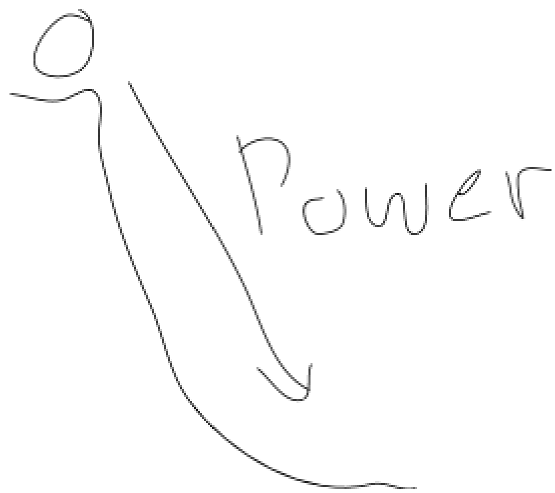
ELG2138 - Lecture 2

Picture a rock and a hill. When the rock goes down the hill, that is power spent. When the rock is brought from the bottom to the top, that is power gained.



Show the power in all elements in F 3.5-1

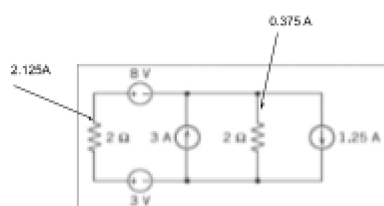


Figure P 3.5-1

P_{8V} = - 8 V * 2.125 A = - 17W
P_{3V} = + 3 V * 9.125 A = + 6.375 W
P_{3A} = + (2 * 0.375) V * 3 A = + 2.25 W

- V = I * R
- V = 0.375 A * 2 Ω (Resistor in parallel)

$P_{1.25A}$ = - (2 * 0.375) * 1.25 A = - 0.9375 W
Total power in all sources should not be 0, we have 2 loads in the form of resistors.
$Power_{Total}$ = -9.3125

$R_R = I^2 * 2$
$= (2.125^2 * 2) + (0.375^2 * 2)$
$= 9.3125$
$Power_{Total} + R_R = 0$ should always hold true

Find i_A, i_B, i_2, and V_1

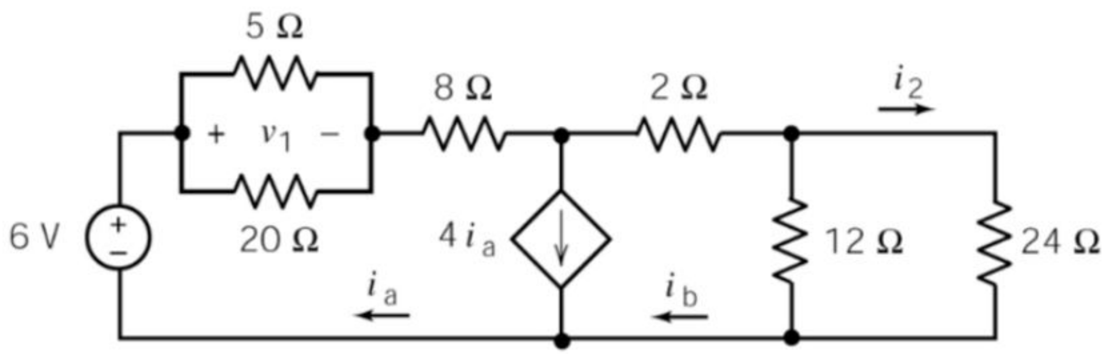
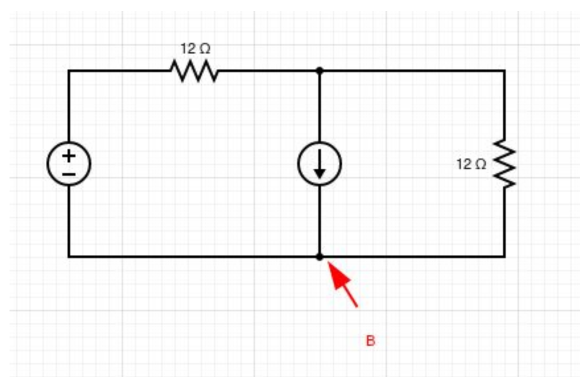


Figure P3.6-42

Always start with simplifying



Start with KcL

$I_a = 4i_a + i_b$

$-3i_a = i_b$

Start with the voltage source, there is a 6 volt drop

$-6 + 12\ i_a + 10\ i_b = 0$

Solve for two linear equations

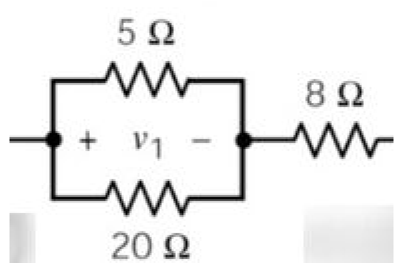
$I_a = -⅓$ A

$I_b = 2$ A

By the idea of the current divider

$I_2 = (12 / (12+24)) * i_b$

$I_2 = ⅓$



We take the original resistor setup for V_1

We know the amps going through (right to left) is

-⅓ A

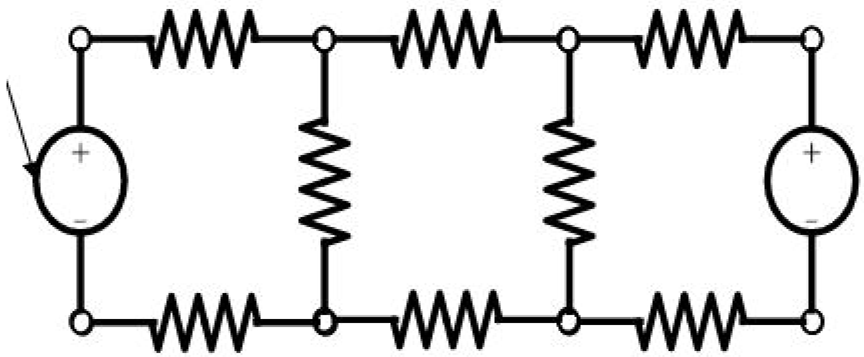
(5 * 20 / 5 + 20) = 4 Ω

Voltage across the whole circuit = -4 V

Using voltage divider to determine only the 4 Ω section

V_i = Our resistor / Total Resistance * Voltage Drop
$V_i = 4 / (4 + 8) * -4$ V
$V_1 = 4/12 * (-4\ V)$

General Resistive Circuits

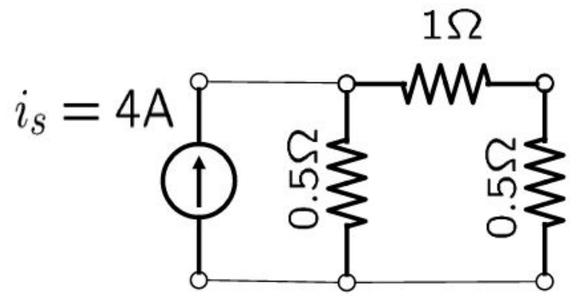


This circuit can not be simplified

Node voltage analysis method

Circuits with independent current sources

Steps:
1. Identify the number of nodes in the circuit
2. Designate one node as a reference node
3. Express current in the circuit elements in terms of node voltages
4. Apply KCL Law at each node except the reference node
5. Solve the equations resulting from KCL to get node voltages
6. Using the node voltages Find the currents in the elements

	$i_s = 4\text{A}$ 1Ω 0.5Ω 0.5Ω