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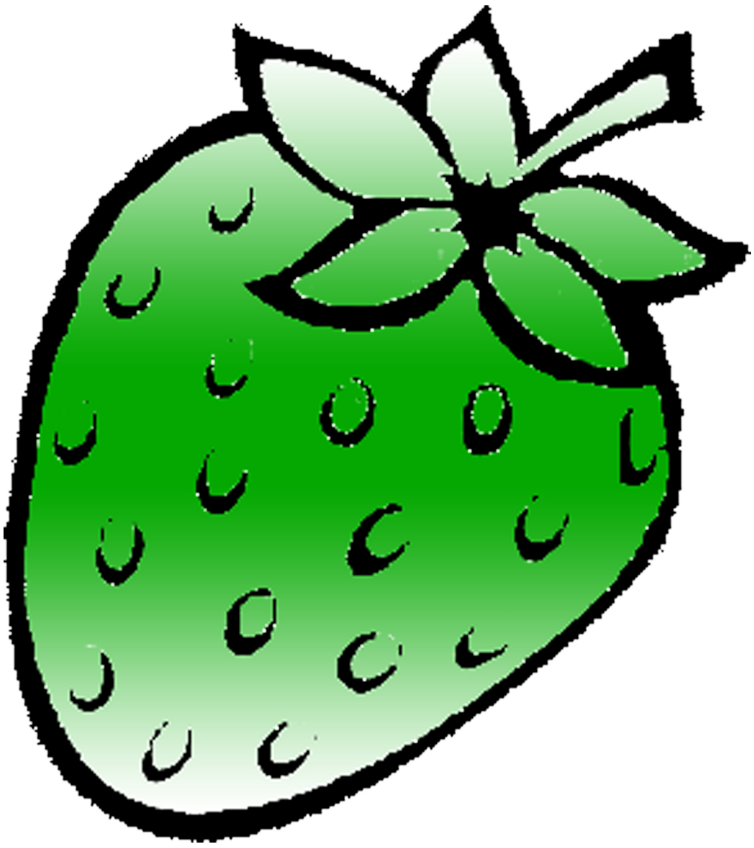

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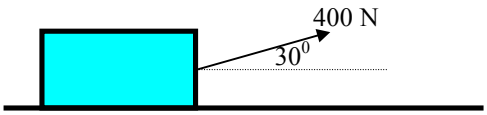
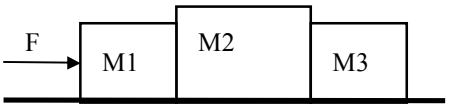
KINETICS OF PARTICLES

1. **A vertical lift of total mass 750kg acquires an upward velocity of 3m/s over a distance of 4m moving with constant acceleration starting from rest. Calculate the tension in the cable. Take g= 10 m/s^2**
   Ans:8343.75N

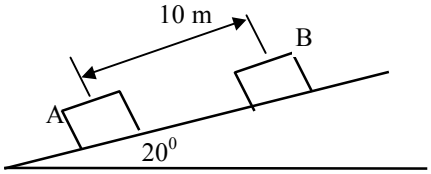
2. **The 50Kg crate shown in figure rests on a horizontal plane for which the coefficient of kinetic friction is 0.3. If the crate is subjected to a 400N towing force as shown, determine the velocity of the crate in 5 sec starting from rest.**
   Ans. : a = 5.19 m/s^2, v=26 m/s →



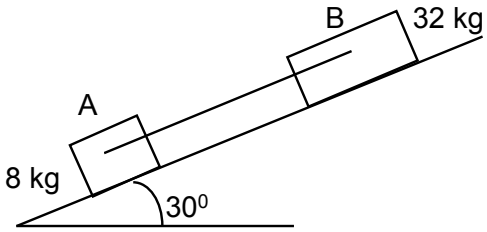
3. **Three particles m_1, m_2 & m_3 of masses 1.5Kg, 2Kg & 1Kg respectively are placed on a rough surface with, as shown. If a force F is applied to accelerate the blocks at 3m/s^2, what will be the force that 1.5Kg block exerts on 2Kg block? (Coefficient of friction μ = 0.20)**
   Ans. : F=22.5 N, P= 15N



4. **Two blocks 'A' and 'B' are held stationary 10m apart on a 20^0 incline as shown. The cofft. of dynamic friction between the plane and 'A' is 0.3 and for 'B' is 0.1.If the blocks are released simultaneously, find the time taken and the distance traveled by each block before they are on the verge of colliding.**
   Ans. : t=3.351 sec, x=3.246 m from A

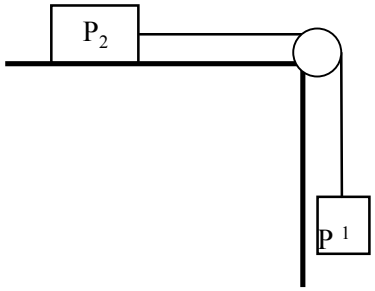


5. **Two blocks A (mass 8kg), B (mass 32kg) are connected by a pin connected light rod as shown in the figure. If the blocks start moving find the velocity of each block after 2sec. Assume μ = 0.25 for block A and plane and μ = 0.10 for block B and plane.**
   Ans. : 7.6m/s

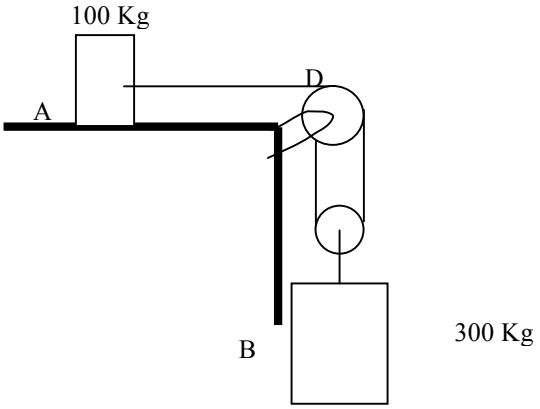


6. **An airplane has a mass of 25000Kg and its engine develops a total thrust of 40KN along the runway. The force of air resistance to motion is given by D = 2.25V^2 , where V is in m/s and D in Newtons. Determine the length of the runway required if the plane takes off and in airborne at a speed of 240 km/h.**
   Ans. : 1600 m

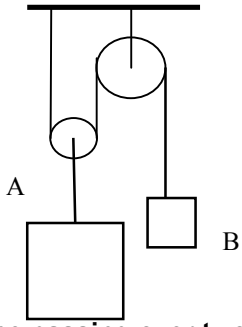
7. **Block P_1 of weight 4N is connected to block P_2 of weight 8N by an extensible string. Find the velocity of block P_1 if it falls by 0.6m starting from rest. Coefficient of friction is 0.2.**
   Ans.: 1.53 m/s



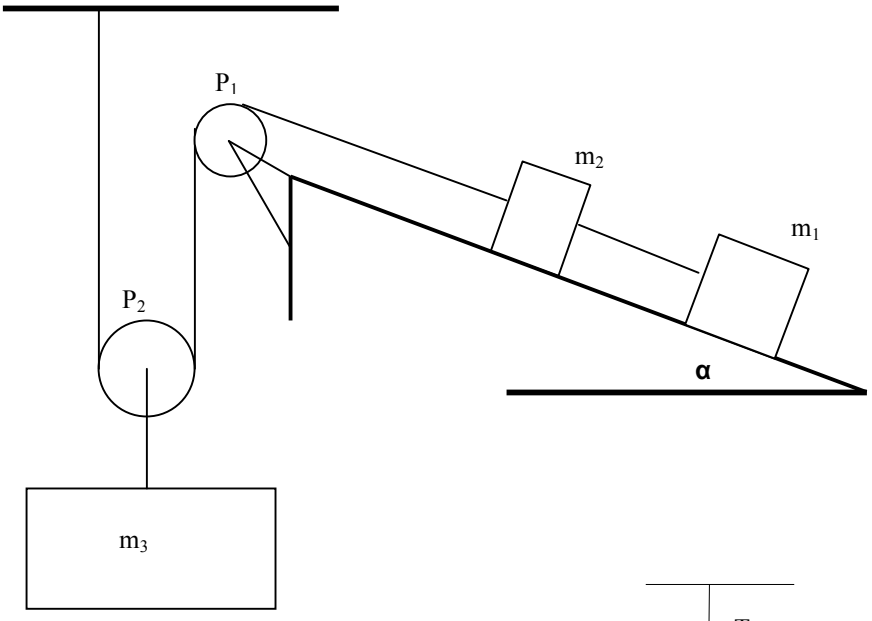
8. **The 2 blocks shown start from rest. The horizontal plane and pulley are frictionless, and the pulley is assumed to be of negligible mass. Determine the acceleration of each block and tension in cord.**
Ans. : a_A= 8.40m/s^2, a_B=4.2m/s^2(b)T_1 =840 N ,T_2= 1680 N



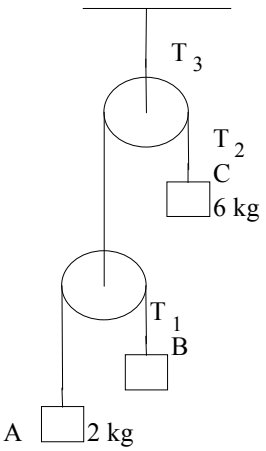
9. **The 100Kg block A shown in fig is released from rest. If the mass of the pulleys and chord is neglected, determine the speed of the 20Kg block B in 2 Sec.**
Ans.: 13.1 m/s upward



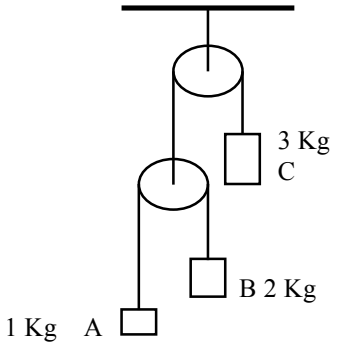
10. **Figure shows two masses m_1=1 Kg and m_2=2 Kg connected by rope and rope passing over two smooth pulleys P_1 and P_2.Mass m_3=5Kg is supported from the movable pulley P_2. If the inclination of the inclined pulley is α where tan α = ¾. Coefficient of friction is 0.1.Determine the motion of the system neglecting the weight of pulley P_2.**



11. **In the system of pulleys, masses and connecting inextensible cables shown in the figure, the pulleys and the cables are considered massless and frictionless. Mass of A = 2kg, mass of B = 4kg and mass of C = 6kg. If the system is released from rest find: [a] tension in each of three cables.[b] acceleration of each of the three masses.**
Ans. : a_A = 4.04m/s^2↑, T_1 = 27.7KN, a_B = 2.89m/s^2↓, T_2 = 55.39KN, a_C = 0.577m/s^2↓, T_3 = 55.39KN



12. If the system shown in figure is released from rest, find the acceleration of cylinder B. Neglect the mass of pulleys and chords.
Ans.: $a_B = 2.89\ m/s^2$



13. In the system shown in figure the pulleys are to be considered mass less and frictionless. The masses in Kg are 1,2,3 and 4.Determine the acceleration of each mass and tension in the fixed cord.