

Two resistances 2Ω and 3Ω are in parallel. The combination is in series with 1.5Ω resistance and a power supply of voltage V . There is a current of $3A$ through the 2Ω resistance. What are the values of the current I delivered by, and the voltage V across the power supply?

- A. $3A$ and $10.5V$
- B. $4A$ and $9V$
- C. $4A$ and $12V$
- D. $12A$ and $18V$

Solution:

The voltage across the resistor with resistance 2Ω :

Ohm's law:

$$I_1 = \frac{U_1}{R_1}; U_1 = R_1 * I_1 = 2\Omega * 3A = 6V$$

Because the resistance connected in parallel, they have the same voltage:

$$U_1 = U_2 = 6V$$

$$I_2 = \frac{U_2}{R_2} = \frac{6V}{3\Omega} = 2A$$

The total current in the circuit - the sum of the currents through the two resistances R_1 and R_2 :

$$I = I_1 + I_2 = 2A + 3A = 5A$$

$$U_3 = I * R_3 = 5A * 1.5\Omega = 7.5V$$

The voltage across the power supply:

$$U_{\text{power}} = U_3 + U_1 = 7.5V + 6V = 13.5V$$

Answer: $5A$ and $13.5V$

