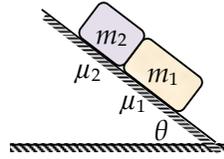
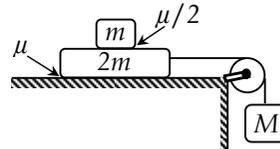


- Q2. Two blocks of masses m_1 and m_2 are placed on a rough inclined plane of coefficient of friction as μ_1 & μ_2 respectively for the blocks. Find the maximum angle, say θ_0 , at which they can still remain stationary on the inclined plane after being released from a state of rest. Now consider the inclination to be some $\theta (> \theta_0)$ such that they slide down after being released. Then find their accelerations & the normal force between the blocks.

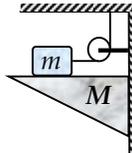


- Q3. In the arrangement shown in the figure the pulley and the string are ideal. The friction between the horizontal surface and $2m$ is μ and between m and $2m$ is $\mu/2$. The hanging block has a mass M . ($\mu > 1/2$).

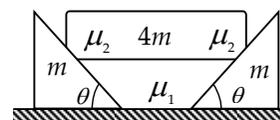


- (a) Find the maximum value of M for the system to remain at rest.
 (b) Find the maximum value of M for no slipping between m and $2m$.
 (c) If M is half of the above answer then what is the acceleration of m ?
 (d) What is the tension in the string for M having value for Q (b)?

- Q4. The system shown in the figure is assembled with the string just taut with its portions properly horizontal & vertical. Friction coefficient between all the surfaces is μ . What is the minimum required value of μ such that arrangement remains at rest when released carefully?

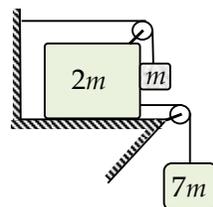


- Q5. As shown in the figure the triangular wedges have mass m each. The block kept on them has mass $4m$. The friction coefficient between the bodies is μ_2 and between the ground and the wedge is μ_1 . For the system to remain at rest find:-



- (a) Minimum required μ_1 if $\mu_2 = 0$.
 (b) Minimum required μ_2 if $\mu_1 = 0$.

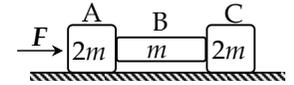
- Q6. For the system shown in the diagram, find the acceleration of the mass m if the friction coefficient between all contacting surfaces is known to be μ . The strings & pulleys are ideal.



- Q7. A block kept on a horizontal surface is given a sudden push so that it starts moving horizontally. It is observed that in a time interval of t_1 the block moves a distance d . Find the possible distance it may move in the subsequent time interval t_2 . Consider as many as possible cases you can think of...!!!

----- Level 1 -----

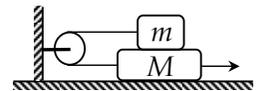
- Q1. The system shown in the figure is pushed by a force F . All surfaces are smooth except between B and C where the friction coefficient is μ . Find the minimum value of F required to stop block B from slipping downward?



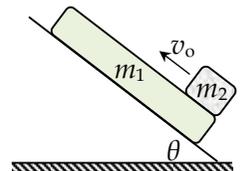
- Q2. You want to pile up sand as a cone onto a circular area of radius R . What is the greatest height of the sand pile that can be erected without the sand spilling onto the surrounding area, if μ is the coefficient of friction between sand particles?

- Q3. A long plank of mass M placed on a floor with friction coefficient as μ , is pulled by a constant horizontal force F_0 . With what acceleration a man of mass m should run on the plank so that the plank is at rest?

- Q4. What is the acceleration of the mass m for the arrangement shown? The horizontal rightwards force applied to block M is η times the minimum force required to bring about any motion of the masses. The coefficient of friction between all surfaces is μ .



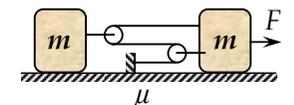
- Q5. A long plank of mass m_1 remains stationary on a smooth inclined plane when another small block with mass m_2 is kicked upwards with a velocity v_0 . Find the distance travelled by the small block before coming to rest for the first time.



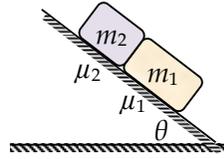
- Q6. Consider a simple Atwood's machine with masses m_1 & m_2 ($m_1 > m_2$). The ideal string connecting the mass m_1 is passed through a fixed small slit which offers a constant frictional force F on to the string. What is the acceleration of the masses when this system is set free?

----- Level 2 -----

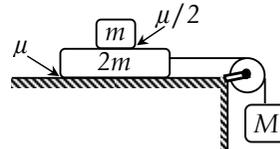
- Q1. Two identical blocks of mass m each are connected with ideal pulleys and string and placed over a rough horizontal surface of friction coefficient μ as shown in the figure. A horizontal force F is applied to the right block as shown. Find the accelerations of the masses.



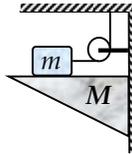
- Q2. Two blocks of masses m_1 and m_2 are placed on a rough inclined plane of coefficient of friction as μ_1 & μ_2 respectively for the blocks. Find the maximum angle, say θ_0 , at which they can still remain stationary on the inclined plane after being released from a state of rest. Now consider the inclination to be some $\theta (> \theta_0)$ such that they slide down after being released. Then find their accelerations & the normal force between the blocks.



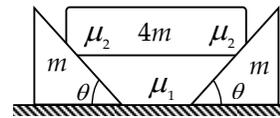
- Q3. In the arrangement shown in the figure the pulley and the string are ideal. The friction between the horizontal surface and $2m$ is μ and between m and $2m$ is $\mu/2$. The hanging block has a mass M . ($\mu > 1/2$).
- Find the maximum value of M for the system to remain at rest.
 - Find the maximum value of M for no slipping between m and $2m$.
 - If M is half of the above answer then what is the acceleration of m ?
 - What is the tension in the string for M having value for Q (b)?



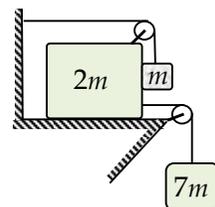
- Q4. The system shown in the figure is assembled with the string just taut with its portions properly horizontal & vertical. Friction coefficient between all the surfaces is μ . What is the minimum required value of μ such that arrangement remains at rest when released carefully?



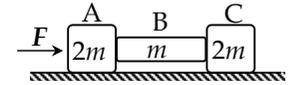
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- Minimum required μ_1 if $\mu_2 = 0$.
 - Minimum required μ_2 if $\mu_1 = 0$.



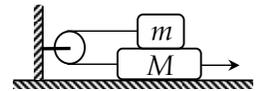
- Q6. For the system shown in the diagram, find the acceleration of the mass m if the friction coefficient between all contacting surfaces is known to be μ . The strings & pulleys are ideal.
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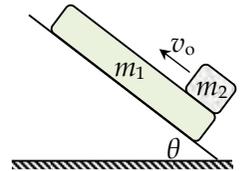
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Level 2

- Q1. Two identical blocks of mass m each are connected with ideal pulleys and string and placed over a rough horizontal surface of friction coefficient μ as shown in the figure. A horizontal force F is applied to the right block as shown. Find the accelerations of the masses.

