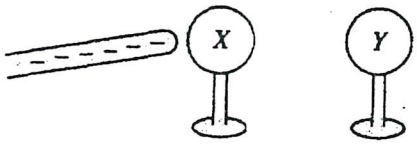


55. Two metal spheres that are initially uncharged are mounted on insulating stands, as shown above. A negatively charged rubber rod is brought close to, but does not make contact with, sphere X. Sphere Y is then brought close to X on the side opposite to the rubber rod. Y is allowed to touch X and then is removed some distance away. The rubber rod is then moved far away from X and Y. What are the final charges on the spheres?

	Sphere X	Sphere Y
(A)	Zero	Zero
(B)	Negative	Negative
(C)	Negative	Positive
(D)	Positive	Negative
(E)	Positive	Positive

56. The potential of an isolated conducting sphere of radius R is given as a function of the charge q on the sphere by the equation $V = kq/R$. If the sphere is initially uncharged, the work W required to gradually increase the total charge on the sphere from zero to Q is given by which of the following expressions?

(A) $W = kQ/R$

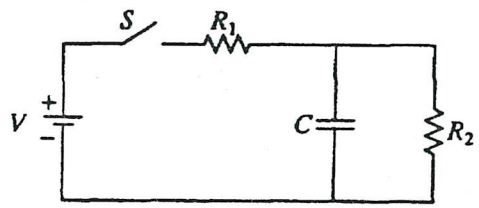
(B) $W = kQ^2/R$

(C) $W = \int_0^Q (kq/R)\, dq$

(D) $W = \int_0^Q (kq^2/R)\, dq$

(E) $W = \int_0^Q (kq/R^2)\, dq$

Questions 57-58



In the circuit shown above, the battery supplies a constant voltage V when the switch S is closed. The value of the capacitance is C, and the value of the resistances are R_1 and R_2.

57. Immediately after the switch is closed, the current supplied by the battery is

(A) $V/(R_1 + R_2)$
(B) V/R_1
(C) V/R_2
(D) $V(R_1 + R_2)/R_1R_2$
(E) zero

58. A long time after the switch has been closed, the current supplied by the battery is

(A) $V/(R_1 + R_2)$
(B) V/R_1
(C) V/R_2
(D) $V(R_1 + R_2)/R_1R_2$
(E) zero