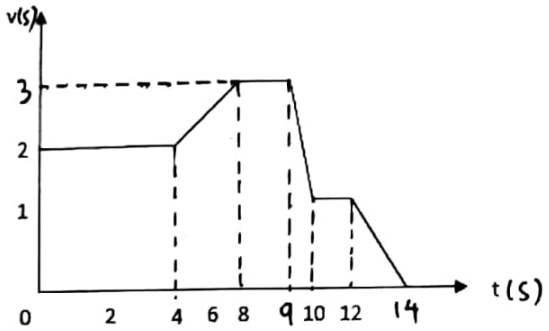
Revisi soal

SOAL DETECT FISIKA DASAR 1 (UTS)

1. Superman berdiri sejauh 120 m secara horizontal dari Lois Lane. Seorang penjahat melempar batu secara vertikal ke bawah dengan kecepatan 2,8 m/s dari ketinggian 14 m dari ~~atas tanah~~ kepala lois lane. (a) Jika superman berhasil menghentikan batu tepat sesaat batu mengenai Lois Lane, berapakah percepatan minimun yang harus dimiliki superman? (b) Berapa kecepatan superman saat sudah mencapai tempat Lois Lane?

2.



Selesaikanlah pertanyaan berikut ini berdasarkan grafik diatas!

(a) Posisi benda pada saat t = 8 s

(b) Jarak yang ditempuh benda dari t = 2 s sampai t = 9 s

(c) Kecepatan benda saat t = 6 s

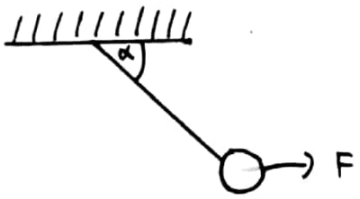
(d) Percepatan benda pada selang waktu t = 10s sampai t = 12s

(e) Buatlah grafik ~~a-t~~ a-v

(f) Buatlah grafik a-t

12. Bola bermassa 2,5 kg terikat pada tali yang dipasang ke langit-langit. Bola tersebut ditarik ke satu sisi dengan gaya F (sudut α dari langit = 37°)

(a) Sebelum bola dilepaskan dan berayun bolak balik, berapa besar gaya F yang menahan bola pada posisinya? (b) Sebelum bola dilepaskan dan berayun bolak balik, berapa besar tegangan tali yang menahan bola?



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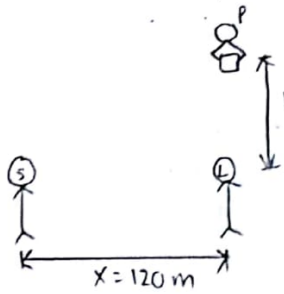


Ⓢ superman
Ⓛ Louis Lane
Ⓟ penjahat
$V_{op} = 2{,}8\ m/s$
asumsi $g = 10\ m/s^2$

a Waktu benda untuk jatuh tepat di Louis Lane

GLBB

$h = v_{oy}t + \frac{1}{2}gt^2$

$14 = 2{,}8t + \frac{1}{2}\cancel{10}^{5}t^2$

$5t^2 + 2{,}8t - 14 = 0$

$t_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{-2{,}8 \pm \sqrt{(2{,}8)^2 - 4 \cdot 5 \cdot (-14)}}{2\,5}$

$= \frac{-2{,}8 \pm \sqrt{287{,}84}}{10}\ s$

$t_1 \approx 1{,}417s$ ✓ $t_2 \approx -1{,}9775$ (TM)

GLBB

Tinjau Superman

$x = \cancel{v_{0x}}^{=0}t + \frac{1}{2}at^2$ ($v_{0x} = 0$)

$x = \frac{1}{2}at^2$

$120 = \frac{1}{2}a(1{,}417)^2$

$a = \frac{240}{(1{,}417)^2}$

$a \approx 119{,}73\ m/s^2$

b v_{tsx} ?

GLBB

$v_{tsx} = \cancel{v_{0sx}}^{=0} + at$

$v_{tsx} = at$

$v_{tsx} = 119{,}53 \cdot 1{,}417$

$v_{tsx} \approx 169{,}66\ m/s$

2 a. posisi, luas dibawah kurva

$s = v\,t$ (t 0s-4s)

$s = 2\ 4$

$s = 8\ m$

t_{4s-8s}

$v_t = v_0 + at$

$3 = 2 + a4$

$1 = a4$

$a = 0{,}25\ m/s^2$

$s = v_0t + \frac{1}{2}at^2$

$s = 2\,4 + \frac{1}{2}\frac{1}{4}4^2$

$s = 8 + 2$

$s = 10\ m$

$s\ (t_{0-8s}) = 8 + 10 = 18\ m$

b t_{2-5} 4s

$s = vt$

$s = 2\ 2$

$s = 4\ m$

t_{4s-8s} $s = 10\ m$

t_{8s-9s} $s = 3\ 1$ $s = 3m$

$s_{t_2-t_9} = 4 + 10 + 3 = 17s$

c t_{6s}

$v_t = v_0 + at$

$v_t = 2 + \frac{1}{4}2$

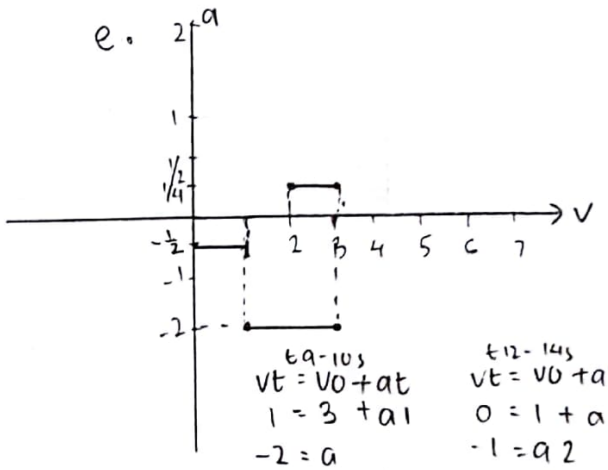
$v_t = 2{,}5\ m/s$

d. $v_t = v_0 + at$

$0 = 0 + a2$

$a = 0\ m/s^2$

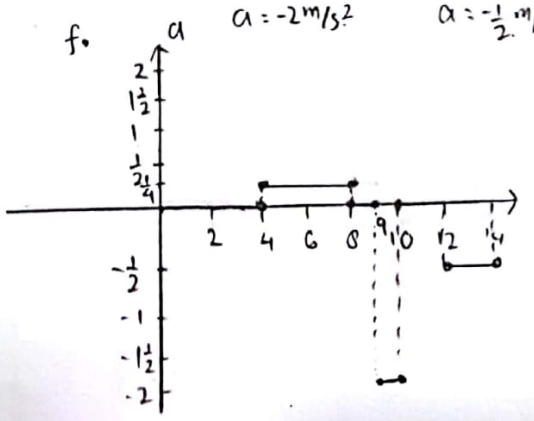
e.



t_{9-10s}
$v_t = v_0 + at$
$1 = 3 + a1$
$-2 = a$
$a = -2\ m/s^2$

t_{12-14s}
$v_t = v_0 + at$
$0 = 1 + a2$
$-1 = a2$
$a = -\frac{1}{2}\ m/s^2$

f.



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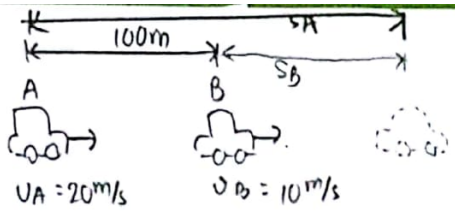


a. $S_A = S_B + 100$

$v_A t = v_B t + 100$

$20t = 10t + 100$

$10t = 100$

$t = 10 s$

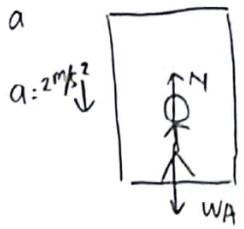
b. $S_A = v_A t$

$S_A = 20 \cdot 10 = 200 m$

c. $S_B = v_B t$

$S_B = 10 \cdot 10 = 100 m$

11. a



$W_A = 540N$

asumsi $g = 10 m/s^2$

Besar dan arah gaya normal?

$\Sigma F_y = m_A a$

$W_A - N = m_A a$

$540 - N = \frac{540}{10} 2$

$540 - N = 108$

$N = 432 N$

b.

$W_A = 540N$ asumsi $g = 10 m/s^2$

Besar dan arah gaya normal?

$\Sigma F_y = m_A a$

$= 0 (a = 0)$

$W_A - N = 0$

$W_A = N$

$N = 540N$

c.

$\Sigma F_y = m_A a$

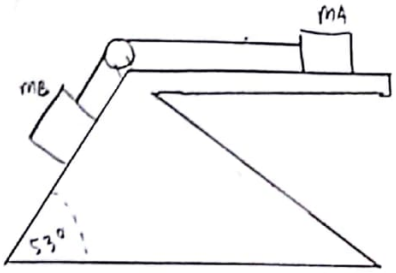
$T - W_A = m_A a$

$T = m_A a + m_A g$

$T = \left(\frac{540}{10}\right) 3 + 540$

$T = 702 N$

6



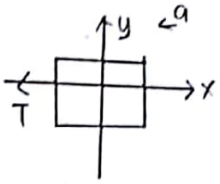
$m_A = 5kg$

$m_B = 15kg$

asumsi $g = 10 m/s^2$

$\theta = 53^0$

tinjau benda A



HK Newton 2

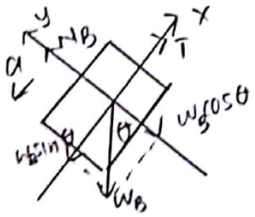
sb x

$\Sigma F_x = m_A a$

$T = m_A a$

$T = 5a \cdots ①$

tinjau benda B



HK Newton 2

sb x

$\Sigma F_x = m_B a$

$W_B \sin\theta - T = m_B a$

① → $W_B \sin\theta - 5a = 15a$

$m_B g \sin\theta = 20a$

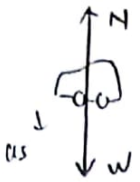
$a = \frac{1}{20} 15 \cdot 10 \sin 53$

$a = \frac{20}{4} 0{,}8$

$a = 6 m/s^2$

(13)

$m = 2\,ton$
$v = 20\,m/s$
asumsi $g = 10\,m/s^2$



$\Sigma F_y = ma_s$

$w - N = m\frac{v^2}{r}$

$N = mg - m\frac{v^2}{r}$

$N = 2000 \cdot 10 - 2000\,\frac{400}{100}$

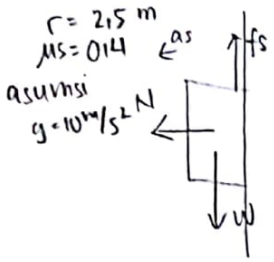
$N = 20000 - 8000$

$N = 12000\,N$

(16)

b. tampak sisi samping

a. terdapat gaya geseran yang menahan benda didaerah dalam dinding.



HK Newton II
sby

$\Sigma F_y = 0$

$f_s = w$

$\mu_s N = w$

$N = \frac{mg}{\mu_s}$ ... (1)

HK Newton II
sbx

$\Sigma F_x = ma_s$

$N = ma_s$

$N = m\omega^2 r$

(1) → $\frac{mg}{\mu_s} = m\omega^2 r$

$\omega^2 = \frac{g}{\mu_s r}$

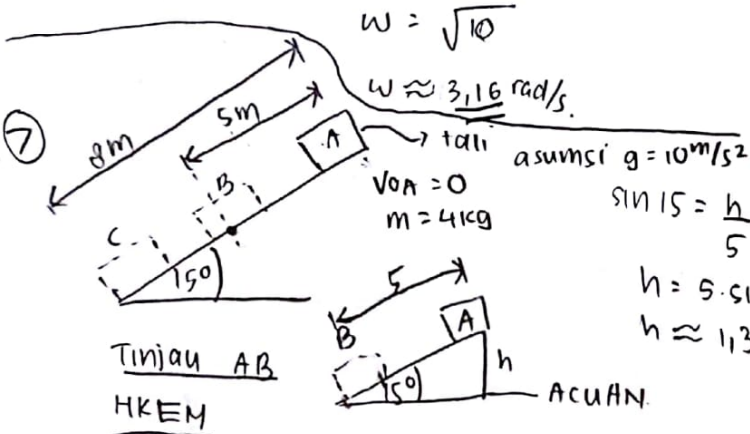
$\omega = \sqrt{\frac{g}{\mu_s r}}$

$\omega = \sqrt{\frac{10}{0,4 \cdot 2,5}}$

$\omega = \sqrt{10}$

$\omega \approx 3,16\,rad/s$.

(7)



asumsi $g = 10\,m/s^2$

$v_{0A} = 0$

$m = 4\,kg$

$\sin 15 = \frac{h}{5}$

$h = 5 \cdot \sin 15$

$h \approx 1,3$

Tinjau AB

HKEM

$E_{KA} + E_{PA} = E_{KB} + E_{PB}$

$=0 (v_{0A} = 0)$ $=0 (h_B = 0)$

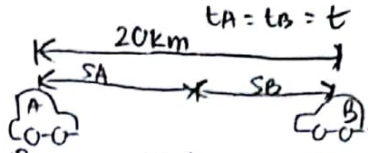
$mgh_A = \frac{1}{2}mv_B^2$

$2 \cdot 10 \cdot 1,3 = v_B^2$

$v_B^2 = 26$

$v_B \approx 5,1\,m/s$.

(8)



$v_A = 40\,km/jam$ $v_B = 84\,km/jam$

$S_A + S_B = 20$

$v_A t_A + v_B t_B = 20$

$40t + 84t = 20$

$124t = 20$

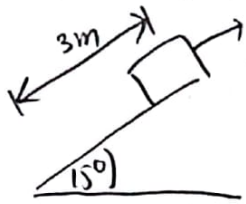
$t = \frac{20}{124} = \frac{5}{31}$ jam

$t = \frac{5}{31}$ 60menit

$\approx 9,68$ menit

∴ waktu yang dibutuhkan agar mobil A dan B berjumpa dari posisi awal adalah 9,68 menit

lanjutan no 7.

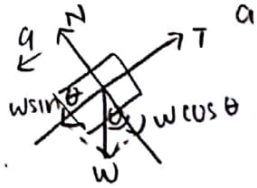


$v_t^2 = v_0^2 + 2as$

$0 = 5,1^2 + 2a\,3$

$-26,01 = 6a$

$a = -4,335\,m/s^2$



$\Sigma F_x = ma$

$w\sin\theta - T = ma$

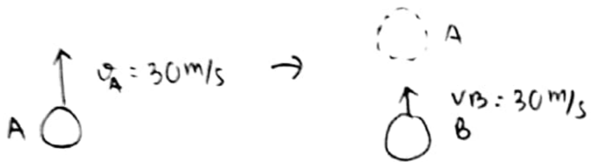
$T = mg\sin\theta - ma$

$T = m(g\sin\theta - a)$

$T = 4(10\sin 15 - (-4,335))$

$T \approx 27,7\,N$

10



$t_A = 1 + t_B$ asumsi $g = 10 m/s^2$

saat bertemu ~ $h_A = h_B$

GVA (Gerak vertikal keatas)

$$h_A = h_B$$

$$V_{0A} t_A - \frac{1}{2} g t_A^2 = V_{0B} t_B - \frac{1}{2} g t_B^2$$

$$30(1+t_B) - \frac{1}{2} 10 . (1+t_B)^2 = 30t_B - \frac{1}{2} 10 \, t_B^2$$

$$30 + \cancel{30t_B} - 5(1 + 2t_B + t_B^2) = \cancel{30t_B} - 5t_B^2$$

$$30 - 5 - 10t_B - \cancel{5t_B^2} = -\cancel{5t_B^2}$$

$$25 = 10 t_B$$

$$t_B = \underline{\underline{2,5 s}}$$

$$h_B = V_{0B} t_B - \frac{1}{2} g t_B^2$$

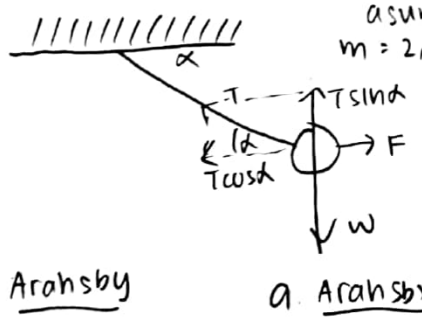
$$h_B = 30 . 2,5 - \frac{1}{2} \overset{5}{\cancel{10}} \, 2,5^2$$

$$h_B = 75 - 31,25$$

$$h_B = \underline{\underline{43,75 m}}$$

∴ bola akan bertemu pada ketinggian 43,75 m dan waktu yang dibutuhkan adalah 2,5 s setelah pelemparan bola kedua (bola B).

12



asumsi $g = 10 m/s^2$

$m = 2,5 kg$

$\alpha = 37°$

a. Arah sb x

$$\Sigma Fx = 0$$

$$F = T \cos \alpha$$

$$F = 41,54 \cos 37$$

$$F \approx \underline{\underline{33,17 N}}$$

b Arah sb y

$$\Sigma Fy = 0$$

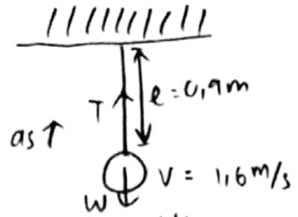
$$T \sin \alpha = w$$

$$T = \frac{mg}{\sin \alpha}$$

$$T = \frac{2,5 . 10}{\sin 37}$$

$$T \approx \underline{\underline{41,54 N}}$$

14.



$m = 1 kg$

asumsi $g = 10 m/s^2$

a. Arah sb y

$$\Sigma Fy = m a_s$$

$$T - W = m \frac{v^2}{r}$$

$$T = mg + m \frac{v^2}{r}$$

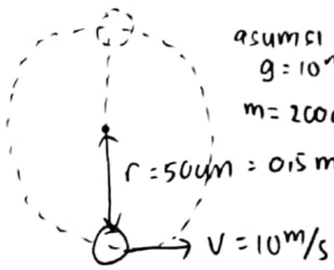
$$T = m \left(g + \frac{v^2}{r}\right)$$

$$T = 1 \left(10 + \frac{1,6^2}{0,9}\right)$$

$$T \approx \underline{\underline{12,84 N}}$$

b karena T menahan bola supaya tidak lepas karena gaya w yang berarah radial keluar sehingga T harus lebih besar atau sama dengan nilai w.

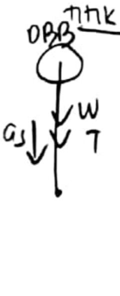
15.



asumsi $g = 10 m/s^2$

$m = 200 gr = 0,2 kg$

titik tertinggi



$$\Sigma Fy = m a_s$$

$$T + W = m a_s$$

$$T = m a_s - W$$

$$T = m \frac{v^2}{r} - mg$$

$$T = m \left(\frac{v^2}{r} - g\right)$$

$$T = 0,2 \left(\frac{100}{0,5} - 10\right)$$

$$T = \underline{\underline{38 N}}$$

titik terendah

$$\Sigma Fy = m a_s$$

$$T - W = m a_s$$

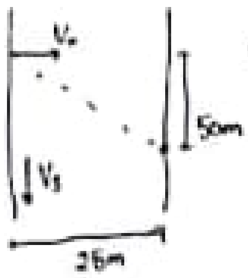
$$T = m a_s + mg$$

$$T = m \left(\frac{v^2}{r} + g\right)$$

$$T = 0,2 \left(\frac{100}{0,5} + 10\right)$$

$$T = \underline{\underline{42 N}}$$

3.



a. $V_0 = 0{,}5\ m/s$

$\tan\theta = \frac{50}{25} = \frac{V_s}{V_0}$

$2 = \frac{V_s}{0{,}5}$

$V_s = 1\ m/s$

b. $V = \sqrt{V_0^2 + V_s^2}$

$= \sqrt{0{,}5^2 + 1^2}$

$= 0{,}5\sqrt{0{,}5}\ m/s$

$= 1{,}12\ m/s$

4. $V_{Doni} = 72\ km/jam$

$72 \cdot \frac{m \cdot 5}{detik \cdot 18}$

$V_{Doni} = 20\ m/s$

V_{batu} menurut doni $= 5\ m/s$

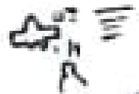
a) Doni → 20 m/s

Batu → 5 m/s searah

searah cepat ⇒

$V_{BO} \Rightarrow 20 + 5 = 25\ m/s$

b)



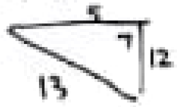
← bola dilempar ke belakang oleh Doni

$V_{BO} = 20 - 5 = 15\ m/s$

5.* Revisi → $V_{sungai} = 1{,}5\ m/s$

a) V_{Doni} thd sungai / V_{Doni} menurut doni = ?

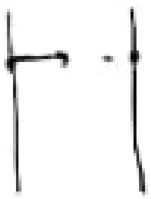
$s = v.t \rightarrow 2 \cdot 6{,}5 = 13m$



$s = 5m,\ t = 6{,}5s \Rightarrow V_0 = \frac{5}{6{,}5}$

$= \frac{10}{13}\ m/s$

b)

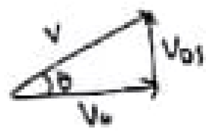


$V_{0s} \rightarrow V_s = 1{,}5\ m/s$

$V_0 = \frac{10}{13}\ m/s$

$V = \sqrt{1{,}5^2 + (\frac{10}{13})^2}$

$\approx 1{,}69\ m/s$



$\tan\theta = \frac{V_{0s}}{V_0}$

$= \frac{1{,}5}{10/13}$

$\theta = \arctan \frac{1{,}5}{10/13}$

$\approx 62{,}85°$

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