

CBSE class 11 Rotational motion worksheet 2

Long answer type questions

Question 1 What do you mean by the moment of force applied on a body? Write its unit and dimensional formula.

Question 2 Define term angular acceleration. Write its unit and dimensional formula. Establish relation between angular acceleration and linear acceleration

Question 3 What is the difference between inertia and moment of inertia? What is the physical significance of moment of inertia?

Question 4 A body is rotating with a uniform angular velocity ω about an axis. Establish a formula for its kinetic energy of rotation. Define moment of inertia of the body with respect to the axis of rotation on this basis?

Question 5 Define angular momentum and torque. Prove that the time rate of change of angular momentum is equal to the applied external torque.

Understanding type questions

Question 6 If a body is rotating is it necessarily being acted upon by an external torque?

Question 7 Two rotating bodies A and B have same angular momentum. The moment of inertia of A is twice that of B . Find the ratio of rotational Kinetic energies of A and B .

Question 8 Is it easier to revolve a stone by attaching it to a shorter string rather than the longer one. Why?

Numerical based questions

Question 9 Suppose the race car now slows down uniformly from 60.0 m/s to 30.0 m/s in 4.50 s to avoid an accident, while still traversing a circular path 4.00×10^2 m in radius. Find the car's

(a) centripetal acceleration, (b) angular speed, (c) tangential acceleration, and (d) total acceleration when the speed is 40.0 m/s.

Question 10

A businessman enters the same revolving door on the right, pushing with 576 N of force directed perpendicular to the door and 0.700 m from the hub, while a boy exerts a force of 365 N perpendicular to the door, 1.25 m to the left of the hub. Find

(a) the torques exerted by each person and

(b) the net torque on the door.

Answers to selected problems

Question 9 (a) 4.00 m/s^2 (b) 0.100 rad/s (c) -6.67 m/s^2 (d) 7.77 m/s^2 .

Question 10 (a) $\tau_{\text{boy}} = -456 \text{ Nm}$, $\tau_{\text{man}} = 403 \text{ Nm}$ (b) $\tau_{\text{net}} = -53 \text{ Nm}$