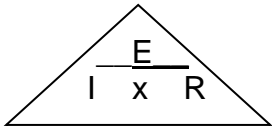


SERIES CIRCUITS (DC)

OHMS LAW

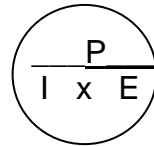


$$E = I \times R$$

$$I = E / R$$

$$R = E / I$$

POWER LAW



$$P = I \times E$$

$$I = P / E$$

$$E = P / I$$

Series Circuit Laws

Voltage – Drops across each resistor in series in series

The total voltage is equal to the sum of the measured voltage drop across each unit of resistance.

$$E_1 + E_2 + E_3 + E_4 \text{ (etc.)} = E_T \text{ (total)}$$

Current – There is only one path for current to flow, because of this the current remains the same at any point in the circuit.

$$I_1 = I_2 = I_3 = I_4 \text{ (etc.)} = I_T \text{ (total)}$$

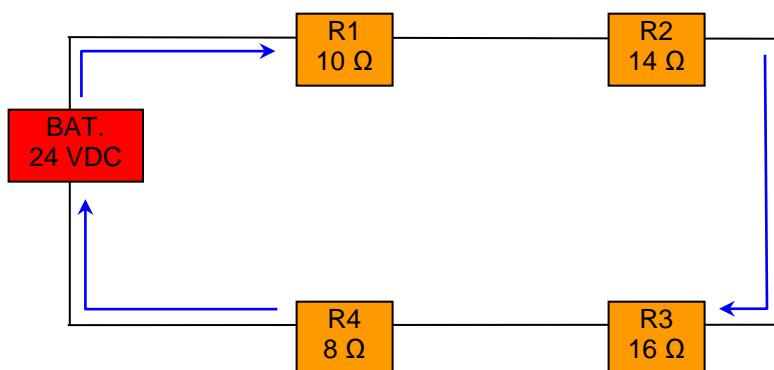
Resistance – The total resistance is equal to the sum of the resistances in the circuit.

$$R_1 + R_2 + R_3 + R_4 \text{ (etc.)} = R_T \text{ (total)}$$

Power – The total power is equal to the sum of the power used across each unit of resistance.

$$P_1 + P_2 + P_3 + P_4 \text{ (etc.)} = P_T \text{ (total)}$$

EXAMPLE:



| | R1 | R2 | R3 | R4 | Total |
|---|-------|-------|-------|-------|--------|
| E | 5 VDC | 7 VDC | 8 VDC | 4 VDC | 24 VDC |
| I | .5A | .5A | .5A | .5A | .5 A |
| R | 10Ω | 14Ω | 16Ω | 8Ω | 48 Ω |
| P | 2.5W | 3.5 W | 4 W | 2 W | 12 W |

EIRP Chart

Follow these numbered steps to solve. Colors below coordinate with the EIRP chart above.

1. $R_1 + R_2 + R_3 + R_4 = R_T$
 $10\Omega + 14\Omega + 16\Omega + 8\Omega = 48\Omega$

2. $E_T / R_T = I_T$
 $24 \text{ VDC} / 48\Omega = .5 \text{ A}$

3. $I_T = I_1 = I_2 = I_3 = I_4$
 $.5 \text{ A} = .5 \text{ A} = .5 \text{ A} = .5 \text{ A} = .5 \text{ A}$

4. $I \times R = E$
 $.5 \text{ A} \times 10\Omega = 5 \text{ VDC}$
 $.5 \text{ A} \times 14\Omega = 7 \text{ VDC}$
 $.5 \text{ A} \times 16\Omega = 8 \text{ VDC}$
 $.5 \text{ A} \times 8\Omega = 4 \text{ VDC}$

5. $I \times E = P$
 $.5 \text{ A} \times 5 \text{ VDC} = 2.5 \text{ W}$
 $.5 \text{ A} \times 7 \text{ VDC} = 3.5 \text{ W}$
 $.5 \text{ A} \times 8 \text{ VDC} = 4 \text{ W}$
 $.5 \text{ A} \times 4 \text{ VDC} = 2 \text{ W}$

6. $I_T \times E_T = P_T$
 $.5 \text{ A} \times 24 \text{ VDC} = 12 \text{ W}$
 or
 $P_1 + P_2 + P_3 + P_4 = P_T$
 $2.5 \text{ W} + 3.5 \text{ W} + 4 \text{ W} + 2 \text{ W} = 12 \text{ W}$

W:
ha

uits