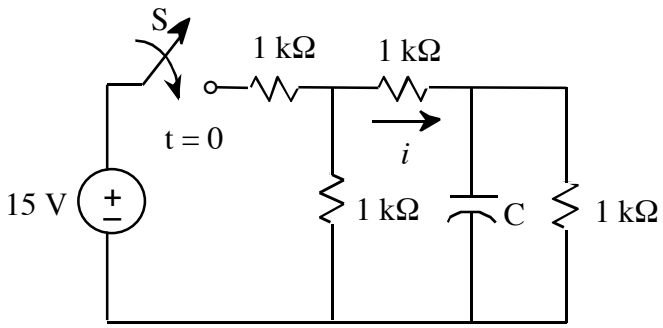
EX: In the circuit below, based on the interpretation that an uncharged capacitance initially looks like a short circuit and finally like an open circuit, give a qualitative description of the current *i* over time.



ANS: When the switch is first closed, C looks like a short circuit. Hence at $t = 0^+$, *i* can be found from voltage division to be 5 mA. As $t \rightarrow \infty$, C begins to look like an open circuit, in which case *i* can again be found from current division to be $i = 3$ mA. Thus the asymptotic value of *i* is 3 mA. Consequently, *i* decreases smoothly from an initial value of 5 mA to a final value of 3 mA at a rate that depends on the time constant, $R_t\ C_2$, where R_t is the Thevenin equivalent resistance across C. For a small value of C, the decay will be fast; for a larger value of C, the decay will be slower.