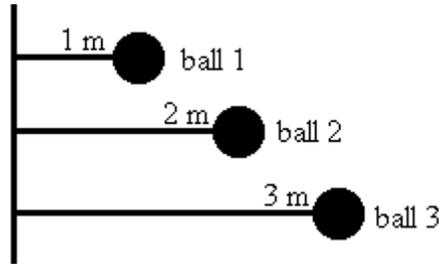


Test 7 – wersja angielska

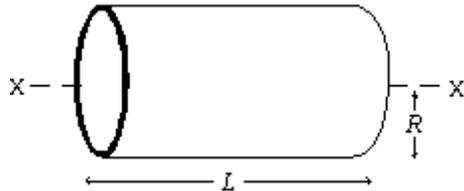
- 7.1A One revolution is the same as:
A) 1 rad B) 57 rad C) $\pi/2$ rad D) π rad E) 2π rad
- 7.2A. If a wheel turns with constant angular speed then:
A) each point on its rim moves with constant velocity
B) each point on its rim moves with constant acceleration
C) the wheel turns through equal angles in equal times
D) the angle through which the wheel turns in each second increases as time goes on
E) the angle through which the wheel turns in each second decreases as time goes on
- 7.3A. A phonograph turntable, initially rotating at 0.75 rev/s, slows down and stops in 30 s. The magnitude of its average angular acceleration in rad/s^2 for this process is:
A) 1.5 B) 1.5π C) $\pi/40$ D) $\pi/20$ E) 0.75
- 7.4A. A wheel is spinning at 27 rad/s but is slowing with an angular acceleration that has a magnitude given by $(3.0 \text{ rad/s}^4)t^2$. It stops in a time of:
A) 1.7 s B) 2.6 s C) 3.0 s D) 4.4 s E) 7.3 s
- 7.5A. If the angular velocity vector of a spinning body points out of the page then, when viewed from above the page, the body is spinning:
A) clockwise about an axis that is perpendicular to the page
B) counterclockwise about an axis that is perpendicular to the page
C) about an axis that is parallel to the page
D) about an axis that is changing orientation
E) about an axis that is getting longer
- 7.6A. A child, riding on a large merry-go-round, travels a distance of 3000 m in a circle of diameter 40 m. The total angle through which she revolves is:
A) 50 rad B) 75 rad C) 150 rad D) 314 rad E) none of these
- 7.7A. A particle moves in a circular path of radius 0.10 m with a constant angular speed of 5 rev/s. The acceleration of the particle is:
A) $0.10\pi \text{ m/s}^2$ B) 0.50 m/s^2 C) $500\pi \text{ m/s}^2$ D) $1000\pi^2 \text{ m/s}^2$ E) $10\pi^2 \text{ m/s}^2$
- 7.8A. A flywheel of diameter 1.2 m has a constant angular acceleration of 5.0 rad/s^2 . The tangential acceleration of a point on its rim is:
A) 5.0 rad/s^2 B) 3.0 m/s^2 C) 5.0 m/s^2 D) 6.0 m/s^2 E) 12 m/s^2

7.9A. Three identical balls are tied by light strings to the same rod and rotate around it, as shown below. Rank the balls according to their rotational inertia, least to greatest.



- A) 1, 2, 3 B) 3, 2, 1 C) 3, then 1 and 2 tie D) 1, 3, 2 E) All are the same

7.10A The rotational inertia of a thin cylindrical shell of mass M , radius R , and length L about its central axis ($X - X'$) is:



- A) $MR^2/2$ B) $ML^2/2$ C) ML^2 D) MR^2 E) none of these

7.11A. Consider four objects, each having the same mass and the same radius:

1. a solid sphere
2. a hollow sphere
3. a flat disk in the x,y plane
4. a hoop in the x,y plane

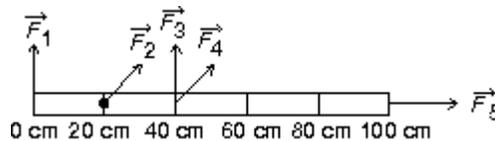
The order of increasing rotational inertia about an axis through the center of mass and parallel to the z axis is:

- A) 1, 2, 3, 4 B) 4, 3, 2, 1 C) 1, 3, 2, 4 D) 4, 2, 3, 1 E) 3, 1, 2, 4

7.12A. A uniform solid cylinder made of lead has the same mass and the same length as a uniform solid cylinder made of wood. The rotational inertia of the lead cylinder compared to the wooden one is:

- A) greater
- B) less
- C) same
- D) unknown unless the radii are given
- E) unknown unless both the masses and the radii are given

- 7.13A. To increase the rotational inertia of a solid disk about its axis without changing its mass:
- drill holes near the rim and put the material near the axis
 - drill holes near the axis and put the material near the rim
 - drill holes at points on a circle near the rim and put the material at points between the holes
 - drill holes at points on a circle near the axis and put the material at points between the holes
 - do none of the above (the rotational inertia cannot be changed without changing the mass)
- 7.14A. The rotational inertia of a solid uniform sphere about a diameter is $(2/5)MR^2$, where M is its mass and R is its radius. If the sphere is pivoted about an axis that is tangent to its surface, its rotational inertia is:
- MR^2
 - $(2/5)MR^2$
 - $(3/5)MR^2$
 - $(5/2)MR^2$
 - $(7/5)MR^2$
- 7.15A. A solid uniform sphere of radius R and mass M has a rotational inertia about a diameter that is given by $(2/5)MR^2$. A light string of length $3R$ is attached to the surface and used to suspend the sphere from the ceiling. Its rotational inertia about the point of attachment at the ceiling is:
- $(2/5)MR^2$
 - $9MR^2$
 - $16MR^2$
 - $47/5MR^2$
 - $(82/5)MR^2$
- 7.16A. The meter stick shown below rotates about an axis through the point marked \bullet , 20 cm from one end. Five forces act on the stick: one at each end, one at the pivot point, and two 40 cm from one end, as shown. The magnitudes of the forces are all the same. Rank the forces according to the magnitudes of the torques they produce about the pivot point, least to greatest.

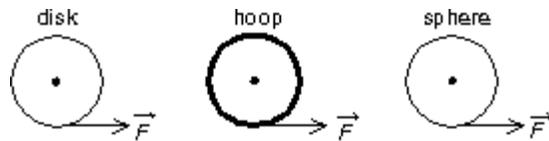


- $\vec{F}_1, \vec{F}_2, \vec{F}_3, \vec{F}_4, \vec{F}_5$
- \vec{F}_1 and \vec{F}_2 tie, then $\vec{F}_3, \vec{F}_4, \vec{F}_5$
- \vec{F}_2 and \vec{F}_5 tie, then $\vec{F}_4, \vec{F}_1, \vec{F}_3$
- $\vec{F}_2, \vec{F}_5, \vec{F}_1$, and \vec{F}_3 tie, then \vec{F}_4
- \vec{F}_2 and \vec{F}_5 tie, then \vec{F}_4 , then \vec{F}_1 and \vec{F}_3 tie

7.17A. $\tau = I\varepsilon$ for an object rotating about a fixed axis, where τ is the net torque acting on it, I is its rotational inertia, and ε is its angular acceleration. This expression:

- A) is the definition of torque
- B) is the definition of rotational inertia
- C) is the definition of angular acceleration
- D) follows directly from Newton's second law
- E) depends on a principle of physics that is unrelated to Newton's second law

7.18A. A uniform disk, a thin hoop, and a uniform sphere, all with the same mass and same outer radius, are each free to rotate about a fixed axis through its center. Assume the hoop is connected to the rotation axis by light spokes. With the objects starting from rest, identical forces are simultaneously applied to the rims, as shown. Rank the objects according to their angular velocities after a given time t , least to greatest.

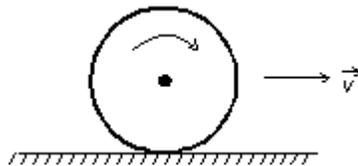


- A) disk, hoop, sphere
- B) hoop, disk, sphere
- C) hoop, sphere, disk
- D) disk, sphere, hoop
- E) sphere, disk, hoop

7.19A. A circular saw is powered by a motor. When the saw is used to cut wood, the wood exerts a torque of $0.80 \text{ N} \cdot \text{m}$ on the saw blade. If the blade rotates with a constant angular velocity of 20 rad/s the work done on the blade by the motor in 1.0 min is:

- A) 0
- B) 480 J
- C) 960 J
- D) 1400 J
- E) 1800 J

7.20A. A wheel of radius 0.5 m rolls without sliding on a horizontal surface as shown. Starting from rest, the wheel moves with constant angular acceleration 6 rad/s^2 . The distance in traveled by the center of the wheel from $t = 0$ to $t = 3 \text{ s}$ is:



- A) zero
- B) 27 m
- C) 13.5 m
- D) 18 m
- E) none of these

7.21A. Two identical disks, with rotational inertia $I (= 1/2 MR^2)$, roll without slipping across a horizontal floor and then up inclines. Disk A rolls up its incline without sliding. On the other hand, disk B rolls up a frictionless incline. Otherwise the inclines are identical. Disk A reaches a height 12 cm above the floor before rolling down again. Disk B reaches a height above the floor of:

- A) 24 cm
- B) 18 cm
- C) 12 cm
- D) 8 cm
- E) 6 cm

- 7.22A. When we apply the energy conservation principle to a cylinder rolling down an incline without sliding, we exclude the work done by friction because:
- A) there is no friction present
 - B) the angular velocity of the center of mass about the point of contact is zero
 - C) the coefficient of kinetic friction is zero
 - D) the linear velocity of the point of contact (relative to the inclined surface) is zero
 - E) the coefficient of static and kinetic friction are equal

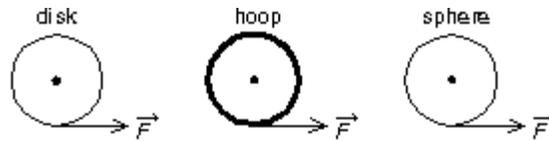
7.23A. The unit $\text{kg}\cdot\text{m}^2/\text{s}$ can be used for:

- A) angular momentum
- B) rotational kinetic energy
- C) rotational inertia
- D) torque
- E) power

7.24A. The newton-second is a unit of:

- A) work
- B) angular momentum
- C) power
- D) linear momentum
- E) none of these

- 7.25A. A uniform disk, a thin hoop, and a uniform sphere, all with the same mass and same outer radius, are each free to rotate about a fixed axis through its center. Assume the hoop is connected to the rotation axis by light spokes. With the objects starting from rest, identical forces are simultaneously applied to the rims, as shown. Rank the objects according to the angular momenta after a given time t , least to greatest.



- A) all tie
- B) disk, hoop, sphere
- C) hoop, disk, sphere
- D) hoop, sphere, disk
- E) disk, sphere, hoop

7.26A. A man, with his arms at his sides, is spinning on a light frictionless turntable. When he extends his arms:

- A) his angular velocity increases
- B) his angular velocity remains the same
- C) his rotational inertia decreases
- D) his rotational kinetic energy increases
- E) his angular momentum remains the same