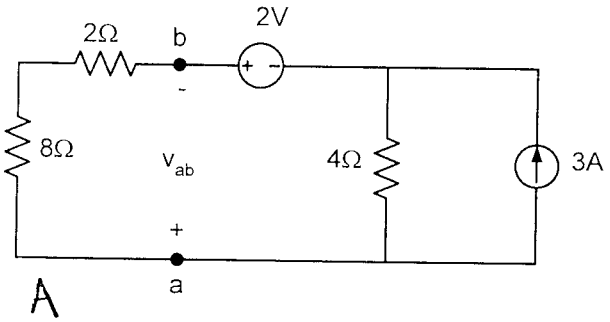
Q#1 For the following circuit, find

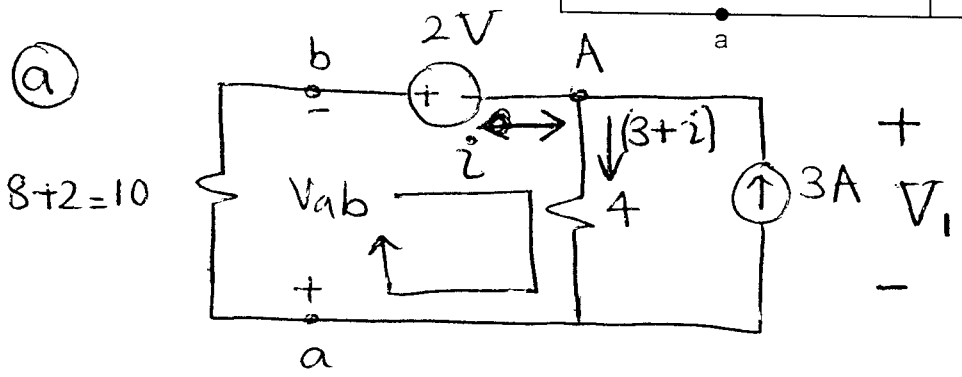
(a) voltage v_{ab}

(b) power of 3A current source, indicate if it is absorbed or delivered

NOTE: DO NOT USE SOURCE TRANSFORMATION



(a)



Apply KVL in the left loop after applying KCL at A.

$(10i) + 2 + 4(3+i) = 0 \Rightarrow 14i = -14 \Rightarrow i = -1\ A$

$\therefore v_{ab} = 10i \Rightarrow \boxed{v_{ab} = -10\ V}$

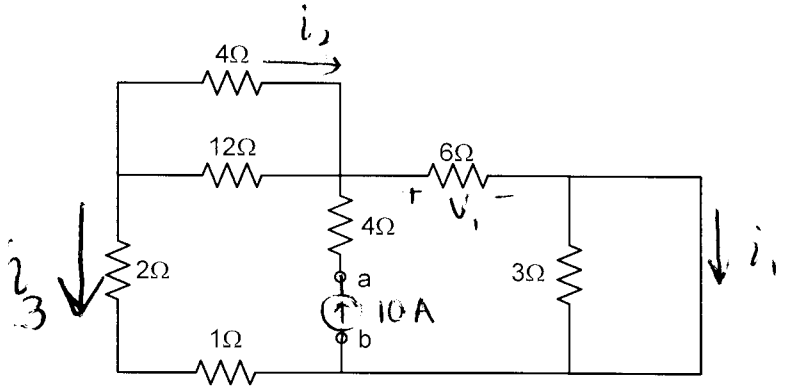
(b) $V_1 = 4(3+i) = 4(3-1) = 8$ volts.

$P_{3A} = -(3)(V_1) = -(3)(8)$

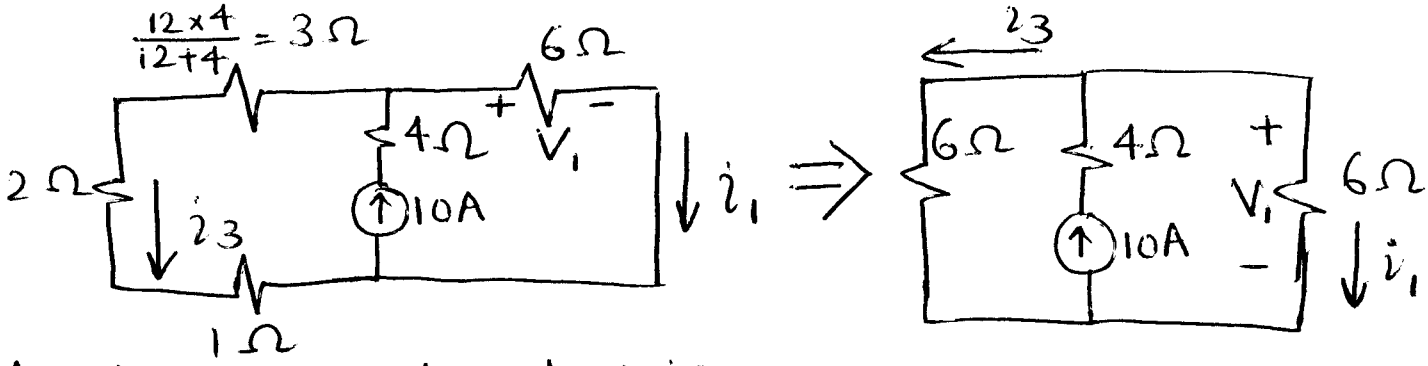
$\boxed{P_{3A} = -24\ W \text{ supplied}}$

i_1, i_2 & V_1

Q#2 Find R_{th} (the resistance seen at terminals 'a' and 'b')



Since 3Ω is in parallel to a short c/ct it can be removed.



Apply current division

$$i_1 = \frac{6}{6+6} \times 10 = 5 \Rightarrow \boxed{i_1 = 5A}$$

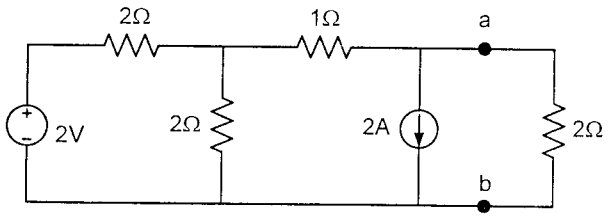
$$\boxed{V_1 = 6i_1 = 30\ V}$$

$$i_3 = 10 - i_1 = 5\ A.$$

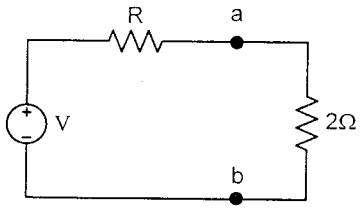
$$\therefore\ i_2 = -\frac{12}{4+12} \times i_3 \Rightarrow i_2 = -\frac{12}{16} \times 5 = \frac{-15}{4}\ A$$

$$\boxed{i_2 = -\frac{15}{4} = -3.75\ A}$$

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).

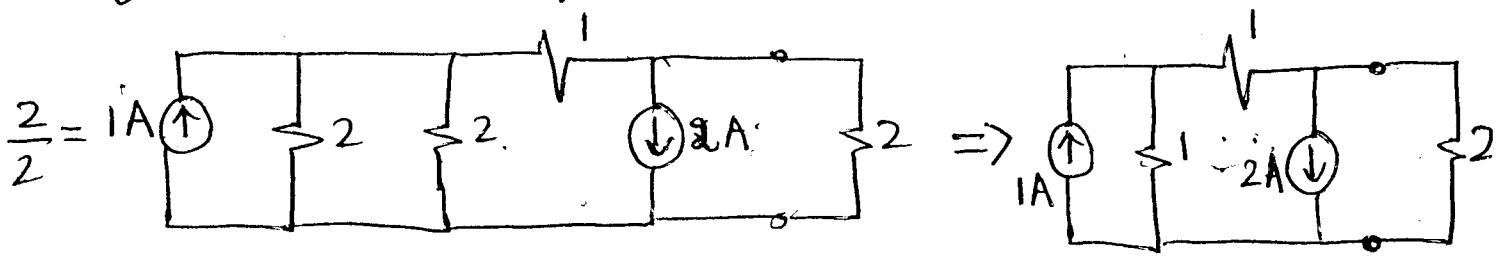


(3a)

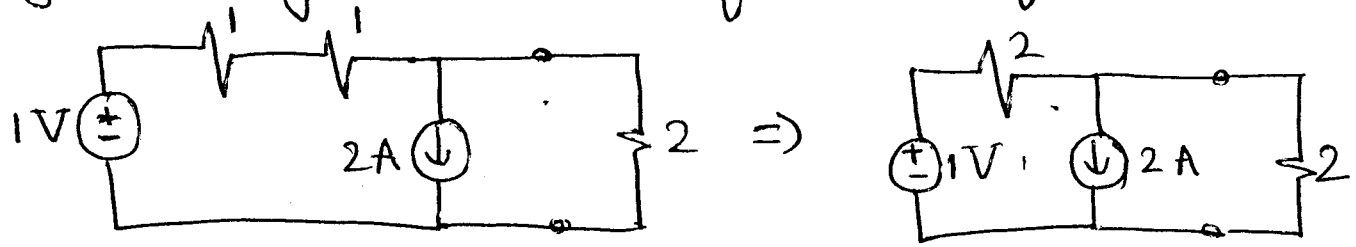


(3b)

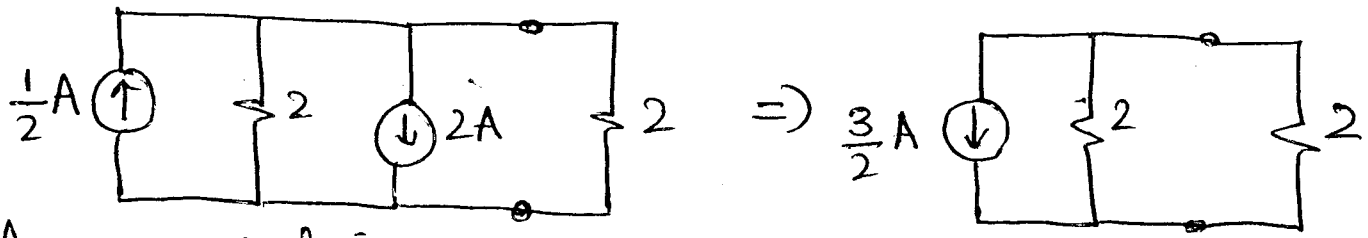
Using source transformation for 2V source



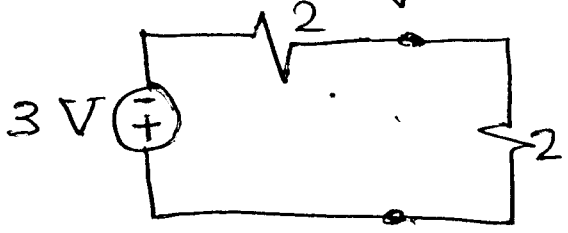
Again using source transformation for 1A source.



Again using source transformation for 1V source



Again applying source transformation.



Compare it with Figure 3b

$V = -3$ Volts

$R = 2\Omega$