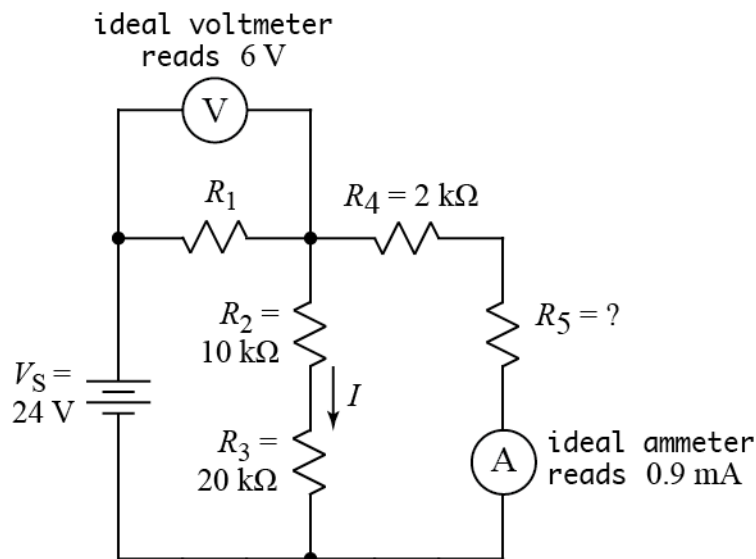


Ex:



Find the values of the following quantities in the above circuit.

- $I$
- $R_5$
- $P_{R4}$  (the power dissipated by  $R_4$ )

**SOL'N:** a) We can find the voltage across  $R_2$  and  $R_3$  using a voltage loop on the left side.

$$V_{R2,3} = V_S - 6\text{ V} = 24\text{ V} - 6\text{ V} = 18\text{ V}$$

Now we use Ohm's law to find  $I$ .

$$I = \frac{V_{R2,3}}{R_2 + R_3} = \frac{18\text{ V}}{10\text{ k}\Omega + 20\text{ k}\Omega} = 0.6\text{ mA}$$

b) The voltage across  $R_2$  and  $R_3$  is the same as the voltage across  $R_4$  and  $R_5$ .

Using Ohm's law, we can find  $R_5$ .

$$0.9\text{ mA} = \frac{V_{R2,3}}{R_4 + R_5} = \frac{18\text{ V}}{2\text{ k}\Omega + R_5}$$

or

$$2\text{ k}\Omega + R_5 = \frac{18\text{ V}}{0.9\text{ mA}} = 20\text{ k}\Omega$$

or

$$R_5 = 20\text{k}\Omega - 2\text{k}\Omega = 18\text{k}\Omega$$

c) The power in  $R_4$  is given by current squared times  $R$ .

$$P_{R4} = (0.9\text{mA})^2 \cdot 2\text{k}\Omega = 1.62\text{ mW}$$