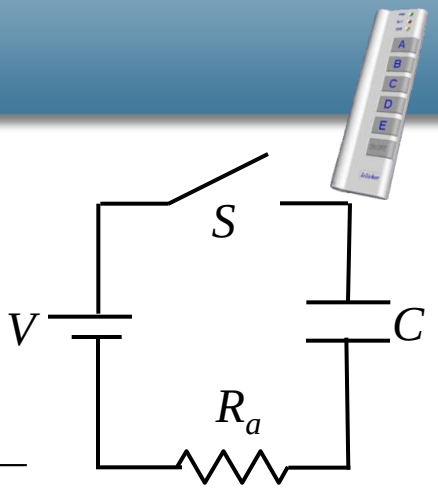
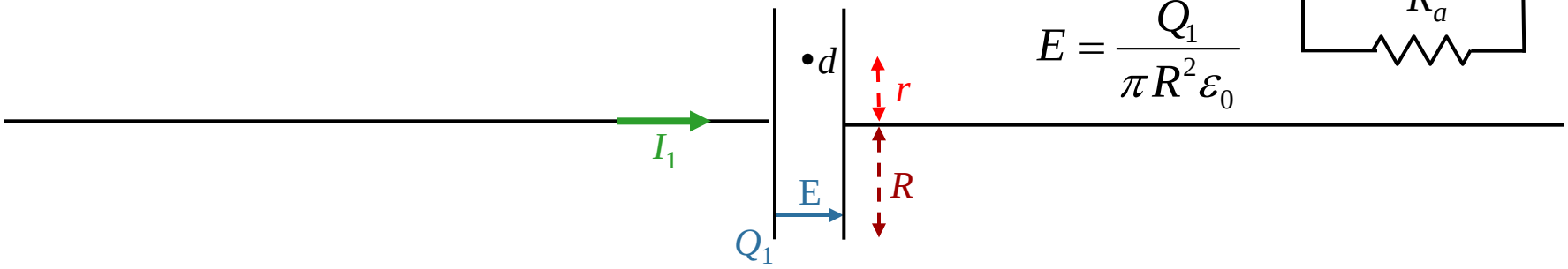
Calculation

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.

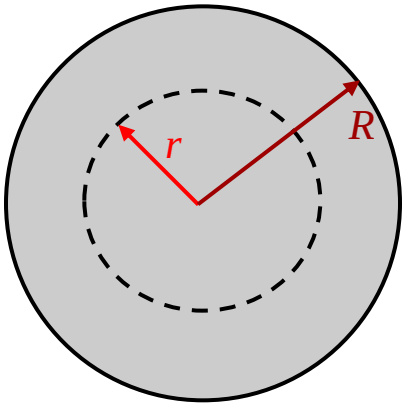




$$E = \frac{Q_1}{\pi R^2 \varepsilon_0}$$

What is the electric flux through a circle of radius r in between the plates?

A) $\Phi_E = \frac{Q_1}{\varepsilon_0}\pi r^2$ B) $\Phi_E = \frac{Q_1}{\varepsilon_0}\pi R^2$ C) $\Phi_E = \frac{Q_1 r^2}{\varepsilon_0 R^2}$ D) $\Phi_E = \frac{Q_1 \pi r^2}{\varepsilon_0 R^2}$



$$\Phi_E = \vec{E} \cdot \vec{A} \rightarrow \Phi_E = \frac{Q_1}{\varepsilon_0 \pi R^2}\pi r^2 \rightarrow \Phi_E = \frac{Q_1}{\varepsilon_0}\frac{r^2}{R^2}$$