1. A 4 g object is dropped onto a record of rotational inertia I = 200 gcm^2 initially rotating freely
at 78 revolutions per minute(rpm). The object adheres to the surface of the record at distance 5 cm from its center. The angular velocity of the record is

a. 24 rpm
b. 36 rpm
c. 42 rpm
d. 52 rpm
e. 78 rpm

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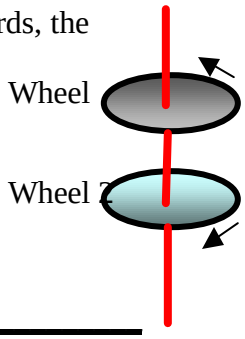
2. One wheel of rotational inertia I_1 = 2 kgm^2 is rotating freely at 20 rad/sec in counterclockwise direction on a shaft whose rotational inertia is negligible. A second wheel of rotational inertia I_2 = 5 kgm^2, rotating freely at 15 rad/sec in the opposite direction, is suddenly coupled along the same shaft to the first wheel. Afterwards, the coupled wheel system rotates at

a. 1.00 rad/s, counterclockwise
b. 2.25 rad/s , clockwise
c. 4.50 rad/s , clockwise
d. 5.00 rad/s , counterclockwise
e. 5.00 rad/s , clockwise



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3. A student, with arms at her sides, is spinning on a frictionless turntable. When the student extends her arms,

a. her angular velocity increases.
b. her angular velocity remains the same.
c. her rotational inertia decreases.
d. her rotational kinetic energy increases.
e. her angular momentum remains the same.

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4. When a man on a frictionless rotating turntable extends his arms out horizontally, his angular momentum

A) must increase
B) must remain the same
C) must increase
D) may increase or decrease depending on his initial angular velocity
E) none of the above

5. A large bug walks from the center of a rotating turntable to its edge and stops. The angular velocity of the turntable

a. stays the same.
b. increases.
c. decreases.
d. can not be determined unless the mass of the bug and radius and rotational inertia of the turntable are given.
e. can not be determined even if the mass of the bug and radius and rotational inertia of the turntable are given.

6. A wheel of moment of inertia of 5 kg m^2 starts from rest and accelerates under a constant torque of 3.0 N m for 8.0 seconds. What is the wheel's rotational kinetic energy at the end of 8 seconds?

a. 57.6 J
b. 64.0 J
c. 78.8 J
d. 122 J
e. 154 J

7. A 32-kg wheel, essentially a thin hoop, with moment of inertia I = 3 kg·m^2 is rotating at 280 rev/min. It must be brought to stop in 15 seconds. The required work to stop it is:

a. 1000 J
b. 1100 J
c. 1200 J
d. **1300** J

8. A 10-kg disk with radius 30 cm must reach a final velocity of 300 rev/min in 10 sec. What is the required average power?

A) 10 W
B) 22 W
C) 45 W
D) 60 W
E) 72 W

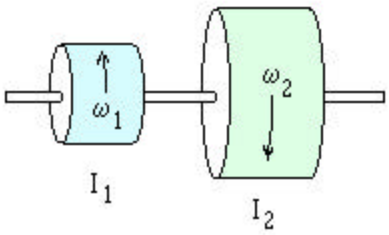
9. A disk with a rotational inertia of 5 kgm^2 and a radius of 0.25 m rotates on a fixed axis perpendicular to the disk and through its center. A force of 2 N is applied tangentially to the rim. As disk turns through half a revolution the work done by the force is

A) 1.6 J
B) 2.5 J
C) 6.3 J
D) 8.5 J
E) 9.8 J

10. A 15-g paper clip is attached to the rim of a phonograph record with a radius of 30 cm, spinning at 3.5 rad/s in clockwise direction. Its angular momentum is

A) $1.4x10^{-3}$ kgm^2/s, up
B) $1.4x10^{-3}$ kgm^2/s, down
C) $4.7x10^{-3}$ kgm^2/s, up
D) $4.7x10^{-3}$ kgm^2/s, down
E) $8.5x10^{-3}$ kgm^2/s, up

11. Two disks of rotational inertia of are mounted on low-friction bearings on a common shaft. The first disk has rotational inertia of 2 kgm^2 and is spinning counterclockwise with angular velocity of 5 rev/s. The second disk has rotational inertia of 3 kgm^2 and is spinning clockwise with angular velocity of 4 rev/s. What is the magnitude and direction of the net angular momentum of the system?



A) 12.56 kgm^2/s , to the left
B) 12.56 kgm^2/s , to the right
C) 25.12 kgm^2/s , to the left
D) 25.12 kgm^2/s , to the right
E) none of the above

Workout problem I

A flywheel of rotational inertia of I = 2-kg·m^2 rotates about its center at 5 revolutions per second.

a) What is the initial kinetic energy of the flywheel (in Joules)?
Answer: _____

b) What work must be done to increase the flywheel's velocity to 7 revolutions per second.
Answer: _____

c) What is the magnitude of torque that must be applied to increase the velocity from 5 rev/sec to 7 rev/sec in 3 seconds? Answer: _____

Workout problem II

A 60-kg student stands on a rim of a horizontal platform of rotational inertia I = 300 kg·m^2 and radius 2 m. Initially the platform & student rotate together with angular velocity of 1.5 radians per second. The student walks slowly from the rim of platform toward the center.

a) What is the angular velocity of platform - student when the student is at 0.2 m from the center of platform?
Answer: rad/s

b) What is the change of kinetic energy of the system?
Answer: J