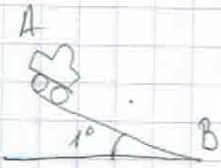
A compléter par 1 phrase — Exercices Synthèse pp 38 pt 6 — (A) (1)

Energies	D	I	F	S
(1) 	$m = 1500\ kg$ $v = 1\ m/s$ $L = 10\ m$ pas frottements $E_{mA} = E_{mB}$ $= W_{F_f}$	$W_{F_f} = ?$	$E_{mA} = E_c + E_p$ $E_p = W_{pes}$ $E_c = \frac{m v^2}{2}$ $W = m.g.\sin\alpha . d$	$E_{cA} = \frac{1500.1}{2} = 750\ J$ $W_{pesanteur} = 1500.9,81.\sin 1 . 10$ $= 12824,9\ J$ $E_m = 750 + 12824$ $= 13574,9\ J$ $\simeq 13600\ J$
(12) $m = 1,99\,10^{-26}\ kg$ $E_c = 4,64\,10^{4}\ J$	$v = ?$	$v = \sqrt{\frac{2E_c}{m}}$		$v = \sqrt{\frac{2.4,64\,10^{4}}{1,99\,10^{-26}}}$ $= 2,16\,10^{15}\ m/s$
(14) a] $v = 8,33\ m/s$ ⚠ les réponses sont données avec $g = 10\ N/kg$ b] $v = 13,89\ m/s$ c] $v = 25\ m/s$	$h = ?$	$E_p = E_c$ $E_p = m.g.h$ $E_c = \frac{m v^2}{2}$ $h = \frac{m v^2}{2} / m.g$ $h = \frac{v^2}{2} / g$	$h = \frac{(8,33)^2}{2} / 9,81$ $= 3,54\ m = 3,46\ m$ (g = 10) $h = \frac{(13,89)^2}{2} / 9,81$ $= 9,83\ m$ $h = \frac{(25)^2}{2} / 9,81 = 31,85\ m$	
(15) $m = 90\ kg$ $v = 8\ m/s$	$h = ?$	$E_p = E_c$ $E_p = m.g.h$ $E_c = \frac{m v^2}{2}$ $h = \frac{v^2}{2} / g$	$h = \frac{8^2}{2} / 9,81 = 3,26\ m$	

(17) $h = 140\ m$ | $h_n = ?$ | $E_c = \frac{m v^2}{2}$ | $E_c = \frac{500 . (55,5)^2}{2}$

$d = 500\ L/s$ | $E_{c_A} = E_{p_B}$ | $= 770\,062,5\ J$

$v = 200\ km/h$ | $h = \frac{E_p}{mg}$ | $h = \frac{770062,5}{500 . 9,81}$

$= 55,5\ m/s$ | | $= 156,9\ m$

$m = 500\ kg$

car $500\ L$.

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(19) $d = 4\ mm$ diamètre | $E_c = ?$ | $E_c = \frac{m v^2}{2}$ | $V = \frac{4}{3} 3,14 . \left(2 . 10^{-3}\right)^3 = 8 . 10^{-9}$

$m = ?$ | en $A \Rightarrow E_p$ | $= 3,349 . 10^{-8}\ L$

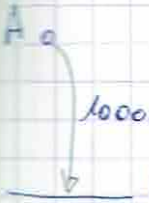
$h = 1000\ m$ | en $B \Rightarrow E_c$ | $m = 3,35 . 10^{-8}\ kg$

pas frottements | $E_{pA} = E_{cB}$ | $E_p = 3,35 . 10^{-8} . 9,81 . 1000$

$E_{mA} = E_{mB}$ | $E_{pA} = m . g h_A$ | $= 3,28 . 10^{-4}\ J$

$1\ L \Rightarrow 1\ kg$ d'eau | $v =$ | $E_c = 3,28 . 10^{-4}\ J$

$V = \frac{4}{3} \pi r^3$



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(20) $m = 100\,000\ T$ | $E_c = ?$ | $E_c = \frac{m v^2}{2}$ | $E_c = \frac{1 . 10^6 . (46,3)^2}{2}$

$= 1 . 10^6\ kg$ | | | $= 1,0718 . 10^{10}\ J$

$v = 90\ miles/h$

$= 90 . 1852\ m/h$

$= 166\,680\ m/h$

$v = 46,3\ m/s$

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(21) $m = 350\ kg$ | $h = ?$ | $E_p = mgh$ | $h = \frac{257500}{350 . 9,81}$

$E_p = 257500\ J$ | | $h = \frac{E_p}{mg}$ | $= 74,996\ m$

$g = 9,81\ N/kg$ | | | $= 75\ m$

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(22) $h = 20\ m$ | ~~$V = ?$~~ | $m = \frac{E_p}{gh}$ | $m = \frac{1,8 . 10^6}{9,81 . 20}$

$E = 1,8 . 10^6\ J$ | | | $= 9,17 . 10^3\ kg$

$E_{mA} = E_{mB}$. | | | $V = 9,17 . 10^3\ L$ d'eau

(25) $h = 6\ m$ | $E_p = ?$ | $E_p = mgh$ | $E_p = 10 \cdot 9,81 \cdot 6$ (B)

$m = 10\ kg$ | | | $E_p = 588,6\ J$

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(26) $m = 8\ g = 8 \cdot 10^{-3}\ kg$ | $h = ?$ | $v = \sqrt{\frac{2E_c}{m}}$ | $v = \sqrt{\frac{3200 \cdot 2}{8 \cdot 10^{-3}}}$

$E_c = 3200\ J$ | $v = ?$ | | $= 894,43\ m/s$

en A $E_m = E_{cA}$ | | $h = \frac{E_p}{m \cdot g}$ | $h = \frac{3200}{8 \cdot 10^{-3} \cdot 9,81}$

en B $E_m = E_{pB}$ | | | $= 4077,5\ m$

$E_{cA} = E_{pB}$ | | | $= 40,8\ hm$

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(27) $v = 120\ km/h$ | $E_c = ?$ | $E_p = mgh$ | $E_{pA} = 500 \cdot 20 \cdot 9,81$

$= 33,33\ m/s$ | | $E_c = \frac{mv^2}{2}$ | $= 98100\ J$

en A $E_m = E_p$ | | | $E_{cA} = E_{pA}$

en B $E_m = E_c$ | | | $E_{cB} = 98100\ J$

$E_{mA} = E_{mB}$ | $m = ?$ | $m = \frac{2E_p}{v^2}$ | $m = \frac{2 \cdot 98100}{(33,33)^2}$

$m = 500\ kg$ | | | $= 176,$

$h = 20\ m$

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(28) $v = 15\ km/h$ | $m = ?$ | $m = \frac{2E_c}{v^2}$ | $m = \frac{2 \cdot 814}{(4,17)^2}$

$= 4,167\ m/s$ | | | $= 93,76\ kg$

$E_c = 814\ J$

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(29) $E_p = 4200\ J$ | $m = ?$ | $m = \frac{E_p}{gh}$ | $m = \frac{4200}{9,81 \cdot 5} = 85,63\ kg$

$h = 5\ m$

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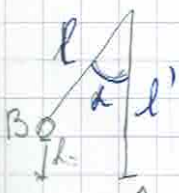
(30) $m = 100\ g = 0,1\ kg$ | $h = ?$ | $E_c = \frac{m \cdot g^2}{2}$ | $E_c = \frac{0,1 \cdot 1}{2} = 0,05\ J$

$v = 1\ m/s$ | | $h = \frac{E_p}{mg}$ | $h = \frac{0,05}{0,1 \cdot 9,81} = 0,05\ m$

en A $E_c = E_m$ | | | $= 5\ cm$

en B $\Rightarrow E_p = E_m$.

(31)



$l = 1,5\ m$
$m = 2\ kg$
$\alpha = 40°$
en A → Ec
en B → Ep
$g = 9,81\ N/kg$

$h = ?$
$E_p = ?$
$v_{max} = ?$

$h = l - l'$
$l' = l \cos\alpha$
$E_p = m.g.h$
$v = \sqrt{\frac{2E_c}{m}}$

$l' = 1,5 . \cos 40$
$= 1,15\ m$
$h = 1,5 - 1,15$
$= 0,35\ m$
$E_p = 2 . 9,81 . 0,35$
$= 6,867\ J$
$v = \sqrt{\frac{2 . 6,867}{2}}$
$= 2,62\ m/s$

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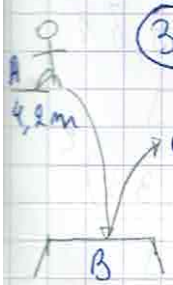
(32)



$h_A = 4,2\ m$
$h_C = 2,8\ m$
$m = 73\ kg$
$g = 9,81\ N/kg$

$E_{perdue} = ?$

$E_{mA} = E_{pA}$
$E_{mB} = E_{pB}$
$E_{perdue} = E_{pA} - E_{pB}$

$E_{pA} = 73 . 9,81 . 4,2$
$= 3007,75\ J$
$E_{pB} = 73 . 9,81 . 2,8$
$= 2005,16\ J$
$E_{perdue} = 3007,75 - 2005,16$
$= 1002,59\ J$

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(33) = (12)

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(35)

$v_A = 7,2\ km/h$
$= 2\ m/s$
$m = 80\ kg$
$v_C = 30\ m/s$

Si $v_{C_2} = 29\ m/s$

$h = ?$
$E_{perdue} = ?$

$E_c = \frac{mv^2}{2}$
$E_p = m.g.h$
$h = \frac{E_p}{m.g}$
$E_{perdue} = E_{cB} - E_{c_2}$

en A $E_{mA} = E_{pA}$ $E_{mA} = E_{mB}$
en C $E_{mB} = E_{cB}$
$E_c = \frac{80 . 30^2}{2} = 36000\ J$
$h = \frac{3600}{80 . 9,81} = 45,87\ m$
$= 46\ m$
$E_{c_2} = \frac{80\ 29^2}{2} = 33640\ m$
$E_{perdue} = 36000 - 33640$
$= 2360\ J$

$2360 \Rightarrow 6\%$ de $36000\ J$

(C)

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$v_A = 30\ km/h$
$= 8,33\ m/s$
$v_B = 15\ km/h$
$= 4,17\ m/s$
pas frottements

$h = ?$

$h = \frac{E_p}{m \cdot g}$

$E_{mA} = E_{mB}$

en A $E_{mA} = E_{cA}$
en B $E_{mB} = E_{cB} + E_{pB}$

$\frac{m v_A^2}{2} = \frac{m v_B^2}{2} + m g h_B$

$\frac{8,33^2}{2} = \frac{4,17^2}{2} + 9,81 h_B$

$34,69 = 8,69 + 9,81 h_B$

$9,81 h_B = 34,69 - 8,69$

$h_B = \frac{26}{9,81}$

$= 2,65\ m$

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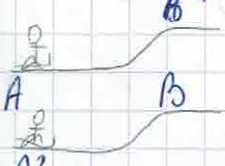

$v_A = 4\ m/s$
$v_B = 0\ m/s$
$v_{A'} = 5\ m/s$
pas frottements

$h = ?$

$E_{mA} = E_{mB}$

$v_{B'} = ?$

$E_{mA'} = E_{mB'}$

en A $E_{mA} = E_{cA}$
en B $E_{mB} = E_{pB}$

$\frac{m v_A^2}{2} = m \cdot g \cdot h_B$

$h_B = \frac{v_A^2}{2} / g$

$h_B = \left(\frac{16}{2}\right) : 9,81$

$= 8 / 9,81 = 0,815\ m$

en A' $E_{mA'} = E_{cA'}$
en B' $E_{mB'} = E_{pB'} + E_{cB'}$

$\frac{m v_{A'}^2}{2} = m \cdot g \cdot h_B + \frac{m v_B^2}{2}$

$\frac{v_B^2}{2} = \frac{5^2}{2} + 9,81 \cdot 0,815$

$= 12,5 - 7,99$

$= 4,5$

$v_B^2 = 4,5 \cdot 2 = 9$

$v_B = \sqrt{9}$

$= 3\ m/s$

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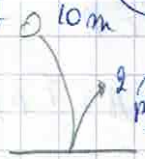

$m = 0,25$ kg
$h_A = 10$ m
$h_B = 2$ m

E perdue = ?

E perdue $= E_{pA} - E_{pB}$

en A $E_m = E_p$
en B $E_m = E_p$

$E_{pA} = 0,25 \cdot 9,81 \cdot 10$
$= 24,525$ J

$E_{pB} = 0,25\, 9,81 \cdot 2$
$= 4,9$ J

E perdue $= 24,52 - 4,9$
$= 19,62$ J

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40 a) $v = 78$ km/h $= 21,67$ m/s
$m = 1200$ kg

E perdue = ?

E perdue $= E_c$

$E_c = \frac{m v^2}{2}$

E perdue $= \frac{1200 \cdot (21,67)^2}{2}$
$= 281753,34$ J

b) $d = 55$ m

F_f = ?

$W = E$ perdue
$= F_f \cdot d$

$F_f = \frac{281753,34}{55}$
$= 5122,79$ N

c) Véhicule descend $\neq$ pas variation E_c mais la force va être influencée par l'inclinaison de la pente.

41 a) $m = 100$ g
$F = 80$ N
$d = 0,5$ m

W = ?

$W = F \cdot d$
$W = E_p = E_c$

$W = 80 \cdot 0,5 = 40$ J
$E_p = 40$ J

c)

v = ?

$E_c = \frac{m v^2}{2}$

$v = \sqrt{\frac{40 \cdot 2}{0,1}} = \sqrt{\frac{80}{0,1}}$
$= 28,28$ m/s

c) $v = 28,28$ m/s
$m = 0,1$ kg
$E_p = 40$ J

h = ?

$E_c = E_p$
$h = \frac{E_p}{m \cdot g}$

$h = \frac{40}{0,1 \cdot 9,81}$
$= 40,77$ m

42 $m = 12\,10^{-3}$ kg
$v = 700$ m/s
$h = 10$ m

G = ?

$E_c = \frac{m v^2}{2}$
$E_c = E_p = m \cdot g h$

$E_c = 12\,10^{-3} \cdot (700)^2 = 2940$ J
$G = \frac{2940^2}{10} = 294$ N

Si $m = 30$ g

v = ?

$v = \sqrt{\frac{2 E_c}{m}}$

$v = \sqrt{\frac{2 \cdot 2940}{30\,10^{-3}}} = 442,72$ m/s