

## ΑΥΤΟΜΑΤΙΣΤΕΣ

ΦΥΣΙΚΗ Ι 2/9/09

## ΘΕΜΑ 1

Επίπεδο κίνηση  $x(t) = t + 2t^3$   $m = 1 \text{ kg}$ α) Κινητική Ενέργεια  $E = \frac{1}{2} m v^2$ 

$$v = \frac{dx}{dt} = 1 + 6t^2$$

$$E = \frac{1}{2} (1 + 6t^2)^2 = \frac{1}{2} (1 + 36t^4 + 12t^2) = \frac{1}{2} + 18t^4 + 6t^2$$

β) Επιτάχυνση  $a$ 

$$a = \frac{dv}{dt} = 12t$$

γ) Για  $t = 3 \text{ sec}$ 

$$x(3) = 3 + 2(3)^3 = 57 \text{ m} \quad a(3) = 12 \cdot (3) = 36 \text{ m/s}^2$$

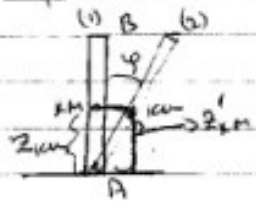
## ΘΕΜΑ 2'

Α. β. γ. α.  $a' = 4t$   $w(0) = w_0$ 

$$w = w_0 + \int a' dt = w_0 + \int 4t dt = w_0 + 4 \frac{t^2}{2} = w_0 + 2t^2$$

$$\varphi = \varphi_0 + \int w dt = \varphi_0 + \int (w_0 + 2t^2) dt = \varphi_0 + w_0 t + \frac{2}{3} t^3$$

Definisi 5:



Ande  $\theta \Delta M E$

$\theta \Delta m (1) \quad E_{max} = E_{pot} = m g z_{cm} = m g \frac{L}{2}$

$\theta \Delta m (2) \quad E_{max} = E_{kin} = m g z'_{cm} + \frac{1}{2} I_A \omega^2$

$z'_{cm} = z_{cm} \cdot \sin \varphi = \frac{L}{2} \sin \varphi \quad (3)$

Ande (1), (2), (3)  $\Rightarrow m g \frac{L}{2} = m g \frac{L}{2} \sin \varphi + \frac{1}{2} I_A \omega^2$

Opur  $I_A = I_{cm} + M \left(\frac{L}{2}\right)^2$  (ano  $\theta$  teorema Steiner)

$I_A = \frac{1}{12} M L^2 + \frac{M L^2}{4} = \frac{1}{3} M L^2$

ETA  $m g \frac{L}{2} (1 - \sin \varphi) = \frac{1}{2} \cdot \frac{1}{3} M L^2 \omega^2$

$\omega^2 = \frac{3g(1 - \sin \varphi)}{L}$

Orao opira na epizodiu d'ora  $\varphi = 90 \Rightarrow \sin \varphi = 1$

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

Dekezo na  $\omega$  na  $\theta$  d'ora

(2) orao ant' d'ora na epizodiu d'ora

\* Definisi 6:

Zakupa gijon (Azija, Melanesia, Australia)

te nagatipata.

(angitaki cu aliobize na gijon na b'gijon)

ÜEMA 3:

a) Kreisfrequenz zugehörige Drehimpuls

Zwei Dine R aus Gleichheit, Dichte der Dichte

$$F_g = \frac{GMm}{R^2} \quad \text{H Dichte Dichte von Kreisfrequenz}$$

$$F_g = F_z \Rightarrow \frac{GMm}{R^2} = m \frac{v^2}{R} \Rightarrow v = \sqrt{\frac{GM}{R}}$$

b) R Dichte der Drehimpuls der Drehimpuls der zugehörigen Dichte  $R_1 = 2R_2$

$$v_1 = \sqrt{\frac{GM}{R_1}}$$

$$v_2 = \sqrt{\frac{GM}{R_2}}$$

$$\frac{v_1}{v_2} = \sqrt{\frac{R_2}{R_1}} = \sqrt{\frac{R_2}{2R_2}} \Rightarrow \underline{\underline{v_2 = \sqrt{2} v_1}}$$

ÜEMA 4:

Gleichm. Dichte  $x(t) = x_0 \sin(\omega t + \alpha)$

$$T = 0.15 \Rightarrow \omega = \frac{2\pi}{T} = 20\pi$$

a)  $x(t) = 0.1 \sin(20\pi t + \alpha)$

b) Zwei Dine X für die Dichte Dichte  $E_{max} = E_{kin}$

$$E_{max} = E_{kin} = E_{pot} = 2 E_{kin} = 2 \cdot \frac{1}{2} m \omega^2 x_0^2$$

$$E_{max} = \frac{1}{2} m \omega^2 x_0^2 \Rightarrow \frac{1}{2} m \omega^2 x_0^2 = \frac{1}{2} m \omega^2 x_0^2$$

$$x_0^2 = \frac{x_0^2}{2} \Rightarrow x_0 = \frac{x_0}{\sqrt{2}}$$