

1. A temperature of degrees 245 Fahrenheit is equivalent to \_\_\_\_\_ degrees Celsius.  
A) -18.4  
B) 473.0  
C) 118.3  
D) -28.0
  
2. The average kinetic energy of the molecules in a gas is a measure of  
A) volume.  
B) density.  
C) temperature.  
D) heat content.
  
3. The amount of heat necessary to change the temperature of 1 kg of a substance 1°C is  
A) 1 cal.  
B) the specific heat.  
C) the heat difference.  
D) 1 J.
  
4. How much heat is necessary to change 30 g of water at 40°C into water at 60°C?  
A) 0.06 kcal  
B) 0.6 kcal  
C) 3 kcal  
D) 0.54 kcal
  
5. The mathematical form of Coulomb's law is similar to that of  
A) the second law of thermodynamics.  
B) the second law of motion.  
C) Kepler's second law.  
D) the law of gravitation.

6. Electric charge is measured in units of

- A) coulombs.
- B) watts.
- C) volts.
- D) newtons.

7. The unit for current is the

- A) ampere.
- B) ohm.
- C) coulomb.
- D) volt.

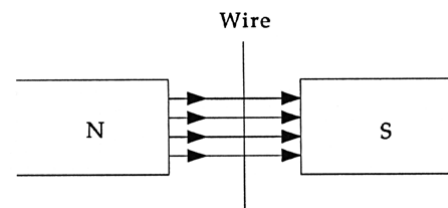
8. Three resistors,  $60\ \Omega$ ,  $80\ \Omega$ , and  $80\ \Omega$ , are wired in series and connected to a 120-V battery.

What is the equivalent resistance for this circuit?

- A)  $220\ \Omega$
- B)  $24\ \Omega$
- C)  $0.042\ \Omega$
- D)  $384000\ \Omega$

9. Consider a wire in a magnetic field, as shown in the following figure, with a current flowing through it. What will happen to the wire?

- A) The wire will be forced toward the north pole.
- B) The wire will be forced perpendicular to the plane of the magnetic field.
- C) The current will cease flowing.
- D) Nothing will happen.



10. A transformer with 400 turns on the primary coil is used to decrease the voltage from 3000 V to 120 V for home use. How many turns should be in the secondary coil? A)

- 400 turns
- B) 10000 turns
- C) 16 turns
- D) 3520 turns

11. Atomic physics deals mainly with phenomena involving which particles in atoms?

- A) Quarks
- B) Protons
- C) Electrons
- D) Neutrons

12. What is the energy of a photon with a frequency of  $5.2 \times 10^{14}$  Hz?

- A)  $3.4 \times 10^{-19}$  J
- B)  $1.3 \times 10^{-20}$  J
- C)  $0.8 \times 10^{-20}$  J
- D)  $0.3 \times 10^{-21}$  J

13. Discrete wavelengths of light are emitted by an excited gas because

- A) the speed of light is constant in a given medium.
- B) light can behave either as a wave or as a particle.
- C) electron energy levels are quantized.
- D) the intensity of radiation is proportional to the second power of the frequency.

14. For a specific element, photons of how many different energies could be emitted by electrons in the  $n = 3$  level as they return to the  $n = 1$  level?

- A) 1
- B) 4
- C) 2
- D) 3

15. When an electron in an atom moves from a lower energy level to a higher one, a \_\_\_\_\_ is \_\_\_\_\_.

- A) photon; emitted
- B) proton; emitted
- C) photon; absorbed
- D) proton; absorbed

16. The Bohr theory was developed to explain which of these phenomena?

- A) The photoelectric effect
- B) Line spectra
- C) Quantum numbers
- D) X-rays

17. How many protons are there in an atom of  ${}_{11}^{23}\text{Na}$

- A) 12
- B) 34
- C) 23
- D) 11

18. The various isotopes of an element all have

- A) the same number of protons but different numbers of neutrons.
- B) the same total number of neutrons and protons.
- C) the same number of neutrons but different numbers of protons.
- D) the same number of neutrons and the same number of protons.

19. When  ${}_{88}^{226}\text{Ra}$  undergoes alpha decay, the daughter is

- A)  ${}_{86}^{222}\text{Rn}$
- B)  ${}_{90}^{230}\text{Th}$
- C)  ${}_{89}^{226}\text{Ac}$
- D)  ${}_{1}^1\text{H}$

20. A non-chemical combination of two or more substances in variable proportions is called

- A) a mixture.
- B) a compound.
- C) an ion.
- D) a molecule.

21. The symbols the chemical elements most associated with living organisms are CHONSP, which stand for

- A) Chromium, Mercury, Oxygen, Nubium, Salt, Protactinium
- B) Carbon, Hydrogen, Oxygen, Nitrogen, Sulfur, Phosphorus
- C) Carborundum, Helium, Osmium, Nigerium, Platinum
- D) Carbon, Hydrogen, Oxygen, Selenium, Plumbum

22. The chemical properties of fluorine and chlorine are similar because both

- A) are nonmetals and they are close together in the periodic table.
- B) have seven valence electrons.
- C) have two electrons in the first shell.
- D) are in the same period.

23. A substance of unknown composition is heated in a sealed container and exhibits chemical change. As a result, the mass of the container and its contents

- A) increases.
- B) decreases.
- C) remains the same.
- D) Any of these could occur.

24. The law of definite proportions states that different samples of a pure compound always contain the same elements in the same proportion by

- A) mass.
- B) atoms.
- C) atomic number.
- D) volume.

25. When the equation  $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$  is balanced, the coefficient of  $\text{H}_2\text{O}$  is

- A) 3.
- B) 4.
- C) 2.
- D) 1.