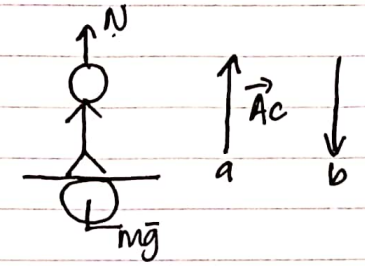
No.

Date

Kelas B
Kelompok 5
Anggota : 1. Fadiyah Farah Khoirunnisaa 2013022016
2. Gustin Wardani 2013022030
3. Elpin Nurul Rahmayani 2013022038

(5.1) a.)



$$\vec{N} + m\vec{g} - m\vec{A}_0 = 0$$
$$N - mg - mA_0 = N - mg - m\frac{g}{4} = 0$$
$$N - \frac{5}{4}mg = 0$$
$$\omega' = N = \frac{5}{4}mg = \frac{5}{4}\omega$$
$$\omega' = 150\,\text{rad}$$

b.) $N - mg - m\left(\frac{g}{4}\right) = 0$

$$\omega' = \omega - \frac{V_1}{4} = \frac{3}{4}\omega$$
$$\omega' = 90\,\text{rad}$$

(5.2) a.) $\vec{F}_{cent} = -m\vec{\omega} \times (\vec{\omega} \times \vec{r})$
Untuk $\vec{\omega} \perp \vec{r} \rightarrow F_{cent} = m\omega^2 r' \hat{e}_r$
$\omega = 500\ s^{-1} = 1000\ \pi\ s^{-1}$

$$F_{cent} = 10^{-6} \times (1000\pi)^2 \times r\,\hat{E}_r = 5\pi^2$$

b.) $\frac{F_{cent}}{F_g} = \frac{m\omega^2 r'}{mg}$

$$= \frac{(1000\pi)^2\ 5}{980} = 5{,}04 \times 10^4$$

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(5.3) $\vec{Mg} + \vec{T} - m\vec{A_c} = 0$

$-mg\hat{j} + T\cos\theta\,\hat{j} + T\sin\theta\,\hat{i} - m(g/10)\hat{i} = 0$

$T\cos\theta = mg$ dan $T\sin\theta = \frac{mg}{10}$

$\tan\theta = \frac{1}{10} \Rightarrow \theta = 5{,}71$

$T = \frac{mg}{\cos\theta} = 1.005\ mg$

(5.4) $\vec{g'} = \vec{g} - \vec{A_o} = g\hat{i} - \frac{g}{10}\hat{i}$

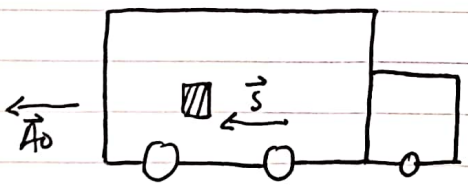
Untuk osilasi kecil pada pendulum sederhana :

$T = 2\pi\sqrt{\frac{L}{g}}$

$g' = \sqrt{g^2 - \left(\frac{g}{10}\right)^2} = 1.005\ g$

$T = 2\pi\sqrt{\frac{1}{1.0059}} = 1.995\,\pi\sqrt{\frac{1}{g}}$

(5.5) (a) $f = -Nmg$ pada Frictional force acting on the



box, law

$\vec{f} - m\vec{A_o} = \vec{ma}$

Sekarang, f adalah req force, maka :

(b) $a = \frac{f}{m} = -\frac{Nmg}{m} = -Ng = -\frac{g}{3}$

$A = -\frac{g}{2}$. Dari atas, $ma - mA_c = m'$

maka jawaban (a) adalah

$a' = a - A_o = -\frac{g}{3} + \frac{g}{2} = \frac{g}{6}$

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(5.6) a.) $\vec{r} = \hat{i}(x_0 + R\cos\Omega t) + \hat{j} R \sin\Omega t$

$\dot{\vec{r}} = -\hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t$

$\dot{\vec{r}}.\dot{\vec{r}} = V^2 = \Omega^2 R^2$

$V = \Omega R$

b.) $\dot{\vec{r}} = \dot{\vec{r}} - \vec{\omega} \times \vec{r}$ Ketika $\vec{r} = \hat{i}x' + \hat{j}y'$

$= -\hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t - \omega\hat{k} \times (\hat{i}x' + \hat{j}y')$

$= -\hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t - \hat{j}\omega x' + \hat{i}\omega y'$

$\dot{x}' = \omega y' - \Omega R \sin\Omega t$

$\dot{y}' = -\omega x' + \Omega R \cos\Omega t$

c.) $v' = x' + iy'$ $\quad i = \sqrt{-1}$!

$\dot{v}' = \dot{x}' + i\dot{y}' = \omega y' - \Omega R \sin\Omega t - i\omega x' + i\Omega R \cos\Omega t$

$i\omega v' = -\omega y' + i\omega x'$

$\Rightarrow \dot{v}' + i\omega v' = -\Omega R \sin\Omega t + i\Omega R \cos\Omega t = i\Omega R e^{i\Omega t}$

$v' = Ae^{-i\omega t} + Be^{i\Omega t}$

$\dot{v}' = -i\omega A e^{-i\omega t} + i\Omega B e^{i\Omega t}$

$i\omega v' = i\omega A e^{-i\omega t} + i\omega B e^{i\omega t}$

$\Rightarrow \dot{v}' + i\omega v' = i(\omega + \Omega) B e^{i\omega t}$, maka $B = \dfrac{\Omega R}{\omega + \Omega}$

$v' = A + B = x'(0) + iy(0) = x_0 + R$

$\Rightarrow A = x_0 + R - B$

$= x_0 + R - \dfrac{\Omega R}{\omega + \Omega}$, maka $A = x_0 + \dfrac{\omega R}{\omega + \Omega}$

$$v' = \left[x_0 + \frac{\omega R}{\omega + \Omega}\right] e^{-i\omega t} + \frac{\Omega R}{\omega + \Omega} e^{i\omega t}$$

(5.7) a.) $\underset{n}{S}(t) = \begin{matrix} Ra \cos\omega at \\ Ra \sin\omega at \end{matrix}$

$\underset{e}{S}(t) = \begin{matrix} Re \cos\omega et \\ Re \sin\omega et \end{matrix}$

$\underset{a}{e} = \dfrac{\underset{a}{S}}{a} - \dfrac{\underset{e}{S}}{e}$

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$$\begin{matrix} e \\ a \end{matrix}(t) = \begin{matrix} Ra \cos \omega at - Re \cos \omega et \\ Ra \sin \omega at - Re \sin \omega et \end{matrix}$$

$$r a^e = r^s a - r^s e$$

$$\begin{matrix} r^e \\ a \end{matrix}(t) = \begin{bmatrix} Ra \cos \omega at - Re \cos \omega et \\ Ra \sin \omega at - Re \sin \omega et \end{bmatrix}$$

b.) $V^e a\ (t) = \frac{d}{dt} ra^2\ (t)$

$$\begin{bmatrix} -\omega a\ Ra \sin \omega at + \omega e\ Re \sin \omega et \\ \omega a\ Ra \cos \omega at - \omega e\ Re \cos \omega et \end{bmatrix}$$

$t = 0$

$$V^e_a\ (t) = 0 \begin{bmatrix} 0 \\ \omega a\ Ra - \omega e\ Re \end{bmatrix}$$

c.) $q^e a(t) = \frac{d}{dt} Va^e\ (t)$

$$= \begin{bmatrix} -\omega a^2\ Ra \cos \omega at + \omega e^2\ Re \sin \omega et \\ -\omega a^2\ Ra \sin \omega at + \omega e^2\ Re \cos \omega et \end{bmatrix}$$