Physics 2611: General Physics II

NAME: _____

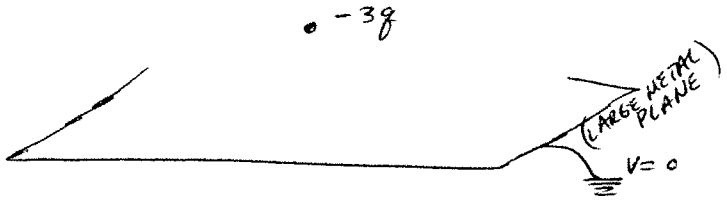
Final Exam

Circle all your final answers!

1a) (Qualitative) Draw the forces between the coils/WIRES.



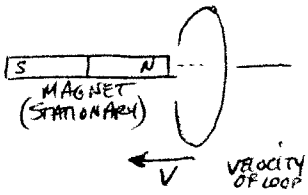
1b) Draw the electric field (as solid lines) and the equipotential surfaces (as dotted lines) for the following situation.

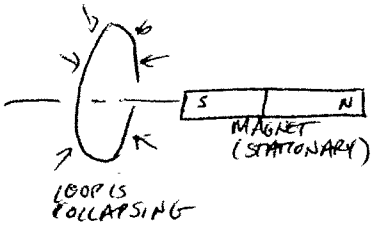


1c) Which way does the magnetic field in the center of the loop point?



1d) In the following pictures draw which way the current flows, if at all, in the loop

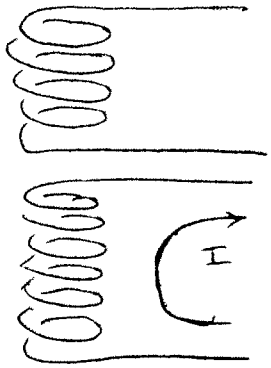




1e) Is there a force on the dielectric in the following picture? If so draw its direction.



1f) The current flowing in the lower coil is abruptly interrupted. Mark with a '+' and '-' sign the polarity of the other coil.

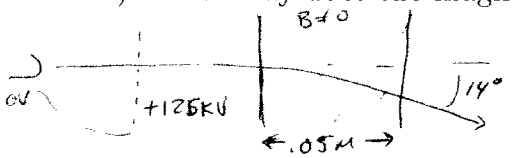


6) A piece of dust is charged with $|q| = 7.0 \times 10^{-14}$ C and then accelerated from rest through a +125 KV voltage drop as shown. It then enters a .05 m magnetic field region ($B = 11.5$ T) and emerges at 14 ^{o} from the original direction, as shown.

a) What is the mass of the dust particle?

b) If the particle had a radius of 1.8 mm, what voltage must have been used to charge the drop in the first place?

c) Which way does the magnetic field point?

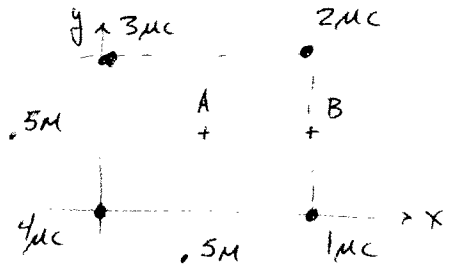


7) (Chapter 23 and 24) For the assembly of static charges below, compute

(a) The electric field at $A = (.25, .25)$

(b) The total potential at $B = (.5, .25)$

(c) The total force on the 2.00 μC charge



8) (Problem 61, Chapter 27) A 800 MW power plant is 35 Km from a large city, its chief customer. How much more power loss in the lines would there be if the transmission voltage was reduced from its present value of 115 KV to 75 KV? Each wire used in the transmission line has a nominal resistance of .065 Ω per kilometer.

9) A capacitor of capacitance c is charged to 6.00 volts. It is then connected to a pair of UNCHARGED metal plates that are 7.3 x 10^{-3} m^2 in area and air-separated by a distance of .10 mm. The final voltage is 2.12V.

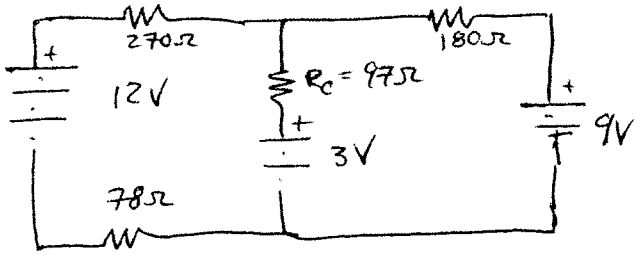
a) Compute the c?

b) Compute the ratio of the final energy of the system to the initial total energy.

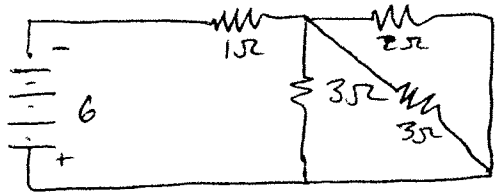
XTRA CREDIT The Dome of the state capital is to be built with a radius of curvature of 45 meters. Sound travels like a light wave and reflects like light off the dome. The architect is told to design the capital so that a whisper 2 meters off the ground on one side of the center of the floor can be easily heard off the dome at a point 2 meters above the ground on the other side from the center. How high off the ground must the architect place the inside top of the dome? Draw the picture and decide with an equation!

2) (Like Problem #58, Chapter 34) Sunlight hits the earth with intensity $I = 1368\ W/m^2$. Use $P = U/c$ to determine the force of sunlight on the earth. The radius of the earth is 6.4 x 10^6 m and the speed of light it $c = 3$ x 10^8 m/s. Note that $F = P/t$ and $I = U/t$ for a time interval t.

3) (Problem 34, Chapter 28) For the following circuit compute the current in the R_c.



4) For the following circuit what is the current flowing DOWN the diagonal 3Ω resistor?



5) (Problem 51, Chapter 33) For an RLC circuit shown compute
(a) The current flowing in the circuit as a function of time with $f = 479$ Hz.
(b) the phase ϕ between the voltage and the current in the case at $f = 479$ Hz.

