1. The electrostatic force between two charges

   (a) is always positive
   (b) is directed along the line that connects two charges
   (c) is directed perpendicular to the line that connects two charges
   (d) is equal to the gravitational force between two charges
   (e) is proportional to the distance between two charges

   http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elefor.html#c1

2. The electric field lines due to an isolated negative charge $-Q$

   (a) form closed concentric circles around the charge
   (b) form a criss-cross pattern around the charge
   (c) are all directed towards the charge
   (d) are more dense far from the charge
   (e) are all directed away from the charge

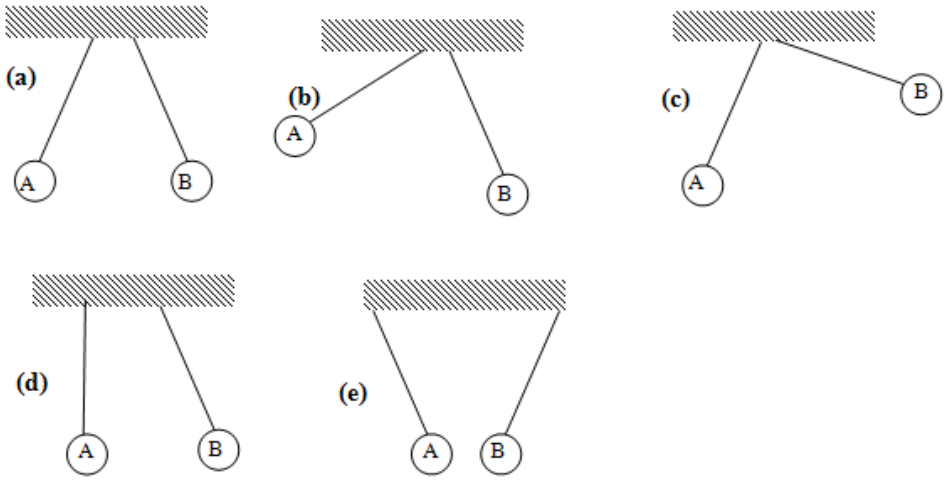
   http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elefie.html#c1

3. To make an uncharged object have a positive charge we must:

   (a) add some atoms
   (b) remove some atoms
   (c) add some electrons
   (d) remove some electrons
   (e) change the reference system and write down a negative sign

   http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elecur.html#c2

4. The figures below shows two oppositely charged spheres of **equal mass**, each suspended by a string of equal length. Sphere A has charge +2Q and sphere B has charge –Q. Which of the following figures correctly depicts the entire system in static equilibrium



   (a) a
   (b) b
   (c) c
   (d) d

(e) e

Correct answer is (e): opposite charges attract each other

5. The stored energy in a capacitor:

(a) has units of *Watts*
(b) depends on the DC current that flows through the capacitor
(c) is proportional to the area of the capacitor plates only
(d) is proportional to the gap between the capacitor plates only
(e) depends on the charge and capacitance

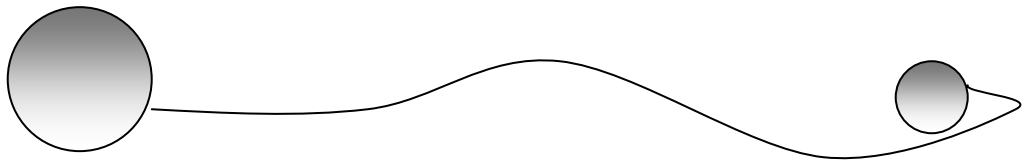
http://hyperphysics.phy-astr.gsu.edu/hbase/electric/capeng.html

6. Three identical isolated spheres A, B, and C have charges: +3Q, –3Q and +9Q, respectively. If we connect all three spheres together with a metal wire still keeping them isolated from the ground, what is the charge on the sphere B?

(a) +3Q
(b) –3Q
(c) Zero
(d) +5Q
(e) –5Q

Total charge of +9Q **is divided equally between connected spheres**

7. Two conducting spheres, one having twice the diameter of the other, are separated by a large distance compared to their diameters. The smaller sphere has charge **q** and the larger sphere is uncharged. If they are connected by a thin conducting wire,



(a) the smaller sphere is at a lower potential than the larger one
(b) both spheres are at the same potential
(c) the smaller sphere has the same amount of charge as the larger one
(d) the larger sphere has less amount of charge than the smaller one
(e) the smaller sphere is at a higher potential than the larger one

(the answer is (b), connected conductors all have the same potential)

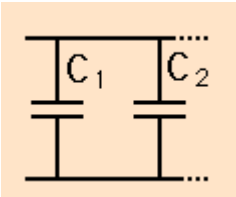
8. A parallel plate capacitor of capacitance C is charged using a battery to a potential difference V_0. After that the battery is disconnected from the capacitor and the distance between the plates of this capacitor is decreased by a factor of 2. The potential difference between the plates V

(a) decreased by a factor of 2
(b) increased by a factor of 2

(c) increased by a factor of 4
(d) decreased by a factor of 4
(e) did not change

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/pplate.html#c1

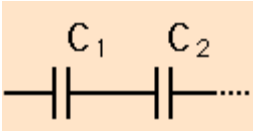
9. Capacitors C_1 and C_2 are connected in parallel. The equivalent capacitance is given by



(a) $C_1C_2/(C_1 + C_2)$
(b) $(C_1 + C_2)/C_1C_2$
(c) $1/(C_1 + C_2)$
(d) C_1/C_2
(e) $C_1 + C_2$

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/capac.html#c2

10. Capacitor s C_1 and C_2 are connected in series. The equivalent capacitance is given by



(a) $C_1C_2/(C_1 + C_2)$
(b) $(C_1 + C_2)/C_1C_2$
(c) $1/(C_1 + C_2)$
(d) C_1/C_2
(e) $C_1 + C_2$

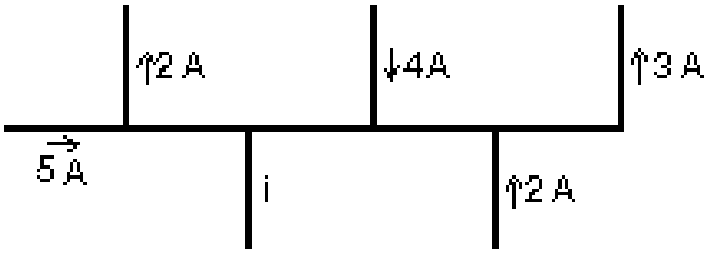
http://hyperphysics.phy-astr.gsu.edu/hbase/electric/capac.html#c2

11. Which of the following is the correct expression for electric current ?

(a) $I = \Delta C/\Delta t$
(b) $I = \Delta V/\Delta t$
(c) $I = \Delta Q/\Delta t$
(d) $I = \Delta R/\Delta t$
(e) $I = \Delta E/\Delta x$

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elecur.html#c1

12. A portion of an electrical circuit is shown, with the values of the currents given for all branches but one (at the low left). What is the direction and value of the current i ?



(a) 6 A, ↑

(b) 6 A, ↓
(c) 4 A, ↑
(d) 4 A, ↓
(e) zero

13. An electric device delivers a DC current of 4A for 4 seconds. How many electrons can flow through this device during this period of time ?

(a) 4
(b) 16
(c) 10^{20}
(d) 1.6×10^{19}
(e) 8.7×10^{-19}

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elecur.html#c1

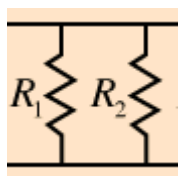
14. A flash light bulb for DC applications is marked "2 Watt, 6 Volt". Its resistance is close to

(a) 18 Ω
(b) 12 Ω
(c) 6 Ω
(d) 2 Ω
(e) 0.33 Ω

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elecur.html#c1

15. Resistor R_1 and R_2 are connected in parallel. The equivalent resistance is given by

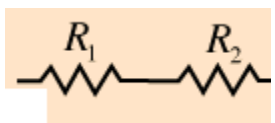
(a) $R_1R_2/(R_1 + R_2)$
(b) $(R_1 + R_2)/R_1R_2$
(c) $1/(R_1 + R_2)$
(d) R_1/R_2
(e) $R_1 + R_2$



http://hyperphysics.phy-astr.gsu.edu/hbase/electric/resis.html#c3

16. Resistor R_1 and R_2 are connected in series. The equivalent resistance is given by

(a) $R_1R_2/(R_1 + R_2)$
(b) $(R_1 + R_2)/R_1R_2$
(c) $1/(R_1 + R_2)$
(d) R_1/R_2
(e) $R_1 + R_2$



http://hyperphysics.phy-astr.gsu.edu/hbase/electric/resis.html#c3

17. The resistance of a 2 m wire of radius of 1 mm is 70 Ω. What is the resistivity of the material of this wire?

(a) 0.76×10^{-6} Ωm
(b) 1.76×10^{-8} Ωm
(c) 2.70×10^{-5} Ωm
(d) 1.10×10^{-4} Ωm
(e) 6.72×10^{-6} Ωm

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/resis.html#c2

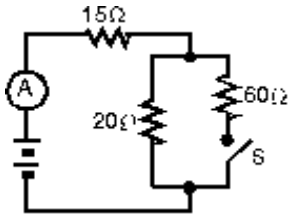
18. The current in a 120V vacuum cleaner 12 A. If the cost of electrical energy is 10 cents per kiloWatt×hour, how much does it cost to use the vacuum cleaner for 2 hours ?

(a) $0.3
(b) $3
(c) $30
(d) $300
(e) $3000

http://hyperphysics.phy-astr.gsu.edu/hbase/electric/resis.html#c2
http://hyperphysics.phy-astr.gsu.edu/hbase/electric/powerac.html#c1

19. The electrical circuit consists of a battery, ammeter, and three resistors: 15 Ω, 20 Ω, and 60 Ω. When switch S is open, the ammeter reads 2.0 A. When switch S is closed, the ammeter reading

(a) increases slightly
(b) decreases slightly
(c) becomes 1A
(d) becomes 4 A
(e) becomes zero



20. An electrical coffeemaker with 1 liter of water at 30^0C is turned on. The heater coil of the coffeemaker has a resistance of 12 Ω, the voltage in the outlet is 120V. How long does it take to warm the water up to 100^0 C ?
Hint: 1 liter of water has a mass of 1 kg. Look for *Specific heat of water* in the Equation sheet.

(a) 1 min
(b) 2 min
(c) 3 min
(d) 4 min
(e) 5 min

4186*1*(100-30))/(60*120*120/12) = 4 min

STOP This is the end of the test.