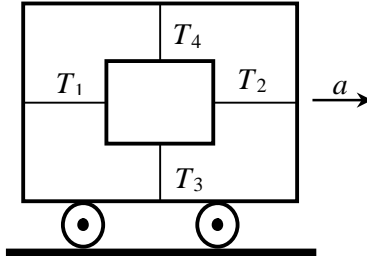


**PENYELESAIAN SOAL-SOAL SELEKSI FISIKA  
TINGKAT PROPINSI - 2006**

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01.



**SKOR : 10**

► Hukum II Newton

$$\sum F = m.a$$

Arah x

$$\sum F_x = m.a$$

$$T_2 - T_1 = m.a \quad \dots\dots\dots(1) \quad \mathbf{2}$$

Arah y

$$\sum F_y = m.g$$

$$T_4 - T_3 = m.g \quad \dots\dots\dots(2) \quad \mathbf{2}$$

►  $\frac{\text{Pers (1)}}{\text{Pers (2)}} \Rightarrow \frac{T_2 - T_1}{T_4 - T_3} = \frac{a}{g}$

$$\Rightarrow a = \frac{T_2 - T_1}{T_4 - T_3} . g \quad \mathbf{2}$$

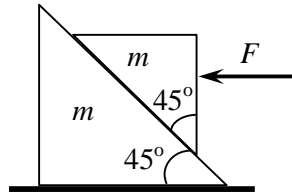
► Jarak yang ditempuh selama waktu t:

$$d = v_0.t + \frac{1}{2} a.t^2 \quad \mathbf{1}$$

$$\underline{\underline{d = \frac{1}{2} \frac{(T_2 - T_1)}{(T_4 - T_3)} g.t^2}} \quad \mathbf{3}$$

SKOR : 12

02.



► Tinjau prisma atas  $\Rightarrow$  tidak bergerak ke atas

$$\sum F_y = 0$$

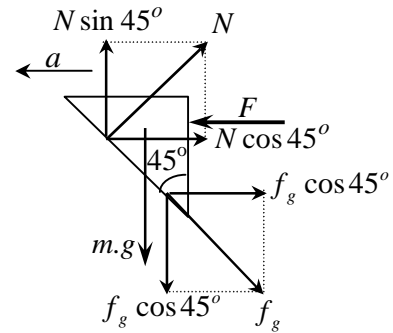
$$N \sin 45^\circ = m \cdot g + f_g \cos 45^\circ$$

$$N \frac{1}{2}\sqrt{2} = m \cdot g + f_g \frac{1}{2}\sqrt{2} \quad (1) \quad 2$$

$$\sum F_x = m \cdot a$$

$$F - f_g \sin 45^\circ - N \cos 45^\circ = m \cdot a$$

$$F - f_g \frac{1}{2}\sqrt{2} - N \frac{1}{2}\sqrt{2} = m \cdot a \quad (2) \quad 2$$

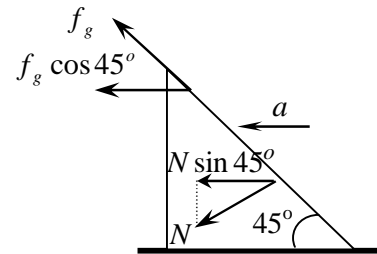


► Tinjau prisma bawah

$$\sum F_x = m \cdot a$$

$$N \sin 45^\circ - f_g \cos 45^\circ = m \cdot a$$

$$N \frac{1}{2}\sqrt{2} - f_g \frac{1}{2}\sqrt{2} = m \cdot a \quad (3) \quad 2$$



► Persamaan (2) = persamaan (3)

$$F - f_g \frac{1}{2}\sqrt{2} - N \frac{1}{2}\sqrt{2} = N \frac{1}{2}\sqrt{2} + f_g \frac{1}{2}\sqrt{2}$$

$$N\sqrt{2} = F - f_g \sqrt{2} \quad (4) \quad 2$$

► Persamaan (1) dikalikan 2 = Persamaan (4)

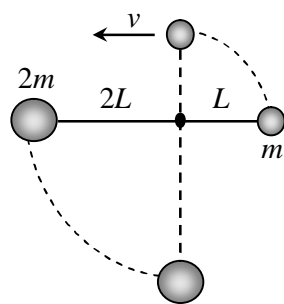
$$2m \cdot g + f_g \sqrt{2} = F - f_g \sqrt{2} \quad \mathbf{1}$$

$$f_g = \frac{\left(\frac{F}{2} - mg\right)\sqrt{2}}{2}$$

$$\underline{\underline{f_g = \left(\frac{F}{4} - \frac{m \cdot g}{2}\right)\sqrt{2}}} \quad \mathbf{3}$$

SKOR : 10

03.



► Hukum kekekalan energi :

$$E_{awal} = E_{akhir} \quad \mathbf{3}$$

$$0 = \frac{1}{2} I \omega^2 + m \cdot gL - 2m \cdot g2L$$

$$0 = \frac{1}{2} [mL^2 + 2m(2L)^2] \omega^2 - 3m \cdot gL$$

$$0 = \frac{9}{2} mL^2 \omega^2 - 3m \cdot gL$$

$$3L\omega^2 = 2g$$

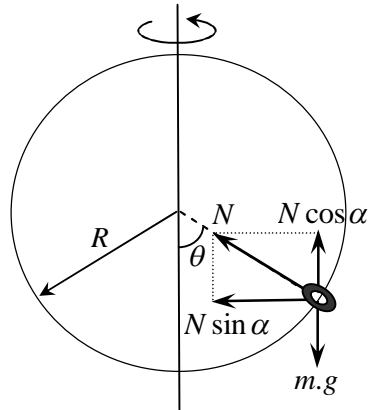
$$\omega = \sqrt{\frac{2g}{3L}} \quad \mathbf{2}$$

$$v = \omega L \quad \mathbf{2}$$

$$\underline{\underline{v = \sqrt{\frac{2gL}{3}}}} \quad \mathbf{3}$$

SKOR : 10

04.



$$\sum F_y = 0 \quad 2$$

$$N \cos \theta = m.g$$

$$N = \frac{m.g}{\cos \theta}$$

$$\sum F_x = m.a_x \quad 2$$

$$N \sin \theta = m.\omega^2.R \sin \theta$$

$$\frac{m.g}{\cos \theta} = m.\omega^2.R$$

$$\cos \theta = \frac{g}{\omega^2.R}$$

$$= \frac{g.R}{\omega^2.R^2}$$

$$\cos \theta = \frac{g.R}{v^2} \quad 4$$

Kesetimbangan juga terjadi pada saat  $\theta = 0^\circ$  (benda diam di bagian bawah hoop)

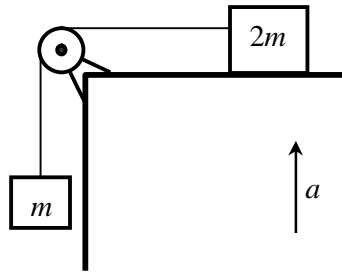
$$\therefore \theta = 0^\circ \quad 2$$

dan

$$\underline{\underline{\theta = \cos^{-1}\left(\frac{g.R}{v^2}\right)}}$$

SKOR : 10

05.



► Tinjau  $2m$  :

$$T = 2m \cdot a' \quad 3$$

$$a' = \frac{T}{2m}$$

► Tinjau  $m$  :

$$\begin{aligned} T - m \cdot g &= m(a - a') \\ &= m \cdot a - m \cdot a' \end{aligned} \quad 3$$

$$T - m \cdot g = m \cdot a - m \left( \frac{T}{2m} \right)$$

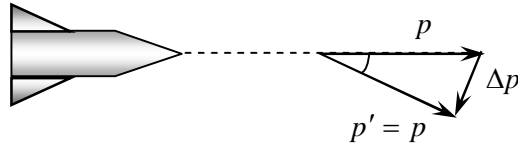
$$T + \frac{T}{2} = m(g + a)$$

$$3T = 2m(g + a)$$

$$\underline{\underline{T = \frac{2m(g + a)}{3}}} \quad 4$$

**SKOR 8**

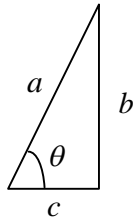
06.



$$t = \frac{2p \sin\left(\frac{\theta}{2}\right)}{F}$$

$$F = \frac{\Delta p}{\Delta t}$$

$$\Delta t = \frac{\Delta p}{F}$$



$$\cos \theta = \cos\left(\frac{\theta}{2} + \frac{\theta}{2}\right)$$

$$\cos \theta = \cos^2 \frac{\theta}{2} - \sin^2 \frac{\theta}{2}$$

$$b^2 = a^2 + c^2 - 2ac \cos \theta$$

$$\Delta p^2 = p^2 + p^2 - 2p^2 \cos \theta \quad \mathbf{3}$$

$$\Delta p^2 = 2p^2(1 - \cos \theta) \quad \mathbf{2} \quad \text{atau}$$

$$\Delta p^2 = 2p^2 \left(1 - \cos^2 \frac{\theta}{2} + \sin^2 \frac{\theta}{2}\right)$$

$$= 2p^2 \left(\sin^2 \frac{\theta}{2} + \sin^2 \frac{\theta}{2}\right)$$

$$\Delta p^2 = 4p^2 \sin^2 \frac{\theta}{2}$$

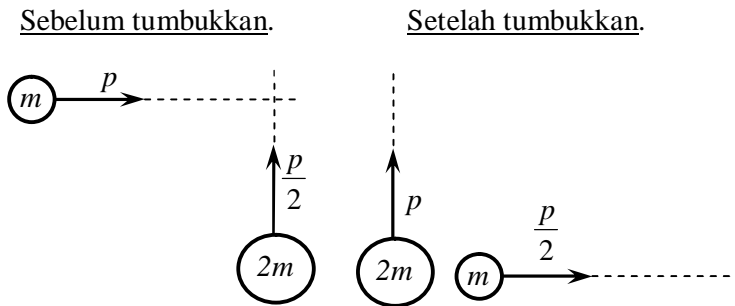
$$\underline{\underline{\Delta p = 2p \sin\left(\frac{\theta}{2}\right)}} \quad \mathbf{3}$$

$$\Delta p = p\sqrt{2(1 - \cos \theta)}$$

$$t = \frac{\Delta p}{F}$$

$$t = \frac{p\sqrt{2(1 - \cos \theta)}}{F} \quad \mathbf{3}$$

07.



Energi kinetik :

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

$$E = \frac{1}{2} \frac{(mv)^2}{m}$$

$$E = \frac{p^2}{2m}$$

Sebelum tumbukkan :

$$E = E_1 + E_2$$

$$E = \frac{p^2}{2m} + \frac{\left(\frac{p}{2}\right)^2}{4m}$$

$$E = \frac{p^2}{2m} + \frac{p^2}{16m}$$

$$E = \frac{9p^2}{16m}$$

Sesudah tumbukkan :

$$E' = E'_1 + E'_2$$

$$E' = \frac{p^2}{8m} + \frac{p^2}{4m}$$

$$E' = \frac{3p^2}{8m}$$

Selisih energi :

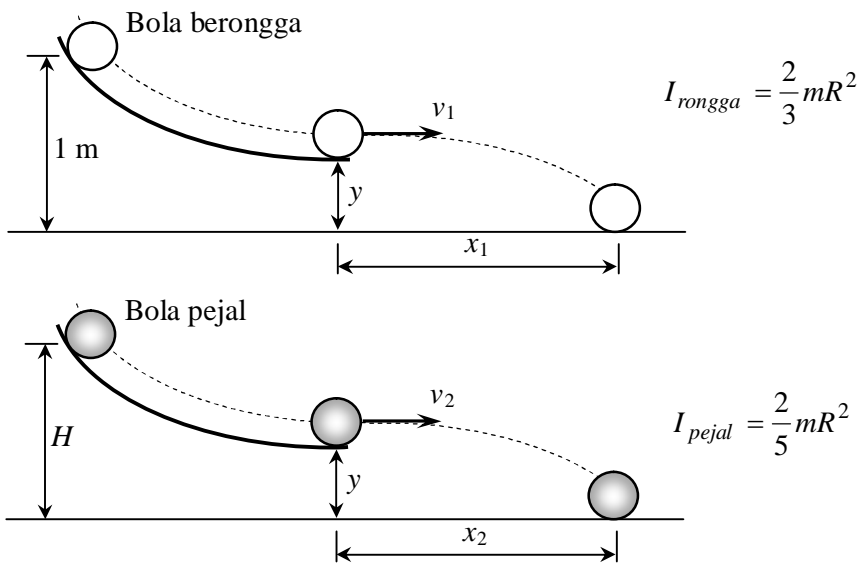
$$\Delta E = E - E'$$

$$\Delta E = \left( \frac{9}{16} - \frac{6}{16} \right) \frac{p^2}{m}$$

$$\underline{\underline{\Delta E = \frac{3p^2}{16m}}}$$

**SKOR 10**

08.



R dan m sama untuk kedua bola.

$H = ?$  supaya  $x_1 = x_2 \Rightarrow v_1 = v_2$  **2**

Bola berongga:

$$\begin{aligned}
 m \cdot g \cdot H &= m \cdot g \cdot y + \frac{1}{2}mv_1^2 + \frac{1}{2}I\omega^2 \\
 &= \frac{1}{2}mv_1^2 + \frac{1}{2} \times \frac{2}{3}mv_1^2 \\
 g \cdot 1 &= \frac{1}{2}v_1^2 + \frac{1}{3}v_1^2 \\
 v_1^2 &= \frac{6}{5}g \dots \dots \dots (1) \quad \mathbf{3}
 \end{aligned}$$

Bola pejal:

$$\begin{aligned}
 m \cdot g \cdot H &= \frac{1}{2}mv_1^2 + \frac{1}{2} \times \frac{2}{5}mv_1^2 \\
 g \cdot H &= \frac{1}{2}v_1^2 + \frac{1}{5}v_1^2 \\
 g \cdot H &= \frac{7}{10}v_1^2 \\
 v_1^2 &= \frac{10g \cdot H}{7} \dots \dots \dots (2) \quad \mathbf{3}
 \end{aligned}$$

(1) = (2)

$$\begin{aligned}
 \frac{6}{5} &= \frac{10H}{7} \\
 H &= \frac{21}{25} \text{ meter} \\
 &= \frac{2100}{25} \text{ cm} \\
 \underline{\underline{H}} &= \underline{\underline{84 \text{ cm}}} \quad \mathbf{2}
 \end{aligned}$$

