

Consider a charge  $q$  at  $x = -a$  and a charge  $-2q$  at  $x = a$ . How much work does it take to bring a charge  $+q$  to  $x = 0$  from infinity.

A stationary ring of radius,  $R$ , has total charge  $Q$ . A small particle of charge  $-q$  is constrained to move along the symmetry axis of the ring, which is the x-axis. (a) find the potential,  $V$  of the particle as a function of  $x$   
(b) Show that for small  $x$ , the potential has the form  $V(x) \approx V(0) + \alpha x^2$  and find  $\alpha$ , which is a constant.

Consider a charge  $q$  that is enclosed by a spherical conducting shell of radius  $R$  that is grounded. What is the charge on the shell?

Consider a uniformly charged sphere of radius  $R$  and total charge  $Q$ . How much energy does it take to assemble this sphere?