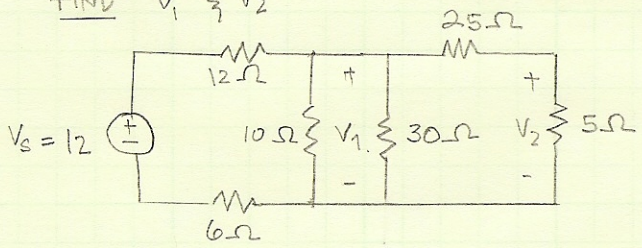
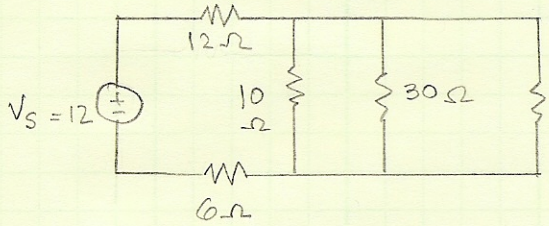
P 2.22.

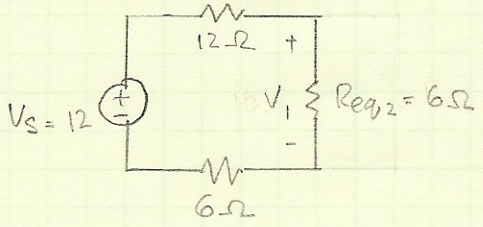
FIND V_1 & V_2



Solution



$Req_1 = (25 + 5)\,\Omega = 30\,\Omega$



$$\frac{1}{Req_2} = \frac{1}{10} + \frac{1}{30} + \frac{1}{30} = \frac{5}{30}$$

$Req_2 = 6\,\Omega$

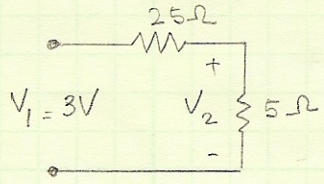
$R_{TOTAL} = (12 + 6 + 6)\,\Omega$

$= 24\,\Omega$

$$I = V_s / R_{TOTAL} = \frac{12}{24} = 0.5\,A$$

$V_1 = (6)(0.5)\,V = \underline{3\,V}$

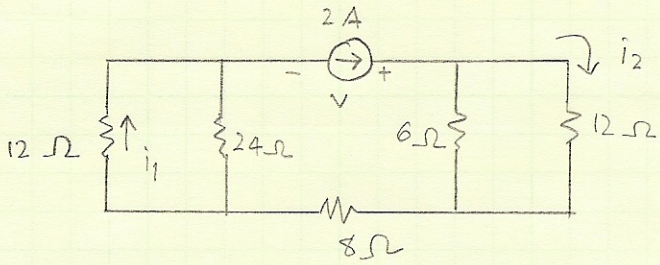
To find V_2, use the voltage division:



$$V_2 = \frac{5}{5 + 25}(3)\,V$$

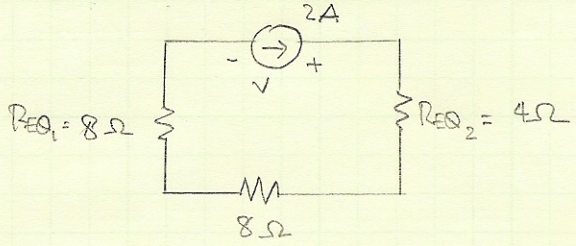
$V_2 = \underline{0.5\,V}$

P2.24



FIND v, i_1, i_2

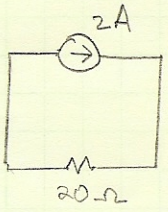
Solution



$$R_{EQ1} = \frac{(12)(24)}{36} = 8\Omega$$

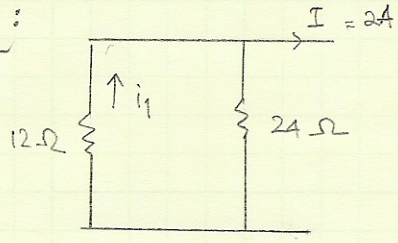
$$R_{EQ_2} = \frac{(6)(12)}{18} = 4\Omega$$

$$R_{TOTAL} = R_{EQ} = (8+8+4)\Omega = 20\Omega$$



$$V = (2)(20) = \underline{40\ V}$$

TO FIND i_1 :

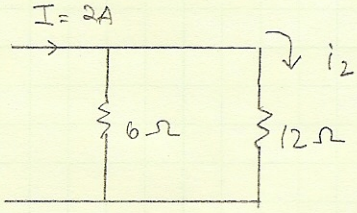


USING CURRENT division:

$$i_1 = \frac{24}{12+24}(2)$$

$$= \underline{1.333\ A}$$

TO FIND i_2 :

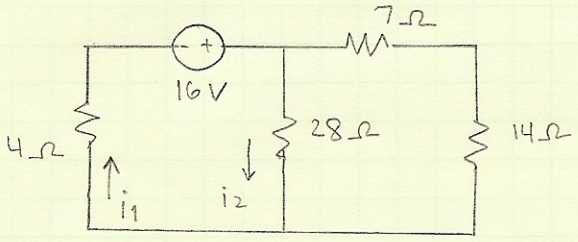


USING CURRENT division

$$i_2 = \frac{6}{6+12}(2)$$

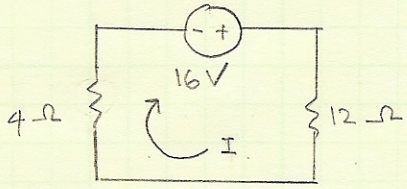
$$= \underline{0.667\ A}$$

P2.27.



FIND i_1 & i_2

Solution.



$$R_{EQ} = \frac{(28)(7+14)}{28+7+14}$$

$$= 12\,\Omega$$

$$I = \frac{16}{16} = 1\,A.$$

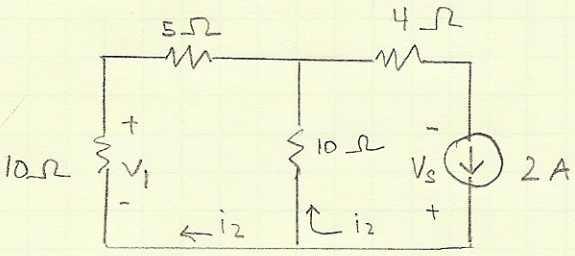
$$i_1 = I = 1\,A$$

To find i_2, use current division:

$$i_2 = \frac{21}{28+21}(1)\,A$$

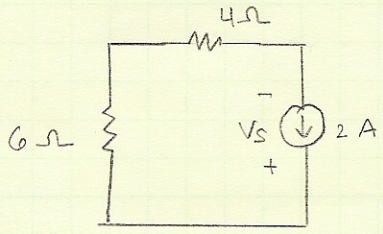
$$= 0.4286\,A$$

P 2.29



FIND V_s, V_1, i_2

Solution



$$R_{EQ1} = (10+5) \,//\, 10$$

$$= \frac{(10+5)(10)}{(10+5)+10} = \frac{150}{25} = 6\,\Omega$$

$$V_s = (2)(4+6)$$

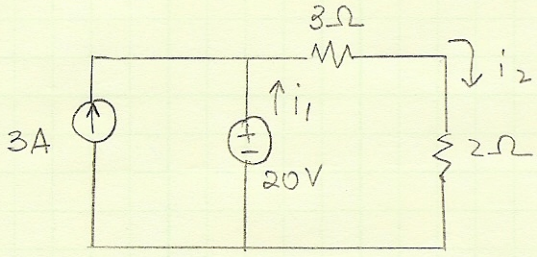
$$= 20\,V$$

USING CURRENT DIVISION.

$$i_1 = (2)\frac{10}{15+10} = 0.8\,A$$

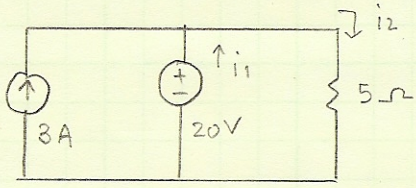
$$i_2 = (2)\frac{15}{15+10} = 1.2\,A$$

P2.31



FIND i_1, i_2 & the POWER of SOURCES.

Solution:



$i_2 = 20/5 = 4A$

$i_2 = i_1 + 3A \Longrightarrow i_1 = i_2 - 3$

$= 4 - 3$

$= 1\,A$

$P_{3A} = (3)(20)$

$= 60\,W$

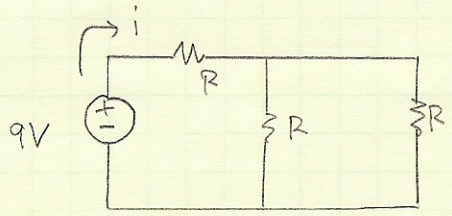
$P_{20V} = (i_1)(20)$

$= (1)(20)$

$= 20W$

POWER is delivered by both SOURCES

P 2.34



Given 9-V voltage source delivers 27 W
FIND R

$$I = \frac{P}{V} = \frac{27}{9} = 3A$$

$$R_{EQ} = R + (R // R)$$

$$= R + \frac{R \cdot R}{R+R} = R + \frac{R^2}{2R}$$

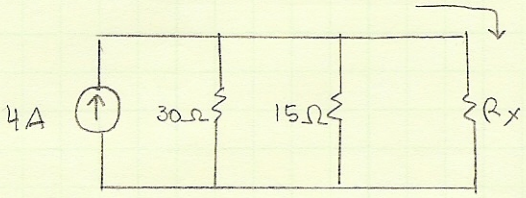
$$= R + \frac{1}{2}R = \frac{3}{2}R$$

$$V = iR_{EQ} \Rightarrow V = \frac{3}{2} iR$$

$$9 = \frac{3}{2}(3)R$$

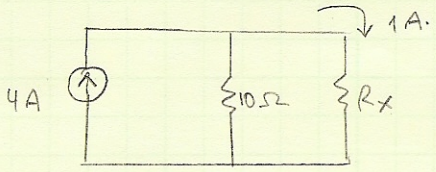
$$\underline{\underline{R = 2\Omega}}$$

P 2.39



FIND Rx.

Solution :

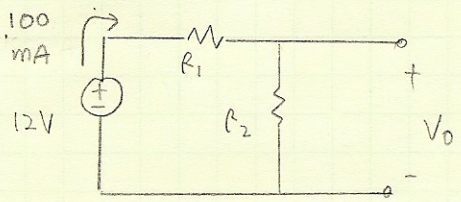


$$R_{30//15} = \frac{(30)(15)}{30+15} = 10\,\Omega$$

Using current division:

$$1A = \frac{10}{10+R_x}(4). \quad \Rightarrow \underline{R_x = 30\,\Omega}$$

P 2.40



$V_o = 5\,V$

(a) Find R_1, R_2

(b) Suppose a resistance 200 Ω is connected across output terminals. Find V_o

(a) Finding R_1: $12 = (0.1)R_1 + 5$

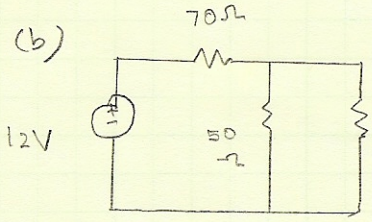
$7 = 0.1 R_1$

$R_1 = \underline{\underline{70\,\Omega}}$

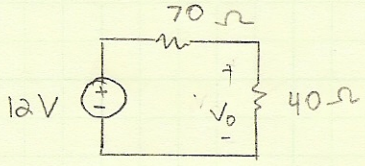
Finding R_2: $5 = (0.1) R_2$

$R_2 = \underline{\underline{50\,\Omega}}$.

(b)



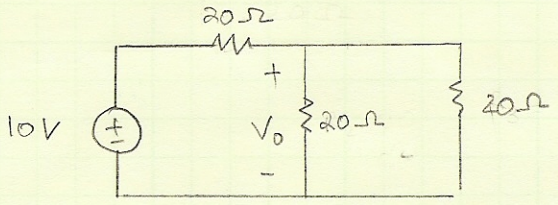
$R_{50//70} = \dfrac{(50)(200)}{50+200} = 40\,\Omega$



To find V_o, use voltage division:

$$V_o = 12\,\frac{40}{40+70} = \underline{\underline{4.364\,V}}$$

P 2.43



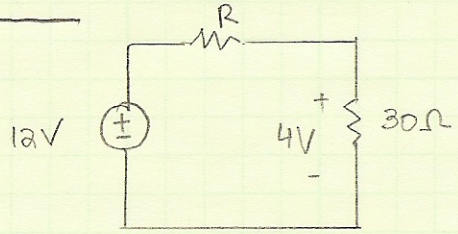
FIND V_o

Solution:

$$R_{20//20} = \frac{(20)(20)}{20+20} = 10\,\Omega$$

$$V_o = \frac{10}{10+20}(10) = \underline{3.333\ V}$$

P 2.45



Given 30Ω supplied with 4V, and a 12 V voltage source

Draw a suitable circuit with one additional RESISTOR.

FIND R.

Solution

The resistor needs to be placed in series w the load & voltage source.

Using voltage division:

$$4 = \frac{30}{30+R}(12) \Rightarrow R = \underline{60\,\Omega}$$