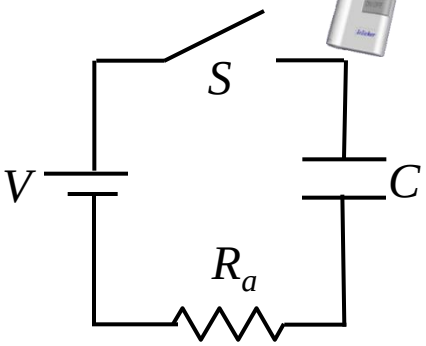
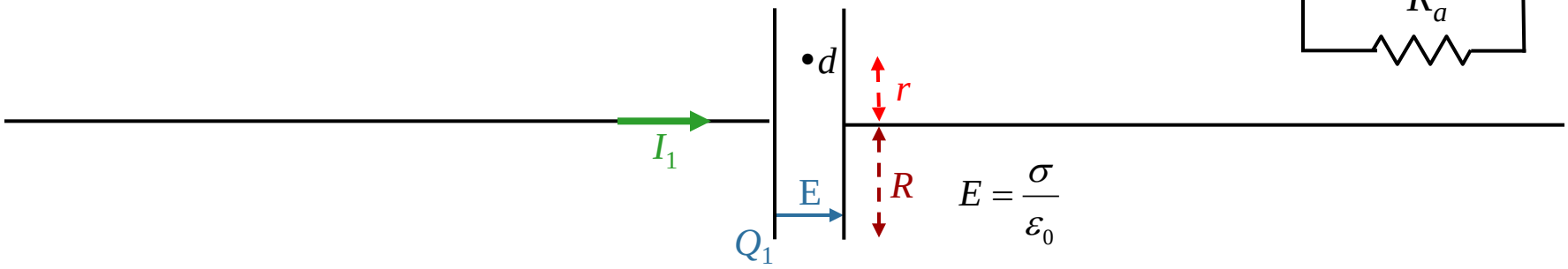
Calculation

Switch S has been open a long time when at $t = 0$, it is closed. Capacitor C has circular plates of radius R. At time $t = t_1$, a current I_1 flows in the circuit and the capacitor carries charge Q_1.





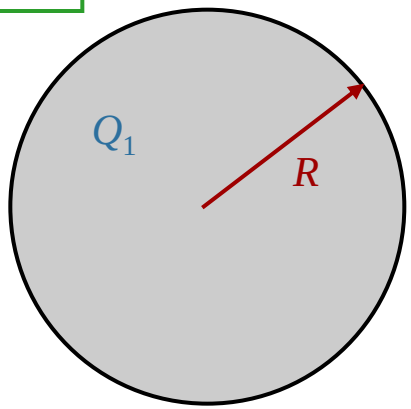
What is the magnitude of the electric field between the plates?

A) $E = \dfrac{Q_1}{\pi R^2 \varepsilon_0}$

B) $E = \dfrac{Q_1 \pi R^2}{\varepsilon_0}$

C) $E = \dfrac{Q_1}{\varepsilon_0}$

D) $E = \dfrac{Q_1}{r}$



$$E = \frac{\sigma}{\varepsilon_0} \rightarrow \sigma = \frac{Q_1}{A} = \frac{Q_1}{\pi R^2} \rightarrow E = \frac{Q_1}{\varepsilon_0 \pi R^2}$$