

مراجعة

على اساسيات الدوائر

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Ohm's Law

Ohm's law states that the voltage v across a resistor is directly proportional to the current i flowing through the resistor.

$$v = iR$$

- $v \rightarrow$ voltage
- $i \rightarrow$ current
- $R \rightarrow$ Resistance

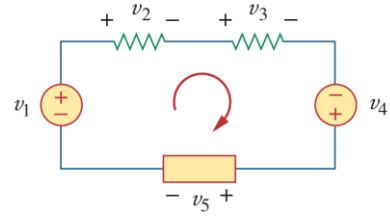
Conductance G

$$G = \frac{1}{R}$$

Power P

$$P = vi = i^2R = \frac{V^2}{R}$$

KVL (Kirchhoff's voltage law)



Kirchhoff's voltage law (KVL) states that the algebraic sum of all voltages around a closed path (or loop) is zero.

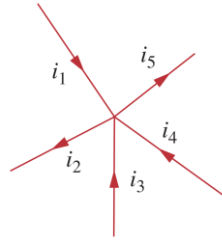
مجموع فروق جهد في أي دائرة = صفر

$$\sum_{m=1}^M V_m = 0$$

KCL (Kirchhoff's current law)

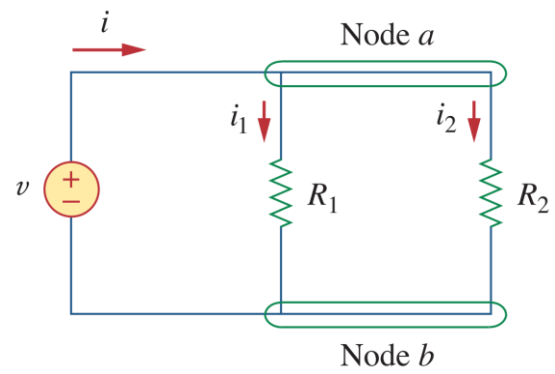
Kirchhoff's current law (KCL) states that the algebraic sum of currents entering a node (or a closed boundary) is zero.

مجموع التيارات الخارجة أو الداخلة في أي نقطة Node = صفر



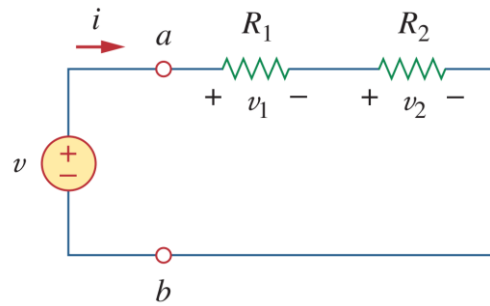
$$\sum_{n=1}^N i_n = 0$$

Current Divider



$$i_2 = i \frac{R_1}{R_1 + R_2}$$

Voltage Division

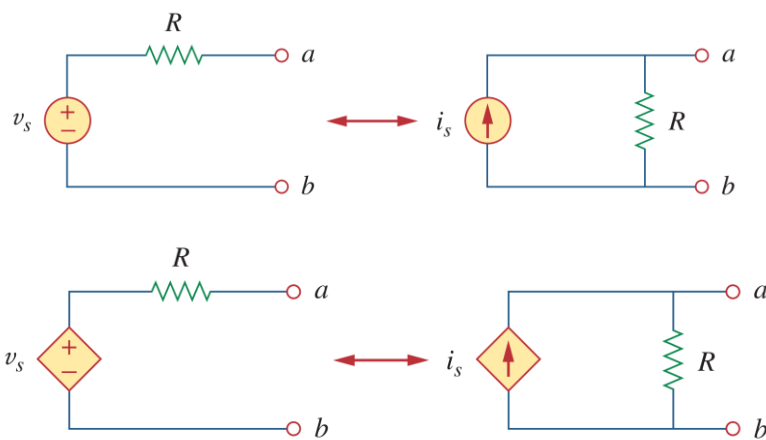


$$v_2 = v \frac{R_2}{R_1 + R_2}$$

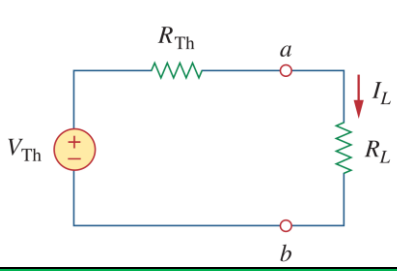
Source Transformation

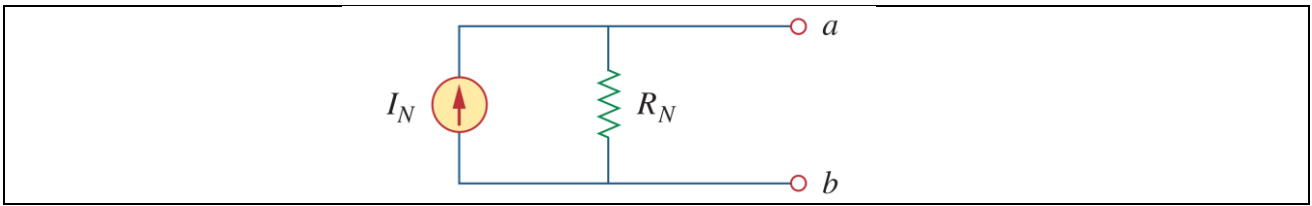
A **source transformation** is the process of replacing a voltage source v_s in series with a resistor R by a current source i_s in parallel with a resistor R , or vice versa

$$v_s = i_s R \Leftrightarrow i_s = \frac{v_s}{R}$$



Thevenin and Norton equivalent

Thevenin Theorem		
	Independent source	Dependent source
V_{th}	<ul style="list-style-type: none"> اجعل الدائرة open circuit قم بحل المسألة لحساب الـ V_{Th} 	<ul style="list-style-type: none"> اجعل الدائرة open circuit قم بحل المسألة لحساب الـ V_{Th}
R_{th}	<ul style="list-style-type: none"> اجعل أي independent voltage source → Short circuit اجعل أي independent current source → Open circuit أحسب الـ R_{Th} 	<ul style="list-style-type: none"> اجعل أي independent voltage source → Short circuit اجعل أي independent current source → Open circuit نضع current source بقيمة $1A$ و نحسب الـ V_S نحسب $R_{Th} = V_S$
<p>في النهاية نضع المسألة علي الشكل الاتي:</p> 		
Norton Theorem		
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $R_N = R_{Th}$ </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $I_N = \frac{V_{Th}}{R_{Th}}$ </div>		<ul style="list-style-type: none"> لحساب Norton's
<p>في النهاية نضع المسألة علي الشكل الاتي:</p>		



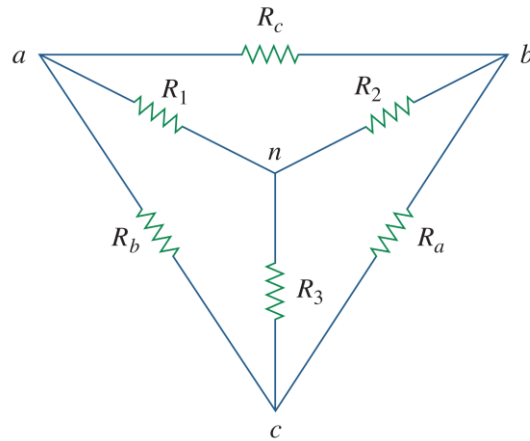
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Delta and Star



Δ to Y Conversion	Y to Δ Conversion
$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$	$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1}$
$R_2 = \frac{R_a R_c}{R_a + R_b + R_c}$	$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2}$
$R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$	$R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3}$