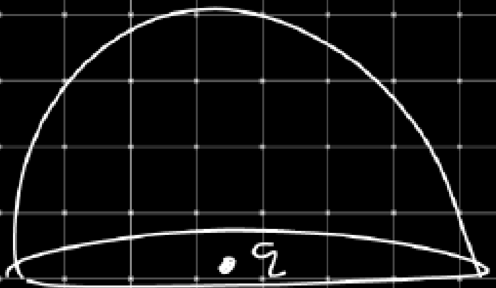
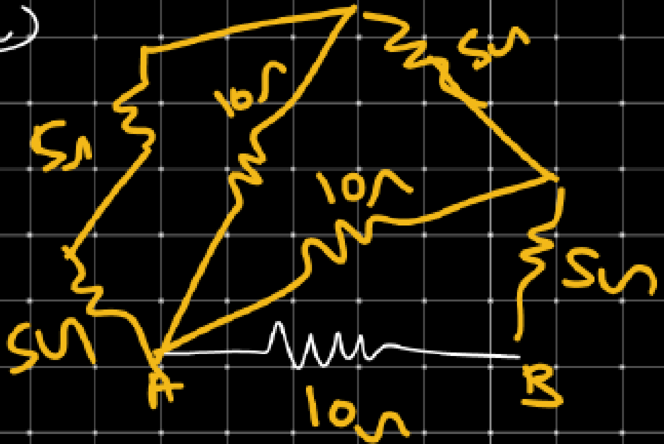
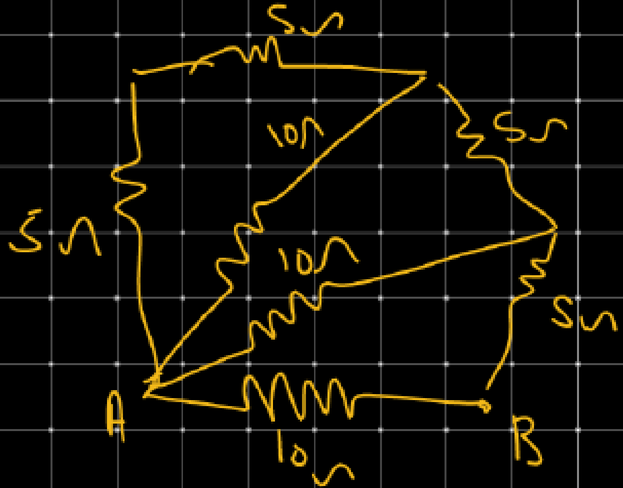
Q)



$$\phi = \frac{q}{2\varepsilon_0}$$

Q2)





JEE Mains 2022

24 – 25 June

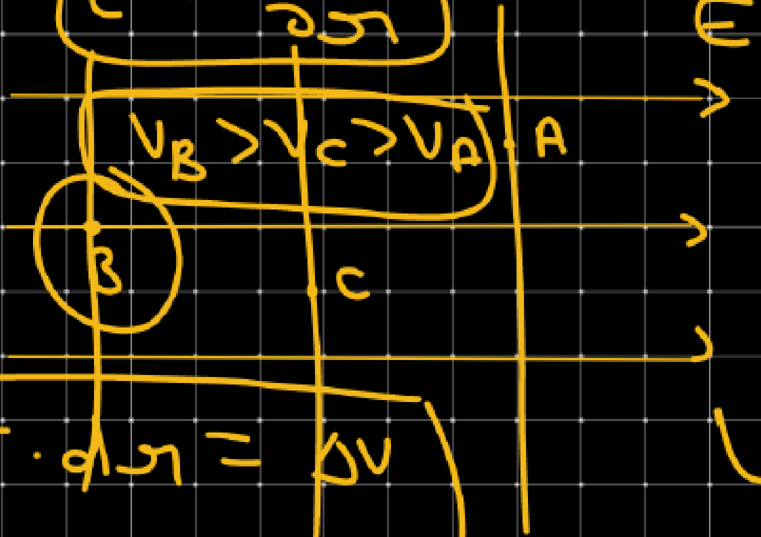
17 NEET

2013 (NEET)

Q1) A, B & C are three points in a uniform electric field. The electric potential is:

$$\boxed{E = -\frac{\partial V}{\partial r}}$$

$$\boxed{V_B > V_C > V_A}$$



$$\boxed{-\int E \cdot dr = \Delta V}$$

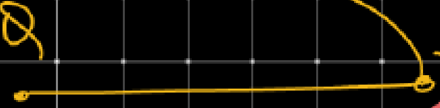
(a) Maximum at C.

(b) Same for all three points

(c) Maximum at A.

(d) Maximum at B.

2008) The electric potential at a point in free space due to charge Q coulomb is $Q \times 10^{11}$ volt. The electric field at that point.



(a) $4\pi\varepsilon_0 Q \times 10^{20}$ V/m

(b) $12\pi\varepsilon_0 Q \times 10^{22}$ V/m

(c) $4\pi\varepsilon_0 Q \times 10^{22}$ V/m

(d) $12\pi\varepsilon_0 Q \times 10^{20}$ V/m

$V = Q \times 10^{11}$ V

$$\boxed{V = Q \times 10^{11} = \frac{KQ}{r}}$$

$$r = \frac{K}{10^{11}} \qquad E = \frac{KQ}{r^2}$$

$$E = \frac{KQ}{\frac{K^2}{10^{22}}} = \frac{Q \times 10^{22}}{K} = \frac{Q \times 10^{22}}{\frac{1}{4\pi\varepsilon_0}} = 4\pi\varepsilon_0 Q \times 10^{22} \text{ V/m}$$

8) AIPMT

$V = (6xy - y + 2yz)V$ Electric field at $(1, 1, 0)$

$x = 1, y = 1, z = 0$

(a) $-(2i + 3j + k)$ N/C.

(b) $-(6i + 9j + k)$ N/C.

(c) $-(3i + 5j + 3k)$ N/C.

(d) $-(6i + 5j + 2k)$ N/C.

$(2, 3, 4)$

(x, y, z)

$$E_x = -\frac{\partial V}{\partial x} i = -\frac{\partial}{\partial x}[6xy - y + 2yz) i$$

$$= -[6y - 0 - 0) = -6y\,i$$

$$E_x = -6i$$

$$E_y = -\frac{\partial V}{\partial y} j = -\frac{\partial}{\partial y}[6xy - y + 2yz] j$$

$$= -[6x - 1 + 2z) j$$

$$= -[6 \times 1 - 1 + 2 \times 0) = -5j$$

-1

30 — Sect

10

1

0

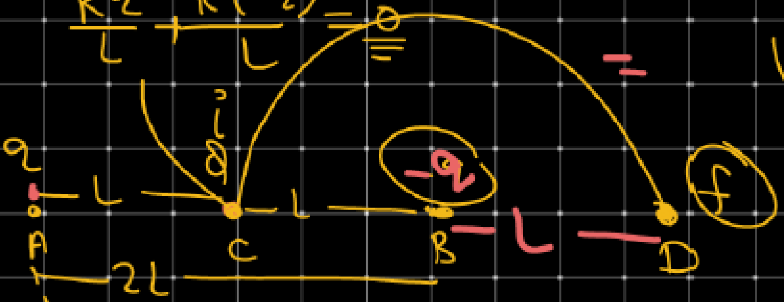
E_z [20]

25

Q 2011) charges $+q$ & $-q$ are placed at point A & B respectively which are a distance $2L$ apart, C is the mid point b/w A & B. The work done in moving charge $+Q$ along the semicircle CRD is. $W_{ext} = q[V_f - V_i]$

$$W = Q[V_f - V_i] = Q[V_D - V_C]$$

$$\frac{Kq}{L} + \frac{K(-q)}{L} = 0$$



$$V_D = \frac{K(-q)}{L} + \frac{K(q)}{3L} = \frac{-2Kq}{3L}$$

$$W = Q\left[\frac{-2Kq}{3L} - 0\right]$$

$$W = \frac{-2KqQ}{3L}$$

$$W = \frac{-\cancel{2}Qq}{\cancel{2}4\pi\epsilon_0 \times 3L} = \frac{-Qq}{6\pi\epsilon_0 L}$$

(a) $qQ/2\pi\epsilon_0 l$

(b) $qQ/6\pi\epsilon_0 l$

(c) $-qQ/6\pi\epsilon_0 l$

(d) $qQ/4\pi\epsilon_0 l$

Q) The electric potential V at any point (x, y, z) all in metres in space is given by $V = 4x^2$ V. The Electric field at the point (1, 0, 2) in V/m is.

(a) 8 along (−x axis)

(b) 8 along (+x axis)

(c) 16 along x-axis

(d) 16 " −x " "

$$\vec{E} = -\frac{\partial V}{\partial x}\hat{i}$$

$x = 0,\ V = 0$

$x = 1,\ V = 4$

$x = 2,\ V = 16$

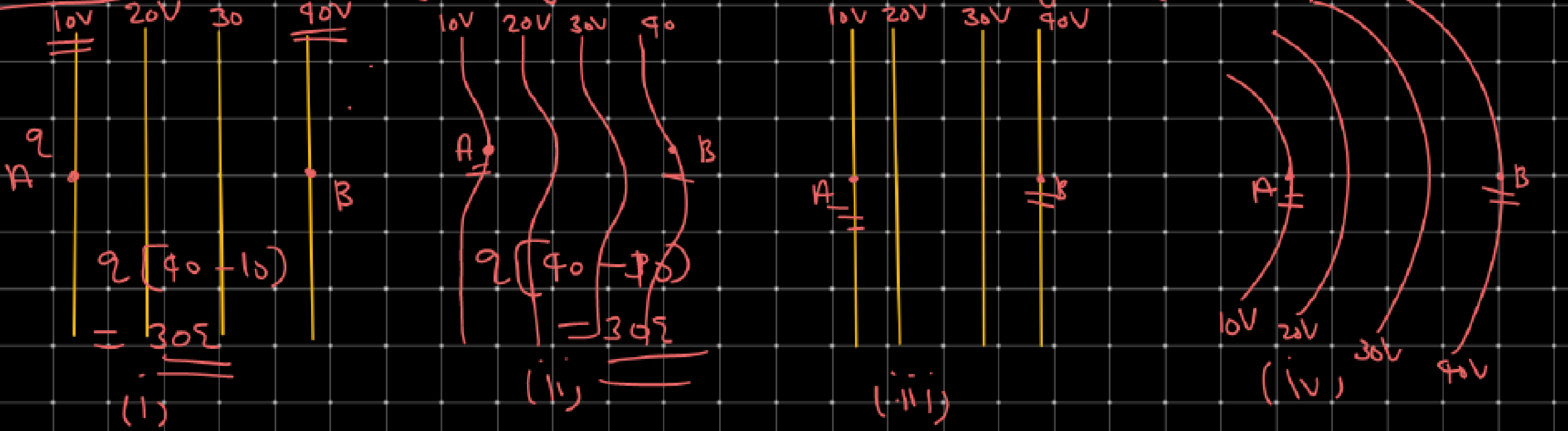
$$= -\frac{\partial}{\partial x}(4x^2)$$

$$= -8x\hat{i}$$

$$\vec{E} = -\underline{\underline{8\hat{i}}} = 8(-\hat{i})$$

$\vec{E}$

NEET) The diagrams below show region of equipotentials



A positive charge is moved from A to B in each diagram

$W = q(V_B - V_A)$

$W = q[30]$

$\boxed{W = 30q\ J}$

Electric field & Potential due to charged sphere.

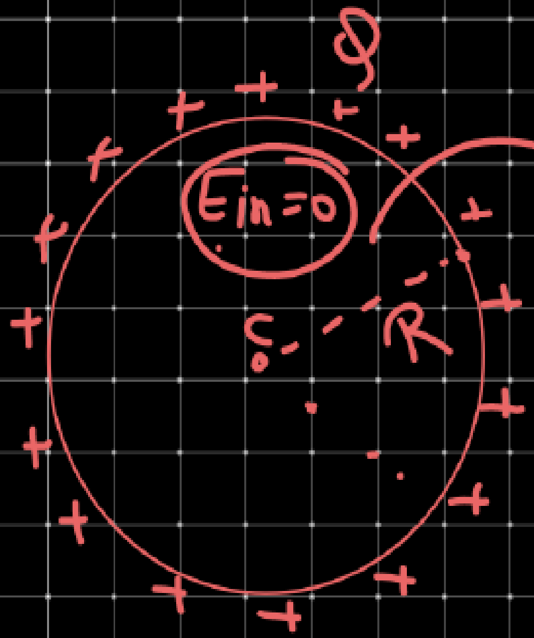
$$E = 0$$

$$E = -\frac{\partial V}{\partial r} = 0$$

$$\underline{\Delta V = 0}$$

$$V_c = \frac{KQ}{R} = V_s$$

#

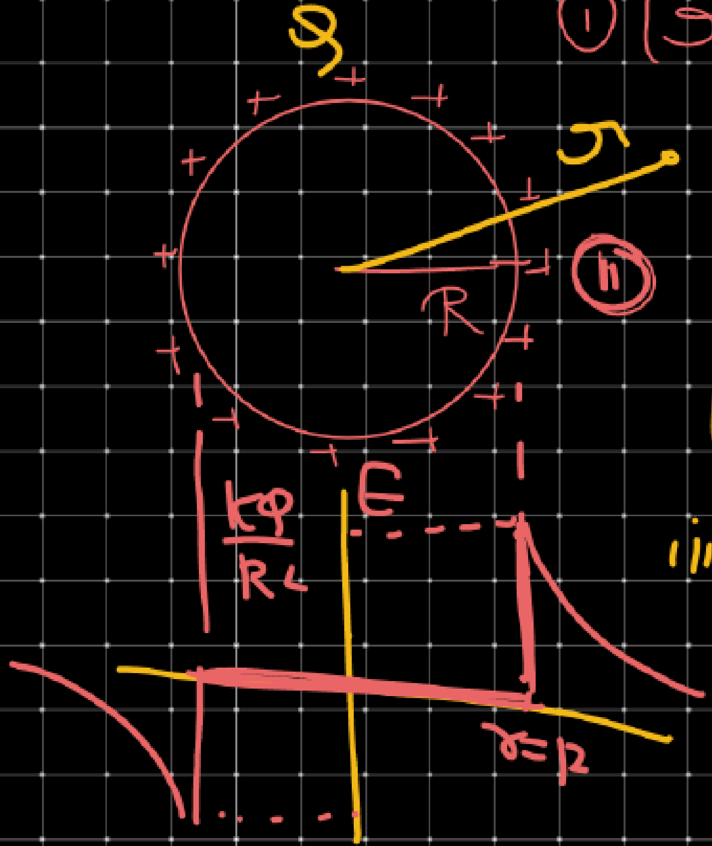


$$\boxed{V_c = \frac{KQ}{R}}$$

→ Equipotential surface

$$V_s = \frac{KQ}{R}$$

Electric field due to charged spherical surface.



① ($r < R$) inside the sphere.

$$E_{in} = 0$$

⑪ $r > R$ [outside point]

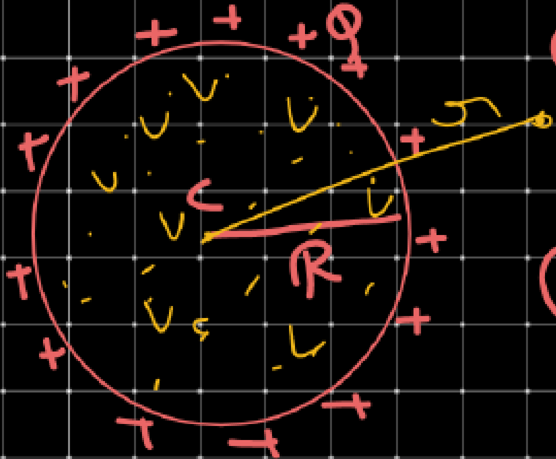
$$E = \frac{Kq}{r^2}$$

(iii)

$r = R$ [on the surface)

$$E = \frac{Kq}{R^2} \; (E_{max})$$

(iv) Potential due to charged sphere.



(i) $\boxed{V_C = \frac{KQ}{R}}$

(ii) $r > R$ (outside point)

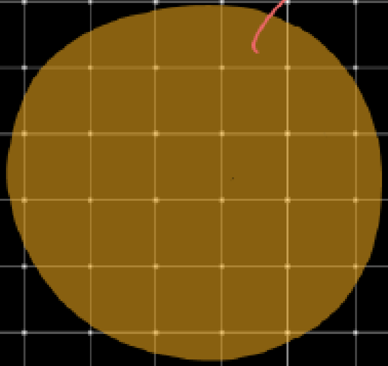
Sphere behave like a point charge

$$V_r = \frac{KQ}{r}$$

$\boxed{E = 0 \text{ inside}}$

$\Delta V = 0$

NEET 2020



region V = Constant

E = ?