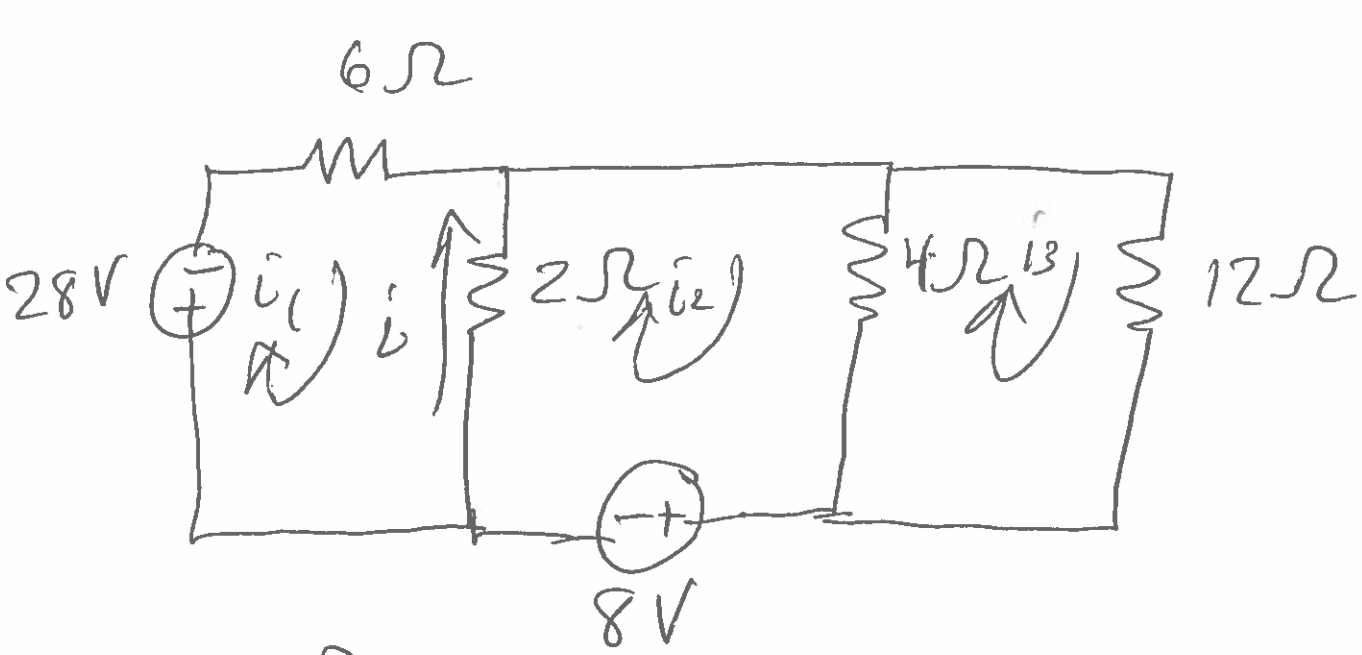


$i = ?$ $\quad i = i_2 - i_1$

$i_1 / \quad -28V = i_1(6\Omega + 2\Omega) - i_2(2\Omega)$

$i_2 / \quad -8V = i_2(2\Omega + 4\Omega) - i_3(4\Omega)$

$\qquad\qquad - i_1(2\Omega)$

$i_3 / \quad 0 = i_3(4\Omega + 12\Omega) - i_2(4\Omega)$

$$i_1(6\Omega+2\Omega) - i_2(2\Omega) = -28\,V$$

$$-i_1(2\Omega) + i_2(2\Omega+4\Omega) - i_3(4\Omega) = -8\,V$$

$$-i_2(4\Omega) + i_3(4\Omega+12\Omega) = 0$$

$$R = \begin{bmatrix} (6+2) & -2 & 0 \\ -2 & (2+4) & -4 \\ 0 & -4 & (4+12) \end{bmatrix}$$

$$V = \begin{bmatrix} 28 \\ -8 \\ 0 \end{bmatrix} \qquad ii = R \backslash V$$

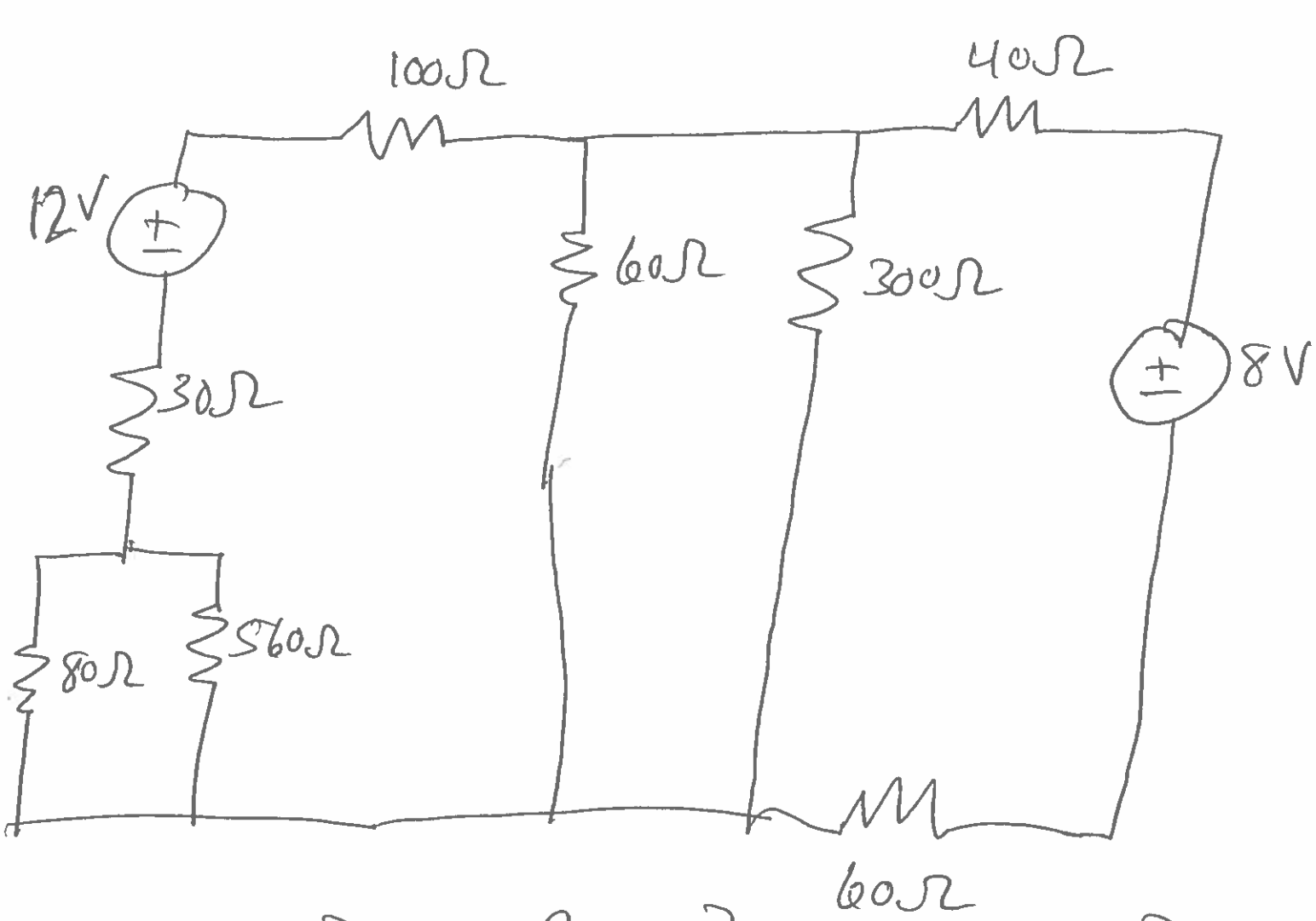
$i_1 = ii(1)$ $\qquad i_1 = -4.33\,A$

$i_2 = ii(2)$ $\qquad i_2 = -3.33\,A$

$i_3 = ii(3)$ $\qquad i_3 = -0.833\,A$

$$i = i_2 - i_1 = -3.33A - (-4.33A)$$

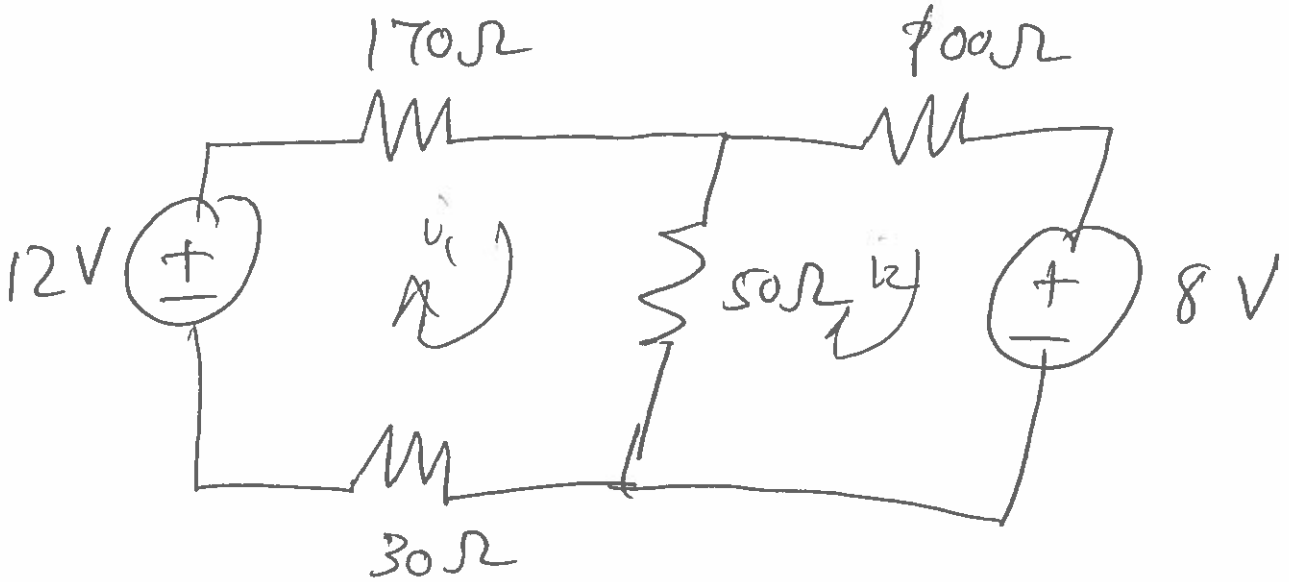
$$\boxed{i = 1.0\,A}$$



$P_{12V} = ?$ $P_{8V} = ?$ $P_{30\Omega} = ?$

$$\frac{1}{80\Omega} + \frac{1}{560\Omega} = \frac{8}{560\Omega} \Rightarrow R_{eff} = 70\Omega$$

$60\Omega \,/\!/\, 300\Omega \Rightarrow 50\Omega$



$$+12V = i_1(30\Omega + 170\Omega + 50\Omega) - i_2(50\Omega)$$

$$-8V = i_2(100\Omega + 50\Omega) - i_1(50\Omega)$$

$$12V = 250\Omega\, i_1 - 50\Omega\, i_2$$

$$-8V = -50\Omega\, i_1 + 150\Omega\, i_2$$

$$36V = 750\Omega\, i_1 - 150\Omega\, i_2$$

$$-8V = -50\Omega\, i_1 + 150\Omega\, i_2$$

$$28V = 700\Omega\, i_1 \Rightarrow i_1 = 0.04A$$

$$i_2 = \frac{i_1(250\Omega) - 12V}{50\Omega} = -0.04A$$

$$P_{12V} = i_1 V = (0.04A)\,12V$$

$$\boxed{P_{12V} = +0.48\,W}$$

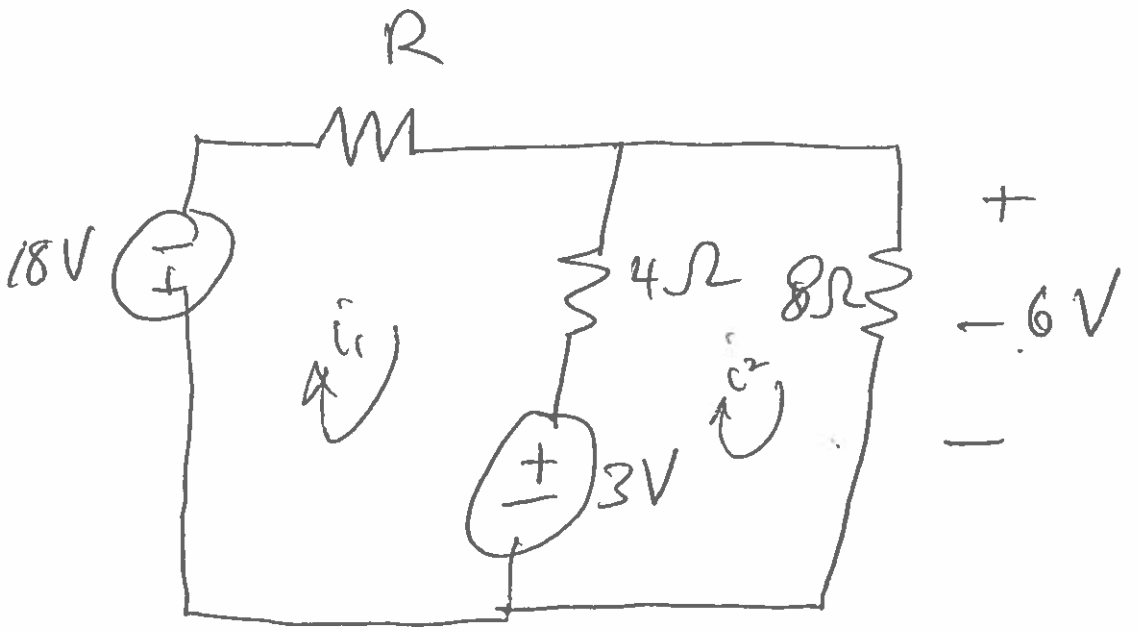
$$P_{8V} = -i_2 V = -(-0.04A)\,8V$$

$$\boxed{P_{8V} = +0.32\,W}$$

$$P_{30\Omega} = -i_1^2 R_{30}$$

$$= -(.04A)^2 (30\Omega)$$

$$\boxed{P_{30\Omega} = -0.048\,W}$$



$R = ?$

i_1

$$-18V = i_1(R+4\Omega) - i_2(4\Omega)$$

$$-3V$$

i_2

$$3V = i_2(4\Omega+8\Omega) - i_4(4\Omega)$$

$$-21V = i_1(R+4\Omega) - i_2(4\Omega)$$

$$3V = -i_1(4\Omega) + i_2(4\Omega+8\Omega)$$

$$i_2 = \frac{V}{R} = \frac{-6V}{8\Omega} = -0.75A$$

$$-21V = i_1(R+4\Omega) - (-.75A)(4\Omega)$$

$$+3V = -i_1(4\Omega) + (-.75A)(4\Omega+8\Omega)$$

$\frac{3}{4}$ $\times 23$ $-9V$

$$3V + 9V = -i_1(4\Omega)$$

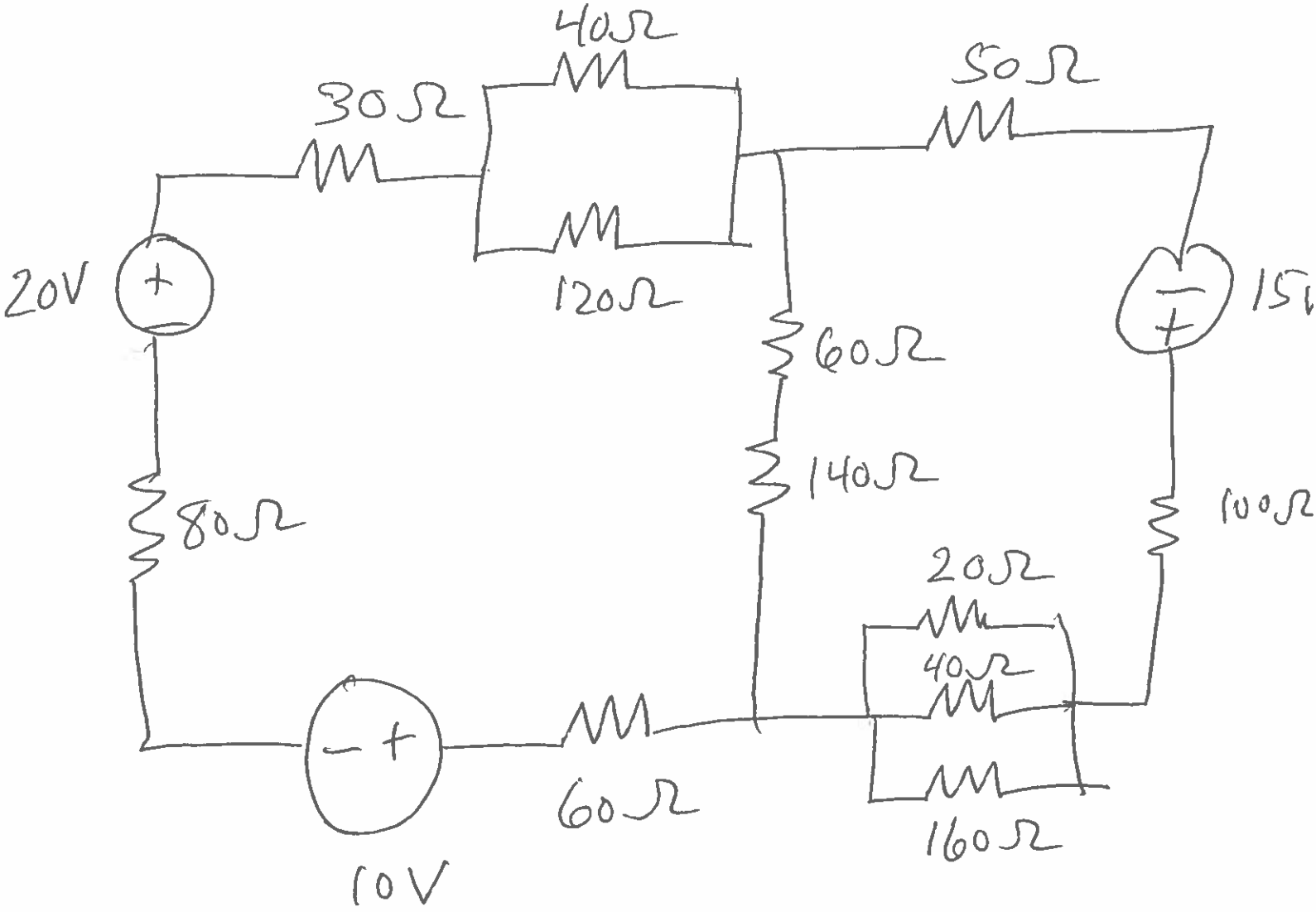
$$i_1 = \frac{-12V}{4\Omega} = -3A$$

$$-21V = (-3A)(R+4\Omega) - (-.75A)(4\Omega)$$

$-3V$

$$\frac{-24V}{-3A} = R + 4\Omega$$

$$8\Omega = R + 4\Omega \Rightarrow R = 4\Omega$$

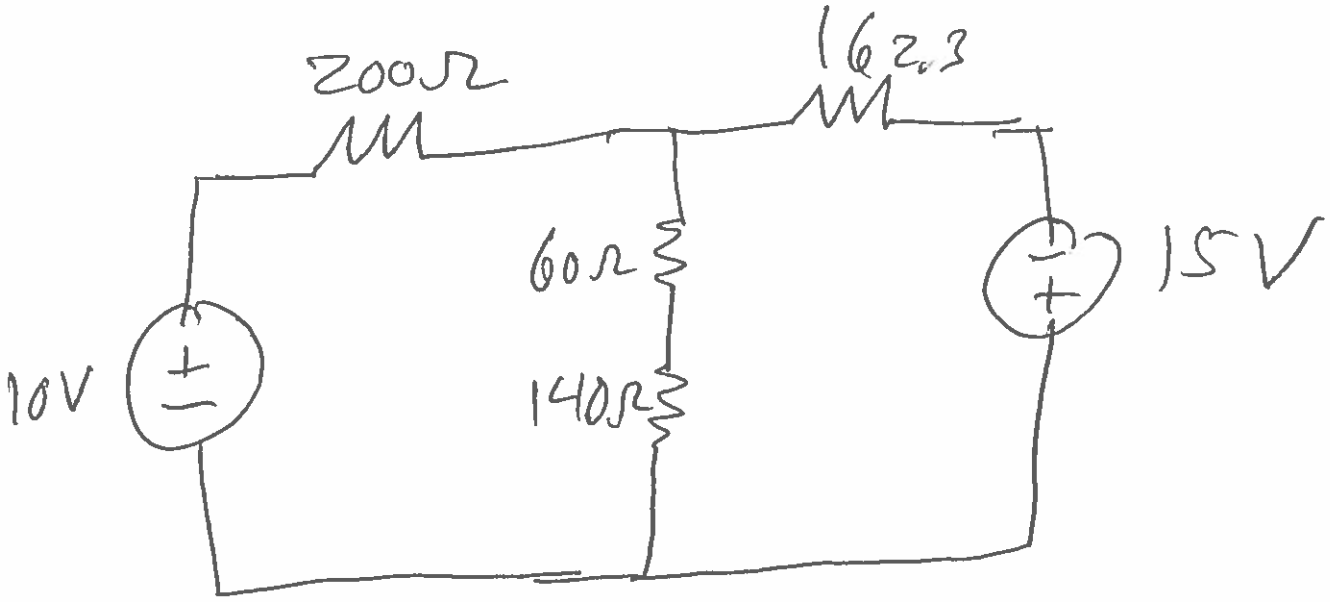


$P_{140\Omega} = ?$

$$\frac{1}{40\Omega} + \frac{1}{120\Omega} = \frac{3+1}{120\Omega} = \frac{4}{120\Omega} = \frac{1}{30\Omega}$$

$$\frac{1}{20\Omega} + \frac{1}{40\Omega} + \frac{1}{160\Omega} = \frac{8+4+1}{160} = \frac{13}{160\Omega}$$

$$\frac{160}{13}\Omega + 150\Omega = 162.3$$


200Ω
162.3
60Ω
140Ω
10V
15V