



5. **Explain** how a nuclear power plant works. **Explain** its **advantages** and **disadvantages**.

6. **Explain** the main disadvantages thermal combustion power plants present.

7. **Explain** how wind power plants work.

8. **Explain** the advantages and disadvantages when obtaining electricity from solar thermal power plants and photovoltaic power plants.

9. **Explain** how hydraulic power plants work.

ELECTRICITY

1. **Define** and note the **units**.

- a. Voltage
  
  
  
  
  
  
  
  
  
  
- b. Electric current
  
  
  
  
  
  
  
  
  
  
- c. Resistance
  
  
  
  
  
  
  
  
  
  
- d. Electric power
  
  
  
  
  
  
  
  
  
  
- e. Energy

2. **Draw** the **symbol** and note which type of element is:

- |                                    |                                 |
|------------------------------------|---------------------------------|
| a. Light bulb                      | f. Commutator                   |
| b. Switch                          | g. Buzzer                       |
| c. Motor                           | h. Battery                      |
| d. Resistance                      | i. Wire crossing with connexion |
| e. Wire crossing without connexion | j. Push button                  |

Formulas:

Electric power:  $P=V \cdot I \rightarrow V=P/I ; I=P/V$

Ohm's law:  $V=R \cdot I \rightarrow R=V/I ; I=V/R$

Units:

Electric power: W (Watt)

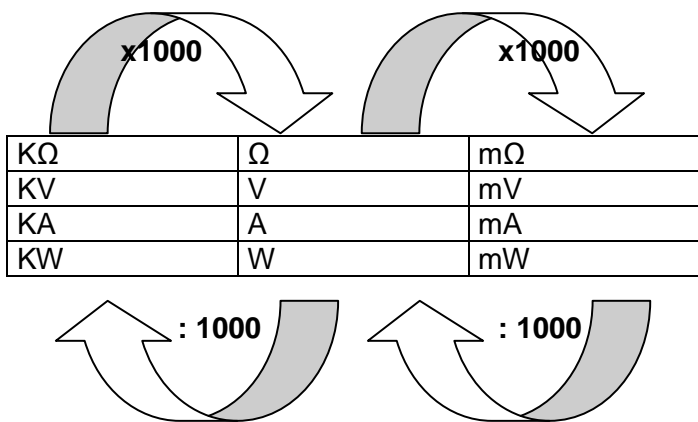
Energy: J (Joules)

Electric current: A (Ampere)

Voltage: V (Volt)

Resistance:  $\Omega$  (Ohms)

Important: before solving your exercises, remember that you need to have your data in the correct units:



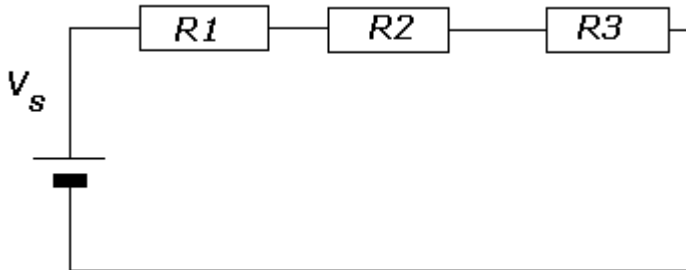
1. Which **voltage** do we need if we want an electrical current of 0.5A if the resistance is of **200  $\Omega$** ?
2. A motor is connected to a **4.5 V** battery. If the electrical current is **1500 mA**, calculate the **resistance** and the **electric power**.
3. An engine has a resistance of **300  $\Omega$**  and is connected to a **9V** battery,
  - a. Calculate the electric current and express it in **mA**
  - b. If we want the electric current to be **15 mA**, which **voltage** do we need at the battery?

4. If we have a **4,5V** battery and we know that the electric current is **0,75 A**, calculate the **resistance**. Express the result in **K $\Omega$**  and  **$\Omega$** .
  
  
  
  
  
  
  
  
  
  
5. Calculate the **electric current** on a circuit if we have a voltage of **125V** and a resistance of **0,05 K $\Omega$** . Calculate the electric power in **KW**?
  
  
  
  
  
  
  
  
  
  
6. A light bulb has an internal resistance of **0,1 K $\Omega$** , if we know that the electric current is **2500 mA**, calculate the voltage and express it in **V** and **mV**.
  
  
  
  
  
  
  
  
  
  
7. Calculate the **electric current** on a light bulb wire if we have this information: **50W** and **220V**. Then, calculate the **resistance**.
  
  
  
  
  
  
  
  
  
  
8. Your compute consumes an electric power of **40W**. If you use it **2 hours every day** during a month (**30 days**), calculate the energy consumed in KWh. If each KW has a cost of **0.1€**, calculate the cost per month.
  
  
  
  
  
  
  
  
  
  
9. Calculate the electric power if voltage is **220V** and electric current **2A**.

10. Solve the following circuits (total resistance, total electric current and electric current and voltage in each resistance).

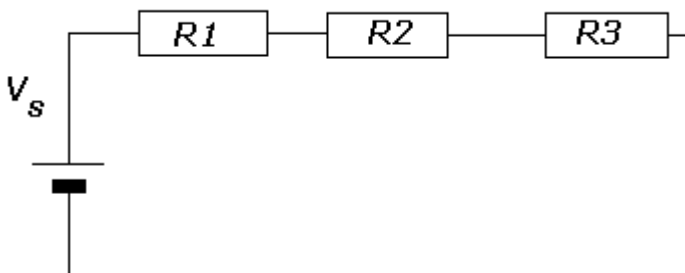
**Circuit 1:**

$R_1=15\Omega$ ,  $R_2=20\Omega$ ,  $R_3=30\Omega$ ,  $V_1=9V$



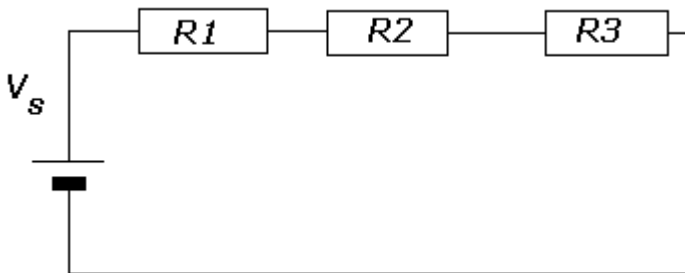
**Circuit 2:**

$R_1=150\Omega$ ,  $R_2=120\Omega$ ,  $R_3=90\Omega$ ,  $V_1=5V$



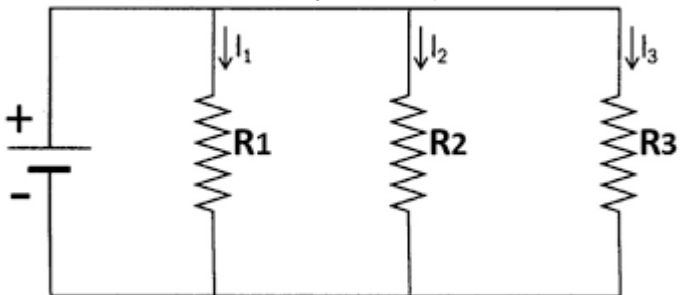
**Circuit 3:**

$R_1=75\Omega$ ,  $R_2=50\Omega$ ,  $R_3=60\Omega$ ,  $I=0,3A$



**Circuit 4:**

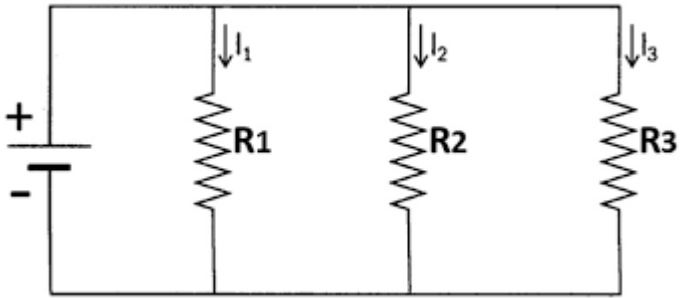
$R_1=65\Omega$ ,  $R_2=20\Omega$ ,  $R_3=50\Omega$ ,  $V_t=6V$





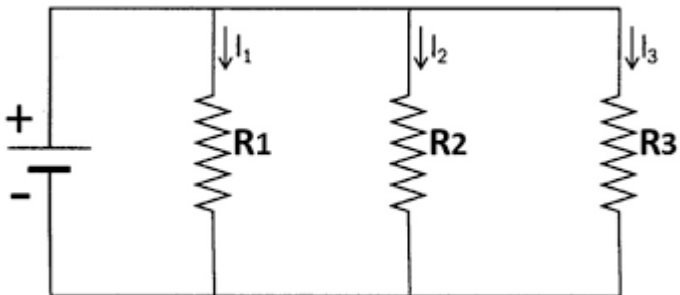
**Circuit 5:**

$R_1=95\Omega$ ,  $R_2=120\Omega$ ,  $R_3=50\Omega$ ,  $I_t=2A$



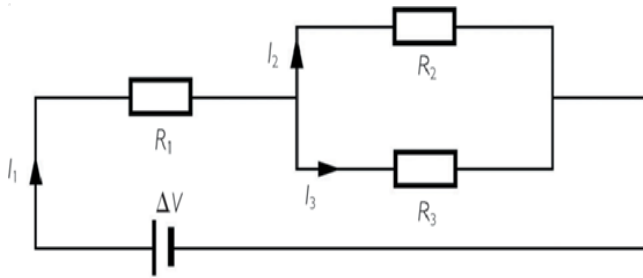
**Circuit 6:**

$R_1=65\Omega$ ,  $R_2=120\Omega$ ,  $R_3=90\Omega$ ,  $I_1=0,5A$



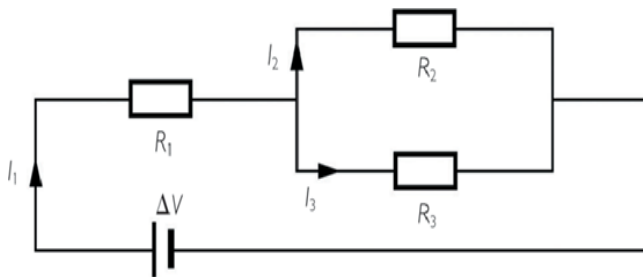
**Circuit 7:**

$R_1=65\Omega$ ,  $R_2=20\Omega$ ,  $R_3=50\Omega$ ,  $V_1=6V$



**Circuit 8:**

$R_1=95\Omega$ ,  $R_2=50\Omega$ ,  $R_3=40\Omega$ ,  $V_1=5V$



## **MATERIALS**

1. Define plastic
2. Explain plastic properties depending on their internal structure.
3. Write down the technique used for manufacturing each product:
  - Pipe
  - Surgeon's glove
  - Pan's handle
  - Vinyl record
  - Stocking
  - Straw
  - Sail
  - Sole
4. Explain the following techniques:
  - Extrusion
  - Blow molding
  - Compression
  - Calendering
5. Explain the mechanical recycling of plastics.