Prefix	Symbol	Magnitude
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}

$e = 1.6 \times 10^{-19}$ (C)

$\sum P = 0$ Energy conservation

$$P = \frac{dw}{dt} = \frac{dw}{dq}\frac{dq}{dt} = vi \qquad P = V \cdot I = (R \cdot I) \cdot I = I^2 R$$

$$i = \frac{dq}{dt} \qquad \upsilon = iR \qquad R = \frac{\upsilon}{i}$$

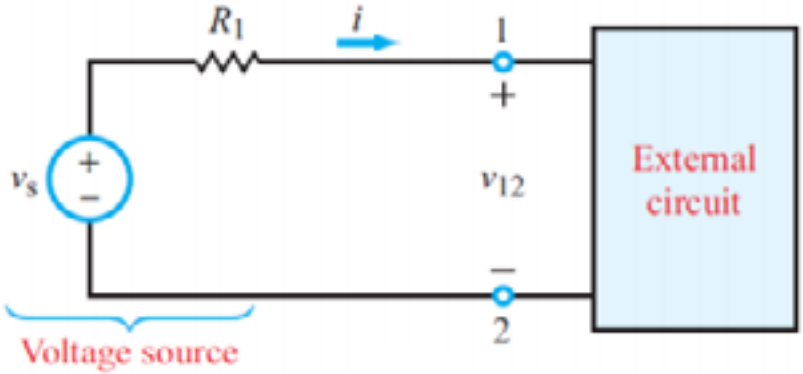
$$R = \frac{\ell}{\sigma A} = \rho \frac{\ell}{A} \quad (\Omega).$$

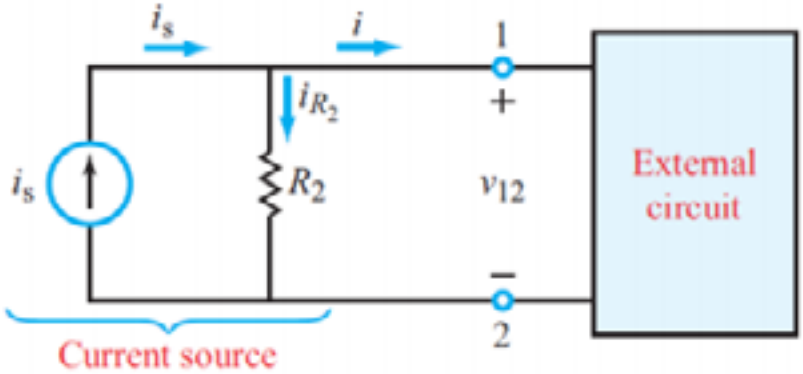
ρ = resistivity, σ = conductivity

Source Transformation

For the two circuits to be equivalent :

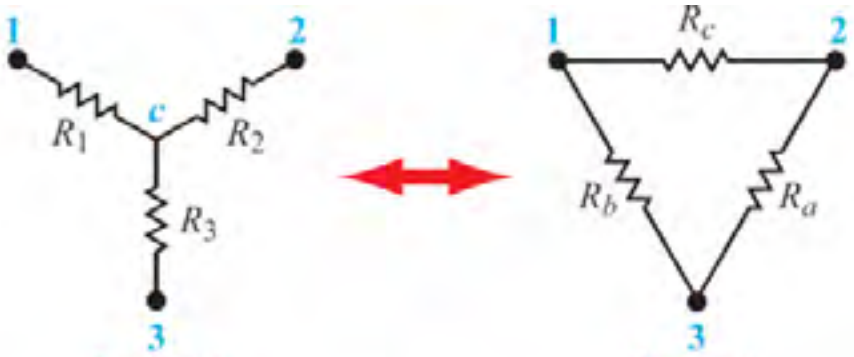
$R_1 = R_2$ $\quad i_s = \frac{v_s}{R_1}$.





$i_s = V_s / R_s$

$R_2 = R_1$



Y circuit
(a)

Δ circuit
(b)

Simultaneous solution leads to:

Δ →Y Transformation

$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_a R_c}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$$

Y→ Δ Transformation

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_1 R_3}{R_1}$$

$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_1 R_3}{R_2}$$

$$R_c = \frac{R_1 R_2 + R_2 R_3 + R_1 R_3}{R_3}$$