



Consider the setup of a physical pendulum where P is the pivot point.  $b$  is the distance between P and the center of gravity. By applying  $\tau = I \alpha$ , in small  $\theta$  approximation, where  $b_{\perp} = b \sin \theta \simeq b \theta$ , the equation of motion is given by

$$\tau = I \alpha = I \frac{d^2 \theta}{dt^2} = -m g b \sin \theta \simeq -(m g b) \theta .$$

Determine the period  $T$ , of the physical pendulum.

- A)  $T = \sqrt{\frac{I}{m g b}}$
- B)  $T = 2 \pi \sqrt{\frac{I}{m g b}}$
- C)  $T = \sqrt{\frac{m g b}{I}}$
- D)  $T = 2 \pi \sqrt{\frac{m g b}{I}}$

Present equation of motion of  $\tau = I\alpha$  implies,  $\omega^2 = \frac{bmg}{I}$ , in turn

$$2\pi \sqrt{\frac{I}{mgb}}.$$

Answer **B**.

13.04-01 Physical Pendulum 2004-3-24