The masses of the wires of copper is in the ratio of 1 : 3 : 5 and their lengths are in the ratio of 5 : 3 : 1. The ratio of their electrical resistance is

(a) 1 : 3 : 5 (b) 5 : 3 : 1

(c) 1 : 25 : 125 (d) 125 : 15 : 1

$R_1 : R_2 : R_3 = \frac{l_1^2}{m_1} : \frac{l_2^2}{m_2} : \frac{l_3^2}{m_3}$

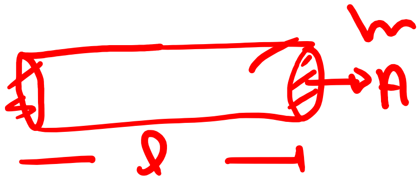
$m, 3m, 5m$

$5l, 3l, l$

$R_1 : R_2 : R_3 = \frac{25 l^2}{m} : \frac{9 l^2}{3m} : \frac{l^2}{5m}$

$= 25 : 3 : \frac{1}{5}$

$= 125 : 15 : 1$



$$\text{density} = \frac{m}{Al}$$

$$m = A \cdot l \times \text{density}$$

$$R = \frac{\rho l}{A} = \frac{\rho l^2}{Al}$$

$$= \frac{\rho l^2}{m / \text{density}}$$

$$R = \frac{\rho l^2 \, (\text{density})}{m}$$

$$\boxed{R \propto \frac{l^2}{m}}$$

$$R \propto \frac{l^2}{m}$$

A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} V m^{-1}, has a mobility in m^{2} V^{-1} s^{-1} of

(a) 2.25×10^{15}

(b) 2.5×10^{6}

(c) 2.5×10^{-6}

(d) 2.25×10^{-15}

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$v_d = 7.5 \times 10^{-4}$ m/s

$E = 3 \times 10^{-10}$ V/m

$\mu = \frac{v_d}{E} = \frac{7.5 \times 10^{-4}}{3 \times 10^{-10}}$

$= \frac{7.5 \times 10^{-4} \times 10^{10}}{3}$

$= 2.5 \times 10^{6}$ m^2/V sec

The color code of a resistance is given below

X Y Z T

The values of resistance and tolerance, respectively, are

(a) 470 kΩ, 5% (b) 47 kΩ, 10%

(c) 4.7 kΩ, 5% (d) 470 Ω, 5%

$(XY \times 10^{Z} \pm T)$

$\Rightarrow 47 \times 10^{1} \pm 5\%$

$= (470 \pm 5\%)$

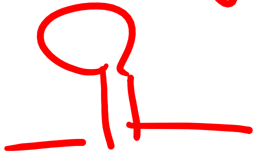
BB ROY
0 1 2 3 4
Great → 5
Boy → 6
Very → 7
Good → 8
Wide → 9
Gold → 5%
Silver → 10%
No colour 20%

An electric bulb is rated 60 W, 220 V. The resistance of its filament is

(a) 870 Ω (b) 780 Ω

(c) 708 Ω (d) 807 Ω

Rating 60W, 220V



If 220 Volt apply across the filament of bulb then bulb gives power 60 J/sec = 60 watt

$$P = \frac{V^2}{R}$$

$$R = \frac{220 \times 220}{60} = \frac{2420}{3} = 806.66 = 807\,\Omega$$

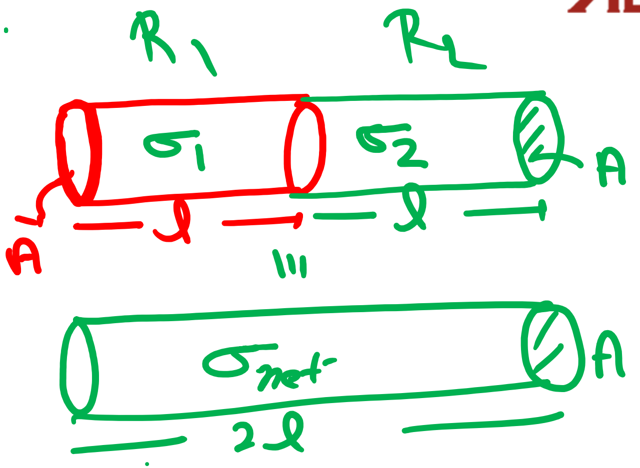
Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of the metal wires respectively, the effective conductivity of the combination is

(a) $\dfrac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

(b) $\dfrac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

(c) $\dfrac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

(d) $\dfrac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$



$R = \dfrac{\rho l}{A}$

$R = \dfrac{l}{\sigma A}$

$\rho = \dfrac{1}{\sigma}$

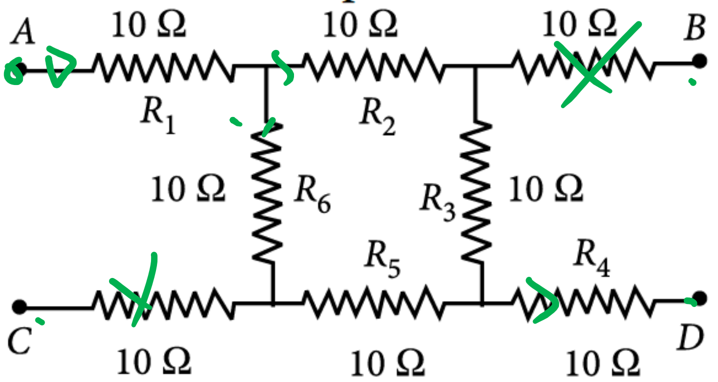
$R_{eq} = R_1 + R_2$

$\dfrac{2l}{\sigma A} = \dfrac{l}{\sigma_1 A} + \dfrac{l}{\sigma_2 A}$

$\dfrac{2}{\sigma} = \dfrac{1}{\sigma_1} + \dfrac{1}{\sigma_2}$

$\sigma = \dfrac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

What will be the equivalent resistance between the two points A and D?



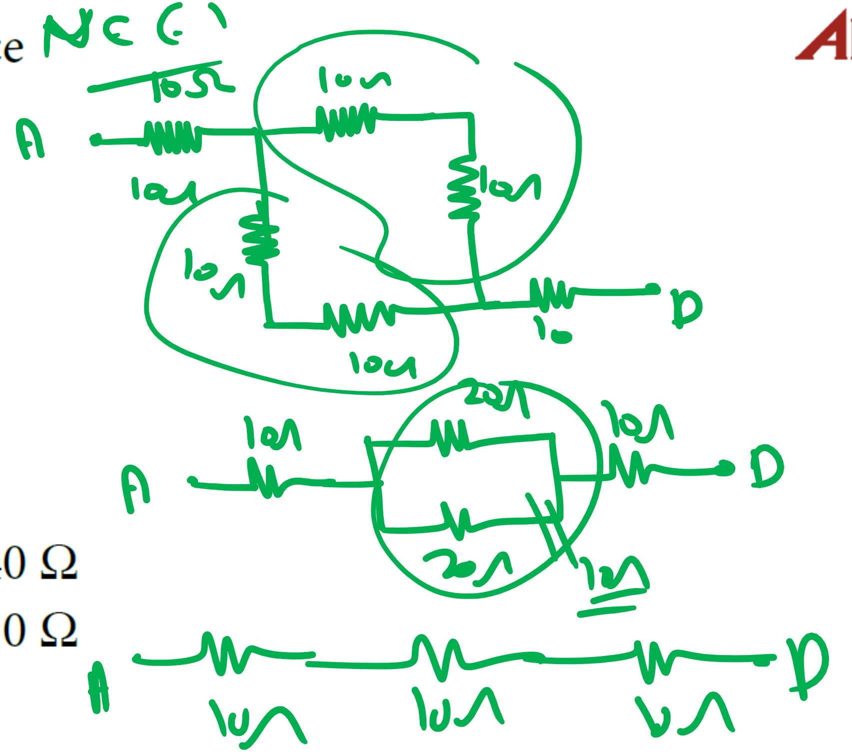
(a) 30 Ω

(b) 40 Ω

(c) 20 Ω

(d) 10 Ω

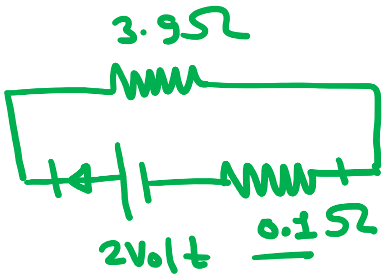
$R_{AD} = 30\Omega$



The internal resistance of a cell of e.m.f. 2 V is 0.1 Ω. It is connected to a resistance of 3.9 Ω. The voltage across the cell will be

(a) 1.95 V (b) 1.9 V

(c) 0.5 V (d) 2 V



$T.P = \varepsilon - ir$

$= 2\text{volt} - \frac{2}{4} \times 0.1$

$= 2 - \frac{1}{2} \times 0.1$

$= 2 - 0.05$

$= 1.95 \text{ Volt}$

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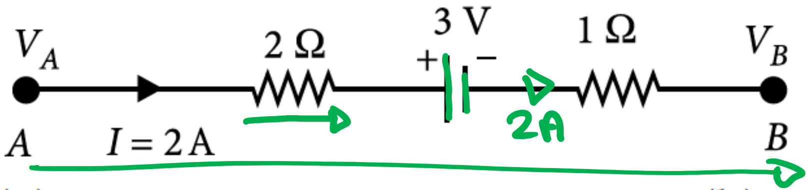
The potential difference ($V_A - V_B$) between the points A and B in the given figure is



(a) −3 V

(b) +3 V

(c) +6 V

(d) +9 V

$V_A - 2\times 2 - 3 - 2\times 1 = V_B$

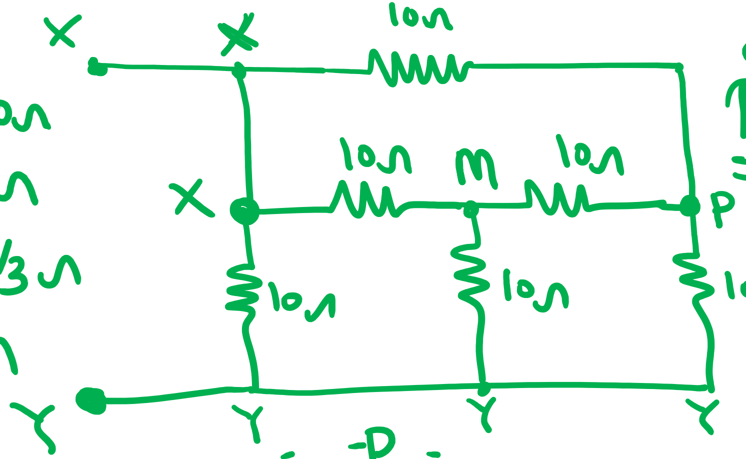
$V_A - V_B = 4 + 3 + 2$

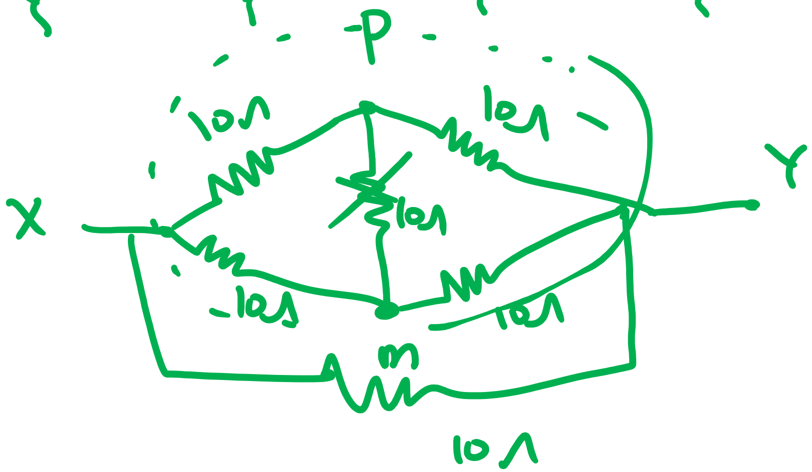
$= 9$ Volt

$V_A - V_B = 9$ Volt

Q :- find R_{AB}

(a) 20Ω
(b) 5Ω
(c) 25/3 Ω
(d) 10Ω





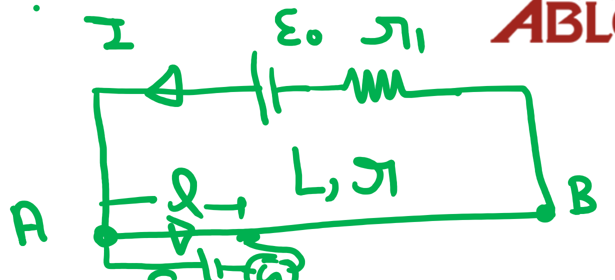
A potentiometer wire of length L and a resistance r are connected in series with a battery of e.m.f. E_0 and a resistance r_1. An unknown e.m.f. E is balanced at a length l of the potentiometer wire. The e.m.f. E will be given by

(a) $\frac{E_0 l}{L}$

(b) $\frac{L E_0 r}{(r+r_1) l}$

(c) $\frac{L E_0 r}{l r_1}$

(d) $\frac{E_0 r}{(r+r_1)} \cdot \frac{l}{L}$ ✓



$I = \frac{E_0}{(r_1+r)}$ $\quad V_A - V_B = I r$

$V_A - V_B = \left(\frac{E_0}{r_1+r}\right) r$

$x = \frac{V_{AB}}{L} = \left[\left(\frac{E_0 r}{r_1+r}\right) \times \frac{1}{L}\right]$

$E = x l$

$E = \frac{E_0 r}{(r_1+r)} \times \frac{1}{L} \times l = \frac{E_0 r l}{(r_1+r) L}$

9) Two bulbs are of (40W, 200V) & (100W, 200V). The correct relation for their resistance.

(a) $R_{40} < R_{100}$

(b) $R_{40} > R_{100}$

(c) $R_{40} = R_{100}$

(d) no relation can be predicted.

$R_{40W} = \frac{V^2}{P} = \frac{200 \times 200}{40}$

$R_{40W} = 1000\,\Omega$

$R_{100W} = \frac{200 \times 200}{100} = 400\,\Omega$

R

If specific resistance of a potentiometer wire is $10^{-7}\ \Omega$ m and current flow through it is 0.1 amp., cross-sectional area of wire is $10^{-6}\ m^2$ then potential gradient will be

(a) 10^{-2} volt/m (b) 10^{-4} volt/m

(c) 10^{-6} volt/m (d) 10^{-8} volt/m

$\rho \rightarrow 10^{-7}\ \Omega\text{-}m$

$i = 0.1$ amp

$A = 10^{-6} m^2.$

$V_A - V_B = i \times R$

$V_A - V_B = i\left(\frac{\rho l}{A}\right)$

$x = \frac{V_A - V_B}{l} = \frac{i[\rho l]}{A \times l}$

$= \frac{i\rho}{A} = \frac{0.1 \times 10^{-7}}{10^{-6}} = 0.1 \times 10^{-7} \times 10^{+6}$

$= 1 \times 10^{-2}$ Volt/m

Q1: A (100W, 200) Volt bulb is connected to a 160V supply. The power consumption would be.

Sol

(a) 100W.

(b) 125W.

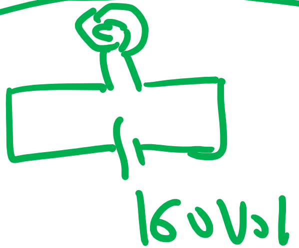
(c) 64W.

(d) 80W.

Rating से क्या find करते हैं। Resistance

$P = \frac{V^2}{R}$ $\quad R = \frac{200 \times 200}{100}$

$R = 400\,\Omega$



$P_{real} = \frac{V^2}{R} = \frac{160 \times 160}{400}$

$= 64$ watt

1	2	3	4	5	6	7	8	9	10
D	B	D	D	C	A	A	D	D	A