Brandon Ramos

$100\mu s \times \frac{10^{-6}}{1\mu s} = 100\times10^{-6}\,s$

$1k\Omega \times \frac{1000\Omega}{1k\Omega} = 1000\Omega$

#1

a) $RC = \tau$ $\qquad \tau < 100\times10^{-6}\,s$

$(1000\Omega)\,C < 100\times10^{-6}\,s$

$C < \frac{100\times10^{-6}\,sec}{1000\Omega}$

$\boxed{C < 1.0\times10^{-7}\,F}$

b)

NO, b/c you can add more resistors to lower the capacitance and the time constant is $\tau < 100\times10^{-6}\,s$ so it can be used ~~capacitor~~ with low amount of capacitance

c) $V_c(t) = \mathcal{E}_0\,(1-e^{-t/RC})$ $\qquad RC = (1000\Omega)(1.0\times10^{-7}F)$

$RC = 1.0\times10^{-4}$

$\frac{0.03V}{0.06V} = \frac{\cancel{0.06V}(1-e^{-t/1.0\times10^{-4}s})}{\cancel{0.06V}}$

$0.5V = 1-e^{-t/1.0\times10^{-4}s}$ $\qquad \frac{-t}{-1} = \frac{-6.93\times10^{-5}}{-1}$

$\ln(e^{-t/1.0\times10^{-4}s}) = \ln(0.5)$ $\qquad \boxed{t = 6.93\times10^{-5}\,sec}$

$\cancel{1.0\times10^{-4}} \times \frac{-t}{\cancel{1.0\times10^{-4}}s} = \ln(0.5)$

$-t = \ln(0.5)(1.0\times10^{-4}\,s)$

a) $V(t) = V_0 \sin(2\pi f t + \phi)$

$V_0 = 120V$; $\phi = 0$

$V(t) = 120 \sin(2\pi f t)$

$n = 0, 1 2 3, \ldots$

* $\sin(2\pi n) = 0$

$\sin(2\pi f t) = \sin(2\pi n)$

$\frac{\cancel{2\pi} f t}{\cancel{2\pi} f} = 2\pi n$

$t = \frac{\cancel{2\pi} n}{\cancel{2\pi} f}$

$\boxed{t = \frac{n}{f}}$

$$R$$

b) $1\,k\Omega \times \frac{1000\,\Omega}{1\,k\Omega} = \underline{1000\,\Omega}$ $\quad V_0 = \underline{120V}$

$f = \underline{60\,Hz}$

$\frac{V}{R} = \frac{I\cancel{R}}{\cancel{R}}$ $\quad \frac{\Delta V}{R} = \Delta I \rightarrow I$

$* \quad i(t) = \frac{V(t)}{R} \sin(2\pi f t + \phi)$

$i(t) = \frac{120V}{1000\,\Omega}\left(\sin(2\pi(60\,Hz)(t)) + \phi\right)$

??

$i(t) = 0.12A$ $\quad P = IV \quad V = IR$

$\boxed{i(t) = 0.12A}$ $\quad P = I^2 R$

$P = (0.12A)^2 \cdot 1000\,\Omega$

$P = 14.4$ watts

$$V = \frac{I R}{2}$$ Avg

$$P = I V$$

$$P = \frac{(I)^2 R}{2}$$

$$P = \frac{(0.12A)^2 \cdot 1000\Omega}{2}$$

$$P = \frac{0.0144A \cdot 1000\Omega}{2}$$

$$\boxed{P = 7.2 \text{ watts}}$$ Avg!!

#3 $3.00A = I$ $\quad$ * $P = IV$

$110V = V$

$P = (3.00A)(110V)$

$P = 330 \text{watts}$

$P_{tot} = 330w + 100w + 60w + 3w$

$P_{tot} = 493w = 0.493kw$

$\frac{0.2 \text{doll}}{kw \cdot hr}$ *

~~$\frac{1}{hr} \times \frac{12hr}{1 day} \times \frac{30days}{1month}$~~

$0.493\cancel{kw} \cdot \frac{0.2 \text{doll}}{\cancel{kw} \cdot \cancel{hr}} \cdot \frac{12\cancel{hr}}{1\cancel{day}} \cdot \frac{30\cancel{days}}{1month}$

$\approx \$35.49$ in one month

CH: 10

1

$I_1 = (I_2 + I_3)$

$E - I_3\left(\frac{1}{2R} + \frac{1}{2R}\right) - I_1 R = 0$

$E - I_3\left(\frac{1}{2R} + \frac{1}{2R}\right) - (I_2 + I_3) R = 0$

$E = I_3\left(\frac{1}{2R} + \frac{1}{2R}\right) + I_2 R + I_3 R = 0$

$E = I_3\left(\frac{1}{2R} + \frac{1}{2R} + R\right) + I_2 R = 0$

* $R = 1000\,\Omega$
* $V = 12V$

* $\frac{1}{R} = \frac{1}{2R} + \frac{1}{2R}$

$R = \frac{\cancel{2}R}{\cancel{2}} = 1000\,\Omega$

$12V = I_3\,(1000\,\Omega + 1000\,\Omega)$

$12V = I_3\,(2000\,\Omega) + 1000\,\Omega\, I_2 = 0$

$(I_2 + I_3) = I_1$

$E - I_2 R - I_1 R = 0$

$E - I_2 R - (I_2 + I_3) R = 0$

$E - I_2 R - I_2 R - I_3 R = 0$

$E = I_2 R + I_2 R + I_3 R$

$E = I_2 (R + R) + I_3 R$

$12V = I_2\,(2000\,\Omega) + 1000\,\Omega\, I_3$

Next Page

Elim

$2(12V) = (2000\Omega I_2 + 1000\Omega I_3)\,2$

$12V = 1000\Omega I_2 + 2000\Omega I_3$

subtract

$24V = 4000\Omega I_2 + \cancel{2000\Omega I_3}$

$- \quad 12V = 1000\Omega I_2 + \cancel{2000\Omega I_3}$

$12V = 3000\Omega I_2 + 0$

we can now find I_3 and I_1

$\frac{12V}{3000\Omega} = I_2$

$\boxed{0.004A = I_2}$

$12V = 1000\Omega I_2 + 2000\Omega I_3$

$12V = 1000\Omega (0.004A) + 2000\Omega I_3$

$12V = 4 + 2000\Omega I_3$

$12 - 4 = 2000 I_3$

$\frac{8V}{2000\Omega} = I_3$

$I_1 = I_2 + I_3$

$\boxed{0.004A = I_3}$

$I_1 = 0.004A + 0.004A$

$\boxed{I_1 = 0.008A}$

Scanned with CamScanner

$P = (I_1)^2 R$

$P = (I_2)^2 R$

$P = (I_3)^2 (R_{tot})$

$$\frac{1}{R} = \frac{1}{2R} + \frac{1}{2R}$$

$$\frac{1}{R} = \frac{2}{2R}$$

$$R = \frac{2R}{2}$$

$R = R$

$R = 1000\Omega$

$P = (0.008A)^2 (1000\Omega) = \boxed{0.064 \text{ watts}}$

$P = (0.004A)^2 (1000\Omega) = \boxed{0.016 \text{ watts}}$

$P = (0.004A)^2 (1000\Omega) = 0.016$ watt total

$$\frac{0.016}{2} = \boxed{0.008 \text{ watts}}$$

for each 2R

So total was

0.064
0.016
0.008
0.008

0.096 watts

Scanned with CamScanner

CHP: 10

$\varepsilon = 1.5V$ $R = 50\Omega$

#2 $r = 0.25\Omega$

$$\varepsilon = I(r+R)$$

a) $\frac{\varepsilon}{r+R} = I$

$$\frac{1.5V}{0.125\Omega + 50\Omega} = I$$

$$\boxed{0.0299 = I}$$

$\frac{1}{R} = \frac{1}{0.25} + \frac{1}{0.25}$

$\frac{1}{r} = \frac{2}{r}$

$r = \frac{r}{2}$

$r = \frac{0.25\Omega}{2}$

$^{*} r = 0.125\Omega$

b) $q = 2.5A \cdot hr$. ~~$q = It$~~

two charges!!!

$*\Delta Q = I\Delta t$

2.5A hr
+2.5A hr
5.0A hr

$\cancel{2.}5.0Ahr = (0.0299A)\Delta t$

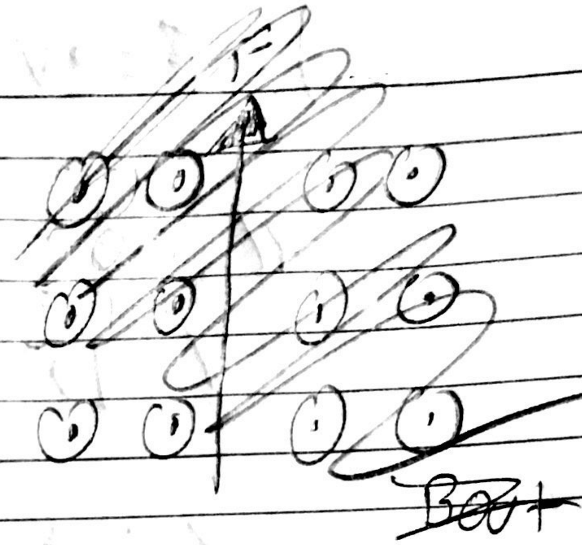
$$\frac{5.0 \cancel{A}hr}{0.0299\cancel{A}} = \Delta t$$

$$167.224 hr = \Delta t$$

a)

Magnetic field is in-to the Puge (Bout).

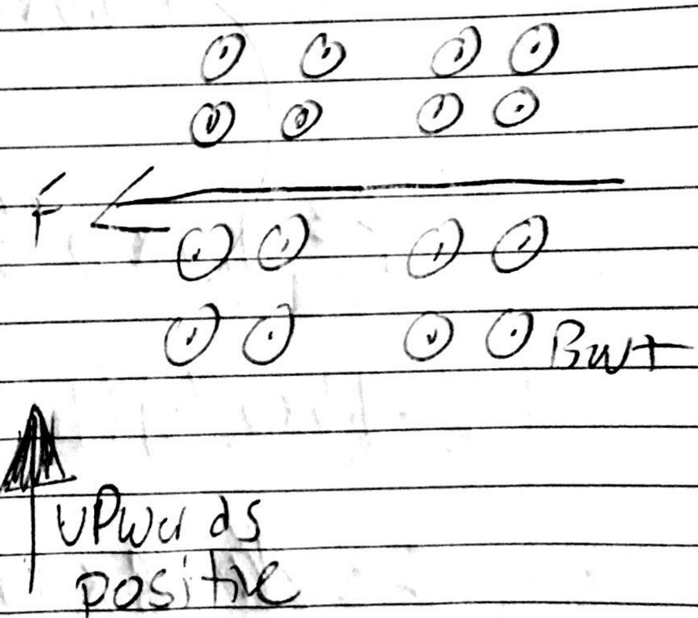
Particle bends to the left (⊖) = F



left hand rule

Upward motion is the direction and is positive (+) charge,

* positively charged particle.



$m = 9.1 \times 10^{-31}$ kg

b) Strange ~~more~~ maybe b/c it has the mass equal to the electron but however it does not have the same charge. Electrons are usulaly ~~charged~~ negative charged.

* This could possiblly be anti particle of electron so it is $q = (+)1.6 \times 10^{-19}$ C

Scanned with CamScanner

c) * $F = qvB\sin\theta$

angle between

B and V B

90^{0} !!

* $B = 0.05T$

$V = 10^{6} m/s$

$q = +1.6\times10^{-19}C$

$F = (1.6\times10^{-19}C)(10^{6}m/s)(0.05T)\sin(90^{0})$

$F = (1.6\times10^{-19}C)(10^{6}m/s)(0.05T)(1)$

$F = \cancel{}\ 8\times10^{-15}N$

* direction is to the left.

using left hand rule