denser materials toward the inner part of the solar nebula, while lighter gases escaped more easily.
D) When the solar nebula formed a disk, materials naturally segregated into bands, and in our particular solar system the denser materials settled nearer the Sun while lighter materials are found in the outer part.
E) In the inner part of the nebula only metals and rocks were able to condense because of the high temperatures, whereas hydrogen compounds, although more abundant, were only able to condense in the cooler outer regions.

28) Which of the following best describes *convection*? 28) _____

A) It is the process by which rocks sink in water.
B) It is the process in which warm material gets even warmer and cool material gets even cooler.
C) It is the process in which warm material expands and rises while cool material contracts and falls.
D) It is the process in which a liquid separates according to density, such as oil and water separating in a jar.
E) It is the process in which bubbles of gas move upward through a liquid.

29) Which of the following is *not* a characteristic of the inner planets? 29) _____
A) They all have substantial atmospheres.
B) They all have solid, rocky surfaces.
C) Their orbits are relatively closely spaced.
D) They are relatively smaller than the outer planets.
E) They have very few, if any, satellites.

30) What is the primary reason why a Pluto flyby mission is cheaper than a Pluto orbiter? 30) _____
A) The fuel needed for an orbiter to slow down when it reaches Pluto adds a lot of weight to the spacecraft.
B) The flyby is easier to design than the orbiter.
C) The fuel needed for an orbiter to slow down when it reaches Pluto is very expensive.
D) The flyby can use less expensive cameras than the orbiter.
E) The question is incorrect; in general, orbiters are cheaper than flybys.

31) The age of our solar system is approximately 31) _____
A) 3.8 million years.
B) 10,000 years.
C) 14 billion years.
D) 4.6 million years.
E) 4.6 billion years.

32) According to the nebular theory, what are asteroids and comets? 32) _____
A) They are chunks of rock or ice that were expelled from planets by volcanoes.
B) They are the shattered remains of collisions between planets.
C) They are leftover planetesimals that never accreted into planets.
D) They are the shattered remains of collisions between moons.
E) They are chunks of rock or ice that condensed long after the planets and moons had formed.

33) Which of the following show evidence of ancient river beds? 33) _____
A) Mercury
B) the Moon
C) Mars
D) Venus
E) all of the above

Astronomy 1010 Quiz 4 Dr. Crenshaw Spring 2012

Name_____

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

1) Why does Jupiter have several distinct cloud layers? 1) _____
   A) Different gases are present at different altitudes in Jupiter's atmosphere.
   B) Different layers represent the various regions where the temperature is cool enough for liquid water to condense.
   C) Clouds form randomly, so on average there are always several layers.
   D) Different layers represent clouds made of gases that condense at different temperatures.
   E) Winds prevent clouds from forming at some altitudes, so we see clouds only at the other altitudes.

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

*Use these processes for the following questions.*

A. outgassing from volcanoes
B. evaporation and sublimation
C. bombardment
D. thermal escape
E. chemical reactions with surface material

2) Which of the above processes is the primary source of the atmospheres on both the Moon and Mercury? 2) _____

3) Which process explains why none of the terrestrial planets have much atomic or molecular hydrogen in their atmospheres? 3) _____

4) Which process is the primary source of the atmospheric gases on Venus? 4) _____

5) Which process explains why the atmospheric pressure on Mars is greater during its southern hemisphere summer than at other times of its year? 5) _____

6) Which process is the primary source of the atmospheric gases on Earth? 6) _____

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

7) Approximately how many other planetary systems have been discovered to date? 7) _____
   A) dozens
   B) only a few
   C) thousands
   D) hundreds
   E) ten thousands

8) Of the four gases $CO_2$, $H_2O$, $N_2$, and $O_2$, which are greenhouse gases? 8) _____

A) only $CO_2$
B) $CO_2$ and $N_2$
C) $CO_2$ and $H_2O$
D) all except $O_2$
E) all four

9) Why are many of the newly detected extrasolar planets called "hot Jupiters"? 9) _____

A) Their masses and composition are similar to what we would expect if Jupiter were hotter.
B) because the discovery of other planets is very exciting
C) The planets tend to be detected around more massive, hotter stars than our Sun.
D) Their masses are similar to Jupiter but their composition is similar to Mercury.
E) Their masses are similar to Jupiter but they are very close to the central star and therefore hot.

10) Why is Mars red? 10) _____

A) Its surface rocks were rusted by oxygen.
B) Its surface is made of ices that absorb blue light.
C) Its surface is made of ices that absorb red light.
D) Its atmosphere scatters blue light more effectively than red light.
E) It is made primarily of red clay.

11) The sky is blue because 11) _____

A) the atmosphere absorbs mostly blue light.
B) the Sun mainly emits blue light.
C) the atmosphere transmits mostly blue light.
D) molecules scatter blue light more effectively than red light.
E) molecules scatter red light more effectively than blue light.

12) A planet is detected via the Doppler technique. The repeating pattern of the stellar motion tells us 12) _____

A) the planet's size.
B) the planet's mass.
C) the orbital period of the planet.
D) the planet's density.
E) the orbital eccentricity of the planet.

13) What is *differential rotation*? 13) _____

A) when storms in the northern hemisphere rotate counterclockwise while storms in the southern hemisphere rotate clockwise
B) when a planet's rotation changes due to a catastrophic event
C) when a body rotates faster or slower at its equator than it does at its poles
D) when a planet's rotation changes through evolution
E) when the core of a planet rotates at a different rate than its atmosphere

14) Which moon has the most substantial atmosphere? 14) _____
A) Ganymede
B) Europa
C) Io
D) Mimas
E) Titan

15) Which planet experiences the greatest change between its actual day temperature and actual night temperature? 15) _____
A) Mercury B) Venus C) Earth D) Mars

16) Planetary rings are 16) _____
A) orbiting in the equatorial plane of their planet.
B) composed of a large number of individual particles that orbit their planet in accord with Kepler's third law.
C) nearer to their planet than any of the planet's large moons.
D) known to exist for all of the jovian planets.
E) all of the above

17) Which of the following worlds has the most substantial atmosphere? 17) _____
A) Earth
B) Venus
C) the Moon
D) Mars
E) Mercury

18) Why is Jupiter denser than Saturn? 18) _____
A) It is made of a different composition than Saturn, including a higher proportion of hydrogen compounds and rocks.
B) Its core is much larger than Saturn's.
C) It has a greater proportion of helium to hydrogen compared to Saturn.
D) The extra mass of Jupiter compresses its interior to a greater extent than that of Saturn.
E) It is unknown why this is so.

19) How does the temperature of a planet change when we increase the following (separately): Sun's temperature, planet's albedo, planet's greenhouse gases? 19) _____
A) increases, increases, decreases
B) increases, decreases, increases
C) increases, decreases, decreases
D) decreases, decreases, decreases.
E) increases, increases, increases

20) What are *greenhouse gases*? 20) _____
A) gases that absorb visible light
B) gases that absorb ultraviolet light
C) gases that absorb infrared light
D) gases that transmit infrared light
E) gases that transmit visible light

21) Which of the following is *not* a product of outgassing? 21) _____

A) water
B) sulfur dioxide
C) oxygen
D) nitrogen
E) carbon dioxide

22) Which of the following is *not* caused by the Coriolis effect on Earth? 22) _____

A) The earth's circulation cells are split into three separate cells in each hemisphere.
B) Objects moving northward in the Northern Hemisphere are deflected to the east.
C) Hurricanes swirl in opposite directions in the Northern and Southern hemispheres.
D) Water going down a drain swirls in opposite directions in the Northern and Southern hemispheres.
E) Objects moving southward in the Northern Hemisphere are deflected to the west.

23) Why does Venus have such a great difference in temperature between its "no atmosphere" temperature and its actual temperature? 23) _____

A) It has a slow rotation.
B) It is so close to the Sun.
C) It has a high level of volcanic activity.
D) It has a large amount of greenhouse gases in its atmosphere.
E) It has no cooling effects from oceans.

24) What is Jupiter's Great Red Spot? 24) _____

A) a large mountain peak poking up above the clouds
B) a long-lived, high-pressure storm
C) the place where Jupiter's aurora is most visible
D) the place where reddish particles from Io impact Jupiter's surface
E) a hurricane that comes and goes on Jupiter

25) What is an important cause of gaps seen in the planetary rings? 25) _____

A) precession of the planet's pole
B) the planet's equatorial bulge
C) satellite resonances
D) the Sun's gravity
E) all of the above

26) What mechanism is most responsible for generating the internal heat of Io that drives the volcanic activity? 26) _____

A) radioactive decay
B) tidal forces
C) differentiation
D) bombardment
E) accretion

27) Where is most of the water on Mars? 27) _____
A) frozen on the peaks of its tall volcanoes
B) distributed evenly throughout its atmosphere
C) in its polar caps and subsurface ground ice
D) in its clouds
E) in deep underground deposits

28) Moving outward from Jupiter, the ratio of ice to rock in the Galilean satellites 28) _____
A) increases.
B) stays the same.
C) varies randomly.
D) decreases.
E) is unkown.

29) There are no auroras on Venus because it 29) _____
A) lacks atmospheric oxygen.
B) lacks an ionosphere.
C) is too hot.
D) lacks a strong magnetic field.
E) lacks strong winds.

30) Earth's stratosphere is heated primarily by which process? 30) _____
A) Greenhouse gases are broken apart by X rays.
B) Ozone is broken apart by ultraviolet radiation.
C) Atoms and molecules absorb infrared sunlight.
D) Greenhouse gases absorb infrared radiation.
E) Ozone absorbs visible sunlight.

31) What is the most important reason why an icy moon is more likely to be geologically active than a rocky moon of the same size? 31) _____
A) Ice has a lower melting point than rock.
B) Ice contains more radioactive elements than rock.
C) Ice is less rigid than rock.
D) Ice is affected by tidal forces to a greater extent than rock.
E) Ice is less dense than rock.

32) Why are there no impact craters on the surface of Io? 32) _____
A) It is too small to have been bombarded by planetesimals in the early solar system.
B) Io's thick atmosphere obscures the view of the craters.
C) Any craters that existed have been eroded through the strong winds on Io's surface.
D) Io did have impact craters but they have all been buried in lava flows.
E) Jupiter's strong gravity attracted the planetesimals more strongly than Io and thus none landed on its surface.

33) What is the habitable zone? 33) _____

A) The region around a star where liquid water could exist on a planet.
B) The region around a star where oxygen would be a gas on a planet.
C) The region around a planet where space stations have stable orbits.
D) The region around a planet where life forms can breath oxygen.