
समस्त बिहार, भरेगा हुंकार
HUNKAR
2025
में आपका स्वागत हैं

HUNKAR 2025

VIDYAKUL

PHYSICS

JP UJALA Sir

VIDYAKUL

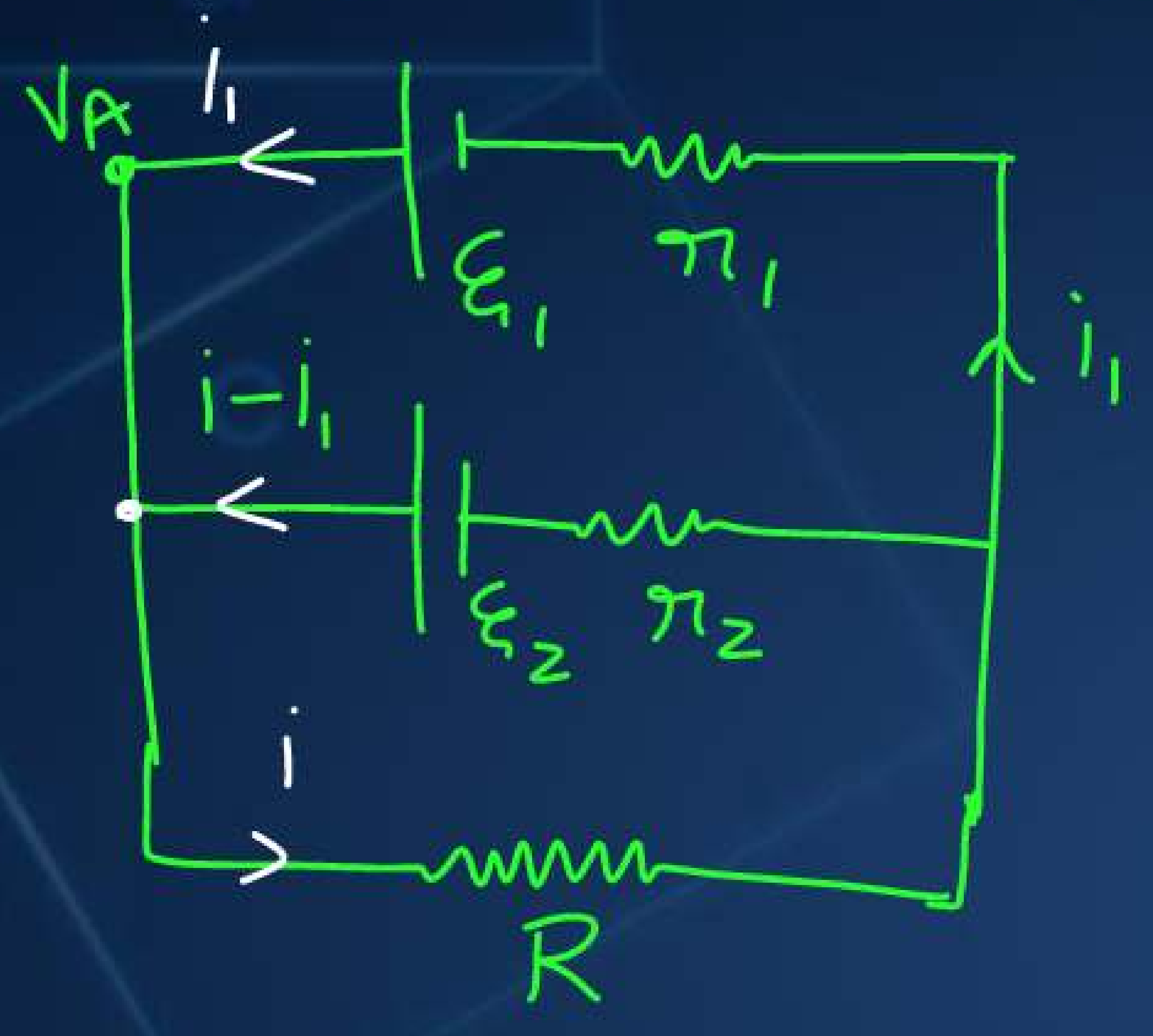
अध्याय 03

Problems on combination of cells.

आज का टॉपिक

PARALLEL COMBINATION OF CELLS

सेलों का समानान्तर क्रम समूहन (अनादर्श सेल)



$$\cancel{V_A} - iR - i_1 r_1 + \varepsilon_1 = \cancel{V_A}$$

$$\varepsilon_1 = iR + i_1 r_1 \quad - \text{(1)}$$

$$\cancel{V_A} - iR - (i - i_1) r_2 + \varepsilon_2 = \cancel{V_A}$$

$$\varepsilon_2 = iR + i r_2 - i_1 r_2 \quad - \text{(ii)} \quad \times r_1$$

$$\varepsilon_1 = iR + i_1 r_1 \quad - - \text{(i)} \quad \times r_2$$

$$\varepsilon_2 r_1 = iRr_1 + i r_2 r_1 - \cancel{i_1 r_2 r_1}$$

$$\varepsilon_1 r_2 = iRr_2 + \cancel{i_1 r_1 r_2}$$

$$\varepsilon_2 r_1 + \varepsilon_1 r_2 = iR(r_1 + r_2) + i r_2 r_1$$

$$\frac{\varepsilon_2 r_1 + \varepsilon_1 r_2}{R(r_1+r_2) + r_1 r_2} = i$$

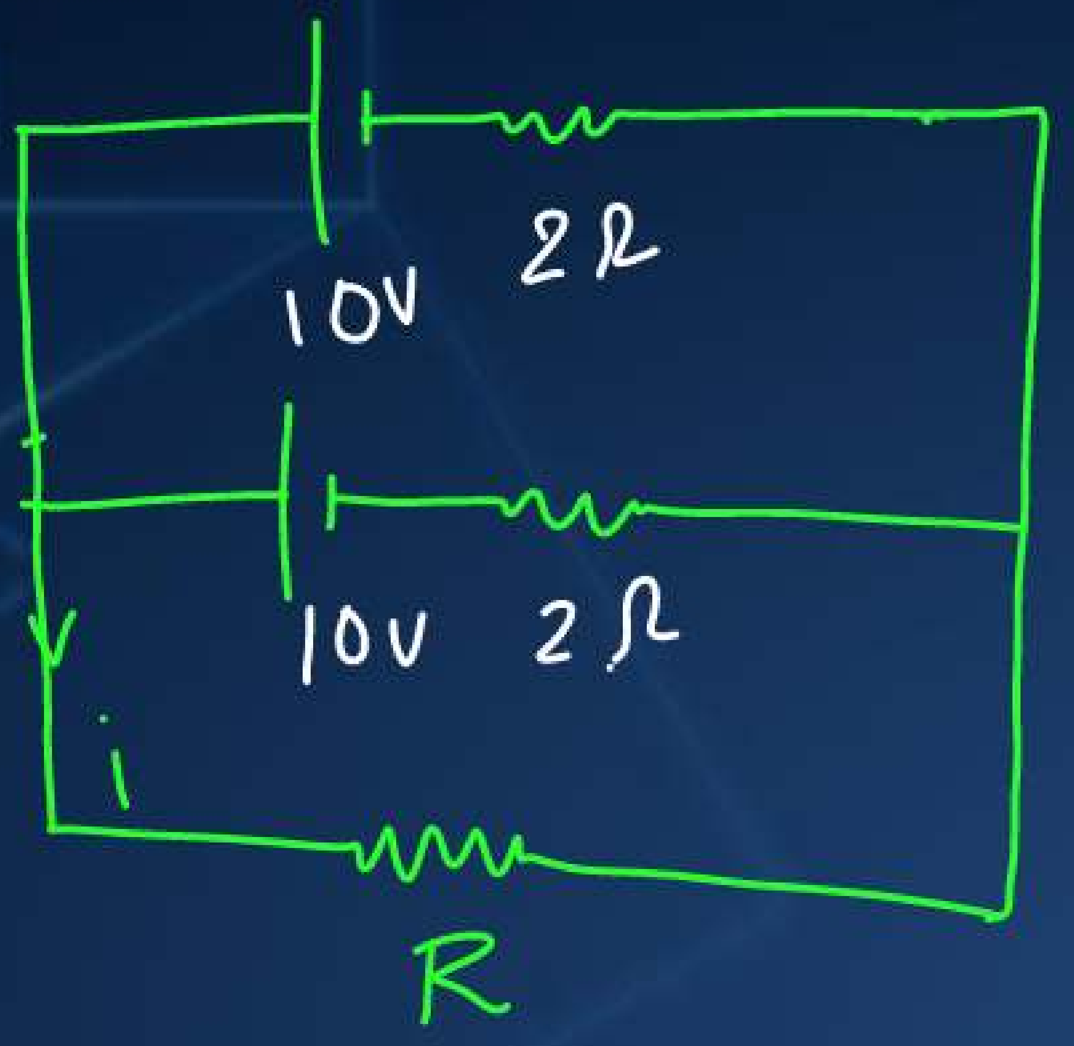
$$\frac{\left(\frac{\varepsilon_2 r_1 + \varepsilon_1 r_2}{(r_1 + r_2)}\right)}{\frac{R(r_1+r_2) + r_1 r_2}{(r_1+r_2)}} = i$$

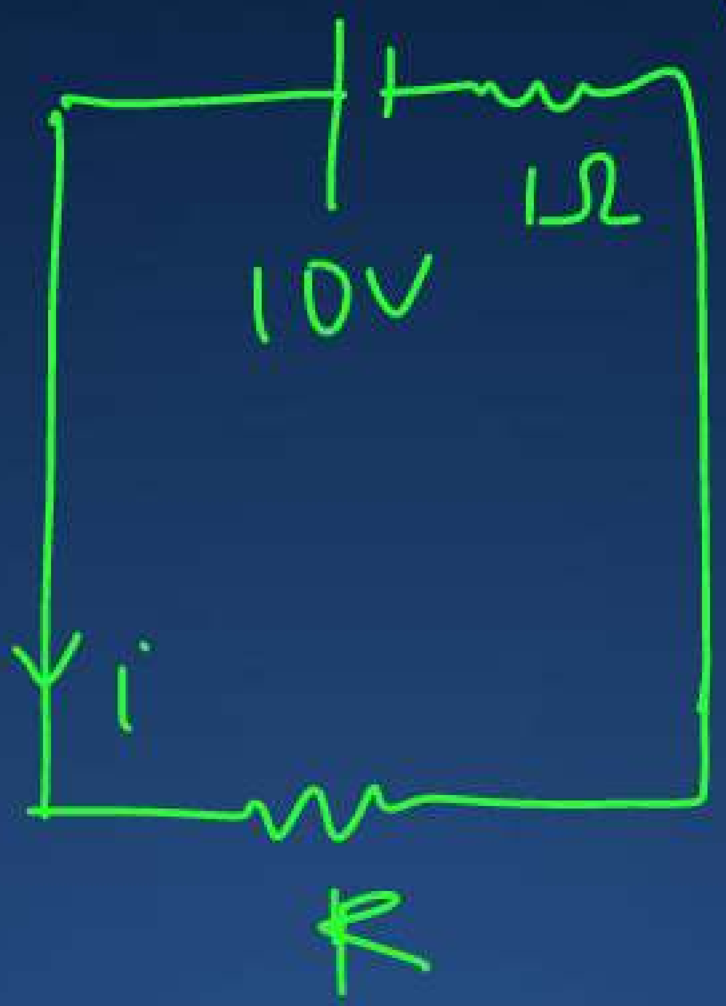
$$\frac{\left(\frac{\varepsilon_2 r_1 + \varepsilon_1 r_2}{r_1 + r_2}\right)}{R + \left(\frac{r_1 r_2}{r_1 + r_2}\right)} = i$$

$$\varepsilon_{eq} = \frac{\varepsilon_1 r_2 + \varepsilon_2 r_1}{r_1 + r_2}$$

$$r_{eq} = \frac{r_1 r_2}{r_1 + r_2}$$

⊛ Example





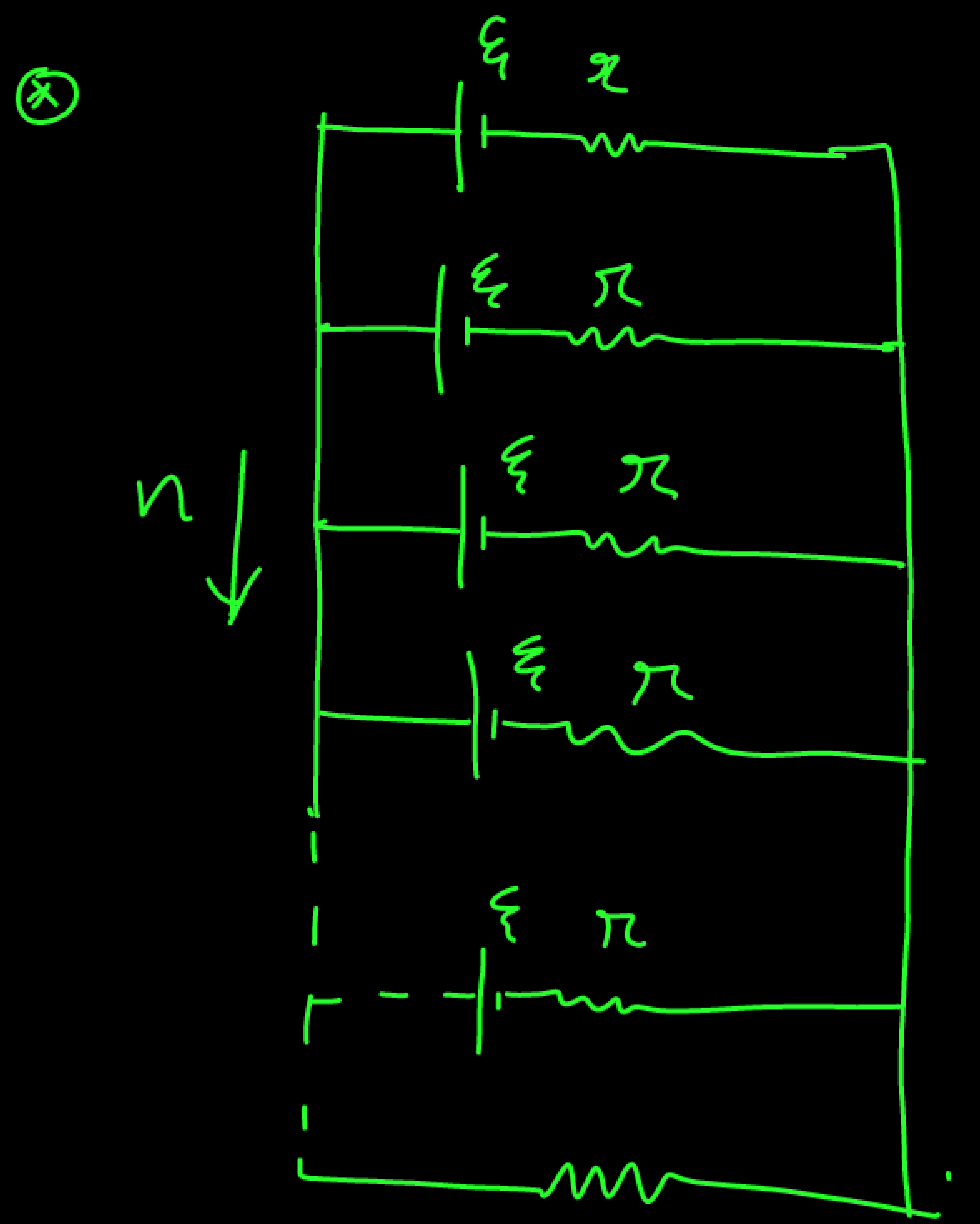
⊛ $\varepsilon_{eq} = \dfrac{10\times 2 + 10\times 2}{4}$

$= \dfrac{\cancel{40}}{\cancel{4}} = 10\,V$

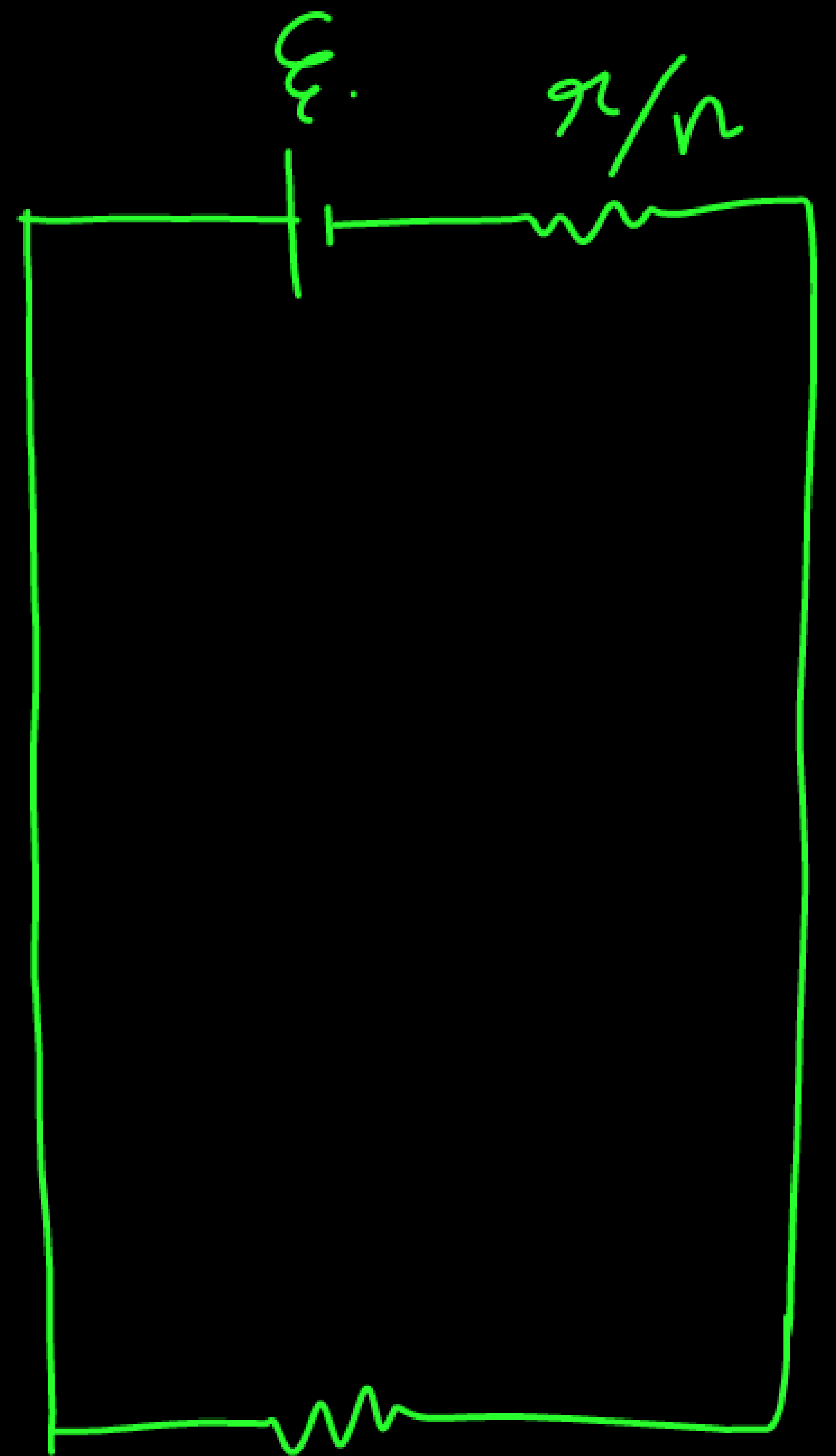
$r_{eq} = \dfrac{2\times 2}{2+2} = 1\,\Omega$

$$\varepsilon_{eq} = \frac{\varepsilon_2 r_1 + \varepsilon_1 r_2}{r_1 + r_2} = \frac{\varepsilon r + \varepsilon r}{2r} = \frac{2\varepsilon \cancel{r}}{2\cancel{r}} = \varepsilon.$$

$$r_{eq} = \frac{r_1 r_2}{r_1 + r_2}$$



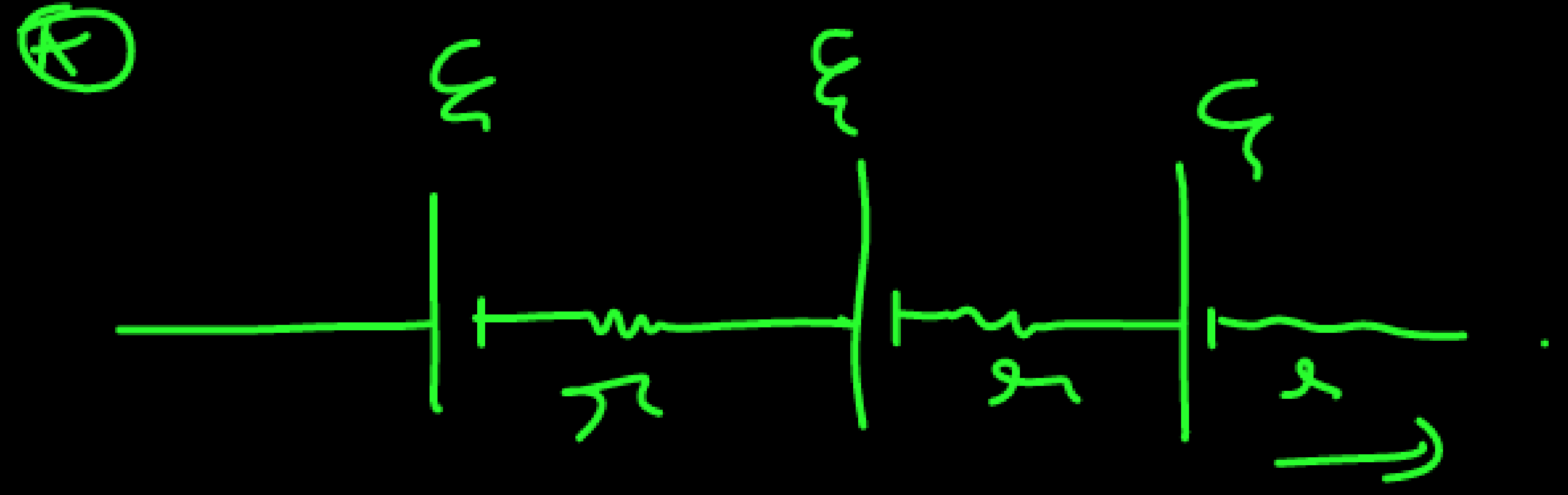
$\rightarrow$



$$\frac{1}{r_e} = \frac{1}{r} + \frac{1}{r} + \frac{1}{r} - - - \frac{1}{r}$$

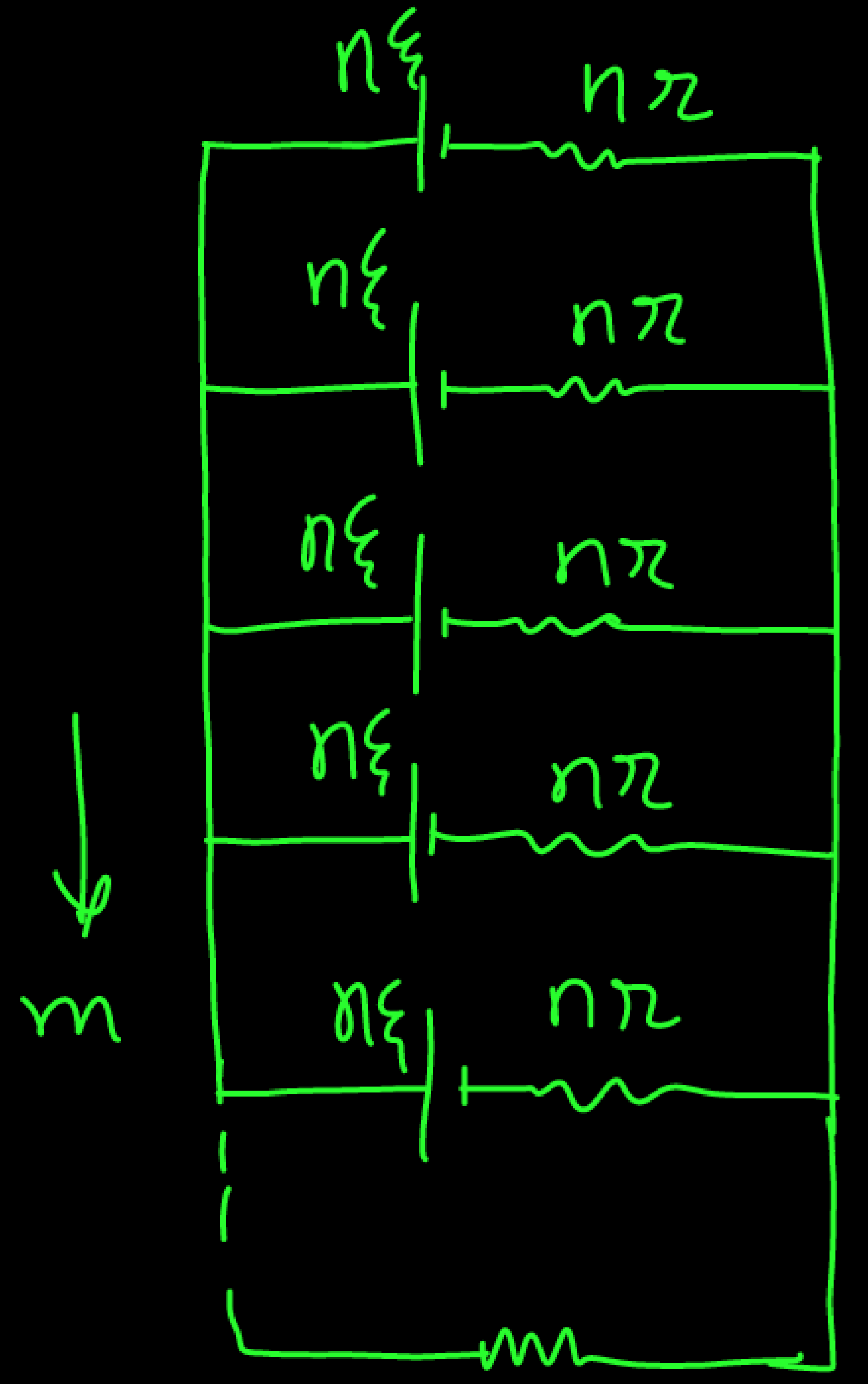
$$= \frac{1+1+1+1+1+1+1+1+\cdots n}{r} = n/r$$

$$\boxed{r_e = r/n}$$



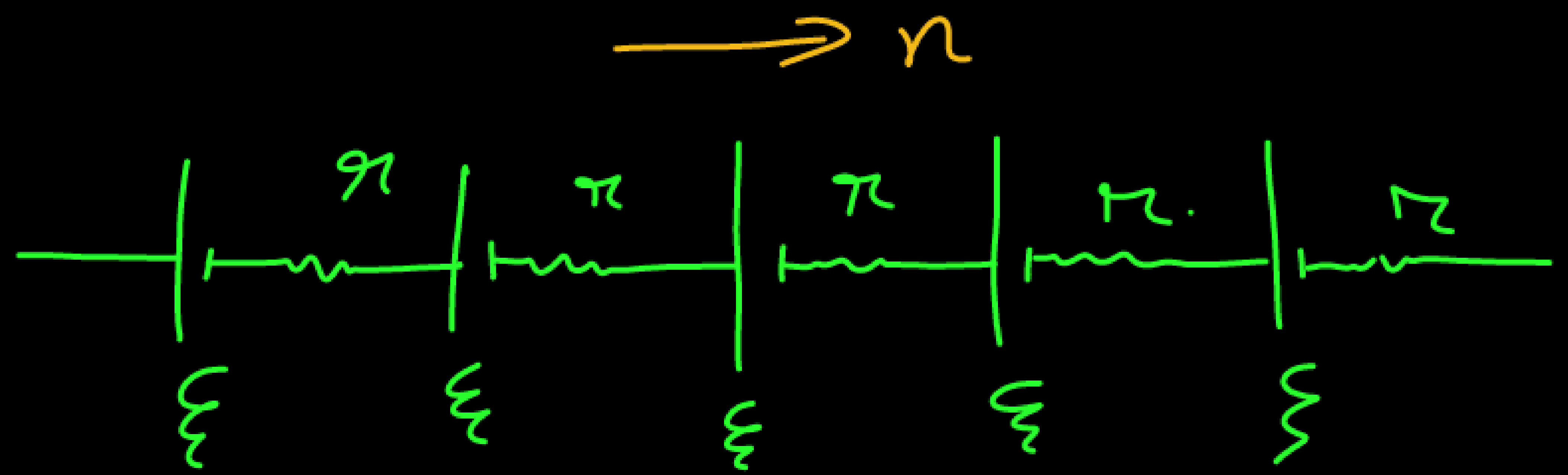
$$\varepsilon_e = n\varepsilon.$$

$$r_e = nr$$



$$\xi_e = n\xi$$

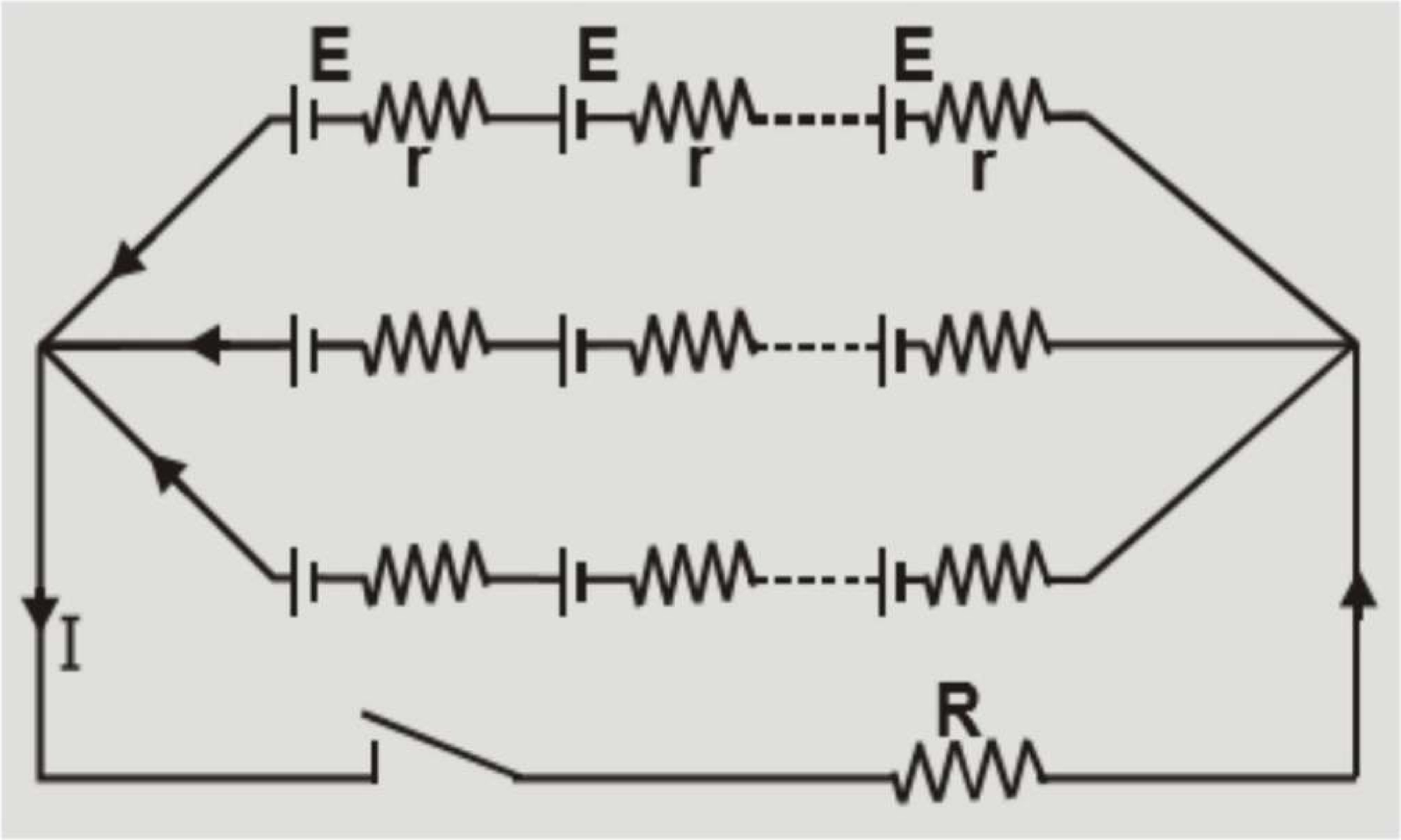
$$r_e = \frac{nr}{m}$$



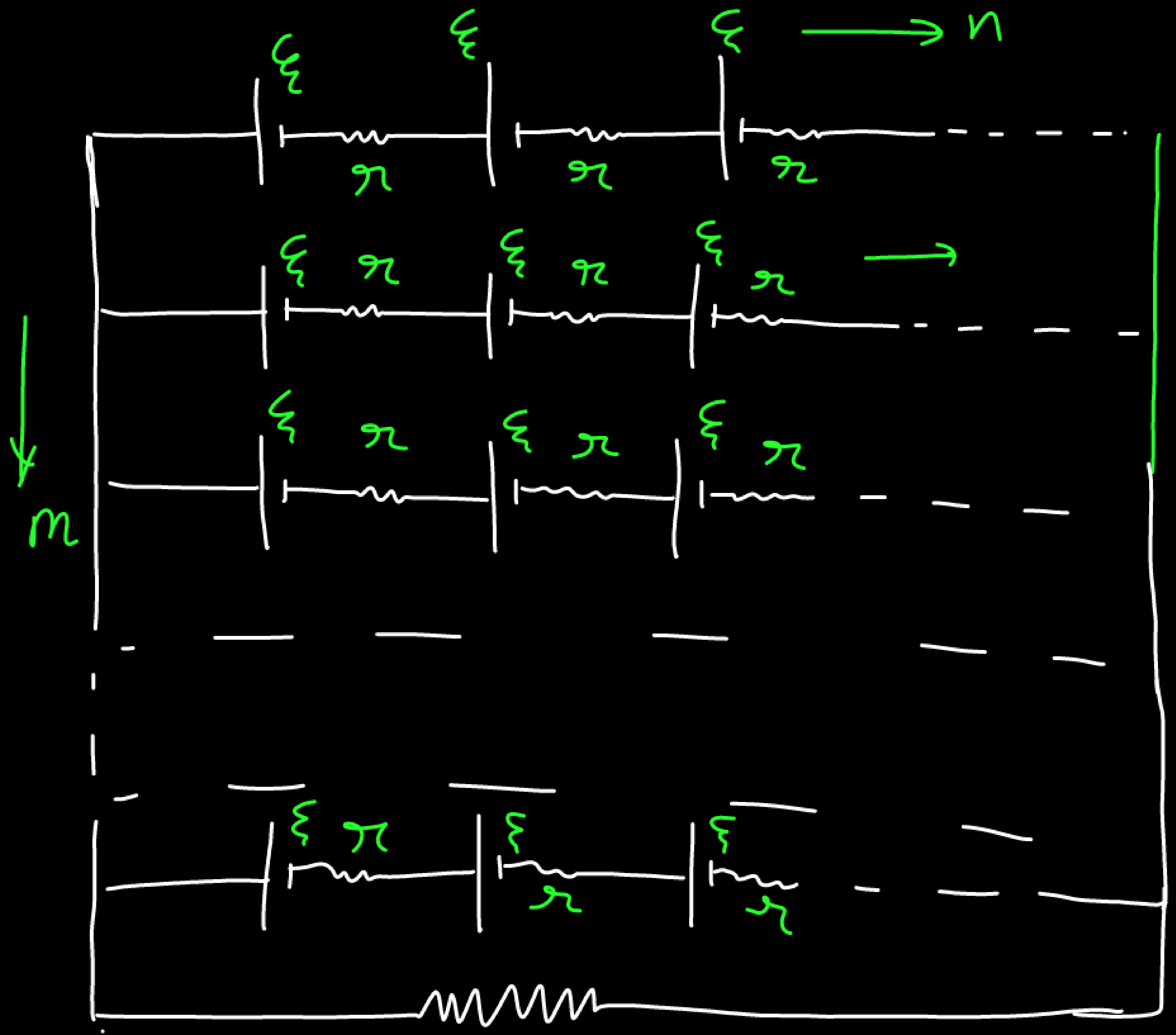
$$\xi_e = n\xi$$

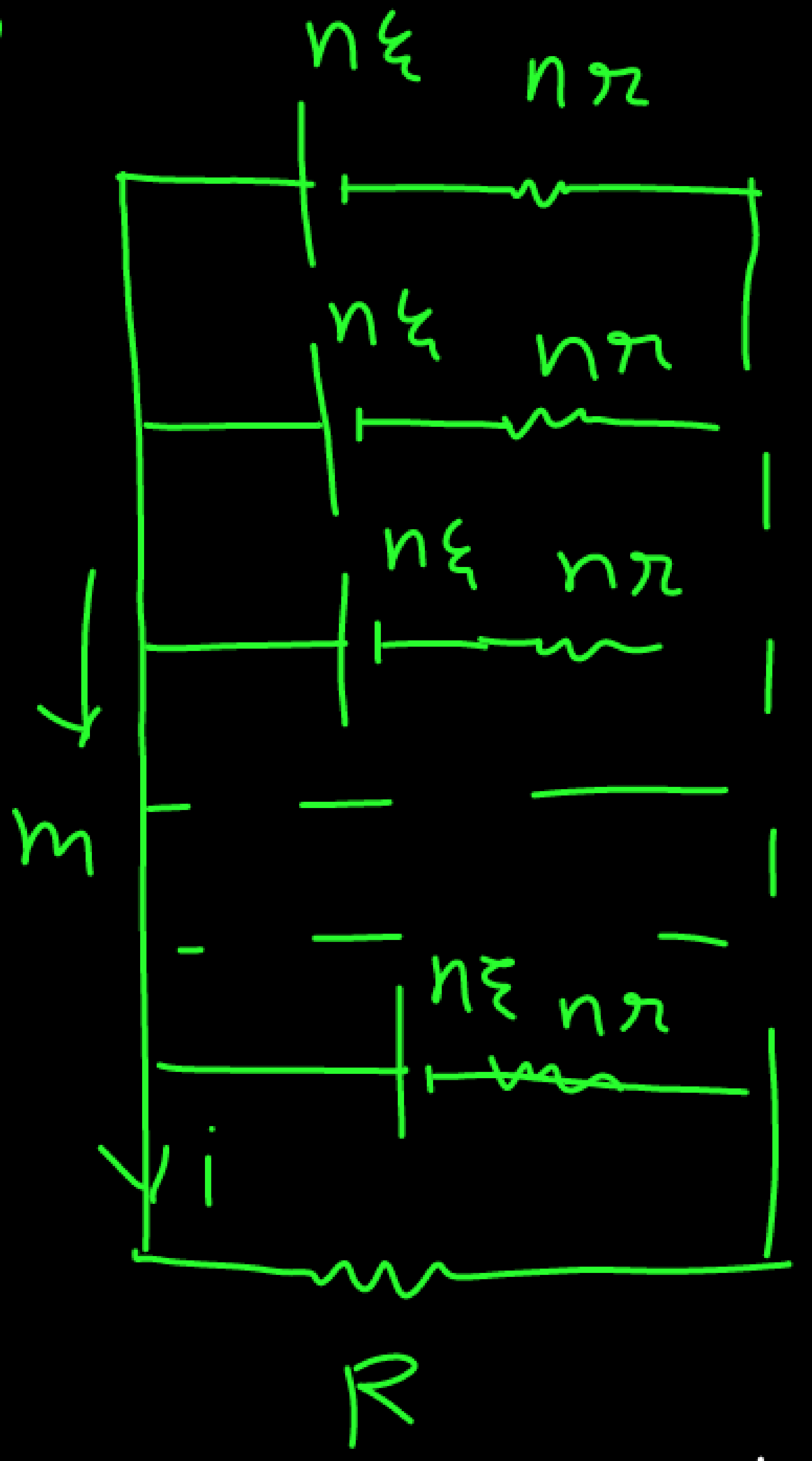
$$r_e = nr$$

MIXED GROUPING OF CELLS



Mixed combination.





$$\varepsilon_{eq} = n\varepsilon$$

$$r_{eq} = \frac{nr}{m}$$

$$\boxed{i = \frac{n\varepsilon}{R + \frac{nr}{m}}}$$

$$\boxed{i = \frac{mn\varepsilon}{mR + nr}}$$

When $mR = nr$.

Power maximum.