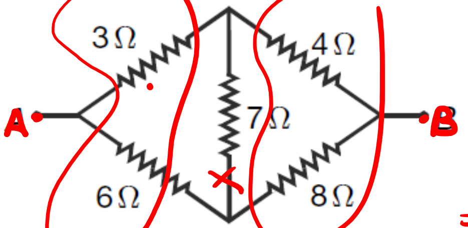
The net resistance of the circuit between A and B is

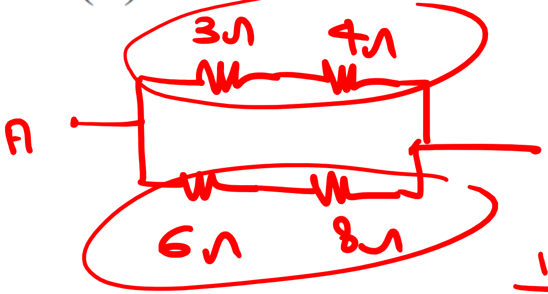


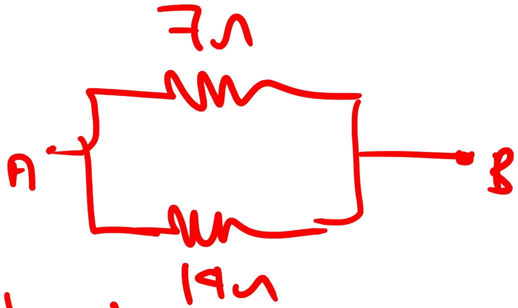
(a) 8/3Ω (b) 14/3 Ω

(c) 16/3 Ω (d) 22/3 Ω

$\frac{3}{6} = \frac{1}{2}$ $\frac{4}{8} = \frac{1}{2}$

⇒ BWSB





$R_{AB} = \frac{7 \times 14}{7 + 14}$

$= \frac{7 \times 14}{21 \times 3}$

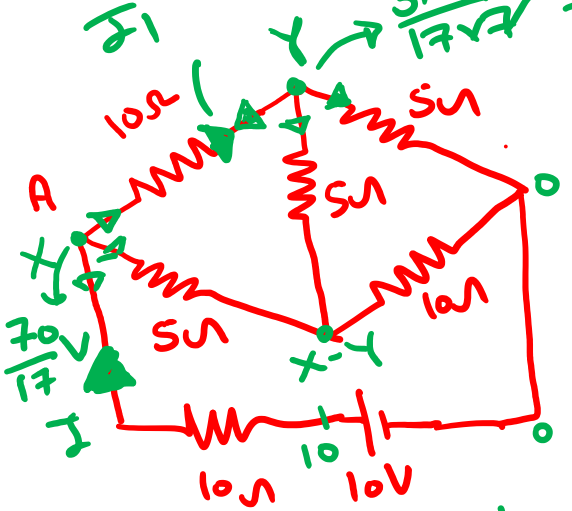
$R_{AB} =$

$\frac{1}{R_{eq}} = \frac{1}{7} + \frac{1}{14}$

$R_{eq} = \frac{14}{3} \Omega$

ABLES KOTA

NCERT Determine the current in each branch of Network shown in figure (XII)



KCL

$\sum I = 0$

$\frac{Y-x}{10} + \frac{Y-0}{5} + \frac{Y-x+Y}{5} = 0$

$y - x + 2y + 4y - 2x = 0$

$7Y = 3x$

$y = \frac{3x}{7}$

KCL

$\frac{x-Y}{10} + \frac{X-(x-Y)}{5} + \frac{x-10}{10} = 0$

$x - y + 2Y + x - 10 = 0$

$2x + y = 10$

$2x + \frac{3x}{7} = 10$

$\frac{17x}{7} = 10$

$x = \frac{70}{17}$ Volt

$I_1 = \frac{V_x - V_Y}{10}$

$\frac{10 - \frac{70}{17}}{10} = \frac{170 - 70}{170} = \frac{100}{170}$

$= \frac{10}{17}$ A

A car battery of emf 12 V and internal resistance $5 \times 10^{-2}\ \Omega$, receives a current of 60 amp, from external source, then terminal potential difference of battery is

(a) 12 V (b) 9 V

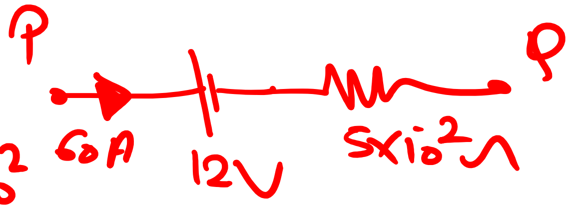
(c) 15 V (d) 20 V

emf = 12V

$r = 5 \times 10^{-2}\ \Omega$

i = 60 amp

charging of battery.



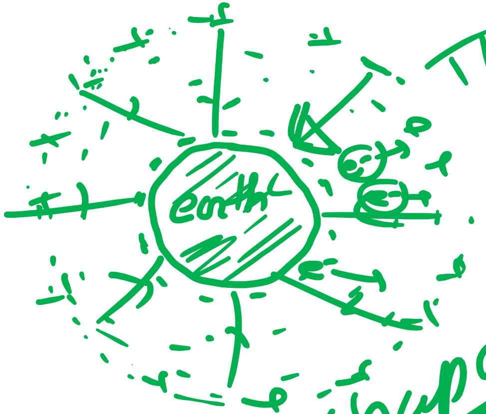
$V_P - V_Q = \varepsilon + ir$

$= 12 + 60 \times 5 \times 10^{-2}$

$= 12 + 300 \times 10^{-2}$

$= 12 + 3 = $ **15 Volt**

(14) Practical: The earth's surface has a negative surface charge density of $10^{-9}\ C/m^2$. The P.D of 400 kV b/w the top of the atmosphere & the surface results [due to the low conductivity of the lower atmosphere] in a current of only 1800 A over the entire globe.



Then

$$q = \sigma \times A = 10^{-9} \times [4\pi \times (6.37 \times 10^{6})^2]$$

$$q = 509 \times 10^{3}\ C$$

$$I = \frac{q}{t}$$

$$t = \frac{q}{I} = \frac{505 \times 10^{3}}{1800}$$

Next Chapter

For a cell terminal potential difference is 2.2 V when circuit is open and reduces to 1.8 V when cell is connected to a resistance of $R = 5\ \Omega$. Determine internal resistance of cell (r)

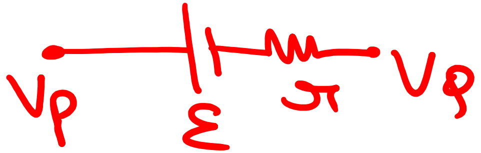
(a) $10/9\ \Omega$ ✓

(b) $9/10\ \Omega$

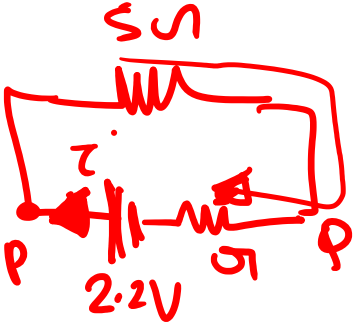
(c) $11/9\ \Omega$

(d) $5/9\ \Omega$

$r = \frac{2}{1.8} = \frac{20}{18} = \frac{10}{9}$



$V_P - V_Q = \varepsilon = 2.2V$



$V_P - V_Q = 1.8V$

$\varepsilon - ir = 1.8V$

$2.2 - \left(\frac{2.2}{5+r}\right)r = 1.8V$

$i = \frac{2.2}{5+r}$

$2.2 - 1.8 = \frac{2.2r}{5+r}$

$.4 = \frac{2.2r}{5+r}$

$\Rightarrow 2 + 0.4r = 2.2r$

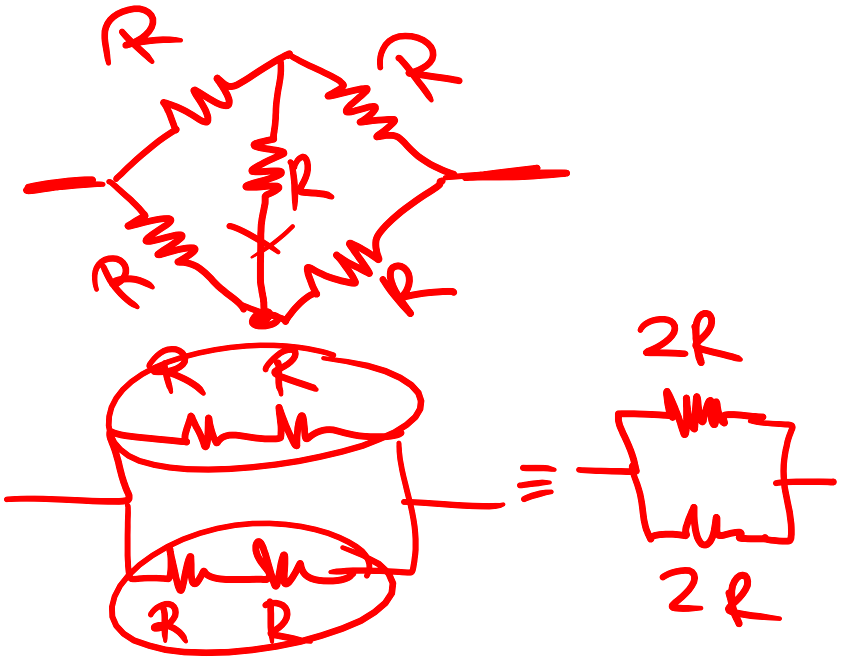
$2 = 1.8r$

In a Wheatstone's bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is

(a) $R/4$ (b) $R/2$

(c) R (d) $2R$

$R_{eq} = R$



$$\frac{1}{R_{eq}} = \frac{1}{2R} + \frac{1}{2R}$$

$$\frac{1}{R_{eq}} = \frac{1+1}{2R}$$

$$\frac{1}{R_{eq}} = \frac{2}{2R}$$

Ohm's law is not obeyed by

(a) electrolytes

(b) discharge tube

(c) vacuum tubes

(d) all of these

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Kirchhoff's I and II laws are based on conservation of

(a) energy and charge

(b) charge and energy

(c) mass and charge

(d) none of these

I Conservation of charge.

II Energy Conservation

Resistance n, each of r ohm, when connected in parallel give an equivalent resistance of R ohm. if these resistances were connected in series, the combination would have a resistance in ohms, equal to

(a) n^2R
(b) R/n^2
(c) R/n
(d) nR

[NEET]

$R_{eq} = \frac{r}{n}$

$\frac{r}{n} = R$

$r = nR$

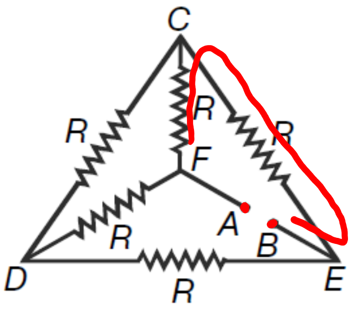
$R_{eq} = nr$

$= n[nR] = n^2R$

Five equal resistances each of resistance R are connected as shown in the figure. A battery of V volts is connected between A and B. The current flowing in $AFCEB$ will be

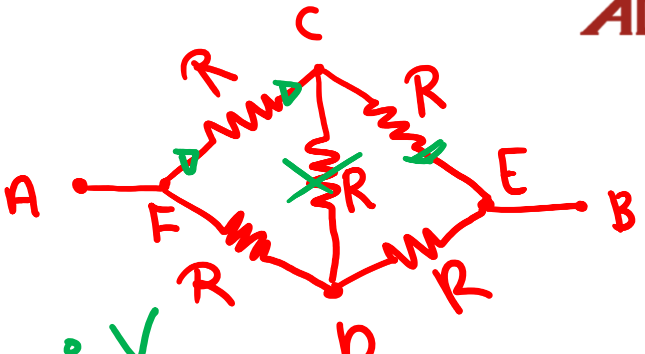
(a) $\frac{3V}{R}$

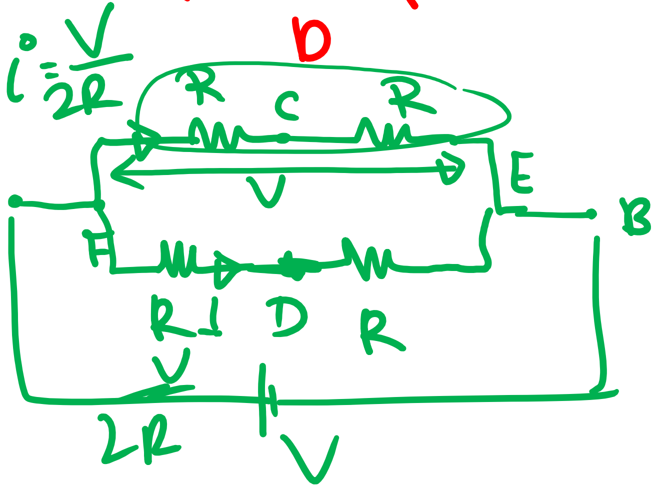
(b) $\frac{V}{R}$



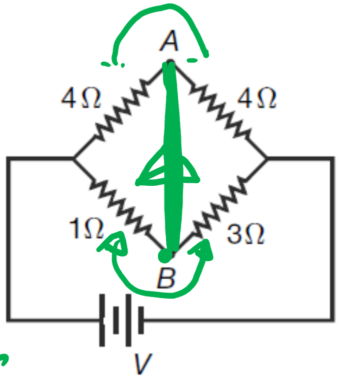
(c) $\frac{V}{2R}$

(d) $\frac{2V}{R}$





In the circuit shown, if a conducting wire is connected between points A and B, current in this wire will



(a) flow from B to A. ✓

(b) flow from A to B.

(c) flow in the direction which will be decided by the value of V.

(d) be zero.

[Yaad Kro]

$4:4 = 1$

JEE (Mains)

$1:3 = 0.33$

$V_B > V_A$

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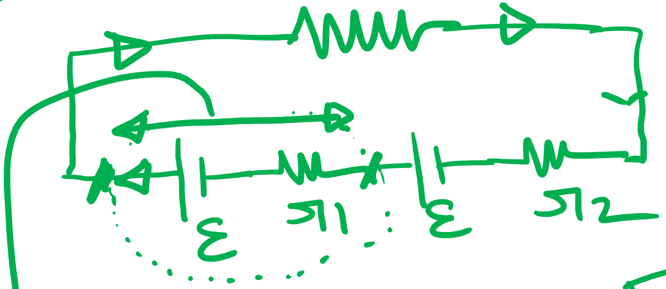
Two cells, having the same e.m.f. are connected in series through an external resistance R. Cells have internal resistances r_1 and r_2 $(r_1 > r_2)$ respectively. When the circuit is closed, the potential difference across the first cell is zero. The value of R is

(a) $r_1 + r_2$ (b) $r_1 - r_2$

(c) $\frac{r_1 + r_2}{2}$ (d) $\frac{r_1 - r_2}{2}$

[good] good A

$r_1 > r_2$



$$i = \frac{2\varepsilon}{R + r_1 + r_2}$$

P.D $\Rightarrow$ $\varepsilon - i r_1 = 0$

$$\varepsilon - \frac{2\varepsilon}{(R + r_1 + r_2)} \times r_1 = 0$$

$R = r_1 - r_2$

$$\varepsilon = \frac{2\varepsilon}{R + r_1 + r_2} \times r_1$$

$R + r_1 + r_2 = 2r_1$

$R = 2r_1 - r_1 - r_2$

$r_1 - r_2$

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