

8. (a) Prove that the moment of inertia of a uniform disc, of mass m and radius r , about an axis through its centre perpendicular to its plane is $\frac{1}{2}mr^2$.

7000

Let M = mass per unit area
 mass of element = $M\{2\pi x \cdot dx\}$
 moment of inertia of the element = $M\{2\pi x \cdot dx\}x^2$
 moment of inertia of the disc = $2\pi M \int_0^r x^3 dx$

$$= 2\pi M \left[\frac{x^4}{4} \right]_0^r$$

$$= \frac{1}{2}\pi M r^4$$

$$= \frac{1}{2}m r^2$$

5
5
5
5

20
