Дано:

$\vec{\omega}_1 = at^2\vec{e}_x$

$\vec{\omega}_2 = 2at^2\vec{e}_y$

$a = 1{,}0$ рад/с^4

$t = 3{,}0$ с

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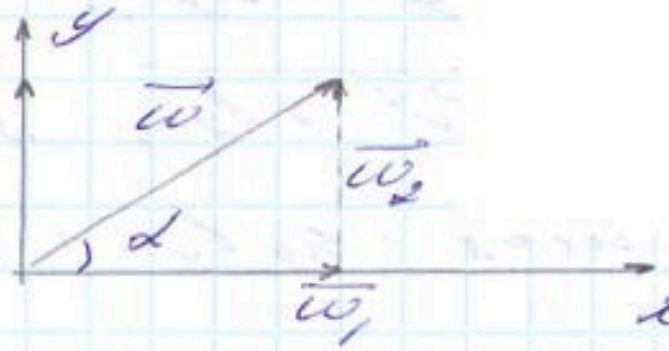
1) $\varphi(t)$ - ?

α - ? $\cos\alpha$ - ?

Решение:



1) $\frac{d\varphi}{dt} = \omega, \quad d\varphi = \omega dt.$

$|\vec{\omega}| = \sqrt{\omega_1^2 + \omega_2^2} = \sqrt{a^2t^4 + 4a^2t^4} = a\sqrt{5}\,t^2$

$$\int_0^\varphi d\varphi = \int_0^\tau \omega dt$$

$$\varphi = \int_0^\tau a\sqrt{5}\,t^2 dt = a\sqrt{5}\int_0^\tau t^2 dt =$$

$$= \frac{a\sqrt{5}\,t^3}{3}\Big|_0^\tau = \frac{a\sqrt{5}\,\tau^3}{3} = \frac{1\ \text{рад}\cdot\sqrt{5}\cdot 27}{3\cdot 3} =$$

≈ 20 рад