1. (3) A wheel starts from rest and rotates with constant angular acceleration to reach and angular speed of 12.0/s in 3.00s. a) Find the magnitude of the angular acceleration b) find the angle in radians through which it rotates in this time interval.

a) 4rad/$s^2$ b)18.0rad

2. (5) An electric motor rotating a grinding wheel at 100 rpm is switched off. The wheel then moves with constant negative angular acceleration of 2.00/$s^2$. A) How long does it take the wheel to come to rest? B) through how many radians does it turn?

a) 5,24s b) 27.4 rad

3. (13) A wheel 2.00m in diameter lies in a horizontal plane and rotates at constant acceleration of 4.00/$s^2$. The wheel starts at rest at t=0 and the radius vector of a certain point P on the rim makes an angle of 57.3˚ (1.00 radian) with the horizontal at this time. At t=2.00s find: a) the angular speed of the wheel b) tangential velocity, c) centripetal acceleration, d) tangential acceleration, d) the angular position of point P.

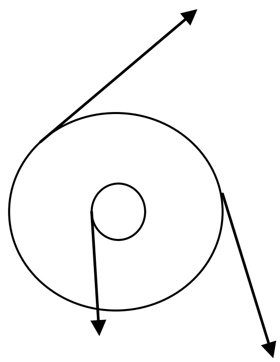
a) 8rad/s b) 8m/s; c) $a_r$= -64m/$s^2$, d) $a_t$= 4m/$s^2$ d) 9 rad

4. A car drives around a circular track with tangential acceleration 1.7m/$s^2$ for a quarter circle before it skids off the road. Find the coefficient of static friction. 0.545

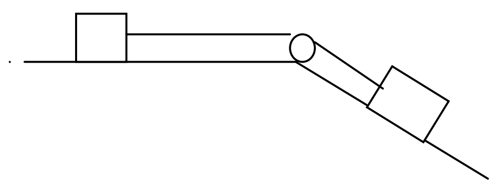
5. (21) Four particles are situated at the corners of a rectangular shape formed by rods of negligible mass. The horizontal length of the rectangle is 4.00m, the vertical length is 6.00 m. The rectangle is centered on the 0 point of an x-y coordinate system. The particles have the masses 2, 4, 2, 3 kg starting at the point (2.00, 3.00)m and continuing clockwise. The system rotates in the x-y plane clockwise around the z-axis with an angular speed of 6.00 radians/s. a) Calculate the moment of inertia of the system around the z-axis b) find the rotational kinetic energy of the system c) what is the direction of the angular velocity vector.

a) 143kgm$^2$ b) 2.57kJ

6. (33) Find the net torque on the wheel in figure 10.33 about the axle through O, taking a=10.0cm and b=25.0cm. Two forces of 10N and 9.0 N are applied cw at distance "b", and a force of 12 N at distance "a" ccw. The forces are perpendicular to the radius. Make a drawing! 3.55Nm cw

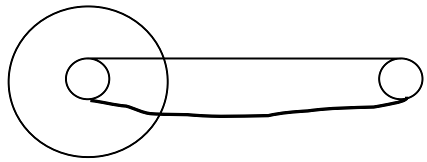


7. (37) A block of mass $m_1$=2.00kg and a block of mass $m_2$=6.00kg are connected by a mass-less string over a pulley in the shape of a solid disk having radius R=0.250m and mass M=10.0kg. These blocks are allowed to move on a fixed wedge of angle θ=30.0˚ (with the horizontal) as shown.



The coefficient of kinetic friction between either block and the surface is 0.360. Determine the acceleration of both blocks and the tensions in both strings on each side of the pulley. A) 0.309 m/ss b) 7.67N; 9.22N

8. (39) An electric motor turns a flywheel through a drive belt that joins a pulley on the motor and a pulley that is rigidly attached to the flywheel as shown in picture 10.39. The flywheel is a solid disk with a mass of 80.0 kg and a diameter of 1.25 m (R=0.6125m). It turns around a frictionless axle. Its pulley has a much smaller mass and a radius of $r_1$= 0.230m. The tension in the upper (taut) segment of the belt is 135 N and the flywheel has a clockwise angular acceleration of 1.67/s$^2$. Find the tension in the lower (slack) segment of the belt. 21.5N



Sum of the exterior torques is equal to the moment of inertia times angular acceleration:

9. (44) Consider an Atwood machine with a massive cylindrical pulley of mass 5.00kg, and radius 0.200m. Two masses are suspended from the pulley, the lighter one of them resting on the floor initially. Its mass $m_1$ =12.5kg. A larger mass $m_2$=20.0kg hangs from the other end of the string originally held steady at a height of 4.00m above the ground. Calculate the time required for the heavier mass to hit the floor, once it is released.

a=2.1m/s$^2$;t=1.95s

10. (53) A cylinder of mass 10.0 kg rolls without slipping on a horizontal surface. At a certain instance its center of mass has a speed of 10.0m/s. Determine a) the translational kinetic energy of the center of mass, b) the rotational kinetic energy around its axis, c) the total kinetic energy. 500J; 250J; 750J

11. (71) Two blocks are connected by a mass-less rigid string over a pulley of radius 0.250m and moment of inertia I. The lighter block moves upward on the inclined plane of a wedge (37.0° with the horizontal) with an acceleration of 2.00m/s$^2$. It has a mass of 15.0 kg. The heavier mass of 20.0 kg hangs freely on the vertical side of the wedge, without touching it. Determine $T_1$, the tension of the string between the lighter mass and the pulley on the incline, and $T_2$, the tension between the heavier mass and the pulley. (Make a drawing.)

118N and 156N; I=1.17 kgm$^2$