Phys2523P01 **Quiz 1A** **Feb. 26, 2009**

For multiple-choices questions please circle the correct alphabet as "answer"; for filling-blanks questions please fill the blanks with correct answers.

NAME: KEY **; Signature:** _____

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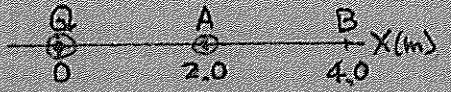
(A). An electric charge Q, sits at the origin, creates an electric potential V = 9.0 x 10^3V at a point A which is 2.0-m away on the x-axis.

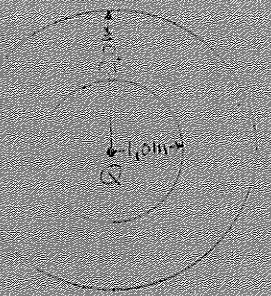


1. The electric field E at point A due to Q is: (a) 3.0; (b) 3.5; (c) 4.0; (d) 4.5; (e) 5.0; x 10^3V/m, in the direction of X-axis
2. The electric potential at point B 4.0-m away is V = 4.50 x 10^3V;
3. Q = 2.00 x 10^{-6}C; (a) 1.5; (b) 2.0; (c) 2.5; (d) 3.0; (e) 3.5.

Now we put another charge q = 3.0-nC at a point A,

4. The electric potential energy of the Q-q system is, U_{Qq} = 2.70 x 10^{-6}J;
5. The electric force on q is, F = 13.5×10^{-6} N, in the direction of X-axis.

(B) Fig. 2 shows a conducting spherical thick shell of outer radius 2.0-m & inner radius 1.0-m with no net charge. Then we sneak in a charge Q & put it at the center of the shell with no transfer of charge to the shell. Charge Q creates an electric field of 1.08 x 10^5N/C at r_1 = 0.50-m;



1. The electric field at r_2 = 1.50-m is E (1.5) = 0 N/C
   Rational; Inside a conductor E = 0
2. The charge Q = 3.0 μC.
3. The charge on the inner surface A is: -3.0 μC;
4. The charge on the outer surface A is 3.0 μC;
5. The electric field at r_3 = 3.0-m is E (3.0) = 3.0×10^3 N/C.

(C) Fig. 3 shows a uniformly charged square sheet conductor with each side of 2.0-m. At a point A 1.0-cm above the sheet, E is found to be 3.0 x 10^3N/C & points upward.

1. An equipotential surface containing point A takes a form of flat sheet (surface)
   With an orientation of parallel to the charged sheet; Rational: E lines to be perpendicular to equipotential surface at every point of the surface;
2. The change of electric potential from point A to point B which is 2.0-cm above the sheet is $\Delta V_{A\to B}$ = -30.0 V; (a) 20.0; (b) 25.0; (c) 30.0; (d) 35.0; (e) 40.0.
3. The surface charge density σ = -3.1 x 10^{-9}C/m^2;
4. The total charge on the sheet is Q = -12×10^{-9} C;
5. The electric potential at a distance 400-m from the sheet is: V = -4.77 V.