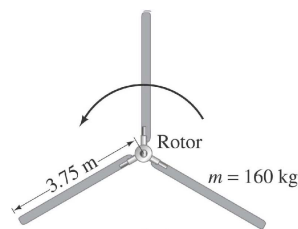


PHYSICS ASSIGNMENT – ROTATIONAL DYNAMICS

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1. Tabulate moment of inertia of different object for different location of axis?
2. A 55-kg person riding a bike puts all her weight on each pedal when climbing a hill. The pedals rotate in a circle of radius 17 cm. What is the maximum torque she exerts?
3. A helicopter rotor blade can be considered a long thin rod, as shown in Figure. (a) If each of the three rotor helicopter blades is 3.75 m long and has a mass of 160 kg, calculate the moment of inertia of the three rotor blades about the axis of rotation. (b) How much torque must the motor apply to bring the blades up to a speed of 5.0 rev/s in 8.0 s?



4. A person stands, hands at his side, on a platform that is rotating at a rate of 1.30 rev/s. If he raises his arms to a horizontal position, the speed of rotation decreases to 0.80 rev/s. (a) Why? (b) By



what factor has his moment of inertia changed?

5. a) What is the angular momentum of a figure skater spinning at 3.5 rev/s with arms in close to her body, assuming her to be a uniform cylinder with a height of 1.5 m, a radius of 15 cm, and a mass of 55 kg?
(b) How much torque is required to slow her to a stop in 5.0 s, assuming she does not move her arms?
6. A 4.2-m-diameter merry-go-round is rotating freely with an angular velocity of 0.80 rad/s. Its total moment of inertia is $1760 \text{ Kg}\cdot\text{m}^2$. Four people standing on the ground, each of mass 65 kg, suddenly step onto the edge of the merry-go-round. What is the angular velocity of the merry-go-round now? What if the people were on it initially and then jumped off in a radial direction (relative to the merry-go-round)?