1. $q1= 2\mu C$ $q2= -3\mu C$ r= 0.50m

Coulomb's law = F = k (q1q2)/ r^2 Coulomb's constant = k= 8.98 x 10^9 Nm^2/C^2

$2\mu C$ = 2.0 x 10^-6C $-3\mu C$ = -3.0 x 10^-6C

F = 8.98 x 10^9 ((2.0 x 10^-6)(-3.0 x 10^-6) / (0.50)^2) -> **F= 0.216N Force is attractive towards each other.**

- It is attractive because q1 is positive and q2 is negative so they have opposite signs which means they attract each other.

2. q = $5.0\mu C$ = 5.0 x 10^-6C r= 0.30m

E = k ((q) / (r)^2) -> E= (8.98 x 10^9) ((5.0 x 10^-6) / (0.30)^2) = **4.9 x 10^5 N/C**

- **Because the charge is positive the electric field points away/out from the charge**

3. q1= $1\mu C$ = 1.0 x 10^-6 C q2 = $-2\mu C$ = -2.0 x 10^-6 C distance (d) = 0.40m
   Test charge qt = 1nC

   r = d/2 = 0.40m / 2 = 0.20m

E1= k|q1| / r^2 -> E1 = ((8.98 x 10^9)(1.0 x 10^-6) / (0.20)) = **E1= 2.25 x 10^5 N/C away from q1 to the right**

E2= k|q2| / r^2 -> E2 = ((8.98 x 10^9)(2.0 x 10^-6) / (0.20)) = **E2 = 4.49 x 10^5 N/C towards q2 to the right**

Enet = E1 + E2 = (2.25 x 10^5) + (4.49 x 10^5) = **6.74 x 10^5 N/C**

3b) qt = 1.0 x 10^-9C F = qE -> F = (1.0 x 10^-9) (6.74 x 10^5) = **6.74 x 10^-4N to the right**

4. q= -4.0 x 10^-6C r= 0.25m V = kq/r

V= ((8.98 x 10^9)(-4.0 x 10^-6) / (0.25) **-143800.8V**

5. VA = 100V VB= -50V electron charge (q) = -1.6 x 10^-19C

V = VB - VA = -50 - 100 = **-150V**

W = q (VB - VA)

W = (-1.60 x 10^-19) (-150) = **2.4 x 10^-17J**