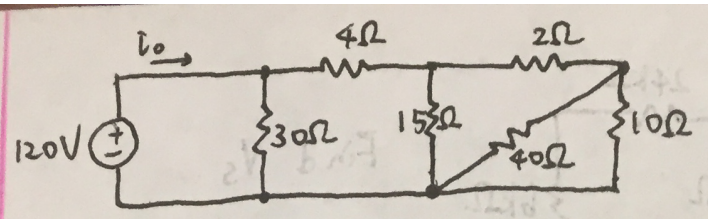


Find i_o.

$40 \parallel 10 = 8$

$8 + 2 = 10$

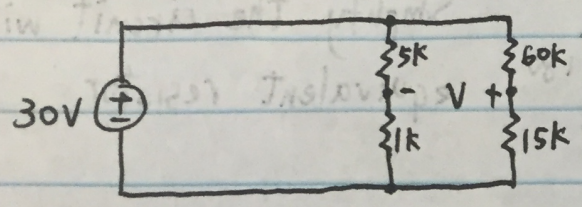
$15 \parallel 10 = 6$

$6 + 4 = 10$

$30 \parallel 10 = 7{,}5\ \Omega$

$$i_o = \frac{V}{R} = \frac{120V}{7{,}5\Omega} = 16\ A \ \#$$

Voltage Divider

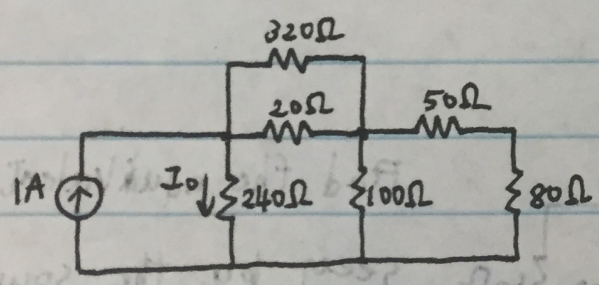


$$V_{1k} = \frac{1}{1+5} \cdot 30 = 5\ V$$

$$V_{15k} = \frac{15}{15+60} \cdot 30 = 6\ V$$

$$V = V_{15k} - V_{1k} = 1\ V \ \#$$

Current Divider



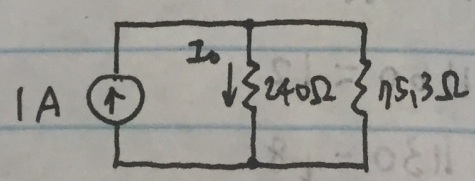
$50 + 80 = 130$

$320 \parallel 20 = 18{,}8$

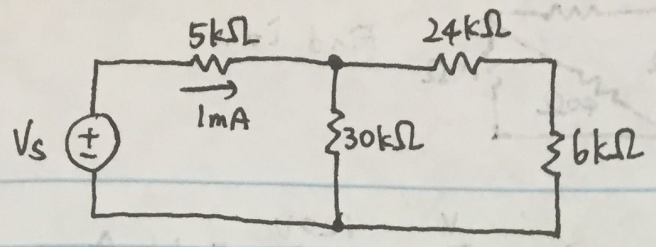
$130 \parallel 100 = 56{,}5$

$18{,}8 + 56{,}5 = 75{,}3$

Find I_o.



$$I_o = 1 \cdot \frac{75{,}3}{240 + 75{,}3} = 0{,}24\ A \ \#$$



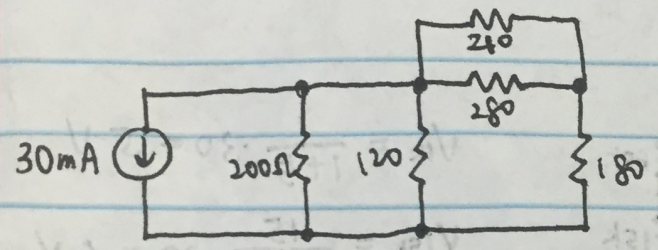
Find Vs.

$24 + 6 = 30$

$30 \parallel 30 = 15$

$15 + 5 = 20$

$V_s = 1 \cdot 20 = 20\ V$ #



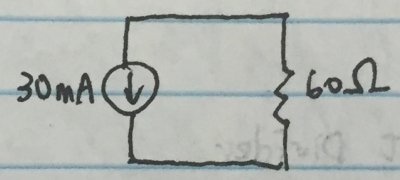
Simplify the circuit with equivalent resistor

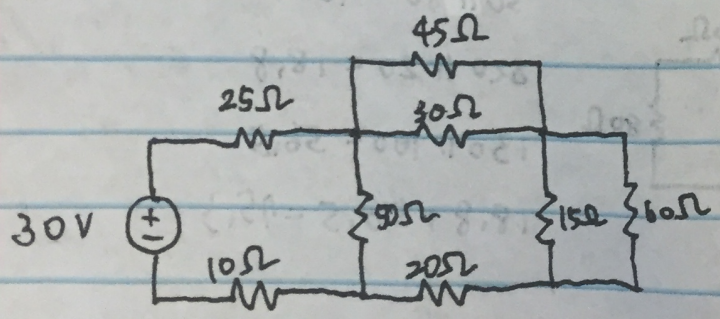
$210 \parallel 280 = 120$

$120 + 180 = 300$

$300 \parallel 120 = 85.7$

$85.7 \parallel 200 = 60$





Find the equivalent resistance seen by the source.

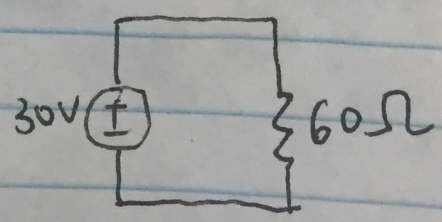
$15 \parallel 60 = 12$

$45 \parallel 30 = 18$

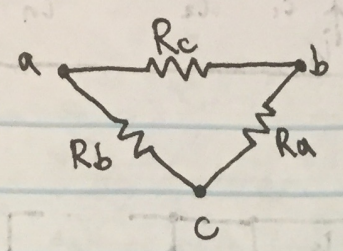
$18 + 12 + 20 = 50$

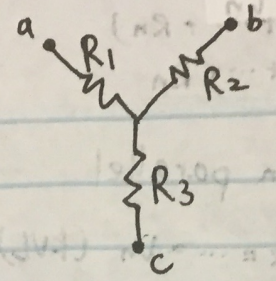
$50 \parallel 50 = 25$

$25 + 25 + 10 = 60\ \Omega$ #



* Δ to Y Transformation

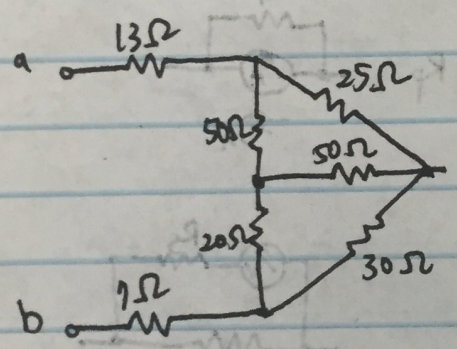




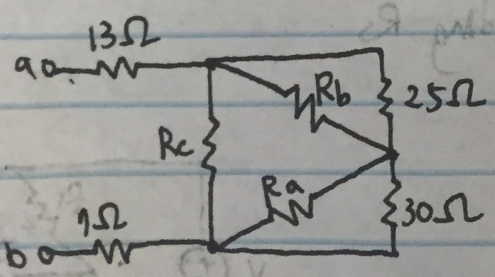
$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c} \qquad R_a = \frac{R_1R_2 + R_2R_3 + R_3R_1}{R_1}$$

$$R_2 = \frac{R_c R_a}{R_a + R_b + R_c} \qquad R_b = \frac{\cdots}{R_2}$$

$$R_3 = \frac{R_a R_b}{R_a + R_b + R_c} \qquad R_c = \frac{\cdots}{R_3}$$



Find the equivalent resistance Rab



$R_1R_2 + R_2R_3 + R_3R_1 = 4500$

$R_a = \frac{4500}{50} = 90\,\Omega$

$R_b = \frac{4500}{20} = 225\,\Omega$

$R_c = \frac{4500}{50} = 90\,\Omega$

$25 \parallel R_b = 22.5$

$30 \parallel R_a = 22.5$

$22.5 + 22.5 = 45$

$45 \parallel R_c = 30$

$13 + 30 + 7 = 50\,\Omega$ #