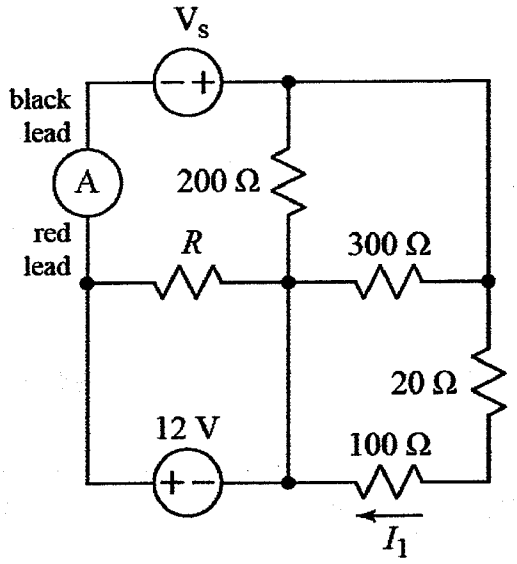
1. (25 points)

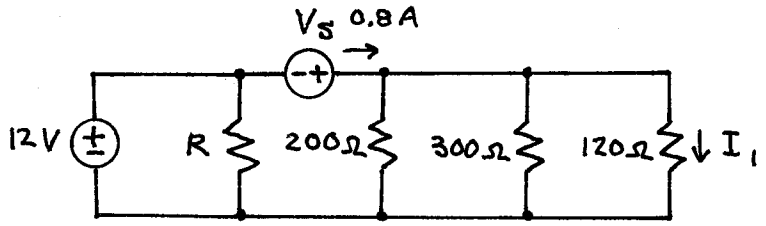


The ideal ammeter in the above circuit measures 0.8 A.

15 pts a) Find the value of V_s.

10 pts b) Find the value of I_1.

soln: a), b) The above circuit is equivalent to the following:



We have two circuits in parallel across the 12V source. One circuit is unknown R. The other circuit is V_s and all other R's.

We are interested in the second circuit, and since we may solve the circuits separately we ignore R.

We have a current divider for I_1.

$$I_1 = 0.8\,A \cdot \frac{200 \| 300}{200 \| 300 + 120} \quad \frac{\Omega}{\Omega}$$

where $200 \| 300 = 100 \cdot 2 \| 3 = 100\left(\frac{6}{5}\right)$

$$= 120\,\Omega$$

$$I_1 = 0.8\,A \quad \frac{120}{240} = \boxed{0.4\,A = I_1}$$

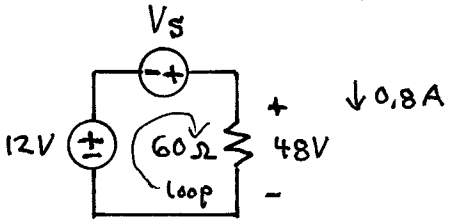
We have $200 \| 300 \| 120\,\Omega = 120 \| 120\,\Omega$

$$= 60\,\Omega$$

The voltage drop across $200 \| 300 \| 120\,\Omega$ is

$$V_{R's} = 60\,\Omega \cdot 0.8\,A = 48\,V$$

So we have a V-loop:



$$12V + V_s - 48V = 0V$$

We have $\boxed{V_s = 36\,V.}$