Phys102 (Sec #41) Quiz # 7 (Ch.23&24)

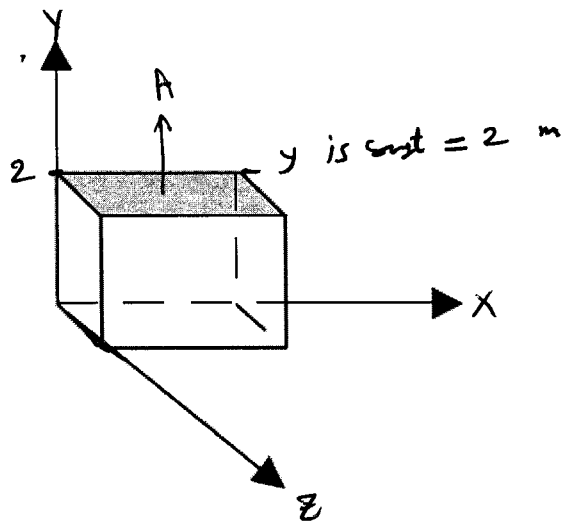
Name: (key) ID #

1- A cube, as in figure, has an edge length of 2 m in a region of a uniform electric field given by the equation: E = (- 5 y j + 6.00 k) N/C, where i, j, and k are the unit vectors in the directions of x, y, and z respectively. Find the electric flux through the top face (shaded).

$\Phi_{top} = \int E \cdot dA$

$= (-10\hat{j} + 6\hat{k}) \cdot 4\hat{j}$

$= \boxed{-40} \frac{N}{C} m^2$.

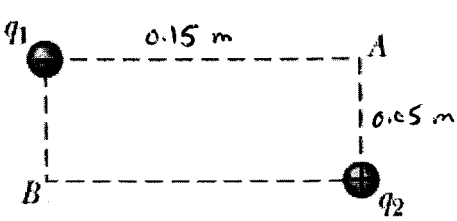


2- In the rectangle shown, the sides have lengths 5 cm and 15 cm, $q_1 = -5$ μC and $q_2 = +2$ μC. With V = 0 at infinity,

a) What is the electric potential at corner A?

$V_A = k\left(\frac{q_1}{0.15} + \frac{q_2}{0.05}\right) = 9\times10^9 * \left(\frac{-5}{0.15} + \frac{2}{0.05}\right)\times10^{-6}$

$= 6 \times 10^4$ V



b) What is the electric potential at corner B?

$V_B = k\left(\frac{q_1}{0.05} + \frac{q_2}{0.15}\right) = 9\times10^9 \left(\frac{-5}{0.05} + \frac{2}{0.15}\right) * 10^{-6}$

$= -7.8 * 10^5$ V

c) Calculate the work we must do in order to move a charge q_3 = +3 μC from corner B to corner A along the diagonal of the rectangle?

$W_{app.} = q_3 \Delta V = q_3 (V_A - V_B) = 3 * 10^{-6} (6 * 10^4 - (-7.8 * 10^5))$

$= 2.5$ J

or equivalently

$W_{app} = \Delta U = U_f - U_i =$