

Physics 102-Rec
 Quiz#7-Sect.23
 Chapter 24

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Name: Key

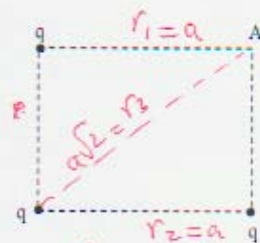
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Consider three equal charges $q = 10 \mu\text{C}$ located at the corners of a square of side 20 cm.

(a) What is the potential V at point A due to the three charges?

$$V_A = \frac{kq}{r_1} + \frac{kq}{r_2} + \frac{kq}{r_3}$$

$$= kq \left(\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} \right)$$



$$= \frac{kq}{a} \left(1 + 1 + \frac{1}{\sqrt{2}} \right) = \frac{9 \times 10^9 \times 10 \times 10^{-6}}{0.2} \left(2 + \frac{1}{\sqrt{2}} \right)$$

$$= \boxed{1.2 \times 10^6 \text{ V}}$$

(b) How much work is required to bring a charge $-20 \mu\text{C}$ from infinity to point A?

$$W = q \Delta V = q (V_f - V_i) = q V_A = -20 \times 10^{-6} \times 1.2 \times 10^6$$

$$= -24 \text{ J}$$

V_i at $\infty = 0$
 this is the work of the ^{electric} ~~applied~~ force

(c) Is this work done by the electric field or an external agent? Explain.

Since $W < 0 \Rightarrow$ It is the electric force

who does the work $W_E = -\Delta U = -(-24 \text{ J})$

$= +24 \text{ J}$
 positive ~~work~~!