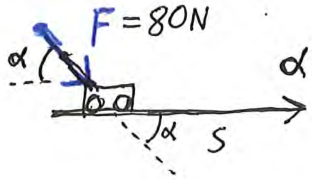
4.311 + $\quad b = 0{,}40\,m$



$\alpha = 55°$

$$W = 1{,}0\,kWh = 3{,}6\cdot10^{6}\,J$$

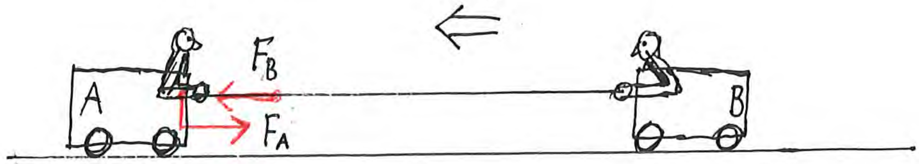
$$W = F\cdot s\cdot\cos\alpha$$

$$\frac{W}{F\cdot\cos\alpha} = s \quad\Rightarrow\quad s = \frac{3{,}6\cdot10^{6}\,J}{80N\cdot\cos 55°} = 7{,}845\cdot10^{4}\,m$$

$$A = s\cdot b = 7{,}845\cdot10^{4}\,m\cdot 0{,}40\,m = 31380\,m^2 = \underline{3{,}1\cdot10^{4}\,m^2}$$

4.312 +

$F_A = 50N$



$m_A = 150\,kg$

$m_B = 200\,kg$

a) Begge vognene utsettes for en kraft på 50N. Begge vil derfor få fart. F_B virker på B gjennom snøret, og motkraften F_A virker på A via person A som vil presse mot vogna når han drar i snøret.

b) $\sum_A F = m_A a_A \qquad v_{0A} = v_{0B} = 0 \qquad \sum_B F = m_B\cdot a_B$

$$F_A = m_A\cdot a_A \qquad\qquad F_B = m_B\cdot a_B$$

$$a_A = \frac{F_A}{m_A} = \frac{-50N}{150\,kg} = -0{,}3333\,\frac{m}{s^2} \qquad a_B = \frac{F_B}{m_B} = \frac{50N}{200\,kg} = 0{,}2500\,\frac{m}{s^2}$$

$$v = \cancel{v_0} + at \qquad v_A = a_A\cdot t = -0{,}3333\,\frac{m}{s^2}\cdot 6{,}0\,s = \underline{-2{,}0\,\frac{m}{s}}$$

$$v_B = a_B\cdot t = 0{,}2500\,\frac{m}{s^2}\cdot 6{,}0\,s = \underline{1{,}5\,\frac{m}{s}}$$

c) $s = \cancel{v_0\cdot t} + \frac{1}{2}at^2$

$$s_A = \frac{1}{2}a_A\cdot t^2 = \frac{1}{2}\left(-0{,}3333\,\frac{m}{s^2}\right)\cdot(6{,}0\,s)^2 = \underline{-6{,}0\,m}$$

$$s_B = \frac{1}{2}a_B\cdot t^2 = \frac{1}{2}\cdot 0{,}2500\,\frac{m}{s^2}\cdot(6{,}0\,s)^2 = \underline{4{,}5\,m}$$

d) $W_A = F_A\cdot s_A = 50N\cdot 6{,}0m = 300\,J$ (F og s er i samme retning ⇒ W positiv)

$W_B = F_B\cdot s_B = 50N\cdot 4{,}5m = 225\,J$

$$\sum W = W_A + W_B = 300\,J + 225\,J = 525\,J = \underline{0{,}53\,kJ}$$

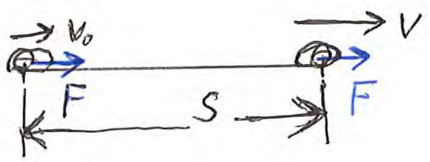
4.320 $m = 800\,kg$ $\quad v_0 = 54\,\frac{km}{h} = 15\,\frac{m}{s}$

a) $E_{k0} = \frac{1}{2} m v_0^2 = \frac{1}{2} \cdot 800 \cdot 15^2\,J = 9{,}00 \cdot 10^4\,J = \underline{90\,kJ}$

b) $v = 72\,\frac{km}{h} = 20\,\frac{m}{s}$

1) $E_k = \frac{1}{2} m v^2 = \frac{1}{2} \cdot 800 \cdot 20^2\,J = 160\,kJ$

$s = 40\,m \qquad F = ?$



$W = \Delta E_k$

$\sum F \cdot s = \Delta E_k$

$\sum F = \frac{\Delta E_k}{s} = \frac{(160 - 90) \cdot 10^3\,J}{40\,m} = 1750\,N \approx \underline{1{,}8\,kN}$

2) $t = 4{,}0\,s \qquad \sum F = m\,a$

$\sum F = m \cdot \left(\frac{v - v_0}{t}\right) = 800\,kg \cdot \left(\frac{20-15}{4{,}0}\right) \frac{m}{s^2} = \underline{1{,}0\,kN}$

4.321 $v_0 = 8{,}0\,\frac{m}{s} \rightarrow$ østover

$m = 2{,}0\,kg$

a) $W = ?$

1. $v = 0 \qquad W = \Delta E_k = \frac{1}{2} m v^2 - \frac{1}{2} m v_0^2 = 0 - \frac{1}{2} \cdot 2{,}0 \cdot 8{,}0^2\,J$

$= \underline{-64\,J}$

2. $v = 8{,}0\,\frac{m}{s} \leftarrow$ vestover

$W = \Delta E_k = \frac{1}{2} m v^2 - \frac{1}{2} m v_0^2 = \underline{0} \qquad (v^2 = v_0^2)$

(Kvadratet av farten blir lik uansett retning.)

b) 1. $\Delta E_k = \underline{-64\,J}$

2. $\Delta E_k = \underline{0}$

4.322+ $v_0 = 55\,\frac{km}{h} = 15{,}27\,\frac{m}{s}$ $\mu = 0{,}70$ $R = \mu N = \mu G = \mu mg$

a) $m = 3000\,kg$

$\Delta E_K = W_f$

$\frac{1}{2} m v_0^2 = R \cdot s$

$$s = \frac{m v_0^2}{2R} = \frac{m v_0^2}{2\mu m g} = \frac{v_0^2}{2\mu g} = \frac{(15{,}27\,\frac{m}{s})^2}{2 \cdot 0{,}70 \cdot 9{,}81\,\frac{m}{s^2}} = 16{,}97\,m = \underline{17\,m}$$

b) $m_2 = 4000\,kg$ $s_2 = ?$

$\underline{s_2 = 17\,m}$ fordi s er uavhengig av massen

4.324+ $m = 25\,kg$ $\sum F = 140\,N$ $v_0 = 0$ $\sum F = ma$

$$a = \frac{\sum F}{m} = \frac{140\,N}{25\,kg} = 5{,}6\,\frac{m}{s^2}$$

a) $W_{\sum F} = \sum F \cdot s$

$t = 1{,}0\,s$

$s = \cancel{v_0 t} + \frac{1}{2} a t^2$

$= \frac{1}{2} \cdot 5{,}6\,\frac{m}{s^2} \cdot (1{,}0\,s)^2 = 2{,}8\,m$

$W_{\sum F} = 140\,N \cdot 2{,}8\,m$

$= 392\,J = \underline{0{,}39\,kJ}$

b) I femte sekund

$$\Delta W_{\sum F} = \sum F \cdot s_{5\,sek} - \sum F \cdot s_{4\,sek} = \sum F (s_5 - s_4) = \sum F \cdot \frac{1}{2} a (t_5^2 - t_4^2)$$

$$= 140\,N \cdot \frac{1}{2} \cdot 5{,}6\,\frac{m}{s^2} \cdot (5{,}0^2 - 4{,}0^2)\,s^2 = 3528\,J$$

$$= \underline{3{,}5\,kJ}$$

$$\Delta W_{\sum F} = \Delta E_k = E_{k5} - E_{k4}$$

$$= \frac{1}{2} m (v_5^2 - v_4^2) = \frac{1}{2} m \left[(a t_5)^2 - (a t_4)^2 \right]$$

$$= \frac{1}{2} \cdot 25\,kg \cdot \left[(5{,}6 \cdot 5{,}0\,\frac{m}{s})^2 - (5{,}6 \cdot 4{,}0\,\frac{m}{s})^2 \right] = 3528\,J = \underline{3{,}5\,kJ}$$

4.325+ $m = 2{,}0 \cdot 10^6\,kg$ $v_0 = 10\,\frac{m}{s}$ $v = 25\,\frac{m}{s}$ $t = 2{,}0 \cdot 60\,s = 120\,s$

a) $$W = \Delta E_K = \frac{1}{2} m (v^2 - v_0^2) = \frac{1}{2} \cdot 2{,}0 \cdot 10^6\,kg \cdot (25^2 - 10^2)\,\frac{m^2}{s^2}$$

$$= 5{,}250 \cdot 10^8\,J = \underline{5{,}3 \cdot 10^8\,J}$$

b) $$\sum F = ma = m \frac{(v - v_0)}{t} = 2{,}0 \cdot 10^6\,kg \cdot \frac{(25 - 10)\,\frac{m}{s}}{120\,s} = \underline{2{,}5 \cdot 10^5\,N}$$

4.331+ a) $y = 0{,}050\,m \quad V = A \cdot y = 1{,}00\,m^2 \cdot 0{,}050\,m = 0{,}050\,m^3 = 50\,dm^3$
$= \underline{50\,l}$

b) $h = 1{,}5 \cdot 10^3\,m \quad A = 100 \cdot (10^3\,m)^2 = 1{,}00 \cdot 10^8\,m^2$

$E_p = mgh = \rho_v \cdot Vgh = \rho_v \cdot Ay \cdot gh$

$= 0{,}998 \cdot 10^3\,\frac{kg}{m^3} \cdot 1{,}00 \cdot 10^8\,m^2 \cdot 0{,}050\,m \cdot 9{,}81\,\frac{m}{s^2} \cdot 1{,}5 \cdot 10^3\,m$

$= 7{,}342 \cdot 10^{13}\,J = \underline{7{,}3 \cdot 10^{13}\,J}$

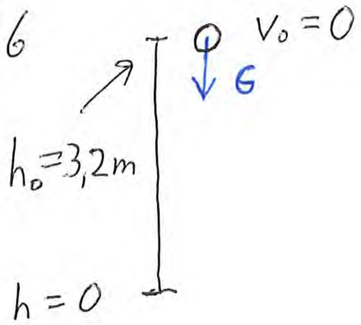
c) $E_k = \frac{1}{2} m v^2 = \frac{1}{2} \rho A y v^2$

$= \frac{1}{2} \cdot 998\,\frac{kg}{m^3} \cdot 1{,}00 \cdot 10^8\,m^2 \cdot 0{,}050\,m \cdot \left(10\,\frac{m}{s}\right)^2 = 2{,}495 \cdot 10^{11}\,J = \underline{2{,}5 \cdot 10^{11}\,J}$

d) $E_p - E_k = 7{,}342 \cdot 10^{13}\,J - 0{,}025 \cdot 10^{13}\,J = \underline{7{,}3 \cdot 10^{13}\,J}$

dvs. nesten all energien.

4.336



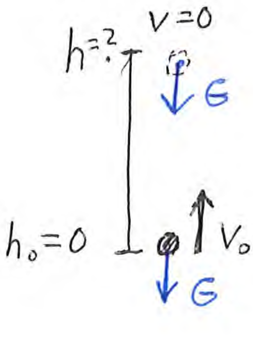
$E_k = E_{p0}$

$\frac{1}{2} \cancel{m} v^2 = \cancel{m} g h_0$

$v^2 = 2 g h_0$

$v = \sqrt{2 g h_0} = \sqrt{2 \cdot 9{,}81 \cdot 3{,}2}\,\frac{m}{s} = \underline{7{,}9\,\frac{m}{s}}$

4.337 $m = 0{,}300\,kg$
$v_0 = 6{,}6\,\frac{m}{s}$



a) $E_p = E_{k0}$

$\cancel{m} g h = \frac{1}{2} \cancel{m} v_0^2$

$h = \frac{v_0^2}{2g} = \frac{(6{,}6\,\frac{m}{s})^2}{2 \cdot 9{,}81\,\frac{m}{s^2}}$

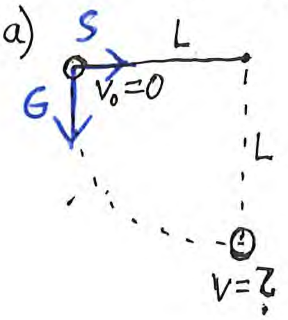
$= \underline{2{,}2\,m} \quad (2{,}220\,m)$

b) $\frac{\Delta E_p}{E_{total}} = \frac{mg(h_{ideell} - h)}{mgh_{ideell}} = \frac{2{,}22\,m - 2{,}0\,m}{2{,}22\,m} = 0{,}099$
$= \underline{9{,}9\,\%}$

$\Delta E_p = mg(h_{ideell} - h) = 0{,}300\,kg \cdot 9{,}81\,\frac{N}{kg} \cdot (2{,}22 - 2{,}0)\,m$

$= \underline{0{,}65\,J}$

4.339+ $m = 10\,kg$
$L = 1{,}0\,m$

a) 

b) $W_s = 0$ fordi S er 90° på bevegelsesretningen under hele bevegelsen.

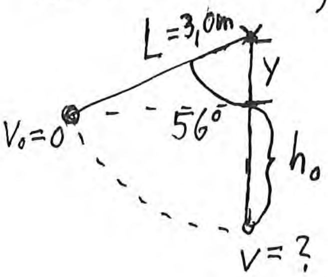
c) $E_{p0} = E_k$

$$mgL = \frac{1}{2}mv^2$$

$$2gL = v^2$$

$$v = \sqrt{2gL} = \sqrt{2 \cdot 9{,}81\,\tfrac{m}{s^2} \cdot 1{,}0\,m} = \underline{4{,}4\,\tfrac{m}{s}}$$

4.340+



a) $E_{p0} = E_k$

$$mgh_0 = \frac{1}{2}mv^2$$

$$2gh_0 = v^2$$

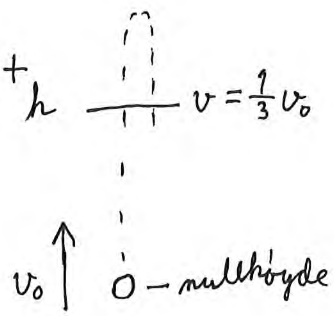
$$v = \sqrt{2gh_0} = \sqrt{2 \cdot 9{,}81\,\tfrac{m}{s^2} \cdot 1{,}322\,m} = \underline{5{,}1\,\tfrac{m}{s}}$$

$$h_0 = L - L\cdot\cos 56° = L\cdot(1-\cos 56°)$$

$$= 3{,}0\,m \cdot (1-\cos 56°) = 1{,}322\,m$$

b) $\underline{5{,}1\,\tfrac{m}{s}}$ massen har ingen betydning.

4.341+



a) $E_{k0} + \cancel{E_{p1}} = E_k + E_p$

$$\frac{1}{2}mv_0^2 = \frac{1}{2}mv^2 + mgh \quad | :m$$

$$\frac{1}{2}v_0^2 = \frac{1}{2}v^2 + gh$$

$$\frac{1}{2}(v_0^2 - v^2) = gh$$

$$h = \frac{1}{2g}(v_0^2 - v^2)$$

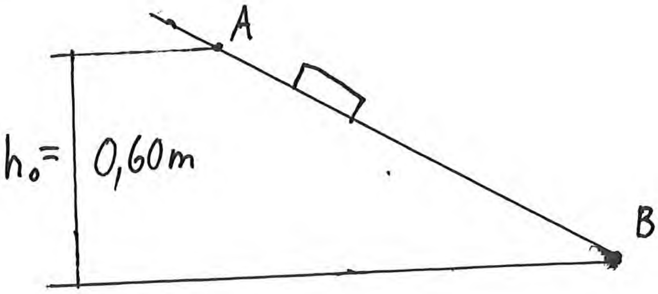
$$h = \frac{1}{2g}\left[v_0^2 - \left(\frac{1}{3}v_0\right)^2\right]$$

$$h = \frac{1}{2g}\left[v_0^2 - \frac{1}{9}v_0^2\right] = \frac{1}{2g}\cdot\frac{8}{9}v_0^2$$

$$\underline{h = \frac{4}{9g}\cdot v_0^2}$$

b) $h = \frac{4}{9 \cdot 9{,}81\,\frac{m}{s^2}} \cdot \left(25\,\frac{m}{s}\right)^2 = \underline{28\,m}$

4.342



$m = 2{,}5\,kg \qquad V_0 = 0$

$V = 2{,}0\,\frac{m}{s}$

$W_f = ?$

$E_{p0} = E_K + W_f$

$W_f = E_{p0} - E_K$

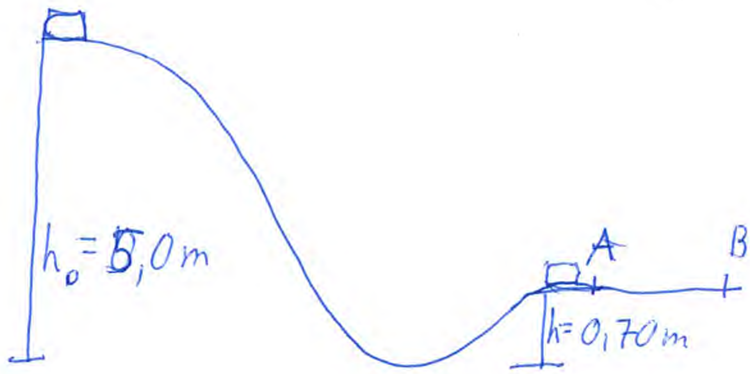
$= mgh_0 - \frac{1}{2}mv^2$

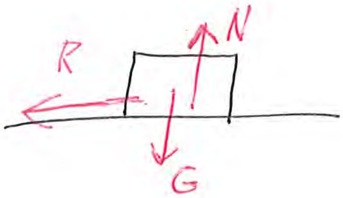
$= m(gh_0 - \frac{1}{2}v^2)$

$= 2{,}5\,kg \cdot \left(9{,}81\,\frac{m}{s^2} \cdot 0{,}60\,m - \frac{1}{2} \cdot \left(2{,}0\,\frac{m}{s}\right)^2\right)$

$= 9{,}715\,J = \underline{9{,}7\,J}$

4.343





$E_{p0} = mgh_0$

$E_{K\,iA} = E_A = E_{p0} - E_p = mg(h_0 - h)$

$R = 1{,}20 \cdot G = 1{,}20 \cdot mg$

$W_f = R \cdot s = 1{,}20 \cdot mgs$

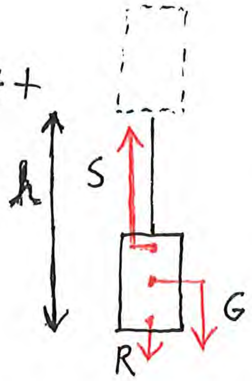
$E_A = W_f$

$\cancel{mg}(h_0 - h) = 1{,}20 \cdot \cancel{mg}s$

$s = \frac{(h_0 - h)}{1{,}20} = \frac{4{,}30\,m}{1{,}20} = \underline{3{,}6\,m}$

4.344+

$+\Uparrow$



$S = 9200\,N$ $\qquad h = 3{,}0\,m$

$m = 800\,kg$

$G = mg = 800\,kg \cdot 9{,}81\,\frac{m}{s^2} = 7848\,N$

$R = 100\,N$

a) $W_S = S \cdot h = 9200\,N \cdot 3{,}0\,m = 27600\,J = 2{,}8 \cdot 10^4\,J = \underline{28\,kJ}$

b) $\Delta E_p = mgh = 7848\,N \cdot 3{,}0\,m = 23544\,J = 2{,}4 \cdot 10^4\,J = \underline{24\,kJ}$

c) $\Delta E_k = W_{\Sigma F}$

$\Delta E_k = (S - G - R) \cdot h = (9200 - 7848 - 100)\,N \cdot 3{,}0\,m = 3756\,J$

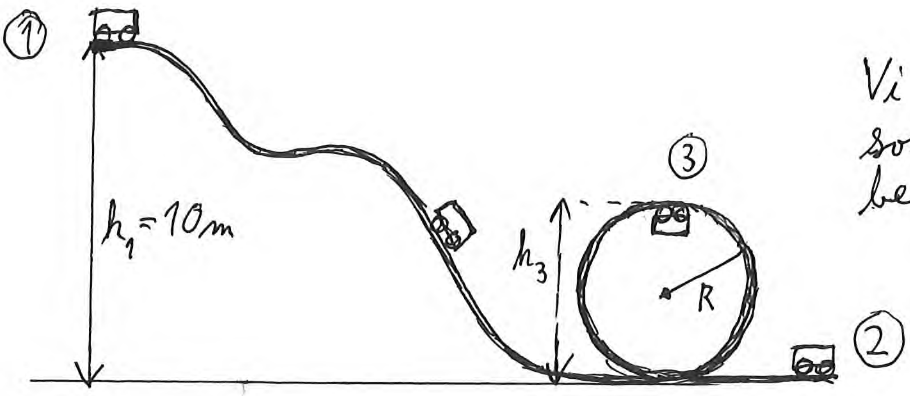
$= \underline{3{,}8\,kJ}$

d) $\Delta E_p + \Delta E_k \neq 0$ fordi flere krefter enn tyngden gjør et arbeid på heisen

e) $\Delta E_p + \Delta E_k = W_S - W_R$

Ja, endringen i mekanisk energi er lik arbeidet S gjør minus størrelsen på arbeidet som R gjør,

4.346+



Vi betrakter vogna som et punkt i bevegelse.

a) $E_{k2} + \cancel{E_{p2}} = \cancel{E_{k1}} + E_{p1}$

$$\frac{1}{2} m v_2^2 = m g h_1$$
$$\frac{1}{2} \cdot v_2^2 = g \cdot h_1$$
$$v_2^2 = 2 g h_1$$
$$v_2 = \sqrt{2 g h_1} = \sqrt{2 \cdot 9{,}81 \frac{m}{s^2} \cdot 10m} = \underline{14 \frac{m}{s}}$$

b) $R = 2{,}0m$

Diameteren på sirkelen er $2 \cdot R = 4{,}0m$

Høyden over bakken i toppen av sirkelen blir dermed $h_3 = 4{,}0m$.

Den mekaniske energien er bevart i bevegelsen og vi får

$$E_{k3} + E_{p3} = \cancel{E_{k1}} + E_{p1}$$
$$\frac{1}{2} m v_3^2 + m g h_3 = m g h_1 \quad | : m$$
$$\frac{1}{2} v_3^2 + g h_3 = g h_1$$
$$\frac{1}{2} v_3^2 = g(h_1 - h_3)$$
$$v_3^2 = 2g(h_1 - h_3)$$
$$v_3 = \sqrt{2g(h_1 - h_3)}$$
$$v_3 = \sqrt{2 \cdot 9{,}81 \frac{m}{s^2} (10m - 4{,}0m)} = \underline{11 \frac{m}{s}}$$

4.348

$k = 800\,\frac{N}{m}$

a) $x = 0{,}15\,m$ $\quad E_p = \frac{1}{2}kx^2$

$= \frac{1}{2}\cdot 800\,\frac{N}{m}\cdot(0{,}15\,m)^2$

$= \underline{9{,}0\,J}$

$v_0 = 2{,}5\,\frac{m}{s}$

b) Vis at $x = 0{,}25\,m$ på det meste.

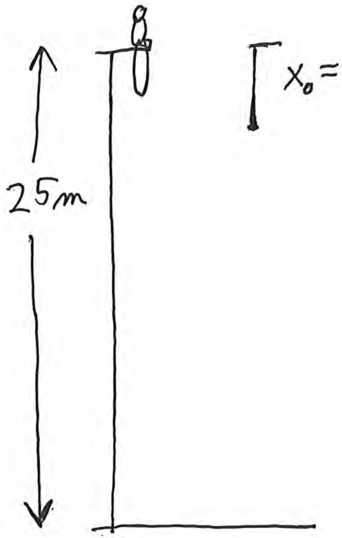
$$E_p = E_{k0}$$

$$\frac{1}{2}kx^2 = \frac{1}{2}mv_0^2$$

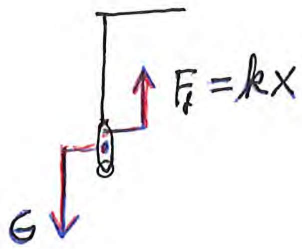
$$x^2 = \frac{mv_0^2}{k}$$

$$x = \sqrt{\frac{m}{k}}\cdot v_0 = \sqrt{\frac{8{,}0\,kg}{800\,\frac{N}{m}}}\cdot 2{,}5\,\frac{m}{s} = \underline{0{,}25\,m \text{ (som oppgitt)}}$$

4.350+ $\quad m = 50\,kg \qquad k = 100\,\frac{N}{m}$



$x_0 = 5{,}0\,m$ uten belastning



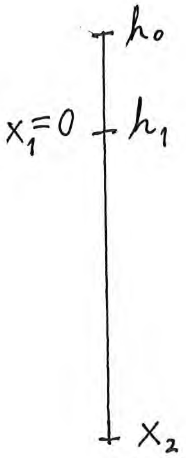
a) Farten er størst der akselerasjonen er null.

$\Sigma F = ma$ og $a = 0$ gir

$$F_f - G = 0$$
$$kx = mg$$
$$x = \frac{mg}{k} = \frac{50\,kg \cdot 9{,}81\frac{m}{s^2}}{100\,\frac{N}{m}} = 4{,}905\,m$$

$$x_{total} = x_0 + x = 5{,}0\,m + 4{,}905\,m = 9{,}905\,m = \underline{9{,}9\,m}$$

b) $v = 0$ i bunnen av fallet. All energi er potensiell der.
Antar bevaring av mekanisk energi



$$E_{p1} + E_{k1}^{*} = E_{p2}$$
$$E_{p1} + \Delta E_{p10} = E_{p2}$$
$$mgx_2 + mg(h_0 - h_1) = \tfrac{1}{2}kx_2^2$$

*Den kinetiske energien etter fallet på 5,0m er lik den potensielle energien i en høyde på 5,0m.

$$** \quad 50 \cdot 9{,}81 \cdot x_2 + 50 \cdot 9{,}81 \cdot 5{,}0 = \tfrac{1}{2} \cdot 100 \cdot x_2^2 \quad | :50$$
$$9{,}81 \cdot x_2 + 49{,}05 = x_2^2$$

** Alt i SI-enheter. Vi sløyfer benevning for oversiktens skyld.

$$x_2^2 - 9{,}81 \cdot x_2 - 49{,}05 = 0 \qquad A = 1 \quad B = -9{,}81 \quad C = -49{,}05$$

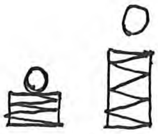
$$x_2 = 13{,}45$$

Dette vil si at den totale anstanden fra toppen er

$$5{,}0\,m + 13{,}45\,m = 18{,}45\,m = \underline{18\,m}$$

4.352+

$x_1 = 0{,}80\,m$



$x_a = 2{,}0\,m$

$k = 50 \cdot 10^3 \frac{N}{m}$ $x = x_a - x_1$
$= (2{,}0 - 0{,}80)\,m = 1{,}2\,m$

$\Delta E_p \approx \Delta E$

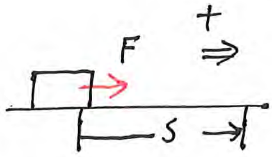
$\frac{1}{2} k x^2 = \quad gh$

$h = \frac{kx^2}{2mg} = \frac{50 \cdot 10^3 \cdot (1{,}2\,m)^2}{2 \cdot 2{,}0\,kg \cdot 9{,}81 \frac{m}{s^2}} = \underline{1{,}8\,km}$

Vi ser bort fra høydeendring under utskyting.

4.354+

a) $P = \frac{W}{t} = \frac{F \cdot s}{t} = F \cdot \frac{s}{t} = F \cdot v$

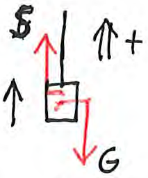


$v = \text{konst.}$

b) $P = F \cdot v = S \cdot v = G \cdot v$

$P = mgv$

$\frac{P}{mg} = v$



$\sum F = 0$

$S = G$

$v = \frac{6{,}8 \cdot 10^3\,W}{300\,kg \cdot 9{,}81 \frac{N}{kg}} = 2{,}310 \frac{W}{N} = 2{,}3 \frac{\frac{J}{s}}{N} = 2{,}3 \frac{\frac{Nm}{s}}{N} = \underline{2{,}3 \frac{m}{s}}$

4.355 $\eta = 0{,}78$ $h = 10\,m$ $m = 200\,kg$

$E_{p_{ut}} = mgh = 200\,kg \cdot 9{,}81 \frac{N}{kg} \cdot 10\,m = 19{,}62\,kJ$

$\eta = \frac{E_{ut}}{E_{inn}} \Rightarrow E_{inn} = \frac{E_{ut}}{\eta} = \frac{19{,}62\,kJ}{0{,}78} = \underline{25\,kJ}$

4.356+ $\eta_M = 0{,}90$ $\eta_H = 0{,}40$ $P_{tilf\,M} = 5{,}0 \cdot 10^3\,W$

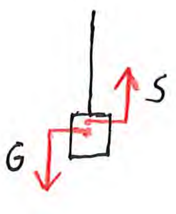
a) $\eta_{tot} = \eta_M \cdot \eta_H = 0{,}90 \cdot 0{,}40 = 0{,}36 = \underline{36\%}$

b) $m = 450\,kg$ $v = ?$

$P_{nyttig} = S \cdot v = G \cdot v = mgv$

$P_{tilført} = 5{,}0 \cdot 10^3\,W$

$\eta = 0{,}36$



$\frac{P_{nyttig}}{P_{tilført}} = \eta \Rightarrow \frac{mgv}{P_{tilført}} = \eta$

$v = \frac{\eta \cdot P_{tilført}}{mg}$

$v = \frac{0{,}36 \cdot 5{,}0 \cdot 10^3 \frac{Nm}{s}}{450\,kg \cdot 9{,}81 \frac{N}{kg}} = \underline{0{,}41 \frac{m}{s}}$

4.358+ $v_0 = 60\,\frac{km}{h}$ $\quad v_1 = 65\,\frac{km}{h}$ $\quad v_2 = 55\,\frac{km}{h}$ $\quad t = 7{,}2\,s$

$m = 1450\,kg$ $\quad = 18{,}05\,\frac{m}{s}$ $\quad = 15{,}27\,\frac{m}{s}$

$$P = \frac{W}{t}$$

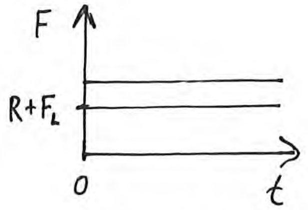
$$= \frac{\Delta E_K}{t} = \frac{\frac{1}{2}m\left(v_1^2 - v_2^2\right)}{t} = \frac{\frac{1}{2}\cdot 1450\,kg \cdot \left(18{,}05^2 - 15{,}27^2\right)\frac{m^2}{s^2}}{7{,}2\,s}$$

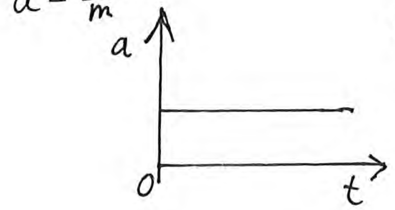
$$= 9327\,W = \underline{9{,}3\,kW}$$

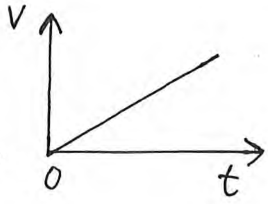
(antar at luftmotstand og annen friksjon øker lineært med t)

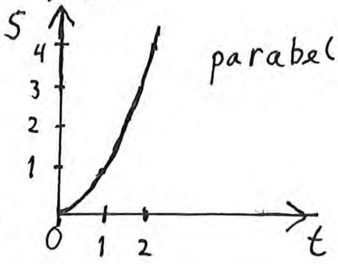
4.359+ $F(t),\ a(t),\ v(t),\ s(t),\ E_k(t),\ P(t)$

• $F = \text{konst}$ $\quad F = ma$, $a = \frac{F}{m}$ $\quad v = v_0 + at$ $\quad s = v_0 t + \frac{1}{2}at^2$





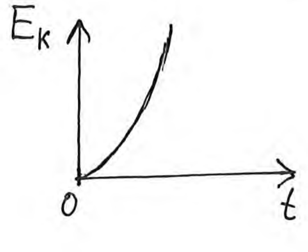


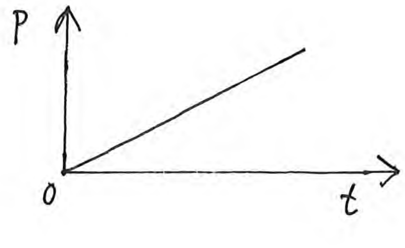


parabel

$E_K = \frac{1}{2}mv^2$ og v øker lineært med t $\quad P = F\cdot v$

R = konst,
F_L = konst.





• $P = \text{konst}$ og $\Sigma F = 0 \Rightarrow v = \text{konst}.$ $\quad F = R + F_L$