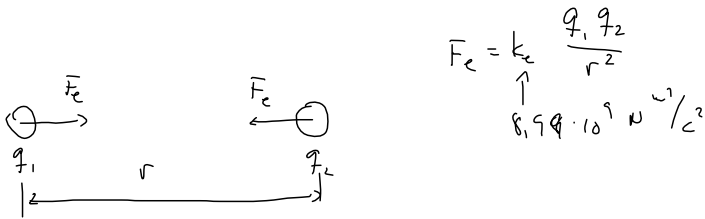


Elektrisk ladning og kraft. Coulombs lov



Finn den elektriske krafta som virker mellom elektronet og protonet i et hydrogenatom. Sammenlign den med tyngdekrafta som virker på hver av dem (på jorda).

$$|q_1| = |q_2| = e = 1,66 \cdot 10^{-19} \text{ C}, \quad r = 5,29 \cdot 10^{-11} \text{ m}, \quad F_e = 8,22 \cdot 10^{-8} \text{ N}$$

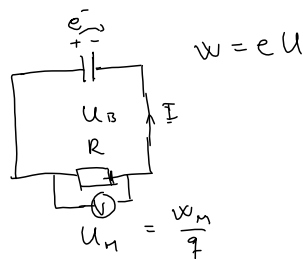
$$G = mg = \begin{cases} m_p g = 1,64 \cdot 10^{-26} \text{ N} & p^+ \\ m_e g = 8,94 \cdot 10^{-30} \text{ N} & e^- \end{cases}$$

May 23-11:11 AM

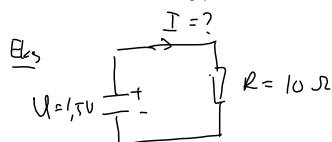
Elektrisk strøm

$$I = \frac{q}{t} \quad : \text{ Ampere}$$

Spennig: $U = \frac{W}{q}$



Ohms lov: $U = RI$



$$I = \frac{U}{R} = \frac{1,5 \text{ V}}{10 \Omega} = 0,15 \text{ A}$$

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Effekt: En pære på 60 W står på i en time. Hvor mye ladning passerer? Hvor mange elektroner er det? $U = 230\text{ V}$

$$U = \frac{W}{q} \quad I = \frac{q}{t} \quad P = UI = \frac{W}{t} \cdot \frac{q}{t} = \frac{W}{t}$$

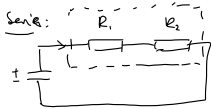
$$I = \frac{P}{U} = \frac{60\text{ W}}{230\text{ V}} = 0,26\text{ A}$$

$$q = I \cdot t = 0,26\text{ A} \cdot 60 \cdot 60\text{ s} = 939\text{ C} \approx 0,94\text{ kC}$$

$$\text{Antall } e^-: \frac{q}{e} = \frac{939\text{ C}}{1,6 \cdot 10^{-19}\text{ C}} = 5,7 \cdot 10^{21}$$

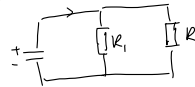
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Parallell og seriekobling av motstander

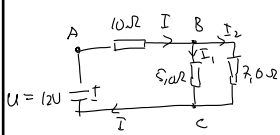


$$R_T = R_1 + R_2$$

Parallell



$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$



$$\frac{1}{R_P} = \frac{1}{5,0\Omega} + \frac{1}{7,0\Omega} \quad R_P = 2,917\Omega$$

$$R_S = 10\Omega + 2,917\Omega = 12,917\Omega$$

$$I = \frac{U}{R_S} = \frac{12\text{ V}}{12,917\Omega} = 0,93\text{ A}$$

$$U_{AB} = 10\Omega \cdot I = 10\Omega \cdot 0,93\text{ A} = 9,3\text{ V}$$

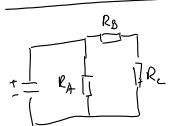
$$U_{BC} = R_P I = 2,917\Omega \cdot 0,93\text{ A} = 2,7\text{ V}$$

$$U_{BC} = 12\text{ V} - 9,3\text{ V} = 2,7\text{ V}$$

$$U_{BC} = 5,0\Omega I_1 \quad I_1 = \frac{U_{BC}}{5,0\Omega} = \frac{2,7\text{ V}}{5,0\Omega} = 0,54\text{ A}$$

$$U_{BC} = 7,0\Omega I_2 \quad I_2 = \frac{U_{BC}}{7,0\Omega} = \frac{2,7\text{ V}}{7,0\Omega} = 0,39\text{ A}$$

$$I_2 = I - I_1 = 0,93\text{ A} - 0,54\text{ A} = 0,39\text{ A}$$



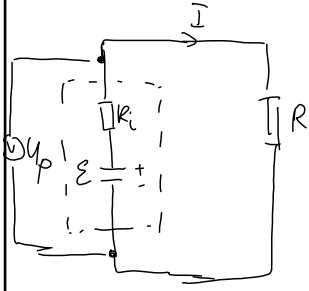
$$R_S = R_B + R_C$$

$$\frac{1}{R_T} = \frac{1}{R_A} + \frac{1}{R_S} = \frac{1}{R_A} + \frac{1}{R_B + R_C}$$



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Indre resistans



$$U_i = R_i I$$

$$U_p = \varepsilon - U_i = \varepsilon - R_i I$$

$$\underline{\text{Eks:}} \quad \varepsilon = 12\text{V}, \quad R_i = 0,020\Omega \quad R = 0,500\Omega$$

$$\Rightarrow U_p = ??$$

$$R_T = R_i + R = 0,520\Omega$$

$$I = \frac{\varepsilon}{R_T} = \frac{12\text{V}}{0,520\Omega} = 23,1\text{A}$$

$$U_p = \varepsilon - R_i I = 11,5\text{V}$$

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