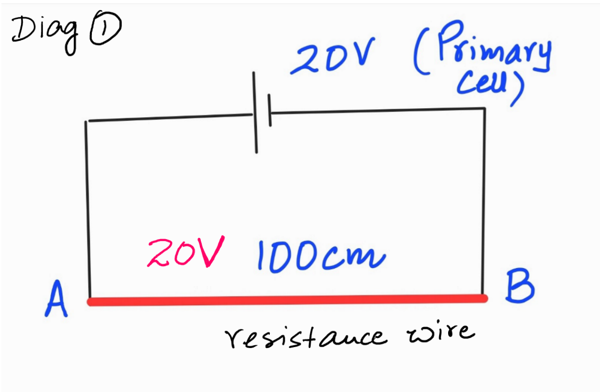
Potentiometer

09 March 2021 16:51

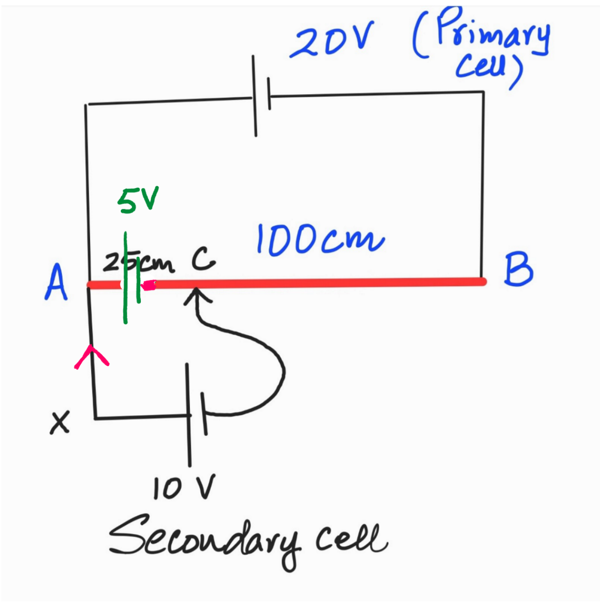
Slide ②



★ Diag ① shows a resistance wire AB which is connected to a 20V battery (Primary cell). Length of wire AB = 100cm. Connecting wires have zero Resistance.

Q:: How much Voltage will be available for this resistance wire AB

Ans = 20V (the entire voltage)



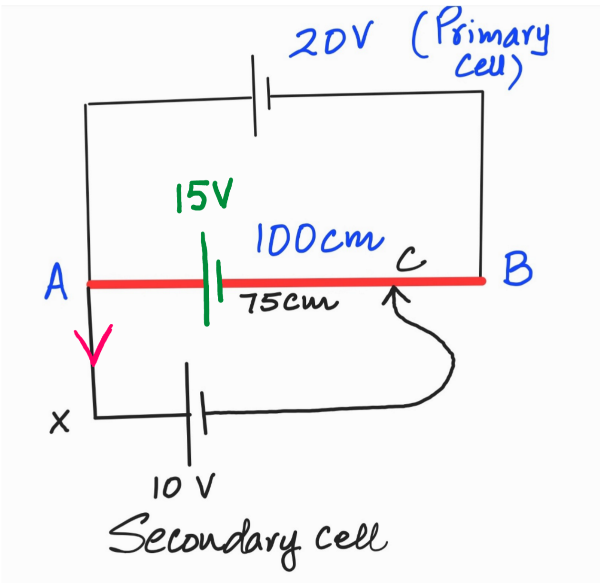
Q :: How much Voltage is available for wire AC ?

AC $\frac{1}{4}$th of AB so

Voltage across AC = **5V**

Q for the shaded portion of the diagram suggest with a reason, should the Current flow from A to X or X to A

Ans. Current flows from a higher potential to a lower potential ∴ it flows from X to A

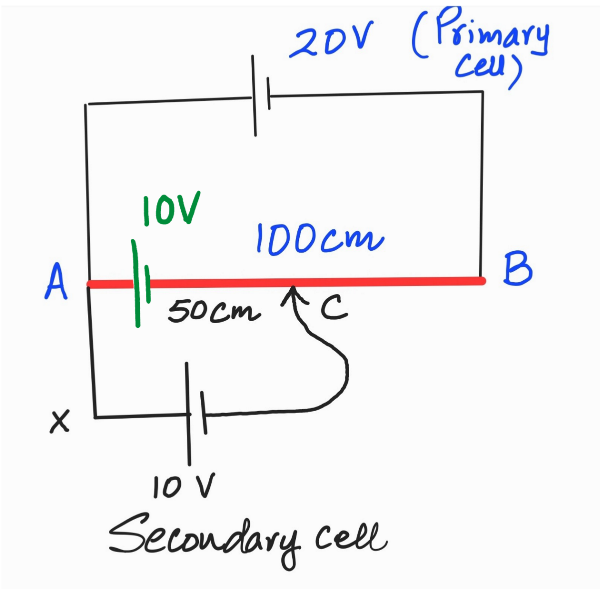


Q :: How much voltage is available across wire of Length AC where AC = 75cm

AC = $\frac{3}{4}$ AB ∴ Voltage across AC = 15V

Hence determine the direction of Current in the branch AX ?

direction of Current A to X



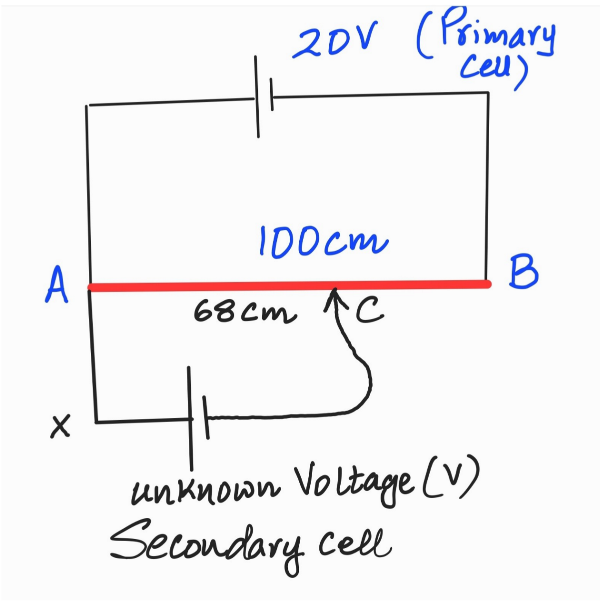
Q:: What voltage is available for Length AC of the wire AC = $\frac{1}{2}$ AB hence Voltage across AC = 10V

Hence determine the direction of Current in the branch AX

Ans :- Null deflection / Zero deflection / Zero Current / Current won't flow.

Why :- Voltage across AC is equal to the voltage of the Secondary cell.

Conclusion :: for Zero current / Null deflection to be observed, across the voltage Length AC of the wire = Voltage of the Secondary cell.



Q Given that a null deflection / Zero Current / Balance pt is achieved for Length AC = 68 cm. Use this info. to calculate the unknown Voltage (V) of the Secondary cell.

$$V = \frac{68}{100} \times 20 = 13.6V$$

General formula

P.C = Primary Cell.

$$V = \frac{l_{AC}}{l_{AB}} \times V_{P.C}$$ or $$V = \frac{R_{AC}}{R_{AB}} \times V_{P.C}$$

$R = \rho \frac{L}{A}$ ∴ $R \propto L$