

Velocity and acceleration of oscillations

$$y = y_m \sin \varphi = y_m \sin \omega t$$

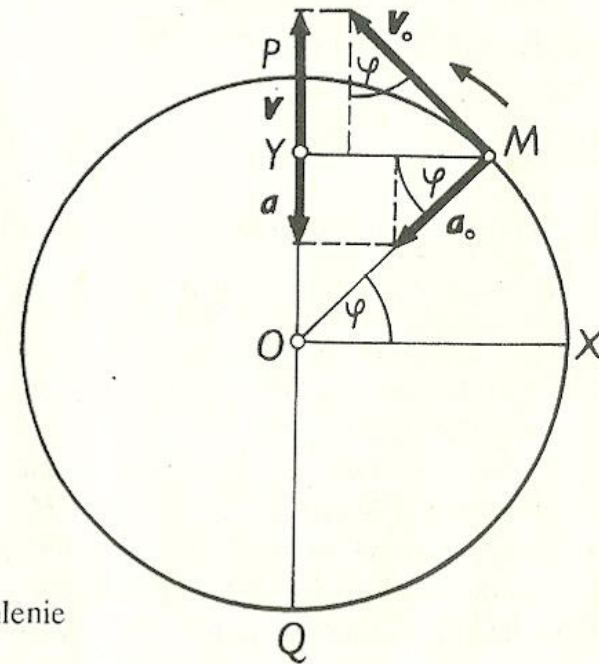
$$r = y_m$$

$$v_0 = \omega r$$

$$v = v_0 \cos \varphi = \omega r \cos \varphi = \omega y_m \cos \varphi$$

$$a_0 = \omega^2 r$$

$$a = -a_0 \sin \varphi = -\omega^2 r \sin \varphi = -\omega^2 y_m \sin \varphi = -\omega^2 y$$



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K odvození vzťahov pre rýchlosť a zrýchlenie kmitavého pohybu

•A point object oscillates with amplitude of 0.2 m. Calculate deflection of the point object at $\frac{1}{4} T$, $\frac{1}{3} T$, $\frac{1}{2} T$. Use $y = y_m \sin \omega t$.

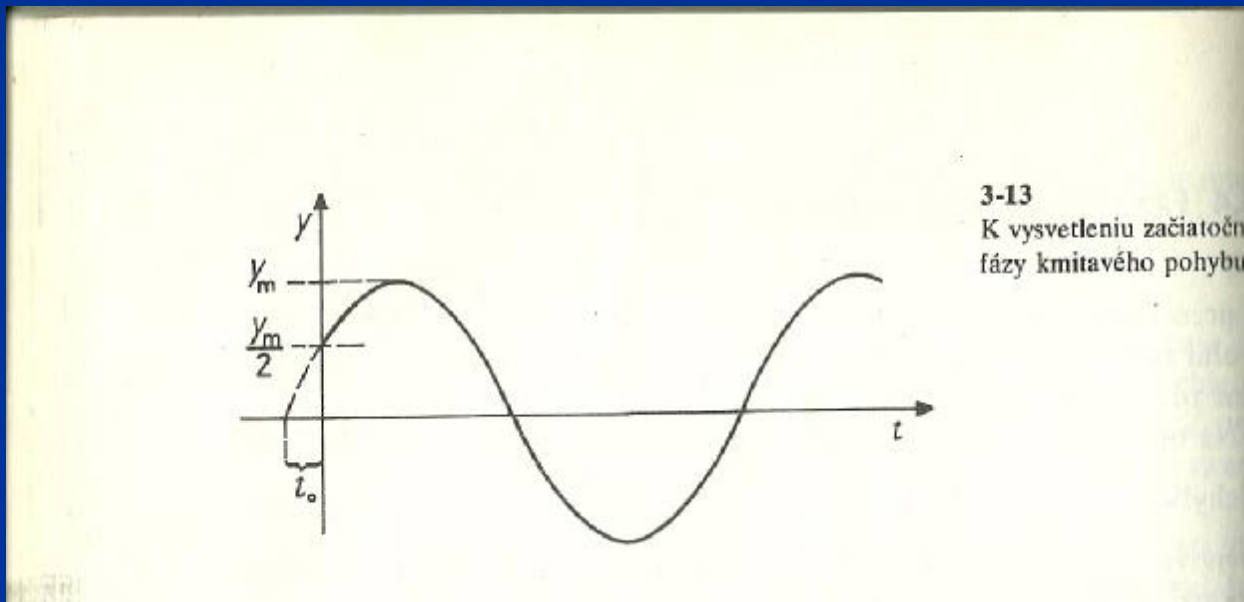
•Harmonic oscillation is described by $y = 8 \sin 4\pi t$ cm. Calculate amplitude and frequency of the oscillator.

•What is the time needed to reach deflection of - 8 cm for an oscillator described by equation $y = 8 \sin 4\pi t$ cm?

Phase of oscillations

- $y = y_m \sin \varphi = y_m \sin (\omega t + \varphi)$
- φ – initial phase

Calculate the initial phase of oscillation depicted in the diagram:



- Calculate initial phase of the harmonic oscillation which is in equilibrium in time $t = T/8$. Write equation of the oscillation.