* Chapter 1.

◈ Reading Assignment : 1.1., 1.2.,

◦ **Electric Circuit** (Electric Network)

- An interconnection of electrical elements linked together in a closed path so that an electrical current may flow continuously.

◦ Charge (=전하) - the quantity of electricity responsible for electric phenomena.

◎ **Current** - the time rate of flow of electric charge past a given point.

(전류는 방향이 아니다)

◦ Direct current (dc current) - a current of constant magnitude.
(not a function of time)

Let q = charge and i = current : $$i = \frac{dq}{dt} \quad \text{—①}$$

◦ Alternating current (ac current) : a sinusoidal (정-부) time-varying current.

from Eq. ① : $$q = \int_{-\infty}^{t} i\,d\tau = \int_{0}^{t} i\,d\tau + q(0)$$ (pulse: 펄스)

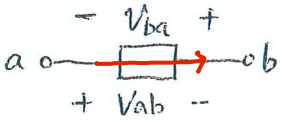
(dummy)

where : $q(0)$ = the charge at $t=0$.

◎ **Voltage**

- The voltage across an element is the work (energy) required to move a unit "positive" charge from the '-' terminal to the '+' terminal. (The unit = V) (= ΔW)

$$v = \frac{dw}{dq}$$



$$V_{ab} = -V_{ba}$$

Eg.) A charge of 1 coulomb delivered an energy of 1 joule as it moves through a voltage of 1 volt.

Note)

Energy (W) = the capacity to perform work.
(=Work)

◈ Power and Energy

∘ 누구 기준 : 전지"가" 공급이 (+) 같다

- Power = the time rate of expending or absorbing energy.

(P)

$$p = \frac{dw}{dt} \quad [\text{watts}]$$

(-) : 생산
(+) : 공급

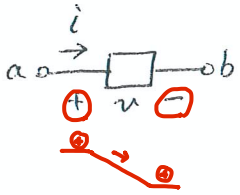
- The power associated with the current flow through an element

$$p = \frac{dw}{dt} = \frac{dw}{dq} \cdot \frac{dq}{dt} = v \cdot i$$

(Note) Power absorbed or supplied by an element

1) Power absorbed by an element

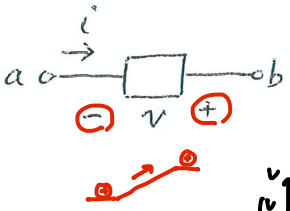
Since the reference direction of v and i adhere to the passive convention, the power $p = vi$ is the power absorbed by the element.

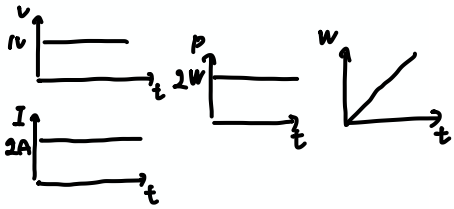


누구 기준인데 : 전지가 맛있게 먹다

2) Power supplied by an element

Since the reference direction of v and i do not adhere to the passive convention, the power $p = vi$ is the power supplied by the element.





∴ power absorbed = − power supplied

∘ The energy absorbed by an element

$$dw = p \cdot (dt)$$

$$w = \int_{-\infty}^{t} p \, d\tau$$

If the element only receives power for $t \geq t_0$ and let $t_0 = 0$, then

$$w = \int_{0}^{t} p \, d\tau$$

공을가 생각나는 공책만 시즌