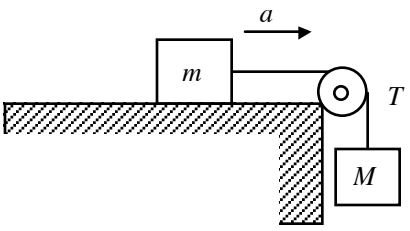
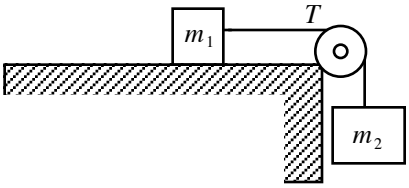
Name: _____ **Date:** _____ **Period:** _____

AP Physics C
Force HO7

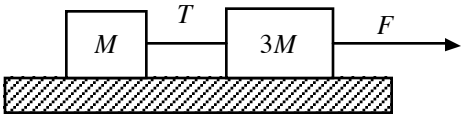
1.) In the figure below, m = 2.5 kg and M = 5.0 kg. The coefficient of kinetic friction between mass m and the table is 0.25. Find the acceleration a and the tension T in the cord connecting the two masses.



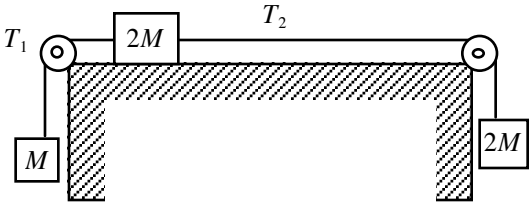
2.) In the figure below, if m_1 = 5.0 kg and T = 9.0 N, what is the mass of the suspended object m_2, assuming the pulley and all surfaces are frictionless?



3.) In the figure below, the coefficient of sliding friction between the surface and the larger block is 0.20, and the coefficient of sliding friction between the surface and the smaller block is 0.30. If F = 14 N and M = 1.0 kg, what is the magnitude of the acceleration of either block and the tension T?

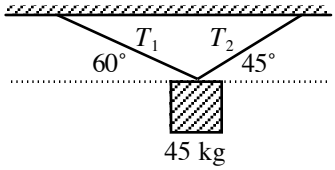


4.) The three blocks shown below are released from rest and are observed to move with accelerations that have a magnitude of 1.5 m/s^2. What is the magnitude of the friction force on the block that slides horizontally? Disregard and pulley mass or friction in the pulley and let M = 2.0 kg. What is the coefficient of friction between the block that slides horizontally and the table and the tensions in the cords connecting the blocks?



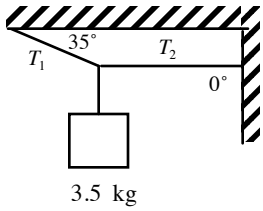
Name: _____ **Date:** _____ **Period:** _____

AP Physics C
Forces HO8

1.) 

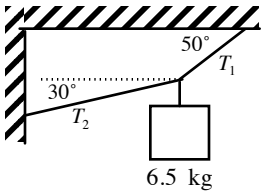
A 45 kg mass is suspended by two ropes of negligible mass as shown in the figure to the left.

What are the values for T_1 and T_2?

2.) 

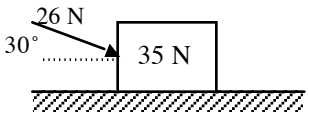
In the figure to the left, a 3.5 kg mass is suspended by two cords with negligible mass.

What is the magnitude of the tension in each cord?

3.) 

In the figure to the left, a 6.5 kg mass is suspended by two cords with negligible mass.

What is the magnitude of the tension in each cord?

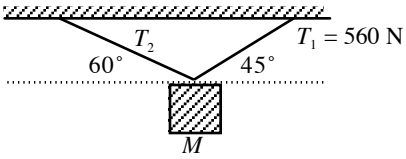
4.) 

A 35 N box is pushed straight across the floor at a constant velocity by a force of 26 N as shown in the figure to the left.

a.) Draw a force-diagram for the box.

b.) How large is the frictional force that impedes the motion of the box?

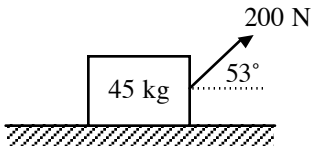
c.) What it the coefficient of kinetic friction between the box and the floor?

5.) 

A box of mass M is suspended by two cords as shown in the figure to the left. The tension in one of the cords is 560 N

a.) Find the tension in the other cord.

b.) What is the mass M?

6.) 

A 45 kg box is pulled across the floor with a force of 200 N as shown in the figure to the left. The coefficient of sliding friction between the floor and box is 0.30.

a.) Draw a force-diagram for the box.

b.) Find the acceleration of the box.

c.) Find the force needed to create twice the acceleration as that found in part (a.).

7.) A hockey puck is given an initial speed of 20.0 m/s on a frozen pond and slides 120 m before coming to rest. Determine the coefficient of kinetic (sliding) friction between the puck and the ice.

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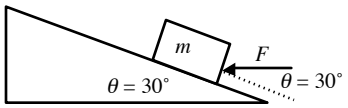
AP Physics C
Forces HO9

1.) A 15 kg block slides down a 36.9° incline. The coefficient of kinetic friction is 0.20. Assuming it starts from rest, how many seconds will it take for the lock to slide 0.5 m and what is the block's speed after sliding 1.0 m?

2.) 

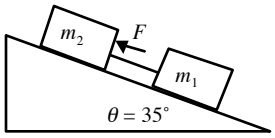
A block is pushed up a frictionless 30° incline by an applied force as shown to the left.

a.) If F = 40 N and m = 4.0 kg, what is the magnitude of the resulting acceleration of the block?

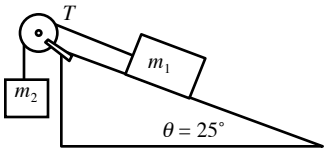
b.) What is the acceleration if the coefficient of kinetic friction between the block and the plane is 0.20?

c.) What value of F will result in the block sliding up the plane at constant velocity?

d.) What value of F will result in the block sliding down the plane at constant velocity?

3.) 

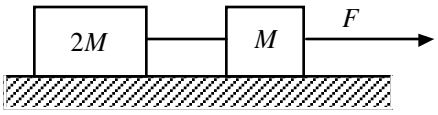
The surface of the inclined plane shown to the left is frictionless. A force F = 50 N is applied to the second block and m_2 = 4.0 kg and m_1 = 3.0 kg. What is the acceleration of both blocks and the tension in the cord connecting the two blocks?

4.) 

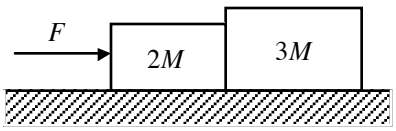
In the figure to the left, m_1 = 8.0 kg and m_2 = 10 kg. The coefficient of kinetic friction is 0.20 for all surfaces. The pulley and connecting cords are frictionless and of negligible mass. The system is initially held at rest.

a.) Find the acceleration of the blocks and the tension T in the cord connecting the blocks after the system is set in motion.

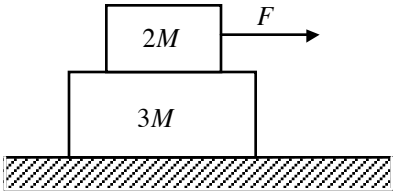
b.) If the coefficient of static friction is 0.35, what is the value m_2 that will just set the block m_1 in motion up the plane?

5.) 

In the figure to the left, the coefficient of sliding friction between the surface and the larger block is 0.20, and the coefficient of sliding friction between the surface and the smaller block is 0.30. If F = 10 N and M = 1.0 kg, what is the tension in the connecting cord?

6.) 

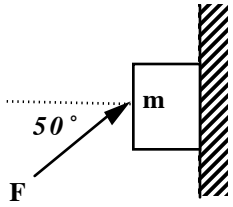
Two blocks are accelerated across a rough horizontal surface by a force applied to one of the blocks as shown in the figure to the left. The magnitude of the force of friction on the smaller block is 2.0 N and the magnitude of the force of friction on the larger block is 4.0 N. If F = 12 N and M = 1.0 kg, what is the magnitude of the force exerted on the larger block by the smaller block?

7.) 

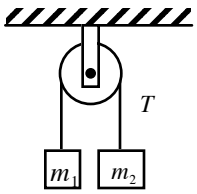
Two blocks are accelerated across a horizontal frictionless surface as shown below. Frictional forces keep the blocks from sliding relative to each other, and the two move with the same acceleration. If F = 1.2 N and M = 1.0 kg, what is the horizontal component (frictional force) of the force of the small block on the large block?

8.) A railroad flatcar is loaded with crates having a coefficient of static friction of 0.25 with the floor. If the train is moving at 14 m/s, in how short a distance can the train be stopped at constant deceleration without causing the crates to slide?

9.) An object is placed on an inclined plane. The angle of incline is gradually increased until the object begins to slide. The angle at which this occurs is 30°. What is the coefficient of static friction between the object and the plane?

10.) 

A block if mass 3.00 kg is pushed against a wall by a force F that makes an angle of 50.0° with the horizontal as shown in the figure to the left. The coefficient of static friction between the block and the wall is 0.250. Determine the possible values for the magnitude of F that allow the block to remain stationary.

11.) 

Two masses are suspended from a frictionless pulley as shown in the figure to the left. Both masses are allowed to fall freely with $m_1 = 0.40$ kg and $m_2 = 0.60$ kg.

a.) Find the acceleration of each mass.

b.) Find the tension T in the cord connecting the two masses while the masses are in motion.

12.) On a recent trip to the Moon, Rat is riding on an elevator while standing on a scale. She observes that her weight is 8.10 N when the elevator is sitting on the first floor of her condo. Her weight on Earth is 49 N. If the elevator accelerates upward at a rate of 0.50 m/s^2, what will be the reading on the scale during the acceleration? (The elevator is on the Moon.)

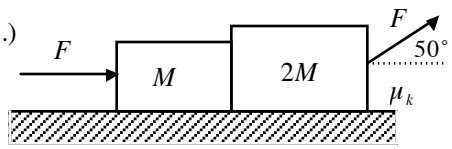
13.) A box rests on the (horizontal) back of a truck. The coefficient of static friction between the box and the surface on which it rests is 0.24. What maximum distance can the truck travel (starting from rest and moving horizontally with constant acceleration) in 3.0 s without having the box slide?

14.) An 8.0 kg object rests on the floor of an elevator which is accelerating downward at a rate of 1.3 m/s^2. What is the magnitude of the force the object exerts on the floor of the elevator?

15.) A 6.0 kg object is suspended by a vertical string from the ceiling of an elevator which is accelerating upward at a rate of 1.8 m/s^2. Determine the tension in the string.

16.) A 5.0 kg mass sits on the floor of an elevator that has a downward acceleration of 1.0 m/s^2. On top of the 5.0 kg mass is an object of unknown mass. The force of the elevator on the 5.0 kg mass is 80 N up. Determine the unknown mass.

17.) A block is released from rest on a 27° incline and moves 6.0 m during the next 2.0 s. What is the coefficient of kinetic friction between the block and the surface of the incline?

18.) 

In the figure to the left, $F = 10$ N, $\mu_k = 0.40$, and $M = 1.0$ kg. Vertical contact surfaces between the two blocks are frictionless.

a.) What is the magnitude of the acceleration of the blocks?

b.) What is the force that the larger block exerts on the smaller block?

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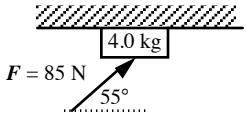
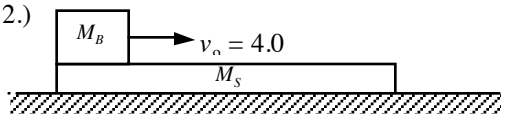
AP Physics C
Force HO10

1.) A 4.0 kg block is pushed along the ceiling with a constant force of 85 N that acts at an angle of 55° with the horizontal as shown to the right. The block accelerates to the right at 6.0 m/s^2. Determine the coefficient of kinetic friction between the block and the ceiling.



2.)



A small block of mass $M_B = 0.50$ kg is placed on a long slab of mass $M_S = 3.0$ kg as shown to the left. Initially, the slab is at rest and the block has a speed of 4.0 m/s to the right. The coefficient of kinetic friction between the block and the slab is 0.20, and there is no friction between the slab and the horizontal surface on which it moves.

a.) On the dots below that represent the block and the slab, draw and label vectors to represent the forces acting on each as the block slides on the slab.

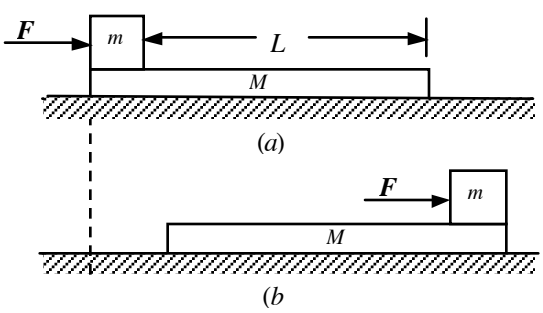
Block Slab

At some moment later, before the block reaches the right end of the slab, both the block and the slab attain identical speeds v_f.

b.) Calculate v_f.

c.) Calculate the distance the slab has traveled at the moment it reaches v_f.

3.)

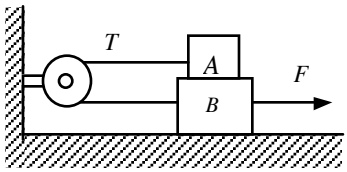


A block of mass $m = 2.00$ kg rests on the left edge of a block of length $L = 3.00$ m and mass $M = 8.00$ kg. The coefficient kinetic friction between the two blocks is $\mu_k = 0.30$, and the surface on which the 8.00 kg block rests is frictionless. A constant horizontal force of magnitude $F = 10.0$ N is applied to the 2.00 kg block, setting it in motion as shown in Figure 3*a*.

a.) How long will it take before this block makes it to the right side of the 8.00 kg block as shown in Figure 3*b*? (*Note*: Both blocks are set in motion when ***F*** is applied.)

b.) How far does the 8.00 kg block move in the process?

4.) Block *A* weighs 2.70 N and block *B* weighs 5.40 N. The coefficients of kinetic friction between all surfaces is 0.25. Find the magnitude of the horizontal force *F* necessary to drag block *B* to the right at constant speed if *A* and *B* are connected by a light, flexible cord passing around a fixed, frictionless pulley.



5.) In the figure to the right, the coefficient of kinetic friction between the two blocks is 0.30. The table surface and the pulleys are frictionless.

a.) Draw a free-body diagram for each block.

b.) Find the tensions in the strings.