Please read each question carefully. Each question worth's 1 point.
For the following questions, please circle ◯ the correct answer.

Part 1.

1. Which has zero acceleration? An object

A) at rest B) moving at constant velocity C) in mechanical equilibrium
D) all of the above E) none of the above.

2. The gain in speed each second for a freely falling object is about

A) 0 B) 5 m/s C) 10 m/s D) 20 m/s C) depends on initial speed

3. A package falls off a truck that is moving at **30 m/s**. Neglecting air resistance, the horizontal speed just before it hits the ground is

A) zero B) less than 30 m/s but larger than zero C) about 30 m/s
D) more than 30 m/s E) not enough information to estimate the speed.

4. A piece of rope is pulled by two people from both sides in opposite directions. Each one pulls with a **400 N** force**.** What is the tension in the rope?

A) 0 B) 400 C) 600 D) 800 E) none of the above

5. An object is moving up at a speed of **50 m/s**. Ignoring air resistance, its speed (in **m/s**) after **1 s** is about

A) 25 B) 40 C) 60 D) 55 E) 100

6. Starting from rest, the distance in which a freely falling object will fall in **0.5 s** is

A) 0.5 m B) 2.5 m C) 5.0 m D) 1.25 m E) none of the above.

7. A **2000 kg** car experiences a braking force of **1000 N** and slides to a stop in **6 s** The speed (**in m/s**) of the car just before the brakes were applied was

A) 1.2 B) 15 C) 30 D) 45 E) none of the above

8. A **1000 kg** car moving at **10 m/s** brakes to a stop in **5 s.** The average braking force (in **N**) is

A) 1000 B) 2000 C) 3000 D) 4000 E) 5000

9. A **1.0 N** apple falls freely to the ground. The apple hits the ground with an impact force (in **N**) of about

A) 1 B) 2 C) 4 D) 9.8 E) not enough information.

10. If a ball is thrown straight up at a speed of **10 m/s**, the total time it takes the ball to return to its starting point is about

A) 1 s B) 2 s C) 10 s D) 20 s E) none of the above.

11. The buoyant force on an object is least when the object is

A) partially submerged B) submerged in the middle of the fluid
C) submerged at the bottom of the fluid D) all of the above
E) none of the above.

12. Which temperature scale labels the freezing point of water at **0** degrees?

A) Celsius B) Caloric C) Kelvin D) Fahrenheit
E) All of the above.

13. Energy transfer by convection is primarily restricted to

A) solids B) fluids C) gases D) All of the above
E) none of the above.

14. Suppose you put a closed, sealed can of air on a hot stove burner. The contained air will undergo an increase in

A) thermal energy B) temperature C) pressure
D) all of the above E) none of the above.

15. A conductor differs from an insulator in that a conductor

A) has more protons than electrons. B) has more electrons than protons.
C) has more energy than an insulator D) has fast moving molecules.
E) none of the above.

16. A charge carries in a metal are electrons rather than protons, because electrons are

A) negative B) smaller C) loosely bound
E) all of the above D) none of the above

17. A main difference between gravitational and electric forces is that electrical forces

A) attract. B) repel or attract. C) obey the inverse square law.
D) act over short distances E) none of the above.

18. The electric force on a **2 C** charge is **60 N.** What is the value of the electric field at the place where the charge is located?

A) 20 N/C B) 30 N/C C) 60 N/C D) 120 N/C E) 240 N/C

19. The current through two identical light bulbs connected in series is **0.25 A.** The voltage across both bulbs is **110 V**. The resistance of a single bulb is

A) 22 Ω B) 44 Ω C) 220 Ω D) 440 Ω E) none of the above.

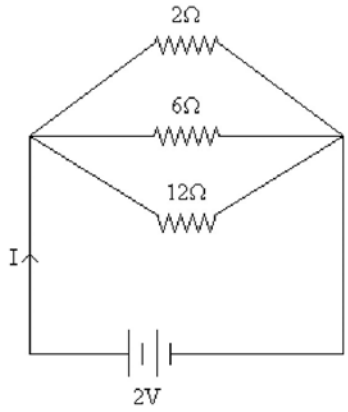
20. What is the power of a light bulb when **0.8 A** flow through it when connected to a **120 V** outlet?

A) 12 W B) 15 W C) 60 W D) 96 W E) 120 W

Part 2:

Please read each question carefully and write your answer in the space provided with the appropriate units. Each question is graded on a 5 points scale.

P.1. Three resistors of values **2 Ω, 6 Ω** and **12 Ω** are connected across a **2.0V DC** voltage source as shown in the figure. What is the total current ***I*** flowing in this circuit?



***Answer*_____**

P.2. An electric device delivers a current of **5.0 A** for **10 seconds**. How many electrons flow through this device?

***Answer*_____**

P.3. The specific heat capacity of **ice** is about **0.5 cal/g.^{0}C.** Suppose it remains at that value all the way to absolute zero. What is the heat required to change a **1.0 g** ice at **absolute zero** to **1.0 g** of boiling water?

***Answer*_____**

P.4. A ball of mass **1.0 kg** rolls off of a **1.25 m** high table and hits the floor **3.0 m** from the base of the table. **(a)** What is the time of flight for the ball? **(b)** What is the velocity of the ball as it leaves the table?

***Answer(a)*_____**

***Answer(b)*_____**

Some useful constants:

$e^- = 1.60 \times 10^{-19}$ C **$k = (1/4\pi\varepsilon_o) = 8.99 \times 10^9$ N.m^2/C^2**

$m_e = 9.11 \times 10^{-31}$ kg **$m_p = 1.67 \times 10^{-27}$ kg.**

$g = 10$ m/s^2 **$\rho_{water} = 1$ gm/cm^3**

$c_{water} = 4190$ J/ kg. K = 1.0 cal/g.^{0}C **1.0 cal = 4.18 J**

L_{fusion} for water = 334 J/g = 80 cal/g

$L_{vaporization}$ for water = 2256 J/g = 540 cal/g