Sample Midterm: Midterm 1 - Ay2 Fall 08

Student: _____

Chose the BEST answer to each question.

1. The daily motion of the stars, planets, Moon, Sun and other objects from east to west is due to _____.
A. Spinning
B. Orbital motion
C. Rotational motion
D. Centripetal motion

2. Which of the following objects passes through the zodiac?
A. Sun
B. Planets
C. Earth and Moon
D. All of the above
E. None of the above

3. Which of the following statements regarding the orbits of objects in the celestial sphere is true?
A. The Sun's orbit is on the celestial equator
B. The Moon's orbit is on the celestial equator
C. The planets orbit parallel to the celestial equator
D. The stars orbit on the zodiac
E. The stars orbits are parallel to the celestial equator

4. What is the ecliptic?
A. The line of the solar and lunar eclipses on the celestial sphere
B. The extension of the Earth's path on the celestial sphere
C. The elliptical shape of the Earth's orbit around the Sun
D. All of the above

5. One of _____'s law states that the orbits of planets are elliptical, with the Sun in one focus.
A. Kepler
B. Newton
C. Copernicus

6. Galileo was the first to observe the phases of _____.
A. The Moon

B. Venus

7. During a solar eclipse, the _____ casts a small circular shadow on the ____.
A. Moon; Earth
B. Sun; Moon

8. During retrograde motion, a planet moves from _____ to _____ relative to the stars.
A. East, west
B. West, east

9. The Sun's apparent path on the celestial sphere is on the _____.
A. Celestial equator
B. Ecliptic
C. Meridian

10. Which of the following was the most crucial contribution of Galileo in rejecting the geocentric system?
A. The observation of parallax
B. The fact that Venus shows a gibbous phase
C. The fact that Venus shows a crescent phase
D. All of the above
E. Only B and C above

11. What is the size of an object located at a distance of 1 km, and has angular size $A=2^{o}$?
A. About 10 meters
B. About 35 meters
C. About 2 meters
D. About 360 meters

12. Due to what property does a body display the tendency to stay in the state of rest or motion?
A. Temperature
B. Acceleration
C. Pressure
D. Inertia
E. Volume

13. Which statement is true about Newton's first law of motion?
A. A body at rest stays in rest unless a force is applied on it
B. A body in motion stays in motion unless a force is applied on it
C. A body in motion has the tendency to come to a stop eventually
D. Both A and C

E. Both A and B

14. The Earth's radius at the equator is larger than that at the poles. Where is the Earth's surface gravity more?
A. At the equator
B. At the North Pole
C. At the South Pole
D. Same everywhere
E. Both B and C

15. Which of the following objects is obeying Newton's laws of motion?
A. A sleeping cat
B. A communications satellite orbiting the Earth
C. A runner racing around the track
D. A skydiver falling under the force of gravity
E. All of the above

16. Consider an apple falling off a tree. Which of the following apply to this situation?
A. The apple is attracting the Earth
B. The Earth is attracting the apple
C. The Earth is attracting the apple; the apple is not attracting the Earth
D. Only B and C apply
E. Only A and B apply

17. Suppose that the Sun started shrinking in size, without losing any mass. What would be the effect of the Sun's change on the orbits of the planets?
A. The orbits would become smaller in size
B. The orbits would become larger
C. The orbits would not be affected
D. The planets would escape

18. The acceleration of gravity on the Earth's surface is 9.8 m/s^2. What is the acceleration of gravity at a height of 6,400 km above the Earth's surface? (Hint: recall the $1/r^2$ dependence and note that the Earth's radius is 6,400 km)
A. 4.9 m/s^2
B. 2.45 m/s^2
C. 19.6 m/s^2
D. 9.8 m/s^2

19. What is the average orbital speed of the Earth around the Sun? (Note: $r = 1.5 \times 10^{11}$ m and $P = 3.16 \times 10^7$ s)
A. About 30 km/s
B. About 4.7 km/s

C. About 9.8 m/s^2
D. 365 days
E. 1,000 km/s

20. Newton's modification of Kepler's 3rd law (which relates the orbital period and orbital radius of a planet) allows astronomers to determine the _____ of celestial objects by timing their velocity during a full orbit.
A. Mass
B. Period
C. Distance
D. Acceleration

21. Mars completes one orbit around the Sun in approximately two Earth years. Mars orbits at an average distance to the Sun of about 1.5 AU, and Mars' mass is about 1/10 of the Earth's mass. Therefore Mars' orbital speed is _____ the orbital speed of the Earth.
A. About 0.8 times
B. 1.5 times larger than
C. About 1/10 of
D. About 3 times

22. Which photons have more energy?
A. Higher frequency photons
B. Lower frequency photons
C. Longer wavelength photons
D. Shorter wavelength photons
E. Both A and D

23. In an atom when an electron jumps from a lower energy orbit to a higher energy orbit, it is called _____.
A. Ionization
B. Acceleration
C. Excitation
D. A ground stage

24. You are heating a jar full of hydrogen and observing its spectrum. When you add more hydrogen in it, what happens to the spectral lines in the spectrum?
A. The positions of emission lines will change
B. You will start seeing lots of absorption lines instead of emission lines
C. The positions of emission lines will remain the same but the lines will get broader and brighter
D. There will be no change in the spectrum

25. _____ spectrum has dark lines on a continuous background.
A. Absorption
B. Emission
C. Continuous

D. None of these

26. _____ spectrum has bright lines on dark background.
A. Absorption
B. Emission
C. Continuous
D. None of these

27. What conclusion can we draw about the motion of a star that does not show any Doppler shift?
A. The star is not moving
B. The star is spinning fast
C. The star does not have a magnetic field
D. The star may be moving perpendicular to our line of sight
E. We cannot draw any conclusions about the motion of this star

28. A photon of blue light has ____ a photon of red light.
A. More energy than
B. The same energy as
C. Less energy than

29. If you see a spaceship moving past you at 90% of the speed of light, a clock on the spaceship will be observed
A. To run faster
B. To run slowly
C. To run the same as the one on the Earth
D. To run backward

30. Lorentz factor (the "gamma" factor discussed in class) is a factor by which an object's _____ when the object moves at close to the speed of light.
A. Length shortens
B. Mass increases
C. Clock slows down
D. All of the above
E. None of the above

31. The Lorentz factor, (the "gamma" factor discussed in class), becomes _____ for an object that moves at the speed of light. In the equation, V is the velocity of an object and c is the speed of light (300,000 km/s).
A. Zero
B. One
C. Infinity
D. Unknown