

HOMEWORK #1

NOTES:

You will need a calculator, a pencil, and a standard scantron.

Each question has one correct answer. Choose the best answer for each. Mark your answer on the scantron.

This homework is due at the beginning of class on September 24. Late homeworks will not be accepted.

1. Approximately how many stars are in the Milky Way galaxy?
 - a) dozens
 - b) thousands
 - c) millions
 - d) billions
2. The Earth moves through space around the Sun at about 30 km/s. Convert this to miles per hour (mph). Use the fact that 1 mile equals 1.6 km.
 - a) 67,500 mph
 - b) 30 mph
 - c) 1.6 mph
 - d) 48 mph
 - e) 172,800 mph
3. Who found that Venus shows phases that are consistent with the heliocentric model?
 - a) Kepler
 - b) Copernicus
 - c) Aristotle
 - d) Galileo
 - e) Brahe
4. If a car drives in a circle, does it experience a force?
 - a) There is a net force acting on it directed away from the center of the circle.
 - b) There is a net force acting on it directed toward the center of the circle.
 - c) There is a net force directly ahead of it.
 - d) There is a net force directly behind it.
 - e) There is no net force if it moves with constant speed.

5. In space above the Earth,
- a) your mass drops to zero.
 - b) your weight drops to zero.
 - c) you would experience weightlessness because you are in free-fall.
 - d) you would experience weightlessness because there is no gravity there.
6. You observe the North Star near the horizon, where are you?
- a) Near the North Pole.
 - b) Near the South Pole.
 - c) Near the equator of the Earth.
 - d) Johnson City.
 - e) Mexico City.
7. Solve the equation $y^2 = 8$.
- a) $y = 2.83$
 - b) $y = 4.00$
 - c) $y = 8.00$
 - d) $y = 16.00$
8. Solve the equation $y^3 = 27$
- a) $y = 3$
 - b) $y = 9$
 - c) $y = 24$
 - d) $y = 81$
9. If a new planet were found at 200 Astronomical Units (200 AU), what would its orbital period around the Sun be?
- a) 34 years
 - b) 200 years
 - c) 300 years
 - d) 2800 years
 - e) 3 billion years
10. The path of the Sun through the constellations over the course of one year is called the
- a) ellipse.
 - b) edgeomatic.
 - c) ecliptic.
 - d) endgame.
 - e) enigma.

11. The apparent rising and setting of the Sun, as viewed from Earth, is caused by
 - a) the Sun's rotation
 - b) the Sun's revolution
 - c) Earth's revolution
 - d) Earth's rotation

12. The Moon travels around the Earth in approximately 30 days. How many degrees is that per day, on average?
 - a) about 0.08 degree westward each day
 - b) about 0.08 degree eastward each day
 - c) about 12 degrees eastward each day
 - d) about 12 degrees westward each day

13. The observed position of the Sun relative to the background stars changes each day because of
 - a) none of the other answers are correct
 - b) the rotation of the Earth
 - c) the tilt of the Earth's axis
 - d) the actual motion of the Sun through space
 - e) the revolution of the Earth around the Sun

14. At perihelion, a planet moves
 - a) at its slowest speed.
 - b) at its fastest speed.
 - c) midway between its fastest and slowest speeds.
 - d) none of the above.

15. Wien's law describes
 - a) how color depends on temperature.
 - b) how energy depends on frequency.
 - c) how brightness depends on temperature.
 - d) how orbital period depends on orbital size.
 - e) how the force of gravity depends on mass and separation.

16. The Stefan-Boltzmann law describes
 - a) how color depends on temperature.
 - b) how energy depends on frequency.
 - c) how brightness depends on temperature.
 - d) how orbital period depends on orbital size.
 - e) how the force of gravity depends on mass and separation.

17. A blackbody is
- a) a perfect reflector.
 - b) a perfect emitter.
 - c) a perfect tan.
 - d) a perfect absorber.
 - e) light before it passes through a prism.
18. A beam of light originally emitted at 8000 \AA is measured at 8002 \AA owing to the Doppler shift. What is the percent change in the wavelength?
- a) 2.5%
 - b) 0.25%
 - c) 0.025%
 - d) 0.0025%
19. In the Bohr atom,
- a) electrons can only be at certain distances from the nucleus.
 - b) electrons can be at any distance from the nucleus.
 - c) electrons can only be found in the nucleus.
 - d) electrons are never found in atoms.
 - e) electrons are neutral charged particles.
20. Consider a world like the Earth where the temperature of the gas is 9 times higher, but the atmosphere consists of particles that are also 9 times more massive. How will the thermal speed of those gas particles compare to one on Earth?
- a) 9 times bigger than Earth particles
 - b) 3 times bigger than Earth particles
 - c) the same as Earth particles
 - d) 3 times smaller than Earth particles
 - e) 9 times smaller
21. The advantage of larger telescopes is that
- a) bright objects are easier to see.
 - b) faint objects are easier to see.
 - c) clouds do not affect big telescopes.
 - d) larger telescopes can see more electromagnetic bands than small ones.
22. Of the following list of elements, which is most abundant in the universe?
- a) C
 - b) Fe
 - c) He
 - d) O
 - e) N

23. The _____ is NOT visible during a total eclipse of the Sun.
- a) zenith
 - b) corona
 - c) umbra
 - d) photosphere
24. What keeps the Sun from collapsing under its own gravity?
- a) The outward force exerted by intense magnetic fields in its core.
 - b) The fact that its interior is liquid and therefore cannot be compressed.
 - c) The fact that its interior is mostly iron.
 - d) The outward force exerted by gas pressure. hot interior.
 - e) None of the above.
25. Why are astronomers interested in solar neutrinos?
- a) They are the only products of nuclear reactions in the Sun which directly escape from the Sun.
 - b) They are the only probes of the sunspot cycle.
 - c) A sudden burst of neutrino activity might imperil astronauts if outside their spacecraft.
 - d) Their detection would mean that the Sun has exhausted its nuclear fuel.
26. The temperature in the center of the Sun is closest to
- a) one billion K.
 - b) ten million K.
 - c) 6000 K.
 - d) 3000 K.
 - e) 300 K.
27. Sunspots are
- a) regions where the gas is considerably cooler than the surroundings.
 - b) regions where the gas is considerably hotter than the surroundings.
 - c) regions where the magnetic field is stronger.
 - d) Both a and c.
 - e) Both b and c.
28. A solar flare erupts and its particles reach the Earth after 4 days. Given that the Sun is 1 AU from the Earth, how fast were the particles moving?
- a) 430 km/sec
 - b) 1.5×10^6 km/sec
 - c) 4×10^7 km/sec
 - d) 0.25 km/sec