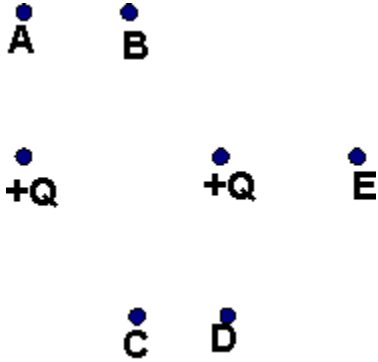


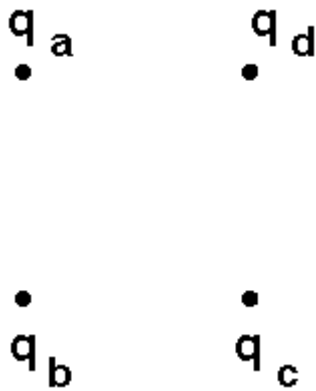
Electric Charges, DC Circuits, Magnetism

1. Two point charges of charge $+Q$ are placed as shown below. At what point will a negative charge experience a force toward the bottom of the page?



- a) A
- b) B
- c) C
- d) D
- e) E

2. Four point charges are placed in the corners of a square, as shown in the figure below. If $q_b = 10^{-9}C$, $q_c = -10^{-9}C$ and $q_d = 10^{-9}C$, and the magnitude of the electric forces on q_c is 0 N, which of the statements below is true?

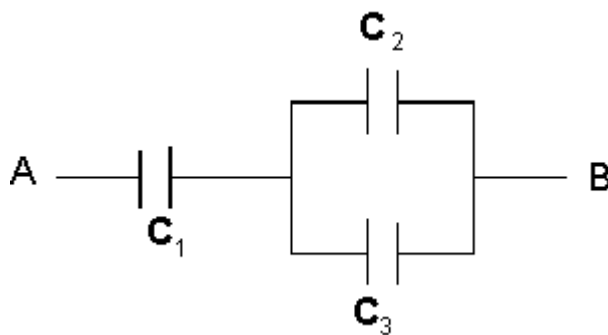


- a) $q_c > 10^{-9}C$
- b) $0 < q_c < 10^{-9}C$
- c) $q_c = 0C$
- d) $-10^{-9}C < q_c < 0C$
- e) $q_c < -10^{-9}C$

3. The magnitude of the electric field generated by a charge q at a distance d_1 from the charge is E_1 . What is the magnitude of the electric field generated by the charge at a distance d_2 from the charge?

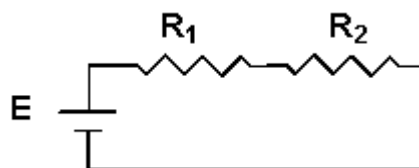
- a) E_1
- b) $E_1 \cdot (d_2^2/d_1^2)$
- c) $E_1 \cdot (d_1^2/d_2^2)$
- d) $E_1 \cdot (d_1/d_2)$
- e) $E_1 \cdot (d_2/d_1)$

4. What is the capacitance between the points A and B if $C_1 = C_2 = C_3 = 10^{-6}\text{F}$?



- a) 10^{-6}F
- b) $2 \cdot 10^{-6}\text{F}$
- c) $.67 \cdot 10^{-6}\text{F}$
- d) $.5 \cdot 10^{-6}\text{F}$
- e) $1.5 \cdot 10^{-6}\text{F}$

5. A DC voltage source is connected to two resistors in series, as shown in the figure below. What is the ratio between the power dissipation of resistor R_1 and the power dissipation of resistor R_2 ?

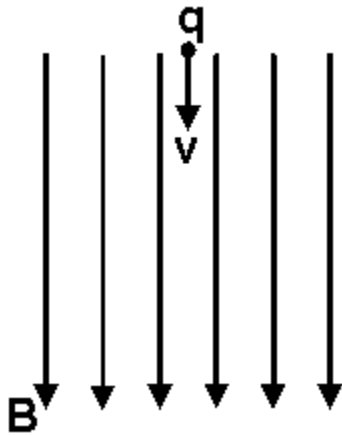


- a) $(R_1/R_2)^2$
- b) $(R_2/R_1)^2$
- c) $(1 - R_1)/(1 - R_2)$
- d) R_1/R_2
- e) R_2/R_1

6. A copper wire of length $l_1 = 6$ m and cross-sectional area of $A_1 = 4$ mm² has the same resistance as another copper wire of length $l_2 = 18$ m. What is the ratio between the masses of the two wires, m_2/m_1 ?

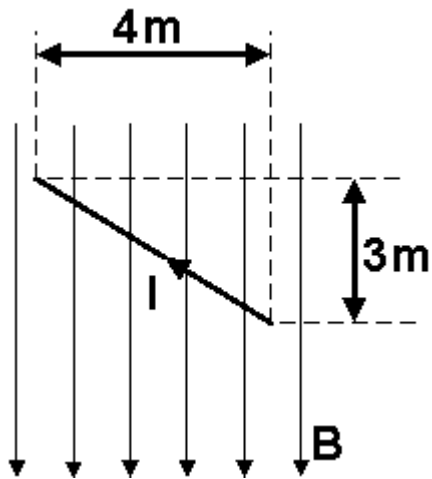
- a) 9
- b) 3
- c) 1
- d) 1/9
- e) 1/3

7. A particle with a positive charge of q moves with a speed v and passes through a magnetic field B parallel with the speed v . What is the magnitude of the magnetic force on the particle?



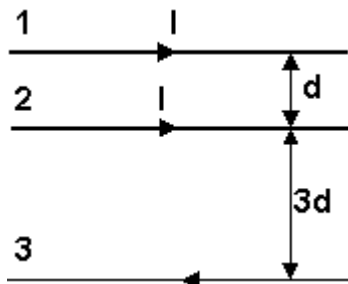
- a) $F = qvB$
- b) $F = -qvB$
- c) $F = 0$
- d) $F = qvB/2$
- e) $F = -qvB/2$

8. In the figure below, a magnetic field of $.01\text{ T}$ is applied locally to a wire carrying a current of intensity $I = 10\text{ A}$. What is the magnitude of the magnetic force applied to the wire?



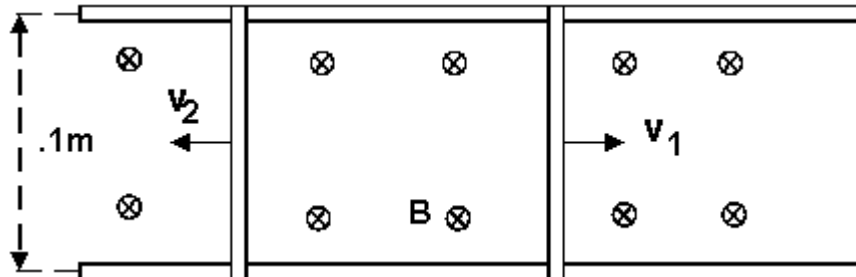
- a) $F = .3\text{ N}$
- b) $F = .4\text{ N}$
- c) $F = .5\text{ N}$
- d) $F = 1\text{ N}$
- e) $F = 3\text{ N}$

9. Three parallel long straight wires carry currents as shown in the picture below. If the currents in the wires #1 and #2 are $I = 5\text{ A}$, and the magnetic force on wire #1 is equal to 0 A , what is the current in wire #3?



- a) $I_3 = 5\text{ A}$
- b) $I_3 = 10\text{ A}$
- c) $I_3 = 15\text{ A}$
- d) $I_3 = 20\text{ A}$
- e) $I_3 = 25\text{ A}$

10. Two metallic bars slide along metallic rails at speeds $v_1 = .1\text{m/s}$ and $v_2 = .2\text{m/s}$ as shown below. The bar and the rails are situated in a magnetic field of 4T . What is the induced voltage in the bar and rails?



- a) 50mV
- b) 60mV
- c) 100mV
- d) 120mV
- e) 150mV

Solutions:

Question #1: b

Question #2: e

Question #3: c

Question #4: c

Question #5: d

Question #6: a

Question #7: c

Question #8: b

Question #9: d

Question #10: d