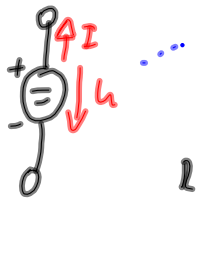
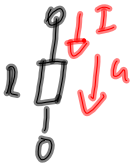
BASIC ELECTRIC CIRCUITS

CURRENT AND VOLTAGE ARROWS



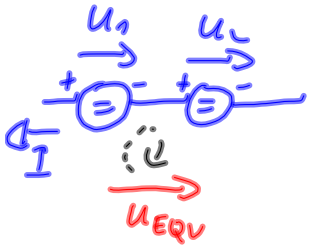
POWER SOURCE – OPPOSITE DIRECTION



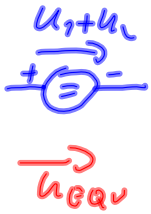
'LOAD' – THE SAME DIRECTION

CONNECTION OF THE SOURCES

1) SERIES – THE SAME CURRENT / SUMMARIZE VOLTAGES



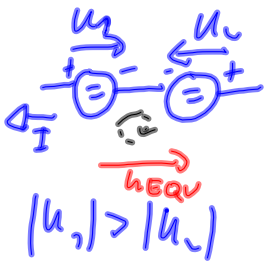
$\Rightarrow$



II. KIRCH. LAW

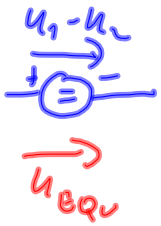
$U_1 + U_2 - U_{EQV} = 0$

$U_{EQV} = U_1 + U_2$



$|U_1| > |U_2|$

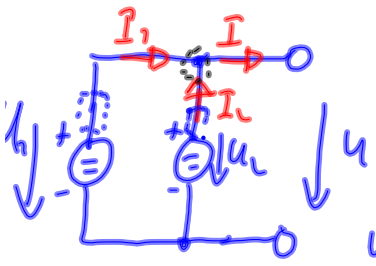
$\Rightarrow$



$U_1 - U_2 - U_{EQV} = 0$

$U_{EQV} = U_1 - U_2$

2) PARALLEL – SUMMARIZE THE CURRENTS

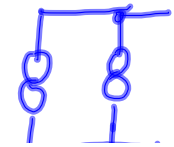


I. KIRCHH. LAW

$I_1 + I_2 - I = 0$

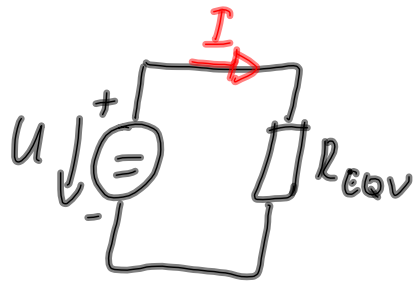
$I = I_1 + I_2$

$U_1 = U_2 = U$



SIMPLE ELECTRIC CIRCUIT

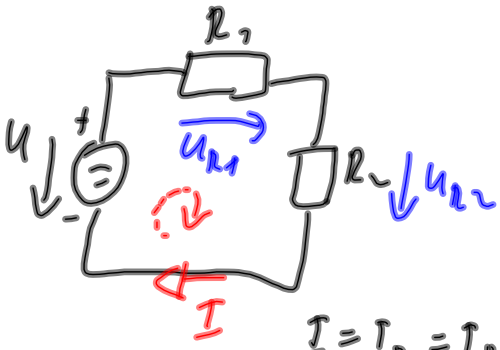
– WITH 1 POWER SUPPLY



OHM'S LAW

$$I = \frac{U}{R_{EQV}}$$

1) RESISTORS IN SERIES ($R_{EQV} = R_1 + R_2$)



$U_{R1} = R_1 \cdot I$ ∴ SAME

$U_{R2} = R_2 \cdot I$ ∴ CURRENT

$$I = \frac{U}{R_{EQV}} = \frac{U_{R1} + U_{R2}}{R_1 + R_2}$$

$I = I_{R1} = I_{R2} \rightarrow$

$$I = \frac{U_{R1}}{R_1} = \frac{U_{R2}}{R_2}$$

II. KIRCH. LAW

$U_{R1} + U_{R2} - U = 0$

$U = U_{R1} + U_{R2}$

$$\boxed{\frac{U_{R1}}{U_{R2}} = \frac{R_1}{R_2}}$$

R_{EQV} IS LARGER THAN SOME OF THE RESISTORS CONNECTED IN SERIES

$R_{EQV} = R_1 + R_2$

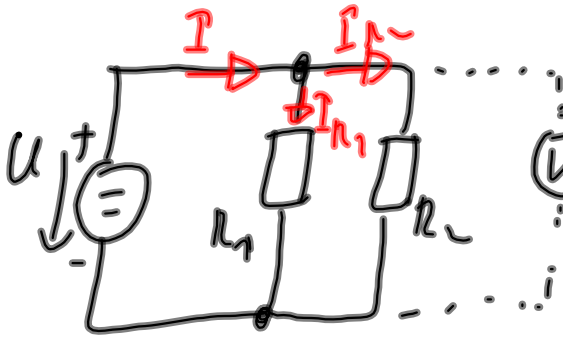
↓

$R_{EQV} > R_1$

$> R_2$

⋮

2) PARALLEL CONNECTION OF RESISTORS $\left(\frac{1}{R_{EQV}} = \frac{1}{R_1} + \frac{1}{R_2}\right)$



$U_{R_1} = U_{R_2} = U$

$$R_{EQV} = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

I. Kirch. Law

$$I - I_{R_1} - I_{R_2} = 0$$

R_{EQV} is smaller than R_1, R_2

$R_{EQV} < R_1 < R_2 \ldots$

$$U = I_{R_1} \cdot R_1 = I_{R_2} \cdot R_2$$

$$\boxed{\frac{I_1}{I_2} = \frac{R_2}{R_1}}$$