
1-If a piece of plastic is negatively charged, this means

- a) Some electrons are added to it.
- b) Some electrons are removed from it.
- c) Some protons are added to it.
- d) Some protons are removed from it.



The length of a certain wire is doubled and at the same time its radius is also doubled. What is the change in the resistance of this wire?

- A) It stays the same
- B) It is reduced by a factor of 2
- C) It is reduced by a factor of 4
- D) It is doubled.



A capacitor consists of two parallel plates of area A separated by a distance d . This capacitor is connected to a battery and charged until its plates carry charges $+Q$ and $-Q$ and then disconnected from the battery. If the separation between the plates is doubled, the electrical energy stored in the capacitor will

- A) not change
- B) be cut in half
- C) double
- D) quadruple



How long it takes for a trillion electrons (10^{12} electrons) to pass through the cross sectional area of a wire that carries a current of 2 mA?

a) 8×10^{-5} s

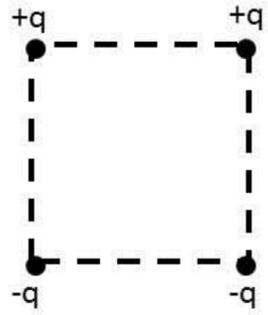
b) 5×10^{11} s

c) 8×10^{-17} s

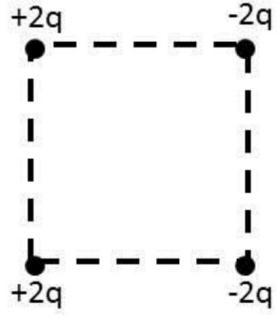
d) 2×10^{-3} s



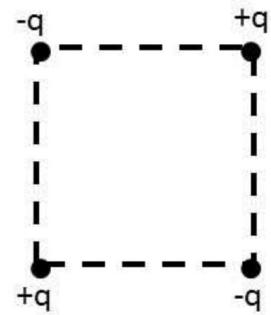
3- In which of the following charge arrangements is the net electric field at the center of the square equals zero?



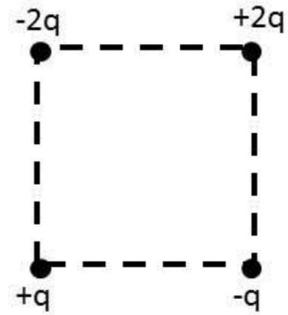
a)



b)



c)

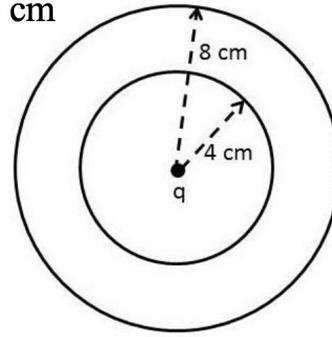


d)



4- A point charge is placed at the common center of two spheres of radii 4 cm and 8 cm as shown. If the net electric flux through the smaller sphere is $400 \text{ N}\cdot\text{m}^2/\text{C}$, what is the net electric flux through the larger sphere?

- a) $800 \text{ N}\cdot\text{m}^2/\text{C}$.
- b) $400 \text{ N}\cdot\text{m}^2/\text{C}$.
- c) $200 \text{ N}\cdot\text{m}^2/\text{C}$.
- d) $100 \text{ N}\cdot\text{m}^2/\text{C}$.



A parallel-plate capacitor with plate area of 2 cm^2 and plate separation of 0.5 mm is charged by a 5 V battery. How much energy is stored in the capacitor?

a) $3.52 \times 10^{-12} \text{ J}$

b) $4.4 \times 10^{-11} \text{ J}$

c) $8.8 \times 10^{-11} \text{ J}$

d) $8.8 \times 10^{-12} \text{ J}$



When a 120 cm long wire is connected to a potential difference of 0.2 V a current of 2 A flows through the wire. If the wire cross-section has a diameter of 1 mm, what is the resistivity of the wire material?

- a) $1.3 \times 10^{-7} \Omega \cdot \text{m}$ b) $0.13 \Omega \cdot \text{m}$ c) $2.6 \times 10^{-3} \Omega \cdot \text{m}$ d) $6.5 \times 10^{-8} \Omega \cdot \text{m}$



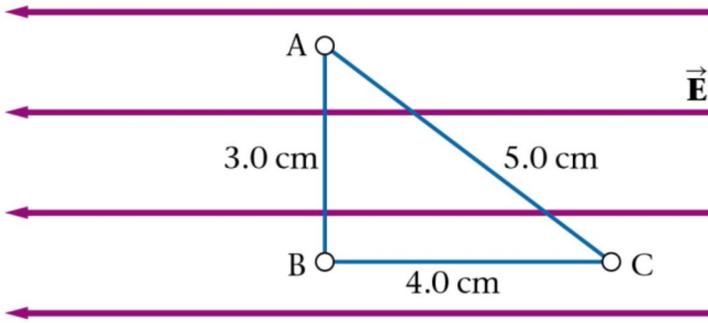
Two point charges $q_1 = 6 \text{ nC}$ and $q_2 = -3 \text{ nC}$ are separated by a distance of 18 m. What is the magnitude of the net electric field at the midpoint between the two charges?

- a) 0.33 N/C b) 1.0 N/C c) 0.67 N/C d) zero



The figure shows a uniform electric field of magnitude $E = 600 \text{ N/C}$ pointing in the negative x -direction. Considering the three points shown, which of the following is **correct**:

- a) $V_A - V_C = 30 \text{ V}$
- b) $V_B > V_C$
- c) $V_A - V_B = 0$
- d) $V_B - V_C = 0$



An electron initially moving at 3×10^6 m/s enters an external uniform electric field of magnitude 600 N/C such that it is moving in the direction of the field. What is the final speed of the electron as it travels a distance of 2 cm along the field?

- a) 2.19×10^6 m/s b) 3.64×10^6 m/s c) 1.48×10^7 m/s d) 1.56×10^6 m/s



How many electrons pass through a $1\ \Omega$ resistor in 5 seconds if the dissipated power in the resistor is $16\ W$?

- A) 2.5×10^{19}
- B) 1.25×10^{20}
- C) 6.4×10^{-19}
- D) 3.2×10^{-18}



An electron is initially at rest. It is accelerated through a potential difference of 40 V. What is the final speed of the electron?

- A) 1.41×10^{13} m/s
- B) 4.05×10^7 m/s
- C) 6.4×10^{-18} m/s
- D) 3.75×10^6 m/s



The potential difference between the plates of a parallel plate capacitor with the plate separation of 6 cm is 60 V. What is the electric field between the plates of this capacitor?

- A) 1000 N/C
- B) 60 N/C
- C) 3600 N/C
- D) 2000 N/C



What is the net electric flux through a surface which encloses three charges $q_1 = +6 \text{ nC}$, $q_2 = -12 \text{ nC}$, and $q_3 = +2 \text{ nC}$?

- a) $-2260 \text{ N.m}^2/\text{C}$
- b) $-452 \text{ N.m}^2/\text{C}$
- c) $+452 \text{ N.m}^2/\text{C}$
- d) $+2260 \text{ N.m}^2/\text{C}$



2- Two identical point charges q_1 and q_2 are placed a certain distance apart. A third positive charge q_3 is placed midway between them along the line that connects them. Which of the following statements is true about charge q_3 ?

- a) It exerts an electric force on q_1 and q_2 .
- b) It experiences no net force.
- c) It is placed at a zero net electric field location.
- d) all of the above.



5- Which of the following changes would be certain to increase the resistance of a copper wire?

- a) Decreasing its diameter and decreasing its length.
- b) Increasing its diameter and increasing its length.
- c) Decreasing its diameter and increasing its length.
- d) Increasing its diameter and decreasing its length.



5- An electric heater is rated at 600 watts when it is connected to 115 volt source. What is the resistance of this electric heater?

a) 5.26 Ω

b) 0.045 Ω

c) 0.19 Ω

d) 22 Ω



(2 points) Consider a uniform electric field of magnitude $E = 200 \text{ N/C}$ pointing in the negative y -direction. Given the two points $P_1 = (0, 0) \text{ cm}$ and $P_2 = (2, 3) \text{ cm}$ located inside the electric field,

- a) Calculate the potential difference between the two points $\Delta V_{2,1} = V_{P_2} - V_{P_1}$
- b) An electron is moved from P_1 to P_2 , calculate the change in its potential energy.



(2 points) A $-16 \mu\text{C}$ charge is placed at $(0, 0) \text{ cm}$ and a $-4 \mu\text{C}$ charge is placed at $(30, 0) \text{ cm}$. At what point on the line joining the two charges is the electric field zero?