$\boxed{V_d = \frac{eE\tau}{m_e}}$

$\boxed{I = ne.AV_d}$

per unit volume

$\boxed{\mu = \frac{V_d}{E}}$

$\boxed{\vec{J} = \frac{I}{\vec{A}}} \Rightarrow I = \vec{J}.\vec{A}$

$\boxed{\vec{E} = \rho\vec{J}}$ $\rho = \frac{1}{\sigma}$ conductivity

E = BC

$\boxed{R = \left(\frac{m}{ne^2\tau}\right) \cdot \frac{l}{A}}$

$\Downarrow \rho$ $\boxed{\sigma = \frac{1}{\rho}}$

$\rho = \frac{m}{ne^2\tau}$, if $T\uparrow \Rightarrow \tau\downarrow$

$\Rightarrow \rho\uparrow$

$\Rightarrow R\uparrow$

$\boxed{R_{T_2} = R_{T_1}(1+\alpha\Delta T)}$

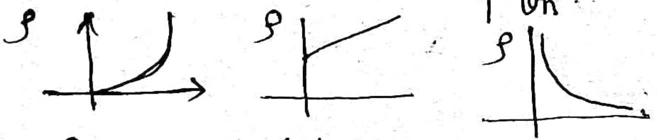
$\boxed{\rho_2 = \rho_1(1+\alpha\Delta T)}$

semiconductor

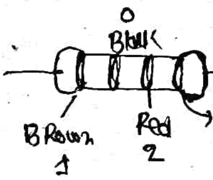
$T\uparrow \Rightarrow \rho\downarrow$

$\Rightarrow R\downarrow$

on



cu nichrome semicondctr

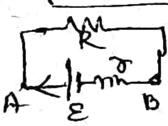


0 Black
1 Brown
R
O
Y
G — 5 %
Golden S — 10 %
Blue No col — 20 %
V
Grey
W

$\boxed{R = 10 \times 10^2 \pm 5\%}$

$\boxed{V_{AB} = \varepsilon - Ir}$, W.D by battery

$\boxed{V_{AB} = \varepsilon + Ir}$, W.D on battery (charging)



$V_{AB} = iR = \frac{\varepsilon R}{R+r}$

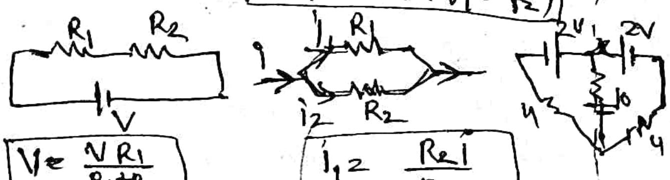
Combination of cell

D.P.

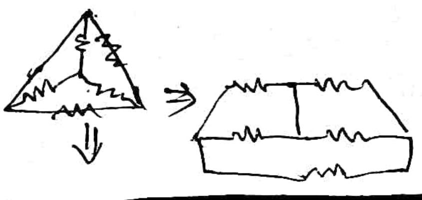
a. series: $\boxed{\varepsilon_{eq} = \varepsilon_1 + \varepsilon_2 - \varepsilon_3}$

$R_{eq} = r_1 + r_2 + r_3$

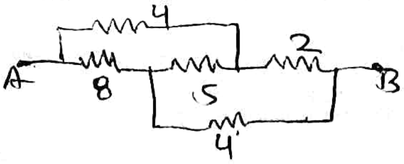
parallel: $\boxed{\varepsilon_{eq} = r_{eq}\left(\frac{\varepsilon_1}{r_1} \pm \frac{\varepsilon_2}{r_2}\right)}$,



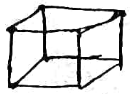
$\boxed{V = \frac{VR_1}{R_1+R_2}}$ $\boxed{i_1 = \frac{R_2 i}{R_1+R_2}}$



$\Downarrow$



cube resistors



$R_{eq} = \frac{5R}{6}$ (body diagonal)

$R_{eq} = \frac{7R}{12}$ (edge)

$R_{eq} = \frac{3R}{4}$ (face diagonal)

$\boxed{P_{av} = \frac{\int i^2R\,dt}{\int dt}}$

$\boxed{P = i^2R} = \boxed{\frac{V^2}{R}} = Vi$ (watt)

$\boxed{H = i^2Rt} = \frac{V^2}{R}t = Vit$ (Joule)

max power transfer theorem

$R_{out} = r$ (internal)

(imp) Resistance const

more P ⇒ more दीप्त

$\boxed{\frac{1}{P_{eq}} = \frac{1}{P_1} + \frac{1}{P_2}}$

G.M → A.M

(a) Ammeter

↳ connect in series

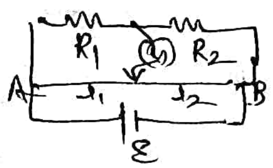
↳ आदर्श $\boxed{R=0}$

$\boxed{(i-i_g)S = i_g R_g}$

meter bridge:

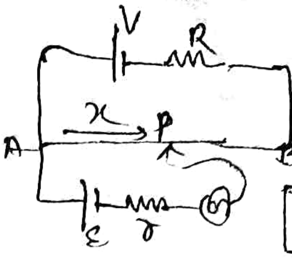
↳ Aim: $R_{unknown} = ?$

↳ Based on व्हीटस्टोन ब्रिज



$\boxed{\frac{AR_1}{\rho l_1} = \frac{R_2 A_2}{\rho l_2}}$ $R_2 = R_1\frac{l_2}{l_1}$

Potentiometer



$\boxed{K = \frac{P.d}{l}}$ V/m

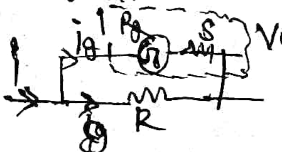
$K = \frac{V_{BA}}{l_0}$

$\boxed{\varepsilon = V_{AP} = Kx}$

$\boxed{\varepsilon_{max} = V_{AB}}$

(b) Voltmeter

↳ आदर्श → ∞



$V = i_g(R_g + S)$

KG = GA-NIBA