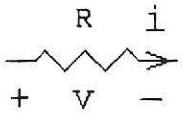
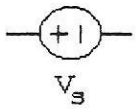
SOME USEFUL FACTS

Resistor & Ohm's Law



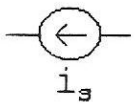
$v = Ri$ or $i = Gv$, $G = \frac{1}{R}$

Voltage Source



Voltage v_s is known.
Current is unknown.

Current Source



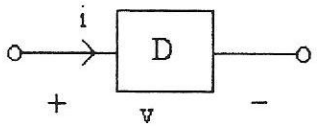
Current i_s is known.
Voltage is unknown.

Power & the Passive Sign Convention [PSC]

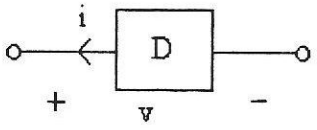
Power into a device [or absorbed by the device]: $p_{in} = vi$
[using the passive sign convention]

Power to a resistor: $p_R = v\,i = i^2R = \frac{v^2}{R}$

$p = \frac{dw}{dt}$



Power out of a device [or delivered by the device]: $p_{out} = vi$
[not using the passive sign convention]



Kirchhoff's Laws

KVL: algebraic sum of voltages around a loop equals zero; or sum of all voltage drops around a loop equals zero.

KCL: algebraic sum of currents at a node equals zero; or sum of all currents leaving a node equals zero.

Series & Parallel Combinations

Voltage sources: in series: add the voltage waveforms
in parallel: the voltages must be the same

Current sources: in parallel: add the current waveforms
in series: the currents must be the same

Resistance in Parallel

$$\frac{1}{R_{eq}} = \sum_{i=1}^{k} \frac{1}{R_i} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_k}$$

ADD resistances in SERIES $R_{eq} = \sum_{i=1}^{k} R_i = R_1 + R_2 + \cdots + R_k$

ADD conductances in PARALL $G_{eq} = \sum_{i=1}^{k} G_i = G_1 + G_2 + \cdots + G_k$

Two resistors in parallel:

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2}$$

Voltage divider $v_j = iR_j = \left(\frac{R_j}{R_{eq}}\right) v$

Current divider $i_j = \frac{v}{R_j} = \left(\frac{R_{eq}}{R_j}\right) i$

$v = \frac{dw}{dq}$; $i = \frac{dq}{dt}$

TABLE 1.3 Standardized Prefixes to Signify Powers of 10

Prefix	Symbol	Power
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nano	n	10^{-9}
micro	μ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}
deka	da	10
hecto	h	10^{2}
kilo	k	10^{3}
mega	M	10^{6}
giga	G	10^{9}
tera	T	10^{12}