Charged Conductor Problem (2)

A conducting spherical shell of inner radius $r_1 = 4$cm and outer radius $r_2 = 6$cm carries no net charge. Now we place a point charge $q = -1\mu$C at its center.

(a) Find the surface charge densities σ_1 and σ_2.

(b) Find the electric fields E_1 and E_2 in the immediate vicinity of the shell.

(c) What happens to the electric fields inside and outside the shell when a second point charge $Q = +1\mu$C is placed a distance $d = 20$cm from the center of the shell?

(d) Which objects exert a force on the second point charge?