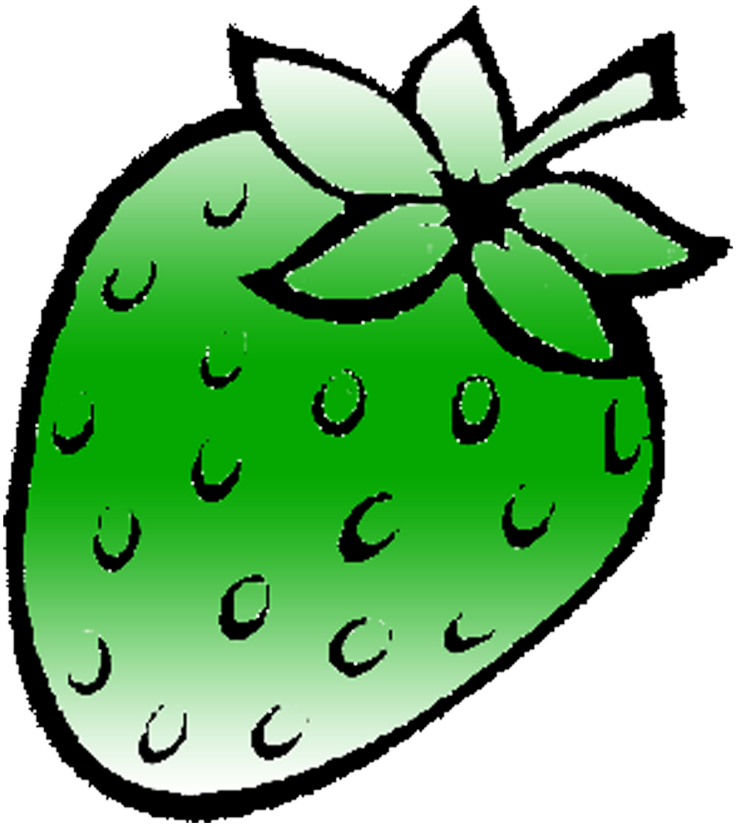
# STRAWBERRY



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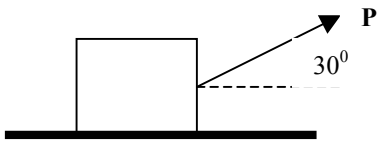
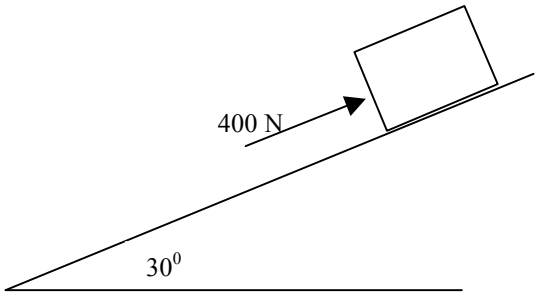
# WORK ENERGY PRINCIPLE

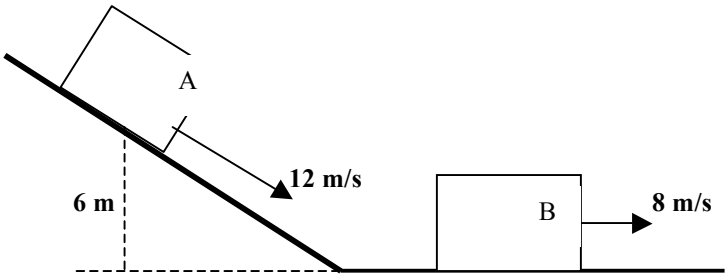
1. **A block weighing 2500N rests on a level horizontal plane for which coefficient of friction is 0.20. This block is pulled by a force of 1000N acting at an angle of $30^0$ to the horizontal. Find the velocity of the block after it moves 30m starting from rest. If the force of 1000N is then removed how much further will it move? Use work energy method.**
**(10.474 m/s, 27.96 m)**



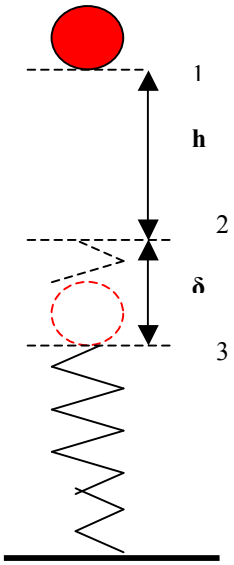

2. **A body weighing 300N is pushed up a $30^0$ plane by a 400N force acting parallel to the plane. If the initial velocity of the body is 1.5m/s and coefficient of kinetic friction is $\mu = 0.2$, what velocity will the body have after moving 6m?**
**(8.942 m/s)**



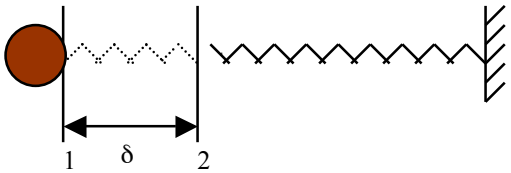

3. **The 30 kg crate slides down the path from A to B in the vertical plane, as shown in figure. If the crate has a velocity of 12m/s down the incline at a point A, and 8m/s at B, calculate the work done by friction during the motion from A to B?**
**(-825.6 J)**



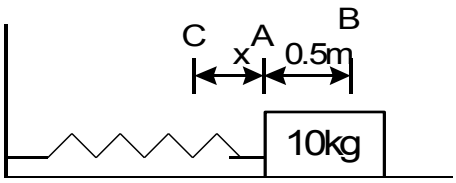

4. **A ball of mass m is dropped on to a spring of stiffness k from a height h. Find the maximum deflection $\delta$ of the spring. Position 1. The ball is at rest at a height h from the top of the spring. Position 2. The ball touches the spring after falling a height h. Position 3. The ball and the spring travel a further distance $\delta$ and come to rest in this position. Take m = 5kg, k = 500N/m, h = 10cm.**
**($\delta$ = 26.91cm)**



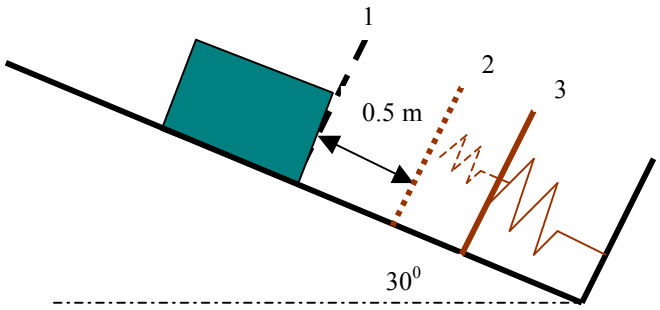

5. **If the spring of Q.4. is placed horizontally (as shown in figure) and the same ball now strikes the spring with a velocity equal to that attained by a vertical fall of height h = 10cm, find the maximum compression of the spring.**
**($\delta$ = 0.140m)**



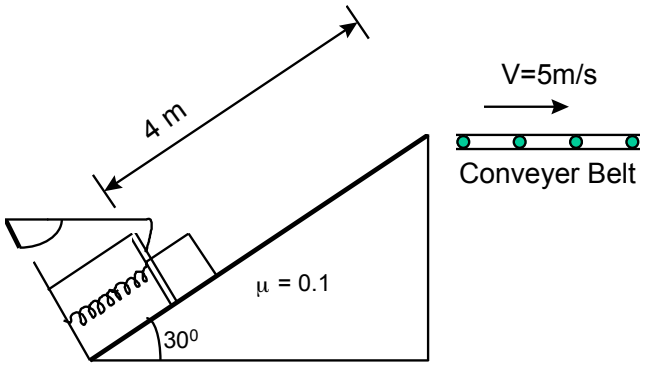
6. **The 10 kg block is released from rest on the horizontal surface at point B, where the spring has been stretched a distance of 0.5m from its neutral position A. The coefficient of kinetic friction between the block and the plane is 0.3. Calculate (a) The velocity v of the block as it passes point A and (b) the maximum distance x to the left of A that the block goes.**
**V=2.13 m/s, x= 0.304 m**



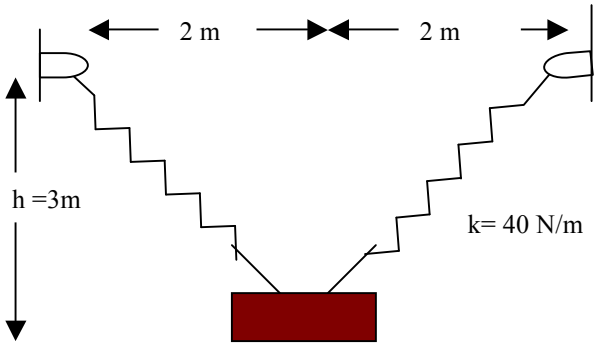

7. **A block of mass 5 kg resting on a $30^0$ inclined plane is released. The block after travelling a distance of 0.5m along the inclined plane hits a spring of stiffness 15N/cm. Find the maximum compression of spring. Assume the coefficient of friction between the block and the inclined plane as 0.20.**
**(11.5cm)**



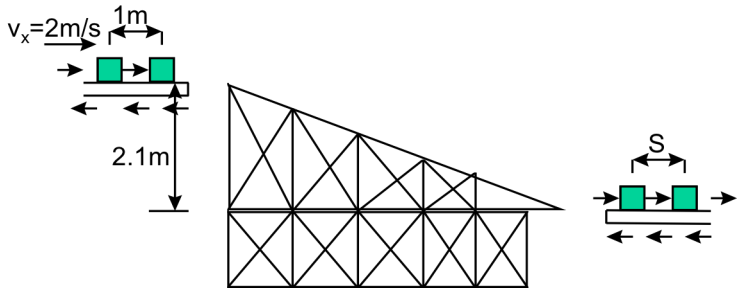

8. **A pre compressed spring compressed to 0.2m is held by a latch mechanism OA as shown in figure. When the latch is released the spring propels a 30kg machine part which is being treated at A up the inclined plane onto a conveyor belt at B. the coefficient of friction between machine parts and ne incline is 0.1. The desired speed of machine part when it reaches the top of incline in 5m/s. Determine the spring constant k in KN/m that engineer must use. Angle of inclination of plane is $30^0$ with the horizontal.**
**Ans. : 53.85KN/m**



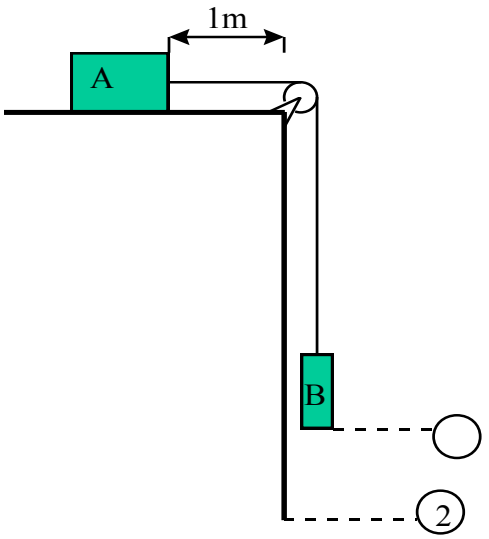

9. **The cylinder has a mass of 20kg and is released from rest when h = 0. Determine its speed when h = 3m. The springs each have an unstretched length of 2m. (7.05 m/s)**



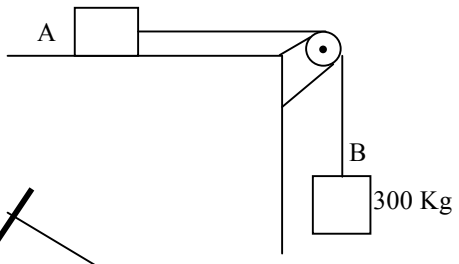
10. **Packages having mass of 5kg are transferred horizontally from one conveyor to the next using a ramp for which the coefficient of kinetic friction $\mu_k$ = 0.15. The top conveyor is moving at 2m/sand packages are spaced 1m. Determine the required speed of bottom conveyor so that no slipping occurs when packages come horizontally in contact with it. What is the spacing S between the packages on the bottom conveyor? Use work energy principle.**
**(4.939m/s, 2.47m)**



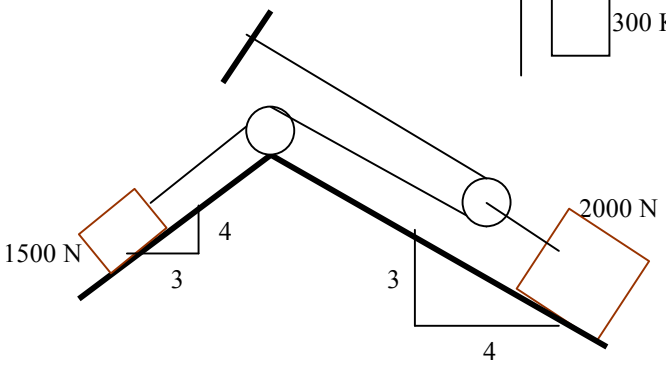

11. **Two block A and B of masses 100kg and 150kg are connected by string. If the system is released from rest, find the velocity of the block A after it has moved a distance of 1m. Assume the coefficient of friction between the block A and the horizontal plane as 0.20.**
**(3.19 m/s)**



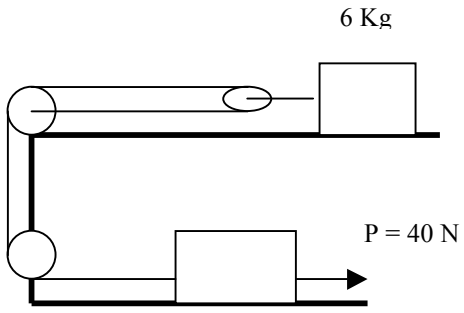

12. **Two blocks are joined by an inextensible cables as shown. If the system is released from rest, determine the velocity of block A after It has moved 2m.Assume that the coefficient of kinetic friction between block A and plane is 0.25 and that the pulley is weightless and frictionless.**
**Ans. : 4.43m/s ←**



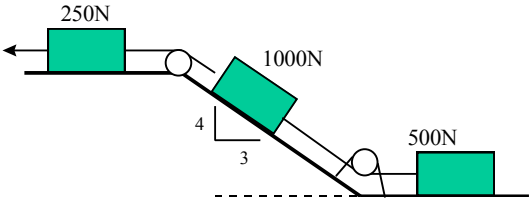

13. **In what distance will body A weighing 1500N as shown in figure attain a velocity of 3m/s, starting from rest? Pulleys are weightless and frictionless. Coefficient of friction between block and surfaceis0.2.**
**(3.529m)**



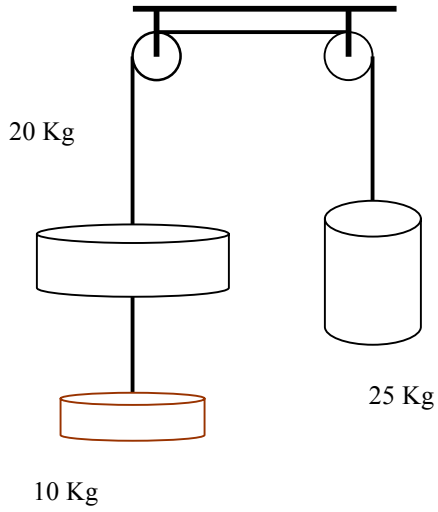
14. **The force P=40N is applied to the system, which is initially at rest. Determine the speeds of A and B after A has moved 0.4m. $V_a$=1.180 m/s, $v_b$= 2.36 m/s**

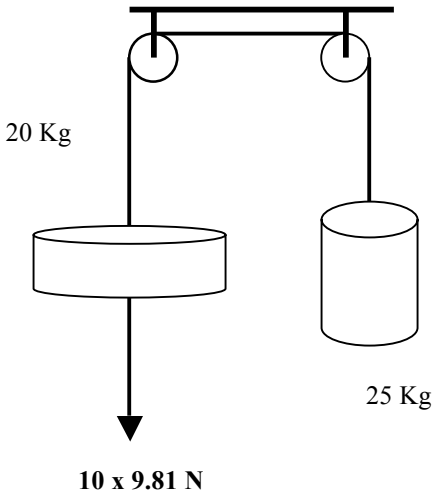



15. **Determine the constant force P that will give the system of bodies shown in figure, velocity of 3m/s after moving 4.5m from rest. Coefficient of friction between the blocks and the plane is 0.3. Pulleys are smooth.**
**(1383.39N)**




16. **Each of the two systems is released from rest. Calculate the velocity v of each 25kg cylinder after the 20kg cylinder has dropped 2m.The 10kg cylinder of case (a) is replaced with a 10(9.81) N force in case (b)**
**(a) V=1.889 m/s, (b) 2.09 m/s**




17. **Two bodies weighing 300N and 450N are hung to the ends of a rope passing over an ideal pulley as shown in figure. How much distance the blocks will move in increasing the velocity of system from 2m/s to 4m/s? Use work energy method.**
**(3.058m, 360N)**