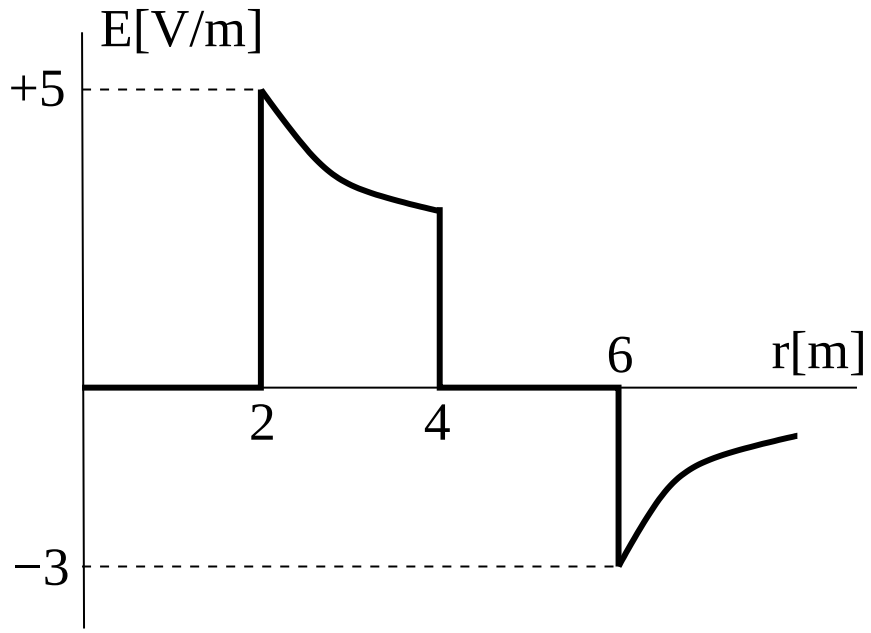
Electric Potential of Conducting Spheres (1)

A conducting sphere of radius $r_1 = 2$m is surrounded by a concentric conducting spherical shell of radii $r_2 = 4$m and $r_3 = 6$m. The graph shows the electric field $E(r)$.

(a) Find the charges q_1, q_2, q_3 on the three conducting surfaces.

(b) Find the values V_1, V_2, V_3 of the electric potential on the three conducting surfaces relative to a point at infinity.

(c) Sketch the potential $V(r)$.



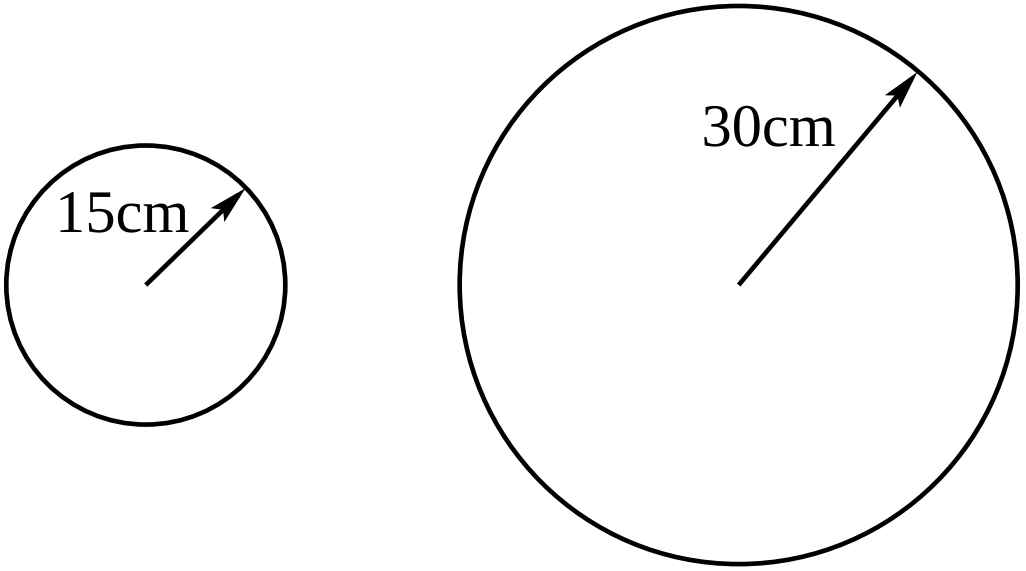
Electric Potential of Conducting Spheres (2)

Consider a conducting sphere with radius $r = 15$cm and electric potential $V = 200$V relative to a point at infinity.

(a) Find the charge Q and the surface charge density σ on the sphere.

(b) Find the magnitude of the electric field E just outside the sphere.

(c) What happens to the values of Q, V, σ, E when the radius of the sphere is doubled?

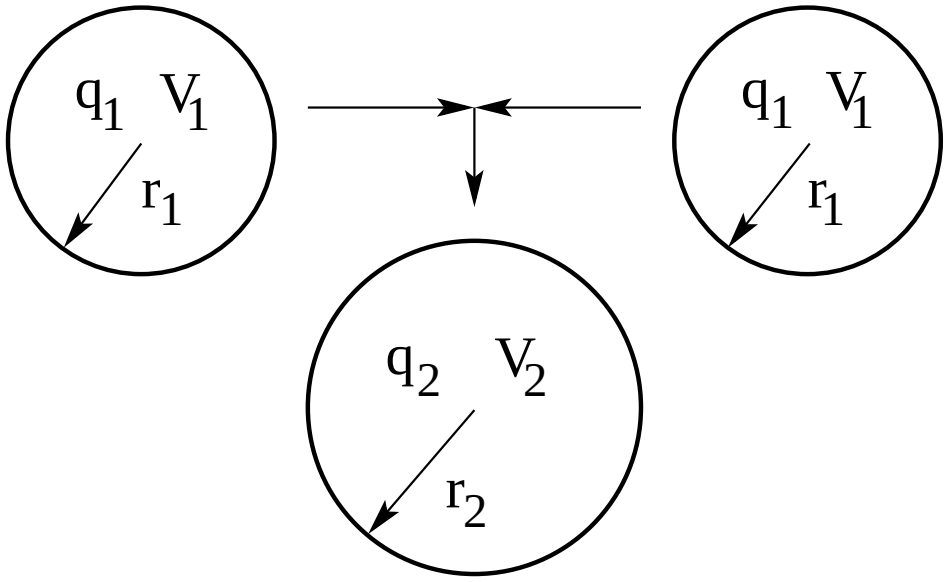


Electric Potential of Conducting Spheres (3)

A spherical raindrop of 1mm diameter carries a charge of 30pC.

(a) Find the electric potential of the drop relative to a point at infinity under the assumption that it is a conductor.

(b) If two such drops of the same charge and diameter combine to form a single spherical drop, what is its electric potential?



Electric Potential of Conducting Spheres (4)

A positive charge is distributed over two conducting spheres 1 and 2 of unequal size and connected by a long thin wire. The system is at equilibrium.

Which sphere (1 or 2)...

(a) carries more charge on its surface?

(b) has the higher surface charge density?

(c) is at a higher electric potential?

(d) has the stronger electric field next to it?