The switch is thrown upward.

(a) What is the initial current (in terms of $\mathcal{E}$, $R$ and $C$)?

$$I = \frac{\mathcal{E}}{R}.$$

(b) How long does it take for the current to decrease to half of its original value (in terms of $\mathcal{E}$, $R$ and $C$)?

$$I(t) = \frac{\mathcal{E}}{R} e^{-t/RC} = \frac{1}{2} \frac{\mathcal{E}}{R} \quad \rightarrow \quad \frac{-t}{RC} = \ln \frac{1}{2} \quad \rightarrow \quad t = RC \ln \frac{1}{2}$$

(c) What is the maximum charge held by the capacitor (in terms of $\mathcal{E}$, $R$ and $C$)?

$$Q = C \mathcal{E}.$$

(d) How long does it take for the capacitor's charge to increase to half of its original value (in terms of $\mathcal{E}$, $R$ and $C$)?

$$Q(t) = \mathcal{E} (1 - e^{-t/RC}) = \frac{1}{2} \mathcal{E}C \quad \rightarrow \quad e^{-t/RC} = \frac{1}{2} \quad \rightarrow \quad t = RC \ln (2)$$

After complete charging of the capacitor, the switch is thrown downward.

(a) What is the initial current (in terms of $\mathcal{E}$, $R$ and $C$)? (Note: "initial" means a very, very short time after the switch is thrown.)

$$\mathcal{E} = IR \quad \rightarrow \quad I = \frac{\mathcal{E}}{R}.$$

(b) How long does it take for the current to decrease to half of its initial value (in terms of $\mathcal{E}$, $R$ and $C$)?

$$\frac{\mathcal{E}}{R} e^{-t/RC} = \frac{1}{2} \frac{\mathcal{E}}{R} \quad \rightarrow \quad \frac{-t}{RC} = \ln \frac{1}{2} \quad \rightarrow \quad t = RC \ln \frac{1}{2}$$

(c) What is the charge held by the capacitor after a long time (in terms of $\mathcal{E}$, $R$ and $C$)?

$$0 \quad \text{(it discharges)}$$

(d) How long does it take for the capacitor's charge to decrease to half of its fully charged value (in terms of $\mathcal{E}$, $R$ and $C$)?

$$\frac{\mathcal{E}}{R} e^{-t/RC} = \frac{1}{2} \mathcal{E} \quad \rightarrow \quad t = RC \ln (2)$$