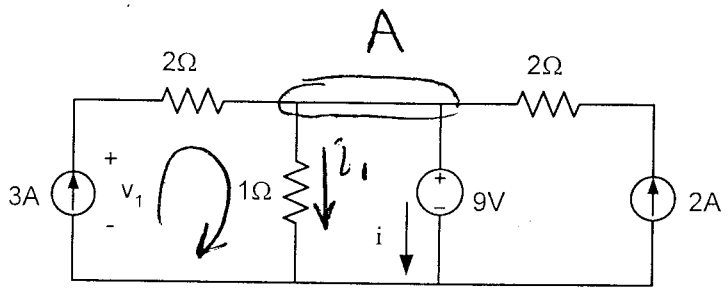
Q#1 For the following single node circuit find,

(a) current **i**

(b) voltage $\mathbf{v_1}$



(a) Since voltage across 1Ω is same as 9V. (parallel connection)

$\therefore i_1 = \frac{9}{1} = 9\,A.$

Applying KCL at big node A.

$3 + 2 = i_1 + i \Rightarrow \boxed{i = -4\,A}$

(b) Applying KVL in the 1st loop

$-V_1 + (2)(3) + 1(i_1) = 0$

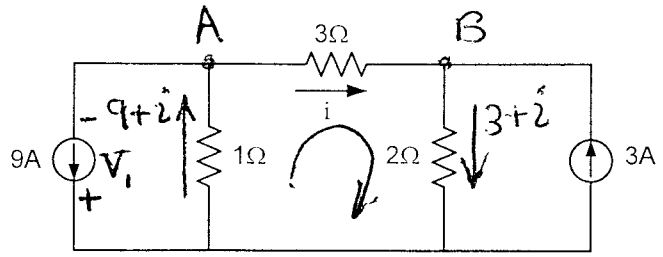
$\Rightarrow \boxed{V_1 = 15\,V}$

Q#2 For the following circuit, find

(a) current **i**

(b) power of 9A current source, indicate if it is absorbed or delivered

NOTE: DO NOT USE SOURCE TRANSFORMATION



(a) Applying KVL in the mid loop after applying KCL at A & B

$$1(9+i)+3(i)+2(3+i)=0$$

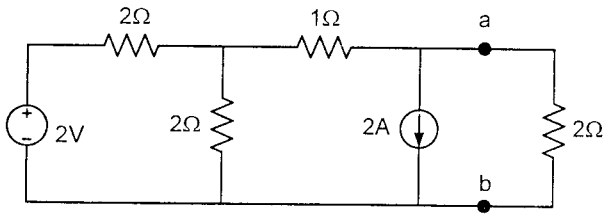
$$\Rightarrow 9+i+3i+6+2i=0 \quad \Rightarrow 6i=-15 \quad \Rightarrow \boxed{i=-\frac{5}{2}\text{ A}}$$

(b) $V_1 = 1(9+i)$ (voltage drop across 1Ω)

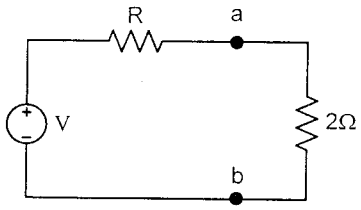
$$\Rightarrow V_1 = \frac{13}{2} \text{ volts}$$

$$\therefore P_{9A} = -(V_1)(9) = -\frac{117}{2} = -58.5\text{ W (delivered)}$$

Q#3 Using a series of source transformations to the left of terminals 'a' and 'b' in Figure (3a), find the values of V and R in the circuit of Figure (3b). Figure (3b) is the equivalent circuit of Figure (3a).

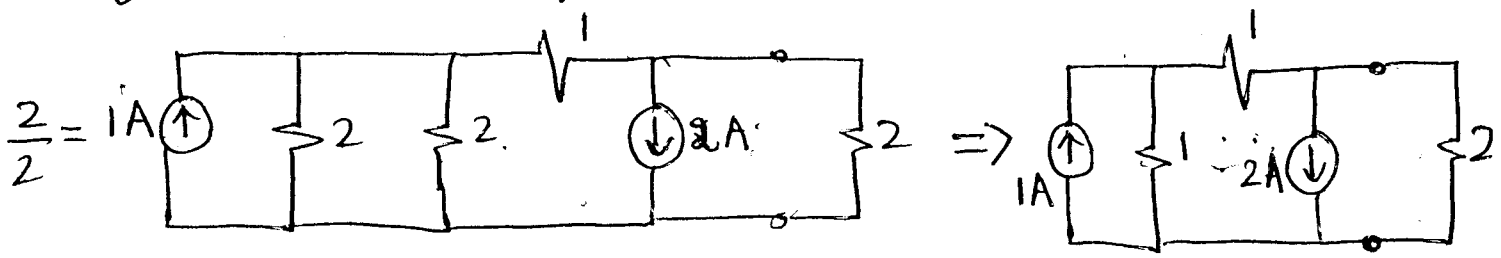


(3a)

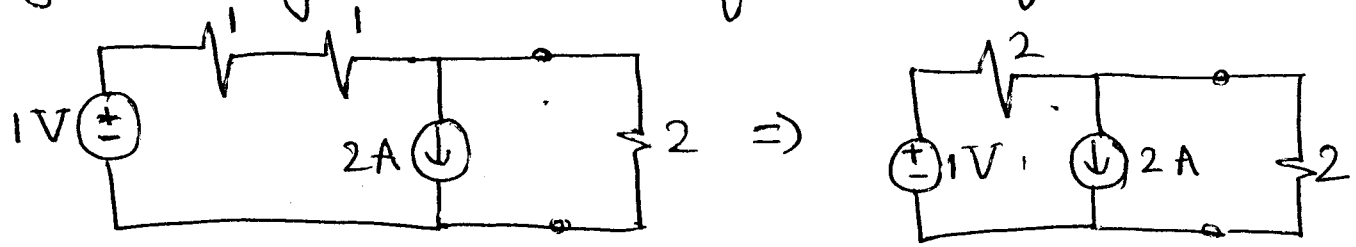


(3b)

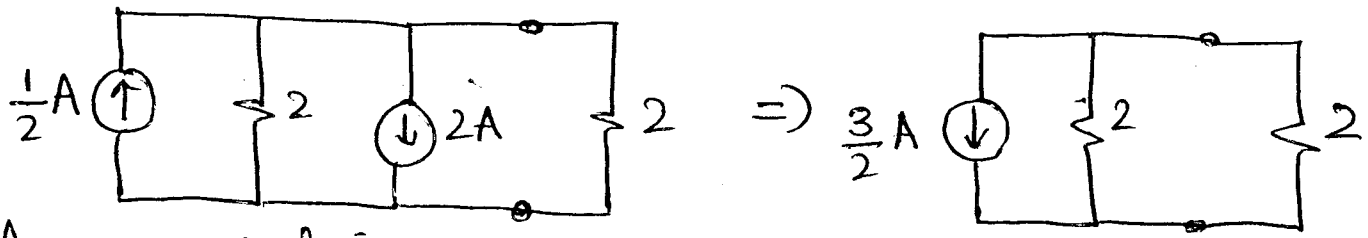
Using source transformation for 2V source



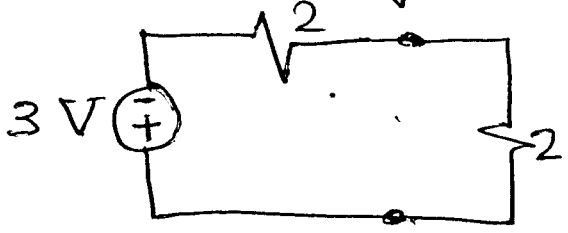
Again using source transformation for 1A source.



Again using source transformation for 1V source



Again applying source transformation.



Compare it with Figure 3b

$V = -3$ Volts

$R = 2\Omega$