



$$\frac{-(9 \times 10^9)(2 \times 10^{-3})}{(0.02)^2} + \frac{(9 \times 10^9)(4 \times 10^{-3})}{(0.005)^2} + \frac{(9 \times 10^9)(2 \times 10^{-3})}{(0.01)^2}$$

$$-4.5 \times 10^{10} \quad +1.44 \times 10^{12} \quad +1.8 \times 10^9$$

$$1.575 \times 10^{12} \text{ N/C}$$

(D)

$$\frac{(9 \times 10^9)(4 \times 10^{-3})}{(0.015)} - \frac{(9 \times 10^9)(2 \times 10^{-3})}{(0.03)}$$

$$2.4 \times 10^9 \quad - 6 \times 10^8$$

$$1.8 \times 10^9 \text{ volts}$$

(E)

$$U = qV = (-2 \times 10^{-3})(1.8 \times 10^9)$$

$$-3.6 \times 10^6 \text{ Joules}$$

energy needed is $-U$ is $3.6 \times 10^6 \text{ Joules}$