Rotation sans calculatrice!

Part 1: No Calculators!

1. A solid disk (m=2.00kg) with a radius of 10.0cm rotates with ω=0.80rad/s.

a. What is the rotational inertia of the disk?

b. What is the tangential speed of a point on the outer edge of the disc?

c. What is the rotational speed of a point 2.00cm from the center of the disc?

2. A bicycle wheel is rotating with ωo=0.10rad/s in. The wheel experiences a constant net torque that changes the angular velocity to 0.40rad/s out in 2.0s.

a. What is the change in angular velocity?

b. What is the angular acceleration?

d. What is the angular displacement?

A circular pulley has a moment of inertia, I=20.0kgm2. The pulley has ropes attached at two different radii as shown below. R1=0.50m, R2=0.25m

120N

A

B

80.0N

3. What is the net torque on the pulley?

A. 140Nm below +x B. 80Nm in C. 80Nm out D. 40Nm in

E. 40Nm out F. 50Nm in G. 50Nm out

4. What is the angular acceleration of point A?

A. 2.0m/s2 in B. 2.0m/s2 out C. 2.0rad/s2 in D. 2.0rad/ss out

E. 4.0m/s2 in F. 4.0m/s2 out G. 4.0rad/s2 in H. 4.0rad/s2 out

I. 1.0m/s2 in J. 1.0m/s2 out K. 1.0rad/s2 in L. 1.0rad/s2 out

M. 0.50m/s2 in N. 0.50m/s2 out O. 0.50rad/s2 in P. 0.50rad/s2 out

5. What is the angular acceleration of point B?

A. 2.0m/s2 in B. 2.0m/s2 out C. 2.0rad/s2 in D. 2.0rad/ss out

E. 4.0m/s2 in F. 4.0m/s2 out G. 4.0rad/s2 in H. 4.0rad/s2 out

I. 1.0m/s2 in J. 1.0m/s2 out K. 1.0rad/s2 in L. 1.0rad/s2 out

M. 0.50m/s2 in N. 0.50m/s2 out O. 0.50rad/s2 in P. 0.50rad/s2 out

6. What is the tangential acceleration of point A?

A. 2.0m/s2 left B. 2.0m/s2 right C. 2.0m/s2 up D. 2.0m/s2 down

E. 4.0m/s2 left F. 4.0m/s2 right G. 4.0m/s2 up H. 4.0m/s2 down

I. 1.0m/s2 left J. 1.0m/s2 right K. 1.0m/s2 up L. 1.0m/s2 down

M. 0.50m/s2 left N. 0.50m/s2 right O. 0.50m/s2 up P. 0.50m/s2 down

7. What is the tangential acceleration of point B?

A. 2.0m/s2 left B. 2.0m/s2 right C. 2.0m/s2 up D. 2.0m/s2 down

E. 4.0m/s2 left F. 4.0m/s2 right G. 4.0m/s2 up H. 4.0m/s2 down

I. 1.0m/s2 left J. 1.0m/s2 right K. 1.0m/s2 up L. 1.0m/s2 down

M. 0.50m/s2 left N. 0.50m/s2 right O. 0.50m/s2 up P. 0.50m/s2 down

8. A solid sphere (I=mr2) has a mass of 1.0kg, a radius of 7.0cm and rolls, from rest, down a ramp without slipping.

0.28m

Find the speed of the ball at the bottom of the ramp, assuming no loss of energy. (Use g=10.0N/kg)

8. A rotating platform has a mass of m=1.00kg and a radius R=2.00m. A 4.00kg mass (M) sits on the platform at a distance r from the center. The moment of inertia of the system is ½mR2+Mr2.

a. What is the moment of inertia when the mass M is 1.00m from the center?

b. What is the moment of inertia when M is 0.50m from the center?

c. The platform rotates at 0.25rad/s when M is 1.00m from the center, how fast does it rotate if the mass moves in to 0.50m from the center?

9. A wheel of outer radius R has an axle of radius R/6. Strings are wrapped as shown around the

rim of the wheel and around the axle. If the string around the rim of the wheel has tension T,

then in order to keep the wheel from turning the tension in the string around the axle must be:



A. 6T

B.6Tsin ϴ

C. T/6

D. (T/6)sinϴ

E. 6Tcosϴ

10. Five forces of the same magnitude act on a square that can rotate about point P at the midpoint of one of the edges. Rank the forces (in ascending order) acting on it according to the magnitude of the torque they create about point P

A. F2, F3, F4,&F5 (tie), F1 F4

B. F3, F4, F1, F2, F5

C. F5, F4, F3, F1, F2 F5

D. F3, F1, F2, F4, F5

E. F4, F3, F2, F5, F1

F1 F3

F2