INGENIERIA
UNIVERSIDAD DE LOS ANDES
MÉRIDA VENEZUELA

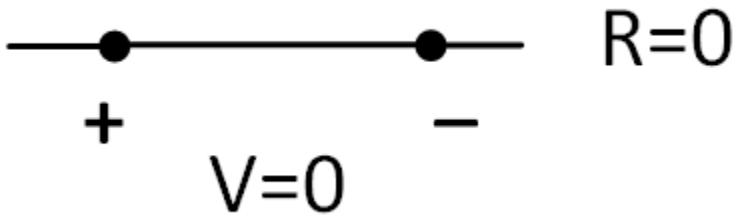
INGENIERIA ELECTRICA
ULA

Elementos del Circuito eléctrico (2/2)

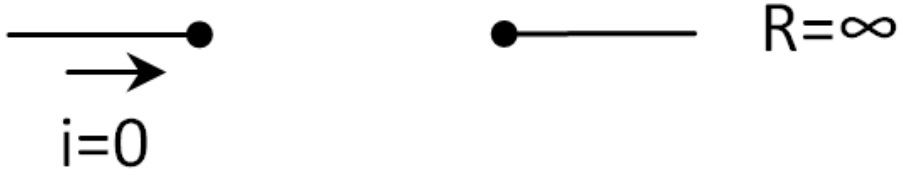
Prof. Gerardo Ceballos

Corto Circuito y Circuito Abierto

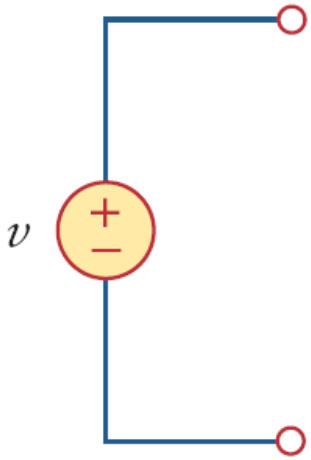
- Corto circuito

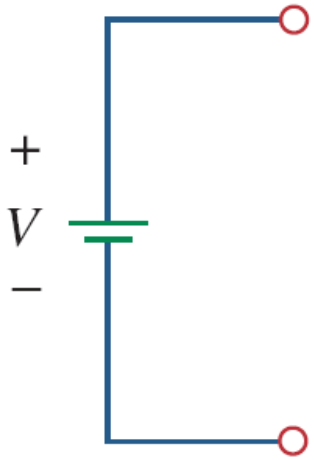


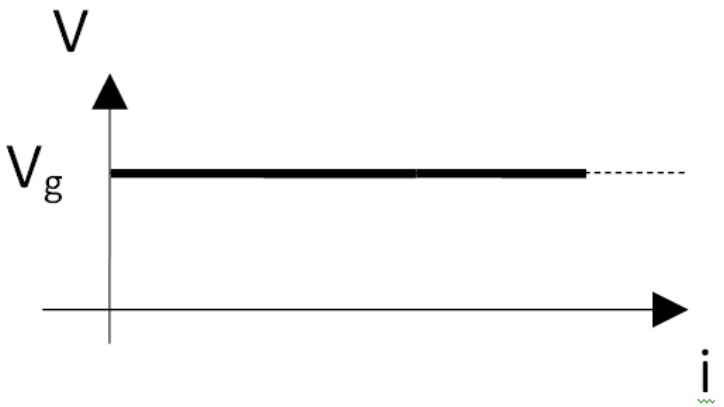
- Circuito abierto



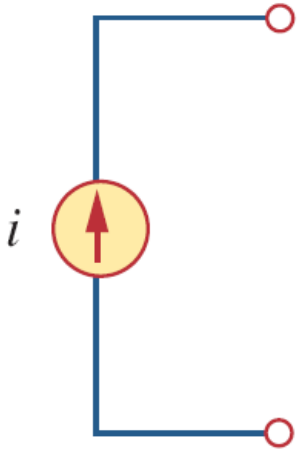
Fuente de voltaje ideal

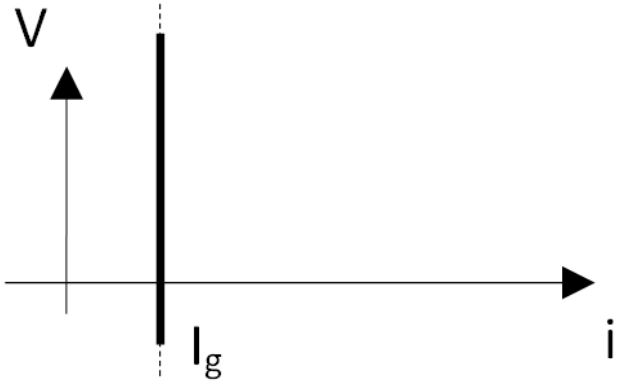




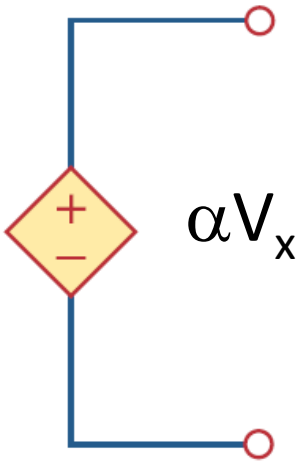


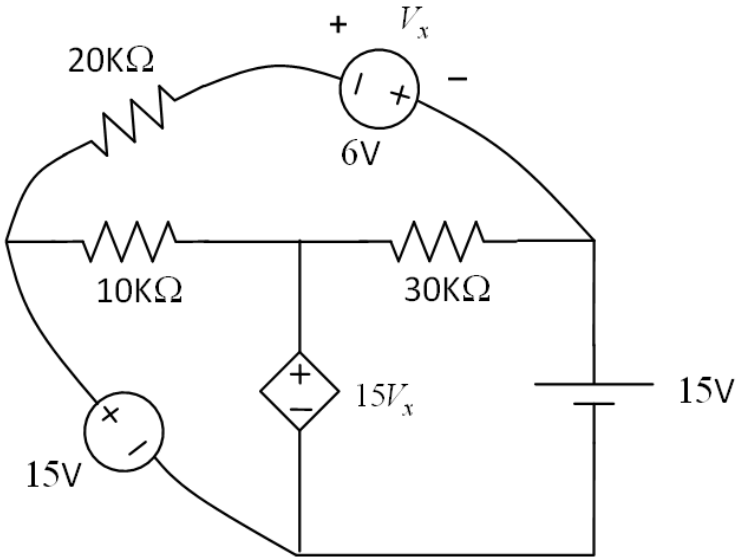
Fuente de corriente ideal



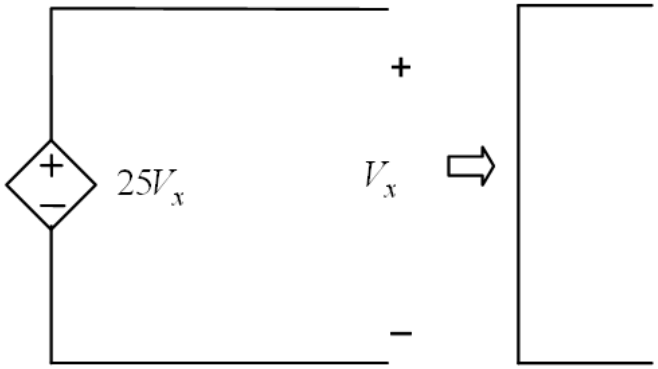


Fuente de voltaje controlada por voltaje

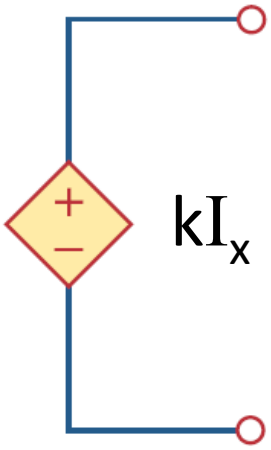


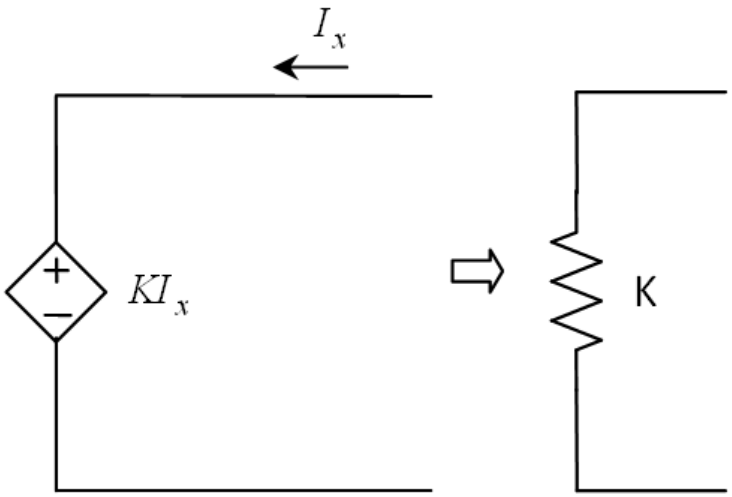


Ejemplo:

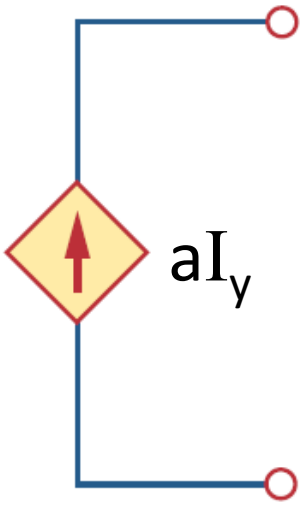


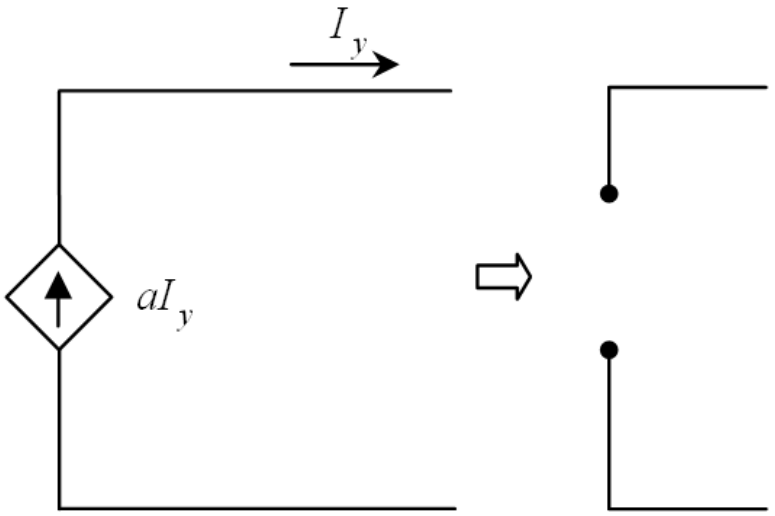
Fuente de voltaje controlada por corriente



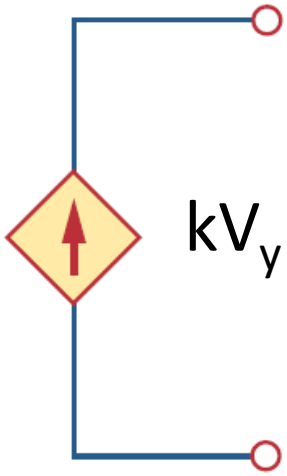


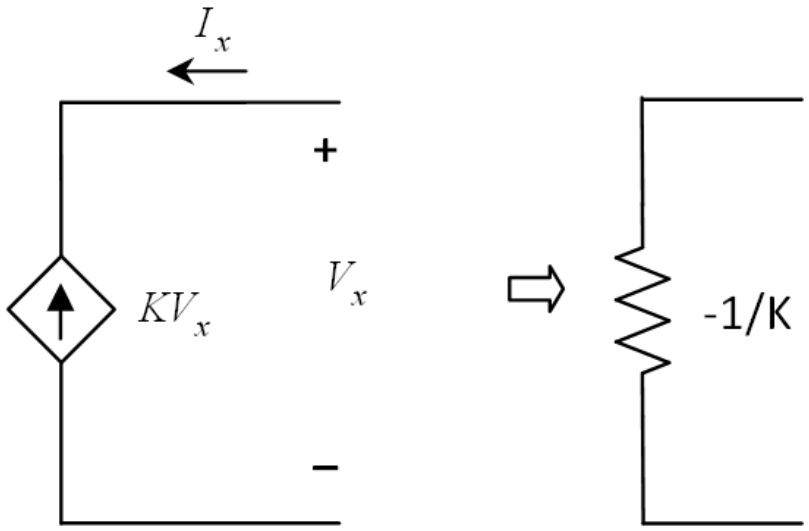
Fuente de corriente controlada por corriente





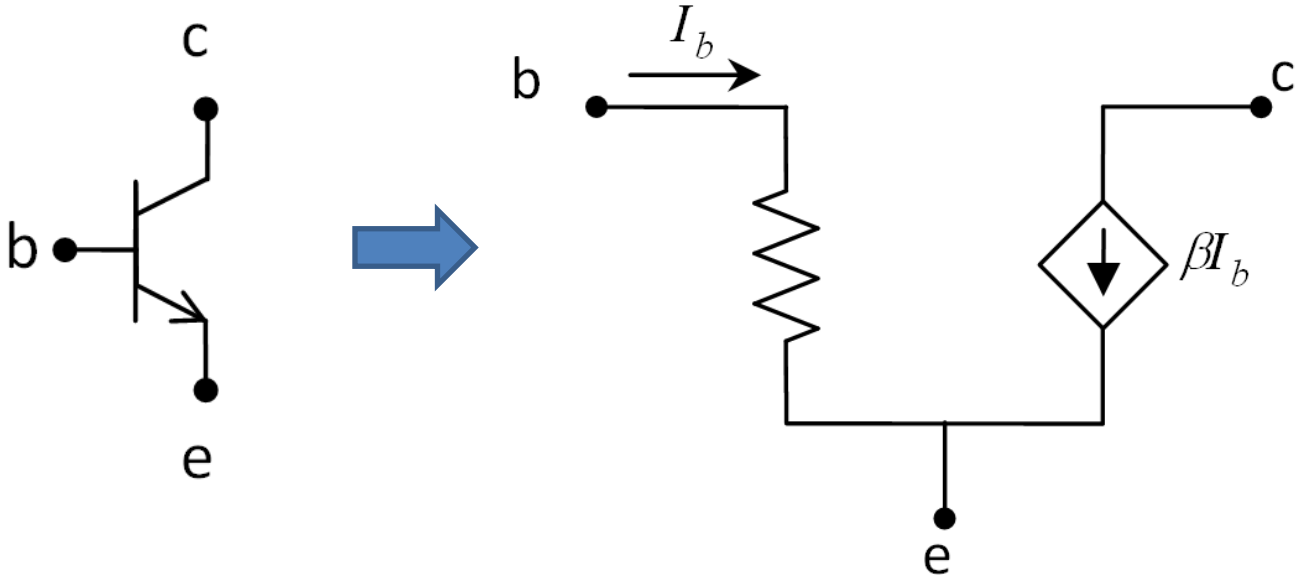
Fuente de corriente controlada por voltaje





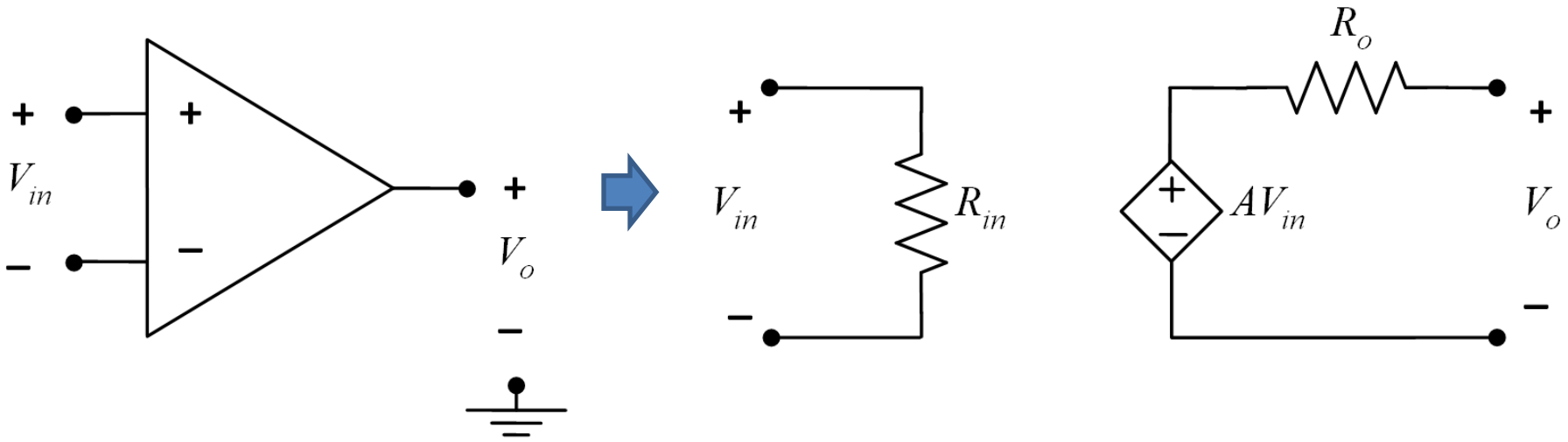
Las fuentes controladas se usan para modelar circuitos

- Ej: Transistor



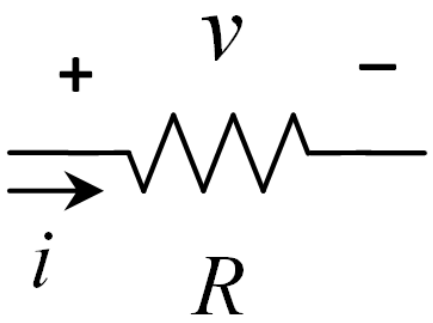
Las fuentes controladas se usan para modelar circuitos

- Ej: OPAMP



Potencia y energía

- Convenciones de signo



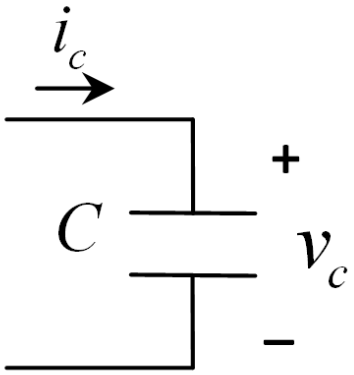
$$v = R.i$$

$$p = v.i = v\frac{v}{R} = \frac{v^2}{R} = i.Ri = i^2R$$

$$E = \int_{t_0}^{t} p(t)dt = \int_{t_0}^{t} i^2 R dt = \int_{t_0}^{t} \frac{v^2}{R} dt$$

Potencia y energía

- Convenciones de signo



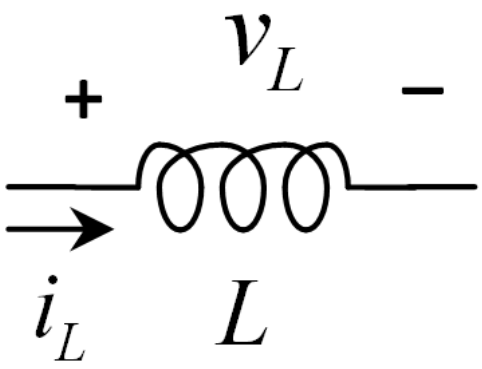
$$i_c = C\frac{dv_c}{dt} \qquad v_c(t) = v_c(t_0) + \frac{1}{C}\int_{t_0}^{t} i_c(\tau)d\tau$$

$$p = v.i = v_c C\frac{dv_c}{dt}$$

$$E = \int_{-\infty}^{t} p(t)dt = \int_{-\infty}^{t} Cv_c\frac{dv_c}{dt}dt = \frac{1}{2}Cv_c^{\,2}$$

Potencia y energía

- Convenciones de signo



$$v_L = L\frac{di_L}{dt} \qquad i_L(t) = i_L(t_0) + \frac{1}{L}\int_{t_0}^{t} v_L(\tau)\,d\tau$$

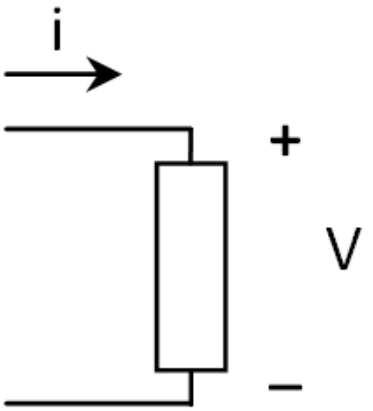
$$p = v.i = i_L L\frac{di_L}{dt}$$

$$E = \int_{-\infty}^{t} p(t)\,dt = \int_{-\infty}^{t} L i_L \frac{di_L}{dt}\,dt = \frac{1}{2} L i_L{}^2$$

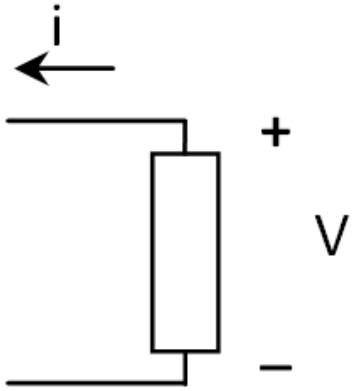
Potencia entregada y absorbida (convención de signo)

(consumida)

Potencia absorbida =V.i



Potencia entregada =V.i

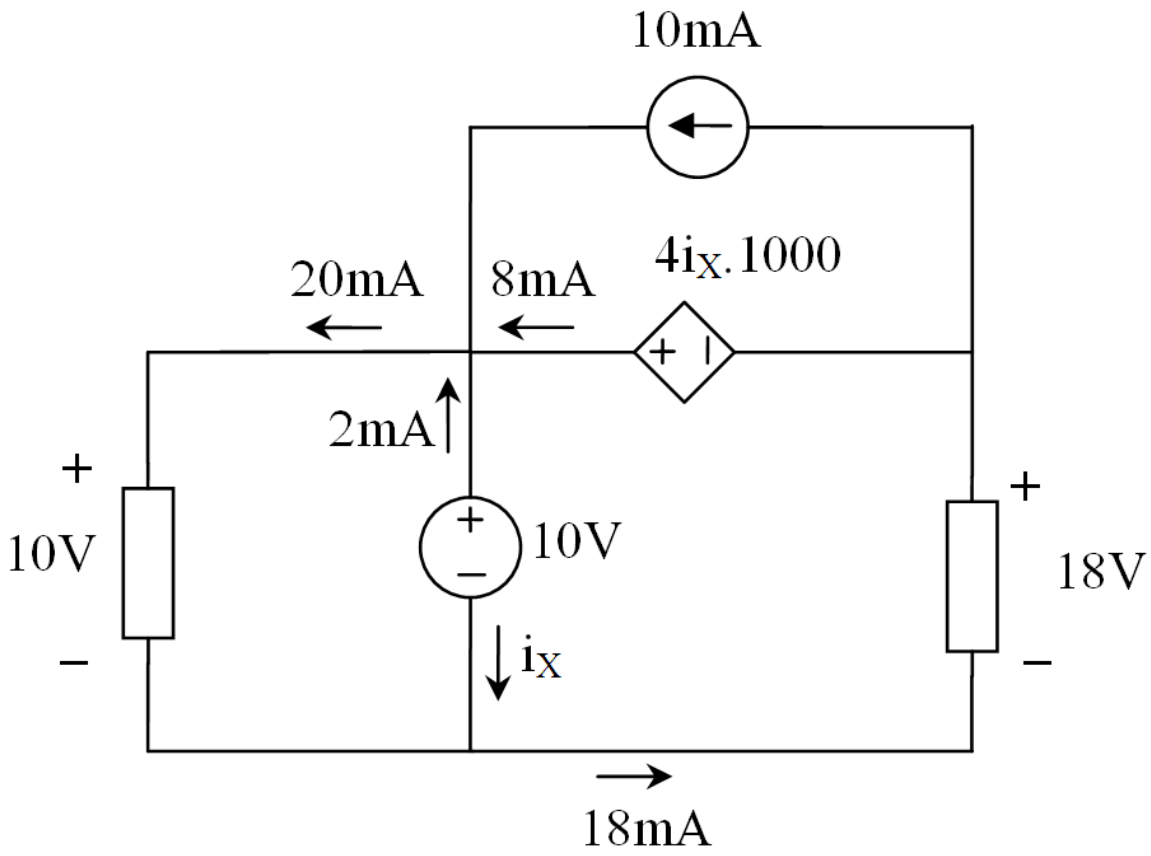


En un circuito:

$$\sum pot \text{ entregada} = \sum pot \text{ absorbida}$$

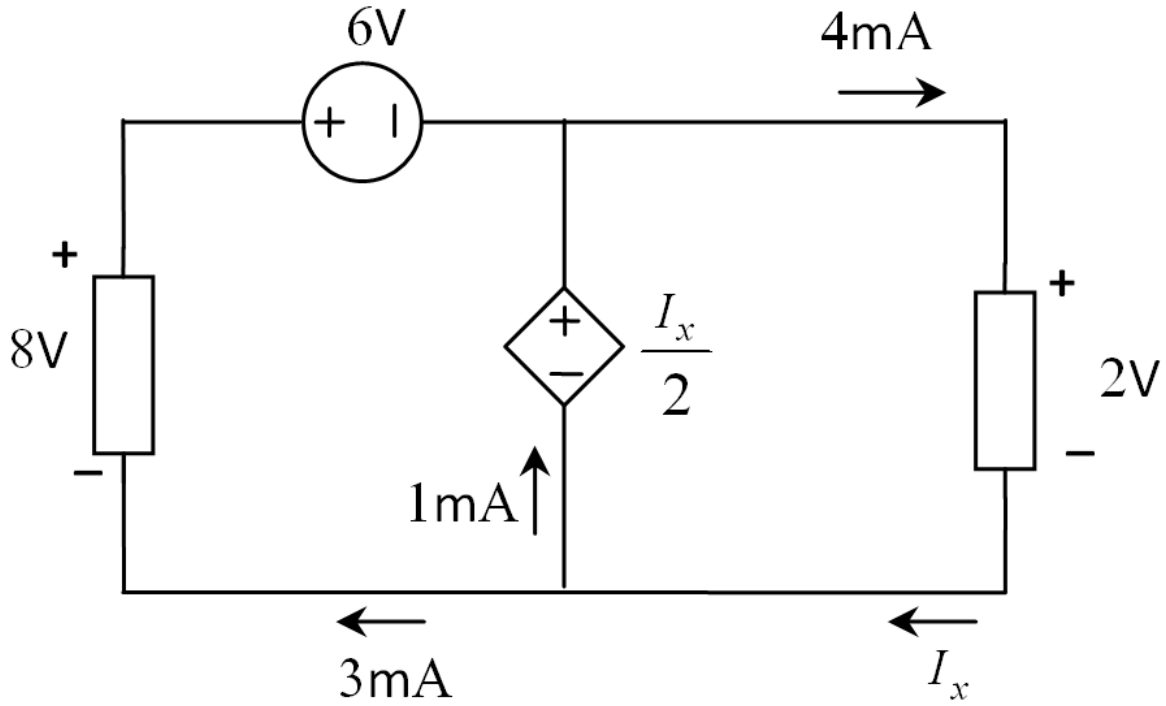
Ejemplo:

Comprobar el principio de conservación de energía, quien entrega y quien recibe potencia.



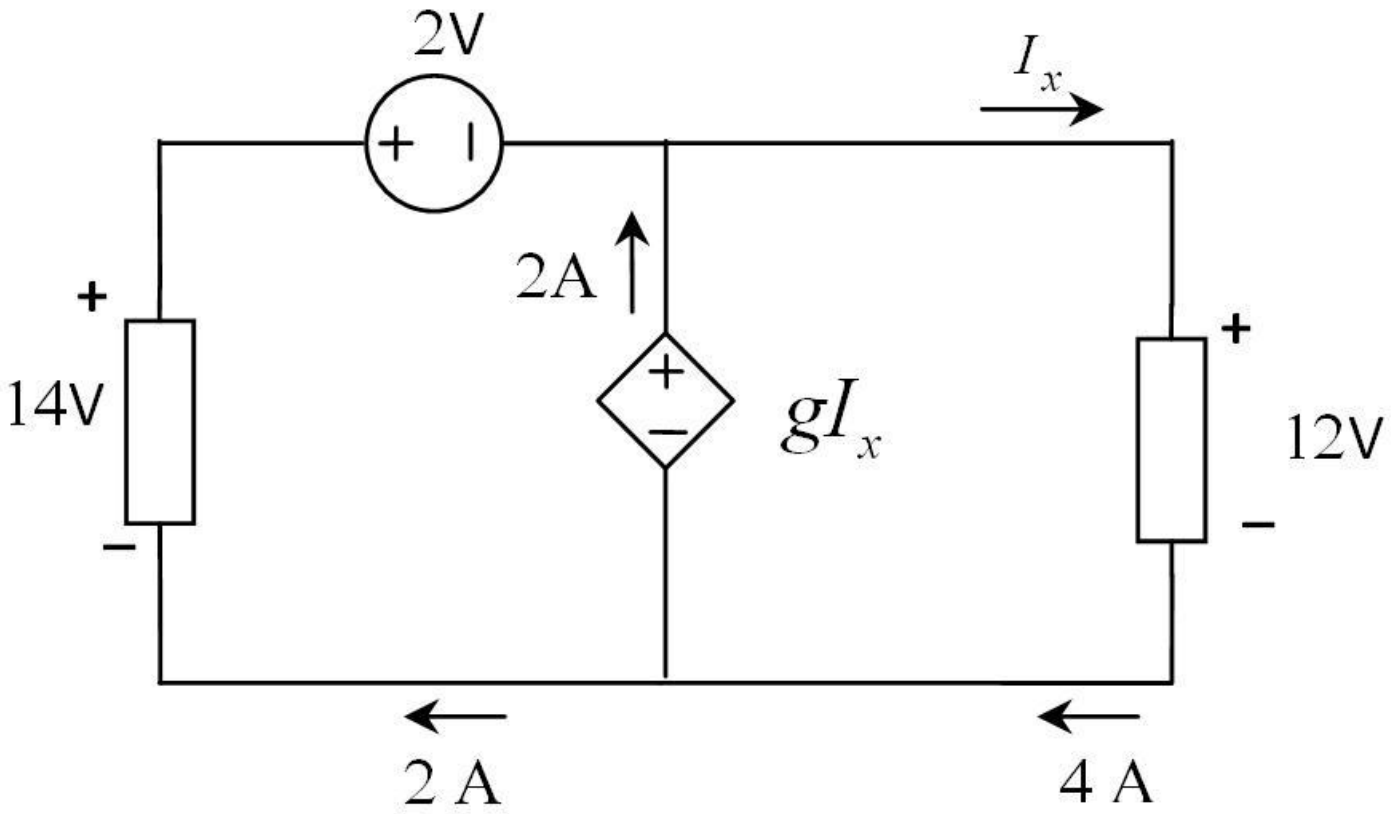
Ejercicio propuesto

Calcular potencia absorbida y entregada por cada elemento. Comprobar sumatoria de pot. entregada igual a absorbida



Ejercicio propuesto

Determinar el valor de la constante g para que se cumpla el balance energético



Bibliografía

- Ilustraciones de:
  - Serway, Physics, 6ta ed.
  - Alexander, Sadiku, Fundamentals of Electric Circuits, 5th ed.