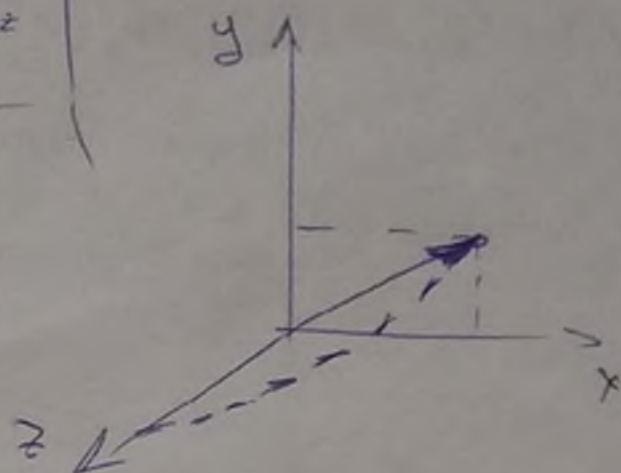


1

Дано:
 $\vec{r}(t) = 2t^3 \vec{e}_x + 3t^2 \vec{e}_y + 4t \vec{e}_z$
 $t = 2c$

$v = ?$

Решение:



$$\frac{d\vec{r}}{dt} = \vec{v} = 6t^2 \vec{e}_x + 6t \vec{e}_y + 4 \vec{e}_z$$

при $t = 2$

$$\vec{v} = 24 \vec{e}_x + 12 \vec{e}_y + 4 \vec{e}_z$$

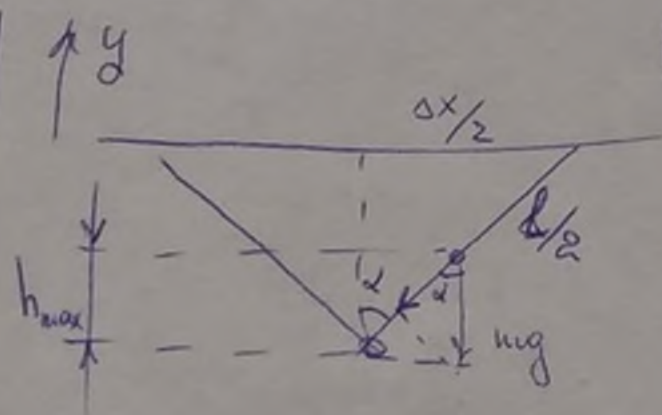
Ответ: $|\vec{v}| = \sqrt{24^2 + 12^2 + 16}$

60

Дано:

Δx
 l

$\omega = ?$



Решение:

$$mgh_{max} = \frac{mv_{max}^2}{2}$$

$$v_{max} = \sqrt{2gh_{max}}$$

$$l_{hor} = \frac{2h_{max}}{\cos(\arcsin \frac{\Delta x}{l})}$$

$$\omega = 2\pi \nu = 2\pi \frac{1}{T} = 2\pi \frac{v}{S} =$$

$$= \frac{2\pi \cdot \sqrt{2gh_{max}} \cdot \cos(\arcsin \frac{\Delta x}{l})}{2 \cdot 2h_{max}} = \frac{\pi \cos(\arcsin \frac{\Delta x}{l}) \cdot \sqrt{2g}}{\sqrt{h_{max}}}$$

Ответ: $\omega = \frac{\pi \sqrt{2g} \cos(\arcsin \frac{\Delta x}{l})}{\sqrt{h_{max}}}$

④ Дано:
 $V(T) = \alpha T^{1/3}$
 $V_0; 2V_0$

 $A = ?$

Решение:
 $A = \int_{V_0}^{V_{\text{кон}}} P dV$
 $P = \frac{\partial RT}{V} \Rightarrow$
 $T = \left(\frac{V}{\alpha}\right)^3$
 $A = \int_{V_0}^{2V_0} \frac{\partial RT}{V} dV = \frac{\partial R}{\alpha^3} \int_{V_0}^{2V_0} V^2 dV = \frac{7 \partial R V_0^3}{3 \alpha^3}$

Ответ: $A = \frac{7 \partial R V_0^3}{3 \alpha^3}$

⑤

Дано:
 R_0
 $p(r) = -\frac{\alpha}{r^2}$
 $2R_0$

 E, φ

Решение:
 $E = k \frac{q_1 q_2}{R^2} = \frac{k}{R^2} \int_0^R \frac{-\alpha r}{\frac{4}{3} \pi R_0^3} dr = \frac{3k}{16 R_0^3 \pi} \cdot \frac{-2 R_0^2}{2} = -\frac{3k\alpha}{32 \pi R_0^3}$
 $\varphi = -\frac{3k\alpha}{32 \pi R_0^2}$

Ответ: $E = -\frac{3k\alpha}{32 \pi R_0^3}$
 $\varphi = -\frac{3k\alpha}{32 \pi R_0^2}$