

The current in the resistors in series in a potential divider chain is given by the input voltage divided by the sum of the resistors in the chain.

The output voltage is given by this current times the resistor across the output.

$$\begin{aligned}\text{Current } I &= \frac{V_{in}}{R_1 + R_2} \\ \text{Output Voltage } V_{out} &= I \times R_2 \\ &= \frac{R_2}{R_1 + R_2} \times V_{in}\end{aligned}$$

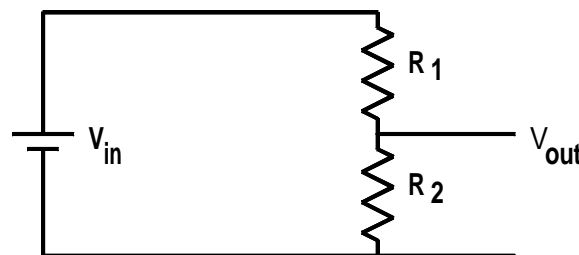


Figure 4.1:— Potential divider

Example 1

Calculate the output voltage from the potential divider in Figure 4.2.

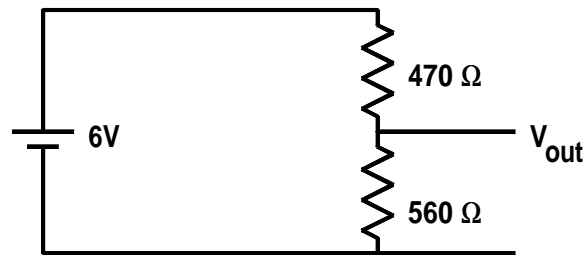


Figure 4.2:—

$$\begin{aligned}\text{Current} &= \frac{6V}{470\Omega + 560\Omega} \\ &= \frac{6}{1030} \\ &= 5.82mA \\ \text{Output Voltage} &= 5.82mA \times 560\Omega \\ &= 3.26V\end{aligned}$$

Example 2

Calculate the output voltage when the potentiometer is set at 0%, 12%, 50%, 75%, 90%, 100% of its range.

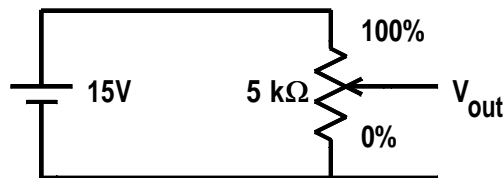


Figure 4.3:—

$$\text{The \% of range} = \frac{R_2}{R_1 + R_2} \times 100$$

$$\begin{aligned} \text{Therefore } V_{out} &= 0.00 \times 15V \\ &= 0.0V \quad \text{for 0 \% setting} \end{aligned}$$

$$\begin{aligned} V_{out} &= 0.12 \times 15V \\ &= 1.8V \quad \text{for 12 \% setting} \end{aligned}$$
