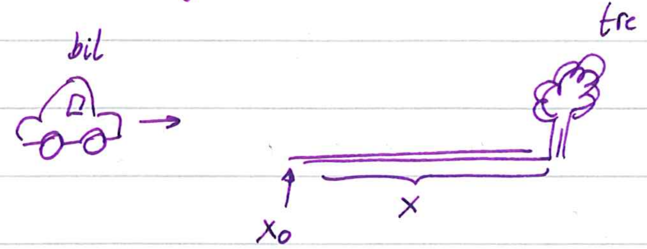
LF FY0001 juni 2020

①



$a = -5{,}60 \ m/s^2$

$t = 6{,}10 \ s$

$x = 113 \ m$

$v(t = 6{,}10 \ s)$?

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

$$113 \ m = 0 + v_0 \cdot 6{,}10 \ s + \frac{1}{2}\underbrace{(-5{,}60)}_{m/s^2} \cdot (6{,}10 \ s)^2$$

$$v_0 = 35{,}6 \ m/s$$

$$v = v_0 + at$$

$$v = 35{,}6 \ m/s - 5{,}60 \ m/s^2 \cdot 6{,}10 \ s = 1{,}44 \ m/s$$

$$\frac{1{,}44 \ m}{1 \ s} = \frac{1{,}44 \cdot 3600}{1000} \frac{km}{t} = \underline{\underline{5{,}18 \ km/t}}$$

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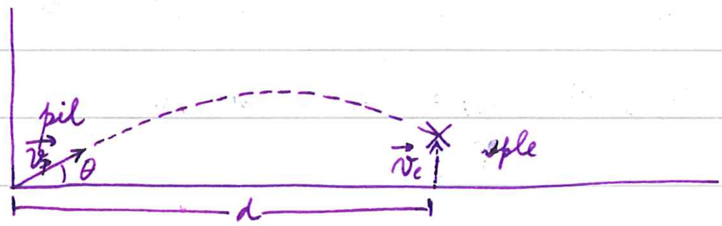
②③



$v_p = 40{,}0 \ m/s$

$\theta = 50°$

$d = 150 \ m$

v_e ?

Hvor lang tid tar pilen å komme til $x = 150 \ m$?

$$x = x_0 + v_{0x} t + \frac{1}{2} a_x t^2$$

$x_0 = 0 \ m$; $a_x = 0 \ m/s^2$

$$t = \frac{x}{v_{0x}} = \frac{150 \ m}{40 \ (m/s) \cdot \cos 50°} = 5{,}83 \ s$$

Hva er y-koordinat hvor pilen treffe eplet?

$$y = y_0 + v_{0y} t + \frac{1}{2} a_y t^2$$

$y_0 = 0$; $v_{0y} = v_0 \cdot \sin\theta$; $a_y = -g$

$$y = 40 \ (m/s) \cdot \sin 50° \cdot 5{,}83 \ s - \frac{1}{2} \ 9{,}81 \ (m/s^2) \cdot (5{,}83 \ s)^2 = 11{,}9 \ m$$

Hva er starthastigheten eplet trenger for å nå y?

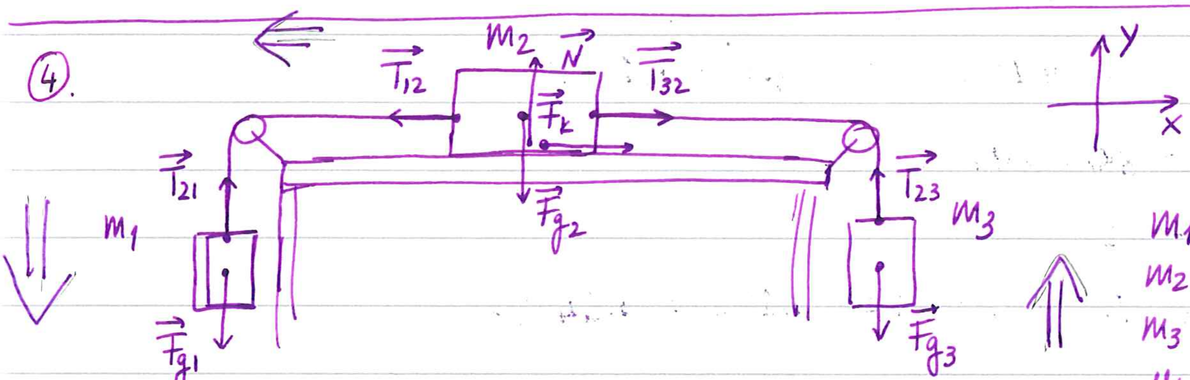
$$a(y-y_0) = \frac{1}{2}(v^2 - v_0^2)$$

$v = 0$ m/s, $y_0 = 0$ m, $a = -g$

$$-g\cdot y = -\frac{1}{2}v_0^2 \Leftrightarrow v_0^2 = 2gh$$

$$\Leftrightarrow v = \sqrt{2gh} = \sqrt{2\cdot 9{,}81\ m/s^2 \cdot 11{,}9\ m} = \underline{\underline{15{,}3\ m/s}}$$

4.



$m_1 = 4{,}00$ kg
$m_2 = 1{,}00$ kg
$m_3 = 2{,}00$ kg
$\mu_k = 0{,}350$
a_2?

Objekter er sammenkoblet så di beveger seg med samme akselerasjon, med forskjellige retninger.
Siden $m_1 > m_2$ er bevegelsen i retningen indikert av $\Longrightarrow$

m_1: $\sum F_y = T_{21} - m_1 g = -m_1 a_y \Leftrightarrow T_{21} = m_1(g - a_y)$ (3)

$\sum F_x = 0$

m_2: $\sum F_x = T_{32} - T_{12} + F_k = -m_2 a_x$ (1)

$\sum F_y = N - m_2 g \Rightarrow N = m_2 g$ (2)

m_3: $\sum F_x = 0$

$\sum F_y = T_{23} - F_{g3} = T_{23} - m_3 g = m_3 a_y \Leftrightarrow T_{23} = m_3(a_y + g)$ (4)

$a_x = a_y = a$

Fra (1): $T_{32} - T_{12} + \mu_k \cdot N = ma$

Fra (2)-(4): $m_3(a+g) - m_1(g-a) + \mu_k \cdot m_2 \cdot g = -m_2 a$

$$m_1 a + m_2 a + m_3 a = m_1 g - \mu_k m_2 g - m_3 g$$

$$a = \frac{m_1 - \mu_k m_2 - m_3}{m_1 + m_2 + m_3}\cdot g$$

$$a = \frac{4{,}00 - 0{,}350 \cdot 1{,}0 - 2{,}00}{4{,}00 + 1{,}00 + 2{,}00} \cdot 9{,}81 = \underline{\underline{2{,}31 \text{ m/s}^2}}$$

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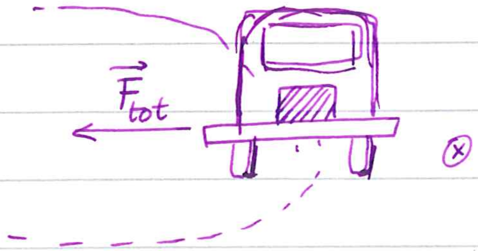
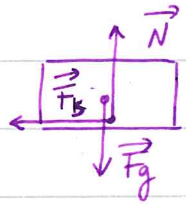
5 6





$r = 35{,}0$ m

$\mu_s = 0{,}600$

$\vec{F} = m\vec{a}$

x-retningen: $F_x = F_s = m a_c = m \frac{v^2}{r}$ (1)

Den største friksjonskraften man kan ha før kassen begynner å skli er

$$F_{s,max} = \mu_s \cdot N$$

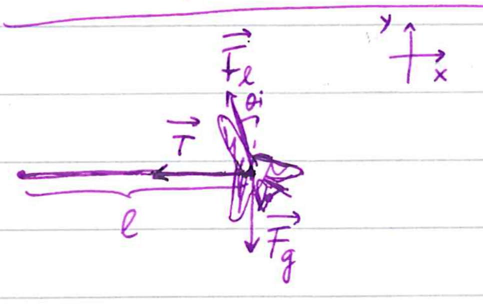
siden $\Sigma F_y = 0 \Rightarrow N = mg$

Fra (1): $\mu_s \cdot \cancel{m}g = \cancel{m} \frac{v^2}{r} \Leftrightarrow v^2 = \mu_s g r$

$$\Leftrightarrow v = \sqrt{\mu_s \cdot g \cdot r}$$

$$v = \sqrt{0{,}600 \cdot 9{,}81 \text{ m/s}^2 \cdot 35{,}0 \text{ m}} = \underline{\underline{14{,}4 \text{ m/s}}}$$

7



$m = 0{,}750$ kg

$\ell = 60$ m

$v = 25{,}0$ m/s

$\theta = 20°$

Flyet flyr i en horisontal sirkel:

$$\Sigma F_x = m a_c = -m \frac{v^2}{r}$$

$$\Sigma F_y = 0$$

$$\Sigma F_y = F_\ell \cdot \cos\theta - F_g = 0 \Rightarrow F_\ell = \frac{mg}{\cos\theta}$$

$$\Sigma F_x = -T - F_\ell \sin\theta = -m\frac{v^2}{r} \Rightarrow T = m\frac{v^2}{r} - F_\ell \sin\theta = m\frac{v^2}{r} - mg\tan\theta$$

$$T = 0{,}750 \text{ kg} \left(\frac{(25{,}0 \text{ m/s})^2}{60 \text{ m}} - 9{,}81 \text{ m/s}^2 \cdot \tan 20° \right) = \underline{\underline{5{,}13 \text{ N}}}$$

⑧ Arbeid: $W = \vec{F} \cdot \vec{s} = |\vec{F}||\vec{s}| \cdot \cos\theta$

$\vec{F} \perp \vec{s} \Rightarrow \cos 90° = 0 \Rightarrow \underline{\underline{W = 0 \text{ J}}}$

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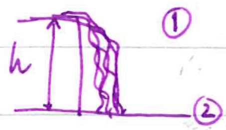
⑨ ⑩



Elv: 2,00 m bred
0,500 m dyp

$v = 1,20$ m/s

$h = 4,00$ m

25% potensiell energi → elektrisk energi

P?

$\rho = 1000 \text{ kg/m}^3$

Hvor mye vann faller på 1 s?

$$V_{vann} = 2,0 \cdot 0,500 \cdot 1,20 = 1,2 \text{ m}^3/\text{s}$$

$$\rho = \frac{m}{V} \Rightarrow m = \rho V = 1000 \text{ kg/m}^3 \cdot 1,2 \text{ m}^3/\text{s} = 1200 \text{ kg/s}$$

$$\overline{P}_{inn} = \frac{W}{\Delta t} = \frac{U_1 - U_2}{\Delta t} \underset{U_2=0}{=} \frac{U_1}{\Delta t} = \frac{mgh}{\Delta t} = \frac{1200 \text{ kg/s} \cdot 9,81 \text{ m/s} \cdot 4,00 \text{ m}}{1 \text{ s}}$$

$$= 4,71 \cdot 10^4 \text{ W}$$

Virkningsgrad på 25%

$$\overline{P}_{utt} = \overline{P}_{inn} \cdot 0,25 = 4,71 \cdot 10^4 \cdot 0,25 = \underline{1,18 \cdot 10^4 \text{ W}}$$

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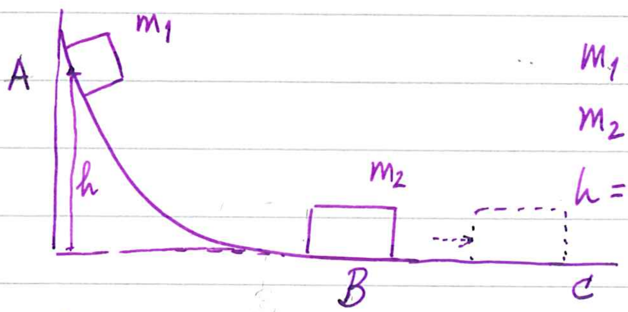
⑪



$m_1 = 5,00$ kg

$m_2 = 10,0$ kg

$h = 5,00$ m

m_1 slippes fra A.

Bevaring av mekkanisk energi: $E_A = E_B$

$$K_A + U_A = K_B + U_B$$

$$\frac{1}{2} m \cancel{v_A^2}^{\,0} + \cancel{m} gh = \frac{1}{2} \cancel{m} v_B^2 + 0$$

$$v_B^2 = 2gh \Rightarrow v = \sqrt{2gh}$$

Før kollisjonen: $v_1 = \sqrt{2gh}$, $v_2 = 0$

Etter kollisjonen: v_1' , v_2'

Elastisk:
$$v_1' = \frac{m_1 - m_2}{m_1 + m_2} \cdot v_1 = \frac{5{,}0 - 10{,}0}{5{,}0 + 10{,}0} \cdot \sqrt{2 \cdot 9{,}81 \cdot 5{,}00} = -3{,}30 \text{ m/s}$$

Hvor høyt kommer m_1?

$$\cancel{m_1} g h' = \frac{1}{2} \cancel{m_1} v_1'^2 \Rightarrow h = \frac{v_1'^2}{2g} = \underline{0{,}555 \text{ m}}$$

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(12). En del av energien fra klossen 1 overføres til kloss m_2 sånn at den beveger seg framover mot C.

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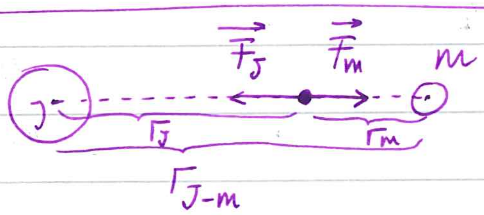
(13).



$r_{J-m} = 3{,}84 \cdot 10^8 \text{ m}$

$M_J = 5{,}98 \cdot 10^{24} \text{ kg}$ r_J?

$M_m = 7{,}35 \cdot 10^{22} \text{ kg}$

Punktet der tyngdekraften fra månen blir sterkere enn tyngdekraften fra jorden, er punktet der $|\vec{F}_J| = |\vec{F}_m|$

$$\frac{\cancel{G} M_J \cancel{m}}{r_J^2} = \frac{\cancel{G} M_m \cdot \cancel{m}}{r_m^2} \Rightarrow r_m^2 \cdot M_J = r_J^2 \cdot M_m$$

$$\Rightarrow r_m = \sqrt{\frac{M_m}{M_J}} \cdot r_J$$

$$\Rightarrow r_m = \sqrt{\frac{7{,}35 \cdot 10^{22} \text{ kg}}{5{,}98 \cdot 10^{24} \text{ kg}}} \cdot r_J = 0{,}111\, r_J$$

$$r_{J-m} = r_J + r_m \Rightarrow r_J = r_{J-m} - r_m = 3{,}84 \cdot 10^8 - 0{,}111\, r_J$$

$$r_J = \frac{3{,}84 \cdot 10^8 \text{ m}}{1 + 0{,}111} = \underline{3{,}46 \cdot 10^8 \text{ m}}$$

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(14). Harmonisk oscillator: 5 svingninger i 12,0 s

(a) $T = \frac{12{,}0}{5} = \underline{2{,}40 \text{ s}}$ (b) $f = \frac{1}{T} = \frac{1}{2{,}40 \text{ s}} = \underline{0{,}417 \text{ Hz}}$

(c) $\omega = \frac{2\pi}{T} = \frac{2\pi}{2{,}40 \text{ s}} = \underline{2{,}62 \text{ rad/s}}$

(15). Stationær mottak $\quad f(\text{mot mottak}) = 560\ Hz$

V_E til sender? $\quad f(\text{fra mottak}) = 480\ Hz$

$$f' = f\left(\frac{1}{1 \pm \frac{V_E}{v}}\right) \Leftrightarrow f'\left(1 \pm \frac{V_E}{v}\right) = f$$

$$f'v \pm f'V_E = vf$$

Mot mottak: $\quad f'v - f'V_E = vf$

Fra mottak: $\quad f''v + f''V_E = vf$

Siden f er konstant

$$f'v - f'V_E = f''v + f''V_E$$

$$(f' - f'')v = (f' + f'')V_E \Leftrightarrow V_E = \frac{(f' - f'')}{(f' + f'')} \cdot v$$

$$V_E = \frac{560 - 480}{560 + 480} \cdot 331 = \underline{\underline{25,5\ m/s}}$$

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(16).

Streng $\quad L$

M/L

F

$$v = \sqrt{\frac{F}{M/L}} = \lambda \cdot f \Rightarrow f = \sqrt{\frac{F}{M/L}}\,\frac{1}{\lambda}$$

$$f' = \sqrt{\frac{F}{2M/L}}\,\frac{1}{\lambda} = \frac{1}{\sqrt{2}} \cdot f$$

frekvens avtar med $\frac{1}{\sqrt{2}}$

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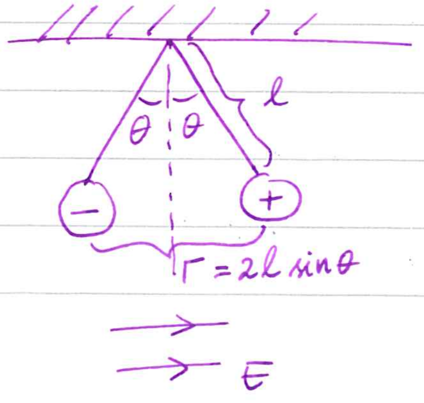
(17) (18)



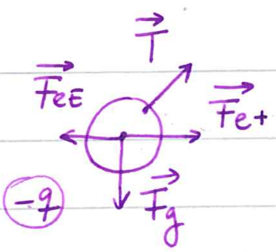
$\theta = 10,0°$

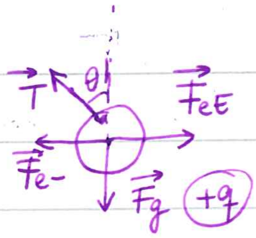
$|q| = 5,00 \cdot 10^{-8}\ C$

$m = 2,00\ g$

$l = 10,0\ cm$

E?





$\Downarrow$ i ro:

$$\sum F_x = \underbrace{F_{eE}}_{\text{fra det uniforme elektriske feltet, } E} - \underbrace{F_{e-}}_{\text{fra } -q} - \underbrace{T_x}_{\text{snordrag}} = 0$$

$T_x = T \cdot \sin\theta$

siden $\sum F_y = T_y - F_g = T\cos\theta - mg = 0 \Rightarrow T = \dfrac{mg}{\cos\theta}$

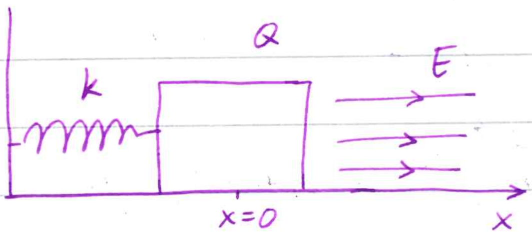
$$T_x = |\vec{T}_x| = mg\tan\theta = 2{,}0\cdot 10^{3}\,\text{kg}\cdot 9{,}81\,\text{m/s}^2\cdot\tan 10^\circ = \underline{0{,}00346\ \text{N}}$$

$$F_{e-} = |\vec{F}_{e-}| = \frac{|q_1 q_2|}{4\pi\varepsilon_0}\frac{1}{r^2} = \frac{(5{,}00\cdot 10^{-8})^2\,\text{C}^2}{4\pi\cdot 8{,}85\cdot 10^{-12}\,\text{C}^2/\text{Nm}^2}\frac{1}{(2\cdot l\cdot \sin\theta)^2} = \underline{0{,}0136\,\text{N}}$$

$$F_{eE} = qE \Rightarrow qE = F_{e-} + T_x = 0{,}00346 + 0{,}0186$$

$$E = 4{,}\underline{42\cdot 10^5\ \text{N/C}}$$

19.

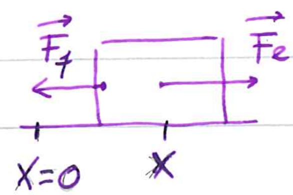


$Q = 1{,}0\,\mu\text{C}$

$k = 0{,}4\ \text{Nm}^{-1}$

$E = 4{,}0\cdot 10^3\ \text{Vm}^{-1}$

Siden klossen har ladning, når systemet er plassert i et homogent elektrisk felt vil E utfører en elektrisk kraft på klossen. E pekker mot høyre og siden klossen har positiv ladning vil Fe virker mot høyre. Når klossen beveger seg mot høyre oppstår en kraft fra føret som virker i motsatt retningen.



i likevektsposisjonen: $\sum \vec{F} = 0\quad \vec{F}_f + \vec{F}_e = 0$

$$-kx + qE = 0 \Rightarrow x = \frac{qE}{k}$$

$$\frac{C\cdot V}{N} = \frac{C\cdot \frac{J}{C}}{N} = \frac{N\cdot m}{N} = m$$

$$x = \frac{1{,}0\cdot 10^{-6}\,C \cdot 4{,}0\cdot 10^{3}\,V/m^{-1}}{0{,}4\ N/m^{-1}} = 0{,}010\ m = \underline{1{,}0\ cm}$$

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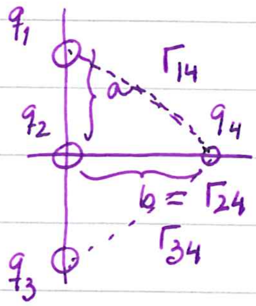
(20).



$q_1 = 20{,}0\ nC$

$q_2 = 10{,}0\ nC$

$q_3 = -20{,}0\ nC$

$q_4 = 40{,}0\ nC$

$a = 4{,}00\ cm$

$b = 3{,}00\ cm$

$m_1 = m_2 = m_3 = m_4 = 2{,}00\cdot 10^{-13}\ kg$

$v\ (x \to \infty)$?

$$E_0 = E_\infty$$

$$\cancel{K_0}^{\,0} + U_0 = K_\infty + \cancel{U_\infty}^{\,0}$$

U_0 til partikkel 4 er:

$$U_0 = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_1 q_4}{r_{14}} + \frac{q_2 q_4}{b} + \frac{q_3 q_4}{r_{34}}\right]$$

Siden $q_1 = -q_3$ og $r_{14} = r_{34}$:

$$U_0 = \frac{1}{4\pi\varepsilon_0}\cdot\frac{q_2 q_4}{b} = 8{,}99\cdot 10^{9}\ \frac{Nm^2}{C^2}\cdot\frac{40{,}0\cdot 10{,}0\cdot 10^{-18}\ C^2}{0{,}03\ m}$$

$$= 1{,}20\cdot 10^{-4}\ J$$

$$K_\infty = U_0 \Rightarrow \frac{1}{2} m v^2 = U_0 \Rightarrow v^2 = \frac{2\cdot U_0}{m}$$

$$\Rightarrow v = \sqrt{\frac{2\cdot U_0}{m}} = \sqrt{\frac{2\cdot 1{,}20\cdot 10^{-4}\ N\cdot m}{2{,}00\cdot 10^{-13}\ kg}} = \underline{3{,}46\cdot 10^{4}\ m/s}$$

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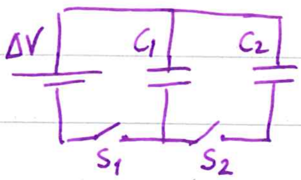
(21). (22)



$C_1 = 6{,}00\ \mu F$

$C_2 = 3{,}00\ \mu F$

$\Delta V = 20{,}0\ V$

I (a) S_1 er åpen $\Rightarrow C_1 = 0$

I (b) S_1 er lukket, C_1 lades fra spenningskildet:

$$Q = C_1\cdot\Delta V = 6{,}00\cdot 10^{-6}\ F\cdot 20{,}0\ V$$
$$= 1{,}2\cdot 10^{-4}\ C$$
$$= \underline{120\ \mu C}$$

I (c) S_1 er åpnet og deretter S_2 er lukket $\Rightarrow$ C_2 lades fra C_1.

Siden C_1 og C_2 er parallellkobblet, spenningsfallet gjennom C_1 og C_2 er like stort:

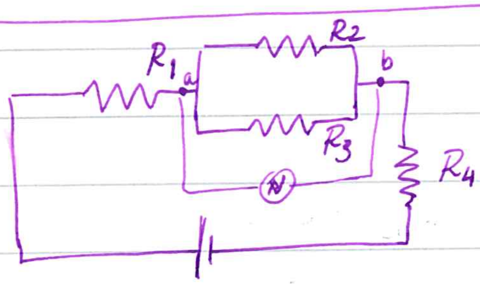
$$\frac{Q_1}{C_1} = \frac{Q_2}{C_2}$$

Ladningen deles mellom C_1 og C_2: $Q_2 = 120\,\mu C - Q_1$

$$\frac{120\,\mu C - Q_2}{C_2} = \frac{Q_2}{C_2} \Leftrightarrow (120\,\mu C - Q_1)\,C_1 = Q_1 \cdot C_2$$

$$Q_1 = \frac{120\,\mu C \cdot C_1}{C_1 + C_2} = \frac{120\,\mu C \cdot 6{,}00\,\mu F}{9{,}00\,\mu F} = \underline{\underline{80\,\mu C}}$$

23.



$R_1 = 5\,\Omega$

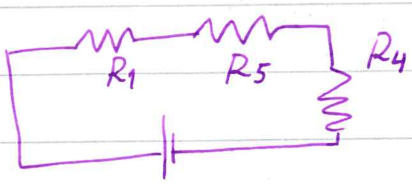
$R_2 = 3\,\Omega$

$R_3 = 6\,\Omega$

$R_4 = 1\,\Omega$

I_1, I_2, I_3, I_4 ?

Vi begynner med I_1 og I_4:



$$\frac{1}{R_5} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$$

$$\Rightarrow R_5 = 2\,\Omega$$

$$R_{tot} = R_1 + R_5 + R_4 = 5 + 2 + 1 = 8\,\Omega$$

Ohms lov: $\Delta V = RI$

$$I_{tot} = \frac{\Delta V}{R_{tot}} = \frac{15\,V}{8\,\Omega} = 1{,}875\,A$$

$$I_1 = I_4 = I_{tot} = \underline{1{,}875\,A}$$

$$\Delta V = \Delta V_{tot} = \Delta V_1 + \Delta V_5 + \Delta V_4 = R_1 I_1 + \Delta V_5 + R_4 I_4$$

$$\Delta V_5 = 15 - 5{,}0 \cdot 1{,}875 - 1{,}875 = 3{,}75\,V$$

$$\Delta V_5 = \Delta V_2 = \Delta V_3$$

$$I_2 = \frac{\Delta V_2}{R_2} = \frac{3,75}{3} = \underline{1,25\ A}$$

$$I_3 = \frac{\Delta V_3}{R_3} = \frac{3,75}{6} = \underline{0,625\ A}$$

$$I_2 + I_3 = 1,875A = I \ !!$$

korrekt

24.

~~Tynn oljefilm (n = 1,25)~~

~~reflekteres sterkest : λ = 640 nm~~ ~~hvor tykk~~?

~~reflekterer ikke : λ = 512 nm~~

ρ (Aluminium) $= 2,8 \cdot 10^{-8}\ \Omega m$

ρ (kobber) $= 1,7 \cdot 10^{-8}\ \Omega m$

motstand : $R_{AL} = \rho_{AL} \frac{L_{AL}}{A_{AL}}$ lengde, areal

$R_{AL} = R_{cu}$

$R_{cu} = \rho_{cu} \frac{L_{cu}}{A_{cu}}$

$L_{AL} = L_{cu}$

$$\rho_{AL} \frac{L_{AL}}{A_{AL}} = \rho_{cu} \frac{L_{cu}}{A_{cu}} \Leftrightarrow \frac{A_{AL}}{A_{cu}} = \cancel{\frac{L_{AL}}{L_{cu}}} \frac{\rho_{AL}}{\rho_{cu}}$$

$$A = 2\pi r^2$$

$$\frac{\cancel{2\pi} r_{AL}^2}{\cancel{2\pi} r_{cu}^2} = \frac{\rho_{AL}}{\rho_{cu}} = \frac{2,8 \cdot 10^{-8}\ \cancel{\Omega m}}{1,7 \cdot 10^{-8}\ \cancel{\Omega m}}$$

$$\frac{r_{AL}}{r_{cu}} = \sqrt{\frac{2,8}{1,7}} = \underline{1,28}$$

25.

$s = 20,0\ m$

$f = 30,0\ cm$

$v = 5,00\ m/s$

$f'(t = 2,00\ s)$?

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f}$$

$$\frac{1}{20} + \frac{1}{s'} = \frac{1}{0,30} \Leftrightarrow \frac{1}{s'} = \frac{1}{0,30} - \frac{1}{20}$$

$$\Leftrightarrow s' = 0,3046\ m$$

After 2,0 s $\Rightarrow$ $s = 30,0 \text{ m}$

$$\frac{1}{30} + \frac{1}{s'} = \frac{1}{0,30} \Leftrightarrow \frac{1}{s'} = \frac{1}{0,30} - \frac{1}{30} \Leftrightarrow \underline{\underline{s' = 0,303 \text{ m}}}$$

Bildet flytter ~~s~~ seg fra 0,3046 m til 0,303 m

$\Rightarrow$ mot <u>linsen</u>

(26).

$q = +e = 1,6 \cdot 10^{-19} \text{ C}$

$v = 4,60 \cdot 10^{5} \text{ m/s}$

$r = 7,95 \text{ mm} = 7,95 \cdot 10^{-3} \text{ m}$

$B = 1,80 \text{ T}$

Siden ion beveger seg i et plan som er vinkelrett på magnetfeltet:

$$\vec{F} = q(\vec{v} \times \vec{B})$$

$$|\vec{F}| = q|\vec{v}||\vec{B}| \sin 90^\circ = q|\vec{v}||\vec{B}|$$

Ion har en sirkel bevegelse:

$$F = m a_s = m\frac{v^2}{r} \Rightarrow \cancel{m} \; q\cancel{v}B = m\frac{v^{\cancel{2}}}{r}$$

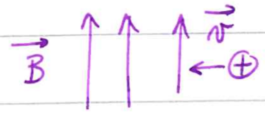
$$\Rightarrow m = \frac{qBr}{v} = \frac{1,6 \cdot 10^{-19} \text{ C} \cdot 1,80 \text{ T} \cdot 7,94 \cdot 10^{-3} \text{ m}}{4,60 \cdot 10^{5} \text{ m/s}}$$

$$= 4,97 \cdot 10^{-27} \text{ kg}$$

$1 \text{ u} = 1,66 \cdot 10^{27} \text{ kg}$

$$m = \frac{4,97 \cdot 10^{-27}}{1,66 \cdot 10^{-27}} \text{ u} = \underline{\underline{3,0 \text{ u}}}$$

(27)

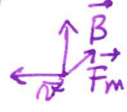


$$\vec{F}_m = q(\vec{v} \times \vec{B})$$

Den positivt ladde partikkelen ~~vil~~ avbøyes i retningen til den magnetiske kraft som oppstår når partikkelen kommer inn i magnetfeltet.

Vi bruker høyrehåndssystemen for å finne retningen til $\vec{F}_m$

Partikkelen avbøyes i retningen "inn" i papir.



28.

$$\lambda_{max} = 32\ \mu m = 32 \cdot 10^{-6}\ m$$

$$\lambda_{max} = \frac{2{,}90 \cdot 10^{-3}\ mK}{T} \Rightarrow T = \frac{2{,}90 \cdot 10^{-3}\ mK}{\lambda_{max}}$$

$$T = \frac{2{,}90 \cdot 10^{-3}\ mK}{32 \cdot 10^{-6}\ m} = \underline{\underline{90{,}6\ K}}$$

29.

$\phi = 5{,}1\ eV$ $\lambda = 230\ nm$

K?

$$K = hf - \phi$$

$$= h\frac{c}{\lambda} - \phi$$

$$= 6{,}63 \cdot 10^{-34}\ Js\ \frac{3{,}00 \cdot 10^{8}\ m/s}{230 \cdot 10^{-9}\ m} - 5{,}1 \cdot 1{,}6 \cdot 10^{-19}\ J$$

$$= 4{,}88 \cdot 10^{-20}\ J$$

$$= \underline{\underline{0{,}30\ eV}}$$

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30. Alfa-henfall av ^{210}Po

$$^{210}Po \longrightarrow {}^{206}Pb + {}^{4}He$$

$m(^{210}Po) = 209{,}982857\ g$

$m(^{206}Pb) = 205{,}974449\ g$

$m(^{4}He) = 4{,}002603\ g$

$$E = \Delta m \cdot c^2$$

$$= \left(m(^{210}Po) - m(^{206}Pb) - m(^{4}He)\right) \cdot 931{,}5\ MeV$$

$$= (209{,}982857 - 205{,}974449 - 4{,}002603) \cdot 931{,}5\ MeV$$

$$= \underline{\underline{5{,}4\ MeV}}$$