

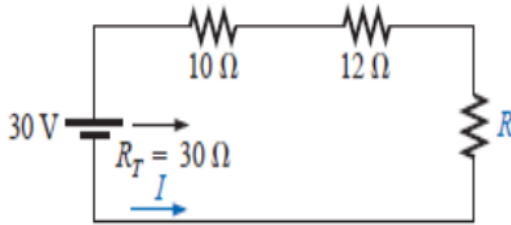
**Exercice1(8):**

1. Match each type of electrical power with the load in which it is primarily associated

Type of Power	Load
A. Active Power	1. Inductor
B. Reactive Power (positive)	2. Capacitor
C. Reactive Power (Negative)	3. Resistor

1ptsX3

2. For the following circuit, the total resistance is **specified**. Find the **unknown resistance** and the **current I**.



**Answer:**

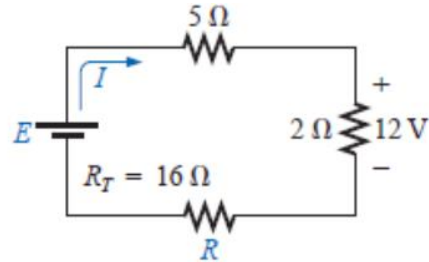
The all resistances are in serial circuit, then

$$R_T = 10 + 12 + R = 30, \text{ then } R = 30 - 22 = 8 \Omega.$$

The Current I across resistors:

$$I = \frac{E}{R_T} = \frac{30}{30} = 1 \text{ A.}$$

3. For the network of the following figure, determine the **current I**, the source **voltage E**, the **unknown resistance**, and the **voltage across each element**.



**Answer:**

- The voltage across the resistor of 2Ohm equal  $RXI$ , then  $I = 12/2 = 6 \text{ A}$ , which is the same current in serial circuit.

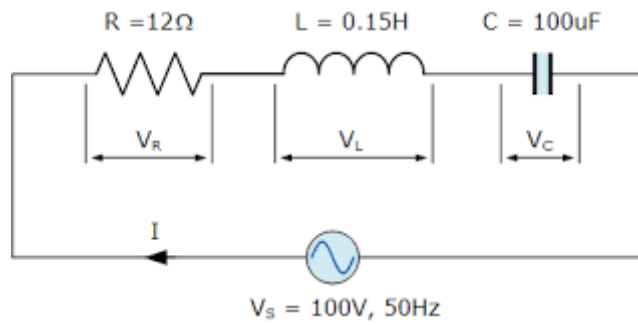
- The voltage  $E = R_T I = 16 \times 6 = 96 \text{ V}$

- The unknown resistor R:  $R = R_T - (5 + 2) = 9 \Omega$

- The voltages across each elements of circuits are:  $5 \times 6 = 30 \text{ V}$ ,  $V_R = R \times I = 9 \times 6 = 54 \text{ V}$

- Verification: Voltage Law:  $E = 30 + 12 + 54 = 96 \text{ V}$ .

**Exercice2:** The electrical circuits is given bellow



- Calculate the *inductive reactance*,  $X_L$  and the *capacitive reactance*  $X_C$ .
    - The inductor has inductive reactance given by :  $X_L = L\omega = L2\pi f = 0.15 \times 6.28 \times 50 = 0.15 \times 314 = 47.1\Omega$  2pts
    - capacitive reactance*  $X_C = -\frac{1}{c\omega} = -\frac{1}{100 \times 10^{-6} \times 314} = -10^{-4}\Omega = -31.85\Omega$  2pts
  - Find the total impedance  $Z$  of the series circuit.  
All circuit elements are in serie, then the impedance:  
 $Z = R + jX_L + jX_C = R + (X_L + X_C)$  1pt
  - Determine the *magnitude*  $|Z|$  and *phase angle*  $\phi$  of the impedance.
    - Amplitude :  
 $|Z| = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{144 + (47.1 - 31.85)^2} \approx 19.40\Omega$  1pts  
 $\sqrt{144 + 15.25^2} = \sqrt{376.56} = 19.40\Omega$
    - $arg(Z) = \tan^{-1}(12/15.25) \approx 51.8^\circ$  1pt
- The impedance is inductive because  $X_L + X_C$  positive.

#### Exercice3(4):

<p><b>What is the main function of a transformer?</b></p> <p>A. Converts AC to DC</p> <p>B. Transfer electrical energy between circuits using electromagnetic induction, <b>Correct</b> ✓</p> <p>C. Store electrical energy</p>	<p><b>The winding that delivers the transformed voltage to the load is called:</b></p> <p>A. Secondary winding, <b>correct</b> ✓</p> <p>B. Primary winding</p> <p>D. Armature</p>
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