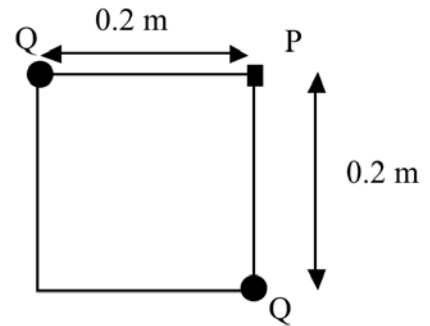1. For the two charges, Q = +5 nC, at opposite points of
the square shown,
   a) Find the potential energy that results from the two
      charges.
   b) What does the sign of the potential energy tell you?
   c) Find the Electric Field at the point P (x = 3cm,
      y=0) (Magnitude AND direction)
   d) Find the electric force on a charge of -10 nC placed
      at point P. (Magnitude AND direction)

0.2 m

Q ←—————→ P

0.2 m

Q

2. An electric potential as a function of distance as shown
below.
   a. An electron is initially sitting at point A. What is the minimum kinetic
      energy the electron will need to get from point A to point C?
   b. A proton is initially sitting at point A. What is the minimum kinetic
      energy the proton will need to get from point A to point C?
   c. Does your answer change for the electron if the particle moves from A to
      E? Explain.
   d. Does your answer change for the proton if the particle moves from A to E?
      Explain.

V (volts)

B

D

X (cm)

C

A   E
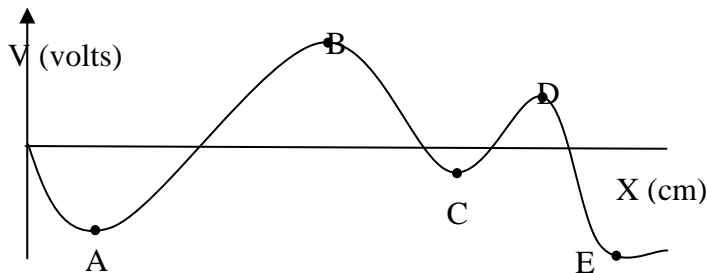
Point	Potential (V)
A	-80
B	+100
C	-15
D	+50
E	-100

3. A parallel plate capacitor has a charge of 0.02 μC on each plate with a potential
difference of 240 V. The parallel plates are separated by 0.40 mm of air.
   a) What is the capacitance for this capacitor?
   b) What is the area of a single plate?
   c) At what voltage will the air between the plates become
      ionized? Assume a dielectric strength of 3.0 kV/mm for
      air.

R1

4. For the circuit on the right, V=50 volts. R1 is 10 Ω, R2 is
   60 Ω, R3 is 30 Ω, and R4 is 15 Ω.
   a) Find the equivalent resistance for R2 and R3 in
      parallel.
   b) Find the equivalent resistance for the complete
      network of resistors shown in the circuit on the right
      (R1, R2, R3, R4).
   c) Find the voltage across R2.
   d) Find the current through R2.

V

R2   R3

R4
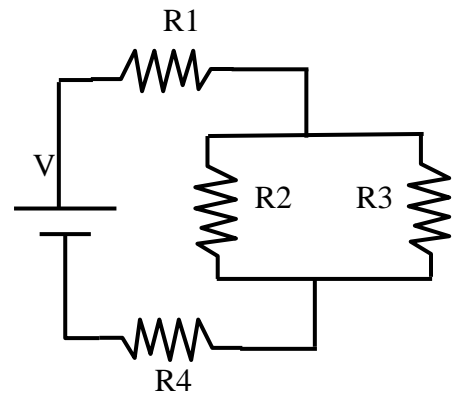
2. Below is a sketch of the equipotential lines for a dipole where the positive charge is on the left and the negative charge is on the right. The equipotential lines are spaced at 10 Volt intervals with the line nearest each charge having a magnitude of 50V.

     a. Label the potential of each line shown below.
     b. How much work is done by the electric force when an electron is moved from point A to point B?
     c. What is the change in potential energy for the electron in part b?
     d. What does the sign of the change in potential energy mean?
     e. Sketch the Electric field lines for the two point charge system shown below.

A

+

-

B