Astronomy 121
Test 1
October 20, 2011

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. There are 30 questions each question is worth 2 points for 60 total multiple choice points.

1) How do the densities of the Jovian and Terrestrial planets compare?　　　　　1) _____
   A) More massive Jovians all have high densities, compared to the tiny Terrestrials.
   B) Made from the same gas cloud that formed the Sun so all planets have similar densities
   C) The closer a planet lies to the Sun, the smaller is its density.
   D) All Terrestrials are more dense than any of the Jovians.
   E) No real pattern here; densities vary greatly and are very individual to each world.

2) What day of the year has the fewest hours of daylight for an observer in Eugene, Oregon?　　　　　2) _____
   A) autumnal equinox
   B) vernal equinox
   C) summer solstice
   D) winter solstice
   E) January 21st, the official coldest day of the year

3) The force of gravity between two massive objects:　　　　　3) _____
   A) depends on the temperature, density, and size of the bodies.
   B) increases with the masses of the bodies, but decreases with their separations.
   C) depends on the density, not the mass of the bodies.
   D) increases with the masses of the bodies, but decreases with the square of the distances
      between them.
   E) increases with the square of their masses, but decreases with the cube of their periods of
      orbit about the Sun.

4) The places where the Sun crosses the Celestial Equator heading southward is called the:　　　　　4) _____
   A) analemma.
   B) vernal equinox
   C) autumnal equinox
   D) summer solstice
   E) winter solstice

5) The apparent path of the Sun through the stars is the:　　　　　5) _____
   A) Prime Meridian
   B) Celestial Meridian
   C) Ecliptic
   D) Celestial Equator
   E) Analemma

6) If high tide occurred at noon yesterday, of the following, what was the most likely phase for the Moon?
   A) New Moon
   B) Full Moon
   C) First or Third Quarter Moon
   D) A or B,; we cannot tell for sure
   E) A, B, or C; it depends on the season

6) _____

7) The Solar Day on the Earth is longest:
   A) in January
   B) when the Earth is closest to the Sun in its orbit
   C) on June 21st, the Summer Solstice
   D) both A and B are correct
   E) A, B, and C are all correct

7) _____

8) On which of these assumptions do Ptolemy and Copernicus agree?
   A) The Sun must orbit us, but the planets do orbit the Sun.
   B) All orbits are perfect circles.
   C) The Sun was bigger than the Earth.
   D) Venus must always stay between us and the Sun.
   E) The Earth must be the center of all motion in the Cosmos.

8) _____

9) Today, scientists do not accept Ptolemy's model because:
   A) the work of Tycho, Kepler , and Newton showed the heliocentric model was more accurate.
   B) it is considered ancient history.
   C) it has been shown that Ptolemy faked his data to match his model's predictions
   D) it had no explanation for retrograde motion.
   E) it was too complicated compared to Copernicus' heliocentric model.

9) _____

10) The plane in which the planets tend to orbit the sun is called the:
   A) Celestial equatorial plane
   B) line of nodes
   C) ecliptic
   D) horizon
   E) Celestial Meridian

10) _____

11) The heliocentric model was actually first proposed by:
   A) Ptolemy
   B) Aristotle
   C) Tycho Brahe
   D) Aristarchus
   E) Galileo

11) _____

2

12) Which was a contribution to astronomy made by Copernicus?   12) _____
    A) His theory of gravity accounted for the variable speeds of the planets.
    B) The planets move around the Sun in elliptical orbits.
    C) He laid a natural explanation for retrograde motion in the solar system
    D) He discovered the Sun was not at the center of the Universe
    E) His telescope revealed the four moons of Jupiter, a model solar system.

13) Where on Earth would an observer be if the North Celestial Pole was at the zenith?   13) _____
    A) Arctic Circle
    B) North Pole
    C) Equator
    D) South Pole
    E) It lies overhead everywhere on Earth.

14) Of the following lcations, where will you observe only half of the stars in the sky, even if you   14) _____
    observe over the course of an entire year?
    A) Eugene, Oregon
    B) Equator
    C) North Pole
    D) anywhere north of latitude = 66.5 degrees
    E) Everyone on Earth can see the whole sky. over the course of a year.

15) A circumpolar star is: 15) _____
    A) a star observable only to an observer on the equator of the Earth
    B) a star which periodically undergoes retrograde motion
    C) a star which does not show annual trigonometric parallax
    D) a star which does not rise or set over the course of a day
    E) a star whose diurnal circle is centered on the Summer Solstice

16) The daily paths followed by stars for an observer at the North Pole of the Earth are best   16) _____
    described as:
    A) semi-circles making 90 degree angles with the horizon
    B) circles moving parallel to the horizon
    C) semi-circles makig an angle of 23.5 degrees with the horizon moving from the west to the
       east across the sky
    D) ellipses with the observer located at one focus of the ellipse
    E) large circles centered on the vernal equinox

17) The phase of the Moon today is roughly: 17) _____
    A) waxing crescent
    B) first quarter
    C) full
    D) third quarter
    E) gibbous

18) Which planet breaks the most rules, based on its odd orbit?   18) _____
    A) Jupiter   B) Mercury   C) Uranus   D) Pluto   E) Mars

19) The morning and evening stars are not actually stars, they are the planets: 19) _____
   - A) Mercury
   - B) Venus
   - C) Mars
   - D) A and B are the morning and evening stars
   - E) A, B, and C are the morning and evening stars

20) At what lunar phase would the highest high tides during the month occur?   20) _____
   - A) new moon
   - B) full moon
   - C) third quarter moon
   - D) waxing crescent moon
   - E) Both new and full produce spring tides.

21) The Ptolemaic model of the universe: 21) _____
   - A) could not account for annual trigonometric parallax
   - B) describes the orbits of the planets as being ellipses, not circles.
   - C) always kept Mars and Mercury between the Earth and Sun.
   - D) explained and predicted the motions of the planets with deferents and epicycles.
   - E) is the basis of our modern cosmology.

22) What contribution to astronomy was made by Tycho Brahe?   22) _____
   - A) His telescope revealed the moons of Jupiter before Galileo noted them.
   - B) The planets' orbits around the Sun are ellipses, not circles.
   - C) The Earth is not the center of the Universe.
   - D) His observations of planetary motion with great accuracy proved circular orbits could not work.
   - E) Retrograde motion must be explained by epicycles larger than those of Ptolemy.

23) Which of these is NOT true of all Jovian planets?   23) _____
   - A) All have their poles approximately perpendicular to the ecliptic.
   - B) Four are presently known orbiting our Sun.
   - C) All are less dense than any of the Terrestrial planets.
   - D) All have rings around their equators.
   - E) All lie at least five Astronomical Units from the Sun.

24) Eugene, Oregon lies at 44 degrees north latitude. Where is Polaris at 9 PM on January 1st?   24) _____
   - A) 46 degrees above the south point on the horizon
   - B) overhead
   - C) 44 degrees above the north point on the horizon
   - D) not visible for another six hours
   - E) It is just rising.

25) The Greeks proposed that if the Earth orbited about the Sun, an effect known as Annual   25) _____
    Trigonometric Parallax should be observed. The Greeks did not detect Annual Trigonometric
    Parallax and so assumed that the Earth was stationary. Today, we would interpret the Greeks
    results as follows:
    A) the effect was not observable because the Greeks only searched for the effect near the
       Autumnal equinox
    B) parallax was not observed because the Earth's orbit has changed over the millenia
    C) the Earth's orbit is elliptical in shape, not circular
    D) the effect was unobservable because of the large distances to stars
    E) the effect was not observed because parallax is an illusion, it is not a real effect

26) Constellations were used by the Greeks   26) _____
    A) as aids to define locations of objects on the sky
    B) to explain why annual trigoometric parallax was not observed
    C) to explain the origin of retrograde motion
    D) as examples to show how stars moved on the Celestial Sphere
    E) to show that the Celestial Sphere was spinning on its axis.

27) As viewed from the north, the Earth spins _____ .   27) _____
    A) in the counterclockwise sense
    B) east–to–west
    C) west–to–east, except when it undergoes retrograde spin episodes and turns east–to–west
    D) A and B are both correct
    E) A, B, and C are all true

28) The daily motion of Celestial objects is a result of: 28) _____
    A) the slight misalignment of the Earth's spin and orbital axes
    B) the tidal interaction between the Earth and the Moon
    C) the orbital motion of the Earth about the Sun
    D) the orbital motion of the Moon about the Earth
    E) the spin of the Earth on its axis

29) The chemical compositions of Jupiter and Saturn are most similar to: 29) _____
    A) the Earth and Moon
    B) icy objects like Pluto and other Plutinos
    C) Mercury and Venus
    D) the Terrestrial planets farthest from the Sun, Mars
    E) the Sun

30) The nadir for an observer is: 30) _____
    A) the location on the Celestial Sphere where the Sun reaches its furthest point north of the
       Celestial Equator
    B) the north point on the horizon for the observer
    C) the point in the direction directly below the observer on the sky
    D) the location of the South Celestial Pole for an observer in the northern hemisphere
    E) the location on the Celestrial Sphere where the Sun reaches its farthest point south of the
       Celestial Equator

SHORT ANSWER. There are 6 questions woth 40 total points. The point value for each question is listed.

31) The Solar Day and Sidereal Day: (8 points)

a. Define the Sidereal Day

b. Define the Solar Day

c. Describe why the Solar Day and Sidereal Day have different lengths

32) Seasonal Variations (6 points)

    a. The seasons vary on a period known as the _____ year.

    b. The seasonal variations on the Earth are caused by the misalignment of the Earth's rotation and orbital axes. What are the two primary results of this misalignment which lead to seasonal variations on the Earth

33) Retrograde Motion (8 points)

a. Define retrograde motion

b. Describe how retrograde motion of the planets was explained in Copernicus's Sun–centered (helio–centric) model for the Solar System.

34) State Kepler's Three Laws of Planetary Motion (6 points)

a.

b.

c.

35) Regularities in the Motions of the Planets (6 points)

State the three most important regularities in the motions of the planets discussed in class:

a.

b.

c.

36) Lunar and Solar eclipses (6 points)

a. During which Lunar phases might Lunar and Solar eclipses occur?

b. If Lunar and Solar eclipses can occur at well–defined Lunar phases, explain why we do not see Lunar and Solar eclipses every month.

1) D
2) D
3) D
4) C
5) C
6) D
7) D
8) B
9) A
10) C
11) D
12) C
13) B
14) C
15) D
16) B
17) D
18) D
19) D
20) E
21) D
22) D
23) A
24) C
25) D
26) A
27) A
28) E
29) E
30) C