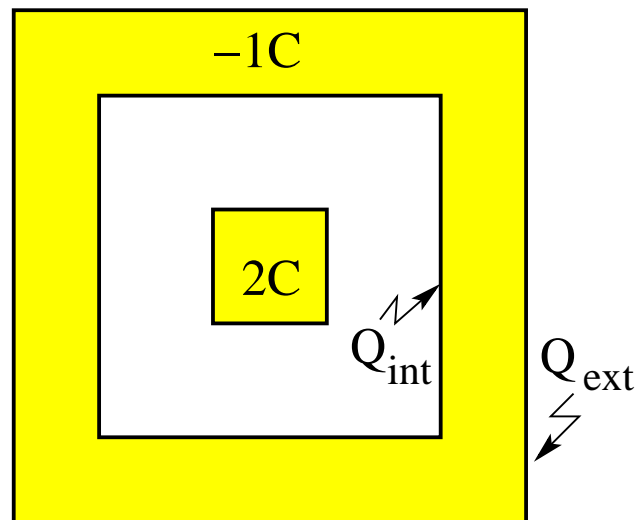Consider a metal cube with a charge 2C on it positioned inside a cubic metal shell with a charge -1C on it.

- Find the charge Q_{int} on the interior surface and the charge Q_{ext} on the exterior surface of the shell.
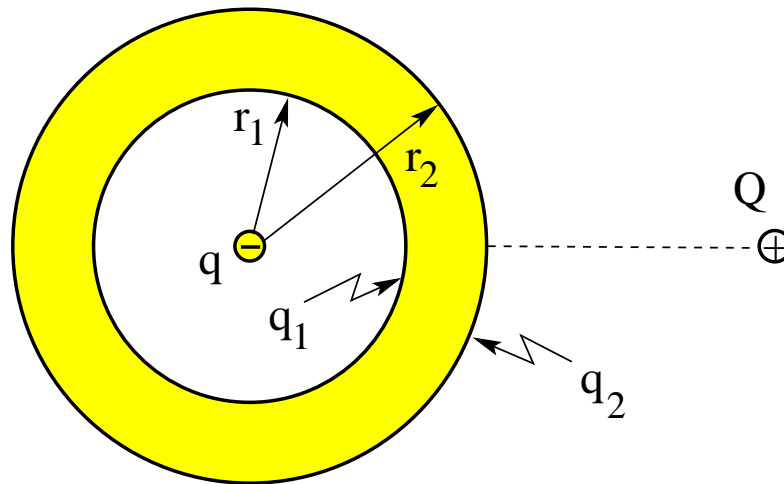
A conducting spherical shell of inner radius $r_1 = 4$cm and outer radius $r_2 = 6$cm carries no net charge. Now we place a point charge $q = -1\mu$C at its center.

(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?

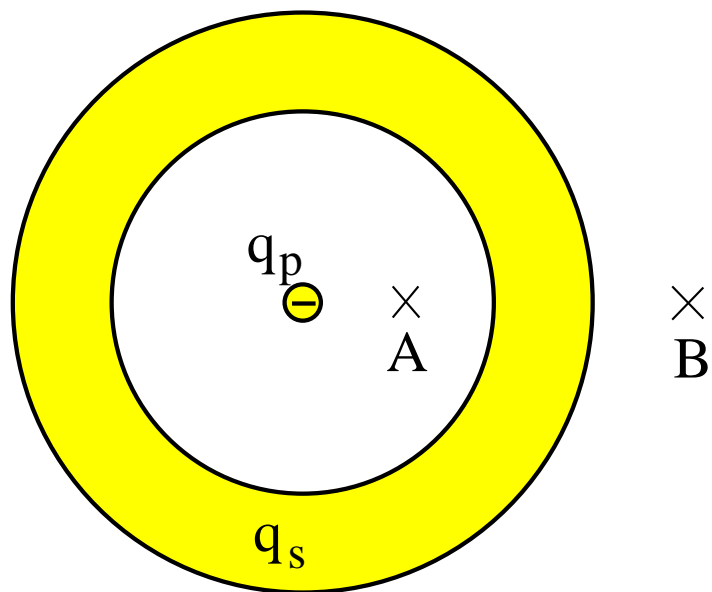(d) Which objects exert a force on the second point charge?

A point charge $q_p = -7\mu$C is positioned at the center of a conducting spherical shell with a charge $q_s = +4\mu$C on it.

- Find the direction (inward/outward) of the electric field at the points A and B.

- Find the charge q_s^{int} on the inner surface and the charge q_s^{ext} on the outer surface of the shell.

A long conducting cylinder of radius $R_0 = 3$cm carries a charge per unit length $\lambda_c = 5.0\mu$C/m. It is surrounded by a conducting cylindrical shell of radii $R_1 = 7$cm and $R_2 = 11$cm. The shell carries a charge per unit length $\lambda_s = -8.0\mu$C/m.

(a) Find the linear charge densities λ_1, λ_2 on the inner and outer surfaces of the shell.

(b) Find the electric fields E_0, E_1, E_3 in the vicinity of the three conducting surfaces.
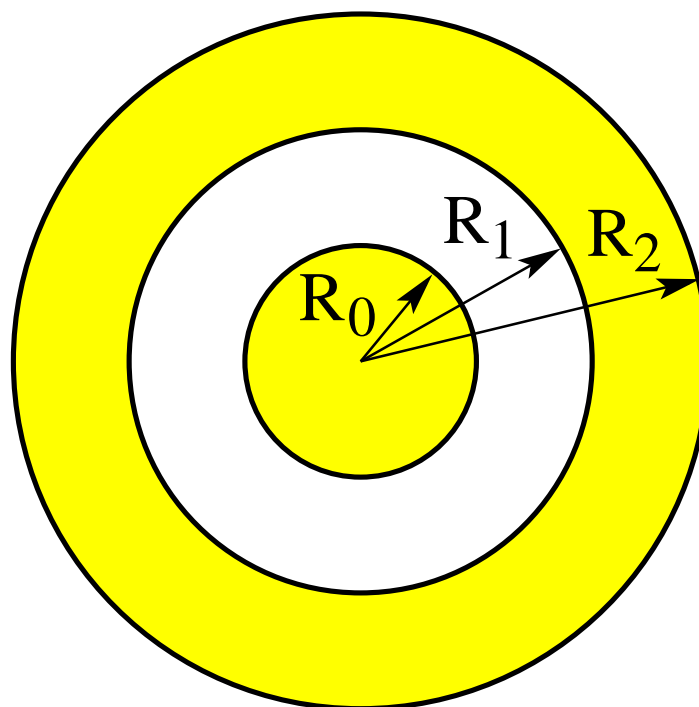
Consider two concentric shells with charges on them as indicated.

- Find the charges q_A, q_B, q_C, q_D on each of the four surfaces.