Descriptive Astronomy (ASTR 108) **Name:_____**

Exam 1 A February 13, 2008

In each of the following multiple choice questions, select the best possible answer. In the line on the scan sheet corresponding to the number of the question, clearly darken the region corresponding to your answer. Be sure to put your name on the cover page for the exam and the scan sheet. Be sure also to indicate on the scan sheet which exam you have (A or B). Turn in the exam and the scan sheet. In case of difficulty with scanning, the written exam is the exam of record. A calculator is not needed for this exam, but you may use a non cell phone calculator if you wish.

1) Circumpolar stars are stars that
   A) are so close to the Celestial Pole as to be stationary.
   B) circle the celestial pole in between rising and setting.
   C) that never set in their daily motion about the celestial pole.
   D) never rise as they circle the celestial pole in their daily motion

2) We say that a celestial object rises when
   A) it is first seen above the horizon.
   B) it crosses the East azimuth.
   C) it reaches its maximum altitude.
   D) none of the above

3) On the celestial sphere, the circle which is located 90 degrees from the zenith is the
   A) ecliptic
   B) meridian
   C) horizon
   D) equator

4) Retrograde motion of a planet is
   A) when, as viewed from Earth, a planet moves behind Sun.
   B) when, as viewed from Earth, a planet briefly appears to reverse direction and move east to west against a background of stars.
   C) the planets reverse direction as the move around the Sun.
   D) all the planets are located on the same side of the Sun.

5) A comet is in a highly elliptical orbit about the Sun. The speed of the comet is slowest when it is
   A) nearest the Sun.
   B) farthest from the Sun.
   C) it travels at a constant speed everywhere in the orbit.

6) Consider two planets. The one with the longest period about the Sun is the
   A) shortest distance from the Sun.
   B) the same distance from the Sun as the one with the shorter period.
   C) greatest distance from the Sun.

7) Who discovered that the period squared divided by the length of the semi-major axis cubed is the same for each planet?

A) Plato
B) Aristarchus
C) Copernicus
D) Brahe
E) Kepler

8) The main premise of Heliocentric theories is that

A) the Earth is at rest at the center of the universe and all heavenly bodies revolve around the Earth.
B) the Sun is at rest at the center of the universe and all heavenly bodies revolve around the Sun.
C) the Sun and the Earth are at rest relative to one another.
D) there is no discernable pattern to the motion of heavenly bodies

9) The point directly over an observer's head is that observer's

A) node
B) pole
C) zentith
D) equator

10) When does retrograde motion of Jupiter occur in the heliocentric model of the solar system?

A) when the Earth passes Jupiter
B) when the Earth and Jupiter are on opposite sides of the Sun
C) when the Earth is nearest the Sun
D) when the Sun and Jupiter are seen close together in the sky

11) Which of the following would be the coordinates of a star which is setting in the northwest?

A) azimuth 180 degrees, altitude 90 degrees
B) azimuth 145 degrees, altitude 0 degrees
C) azimuth 300 degrees, altitude 0 degrees
D) azimuth 75 degrees, altitude 90 degrees

12) The path the Sun travels against the background of stars (the ecliptic) coincides with the celestial equator.

A) True **B) False**

13) The Earth's rotational axis if extended into space would appear to intersect the celestial sphere where?

A) The Celestial Equator
B) The Celestial Poles
C) The Vernal Equinox
D) The Galactic Center
E) None of the above

14) During the night, stars appear to move

A) westward.
B) eastward.
C) southward.
D) northward.

15) An observer in Quito, Ecuador (latitude 0 deg) sees the Sun at the zenith at noon on which day(s)?

A) summer and winter solstice
B) spring and fall equinox
C) never – impossible
D) all days
E) only on June 21

16) A student observes Polaris (star located near the North Celestial Pole) at an altitude of 35°. What is the latitude of the student?

A) 0°
B) 17.5°
C) 35°
D) 55°
E) 70°

17) A star is located directly above the equator, to an observer in the northern hemisphere this star

A) rises in the West and sets in the East
B) rises in the East and sets in the West
C) rises in the North-East and sets in the North-West
D) rises in the South-East and sets in the South-West

18) To an observer in the northern hemisphere a star located in the northern hemisphere will be above the horizon for

A) less than 12 hours
B) exactly 12 hours
C) greater than 12 hours

19) For an observer at the equator, the star Polaris (North star) appears to the North
A) over head
B) at an altitude of 66.5°
C) at an altitude of 23.5°
D) on the horizon

20) Who is responsible for reintroducing the Heliocentric model of the solar system?
A) Aristotle
B) Ptolemy
C) Brahe
D) Galileo
E) Copernicus

21) A shift in the direction of an object caused by a change in the position of an observer is called
A) parallax
B) precession
C) the Coriolis effect
D) epicycle motion

22) The most important contribution of Tycho Brahe to astronomy was
A) to improve the accuracy of measurements of the location of objects.
B) to introduce a novel Heliocentric model of the solar system.
C) to discover a mathematical theory that explained the location of astronomical objects.

23) The angular size of the Moon is about 30
A) minute of arc
B) second of arc
C) radian
D) degree

24) Which of the following statements does not use the term angular size or angular distance correctly?
A) The angular size of the Sun is about the same as that of the Moon.
B) The angular distance between those two bright stars in the sky is about 2 meters.
C) The angular size of the Moon is about 1/2 degree.
D) The angular distance between those two houses in the distance is 30.
E) You can use your outstretched hand to estimate angular sizes and angular distances.

25) The sun moves eastward among the stars at the rate of about one degree per
A) hour
B) month
C) year
D) day
E) minute

26) The occurrence of seasons on the Earth is due to
A) the Earth being closer to the Sun in summer
B) the Earth changing its rotation rate during the year
C) the Earth's axis pointing in different directions during the year
D) the Earth's axis being inclined to the ecliptic
E) the solar wind particles in the Earth's upper atmosphere

27) The synodic period of a planet is
A) the time required for the planet to rotate on its axis.
B) the time required for the planet to go around the Sun.
C) the time required for the Earth to orbit the Sun.
D) the time required for a planet to return to a particular configuration.

28) The Earth's rotation about its axis has a
A) synodic period of approximately 23 hrs 56 min and a sidereal period of about 24 hrs
B) synodic period of approximately 24 hrs and a sidereal period of about 23 hrs 56 min

29) The synodic period of Mars is
A) less than one year.
B) equal to one year.
C) greater than one year.

30) During retrograde motion a planet appears to be
A) dimmer than usual.
B) the same brightness as usual
C) brighter than usual.

31) Which of the following is true of the motion of the planet Mars among the stars?
A) all retrograde loops occur in the same constellation
B) all retrograde loops have the same shape
C) retrograde loops always are separated by the same interval of time
D) retrograde loops occur when Mars is in conjuction (near the sun in the sky)

32) What are the altitude and azimuth (in degrees) of a star which is setting in the west?
A) altitude 45, azimuth 360
B) altitude 90, azimuth 90
C) altitude 0, azimuth 270
D) altitude 30, azimuth 180

34) Why were epicycles used in Ptolemy's model of the solar system?
A) to account for the parallaxes of stars
B) to compensate for the ellipticity of the orbits of the planets
C) to explain the retrograde motions of planets
D) to explain the phenomenon of day and night

35) Which of the following is a reason that the ancient Greek astronomers rejected the heliocentric model of the solar system?
A) it did not account for retrograde motions of the planets
B) it could not explain the phases of Venus
C) they could detect no stellar parallax
D) it could not account for the Coriolis effect

36) As an object with angular size of 1 degree moves farther away, the angular size of the object
A) decreases
B) remains the same
C) increases

37) During the Winter Solstice, the Sun is directly above
A) 66.5° South latitude
B) 23.5° South latitude
C) The equator
D) 23.5° North latitude
E) 66.5° North latitude

38) What was the significance of Galileo's discovery that Venus shows all phases from new to full?
A) it allowed him to find Venus' distance from the Sun.
B) it proved to the other astronomers that his telescope was working correctly.
C) in the geocentric model, only some phases are possible.
D) it proved that Venus has an atmosphere.

39) Superior conjunction of a planet occurs when
A) occurs when the planet and Sun are seen in the same direction from Earth and the planet is closest to Earth.
B) occurs when the planet and sun are seen in the same direction from Earth and the Sun is closest to Earth.
C) occurs when the direction of the planet and the Sun are seen from Earth is exactly on opposite.

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

41) How are galaxies important to our existence?
A) Galaxies recycle heavy elements produced in stars into future generations of stars.
B) Without galaxies, there could not have been a Big Bang.
C) Galaxies provide the gravity that prevents us from falling off Earth.
D) Without galaxies, the universe could not be expanding.
E) Galaxies prevent planets from leaving their orbits around stars; e.g., our galaxy prevents Earth from leaving its orbit of the Sun.

42) Which of the following is smallest?
A) size of a typical planet
B) size of a typical star
C) 1 light-second
D) 1 AU

43) 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?
A) December 25
B) 1 week ago
C) 1 day ago
D) December 30
E) 1 second ago

44) What is an astronomical unit?
A) the diameter of Earth's orbit around the Sun
B) any basic unit used in astronomy
C) the length of time it takes Earth to revolve around the Sun
D) the average speed of Earth around the Sun
E) the average distance from Earth to the Sun

45) Patterns of stars in constellations hardly change in appearance over times of even a few thousand years. Why?
A) Stars are fixed and never move.
B) Stars move, but they move very slowly - only a few kilometers in a thousand years.
C) Although most stars move through the sky, the brightest stars do not, and these are the ones that trace the patterns we see in the constellations.
D) The stars in our sky actually move rapidly relative to us - thousands of kilometers per hour - but are so far away that it takes a long time for this motion to make a noticeable change in the patterns in the sky.
E) Stars within a constellation move together as a group, which tends to hide their actual motion and prevent the pattern from changing.

46) Which of the following statements about the Milky Way Galaxy is not true?

A) The galaxy is about 100,000 light-years in diameter.

B) Our solar system is located very close to the center of the Milky Way Galaxy.

C) Our view of distant objects is obscured by gas and dust when we look into the galactic plane.

D) One rotation of the galaxy takes about 200 million years.

E) It contains between 100 billion and 1 trillion stars.

47) Which of the following correctly lists speeds from slowest to fastest?

A) the speed of our solar system orbiting the center of the Milky Way Galaxy, Earth's speed of revolution about the Sun, Earth's speed of rotation on its axis, the speeds of very distant galaxies relative to us, typical speeds of stars in the local solar neighborhood relative to us

B) the speeds of very distant galaxies relative to us, typical speeds of stars in the local solar neighborhood relative to us, Earth's speed of rotation on its axis, Earth's speed of revolution about the Sun, the speed of our solar system orbiting the center of the Milky Way Galaxy

C) Earth's speed of rotation on its axis, Earth's speed of revolution about the Sun, typical speeds of stars in the local solar neighborhood relative to us, the speed of our solar system orbiting the center of the Milky Way Galaxy, the speeds of very distant galaxies relative to us

D)Earth's speed of revolution about the Sun, Earth's speed of rotation on its axis, the speed of our solar system orbiting the center of the Milky Way Galaxy, typical speeds of stars in the local solar neighborhood relative to us, the speeds of very distant galaxies relative to us

E) Earth's speed of revolution about the Sun, typical speeds of stars in the local solar neighborhood relative to us, Earth's speed of rotation on its axis, the speed of our solar system orbiting the center of the Milky Way Galaxy, the speeds of very distant galaxies relative to us

48) Imagine that we put a raisin cake into the oven, with each raisin separated from the others by 1 cm. An hour later, we take it out and the distances between raisins are 3 cm. If you lived in one of the raisins and watched the other raisins as the cake expanded, which of the following would you conclude?

A) More distant raisins would be moving away from you faster.

B) More distant raisins would be moving away from you more slowly.

C) All raisins would be moving away from you at the same speed.

D) It depends: If you lived in a raisin near the edge of the cake, you'd see other raisins moving away from you, but they'd be coming toward you if you lived in a raisin near the center of the cake.

49) Which scientists played a major role in overturning the ancient idea of an Earth-centered universe, and about when?

A) Huygens and Newton; about 300 years ago

B) Copernicus, Kepler, and Galileo; about 400 years ago

C Aristotle and Plato; about 2,000 years ago

D) Newton and Einstein; about 100 years ago

E) Aristotle and Copernicus; about 400 years ago

50) If the Moon is rising at midnight, the phase of the Moon must be
A) first quarter.
B) full.
C) waxing crescent.
D) third quarter.
E) waning crescent.

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

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