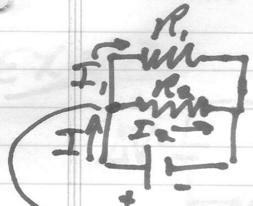


Two resistors in parallel,

$\Delta V_1 = \Delta V_2 = \Delta V$

→ junction, where current splits to go thru 2 resistors

→ ~~less~~ $I_i < I$

$I = I_1 + I_2$

~~→ potential~~

$I = I_1 + I_2 = \frac{\Delta V}{R_1} + \frac{\delta V}{R_2}$

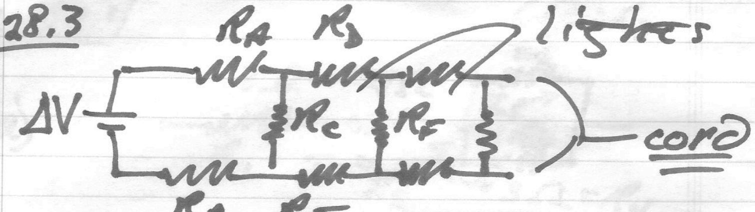
$= \Delta V\left(\frac{1}{R_1} + \frac{1}{R_2}\right) = \frac{\Delta V}{R_{eq}}$

$\boxed{\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}} + \frac{1}{R_3} + + +$

$\left(R_{eq} = \frac{R_1 R_2}{R_1 + R_2}\right)$

$< \min(R_i)$

EX 28.3



$\Delta V > \Delta V_C > \Delta V_F$

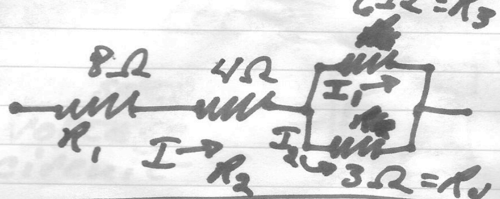
$\therefore I_F < I_C$ (if $R_F = R_C$)

so F dimmer than C

1304/1404 L8, p10

Ex. 28.4

a)



$$\boxed{R_{eq} = R_1 + R_2 + \frac{R_3 R_4}{R_3 + R_4}}$$

$$= 8\Omega + 4\Omega + 2\Omega$$

$$= \underline{14\Omega}$$

b)

$$\underline{I_1 = I_2} = I = \frac{\Delta V}{R_{eq}} = \frac{42V}{14\Omega} = \underline{3A}$$

for $I_3 + I_4$, I splits

$\Delta V_3 = \Delta V_4$, so

$(6\Omega)I_3 = (3\Omega)I_4 \Rightarrow \underline{I_4 = 2I_3}$

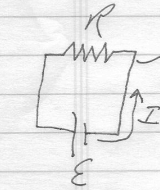
$I_3 + I_4 = 3A$

$3I_3 = 3A$

$\underline{I_3 = 1A}$

(1)

Loop Theorem



equipotential (conservative field)

"algebraic sum of changes in potential encountered in a complete traversal of the circuit must be zero.

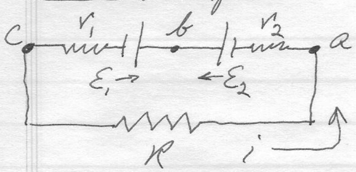
$$-iR + \mathcal{E} = 0$$

Equivalent to statement of conservation of energy

Two notes:

- if a resistor is traversed in the direction of current, the change in potential is $-IR$. In the opposite direction, it's $+IR$
- if the seat of $\mathcal{E}$ is traversed in the direction of emf, the change in potential is $+\mathcal{E}$; in the opposite direction, it is $-\mathcal{E}$.

An Example



$\mathcal{E}_1 = 2.0V$

$\mathcal{E}_2 = 4.0V$

$r_1 = 1.0\Omega$

$r_2 = 2.0\Omega$; $R = 5.0\Omega$

What is the current, i?

Since we have 2 batteries opposing each other, and $\mathcal{E}_2 > \mathcal{E}_1$, the current will flow counterclockwise. (We don't actually need to know this, as we'll see.)

Use the loop theorem:

$$-\mathcal{E}_2 + ir_2 + iR + ir_1 + \mathcal{E}_1 = 0$$

Note signs

$$\underline{\underline{i}} = (\mathcal{E}_2 - \mathcal{E}_1)/(R + r_1 + r_2) = \frac{4V - 2V}{5\Omega + 1\Omega + 2\Omega}$$

$$= \underline{\underline{0.25A}}$$