

QCM

10.77.

Diagram: A cylinder of length L and radius r is shown. Below it, a cylinder of length $2L$ and radius $\frac{r}{2}$ is shown.

$$R_1 = 0,1 \Omega = \rho \frac{L}{\pi r^2}$$

$$R_2 = \rho \frac{2L}{\pi (\frac{r}{2})^2} = 8 \rho \frac{L}{\pi r^2} = 8R_1 = 0,8 \Omega \quad (e)$$

10.78.

Diagram: A circuit with a voltage source U and a resistor R .

$$P = RI^2 = UI = \frac{U^2}{R} \quad (\text{relations equivalents})$$

$$P = \text{constante} : A + B + C \Rightarrow (a)$$

10.79.

Diagram: A circuit with two resistors R_1 and R_2 in series.

$$\text{series} : R_s = 2R \quad \text{parallel} : R_p = R/2 \Rightarrow \frac{R_s}{R_p} = \frac{2R}{R/2} = 4 \quad (b)$$

10.80.

Diagram: A circuit with two resistors R_1 and R_2 in parallel.

$$U = R_1 I_1 = R_2 I_2 \Rightarrow \frac{I_1}{I_2} = \frac{R_2}{R_1} \quad (e)$$

10.81.

Diagram: A circuit with two resistors R_1 and R_2 in series.

$$U_1 = IR_1 \Rightarrow I = \frac{U_1}{R_1} = \frac{U_2}{R_2} \Rightarrow \frac{U_1}{U_2} = \frac{R_1}{R_2} \quad (a)$$

10.82.

Diagram: A circuit with three resistors R , $2R$, and $3R$ in parallel.

$$A : \frac{1}{R} + \frac{1}{2R} + \frac{1}{3R} = \frac{5}{6R} \Rightarrow R_{\text{eq}} = \frac{6R}{5}$$

$$B : \frac{1}{2R} + \frac{1}{2R} = \frac{2}{2R} = \frac{1}{R} \Rightarrow R_{\text{eq}} = R \quad 1) \Rightarrow$$

$$C : \frac{1}{R} + \frac{1}{3R} = \frac{4}{3R} \Rightarrow R_{\text{eq}} = \frac{3R}{4} \quad 2) \Rightarrow B; C; A \quad (d)$$

10.83.

Diagram: A circuit with a voltage source $\mathcal{E}$, a resistor R , and an internal resistor R_{int} .

$$\mathcal{E} - Ri - R_{\text{int}} \cdot i = 0 \Rightarrow i = \frac{\mathcal{E}}{R + R_{\text{int}}}$$

$$\mathcal{E} - R_{\text{int}} \cdot i = \frac{1}{2} \mathcal{E}$$

$$\Rightarrow \mathcal{E} - R \frac{\mathcal{E}}{R + R_{\text{int}}} = \frac{1}{2} \mathcal{E} ; 1 - \frac{R}{R + R_{\text{int}}} = \frac{1}{2} ; \frac{1}{2} = \frac{R}{R + R_{\text{int}}} ; 2R = R + R_{\text{int}}$$

$$\Rightarrow R = R_{\text{int}} \quad (d)$$

10.84.

Diagram: A circuit with a voltage source $\mathcal{E}$ and a resistor R .

$$a). V \quad b). F \quad (b)$$

10.85.

Diagram: A circuit with a voltage source $\mathcal{E}$ and a resistor R .

$$a). F \quad b). V \quad (b)$$

10.86.

Diagram: A circuit with four resistors R , $2R$, $3R$, and $6R$ in parallel.

$$\begin{cases} 2 = R(I_1 + I_2 + I_4) \\ 5 - RI_3 - 7 - RI_2 = 0 \\ 2 - RI_4 - 3 - 5 = 0 \end{cases} ; \begin{cases} 2 = R(I_1 + I_2 + 6/R) \\ -2 = 2RI_2 + RI_1 \\ I_4 = 6/R \end{cases} ; \begin{cases} -4 = RI_1 + RI_2 \quad (1) \\ -2 = RI_1 + 2RI_2 \quad (2) \end{cases}$$

$$\Rightarrow I_2 = \frac{2}{R} = 1A \quad (d)$$

10.87.

Diagram: A circuit with a voltage source $\mathcal{E}$ and a resistor R .

$$\Delta U = R \cdot I_2 = 2V \quad (e)$$

10.88.

Diagram: A circuit with a voltage source $\mathcal{E}$ and a resistor R .

$$(b)$$