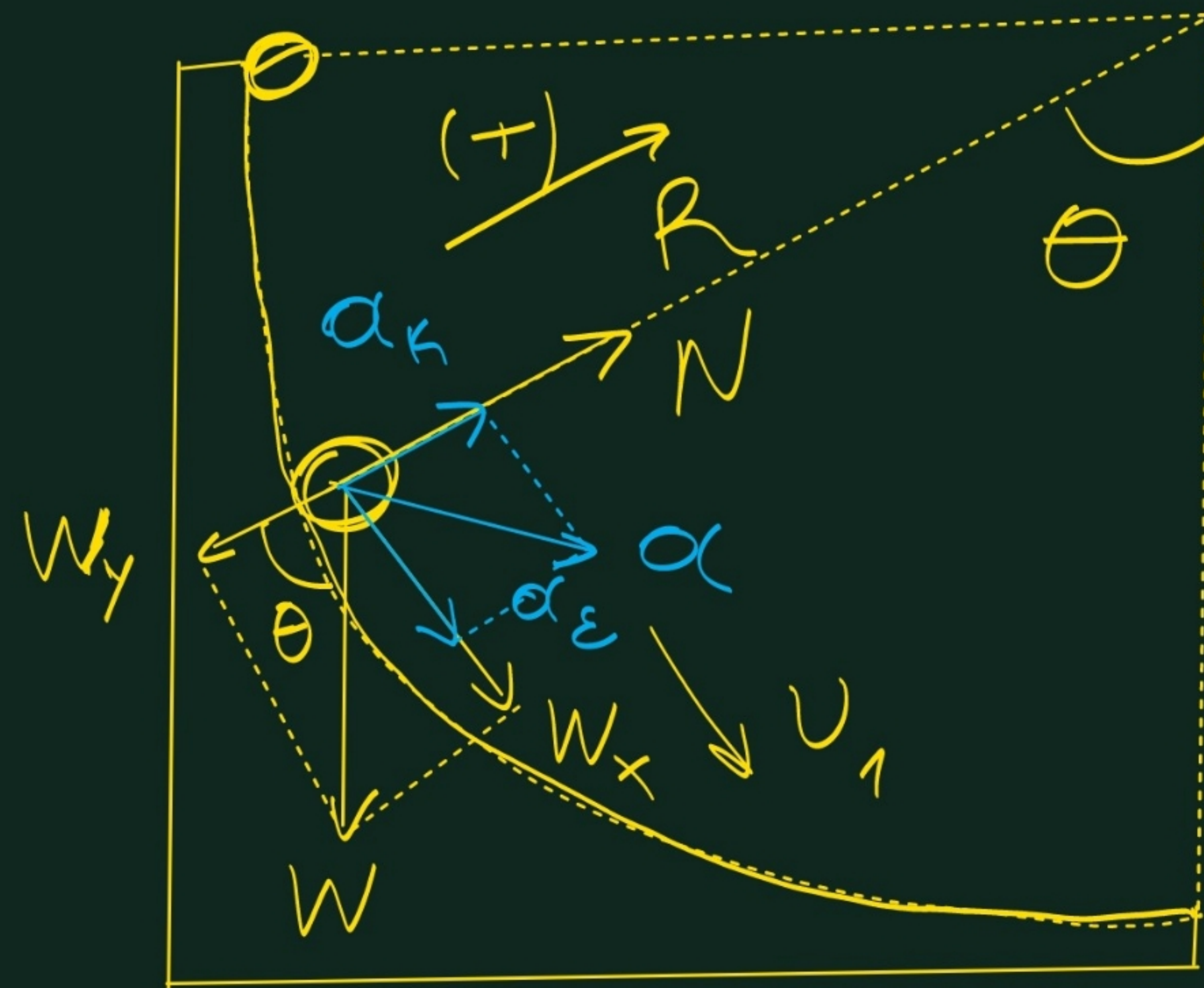


Αδ. 2.115



β) Η συνισταμένη κατά γήινος των αλληλίων διεύθυνσης είναι η κεντρομόλος.

$$\Sigma F_y = m a_k \Rightarrow N - W_y = m a_k$$

α) Η κυκλική κίνηση είναι γη σφαλή επειδή το μέτρο της ταχύτητας v αυξάνεται. Άρα έχει επιτρόχια επιτάχυνση.

$$\Sigma F_x = m a_\epsilon \Rightarrow W_x = m a_\epsilon \Rightarrow$$

$$W \cdot \sin \theta = m a_\epsilon \Rightarrow$$

$$m \cdot g \cdot \sin \theta = m \cdot a_\epsilon \Rightarrow$$

$$a_\epsilon = g \cdot \sin \theta = 10 \cdot \sin 60^\circ =$$

$$a_\epsilon = 10 \cdot \frac{\sqrt{3}}{2} = 5\sqrt{3} \text{ m/s}$$

Επίσης, το σώμα έχει και κεντρομόλο επιτάχυνση

$$a_k = \frac{v_1^2}{R} = \frac{4^2}{1.6} =$$

$$= \frac{16}{1.6} = 10 \text{ m/s}^2$$

$$a^2 = a_\epsilon^2 + a_k^2 =$$

$$= (5\sqrt{3})^2 + 10^2 =$$

$$= 25 \cdot 3 + 100$$

$$= 175 \Rightarrow$$

$$a^2 = 25 \cdot 7 \Rightarrow a = 5\sqrt{7} \text{ m/s}^2$$

$$N - mg \sin \theta = m \frac{v_1^2}{r} \Rightarrow$$

$$N = \frac{mv_1^2}{R} + mg \sin \theta \Rightarrow$$

$$N = \frac{0,02 \cdot 4^2}{1,6} + 0,02 \cdot (0,6 \cdot 60^\circ) =)$$

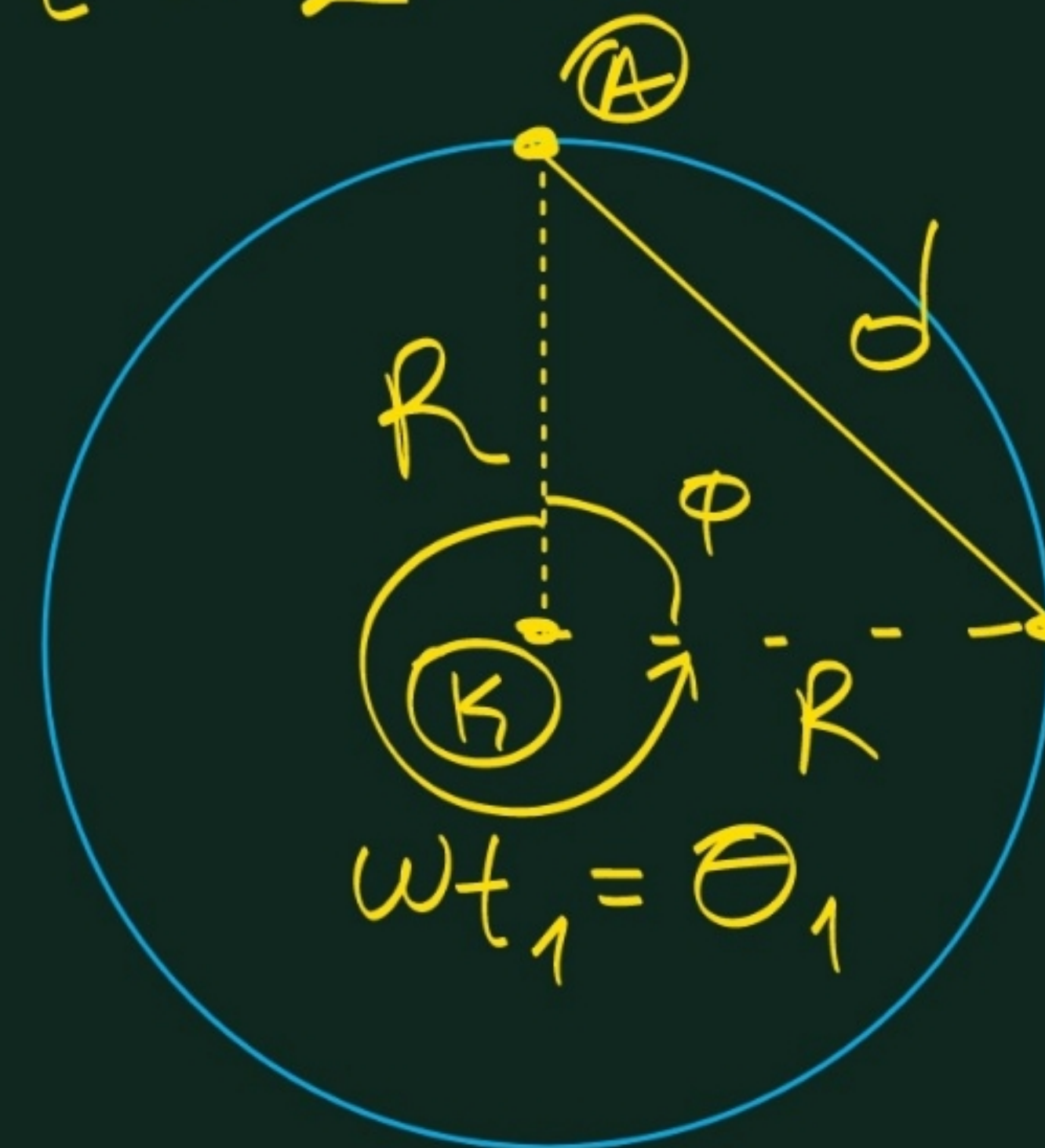
$$N = \frac{0,02 \cdot 16}{1,6} + 0,02 \cdot 10 \cdot \frac{1}{2} \Rightarrow$$

$$N = 0,2 + 0,1 \Rightarrow N = 0,3 N$$

Agü. 2.116)

a) $N=50$ и $\lambda=0.1$

$$\Delta t = 200 \text{ sec}$$



$$t_1 = \frac{3T}{4}$$

$$d = 2\sqrt{2} \text{ m.}$$

$$\Theta_1 = \omega t_1 = \frac{2\pi}{T} \cdot \frac{3T}{4} = \frac{3\pi}{2}$$

$$\Theta_1 = \frac{37}{2} = 270^\circ.$$

✓ 1. $\rho \propto \varphi = 90^\circ$

$$a) f = \frac{N}{\Delta t} = \frac{50}{200} = 0,25 \text{ Hz}$$

$$\omega = 2\pi f = 2\pi \cdot 0,23 \Rightarrow \omega = 0,57 \text{ rad/sec}$$

6) Από το ηω θα έχουμε στο $A \cup B$:

$$R^2 + R^2 = d^2 \Rightarrow 2R^2 = 4 \cdot 2 \Rightarrow R^2 = 4 \Rightarrow R = 2m$$

$$v = \omega \cdot R = 0,5\pi \cdot 2 \Rightarrow v = \pi \text{ m/s}$$

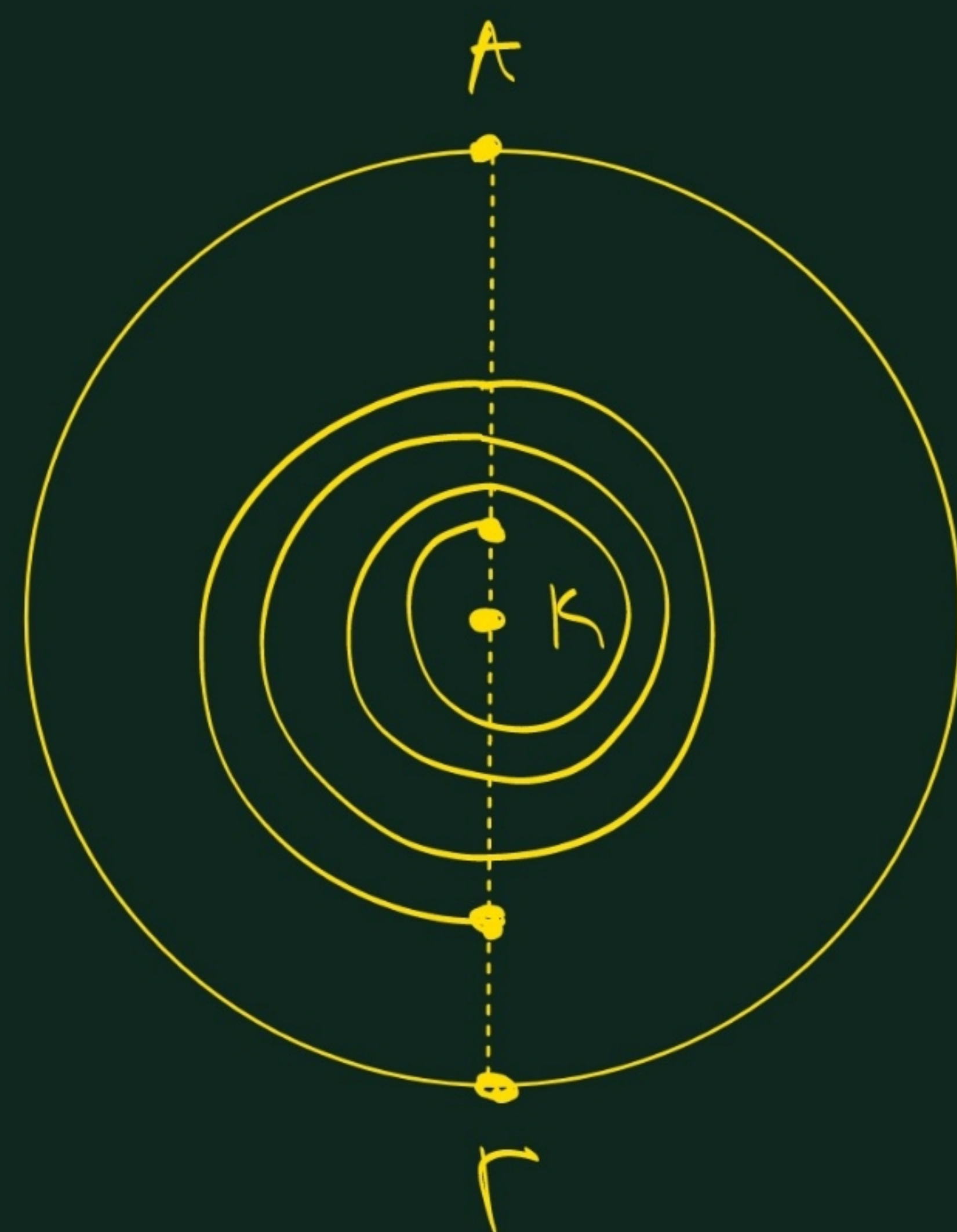
$$\gamma) a_k = \frac{v^2}{R} = \frac{\pi^2}{2} \approx \frac{10}{2} = 5 \text{ m/s}^2$$

$$\delta) \theta_2 = \omega t_2 = 0,5\pi \cdot 14 = \pi$$

$$\theta_2 = 7\pi \text{ rad}$$

$$\theta_2 = 3 \cdot 2\pi + \pi$$

Αρα βρίσκεται στο Γ
και $AG = 2R = 4 \text{ m}$



Ασκ. 2.134

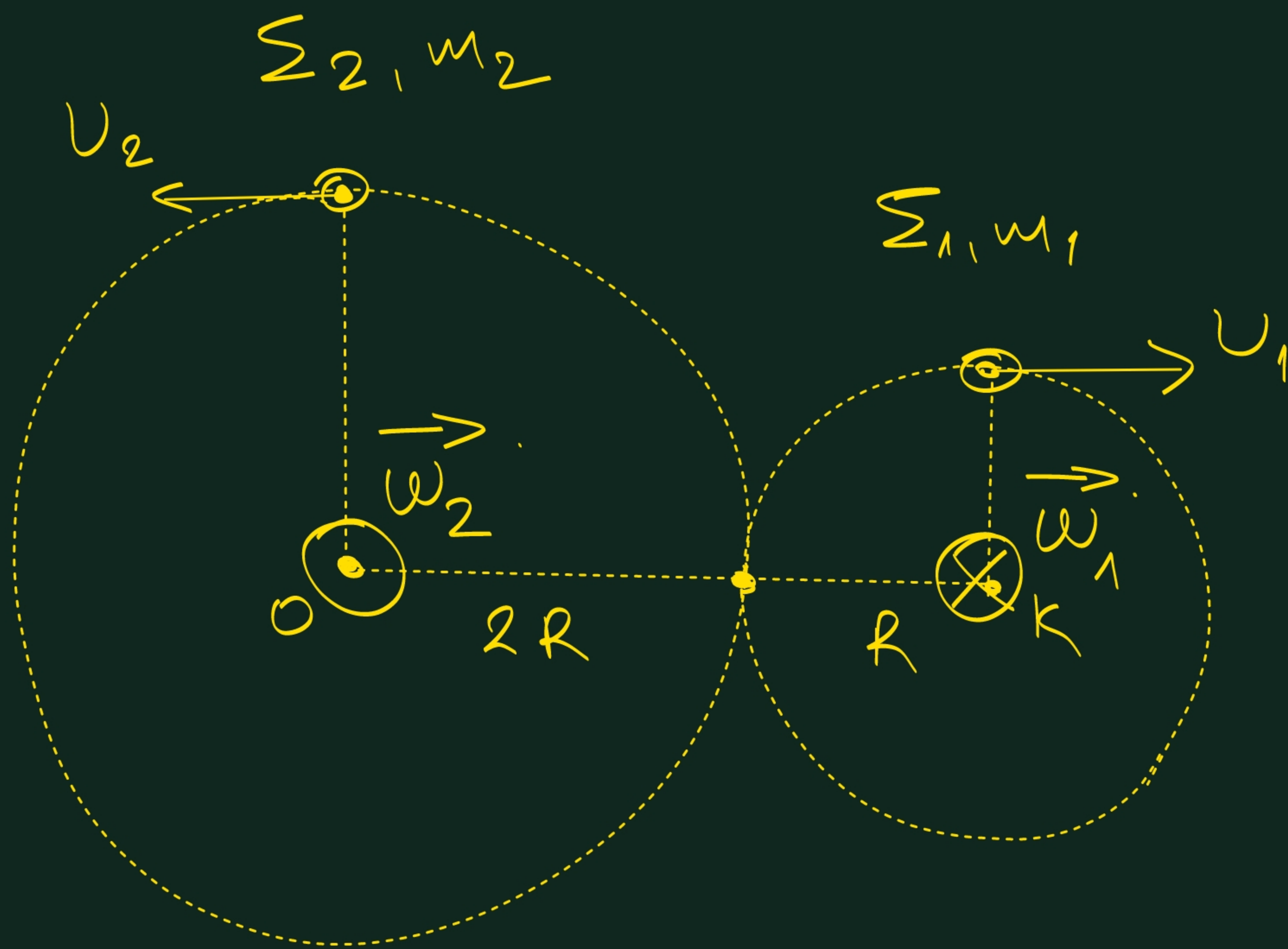
$$m_1 = 2 \text{ kg}$$

$$m_2 = 4 \text{ kg}$$

$$\frac{\alpha_{K(1)}}{\alpha_{K(2)}} = \frac{9}{2}$$

⊙ προς
τα εξω

⊗ προς
τα μέσα



$$b) \frac{\alpha_{K(1)}}{\alpha_{K(2)}} = \frac{9}{2} \Rightarrow \frac{\omega_1^2 \cdot R}{\omega_2^2 \cdot 2R} = \frac{9}{2} \Rightarrow$$

$$\frac{\omega_1^2}{\omega_2^2 \cdot 2} = \frac{9}{2} \Rightarrow \frac{\omega_1^2}{\omega_2^2} = 9 \Rightarrow$$

$$\frac{\omega_1}{\omega_2} = 3$$

$$\frac{v_1}{v_2} = \frac{\omega_1 \cdot R}{\omega_2 \cdot 2R} = \frac{\omega_1}{\omega_2} \cdot \frac{R}{2R} = 3 \cdot \frac{1}{2} = \frac{3}{2}$$

$$\gamma) i) F_{K(1)} = m_1 \cdot a_{K(1)} \Rightarrow$$

$$F_{K(1)} = m_1 \cdot \omega_1^2 \cdot R \Rightarrow$$

$$36 = 2 \cdot \omega_1^2 \cdot 0.5 \Rightarrow$$

$$\omega_1^2 = 36 \Rightarrow \omega_1 = 6 \text{ r/s}$$

$$\omega_1 = 2\pi f_1 \Rightarrow 6 = 2\pi f_1 \Rightarrow$$

$$f_1 = \frac{3}{\pi} \text{ Hz}$$

$$\frac{\omega_1}{\omega_2} = 3 \Rightarrow \frac{2\pi f_1}{2\pi f_2} = 3 \Rightarrow f_1 = 3f_2 \Rightarrow \frac{3}{\pi} = 3f_2 \Rightarrow$$

$$f_2 = \frac{1}{\pi} \text{ Hz}$$

$$F_{K(2)} = m_2 \omega_2^2 \cdot 2R \Rightarrow$$

$$F_{K(2)} = 4 \cdot 2^2 \cdot 2 \cdot 0.5 \Rightarrow$$

$$F_{K(2)} = 16 \text{ N}$$

$$\omega_2 = \frac{\omega_1}{3} = \frac{6}{3} = 2 \text{ r/s}$$

$$\Delta t = N_1 T_1 = \frac{N_1}{f_1} =$$

$$= \frac{3}{\frac{3}{\pi}} \Rightarrow \Delta t = \frac{3}{\frac{3}{\pi}} \Rightarrow \Delta t = \frac{3\pi}{3} = \pi \text{ sec}$$

ii) Έστω ότι συναρτώνται γιγά από χρόνο t .
Το Σ_1 θα έχει επιτελέσει N_1 περιφορές και
το Σ_2 N_2 , όπου N_1 και N_2 θετικοί ακέραιοι

$$\text{Αρα: } f_1 = \frac{N_1}{t}$$

$$f_2 = \frac{N_2}{t}$$

$$\Rightarrow \frac{f_1}{f_2} = \frac{N_1}{N_2} \Rightarrow \frac{\frac{3}{\pi}}{\frac{1}{\pi}} = \frac{N_1}{N_2}$$

$$\Rightarrow \frac{N_1}{N_2} = \frac{3}{1} \Rightarrow \begin{matrix} N_{1, \min} = 3 \\ N_{2, \min} = 1 \end{matrix}$$

Assu. 2.125.

$$m = 0,5 \text{ kg.}$$

$$r = 0,2 \text{ m}$$

$$f = 0,5 \text{ Hz}$$

$$\omega_{\varphi} = 0,6$$

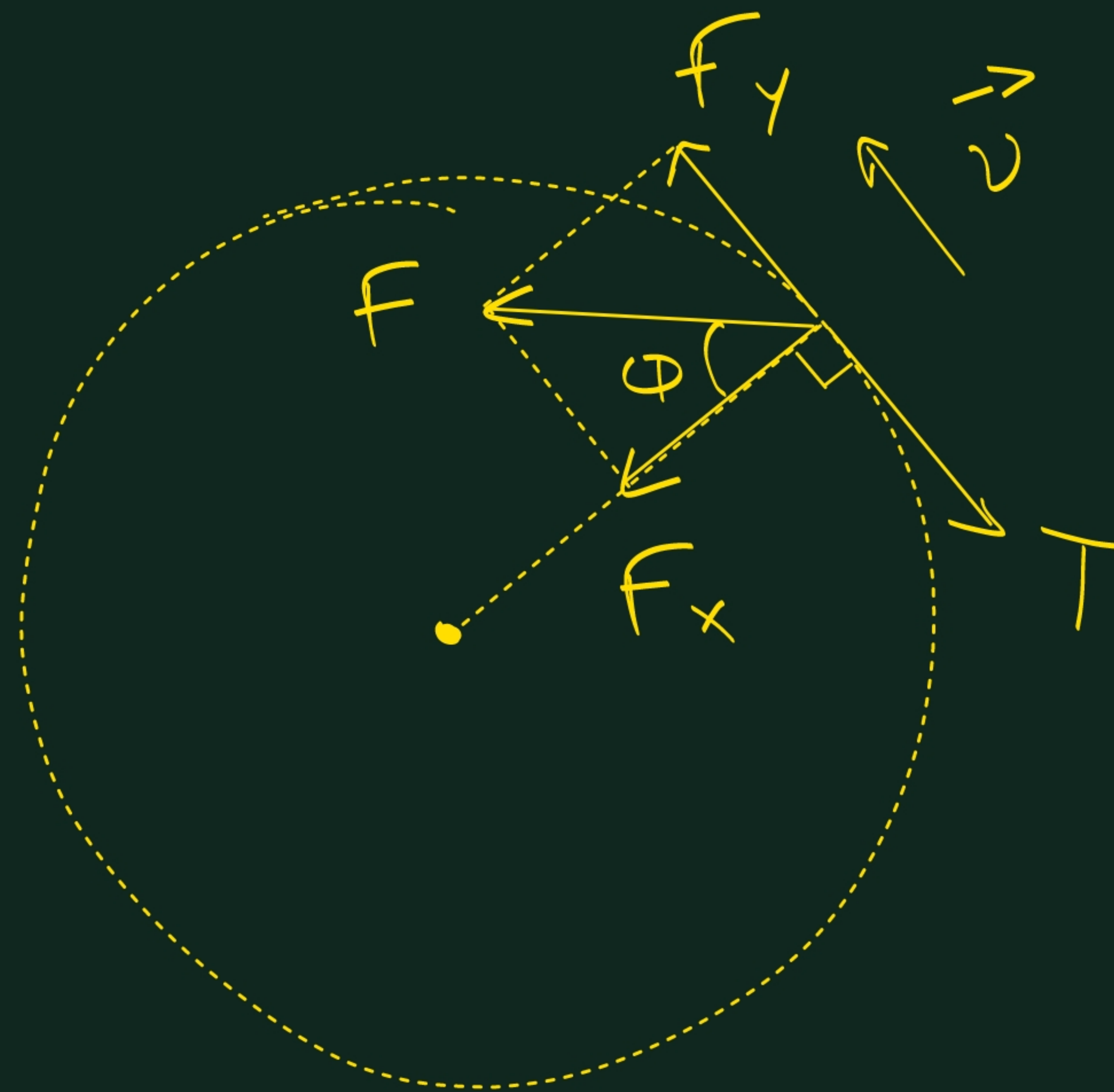
$$\sin \varphi = 0,8$$

$$a) v = \frac{2\pi r}{T} = 2\pi r \cdot f \Rightarrow$$

$$v = 2\pi \cdot 0,2 \cdot 0,5 \Rightarrow$$

$$v = 0,2\pi \text{ m/s.}$$

b)



$$b) F_x = F_y = m\omega^2 r \text{ and} \\ F_y = T$$

$$\text{Appl: } F \cdot \sin \varphi = m\omega^2 r \Rightarrow$$

$$F \cdot 0,8 = 0,5 \cdot (2\pi \cdot 0,5)^2 \cdot 0,2 \Rightarrow$$

$$0,8 F = 0,1 \cdot \pi^2 \Rightarrow$$

$$0,8 F = 1 \Rightarrow F = \frac{10}{8} = 1,25 \text{ N}$$