Practice Test Questions for Rotational Motion

1. The SI unit for angular displacement is

2. The SI unit for angular velocity is

3. The SI unit for angular acceleration is

4. The SI unit for torque is

5. The SI unit for rotational inertia is

6. The SI unit for angular momentum is

7. The SI unit for rotational kinetic energy is

8. Convert 72 rotations/minute to radians/second.

9. A ceiling fan starts from rest and turns through 6 complete rotations before reaching its final operating speed in 4.0 seconds. What is the fan's operating speed?

10. What is the fan's angular acceleration?

11. Jodi pushes a door perpendicularly at a distance of 1.10 m from its hinge. If she pushes with a force of 33.0 N, calculate the magnitude of the torque she applies.

12. Frankie pushes a door at an angle of 70.0 degrees with the door at a distance of 1.05 m from its hinge. If he pushes with a force of 35.0 N, calculate the magnitude of the torque he applies.

13. Calculate the rotational inertia of the International Space Station (ISS) about the center of the Earth. The mass of ISS is 370,000 kg and its orbital radius is 6780 km.

14. Jonah pulls a rope with a force of 16.0 N that is wound around a bicycle wheel gear of radius 6.0 cm. If the rotational inertia of the wheel is 2.25 $kg*m^2$, find the angular acceleration of the wheel.

15. A pulley with a frictionless axle can be modeled as a 0.80 kg solid cylinder with a 0.30 m radius, has a rope hanging over it. The tension in the vertical rope is 15.0 N down on one side and 27.0 N down in the other vertical rope. What is the angular acceleration of the pulley? [$I_{disk}=(1/2)mr^2$]

16. A 350.0 N child and a 300.0 N child sit on either end of a 2.00 m long seesaw. Where along the seesaw should the pivot be placed to ensure rotational equilibrium? (Disregard the mass of the seesaw and give answer in terms of distance from the 300.0 N child.)

17. A uniform bridge 20.0 m long and weighing 4.00×10^5 N is supported by two pillars located 3.00 m from each end. If a 1.96×10^4 N car is parked 8.00m from the right end of the bridge, how much force does each pillar exert?

18. An ice skater decreases her rotational inertia from 3.5 kg*m^2 to 1.5 kg*m^2 and increases her speed from 2.0 rev/s to what?

19. A ceiling fan spins at 4.0 rot/s and has a moment of inertia of 0.80 kg*m^2. Calculate the fan's rotational kinetic energy.

20. A rolling pin [$I = (1/2)mr^2$] is released from rest on top of a 0.75 m tall ramp and rolls without slipping downhill. Calculate its linear speed at the bottom of the ramp.