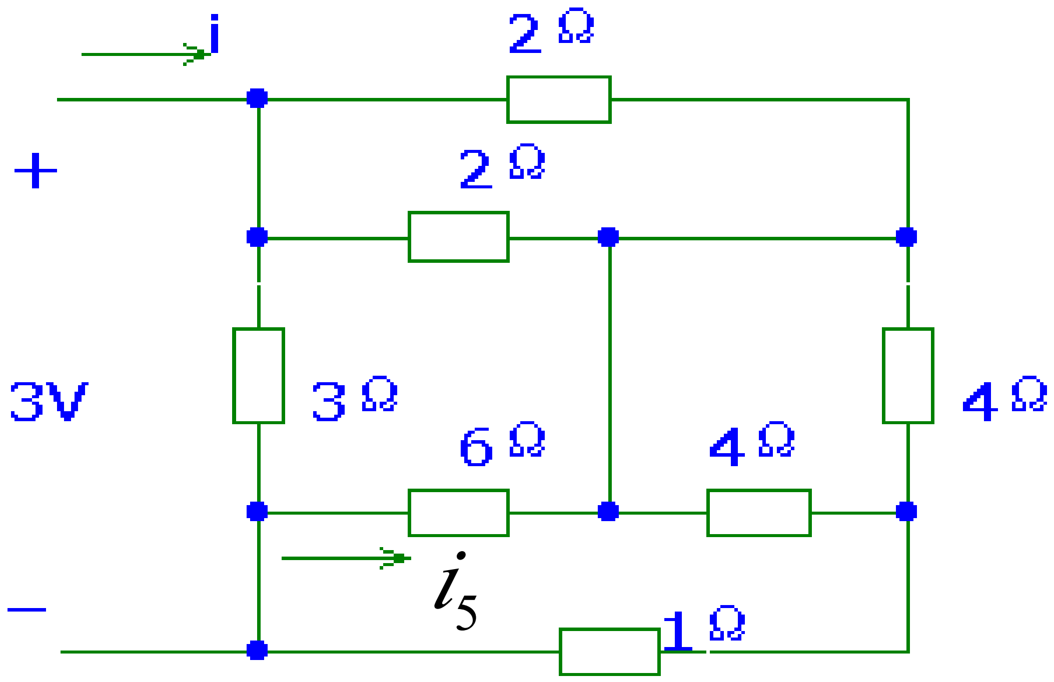
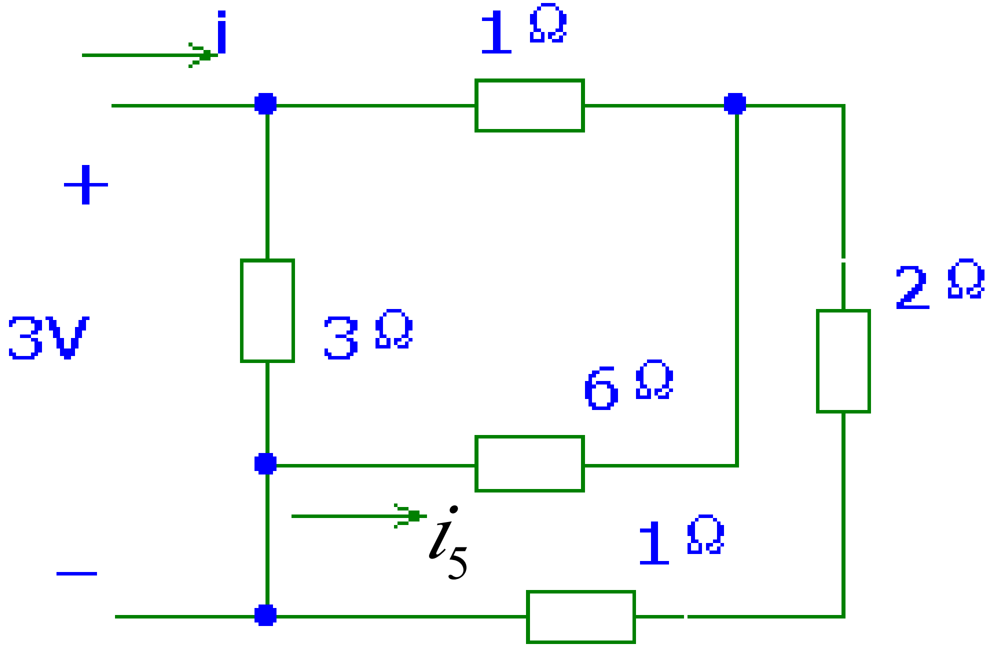
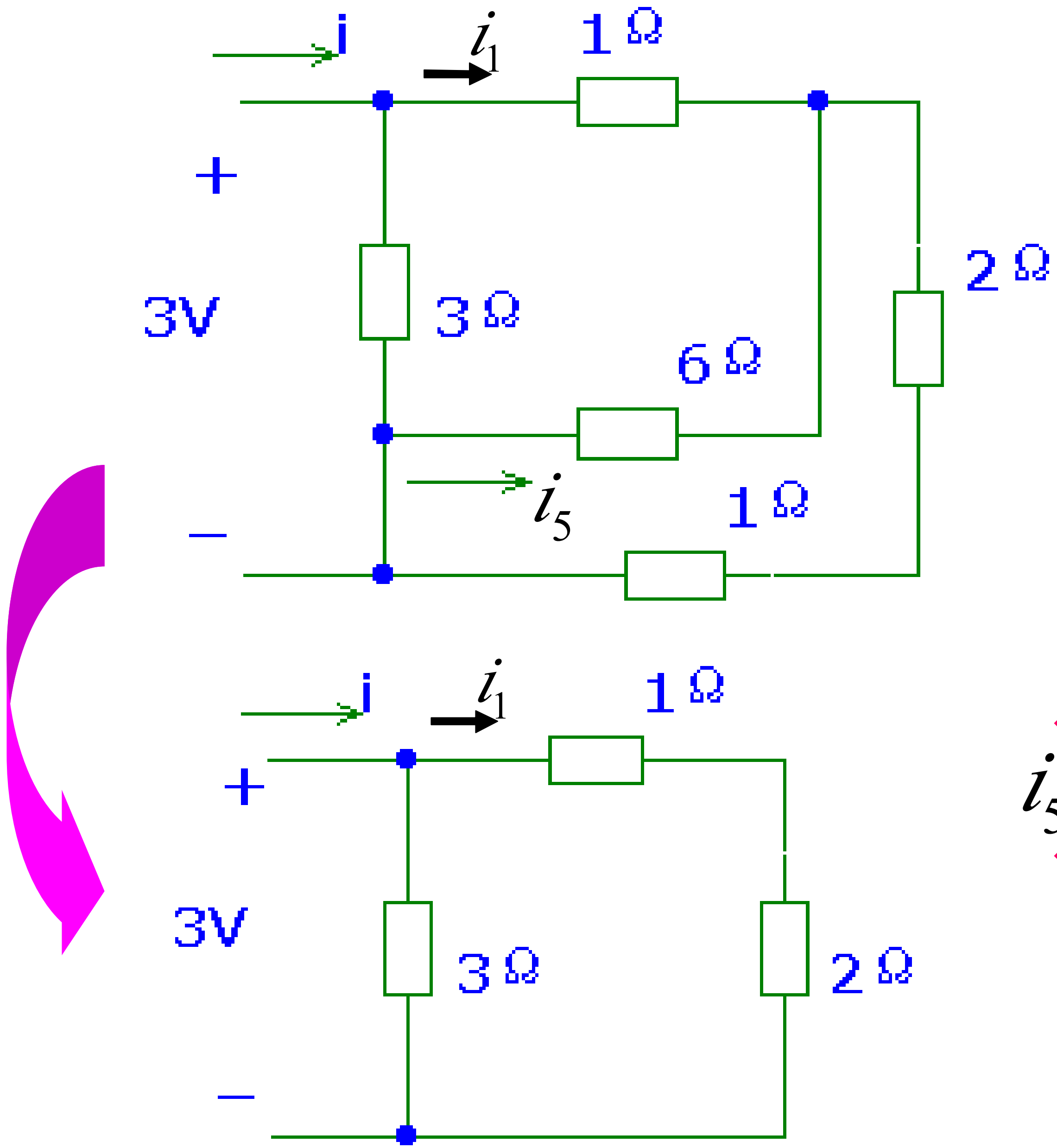
例



求电流i和 i_5





等效电阻

$R = 1.5\,\Omega$

$i = 2A$

$i_1 = 1A$

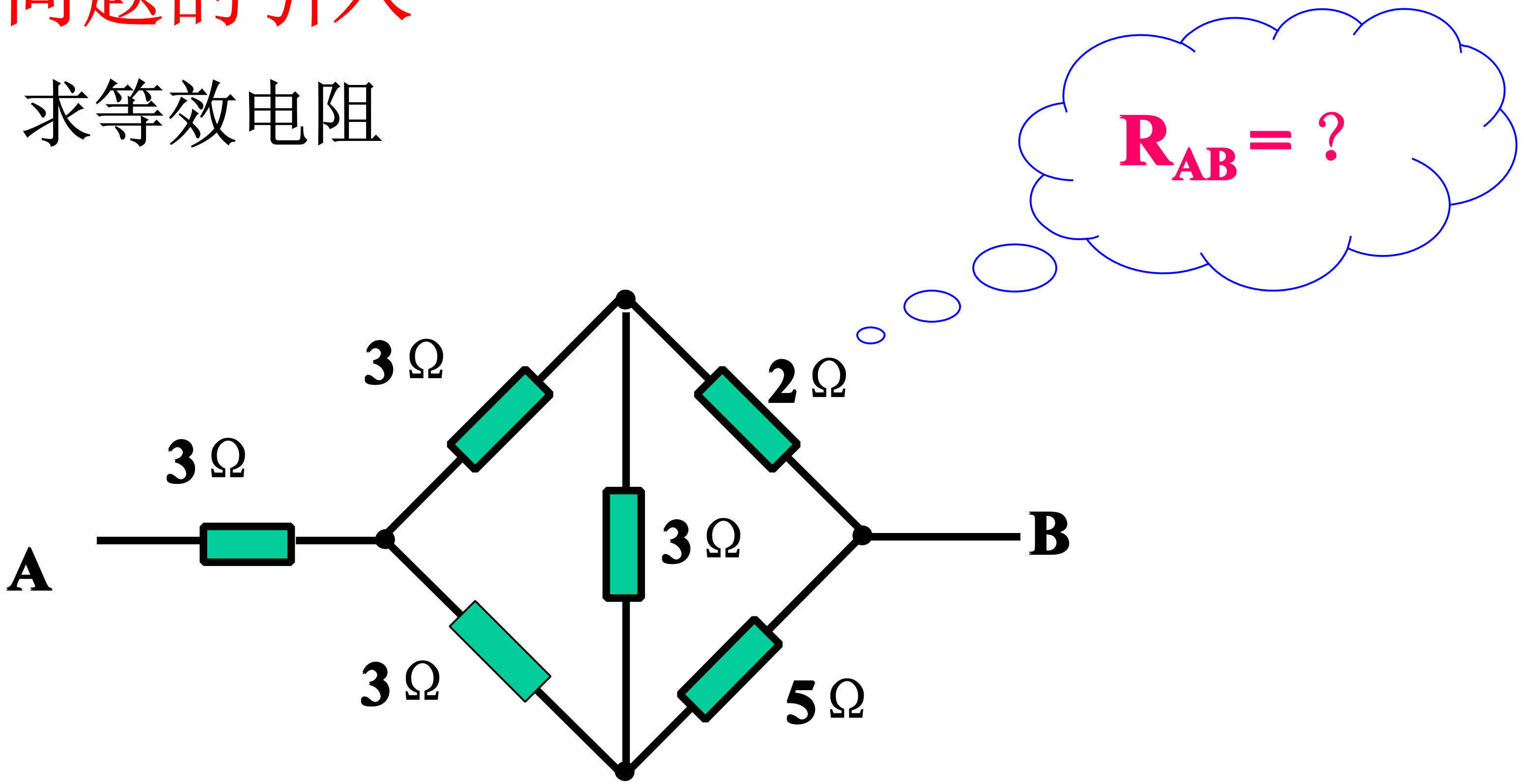
$$i_5 = -\frac{2+1}{6+2+1}\times 1$$

$$= -\frac{1}{3}A$$

电阻的Y形联接与△形联接的等效变换

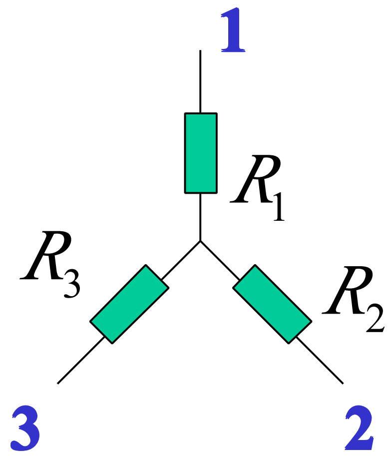
一、问题的引入

求等效电阻

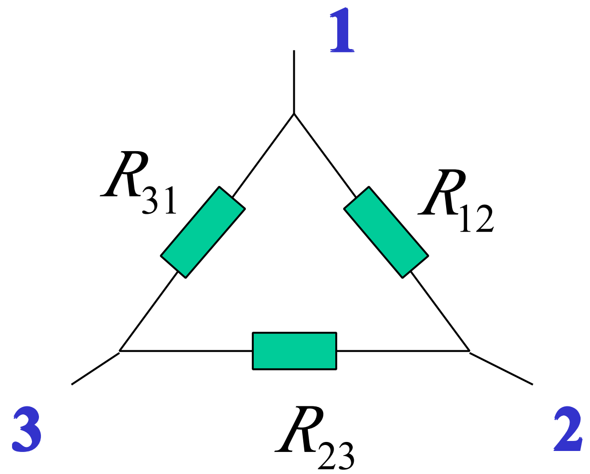


二、星形联接和三角形联接的等效变换的条件

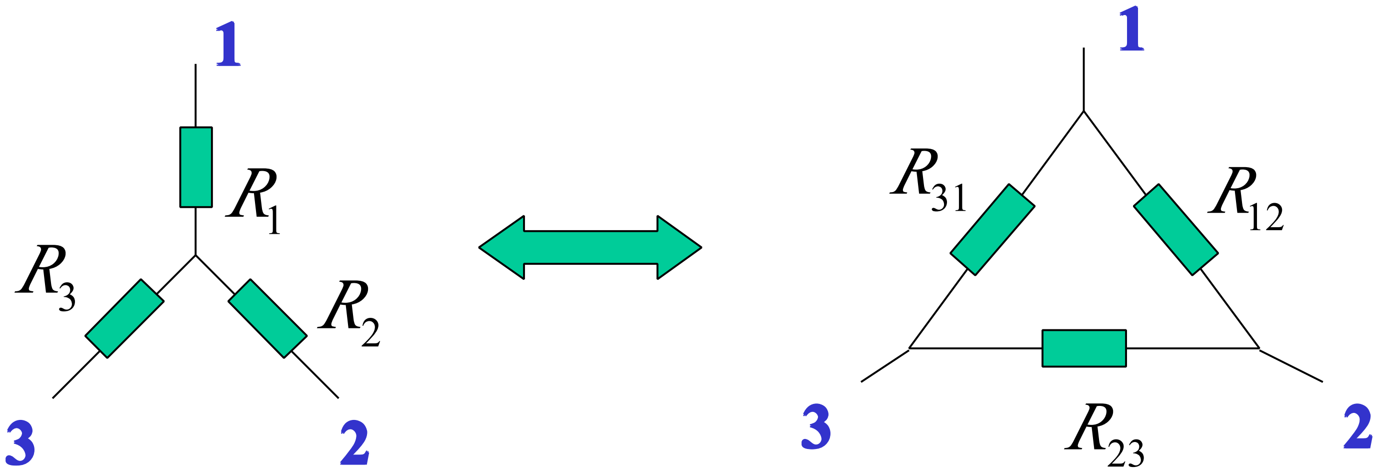
要求它们的外部性能相同，
即当它们对应端子间的电压相同时，
流入对应端子的电流也必须分别相等。



星接（**Y**接）



三角接（△接）

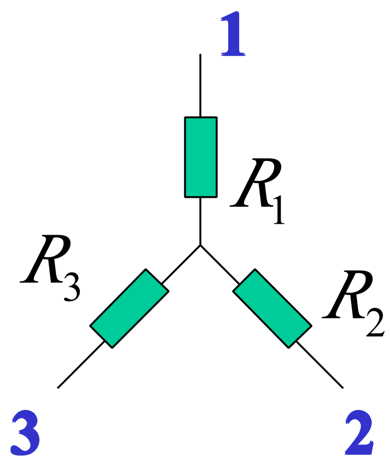


星接（**Y**接）　　　　三角接（△接）

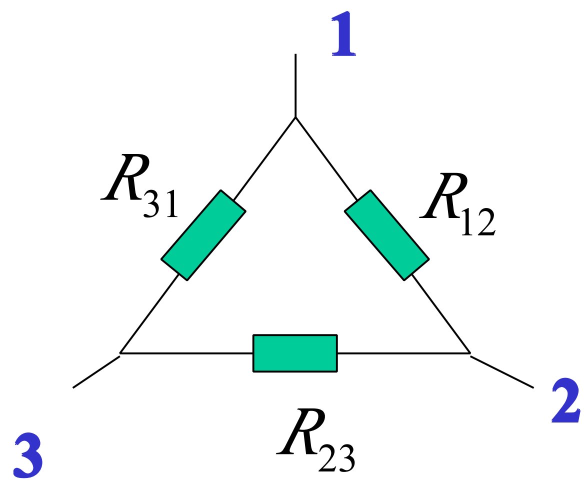
Y→△

$$R_{12} = R_1 + R_2 + \frac{R_1 R_2}{R_3}$$

$$R_{23} = R_2 + R_3 + \frac{R_2 R_3}{R_1} \qquad R_{31} = R_1 + R_3 + \frac{R_3 R_1}{R_2}$$



星接



三角接

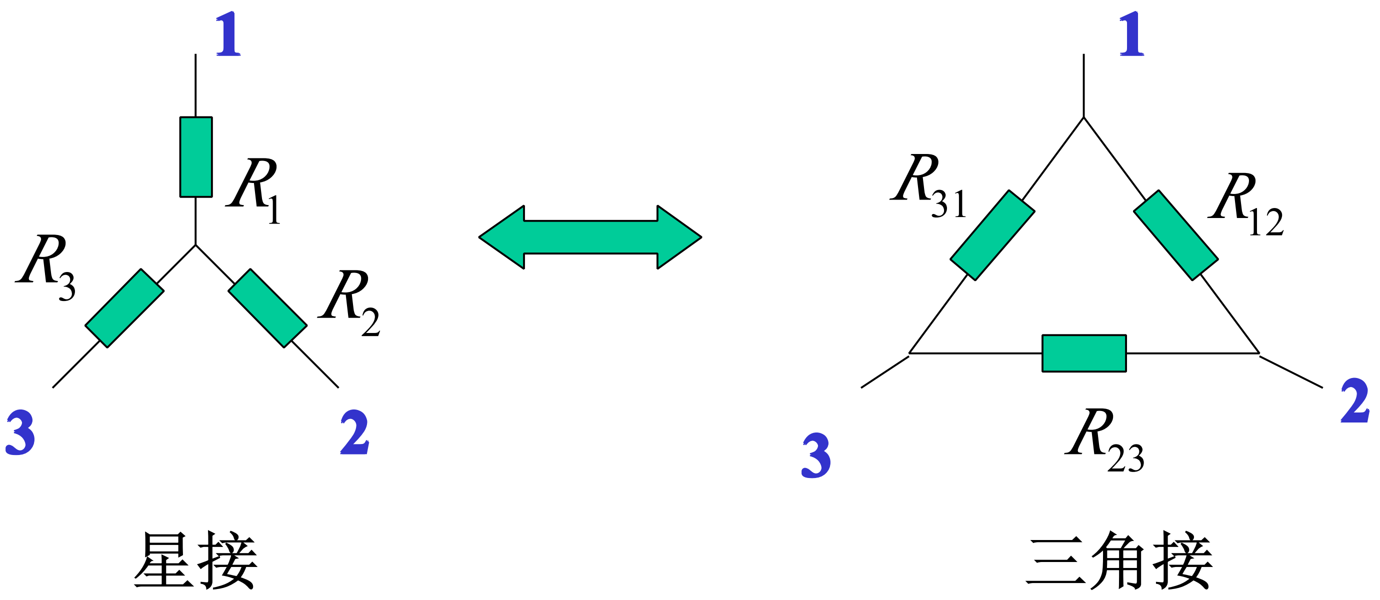
△→**Y**

$$R_1 = \frac{R_{31}R_{12}}{R_{12}+R_{23}+R_{31}}$$

$$R_2 = \frac{R_{12}R_{23}}{R_{12}+R_{23}+R_{31}} \qquad R_3 = \frac{R_{23}R_{31}}{R_{12}+R_{23}+R_{31}}$$

$$\text{Y形电阻} = \frac{\Delta\text{形相邻电阻的乘积}}{\Delta\text{形电阻之和}}$$

$$\Delta\text{形电阻} = \frac{\text{Y形电阻两两乘积之和}}{\text{Y形不相邻电阻}}$$



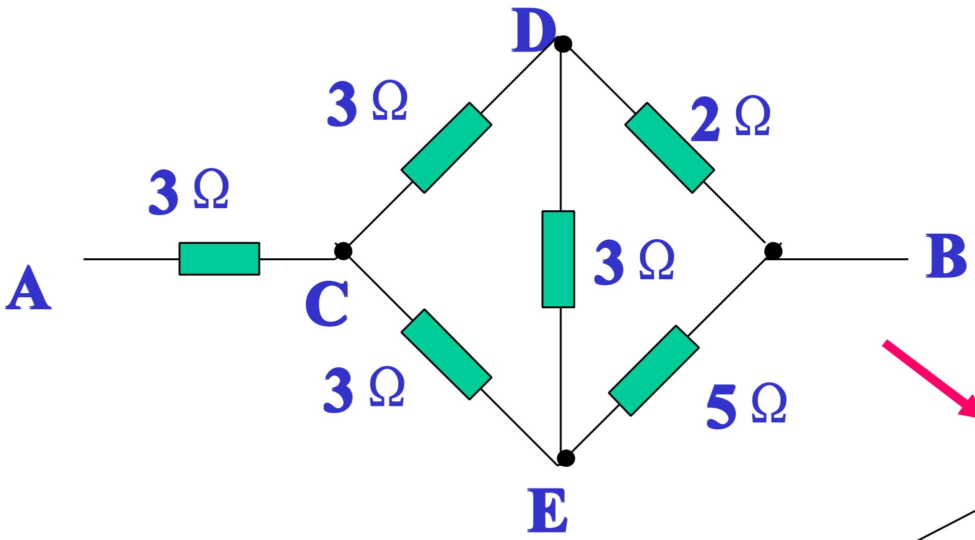
特别若星形电路的3 个电阻相等

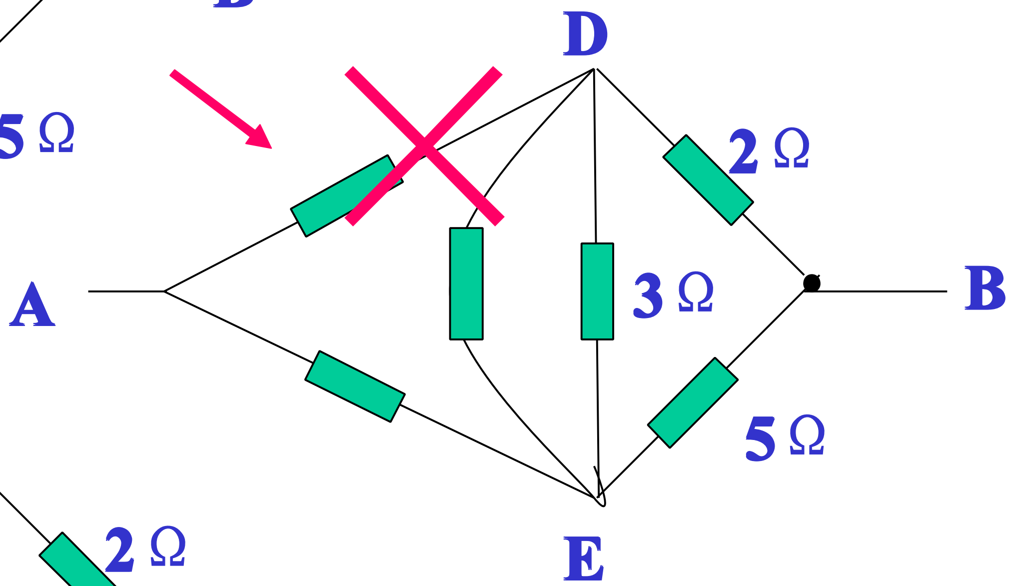
$$R_1 = R_2 = R_3 = R_Y$$

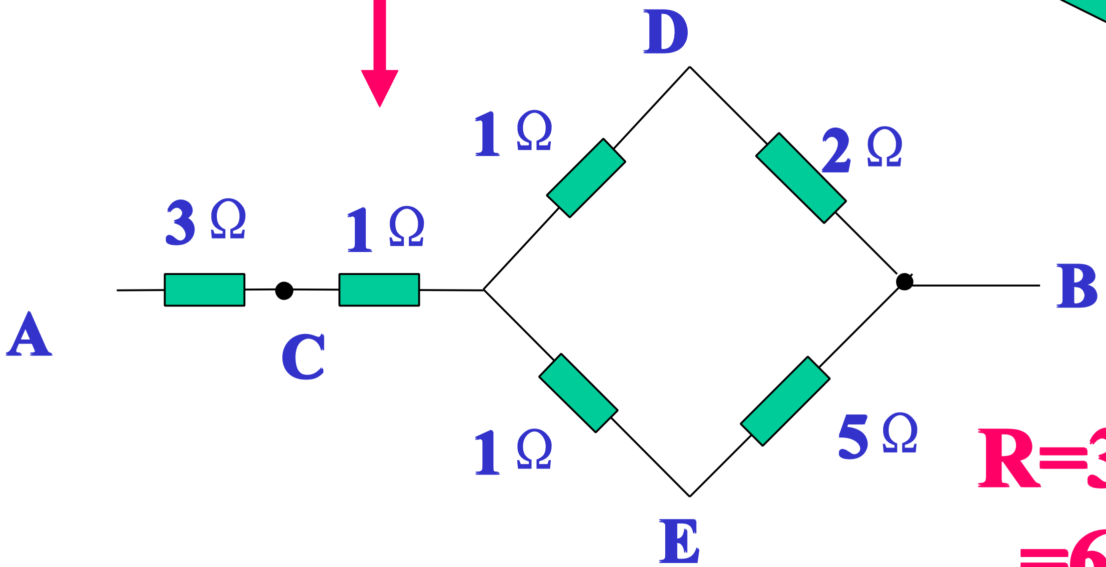
则等效的三角形电路的电阻也相等

$$R_\Delta = R_{12} = R_{23} = R_{31} = 3R_Y$$

反之,则$R_Y = \dfrac{1}{3} R_\Delta$



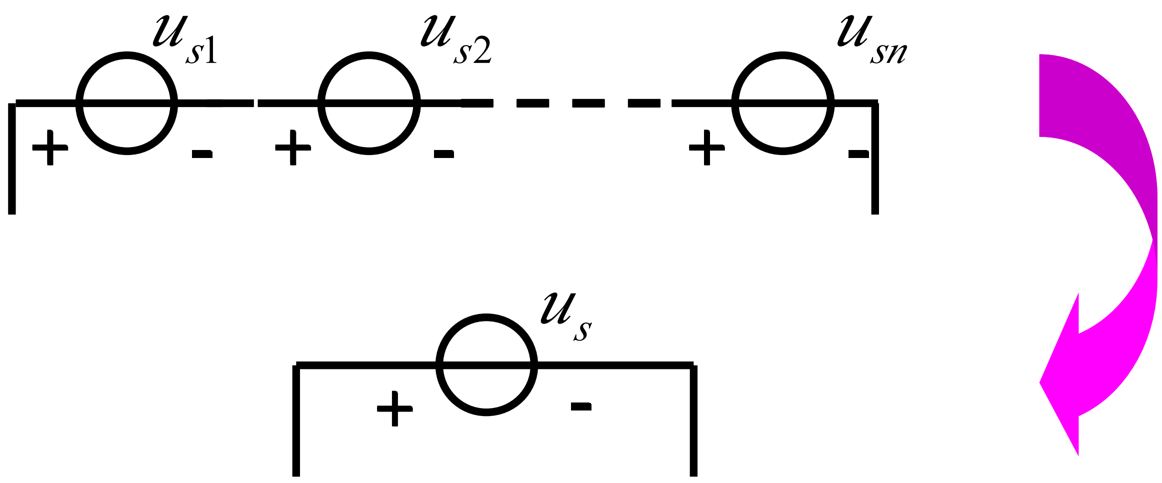




$$R=3+1+(1+2)\,//\,(1+5)$$
$$=6\,\Omega$$

电压源、电流源的串联和并联

一、电压源串联



$$u_s = u_{s1} + u_{s2} + \cdots + u_{sn} = \sum_{k=1}^{n} u_{sk}$$