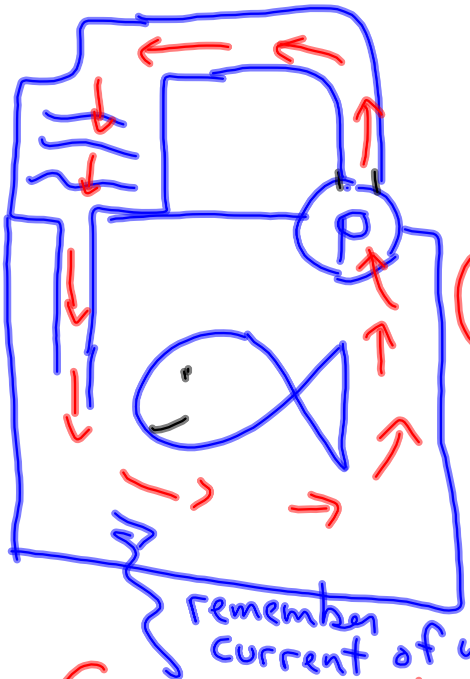
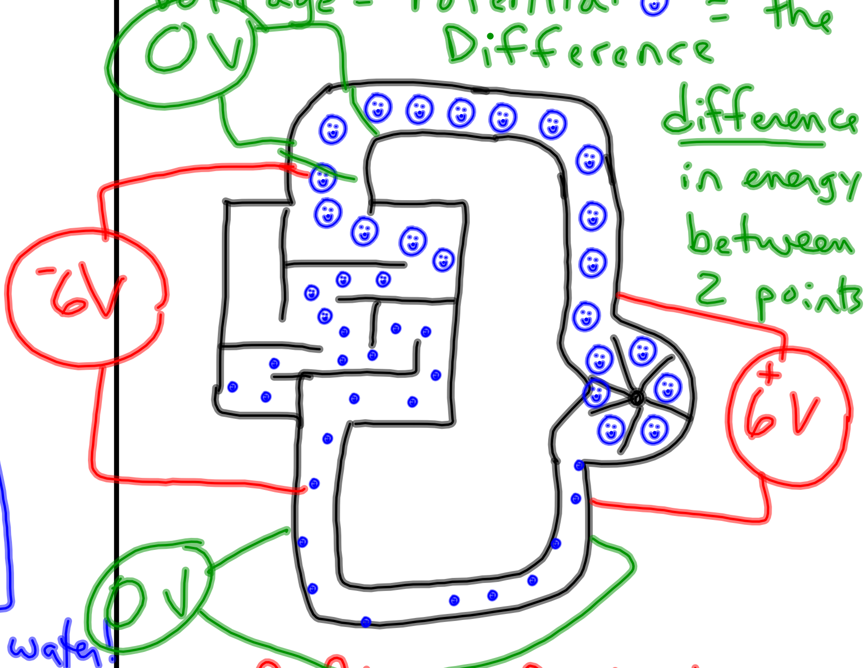


Voltage = Potential ☺ = the Difference

difference in energy between 2 points



Current = the rate of flow of electrons in a circuit

(# $\bar{e}$/s)

→ The resistance and the current are inversely proportional to each other.

∴ = therefore

i.e. ↑R ∴ ↓I

resistance current

OR

↓R ∴ ↑I

Voltage is directly proportional to current.

Synonym is "potential difference"

↑V ∴ ↑I

voltage

OR

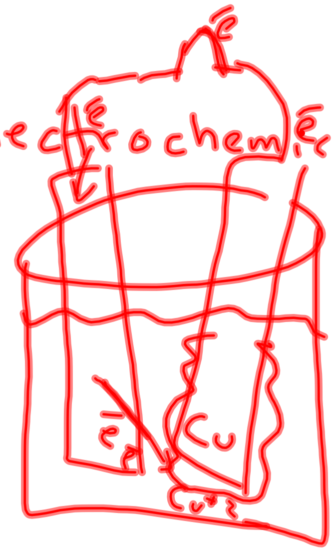
↓V ∴ ↓I

PUMP — anything Battery or Cell

FILTER — using electricity → RESISTOR (e.g. heating element or light)

PIPES — WIRES (conductors)

Electrochemical Cells



1 cell produces 1.5v

	Electromotive force ↓
FORCE OF PUMP	Emf of Power Source
	* Emf is, specifically, the potential difference (voltage) of the power source
Thickness / Cleanliness of Filter	Resistance of Resistor
Flow Rate of Water	Current Intensity

Measurement	Symbol	Unit	Symbol Unit	e.g. of Measurement
Potential Difference / Voltage	V	Volts	V	V = 12 V
Resistance	R	ohms	Ω	R = 3 Ω
Electromotive force	ε	volts	V	ε = 24 V
Current	I	amperes (amps)	A	I = 2 A
Charge	Q	Ampere-hours (larger unit)	A·h	Q = 90 A·h
Charge	Q	Coulombs (small unit)	C	Q = 1.5 C

Charge = amount of "negativeness"

charge of $1\bar{e} = 1.6 \times 10^{-19}$ C

$$\frac{1\bar{e}}{1.6\times10^{-19}\,C} = 6.25\times10^{18}\ \bar{e}\ \text{for}\ 1C. \qquad e/c$$

fyi: 1C per second passing in a circuit is 1 ampere

$1\,C/s = 1A$

amt of charge → Q

$$I = \frac{Q}{t} \qquad \frac{I}{1} = \frac{Q}{t}$$

sec. → t

$$\boxed{Q = It.}$$

Purple Sheet : Ampere-hour Probs

(1)

$Q_{initial} = 90 A\cdot h$

$Q_{used\ up}$ (by headlights) $= I\,t = (15A)(5.5h)$

(I: current lights use; t: hours lights left on)

$= 82.5 A\cdot h$

$Q_{Left\ in\ Battery} = 90A\cdot h - 82.5A\cdot h$

$= 7.5 A\cdot h$

Will the car start?

$Q_{needed\ for\ Start\text{-}up} = I\,t$

(I: for start-up; t: in hours for start-up)

3s ÷ 3600 = 0.00083 h

$= (400A)(0.00083)$

Q needed to start car $= 0.33 A\cdot h$

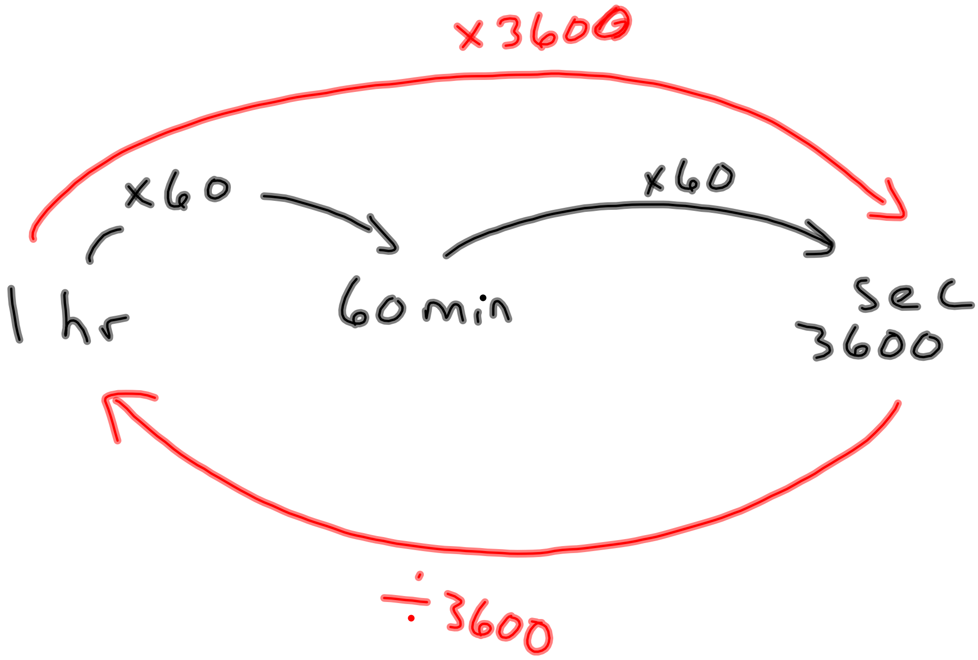
Yes car will start since $Q_{Left} > Q_{needed}$.

8h 36min

36min ÷ 60 → 0.6

8.36 h ?

→ 8.6h


x3600
x60
x60
1 hr
60 min
sec
3600
÷3600

(2)

$Q_{initial} = 95 A\cdot h$

$8h \quad \frac{36 min}{60} = 0.6h$

$Q_{used} = It$

$= (11A)(8.6h)$

$= 94.6 A\cdot h$

$Q_{Left} = 95A\cdot h - 94.6A\cdot h = 0.4 A\cdot h$ left

$Q_{needed\ for\ start\text{-}up} = It$

$4s \div 3600$

$= (370A)(0.0011h)$

$= 0.411\ A\cdot h$ needed

Car won't start

$Q_{needed} > Q_{Left}$

$Q_{initial} =$

$Q_{used\ up} =$

$Q_{initial} - Q_{used\ up} = Q_{left}$

$Q_{needed\ for\ start\text{-}up}$

③ $Q_{initial} = 91 A\cdot h$

$Q_{used} = It$

$= (12A)(7.5h)$

$= 90 A\cdot h$

$Q_{Left} = 91 A\cdot h - 90 A\cdot h = 1 A\cdot h$

$Q_{needed} = It$

$\frac{3.5s}{3600}$

$= (500A)(0.00097h)$

$= 0.486 A\cdot h$

Yes car will start $Q_{Left} > Q_{needed}$.