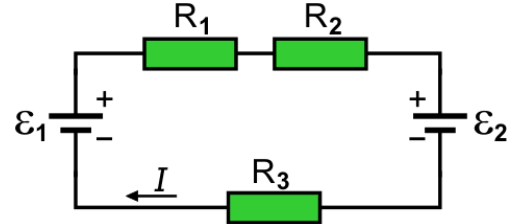


**Problems of Kirchoff's Laws**

1) For the circuit shown below, the resistors are  $R_1 = 4 \Omega$ ,  $R_2 = 9 \Omega$  and  $R_3 = 8 \Omega$ . The voltage sources are  $\epsilon_1 = 43 \text{ V}$  and  $\epsilon_2 = 26 \text{ V}$ . Calculate:

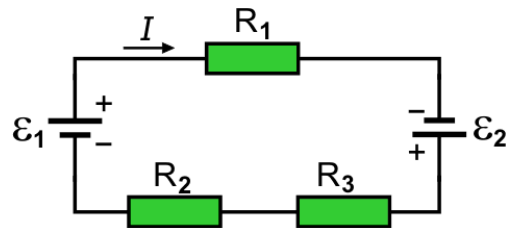
- a) Current.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I = 0.8095 \text{ A}$   
 b)  $3.238 \text{ V}$ , c)  $7.286 \text{ V}$ , d)  $2.621 \text{ W}$

2) For the circuit shown below, the resistors are  $R_1 = 6 \Omega$ ,  $R_2 = 7 \Omega$  and  $R_3 = 11 \Omega$ . The voltage sources are  $\epsilon_1 = 26 \text{ V}$  and  $\epsilon_2 = 38 \text{ V}$ . Calculate:

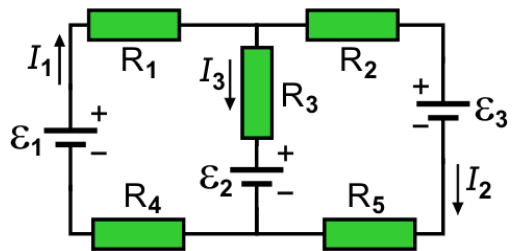
- a) Current.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I = 2.667 \text{ A}$   
 b)  $16 \text{ V}$ , c)  $18.67 \text{ V}$ , d)  $42.67 \text{ W}$

3) For the circuit shown below, the resistors are  $R_1 = 3 \Omega$ ,  $R_2 = 9 \Omega$ ,  $R_3 = 6 \Omega$ ,  $R_4 = 10 \Omega$  and  $R_5 = 12 \Omega$ . The voltage sources are  $\epsilon_1 = 44 \text{ V}$ ,  $\epsilon_2 = 21 \text{ V}$  and  $\epsilon_3 = 12 \text{ V}$ . Find:

- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .

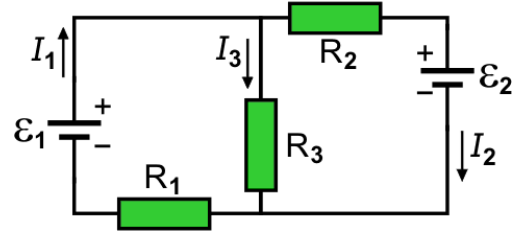


Answer: a)  $I_1 = 1.415 \text{ A}$ ,  $I_2 = 0.6478 \text{ A}$ ,  $I_3 = 0.7673 \text{ A}$   
 b)  $4.245 \text{ V}$ , c)  $5.83 \text{ V}$ , d)  $6.007 \text{ W}$

**Problems of Kirchoff's Laws**

4) For the circuit shown below, the resistors are  $R_1 = 8 \Omega$ ,  $R_2 = 12 \Omega$  and  $R_3 = 12 \Omega$ . The voltage sources are  $\varepsilon_1 = 38 \text{ V}$  and  $\varepsilon_2 = 15 \text{ V}$ . Find:

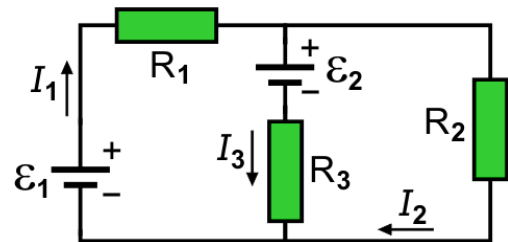
- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I_1 = 2.179 \text{ A}$ ,  $I_2 = 0.4643 \text{ A}$ ,  $I_3 = 1.714 \text{ A}$   
 b)  $17.43 \text{ V}$ , c)  $5.571 \text{ V}$ , d)  $37.97 \text{ W}$

5) For the circuit shown below, the resistors are  $R_1 = 8 \Omega$ ,  $R_2 = 5 \Omega$  and  $R_3 = 5 \Omega$ . The voltage sources are  $\varepsilon_1 = 40 \text{ V}$  and  $\varepsilon_2 = 6 \text{ V}$ . Find:

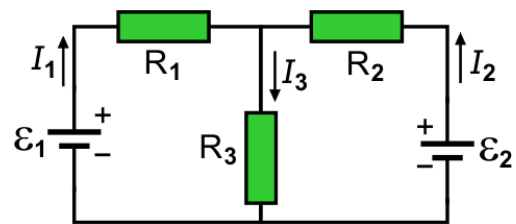
- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I_1 = 3.524 \text{ A}$ ,  $I_2 = 2.362 \text{ A}$ ,  $I_3 = 1.162 \text{ A}$   
 b)  $28.19 \text{ V}$ , c)  $11.81 \text{ V}$ , d)  $99.34 \text{ W}$

6) For the circuit shown below, the resistors are  $R_1 = 11 \Omega$ ,  $R_2 = 9 \Omega$  and  $R_3 = 11 \Omega$ . The voltage sources are  $\varepsilon_1 = 10 \text{ V}$  and  $\varepsilon_2 = 13 \text{ V}$ . Find:

- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .

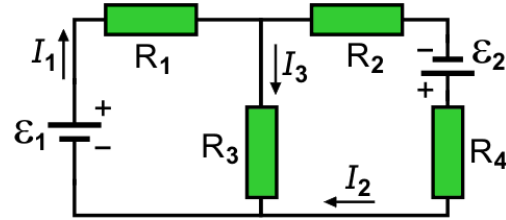


Answer: a)  $I_1 = 0.1787 \text{ A}$ ,  $I_2 = 0.5517 \text{ A}$ ,  $I_3 = 0.7304 \text{ A}$   
 b)  $1.966 \text{ V}$ , c)  $4.966 \text{ V}$ , d)  $0.3512 \text{ W}$

**Problems of Kirchoff's Laws**

7) For the circuit shown below, the resistors are  $R_1 = 10 \Omega$ ,  $R_2 = 6 \Omega$ ,  $R_3 = 8 \Omega$  and  $R_4 = 7 \Omega$ . The voltage sources are  $\epsilon_1 = 17 \text{ V}$  and  $\epsilon_2 = 18 \text{ V}$ . Find:

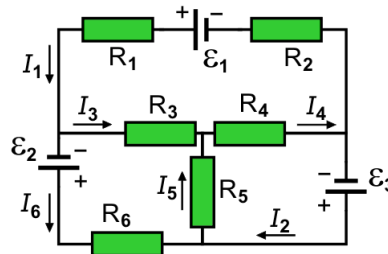
- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I_1 = 1.596 \text{ A}$ ,  $I_2 = 1.465 \text{ A}$ ,  $I_3 = 0.1306 \text{ A}$   
 b)  $15.96 \text{ V}$ , c)  $8.79 \text{ V}$ , d)  $25.46 \text{ W}$

8) For the circuit shown below, the resistors are  $R_1 = 2 \Omega$ ,  $R_2 = 9 \Omega$ ,  $R_3 = 6 \Omega$ ,  $R_4 = 6 \Omega$ ,  $R_5 = 1 \Omega$  and  $R_6 = 2 \Omega$ . The voltage sources are  $\epsilon_1 = 6 \text{ V}$ ,  $\epsilon_2 = 11 \text{ V}$  and  $\epsilon_3 = 25 \text{ V}$ . Find:

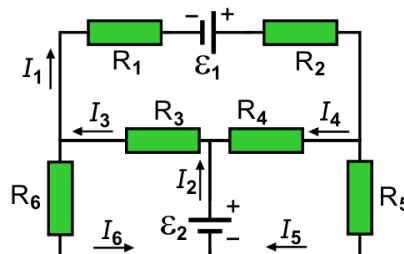
- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I_1 = -0.7712 \text{ A}$ ,  $I_2 = 4.198 \text{ A}$ ,  $I_3 = -1.013 \text{ A}$   
 $I_4 = 3.427 \text{ A}$ ,  $I_5 = 4.44 \text{ A}$ ,  $I_6 = 0.2416 \text{ A}$   
 b)  $1.542 \text{ V}$ , c)  $6.941 \text{ V}$ , d)  $1.19 \text{ W}$

9) For the circuit shown below, the resistors are  $R_1 = 3 \Omega$ ,  $R_2 = 6 \Omega$ ,  $R_3 = 1 \Omega$ ,  $R_4 = 3 \Omega$ ,  $R_5 = 6 \Omega$  and  $R_6 = 8 \Omega$ . The voltage sources are  $\epsilon_1 = 40 \text{ V}$  and  $\epsilon_2 = 15 \text{ V}$ . Find:

- a) Currents.
- b) The voltage across  $R_1$ .
- c) The voltage across  $R_2$ .
- d) Power consumed by  $R_1$ .



Answer: a)  $I_1 = 3.645 \text{ A}$ ,  $I_2 = 4.143 \text{ A}$ ,  $I_3 = 4.907 \text{ A}$   
 $I_4 = 0.7632 \text{ A}$ ,  $I_5 = 2.882 \text{ A}$ ,  $I_6 = 1.262 \text{ A}$   
 b)  $10.93 \text{ V}$ , c)  $21.87 \text{ V}$ , d)  $39.86 \text{ W}$