Problem 1-1: For a resistor circuit element shown in Figure 1-1, and with constitutive relation of Equation 1-1, where V_{n1} and V_{n2} are the node voltages at the ends of the resistor element. i_R is the current through the resistor element, and the resistance has a value of 5 ohms..

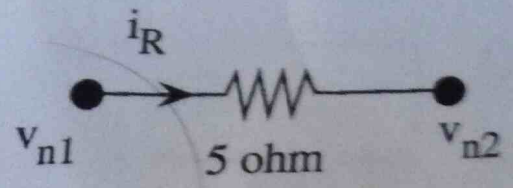


Figure 1-1

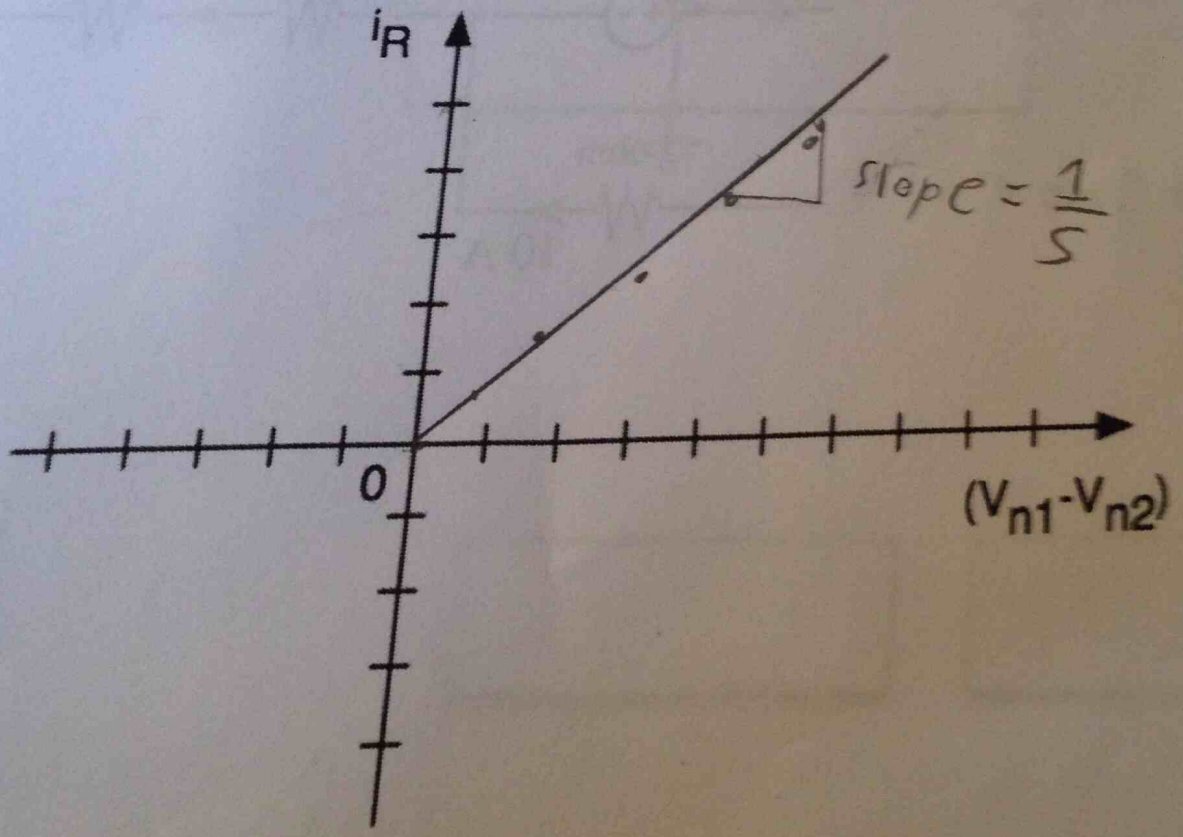
$$(V_{n1} - V_{n2}) - 5\, i_R = 0$$

Equation 1-1

$$\frac{V_{n1} - V_{n2}}{5} = i_R$$

$$\frac{V_{n1} - V_{n2}}{5} = \frac{5\, i_R}{5}$$

at least 3 points that satisfy the constitutive relation and draw a connecting line through your on the graph below of i_R versus the quantity $(V_{n1} - V_{n2})$. *Show units on your graph.*



Problem 1-2B: The node region in Figure 1-2B has 6 elements. Calculate the numerical value for the branch current i_b , give units. Only the local node region is shown NOT the entire circuit. *[Four branch currents are give; use Conservation Laws.]*

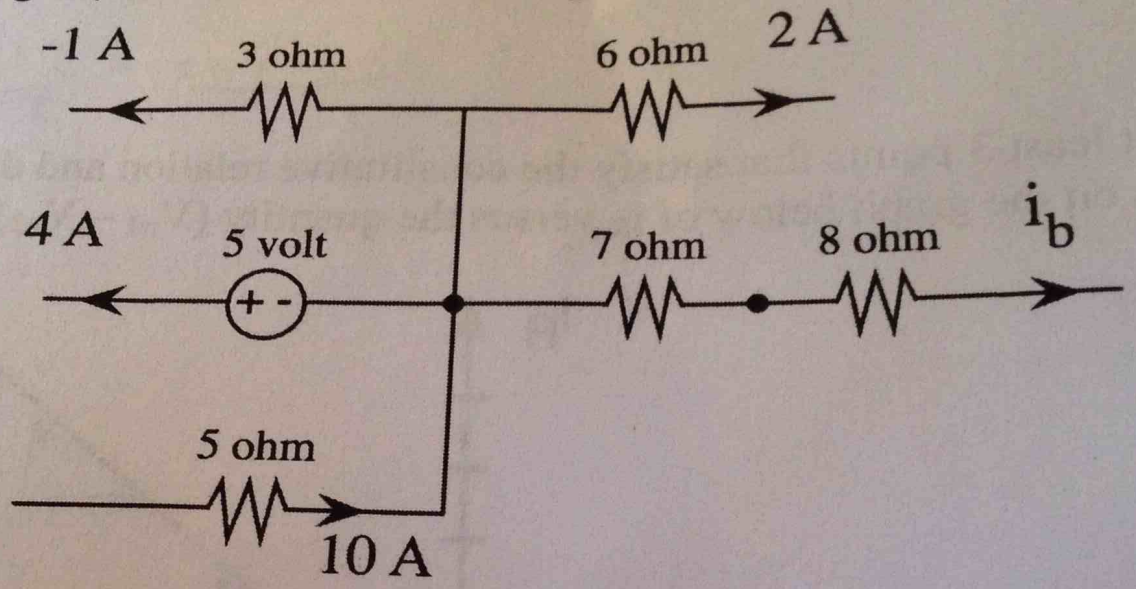


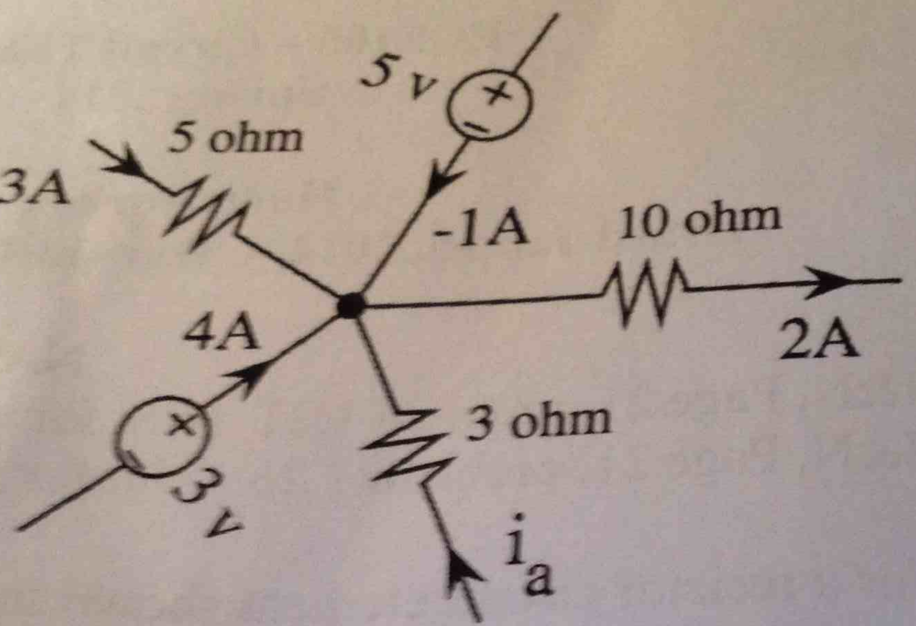
Figure 1-2B

$-1+4+10=0$

$= 6$

$i_b = 6$ amps

Problem 1-2A: The node in Figure 1-2A has 5 branches. Calculate the numerical value for the branch current, i_a, give units. Only the local node region is shown NOT the entire circuit. [Use Conservation Laws]



2 - i_a - 4 - 3 = 0

Figure 1-2A

$i_a = -4$ amp

Problem 1-3A: *The circuit in Figure 1-3A has 3 elements. Calculate the numerical value for the current, i_A, and the power dissipated in the 3 ohm resistor, give units. [Use Constitutive Laws with nodes, note: 'ground' is zero volts.]*

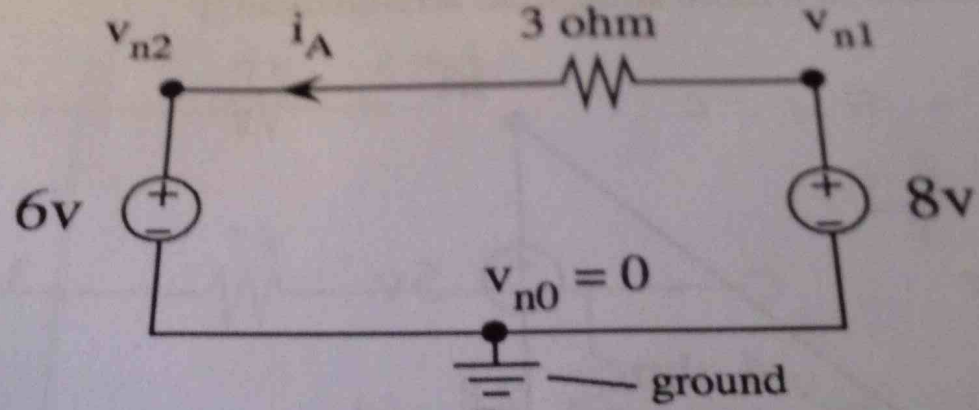


Figure 1-3A

$i_A = \frac{V}{R} = \frac{8-6}{3}$ amps

power dissipated = volts $(i_A) = 2(\frac{2}{3})$ amps =

$i_A = \frac{2}{3}$ amps

$P_d = 2(\frac{2}{3})$ amps $= \frac{4}{3}$ watts