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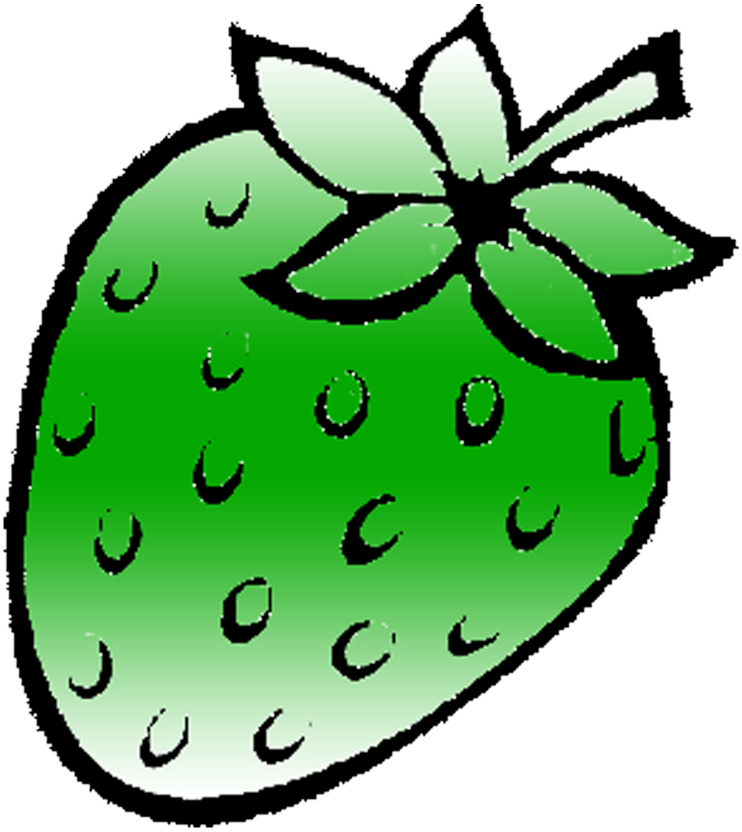

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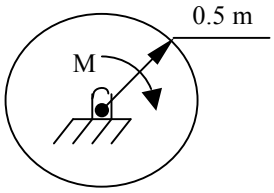
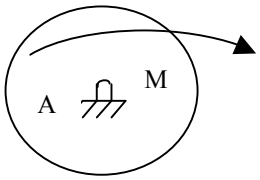
KINETICS OF RIGID BODIES

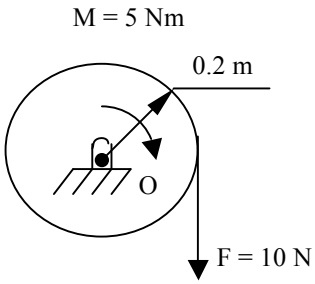
1. **A solid cylinder of mass 30 kg and radius 0.5 m is free to rotate about its axis if a couple of M = 0.02 θ^2 Nm is applied to the cylinder. Find acceleration of point B on the rim when cylinder completes 2 revolutions.**
   Ans. : w = 2.653 r/s (↻), α_B = 3.54 m/s^2.



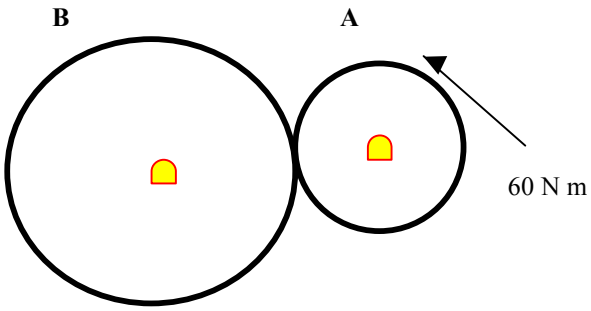
2. **The 10 kg drum of a washing machine has a radius of gyration K_A = 200 mm. If the drum is subjected to a moment M = (4θ) Nm where θ is in radians, determine its angular velocity when it undergoes two revolutions. Also compute the reactions which the fixed pin A exerts on the drum during the motion.**
   Ans. : w = 39.74 r/s (↻), R_A = 98.1 N (↑).



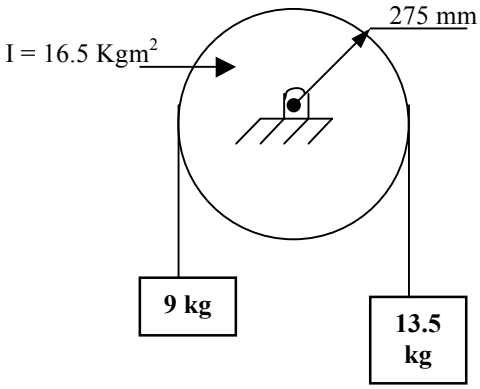
3. **Determine the number of revolutions, the 30 kg disc must make to attain on angular velocity of 20 rad/s starting from rest.**
   Ans. :θ = 2.73 rev.



4. **A moment of 60Nm is applied to the uniform disk A that drives uniform disk B without slip. What is the angular acceleration of each disk? Disk A has a mass of 30kg, radius 600mm and disk B has a mass of 60kg and radius 1200mm.**
   [α_A = 3.7 r/s^2, α_B = 1.85 r/s^2]

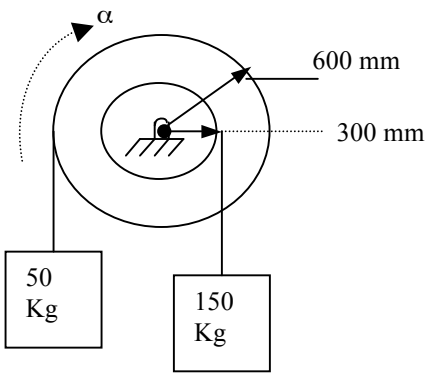


5. **A pulley of mass M.I. = 16.5 kgm^2 is acted upon by two masses as shown in sketch, calculate the angular acceleration of the pulley. The string connected the two masses is massless. Also calculate the tension in each string. Take g = 10 m/s^2.**
   Ans. : 0.68 r/s^2, 132.476 N & 91.683 N.



6. **A compound pulley system as shown in figure has a mass of 30 kg and a radius of gyration of 450 mm. Determine the tension in each cord and angular acceleration of the pulley when the masses of 50 kg and 150 kg which the pulley supports are released. Take g = 10 m/s^2.**

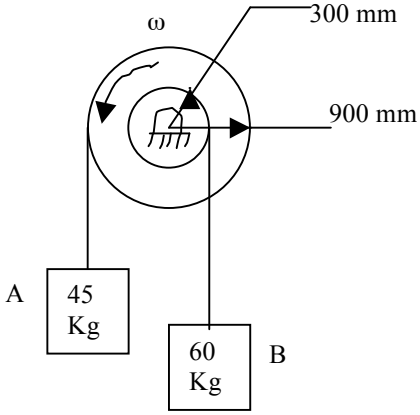
Ans. :α = 3.99 r/s^2, 1320.45 N, 619.7 N.



7. **See figure Block A& B have masses of 45 kg and 60 kg respectively. The drum has a M.I., I = 16 kgm^2. Through what distance will 'A' fall before it reaches a speed of 2 m/s?**

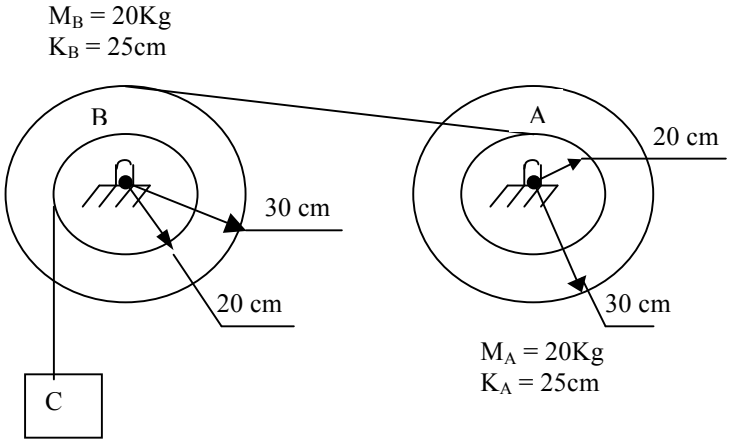
Take g = 10 m/s^2.

Ans. : S_A = 0.571 m.



8. **The system shown in figure is released from rest. Find acceleration of block C and tension in the ropes.**

Ans. : a_c = 2.82 m/s^2 (↓), $T_{BET.\ PULLEYS}$ = 132.43 N, T_C = 287.2 N.



9. **Two double pulleys shown in figure are connected to each other by a string as shown. If each pulley is mounted on frictionless bearings, mass M.I. of each pulley is 0.2 kgm^2 and inner and outer radii of each pulley are 80mm and 120mm respectively, then calculate acceleration of the mass C (6 kg) and tension in the string connected the two pulleys. Take g = 10 m/s^2.**

Ans. : a = 0.558 m/s^2, T = 26.15 N.