

Coulomb's law/Electric Field/ Capacitance Test Review

1. The potential difference between two plates is 50V. Plate A is positive and B is negative. Which plate is at the higher potential?

A + test charge moves from A → B

b. How much work must be done to carry a +6C from B to A?

300J $W = 6 \times 50$

c. What direction does the field run?

A → B

d. If the distance of separation is 10mm, What is the value of E?

5000V $V = Ed$ $E = \frac{V}{d}$ $\frac{50}{.01}$

2. How much electric potential energy does a proton lose as it falls through a potential drop of 5kV?

$-8.6 \times 10^{-16} J$ $EPE = Vq$ $-5000V \times 1.6 \times 10^{-19} =$

3. How much work is required to carry an electron from the positive terminal of a 12V battery to the negative one?

$1.92 \times 10^{-18} J$ $W = qV$ $-1.6 \times 10^{-19} \times -12$

4. An e- starts from rest and falls through a potential rise of 80V. What is its final speed?

$-1.28 \times 10^{-17} J$ $EPE = Vq$ $80 \times -1.6 \times 10^{-19} =$

5. The following charges are placed on the x axis. +2μC at x=20cm, -3μC at x=30cm, -4μC at x=40cm. Find the voltage on the axis at x=0

$-90KV$ $V = \frac{kq}{r}$ $\frac{9 \times 10^9 \times 2 \times 10^{-6}}{.2} + \frac{9 \times 10^9 \times -3 \times 10^{-6}}{.3} + \frac{9 \times 10^9 \times -4 \times 10^{-6}}{.4}$

6. A 1.2μF capacitor is charged to 3kV. What is the energy stored in the capacitor?

5.4 J $Energy = \frac{1}{2} qV$ or $\frac{1}{2} CV^2 = \frac{1}{2} (1.2 \times 10^{-6}) (3000)^2 =$

7. What is the charge on a 300pF capacitor when it is charged to 1kV?

3μC $q = CV$ $300 \times 10^{-12} F \times 1000V$

8. A potential difference of 24kV maintains a downward directed electric field between two horizontal plates separated by 1.8cm. Find the charge on an oil drop of mass $2.2 \times 10^{-13} kg$ that remains stationary between the plates.

$1.6 \times 10^{-18} C$

9. An e- gun shoots e- at a metal plate 4mm away. The plate is 5V lower in potential than the gun. How fast must e- be moving as they leave the gun if they are to reach the plate?

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