Answer on Question #70941-Physics-Other

A uniform disc is pivoted at its rim. Find the period of small oscillations and the length of equivalent simple pendulum

Solution

The moment of inertia is

$$I = \frac{mr^2}{2} + mr^2 = \frac{3mr^2}{2}$$

The period of small oscillations is

$$T = 2\pi\sqrt{\frac{I}{mgr}} = 2\pi\sqrt{\frac{\frac{3mr^2}{2}}{mgr}} = 2\pi\sqrt{\frac{3r}{2g}}$$

The length of equivalent simple pendulum is

$$l = \frac{3}{2}r.$$