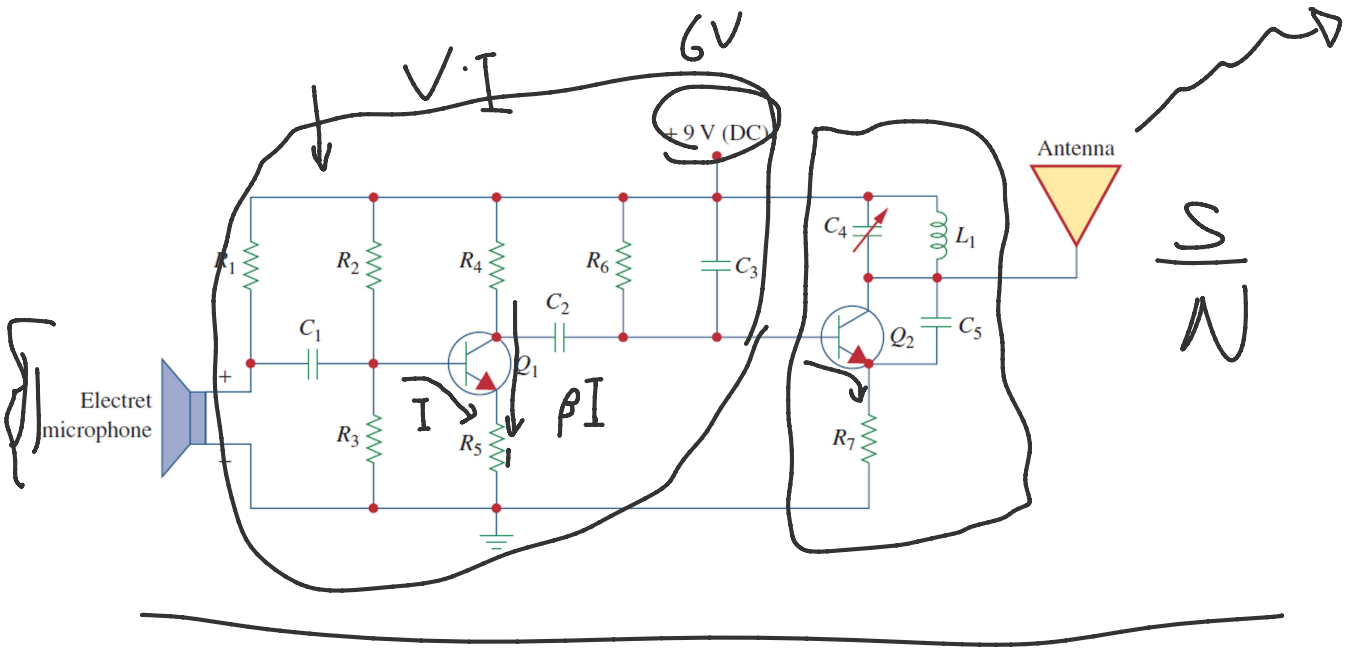
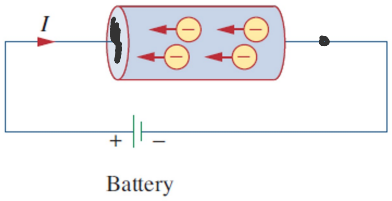
Βασικά Ηλεκτρονικά στοιχεία και κυκλώματα

Monday, May 4, 2020 10:34 PM

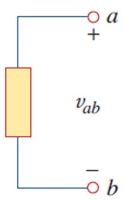




$$i \triangleq \frac{dq}{dt}$$

$$Q \triangleq \int_{t_0}^{t} i\,dt$$

Voltage (or **potential difference**) is the energy required to move a unit charge through an element, measured in volts (V).



$$v_{ab} \triangleq \frac{dw}{dq}$$

where w is energy in joules (J) and q is charge in coulombs (C).

$P_{AN} = 12 \cdot (+12) = 144W$

$P_{MP} = 12 \cdot (-12) = -144W$

V I

$$p = \frac{dw}{} = \frac{dw}{} \cdot \frac{dq}{} = vi$$

12A

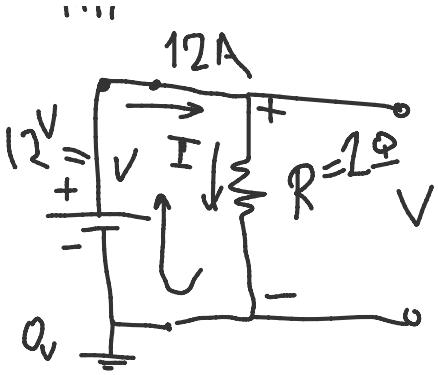
V I

$$p = \frac{dw}{dt} = \frac{dw}{dq} \cdot \frac{dq}{dt} = vi$$

$p = vi$

Αρχή διατήρησης ενέργειας

$\sum p = 0$

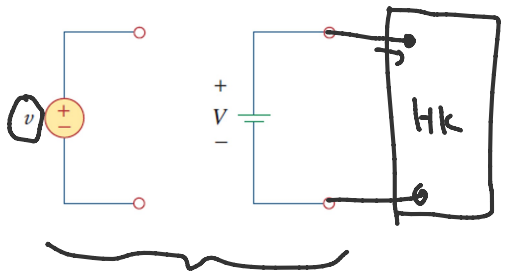


$$R = \frac{V}{I} \Rightarrow$$

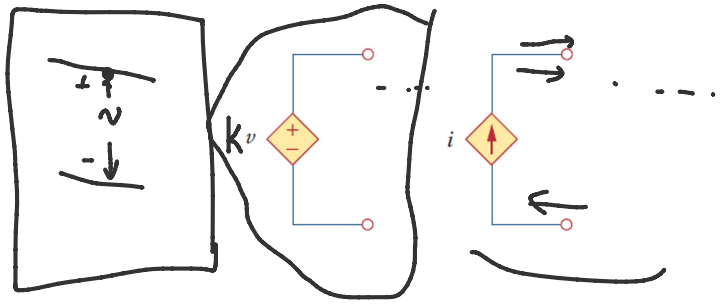
$$I = \frac{V}{R} = \frac{12}{1} = 12A$$

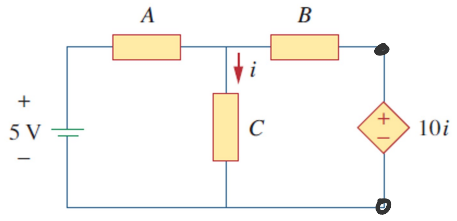
Ηλεκτρικά Στοιχεία

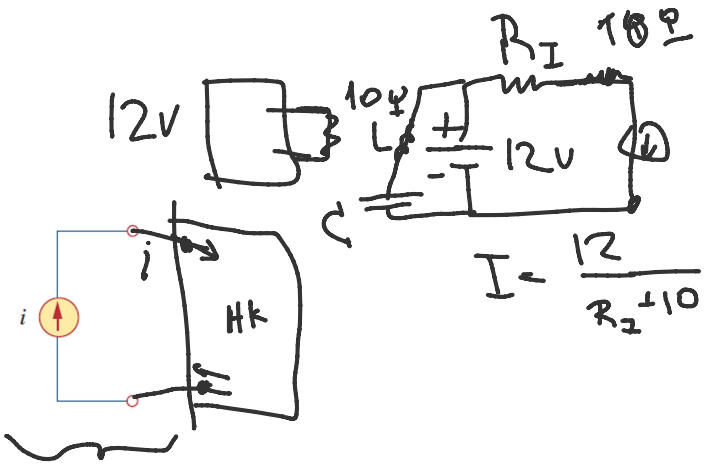
Ανεξάρτητες πηγές



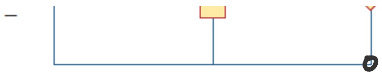
Εξαρτημένες πηγές

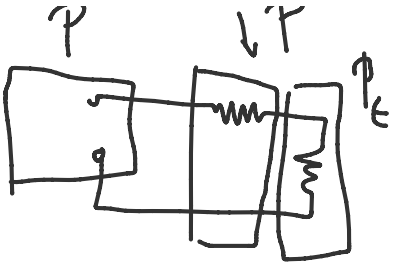


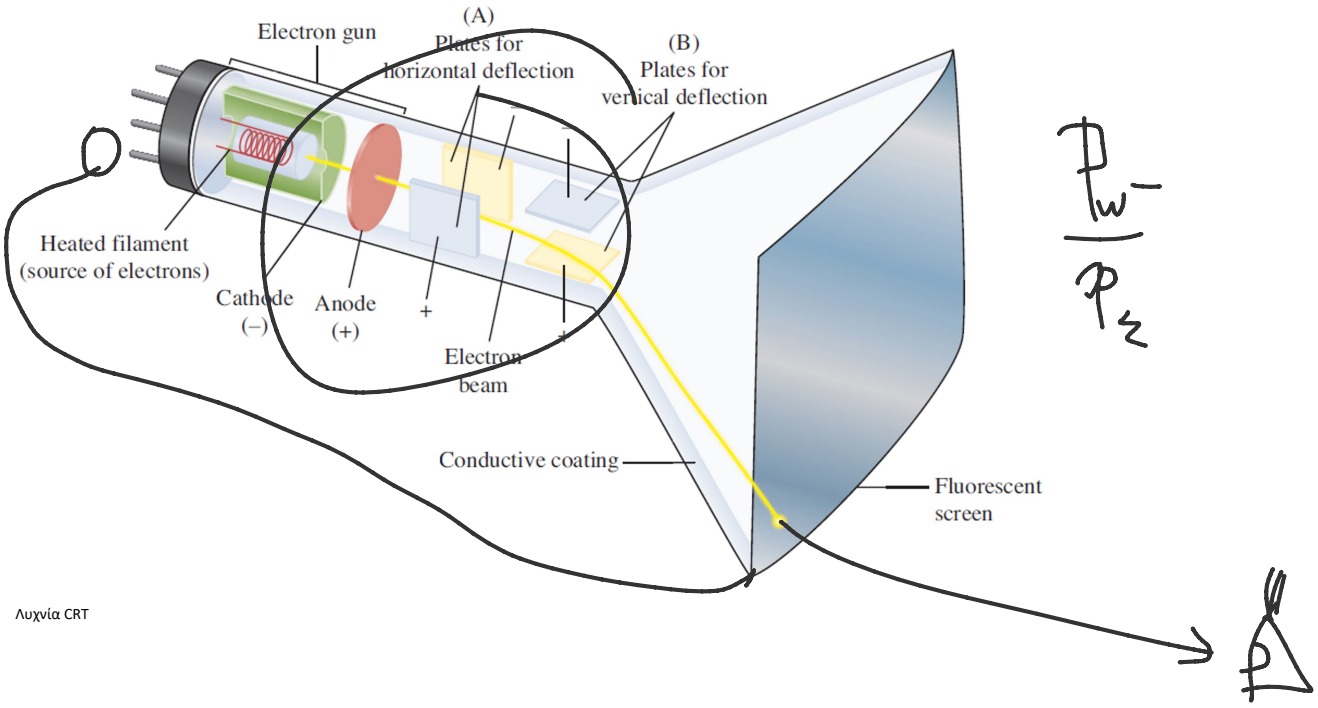




$$I = \frac{12}{R_2 + 10}$$







Λυχνία CRT

Αντίσταση

(a) (b)

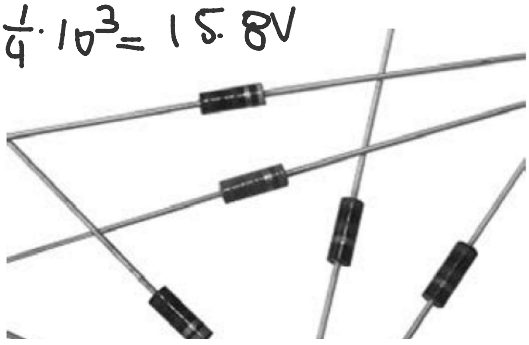
Courtesy of Vishay Intertechnology, Inc.

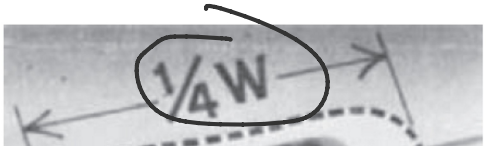
$V = \sqrt{P \cdot R} = \sqrt{\frac{1}{4} \cdot 1} = 0.5V$

$V = \sqrt{\frac{1}{4} \cdot 10^3} = 15.8V$

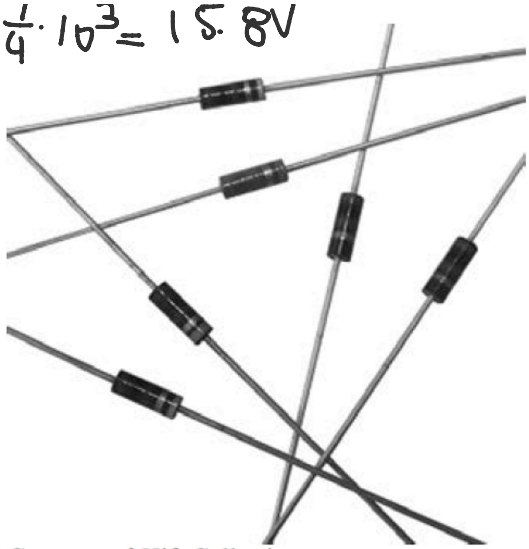
$R = 1\Omega \quad R = 1k\Omega$

$P = V \cdot I = RI^2 = \frac{V^2}{R}$



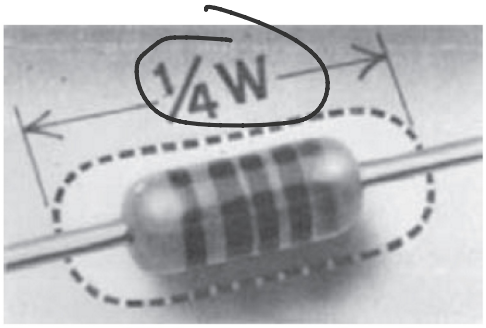


$V = V\frac{1}{4} \cdot 10^3 = 15.8V$



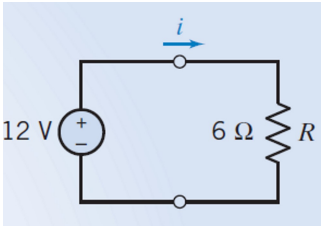
Courtesy of Hifi Collective.

$P = V \cdot I = RI^2 = \frac{V^2}{R}$

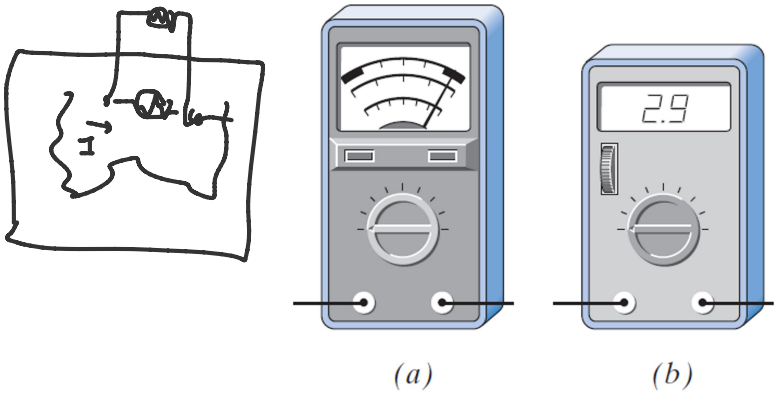


Courtesy of Vishay Intertechnology, Inc.

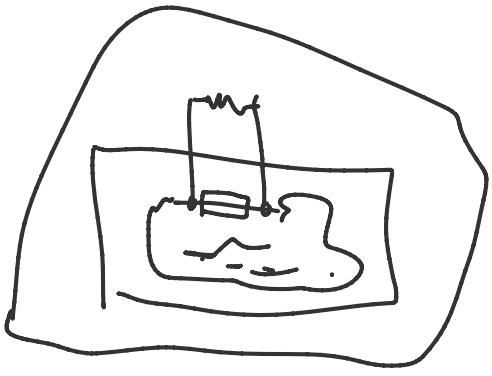
FIGURE 2.4-7 A 1/4-watt metal film resistor. The body

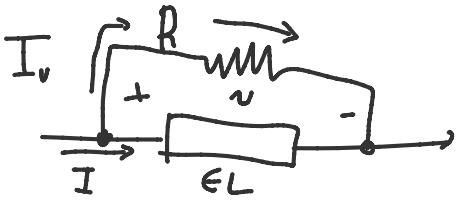


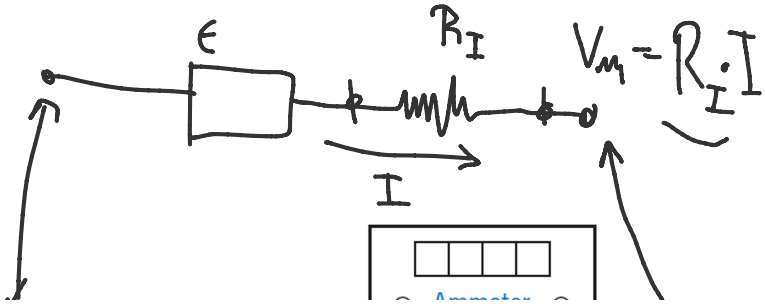
V=RI

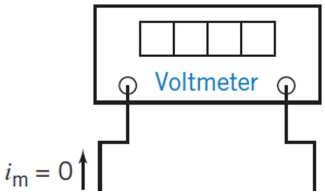


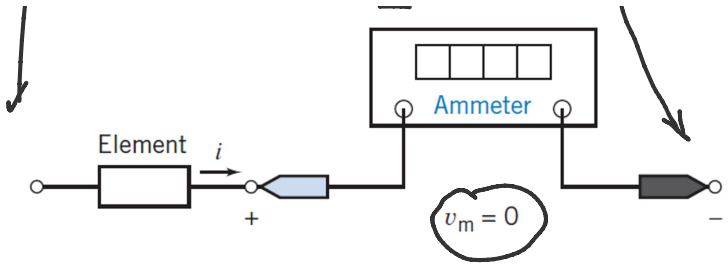
(a) (b)



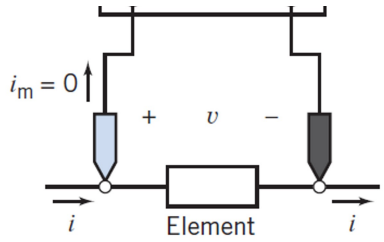




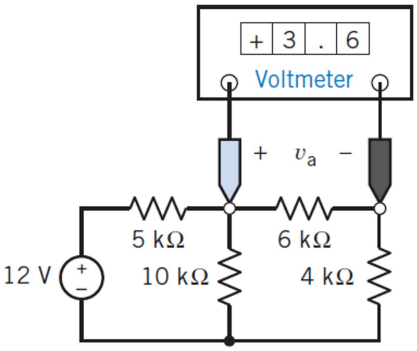


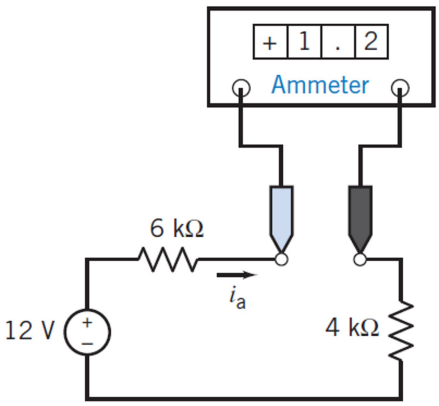


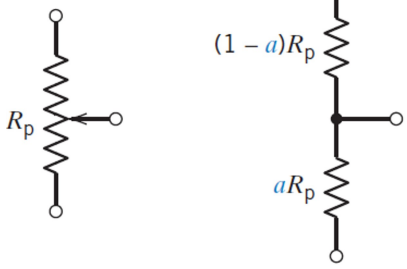
(a)



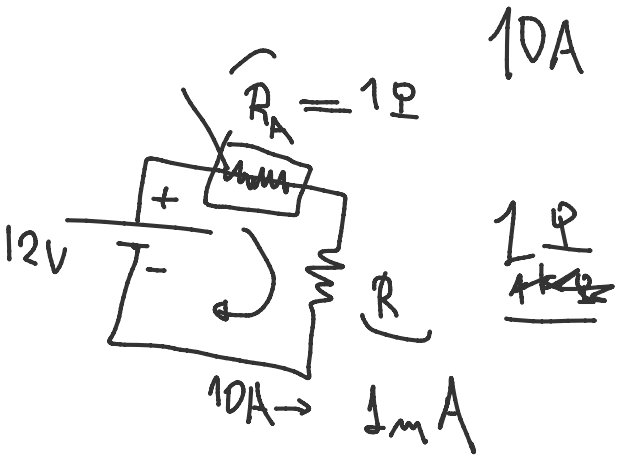
(b)







Ποντεσιόμετρα



$I = 1mA$

$R = \frac{12V}{10^{-3}A} = 12k\Omega$

$12 = (R+1)\cdot 10^{-3} \Rightarrow R = 12000 - 1 \simeq 12k\Omega$

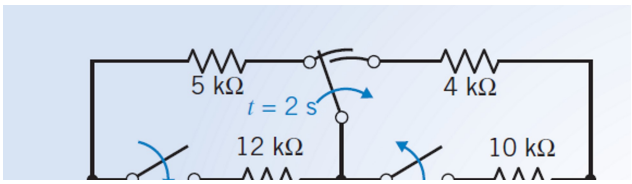
$I = 10A$

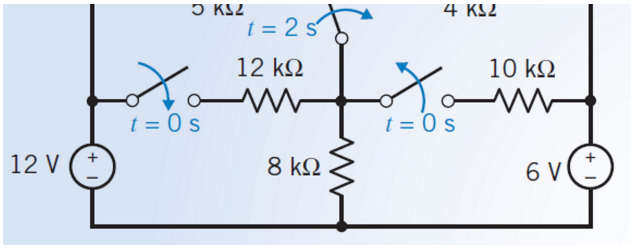
$R = \frac{V}{I} = \frac{12}{10} = 1.2\Omega$

$12V = (R+1)\cdot 10 \Rightarrow$

$12V = R\cdot 10 + 10 \Rightarrow$

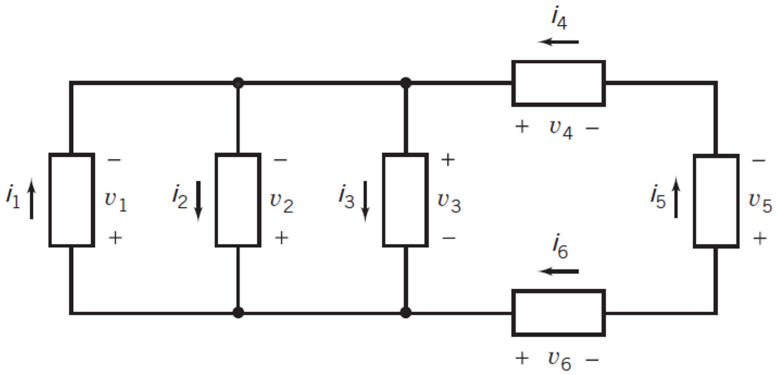
$\Rightarrow R = \frac{2}{10} = 0.2\Omega$



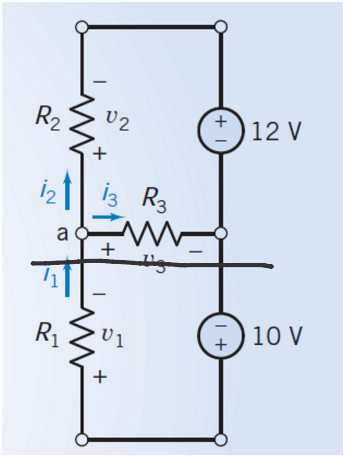


$$\Rightarrow R = \frac{2}{10} = 0.2\,\Omega$$

Νόμοι του Kirchhoff:
(KCL)Το άθροισμα των ρευμάτων σε κάθε κόμβο είναι μηδέν
(KVL) Το άθροισμα των τάσεων σε κάθε βρόγχο είναι μηδέν

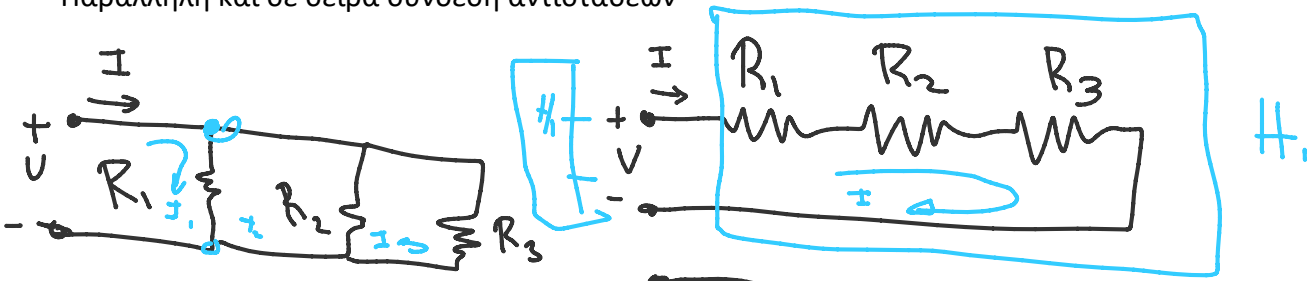


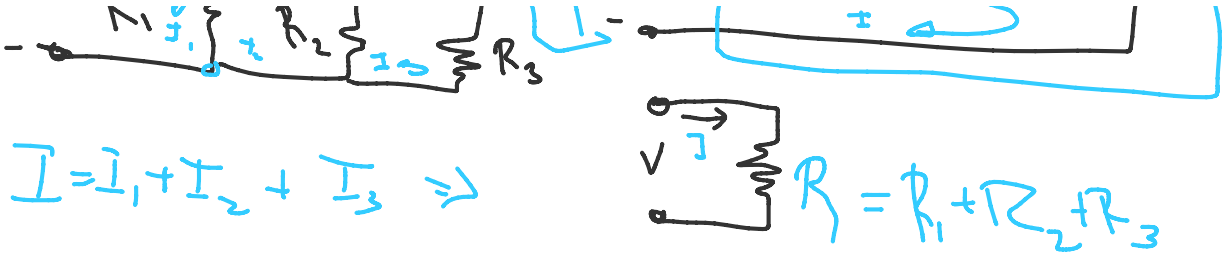
Σε κάθε αντίσταση γνωρίζω ότι V=RI (Ohm)



$R_1 = 8\,\Omega \qquad i_3 = 2\,A \qquad V_2 = -10\,V$

Παράλληλη και σε σειρά σύνδεση αντιστάσεων





$$I = I_1 + I_2 + I_3 \Rightarrow$$

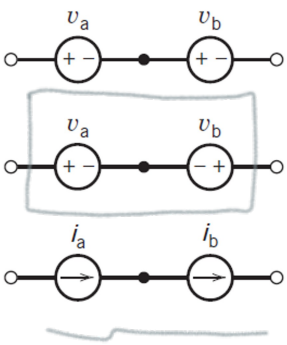
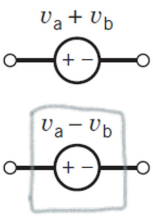
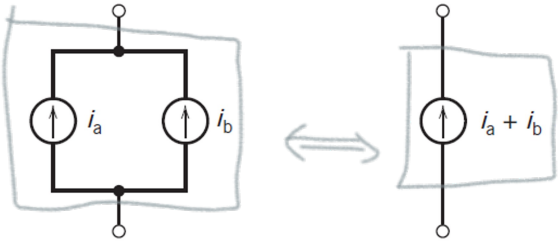
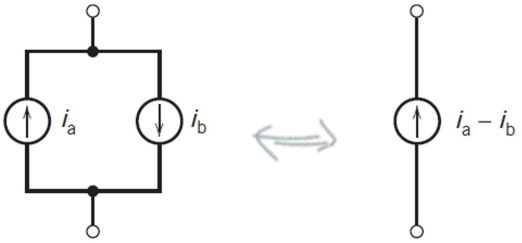
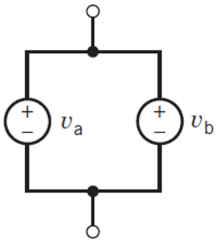
$$R = R_1 + R_2 + R_3$$

$$V = V_{R_1} + V_{R_2} + V_{R_3} = R_1 I + R_2 I + R_3 I \Rightarrow$$

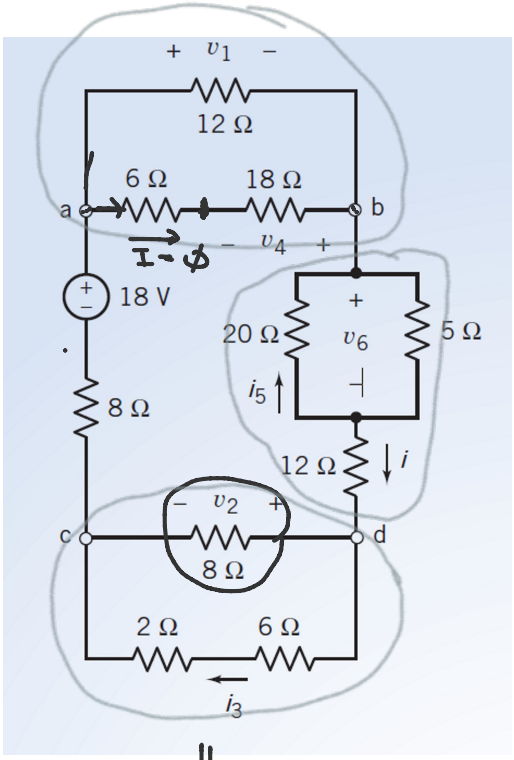
$$V = \underbrace{(R_1 + R_2 + R_3)}_{R} I$$

$$V = R \cdot I$$

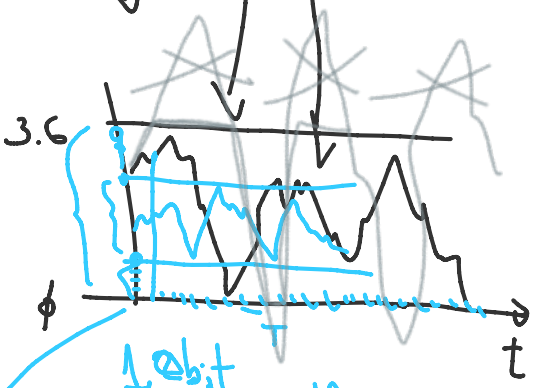
Table 3.5-1 Parallel and Series Voltage and Current Sources

CIRCUIT	EQUIVALENT CIRCUIT	CIRCUIT	EQUIVALENT CIRCUIT
	 Not allowed		
			
			Not allowed

Παράδειγμα



$V_b - V_d = 3V$

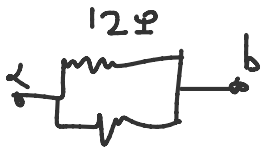


1 bit

$2^{10} = 1024$

gbit

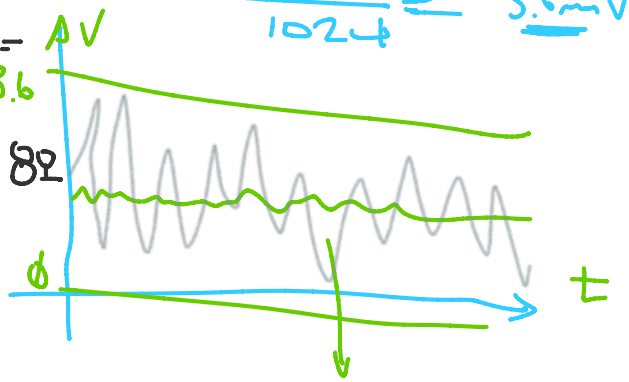
(0, 1023)

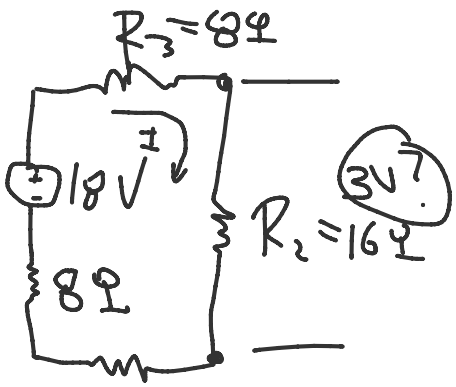


$\frac{1}{R_3} = \frac{1}{12} + \frac{1}{24}$

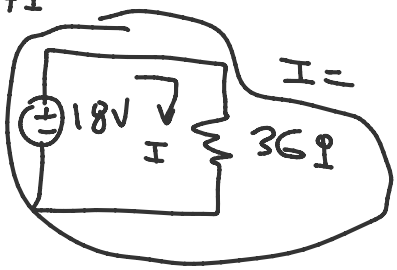
$\frac{3.6V}{1024} \approx 3.6mV$

$R_3 = \frac{12 \cdot 24}{12+24} = \frac{288}{36} = 8\Omega$





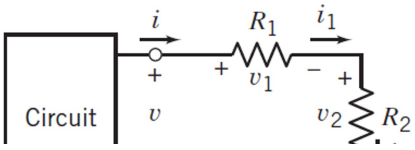
$V_{R_2} = 16\Omega \times 0.5A = 8V$

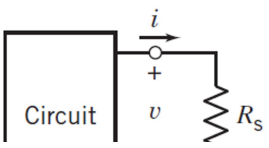


$I = \frac{18}{36} = 0.5A$

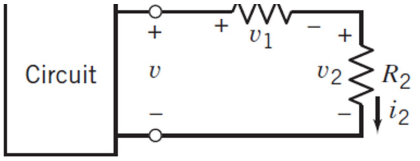
$\Rightarrow I_1 = \frac{3V}{16\Omega} = 0.18A$

Series resistors

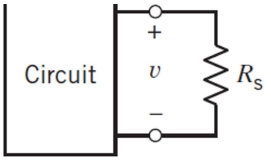




Series resistors



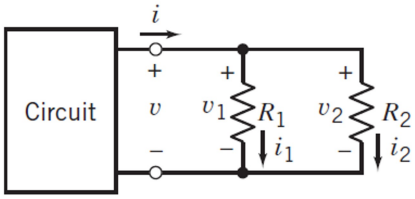
$$i = i_1 = i_2, v_1 = \frac{R_1}{R_1 + R_2} v, \quad \text{and} \quad v_2 = \frac{R_2}{R_1 + R_2} v$$



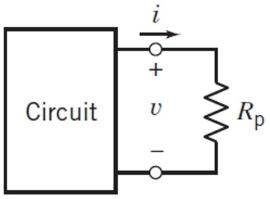
$$R_s = R_1 + R_2 \quad \text{and} \quad v = R_s i$$

$$S_s = \frac{S_1 \cdot S_2}{S_1 + S_2}$$

Parallel resistors



$$v = v_1 = v_2, i_1 = \frac{R_2}{R_1 + R_2} i, \quad \text{and} \quad i_2 = \frac{R_1}{R_1 + R_2} i$$

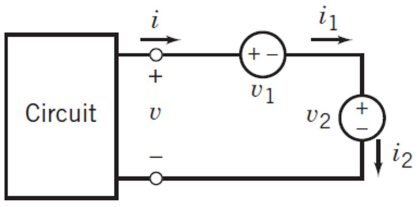


$$R_p = \frac{R_1 R_2}{R_1 + R_2} \quad \text{and} \quad v = R_p i$$

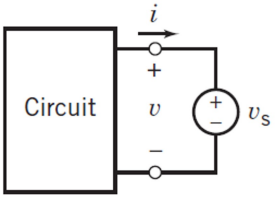
$$\frac{1}{R} = \text{Ağ iletkenliği} = S$$

$$S_p = S_1 + S_2$$

Series voltage sources

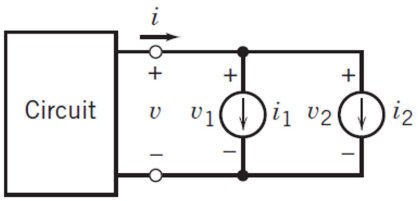


$$i = i_1 = i_2 \quad \text{and} \quad v = v_1 + v_2$$

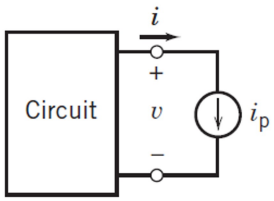


$$v_s = v_1 + v_2$$

Parallel current sources



$v = v_1 = v_2$ and $i = i_1 + i_2$



$i_p = i_1 + i_2$