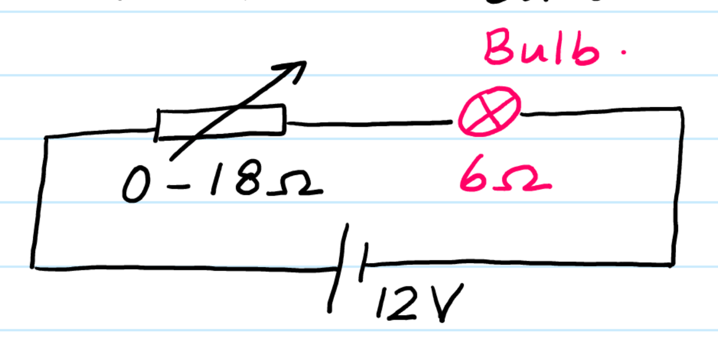
Comparision b/w a Variable Resistor Circuit & a potential divider Circuits.

① Variable Resistor Circuit

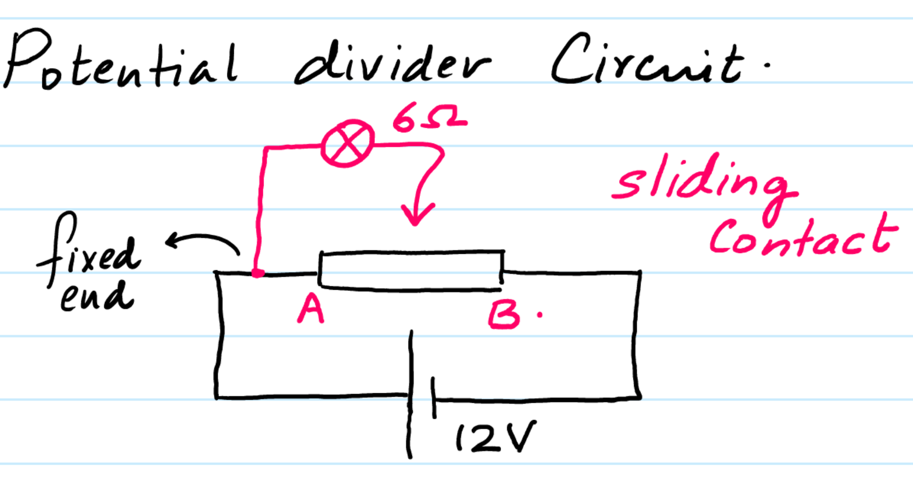


(i) Cal minimum Current in the Bulb $I = \frac{12}{18+6} = 0.5A$

(ii) Cal maximum Current in the Bulb $I = \frac{12}{0+6} = 2A$

$0.5A \leq I \leq 2A$

② Potential divider Circuit.



(i) Cal the Current in the Bulb when sliding Contact is placed at B
Bulb get 12V ; R = 6Ω.
$I = \frac{12}{6} = 2A$

(ii) Cal. the Current in the Bulb when the sliding contact is placed at A
Bulb gets 0V ; R = 6Ω.
$I = \frac{0}{6} = 0A$

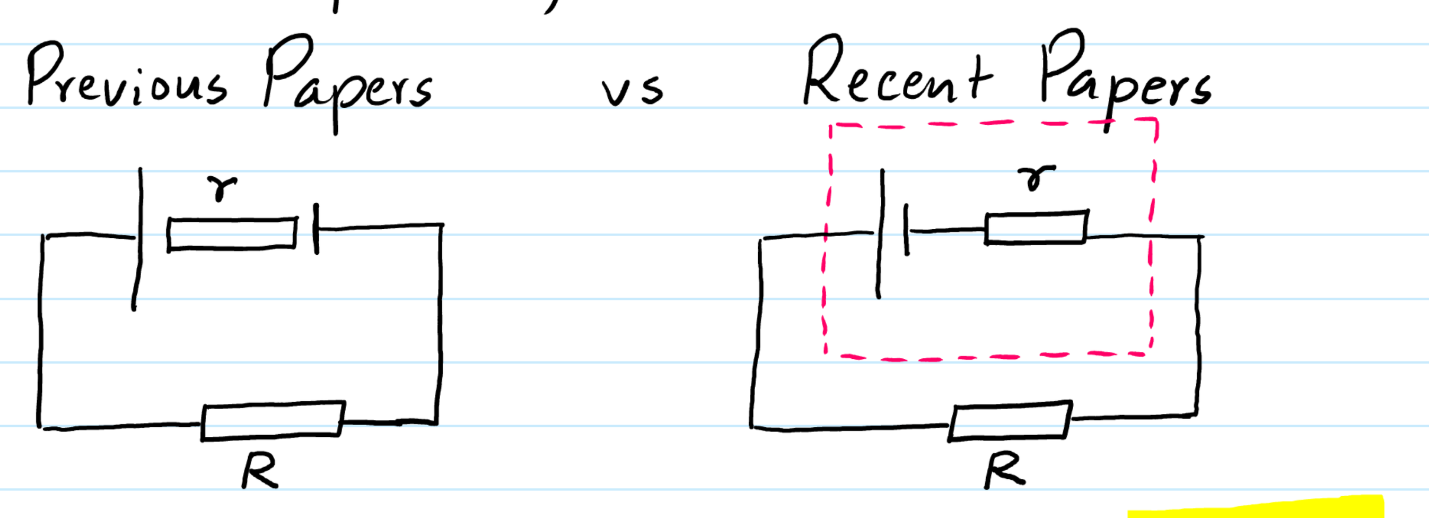
$0A \leq I \leq 2A$

Note :- Both circuits can be used to adjust the brightness of the Bulb however a potential divider circuit provides a wider range of Current i.e
bulb off
bulb dim
bulb bright } $0A \leq I \leq 2A$.

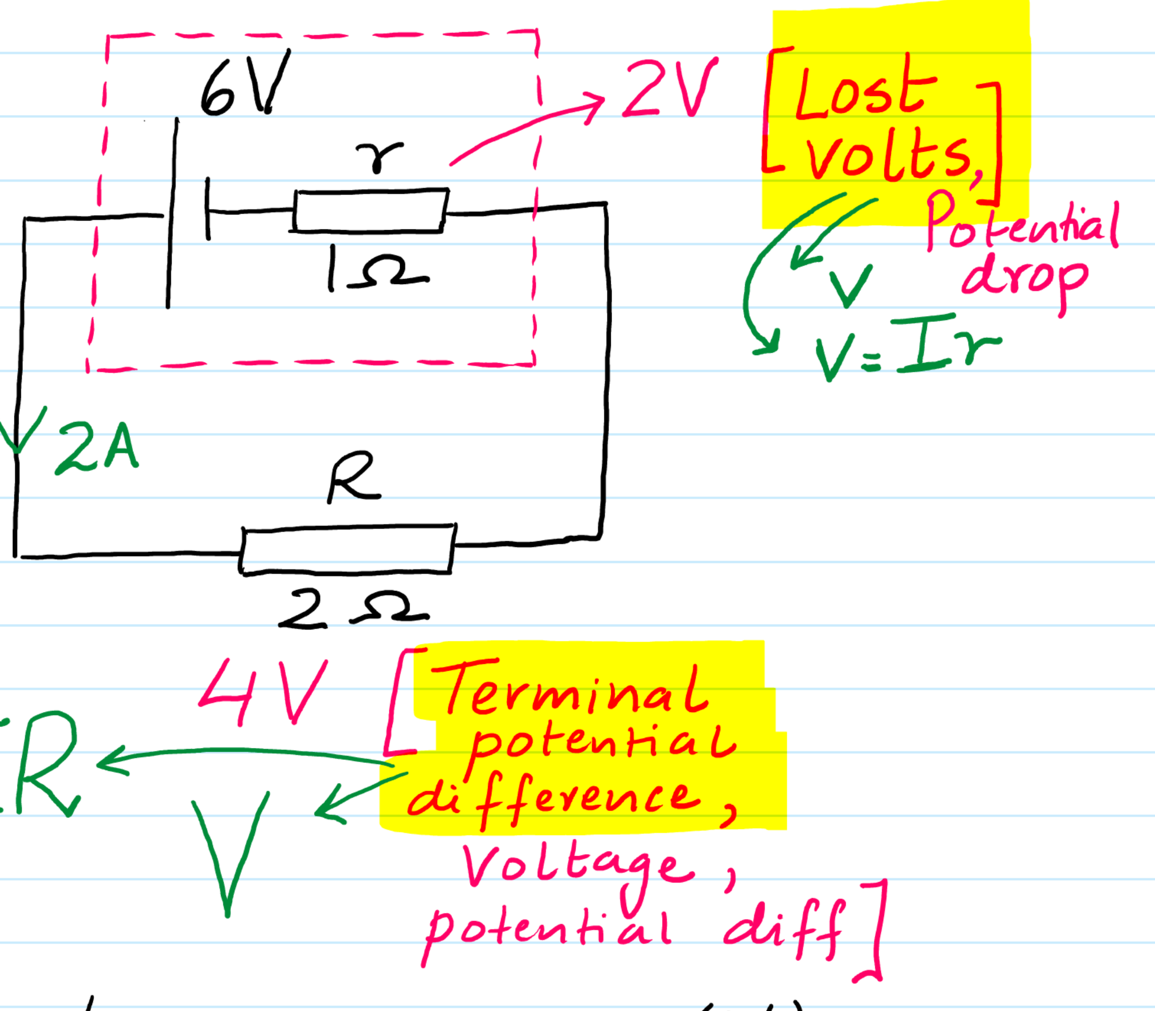
Concept of External resistor (R), internal resistance (r), Voltage (V), Potential drop (v) and Electromotive force (E) :-

- External Resistor (R) refers to any Component / appliance Connected in the circuit
- Internal resistance (r) refers to the resistance offered by the chemicals inside the battery to the flow of Current

Previous Papers vs Recent Papers



Cal. Current Supplied
$I = \frac{6}{1+2}$
$I = 2A$



Voltage / p.d / Terminal p.diff (V) is defined as the amount of Electrical Energy converted into other forms eg light, Heat etc when a unit charge flows through the external circuit. $(V = IR)$

Lost volts (v) is defined as the energy dissapated (Lost) in the form of heat when a unit charge flows through the internal resistance / internal Circuit. $(v = Ir)$

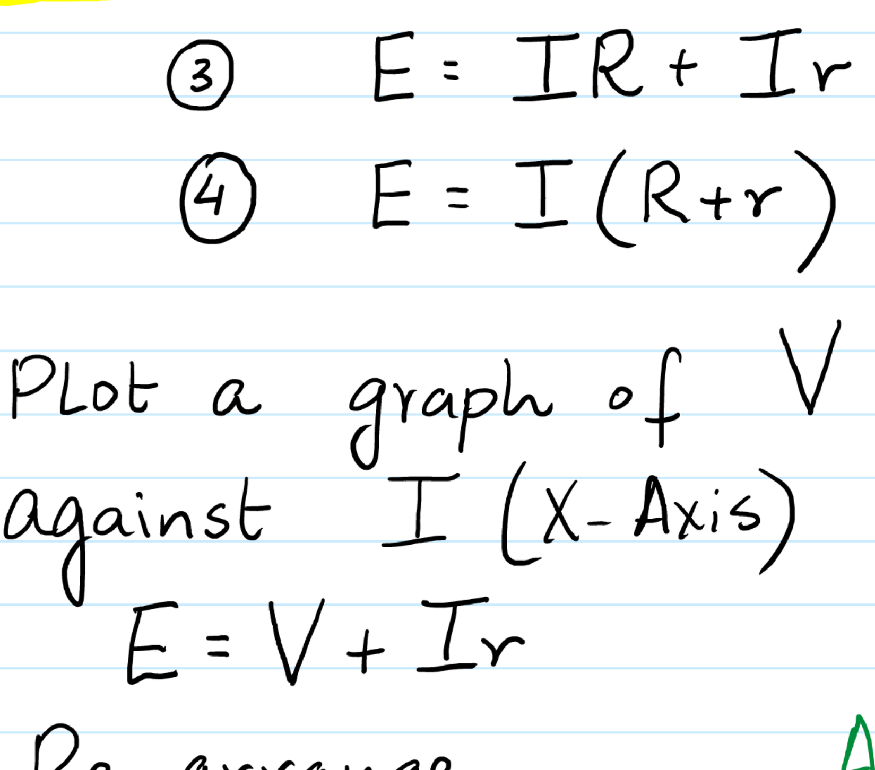
Emf (E) = It is defined as the amount of Chemical Energy Converted into Electrical forms when a unit charge flows through a complete circuit i.e (the internal & external Circuit)
$(E = V + v)$

formulas for Emf (E)

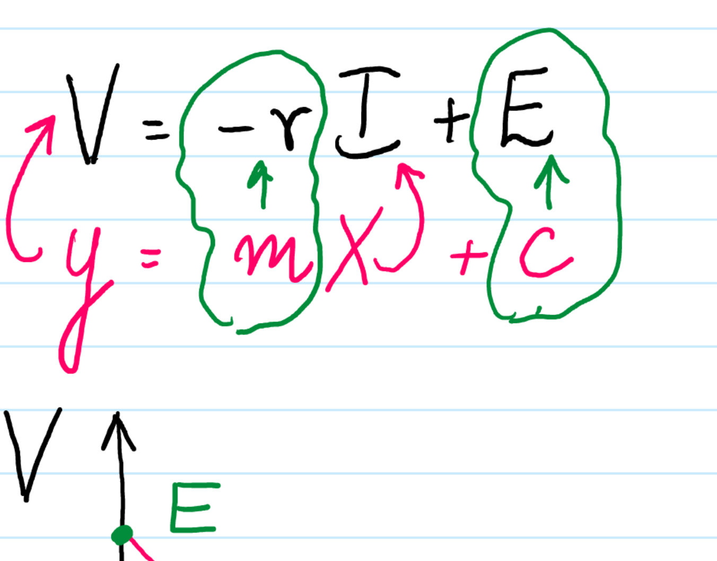
① $E = V + v$
* ② $E = V + Ir$
③ $E = IR + Ir$
④ $E = I(R + r)$

Plot a graph of V (y-Axis) against I (X-Axis)
$E = V + Ir$
Re-arrange
$V = E - Ir$
$V = (-r)I + E$
$y = (m)x + c$

A straight Line graph with a negative gradient & a positive y-intercept



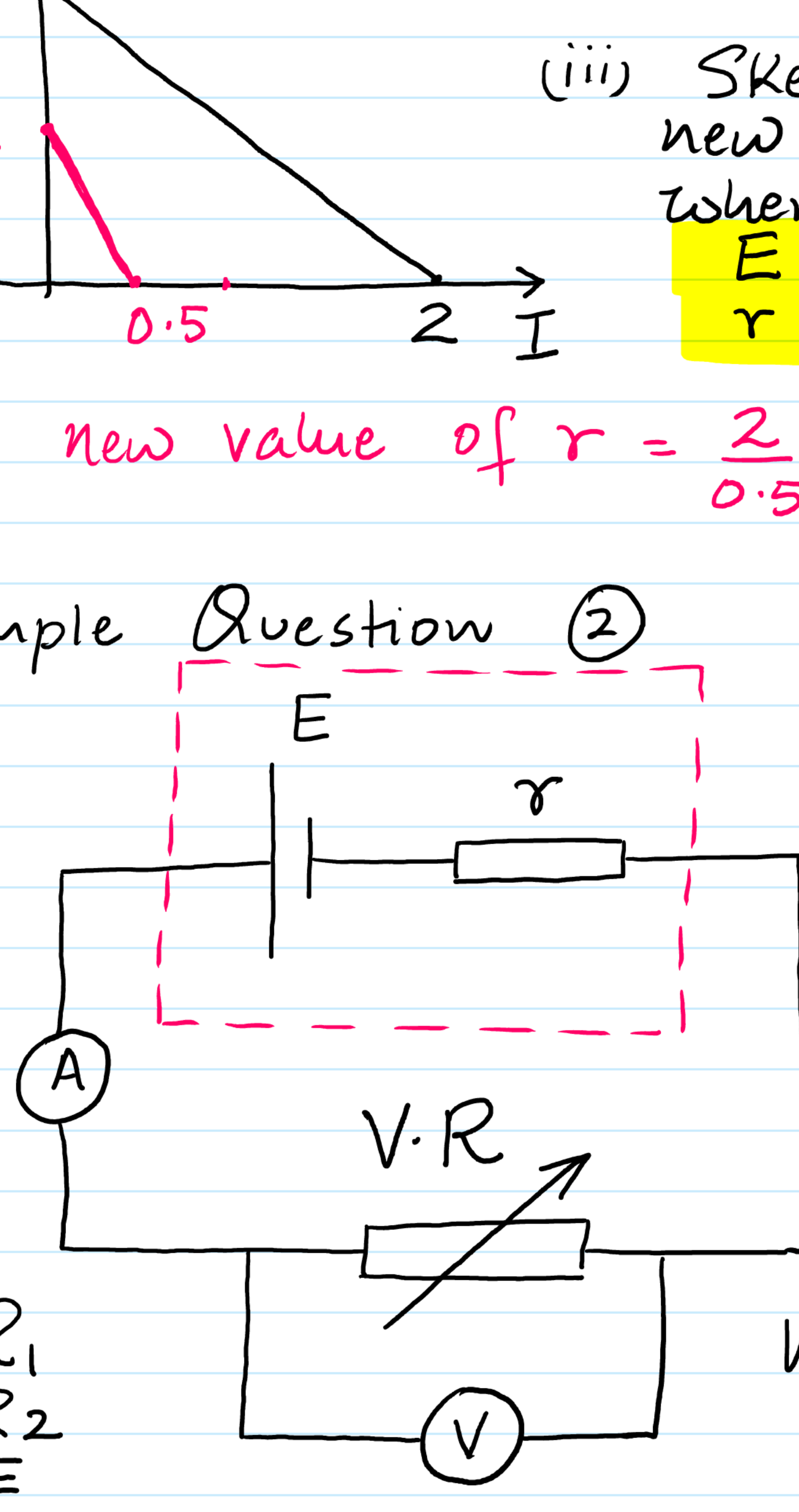
Example Question ①



Calculate
(i) E = 4V
(ii) r = 2Ω
(iii) Sketch a new graph where
E = halved
r = doubled

new value of $r = \frac{2}{0.5} = 4Ω$

Example Question ②



Q When V.R is set at R_1, voltmeter reads 1V & ammeter reads 0.25A
When V.R is set at R_2, voltmeter reads 0.9V & ammeter reads 0.3A.

Cal R_1
Cal R_2
Cal E
Cal r

(i) $R_1 = \frac{1}{0.25} = 4Ω$

(ii) $R_2 = \frac{0.9}{0.3} = 3Ω$

$E = V + Ir$
$E = 1 + 0.25r \longrightarrow ①$
$E = 0.9 + 0.3r \longrightarrow ②$
$r = 2Ω$
$E = 1.5V$