

Electricity

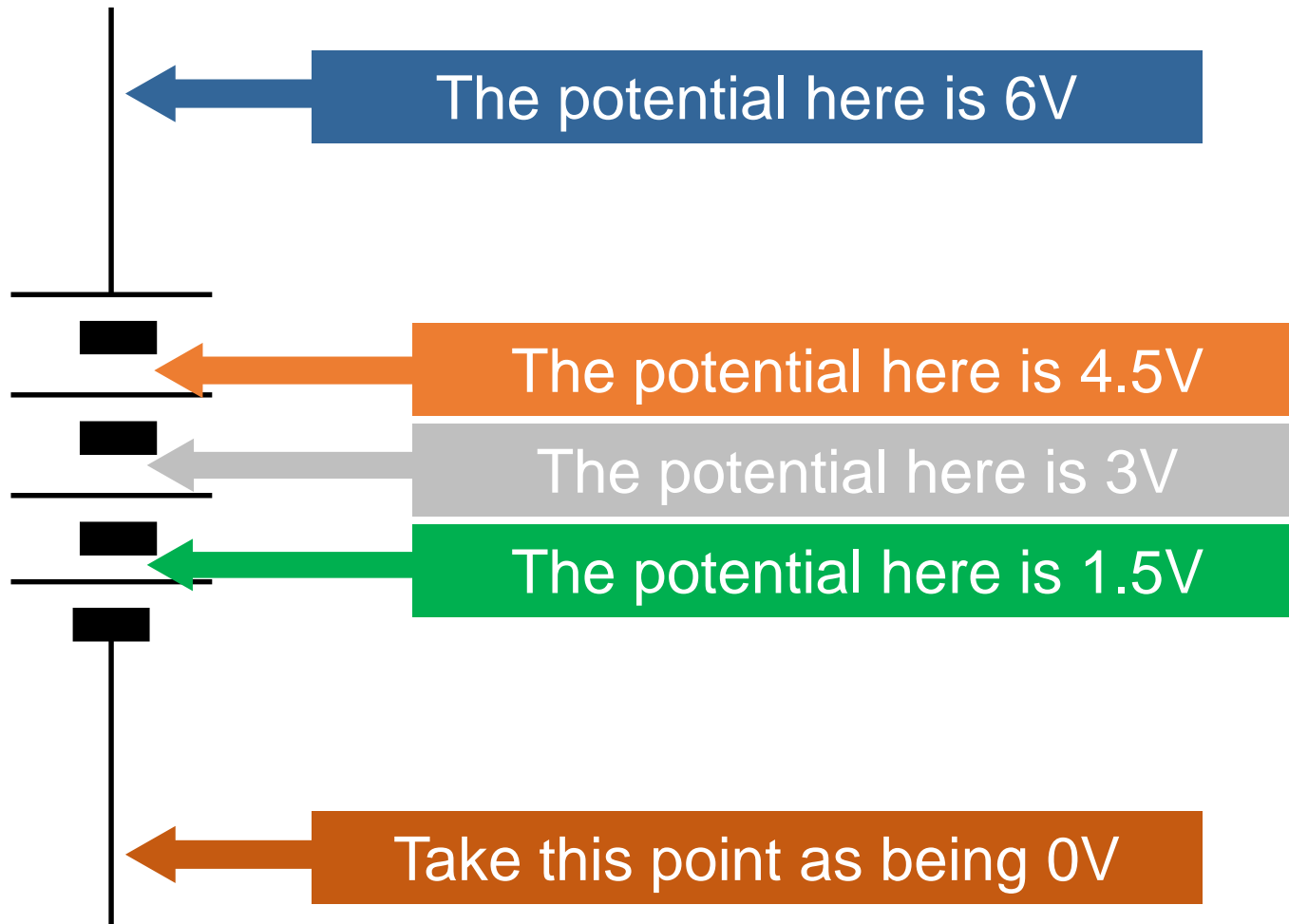
2015 EdExcel A-Level Physics
Topic 3

**Potential
Dividers**



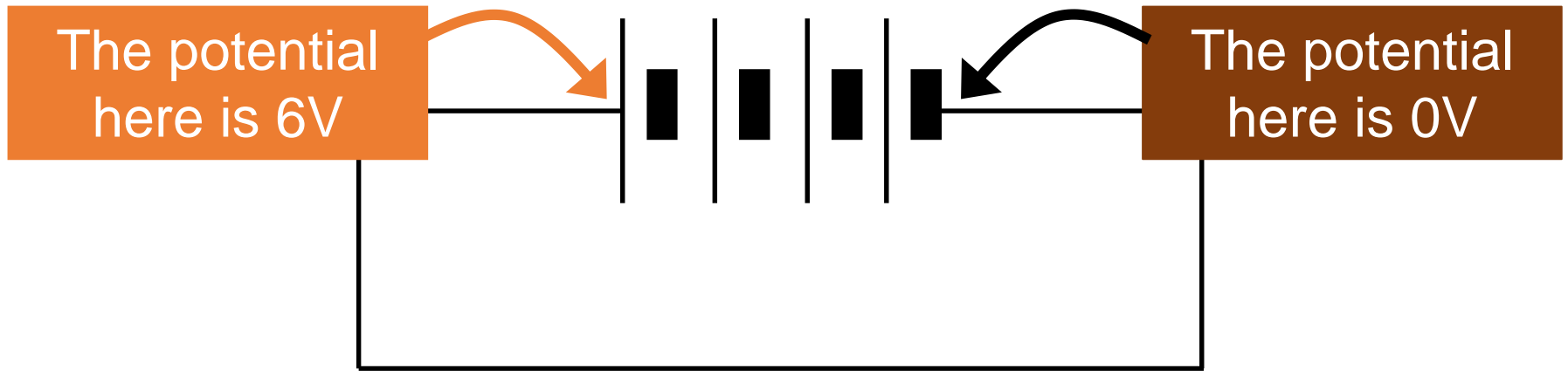
Potential at a point

Consider 4 x 1.5V batteries connected in series



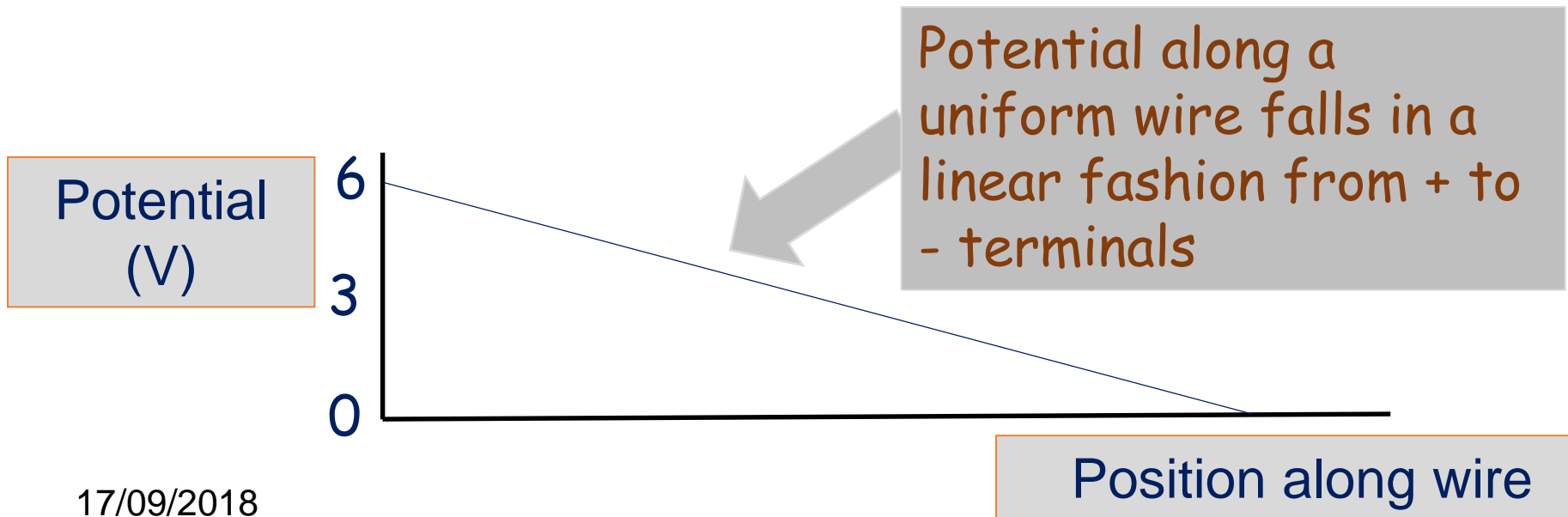
Potential at a point cont.

Now put these batteries into a circuit:



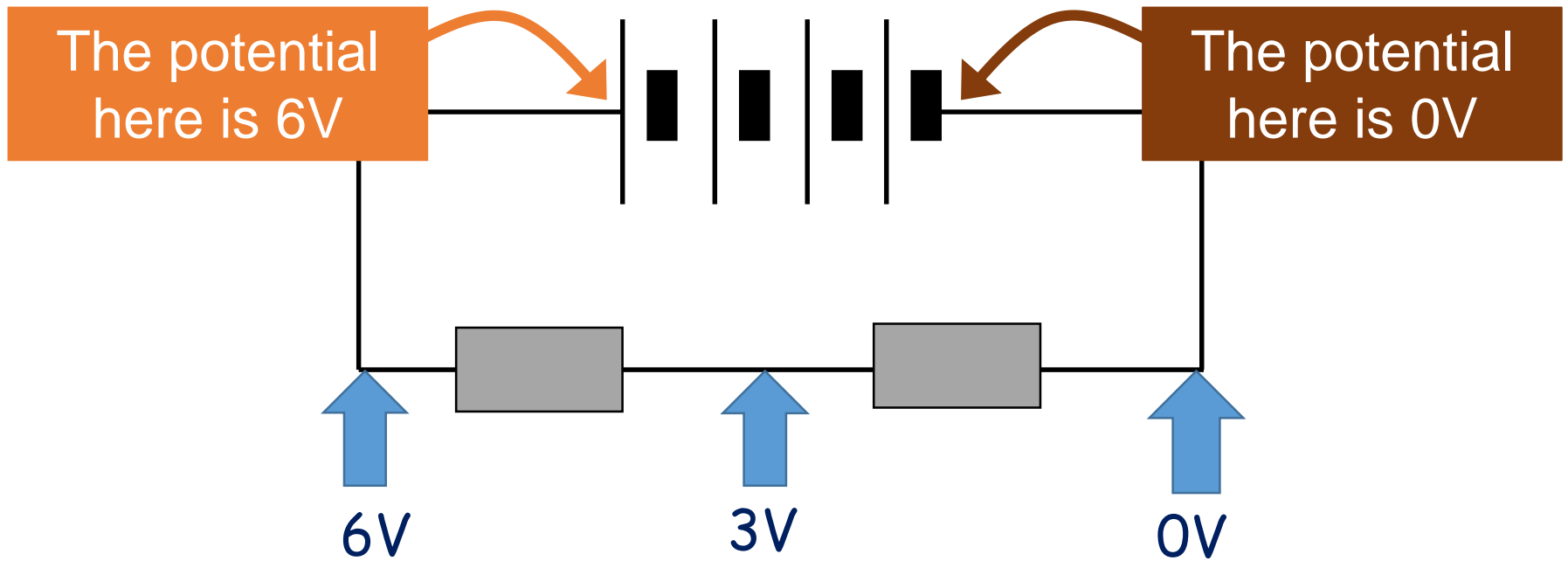
This means that, as we move around the circuit, the voltage should drop from 6V to 0V

Potential along a uniform wire.



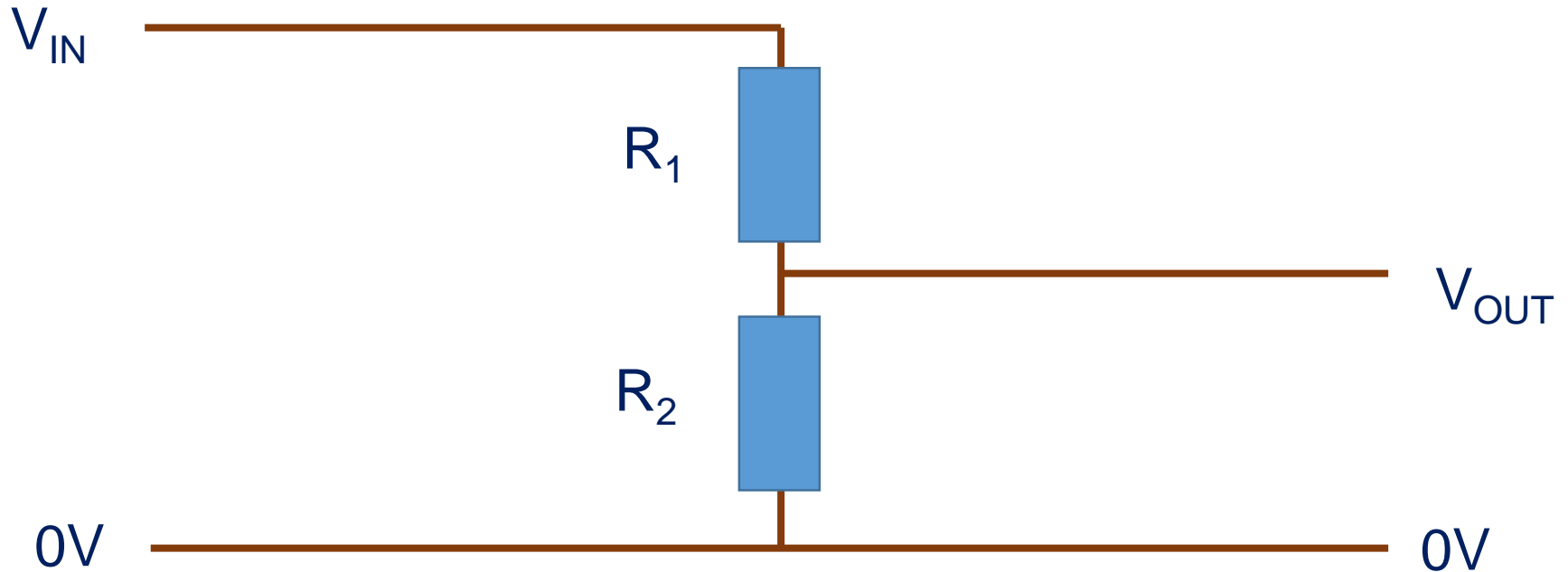
Potential at a point cont.

Now put these batteries into a circuit:



Assuming the wires have negligible resistance, and the resistors are identical, the potentials will be as shown

Potential Dividers



The Potential Divider equation:

$$V_{OUT} = V_{IN} \times \frac{(R_2)}{(R_1 + R_2)}$$

Example

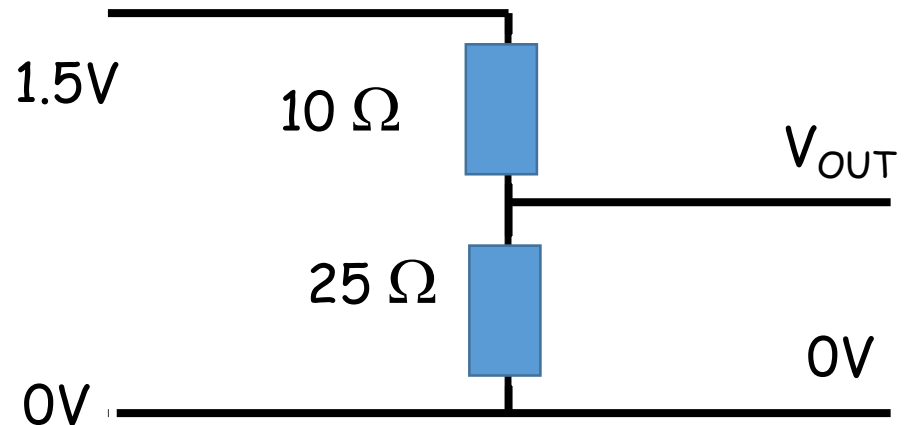
Solution:

According to potential divider equation

$$V_{OUT} = V_{IN} \times \frac{R_2}{R_1 + R_2}$$

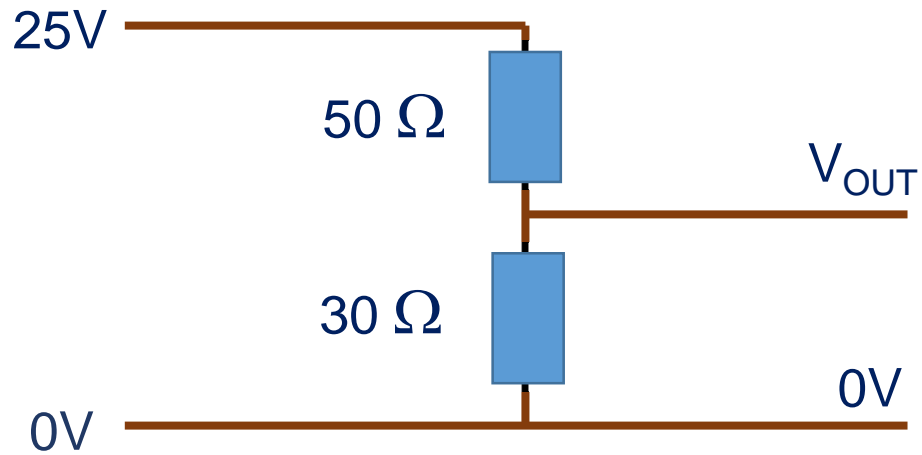
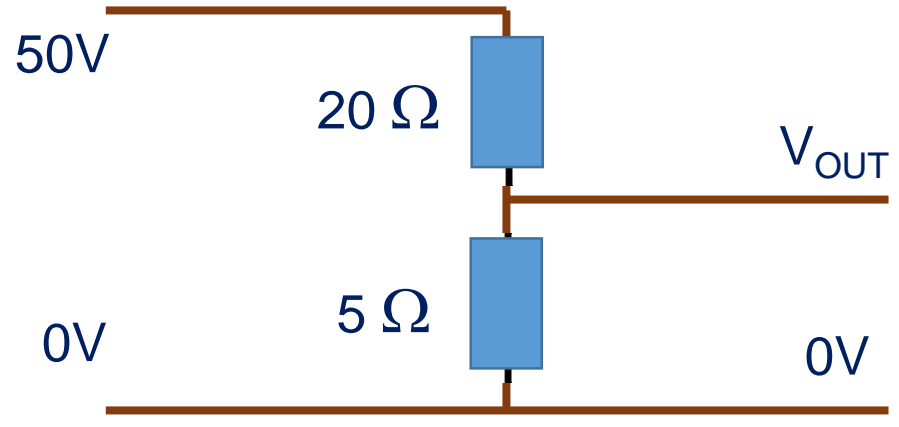
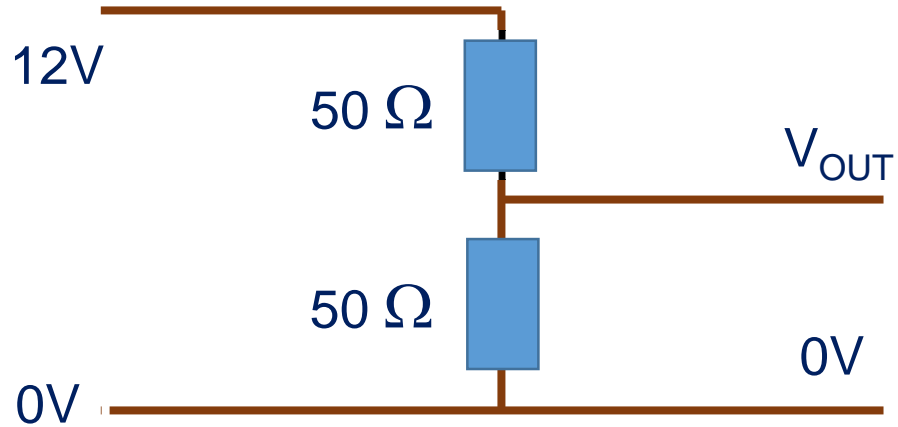
$$V_{OUT} = 1.5 \times \frac{25}{10 + 25}$$

$$V_{OUT} = 1.07V$$



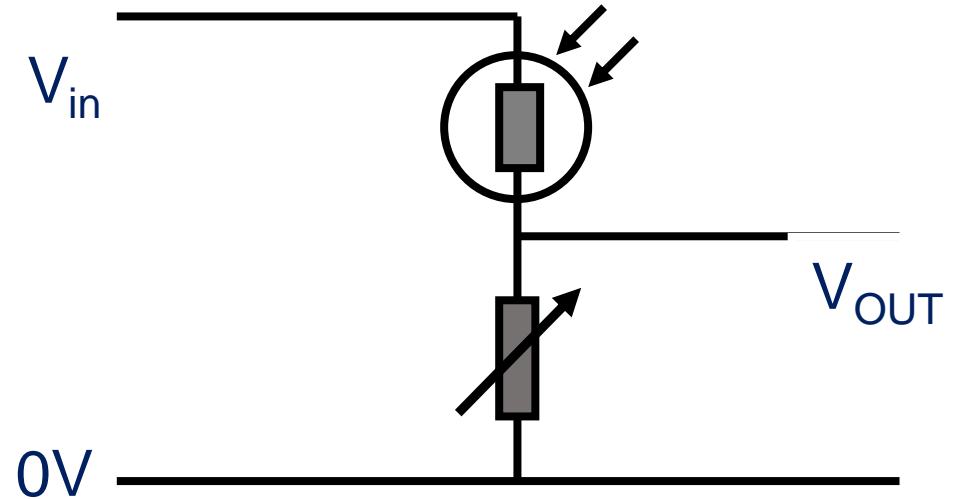
What is the output voltage (V_{out}) ?

Practice questions



Potential divider applications

This is a potential divider used to switch devices on/off when the ambient light reaches a preset level set by the variable resistor



When the light intensity on the LDR increases, its resistance will _____. This causes V_{OUT} to _____ so the output device will probably turn _____. The variable resistor can be adjusted to change the _____ of the whole device.

Words – decrease, sensitivity, increase, on