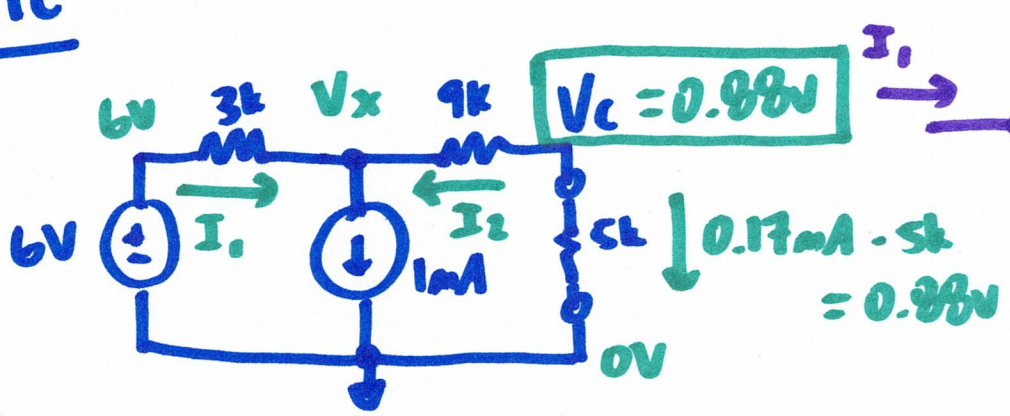
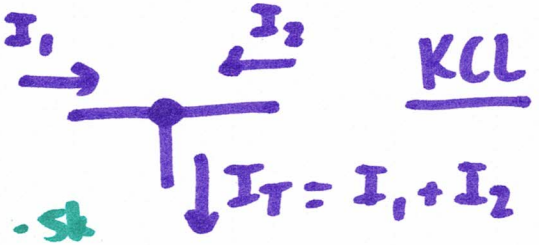
EE 220: Circuits I

HW8.1C

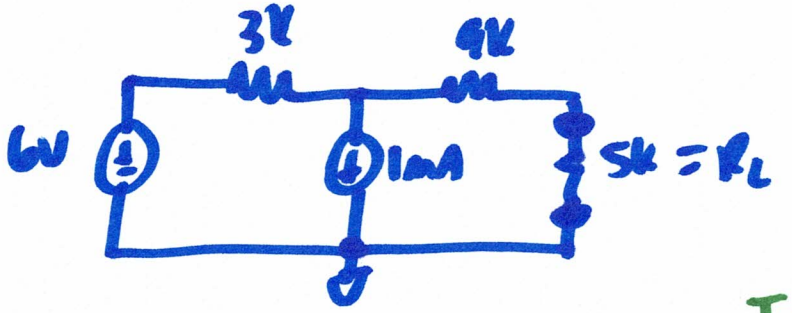




$$I_1 = \frac{6V - V_x}{3k} \qquad I_2 = \frac{0V - V_x}{14k} = \frac{-2.47V}{14k} = -0.17mA$$

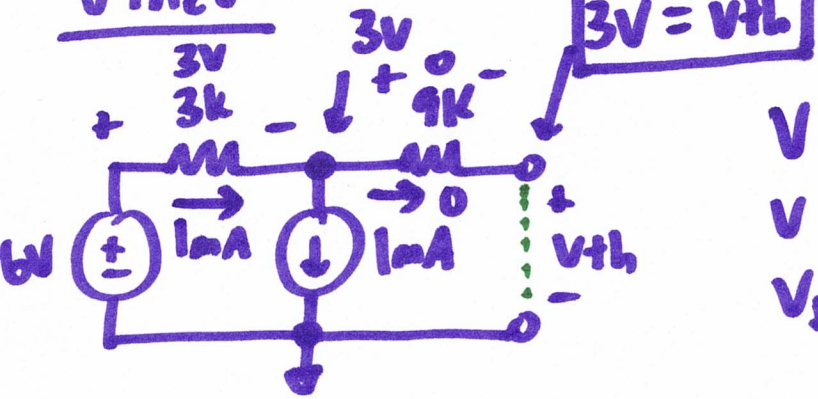
$$\underbrace{\frac{6V - V_x}{3k}}_{I_1} + \underbrace{\frac{0 - V_x}{14k}}_{I_2} = 1mA \rightarrow \boxed{V_x = 2.47V}$$

HW 8.1C (cont.)



$$I_N = \frac{V_{th}}{R_{th}} = \frac{3V}{12k} = 0.25mA$$ ✓

Vthev

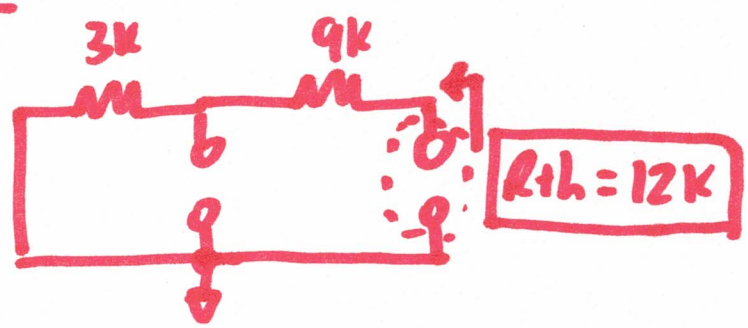


$V = I \cdot R$

$V = 0 \cdot R$

$V_{short} = 0$

Rthev → RN



EE Toolkit

Power (Instantaneous)

Ohm's Law

$V = I \cdot R$

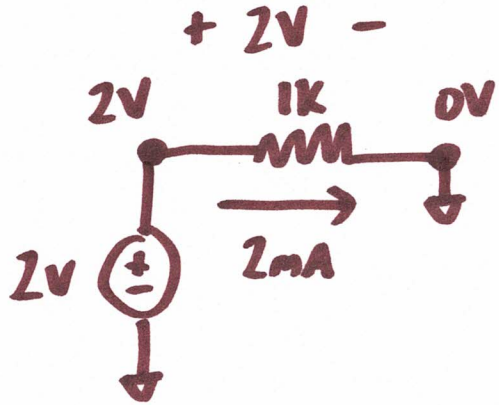
$I = V/R$

$R = V/I$

$P = I \cdot V$

$P = V^2/R$

$P = I^2 \cdot R$



2A

0.2Ω

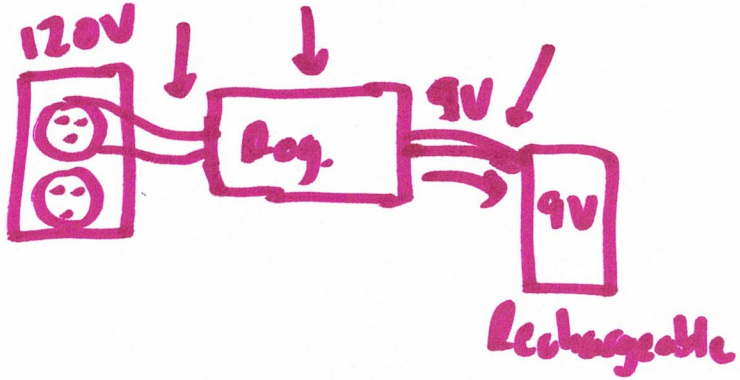
$P = V \cdot I = 2V \cdot 2mA = 4mW$

$P = V \cdot I \rightarrow P = V \cdot \left(\frac{V}{R}\right) = \frac{V^2}{R}$

V/R

$P = V \cdot I \rightarrow P = (I \cdot R) \cdot I = I^2 \cdot R$

$I \cdot R$



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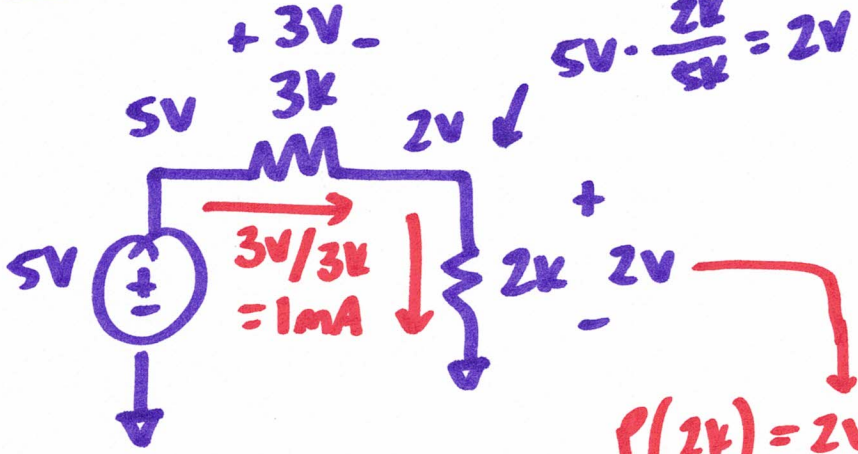
Example



Watts

$P(2k) = 2V \cdot 1mA = 2mW$

$P(3k) = 3V \cdot 1mA = 3mW$

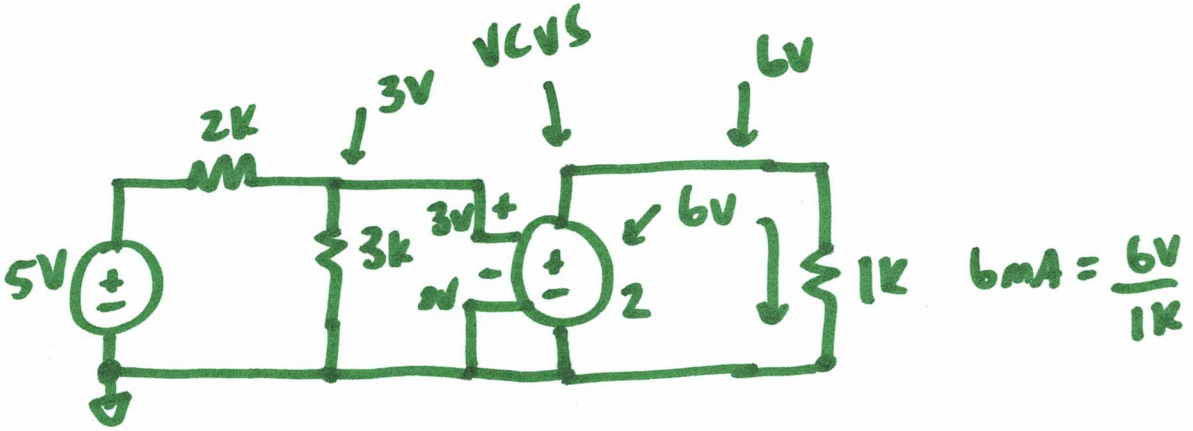
$= 5mW$

$\frac{2mW}{5mW} \cdot 100\% = 40\%$

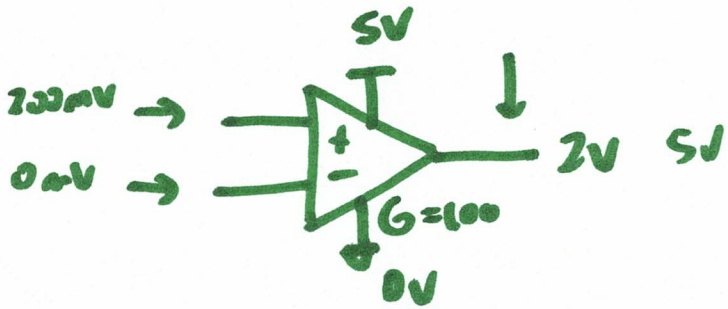
$\frac{3mW}{5mW} \cdot 100\% = 60\%$

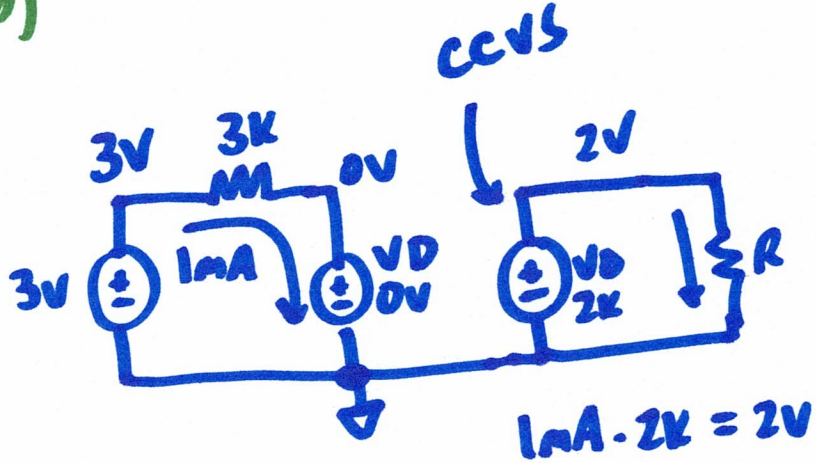
Dependent Sources

4 types: Current → Current
Current → Voltage
Voltage → Current
Voltage → Voltage



Operational amplifier (op-amp)





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