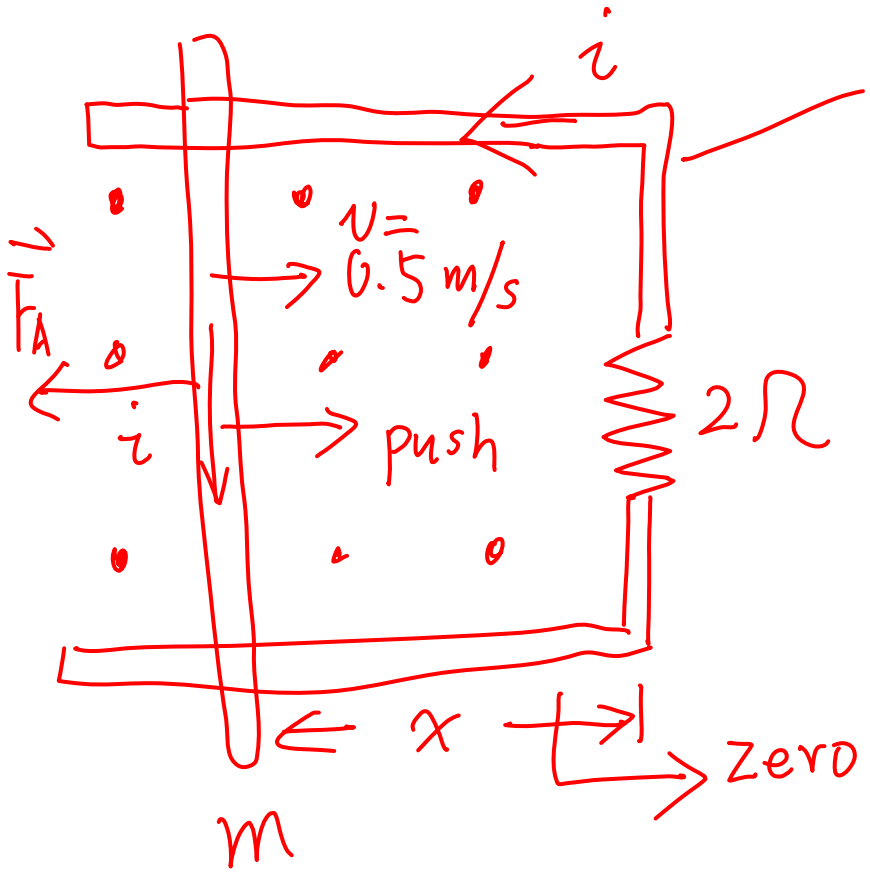
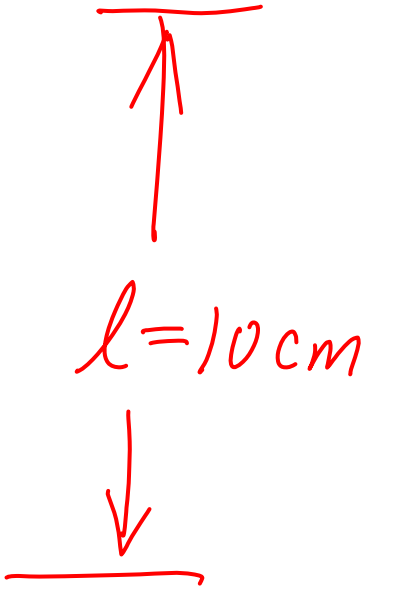


frictionless

B = 0.5 T

$\phi = BA$

$= Blx$



a) $F_{push} = ?$ b) $P_{push} = ?$ c) direction / magnitude of induced current

d) $P_{2\Omega} = ?$

$$\mathcal{E} = \frac{d\phi}{dt} = \frac{d(BA)}{dt} = Bl\left(\frac{dx}{dt}\right) = Blv$$

$dx/dt \rightarrow v$

$$= 0.5 \times 0.1 \times 0.5 = 0.025\,(V)$$

$$\vec{F} = l\,\vec{I} \times \vec{B}$$

$$i = \frac{\mathcal{E}}{R} = \frac{0.025\,V}{2\,\Omega} = 0.0125\ (A)$$

$$F_A = iBl = 0.0125 \times 0.5 \times 0.1 = 6.25 \times 10^{-4}\ (N)$$

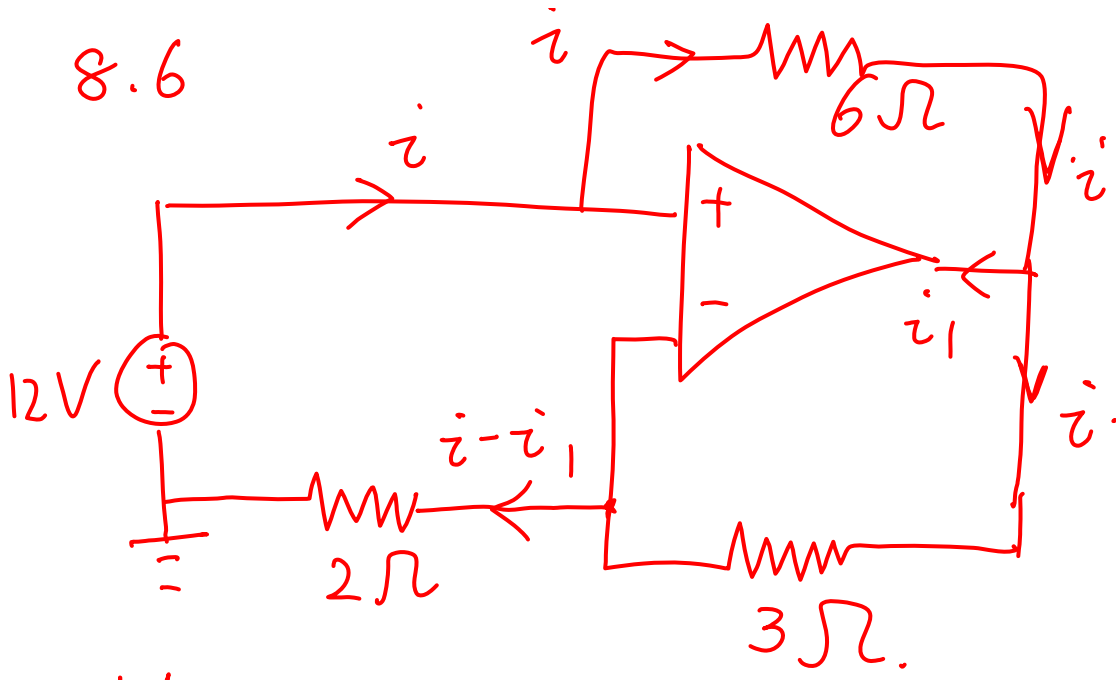
$$F_{push} = F_A = 6.25 \times 10^{-4}\ (N)$$

b) $$P_{push} = F_{push} \cdot v = 6.25 \times 10^{-4} \times 0.5$$
$$= 3.125 \times 10^{-4}\ (W)$$

c) $$i = 0.0125\ A$$

d) $$P_{2\Omega} = i^2 R = (0.0125)^2 \times 2 = 3.125 \times 10^{-4}\ (W)$$

8.6



$i = ?$

Golden rules

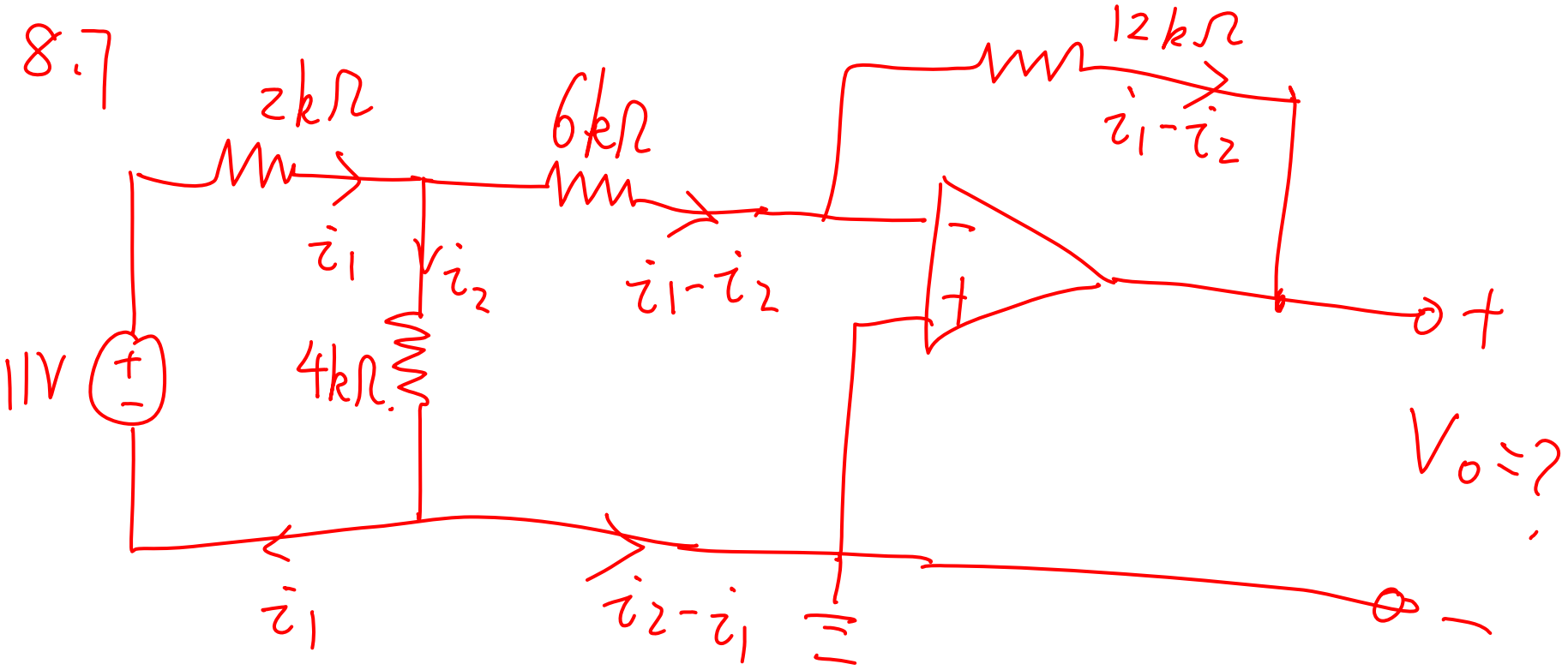
1. $i_{in} = 0$
2. $V_+ = V_-$

$$\begin{cases} 12V - 6i - 3(i - i_1) - 2(i - i_1) = 0 \\ 12 - 2(i - i_1) = 0 \end{cases}$$

$i = -3\ A$

$i_1 = -9\ A$

8.7



$$\begin{cases} 11-2i_1-6(i_1-i_2)-12(i_1-i_2)-V_o=0 \end{cases}$$