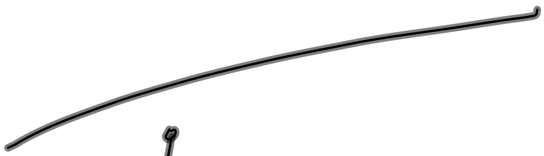
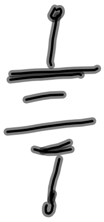
electric current ~ measure Amperes ~ Amps

I — motion of charges ~ A



wire



battery

wire in ~ parallel

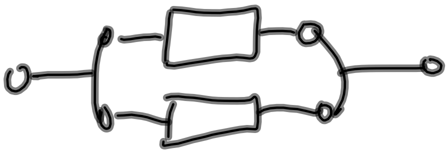
~ series

~ resistor (bulb, ...)

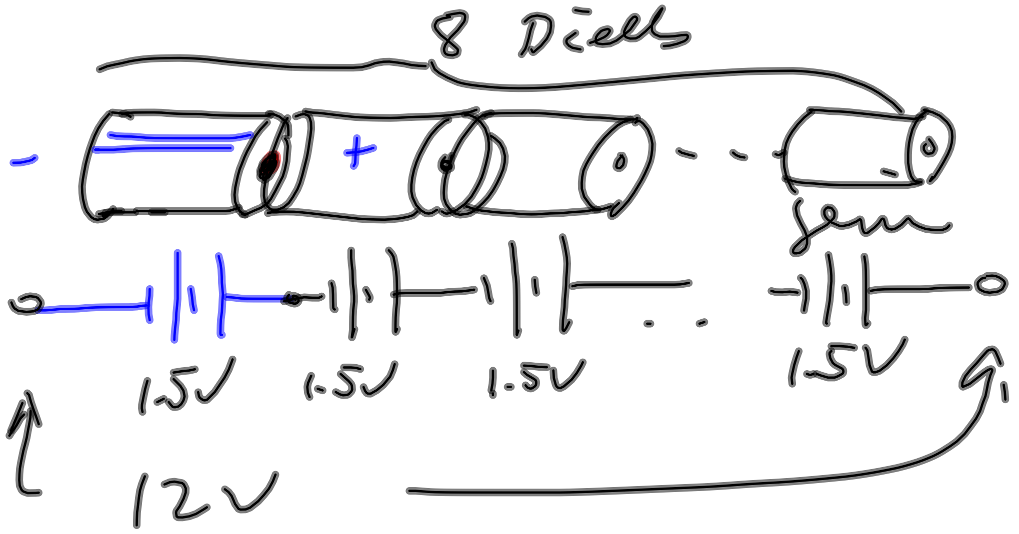
inductor

capacitor

~ series

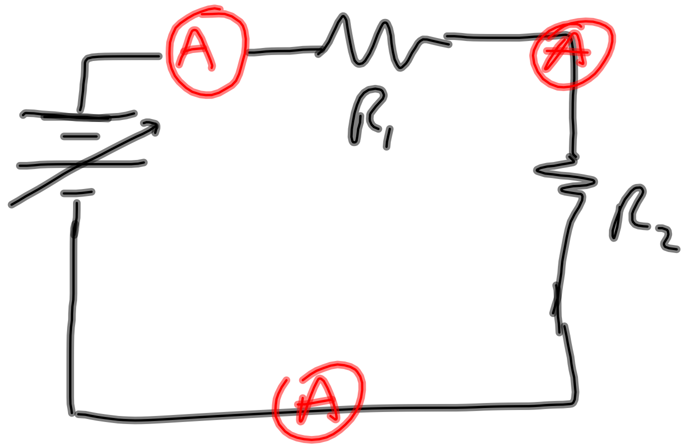


~ parallel



I)

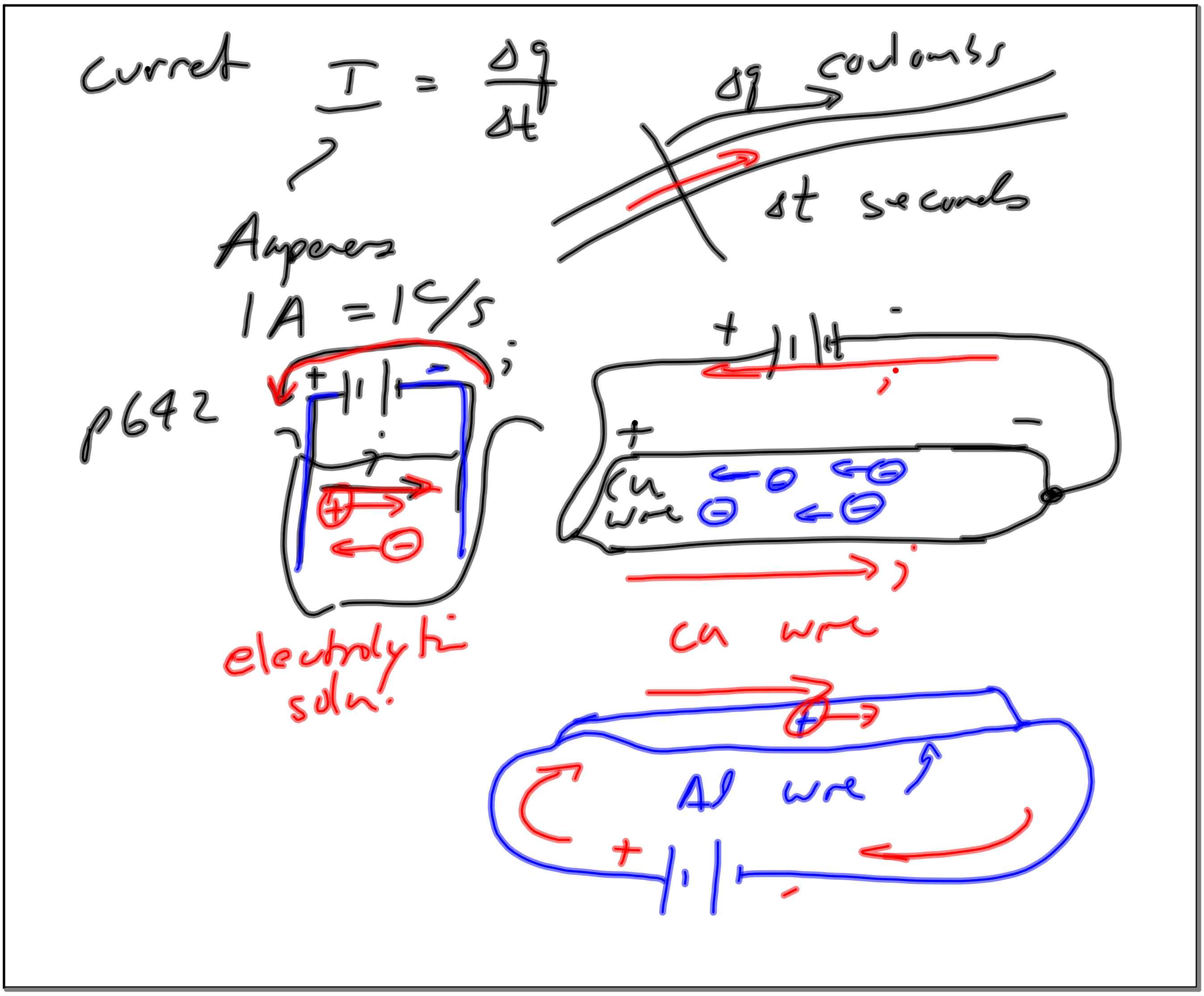
A.

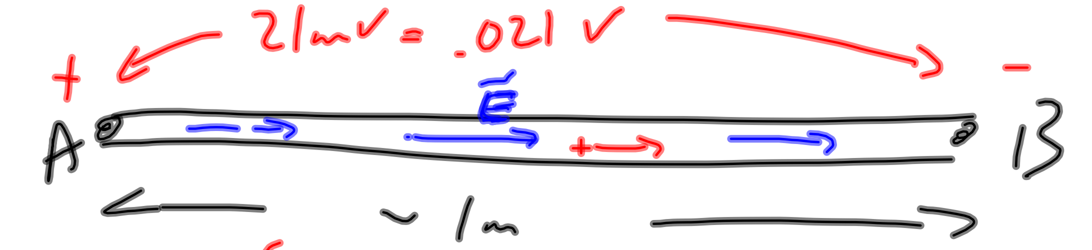


C.

B. parallel

D.


current
I = Δq/Δt
Amperes
1A = 1C/s
Δq coulombs
Δt seconds
p642
electrolytic soln
Cu wire
Cu wire
Al wire



$q\vec{E} = \vec{F}$

$$|E| = \frac{\Delta V}{\Delta x} = \frac{.021\,V}{1m} = .02\,V/m \approx 0$$

$$E_{\text{breakdown air}} \approx 3\,MV/m$$

Recall $\Delta V = \frac{\Delta U}{q}$

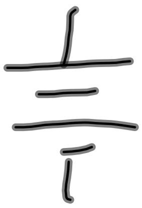
1C falling through .021 V

$$\Delta U = q\Delta V = (1C)(-.021\,V)$$
$$= -.021\,C\cdot V$$
$$= -.021\,J$$

$$C \cdot V = J$$

To increase +q>0 U, equiv. incr. V

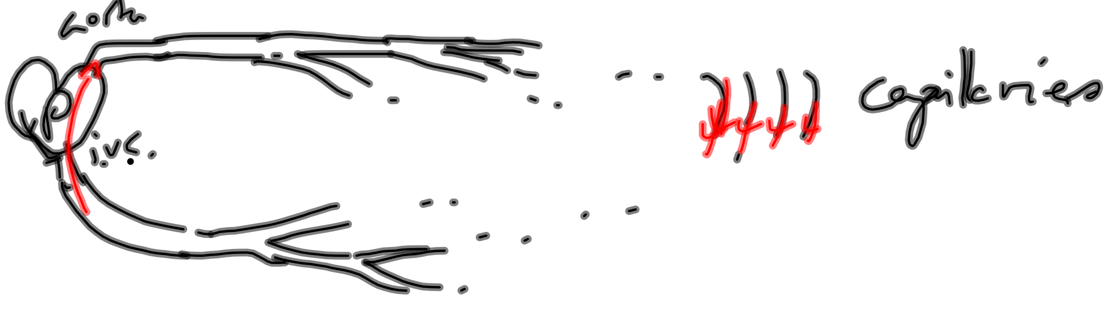
Need external force to "lift it"

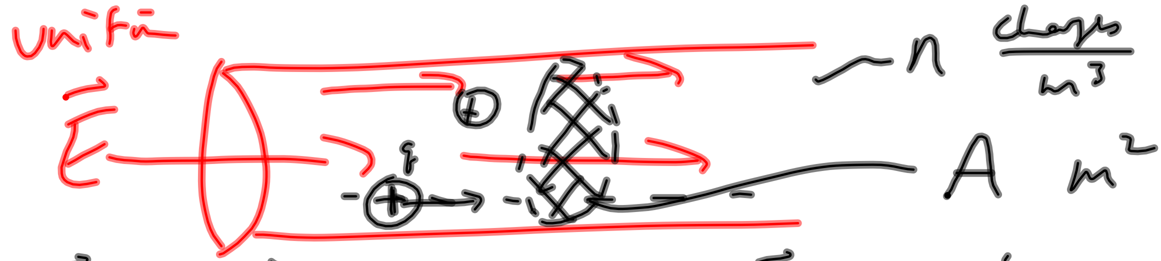


battery – converts chem energy → elec "
or
pwr syply

like humans body water uphill

or " pump incr Press of fluid – like voltage



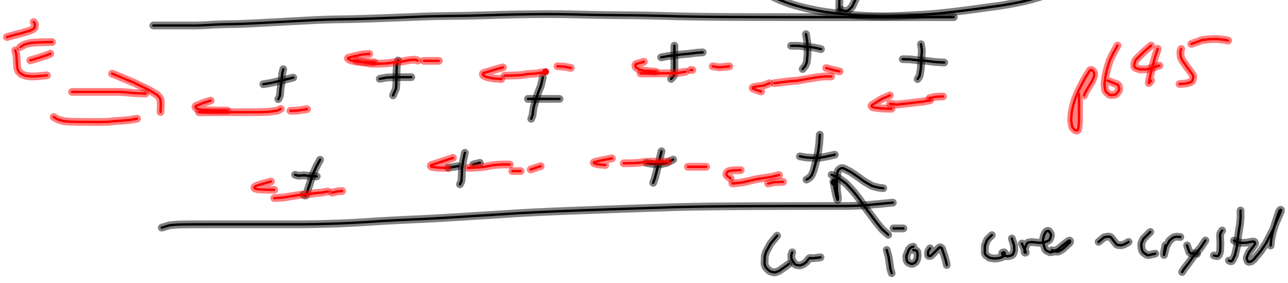


$$\vec{F} = q\vec{E} \Rightarrow \vec{a} = \left(\frac{q\vec{E}}{m}\right) \Rightarrow \vec{v}$$

$$I = (nq)\,A\,v_D$$

$$\frac{C}{s} = \frac{\#}{m^3}\cdot\frac{C}{\#}\cdot m^2\cdot\frac{m}{s}$$

$$v_D \propto E$$



p645

$$I = n q A v_D$$

1m Cu w/ 1A

$$Cu \sim 9 \frac{gm}{cc} = \frac{9\,gm}{1E{-}6\,m^3}\left(\frac{mol}{63.5\,gm}\right)\left(\frac{6E23\ Cu\ atoms}{1\,mol}\right)$$

$$n = 8.5E28\ \frac{Cu\ atoms}{m^3}\left(\frac{1\ charge\ carrier}{Cu\ atom}\right)$$

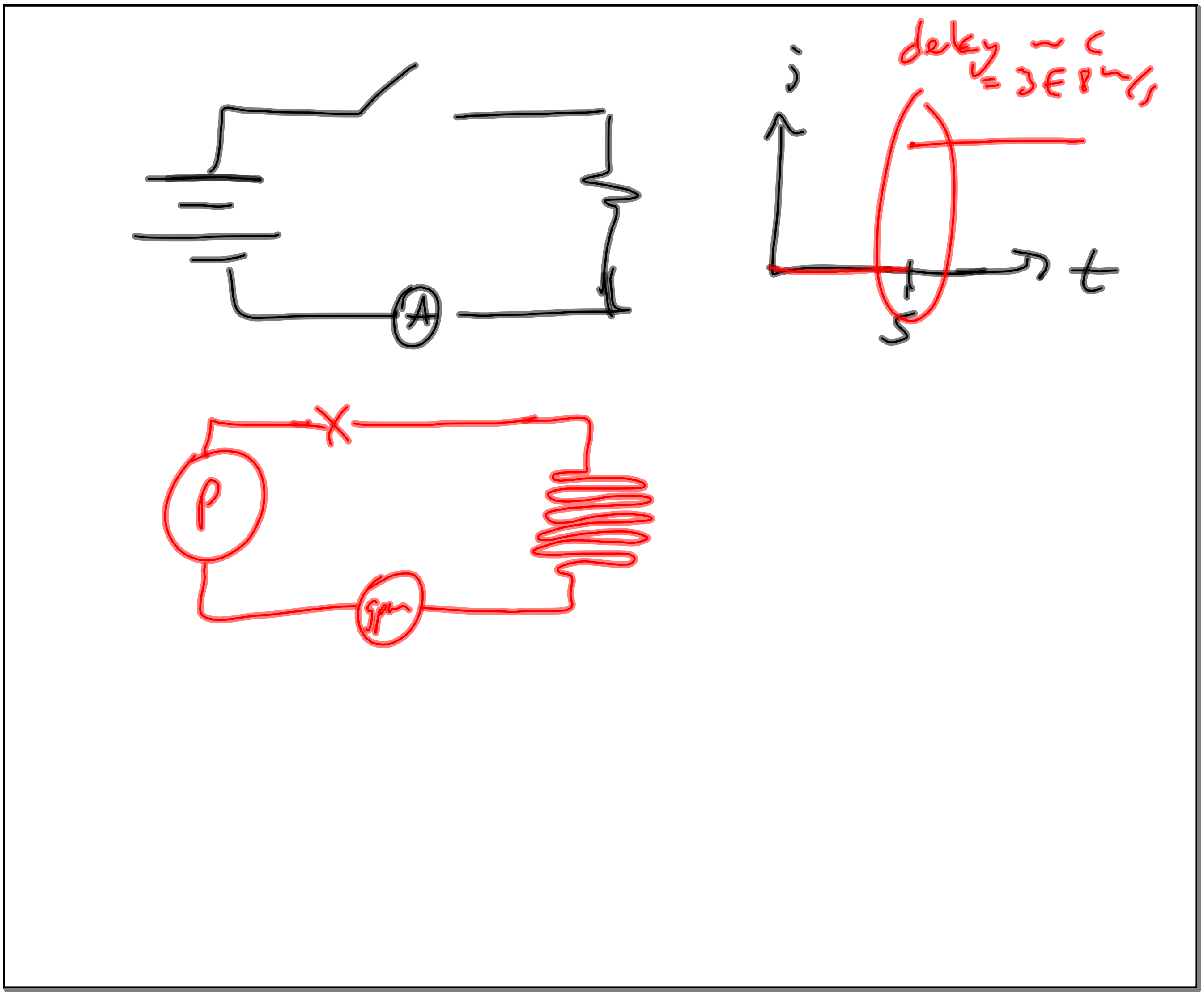
$$q = e = 1.6E{-}19\,C$$

$$A \sim (1E{-}3\,m)^2 = 1E{-}6\,m^2$$

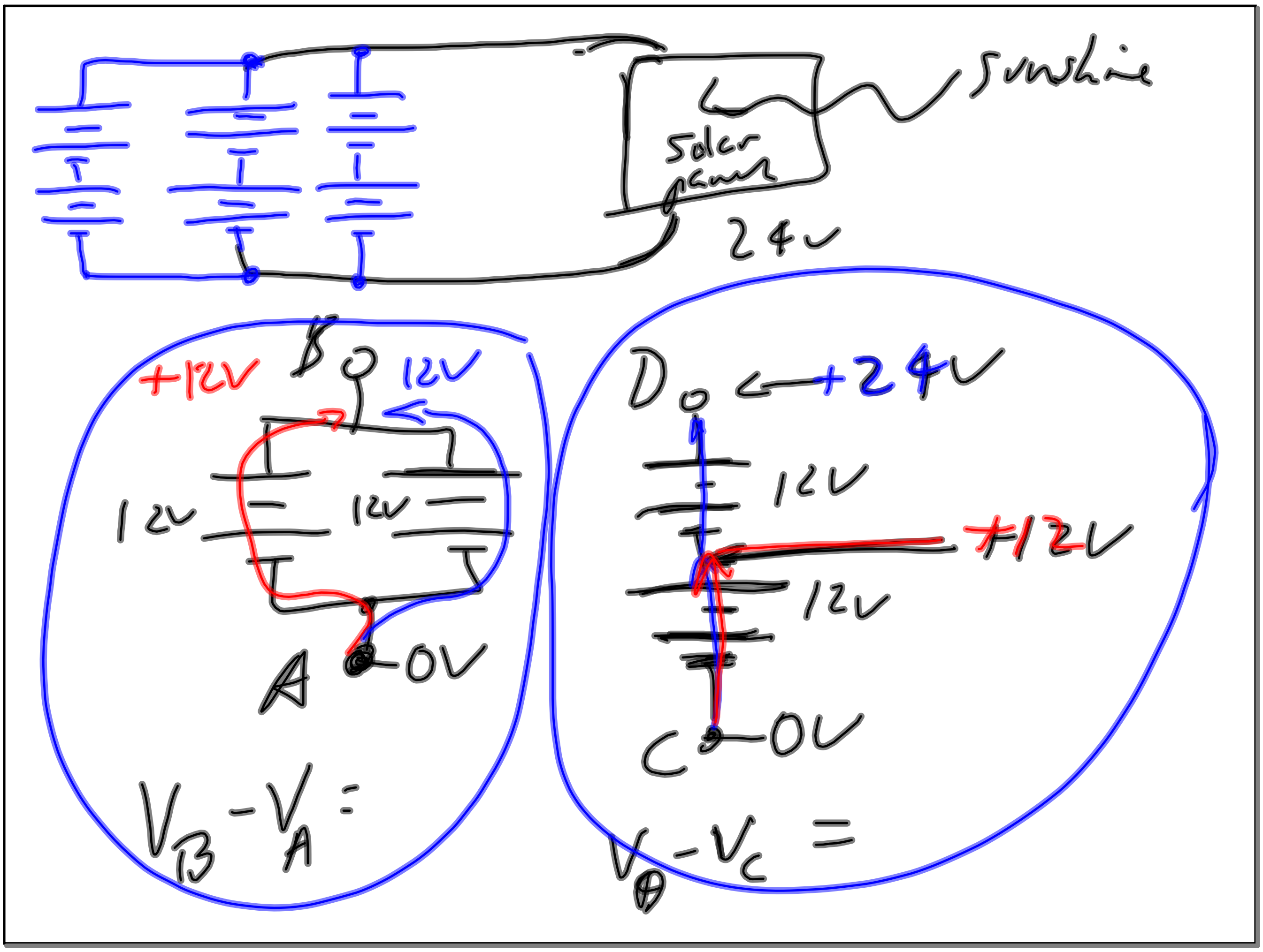
$$v_D = \frac{I}{nqA} = \frac{1\ C/s}{\left(8.5E28\ \frac{\#}{m^3}\right)\left(\frac{1.6E{-}19\,C}{\#}\right)\left(1E{-}6\,m^2\right)}$$

$$= 7E{-}5\ \frac{m}{s} \quad .07\ mm/s\ !$$

To go 10 m takes 1.6 dys ?

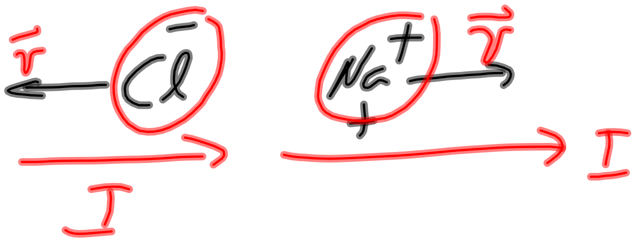


Jan 31-9:07 AM

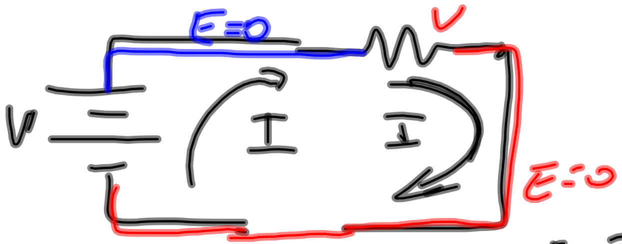


sunshine
solar power
24v
B
+12V
12V
12V
12V
A
0V
$V_B - V_A =$
D
+24V
12V
+12V
12V
C
0V
$V_D - V_C =$

C8 MC #1



(a) Both I to the right



$P_B = P_R = I \cdot V$

$P_{battery} = I \cdot V \sim A \cdot V = \frac{J}{s} = W$

(i) $= 1A \cdot 3.1V = 3.1\ W$ for 100 s

(ii) $(2A)(6.3V) = 12.6\ W$ for 200 s

electric energy $= P \cdot t$

310 J

2520 J

2830 J

Heat

25.7 °C → 28.2

$Q = (MC\Delta T)_{H_2O} + (MC\Delta T)_{can} + (MC\Delta T)_{...}$

$= (2.5\ °C)\left[(205.6\,g)\left(\frac{1\,cal}{g\,°C}\right) + (59.3\,g)\left(\frac{.2\,cal}{g\,°C}\right) + (42\,g)\left(\frac{.1\,cal}{g\,°C}\right)\right]$

$= (2.5\ °C)\left[205.6\ \frac{cal}{°C} + 11.8\ \frac{cal}{°C} + 4.2\ \frac{cal}{°C}\right]$

$= 554$ cal $= 2830$ J

$\frac{2830}{554}$

1 cal = 5.1 J

±20%

5.1 ± 1.0

mech

elect

— 4.186 J/cal