

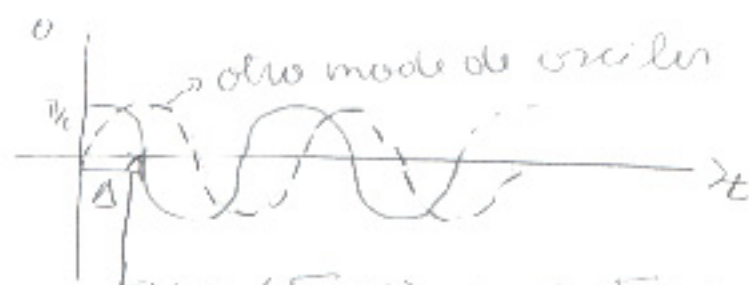
Logo que

$$\dot{\theta}_0 = 0 \quad ; \quad \theta_0 = \pi/2$$

$$\left| \frac{\pi}{2} = A \right| \quad ; \quad \dot{\theta} = -A \sqrt{\frac{mg}{R}} \sin(\sqrt{\frac{g}{R}} t) + B \sqrt{\frac{mg}{R}} \cos(\sqrt{\frac{g}{R}} t)$$

$$\underbrace{\quad}_{\dot{\theta} = 0} \quad \underbrace{\quad}_{B}$$

$$\therefore \theta(t) = \frac{\pi}{2} \cos(\sqrt{\frac{mg}{R}} t)$$

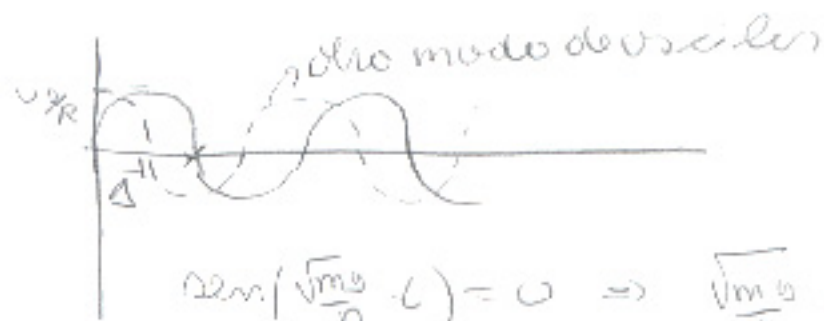


$$\cos(\sqrt{\frac{mg}{R}} t) = 0 \Rightarrow \sqrt{\frac{mg}{R}} t = \pi/2 \Rightarrow t = \frac{\pi}{2} \sqrt{\frac{R}{mg}}$$

$$\dot{\theta}_0 = \frac{v_0}{R} \quad \theta_0 = 0$$

$$A = 0 \quad ; \quad \dot{\theta}_0 = \frac{v_0}{R} = B$$

$$\therefore \theta(t) = \frac{v_0}{R} \sin(\sqrt{\frac{mg}{R}} t)$$



$$\sin(\sqrt{\frac{mg}{R}} t) = 0 \Rightarrow \sqrt{\frac{mg}{R}} t = \pi \Rightarrow t = \sqrt{\frac{R}{mg}} \pi$$

$$\text{desfase de ambos modos de oscilar} = \left| \frac{\pi}{2} \sqrt{\frac{R}{mg}} \right| = \Delta$$