D2 Physics written test questions

1. Which of the following is an aqueous ionic solution?
   a. Salt mixed with oil
   b. Alcohol dissolved in water
   c. Salt dissolved in water
   d. Alcohol mixed with oil
2. What is reduction?
   a. The loss of electrons
   b. The gain of electrons
   c. The annihilation of electrons
   d. The movement of electrons
3. What is oxidation?
   a. The loss of electrons
   b. The gain of electrons
   c. The annihilation of electrons
   d. The movement of electrons
4. If the pH of a liquid is 3.00 and the pOH is 11.00, the substance is most likely…
   a. Vinegar
   b. Water
   c. Bleach
   d. Baking soda
5. Which of the following isotopes is rather stable and can NOT undergo nuclear decay spontaneously?
   a. Uranium-235
   b. Radium-228
   c. Carbon-14
   d. Carbon-12
6. Melting is a…
   a. exothermic process, meaning it releases heat
   b. endothermic process, meaning it absorbs heat
   c. exothermic process, meaning it absorbs heat
   d. endothermic process, meaning it releases heat
7. In the ideal gas law, PV=nRT, what does V stand for?
   a. pressure
   b. volume
   c. temperature
   d. moles of gas
8. A combustion reaction _____ as a reactant
   a. always involves oxygen
   b. usually involves oxygen

c. sometimes involves oxygen

d. never involves oxygen

9. If a man drinks two liters of water per day, how many milliliters of water will he have drank after 80. years (assume there are always 365 days in a year)?

a. 5.8 x 10^4 milliliters of water

b. 5.8 x 10^7 milliliters of water

c. 7.3 x 10^2 milliliters of water

d. 7.3 x 10^5 milliliters of water

10. Which of the following is the name of NO_2?

a. Neptunium dioxide

b. Neptunium dioxygen

c. Nitrogen dioxygen

d. Nitrogen dioxide

11. Which of the following scientists discovered the electron?

a. Thomson

b. Rutherford

c. Einstein

d. Newton

12. Bob starts at the origin and runs in one direction at a constant speed of 5 units per second. Which point could Bob not end up at after five seconds?

a. (25,0)

b. (20,15)

c. (16,19)

d. (7,24)

13. A roller coaster starts 50 meters above the ground at rest. Eventually, it is released from rest and drops to a height of 20 meters. Which of the following is true about the rollercoaster's kinetic energy?

a. It is greater than the rollercoaster's initial potential energy.

b. It is equal to the rollercoaster's initial potential energy.

c. It is greater than zero, but less than the rollercoaster's initial potential energy.

d. It is zero.

14. A doorknob is what kind of simple machine?

a. Screw

b. Lever

c. Pulley

d. Wheel and axle

15. A particle starts from rest and accelerates to a velocity of 10 meters per second after two seconds. What is the average acceleration of this particle?

a. 2 m/s

b. 5 m/s

c. 5 m/s^2

d. 10 m/s^2

16. A particle starts from rest and accelerates to a velocity of 10 meters per second after two seconds. What is the average speed of this particle?

   a. 2 m/s

   b. 5 m/s

   c. 5 m/s^2

   d. The average speed is impossible to determine.

17. A ball is launched from the ground with a velocity of 70 meters per second, directed 45 degrees above the horizontal. What is the velocity of the ball just as it hits the ground again?

   a. 35 m/s

   b. $35\sqrt{2}$ m/s

   c. 70 m/s

   d. $70\sqrt{2}$ m/s

18. A ball is launched from the ground with a velocity of 70 meters per second, directed 45 degrees above the horizontal. What is the velocity of the ball at the highest point in its trajectory?

   a. 35 m/s

   b. $35\sqrt{2}$ m/s

   c. 70 m/s

   d. $70\sqrt{2}$ m/s

19. Which of the following elements would be least likely to react with chlorine?

   a. Hydrogen

   b. Oxygen

   c. Potassium

   d. Silver

20. Carbon-12, the most common isotope of carbon, has six protons and six neutrons. How many protons and neutrons are in Carbon-14?

   a. 6 protons, 6 neutrons

   b. 6 protons, 8 neutrons

   c. 7 protons, 7 neutrons

   d. 8 protons, 6 neutrons

21. Particle A has a mass of 1 kg and a velocity of 2 m/s, while particle B has a mass of 2 kg and a velocity of 1 m/s. Which of the following is true?

   a. The potential energy of particle A is less than that of particle B.

   b. The potential energy of particle A is greater than that of particle B.

   c. The kinetic energy of particle A is less than that of particle B.

   d. The kinetic energy of particle B is greater than that of particle A.

22. Which of the following metals is NOT a solid at room temperature?

a. Titanium
b. Tungsten
c. Mercury
d. Lead

23. A particle moves with a velocity of 6 m/s for five seconds, and a velocity of 10 m/s for some amount of time. If the average velocity of the particle was 9 m/s, for how long was the particle moving at 10 m/s?
    a. 10 seconds
    b. 15 seconds
    c. 20 seconds
    d. 30 seconds

24. A metal block is placed on a ramp and slides down the ramp. A rubber block is placed on the same ramp, but does not move. Which of the following explains this?
    a. The rubber block has a smaller mass than the metal block.
    b. The rubber block has a larger volume than the metal block.
    c. The rubber block has more friction with the ramp than the metal block.
    d. This is not possible, as any object will always slide down the ramp due to gravity.

25. Which of the following is not a transition metal?
    a. Potassium
    b. Titanium
    c. Copper
    d. Gold

26. A cart with mass 100 kg is moving at a speed of 6 m/s. While it is moving, some sand is dumped in the cart, slowing it down. The cart is now moving at 1 m/s. How much sand was emptied into the cart?
    a. 500 kg
    b. 600 kg
    c. 700 kg
    d. 800 kg

27. A raft has a volume of 5 m^3 and a mass of 50 kg. Assuming that the density of water is 1000 kg/m^3, how many 70 kg people could fit into the raft before it sinks?
    a. 50
    b. 60
    c. 70
    d. 80

28. Two balls with identical mass are thrown from the top of a building. One of them is launched downward at 5 m/s, and the other is launched upward at 5 m/s. Which of the following is true about the motion of the two balls?
    a. The distance between the two balls will increase.
    b. The distance between the two balls will decrease.

c. The distance between the two balls will stay the same.

d. The two balls will hit the ground at the same time.

29. When a figure skater starts a slow spin with her arms outstretched, she can dramatically increase her rotational speed by bringing her arms into her side. This effectively reduces her radius. Why does her rotational speed increase?

    a. Conservation of energy

    b. Conservation of mass

    c. Law of Universal Gravitation

    d. Conservation of angular momentum

30. A car starts from rest and accelerates at a constant rate in a straight line. In the first second the car covers a distance of 16 meters. What is the acceleration of the car?

    a. 4 m/s^2

    b. 8 m/s^2

    c. 16 m/s^2

    d. 32 m/s^2