Problem 18.32: An uncharged cap (20 microfarads) and resistor (100 ohms) are in series with an EMF of 9 volts (if there is no internal resistance mentioned for the battery/power-supply, you can assume it is zero).

a.) What's the time constant?

b.) What's the maximum charge on the cap?

b.) After one time constant:

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a.) What's the time constant?

$$\tau = RC$$
$$= (100\Omega)\left(20\text{x}10^{-6}\text{F}\right)$$
$$= 2\text{x}10^{-3} \text{ seconds}$$

b.) What's the maximum charge on the cap?

$$q_{max} = CV_{\text{across cap max}}$$
$$= \left(20\text{x}10^{-6}\text{F}\right)(9 \text{ V})$$
$$= 1.8\text{x}10^{-4} \text{ coulombs}$$

b.) After one time constant:

$$q_{1\tau} = .63q_{max}$$
$$= .63\left(1.8\text{x}10^{-3}\text{C}\right)$$
$$= 1.134\text{x}10^{-3} \text{ coulombs}$$