

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

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

2. *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*

3. *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.*

4. *Coulomb is the unit of which quantity?*

- a) *Field strength*
- b) *Force*
- c) *Permittivity*
- d) *Charge*

5. The SI unit of surface charge density is:

- a) C/m^2
- b) C/m
- c) C/m^3
- d) $C\ m^2$

6. The net electric flux through any closed surface is equal.

- a) Zero
- b) Q/ϵ_0
- c) $Q/2\epsilon_0$
- d) $2Q/\epsilon_0$

7. Electrical conductors are materials in which some of the electrons are free to move:

- True
- False

8. Which among the following statements is/are false regarding electric field lines?

- a) Electric field lines can be seen.
- b) Electric field lines never intersect.
- c) Electric field lines always intersect.
- d) Electric field line may or may not intersect.

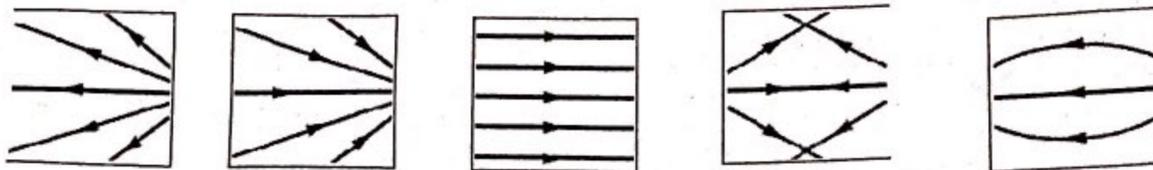
9. Electric field lines provide information about

- a) field strength
- b) nature of charge
- c) direction
- d) all of the above

10. A test charge is moved from lower potential point to a higher potential point. The potential energy of test charge will

- a) remain the same.
- b) Decrease
- c) Increase
- d) become zero.

11. Which one of the diagrams below is not a possible electric field configuration for a region of space which does not contain any charges?



12. Two charged particles, Q_1 and Q_2 , are a distance r apart with $Q_2 = 5Q_1$. Compare the forces they exert on one another when F_1 is the force Q_2 exerts on Q_1 and F_2 is the force Q_1 exerts on Q_2 .

- a) $F_2 = 5F_1$
- b) $F_2 = -5F_1$
- c) $F_2 = F_1$
- d) $F_2 = -F_1$
- e) $5F_2 = F_1$

13. 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

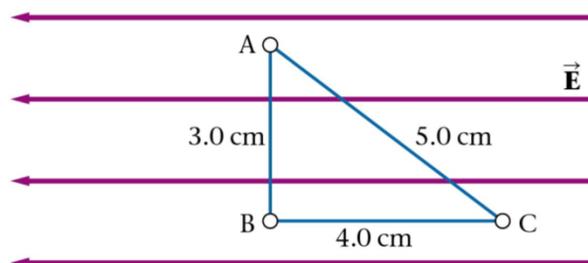
14. Two-point charges $q_1 = 6$ nC and $q_2 = -3$ nC are separated by a distance of 18m. What is the magnitude of the net electric field at the midpoint between the two charges?

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

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15. 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) $V_B - V_C = 0$



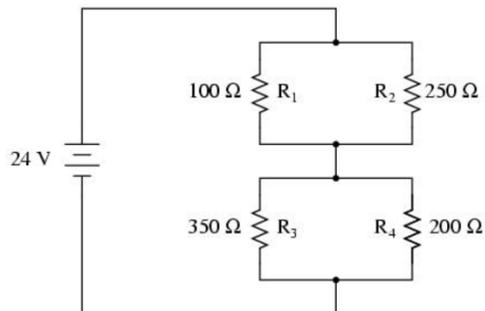
16. How many electrons pass through a 1Ω resistor in 5 seconds if the dissipated power in the resistor is 16 W ?

- a) 2.5×10^{19}
- b) 1.25×10^{20}
- c) 6.4×10^{-19}
- d) 32×10^{-18}

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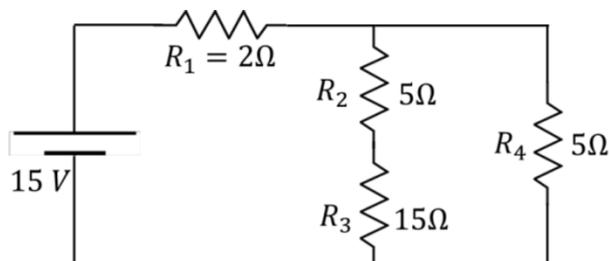
17. A battery with no internal resistance is connected to a set of resistors as shown. How much current flows in the battery?

- a. 0.12 A
- b. 0.19 A
- c. 3055 A
- d. 5142 A



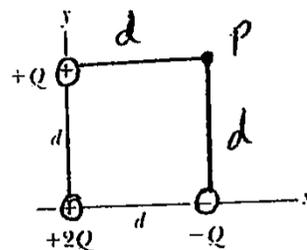
18. Four resistors are connected to a 15 Volts battery as shown. Determine:

- a) The equivalent resistance
- b) The currents in resistors R_1 and R_4 , and the potential difference across them.



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19. Calculate electric potential at point "P". $Q=5\text{nC}$ and $d=50\text{cm}$.



20. A 6m diameter loop is rotated in a uniform electric field until the position of maximum electric flux is found. The flux in this position is measured to be $7 \times 10^5 \text{ Nm}^2/\text{C}$

a- What is the magnitude of the electric field?

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21. 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,
- Calculate the potential difference between the two points $\Delta V_{21} = V_{P_2} - V_{P_1}$
 - An electron is moved from P_1 to P_2 , calculate the change in its potential energy.



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

23. A proton (charge $1.6 \times 10^{-19}\text{C}$) moves on a path perpendicular to the direction of a uniform electric field of strength 5.0 N/C . How much work is done on the proton by the electric field as it moves 10 cm ?

- a) $4.8 \times 10^{-20} \text{ J}$
- b) $-4.8 \times 10^{-20} \text{ J}$
- c) $1.6 \times 10^{-20} \text{ J}$
- d) zero

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