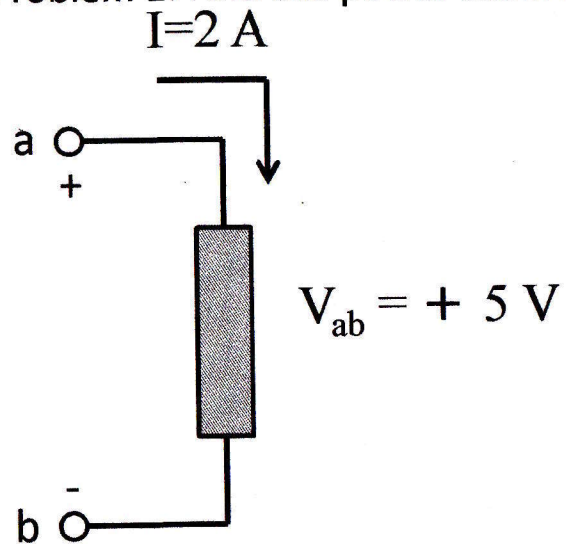


Problem 1: Find the power absorbed or supplied by the element.

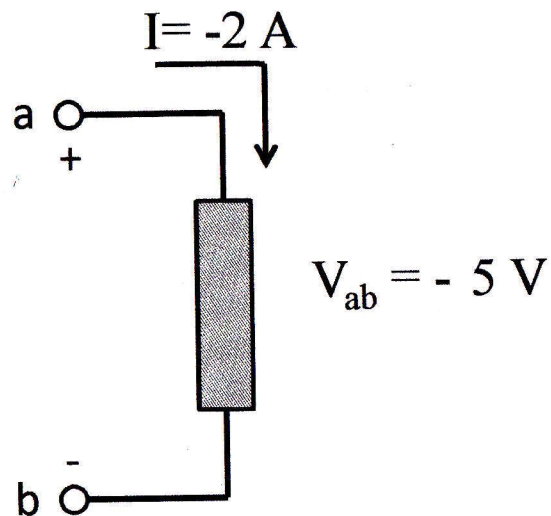


Solution:

$$\begin{aligned} P &= V_{ab} \cdot I_{ab} \\ &= 5 \times 2 \\ &= \boxed{10 \text{ W}} \end{aligned}$$

$P > 0$ power absorbed

Problem 2: Find the power absorbed or supplied by the element.



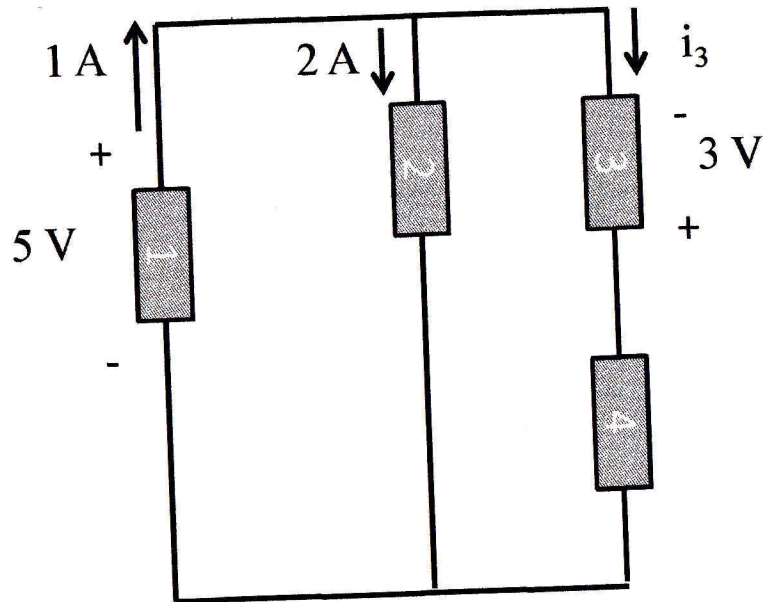
Solution:

$$\begin{aligned} P &= V \cdot I \\ &= V_{ab} \cdot I_{ab} \\ &= (-5) \times (-2) \\ &= \boxed{10 \text{ W}} \end{aligned}$$

$P > 0$ power absorbed

Problem 3:

- a) Find i_3 .
- b) Find the power absorbed or supplied by element 3.
- c) Is element 3 a source or a sink?



Solution: kirchhoff's current law

- a) the total current flowing into a node
= the total current leaving a node

$$\text{So } 1A = 2A + i_3$$

$$i_3 = \boxed{-1A}$$

$$\text{b) } P = V \cdot I$$

$$= (-3) \cdot i_3$$

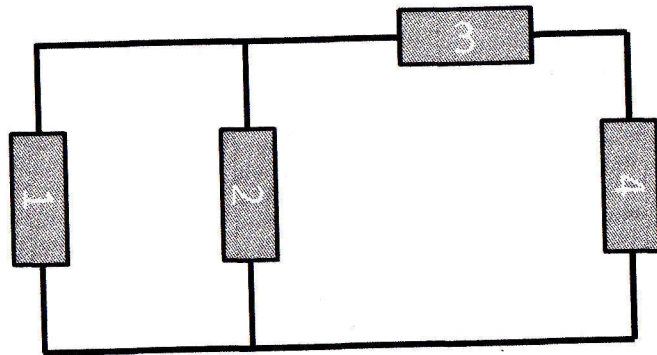
$$= (-3) \times (-1) = \boxed{3W}$$

- c) $P > 0$ power absorbed, sink.

Problem 4: (Power balance)

Assume $P_1 = 10 \text{ W}$, $P_2 = 30 \text{ W}$, $P_3 = -5 \text{ W}$.

Find the power absorbed or supplied by element 4. Is it a source or a sink?



Solution: power conservation

$$\sum P = 0$$

$$P_1 + P_2 + P_3 + P_4 = 0$$

$$P_4 = -(P_1 + P_2 + P_3)$$

$$= -(10 + 30 - 5)$$

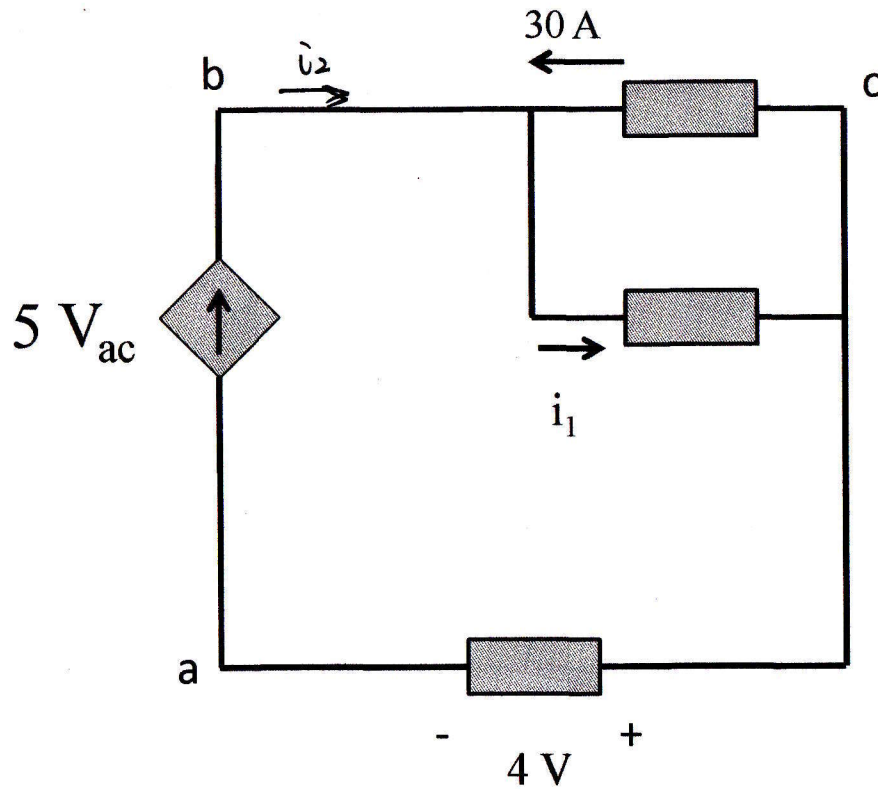
$$= \boxed{-35 \text{ W}}$$

$P_4 < 0$ it is a source.

Problem 5: (VCCS)

Find i_1 .

Is current flowing from b to c or from c to b?



Solution: kirchhoff's current law

$$5V_{ac} + 30A = i_1$$

$$V_{ac} = -4V$$

$$-20 + 30 = i_1$$

$$i_1 = \boxed{10A}$$

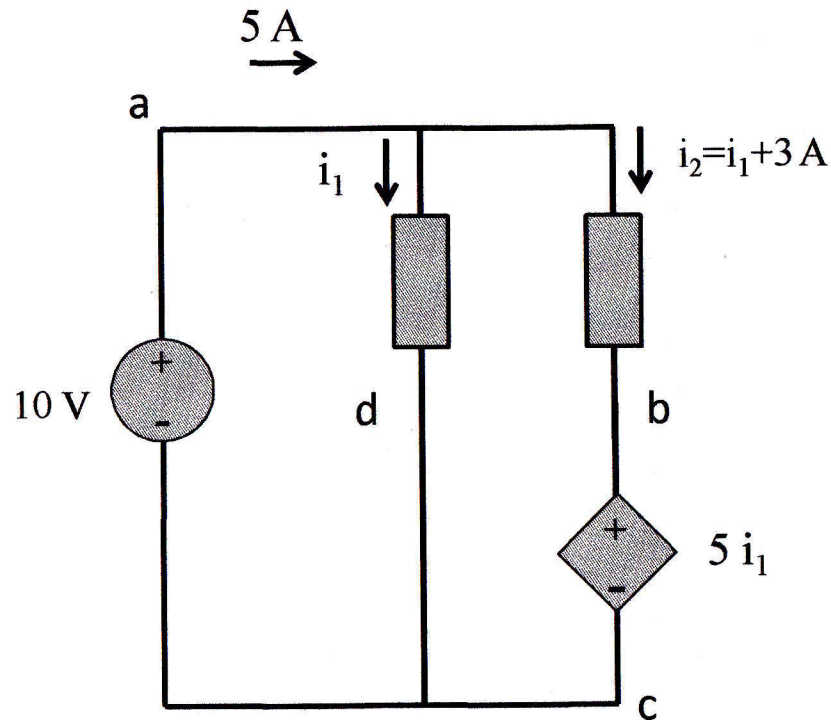
$$i_2 = 5V_{ac} = -20A$$

it's negative, therefore the direction is from c to b

Problem 6: (CCVS)

Find i_1, i_2 .

Find V_{bc} .



Solution: kirchhoff's current law

$$\begin{aligned} 5 &= i_1 + i_2 \\ &= i_1 + i_1 + 3 \\ &= 2i_1 + 3 \end{aligned}$$

$$i_1 = \boxed{1A}$$

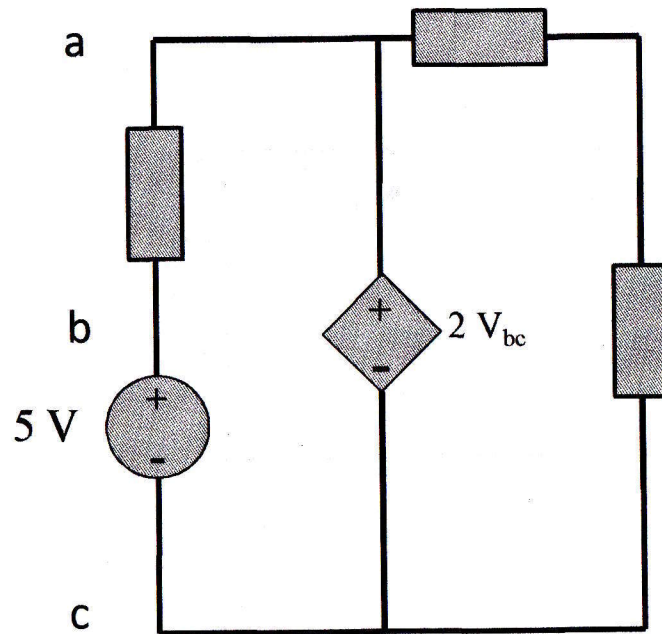
$$i_2 = \boxed{4A}$$

$$V_{bc} = 5i_1 = \boxed{5V}$$

Problem 7: (VCVS)

Find V_{ac} .

Solution: $V_{ac} = 2V_{bc}$
 $= 2 \times 5$
 $= \boxed{10 \text{ V}}$



Problem 8: (CCCS)
Find i_1 .

Solution: Kirchhoff's current law

$$5 + i_1 + i_1 + 1 = 8i_1$$

$$6i_1 = 6$$

$$i_1 = \boxed{1 \text{ A}}$$

