When resistors are connected in series,
the same current flows in all of the resistors.

The voltage drop across the equivalent resistor $R_{series}$ is:-

$$V_{series} = IR_{series} = IR_1 + IR_2 + IR_3 + \cdots$$

Therefore $$R_{series} = R_1 + R_2 + R_3 + \cdots$$

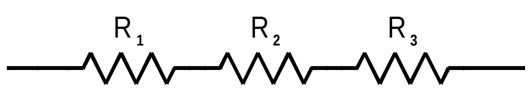


Figure 2.1:—

Example 1
Calculate the current in the circuit of Figure 2.2, if the voltage across the two resistors in series is $3.8V$.
Calculate the current in the $100R$ resistor.

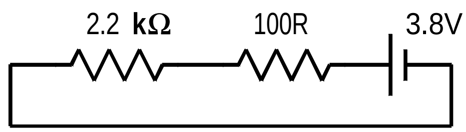


Figure 2.2:—

$$
\begin{aligned}
R_s &= R_1 + R_2 = 2.2k + 100 \\
&= 2.2 \times 10^3 + 100 = 2300\Omega \\
I &= \frac{3.8V}{2300\Omega} \\
&= 1.65 \times 10^{-3} = 1.65mA
\end{aligned}
$$

Example 2.
Calculate the current in the circuit of Figure 2.3, if the voltage across the $1.8k\Omega$ resistor is $6.4V$. Calculate the voltage across the $2.7k\Omega$ resistor. Calculate the battery voltage.

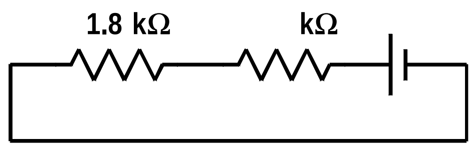


Figure 2.3:—

$$\begin{aligned}
\text{Current} &= I = \frac{6.4V}{1.8k\Omega} = \frac{6.4}{1800} \\
&= 3.55 \times 10^{-3} = 3.55mA \\
V_{2.7k\Omega} &= 3.55mA \times 2.7k\Omega \\
&= 3.55 \times 10^{-3} \times 2.7 \times 10^{3} = 9.58V \\
V_{Battery} &= 6.4V + 9.6V = 16V
\end{aligned}$$