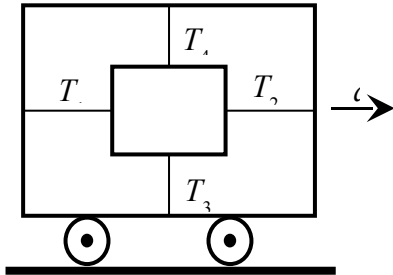


**PENYELESAIAN SOAL-SOAL SELEKSI FISIKA  
TINGKAT PROPINSI - 2006**

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01.



**SKOR : 10**

Hukum II Newton

$$\sum F = m.a$$

Arah x

$$\sum F_x = m.a$$

$$T_2 - T_1 = m.a \dots\dots\dots(1)$$

**2**

Arah y

$$\sum F_y = m.g$$

$$T_4 - T_3 = m.g \dots\dots\dots(2)$$

**2**

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

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

**2**

Jarak yang ditempuh selama waktu t:

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

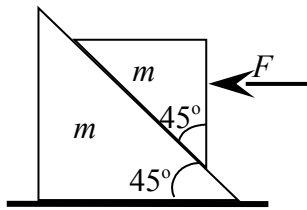
**1**

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

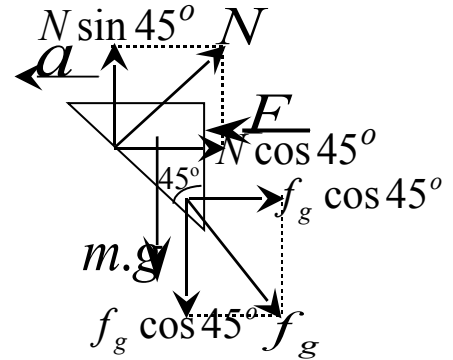
**3**

SKOR : 12

02.



Tinjau prisma atas  $\Rightarrow$  tidak bergerak ke atas



$$\sum F_y = 0$$

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

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

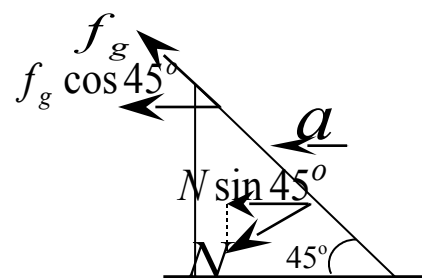
$$\sum F_x = m.a$$

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

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

Tinjau prisma bawah

$$\Sigma F_x = m a$$



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

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

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)

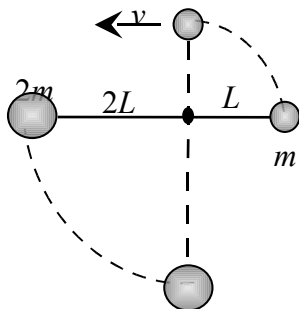
$$2m \cdot g + f_g \sqrt{2} = F - f_g \sqrt{2} \quad 1$$

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

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

SKOR : 10

03.



Hukum kekekalan energi :

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

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

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

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

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

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

$$v = \omega L$$

$$v = \sqrt{\frac{2gL}{3}}$$

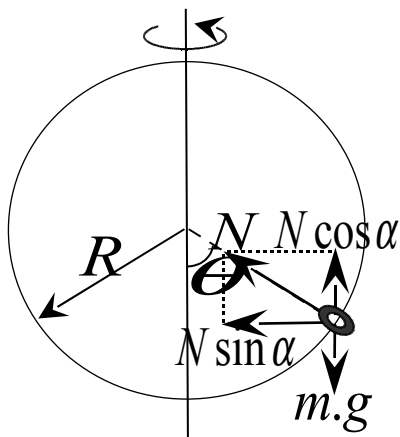
2

2

3

SKOR : 10

04.



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

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

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

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

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

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

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

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

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

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

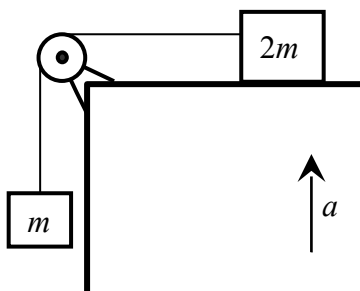
$$\therefore \theta = 0^\circ \quad 2$$

dan

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

SKOR : 10

05.



Tinjau  $2m$  :

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

3

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

Tinjau  $m$  :

$$T - m.g = m(a - a')$$

$$= m.a - m.a'$$

**3**

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

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

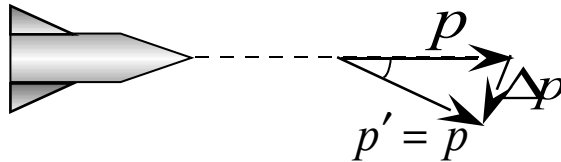
$$3T = 2m(g + a)$$

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

**4**

**SKOR 8**

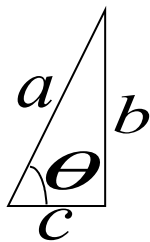
06.



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

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

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



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

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

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

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

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

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

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

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

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

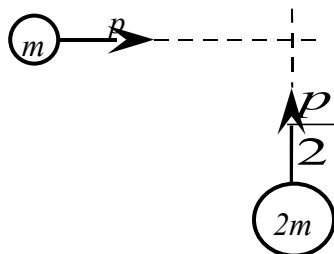
$$\Delta p = p \sqrt{2(1 - \cos \theta)}$$

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

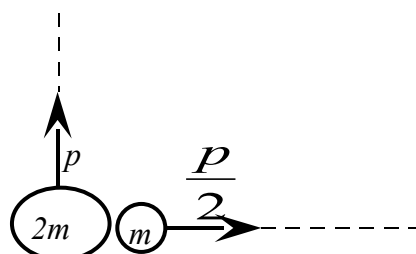
$$t = \frac{p \sqrt{2(1 - \cos \theta)}}{F} \quad 3$$

07.

Sebelum tumbukkan.



Setelah tumbukkan.



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 :

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

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

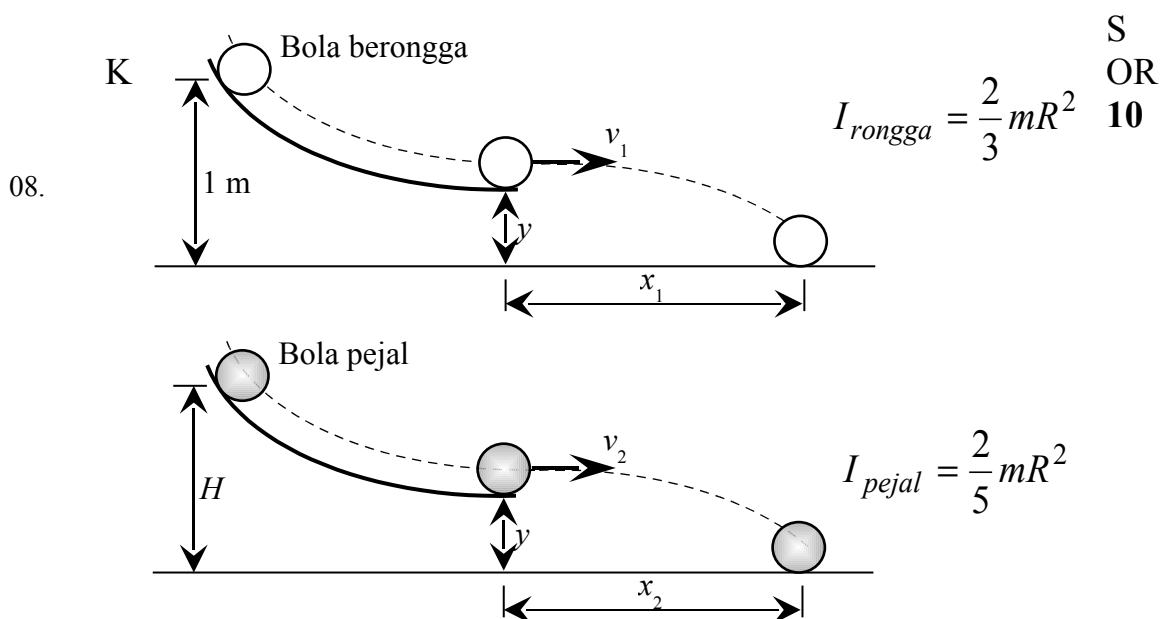
$$E' = \frac{3p^2}{8m}$$

Selisih energi :

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

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

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



R dan m sama untuk kedua bola.

$$H = ? \text{ supaya } x_1 = x_2 \quad \Rightarrow \quad v_1 = v_2 \quad \mathbf{2}$$

Bola berongga:

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

Bola pejal:

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

$$(1) = (2)$$

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