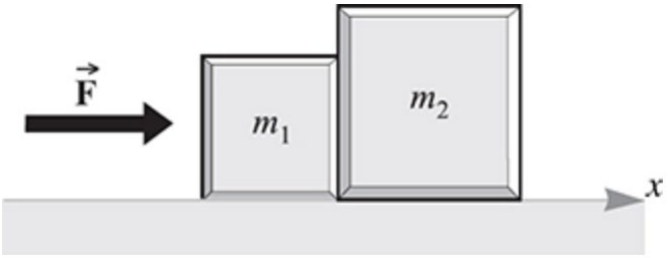
SPH4U1 Chapter 2 Extension Problems

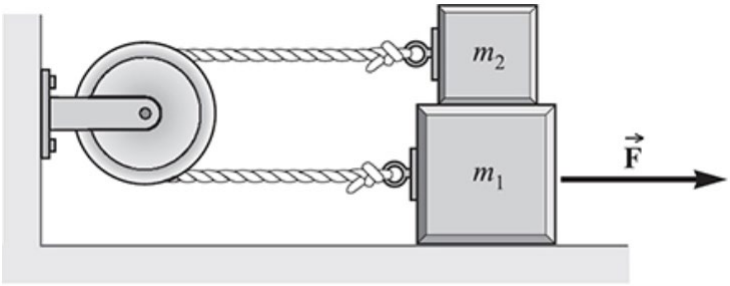
1. (Sch-CP p46#3.29) Two blocks of masses m1 and m2, moving in the x-direction are pushed by a force F as shown in the figure below. The coefficient of friction between each block and the table is 0.40.

a) What must be the value of F if the blocks are to have an acceleration of 200 cm/s2?

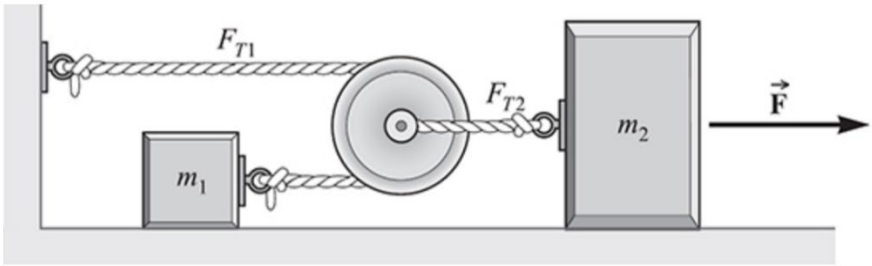
b) How large a force does m1 then exert on m2? Use m1 = 300 g and m2 = 500 g.



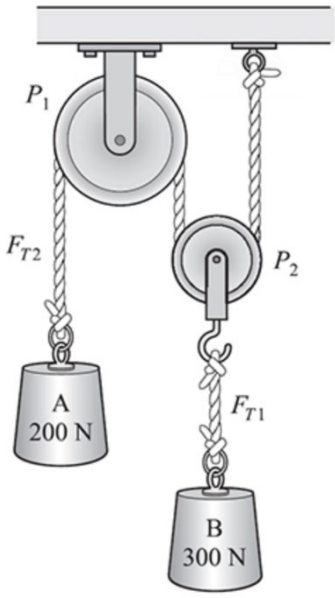
2. (Sch-CP p49#3.35) In the system shown in the figure below, force F accelerates block-1 of mass m1 to the right. Write an expression for its acceleration in terms of F and the coefficient of friction μk at the contact surfaces.



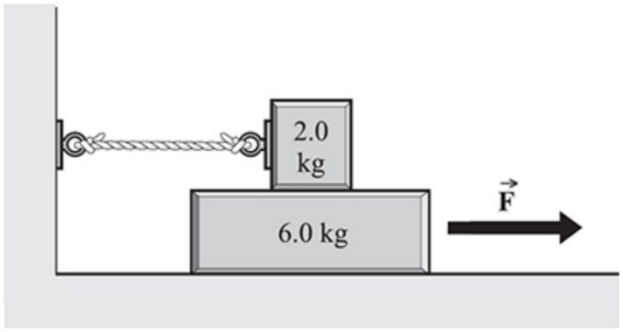
3. (Sch-CP p49#3.36)In the system shown in the figure below, friction and the mass of the pulley are both negligible. Find the acceleration of m2 if m1 = 300 g, m2 = 500 g, and F = 1.50 N.



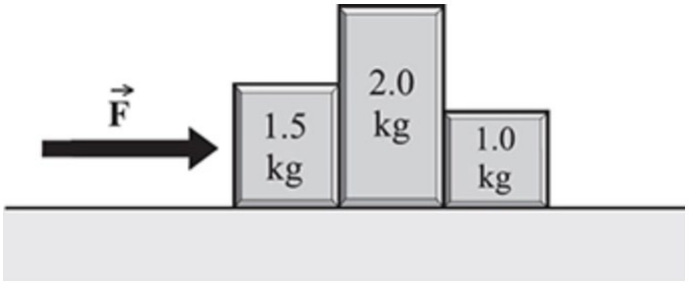
4. (Sch-CP p50#3.37) In the figure on the right, the weights of the objects are 200 N and 300 N. The pulleys are essentially frictionless and massless. Pulley P1 has a stationary axle, but pulley P2 is free to move up and down. Find the tensions FT1 and FT2 and the acceleration of each body.



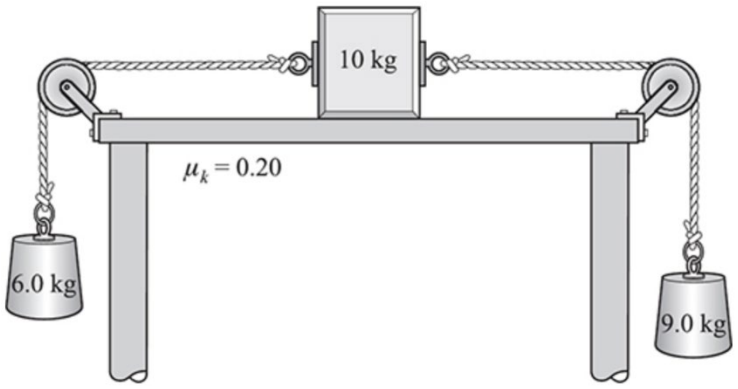
5. (Sch-CP p55#3.78) How large a force F is needed in the figure below to pull out the 6.0-kg block with an acceleration of 1.50 m/s2 if the coefficient of friction at its surfaces is 0.40?



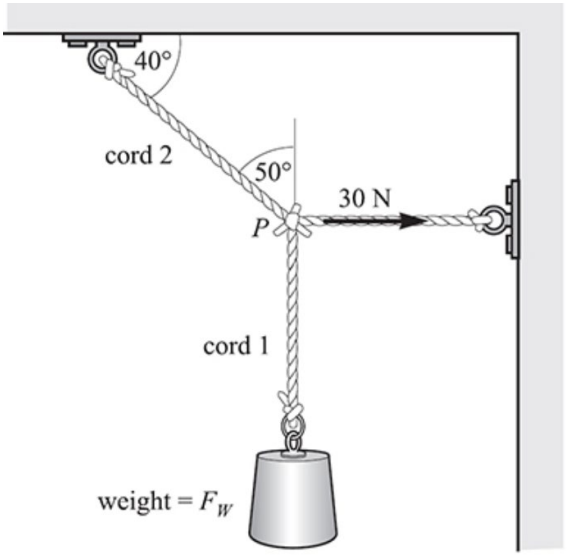
6. (Sch-CP p55#3.79) In the figure below, how large a force F is needed to give the blocks an acceleration of 3.0 m/s2 if the coefficient of kinetic friction between blocks and table is 0.20? How large a force does the 1.50-kg block then exert on the 2.0-kg block?



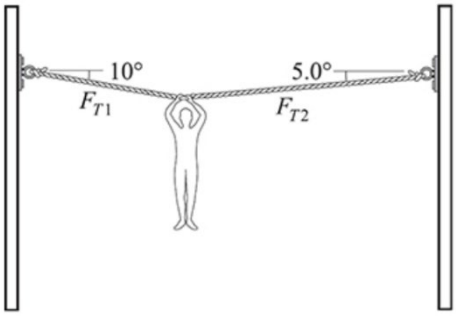
7. (Sch-CP p55#3.82) Three blocks with masses 6.0 kg, 9.0 kg, and 10 kg are connected as shown in the figure on the right. The coefficient of friction between the table and the 10-kg block is 0.20. Find (a) the acceleration of the system and (b) the tension in the cord on the left and in the cord on the right.



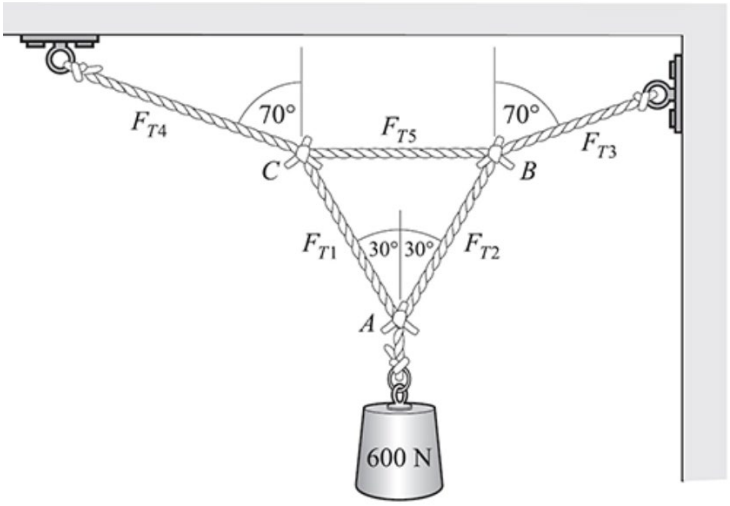
8. (Sch-CP p60#4.1) In the figure below, the tension in the horizontal cord is 30 N as shown. Find the weight of the hanging body.



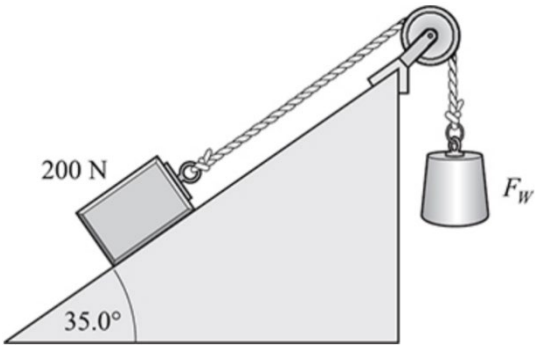
9. (Sch-CP p60#4.2) A rope extends between two poles. A 90-N boy hangs from it as shown in the figure the right. Find the tensions in the two parts of the rope.



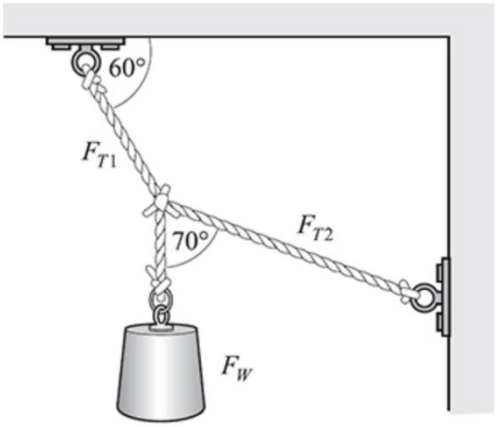
10. (Sch-CP p62#4.4) Find the tensions in the ropes illustrated in the figure below if the supported body weighs 600 N.



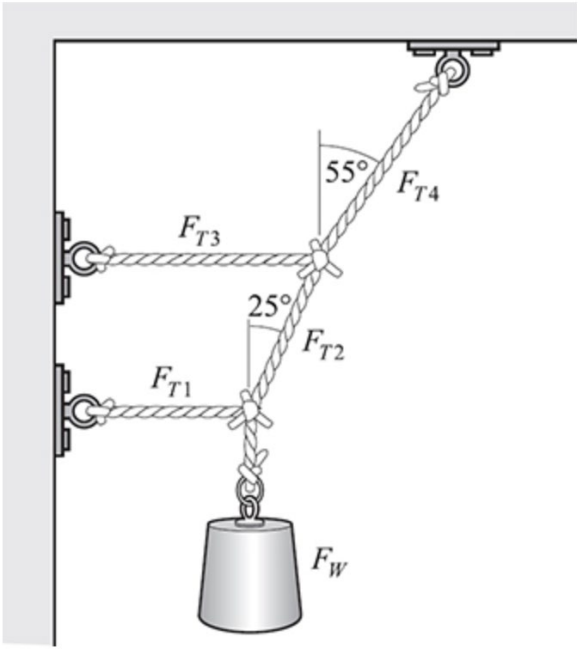
11. (Sch-CP p68#4.22) If in the figure on the right the friction between the block and the incline is negligible, how much must the object on the right weigh if the 200-N block is to remain at rest?



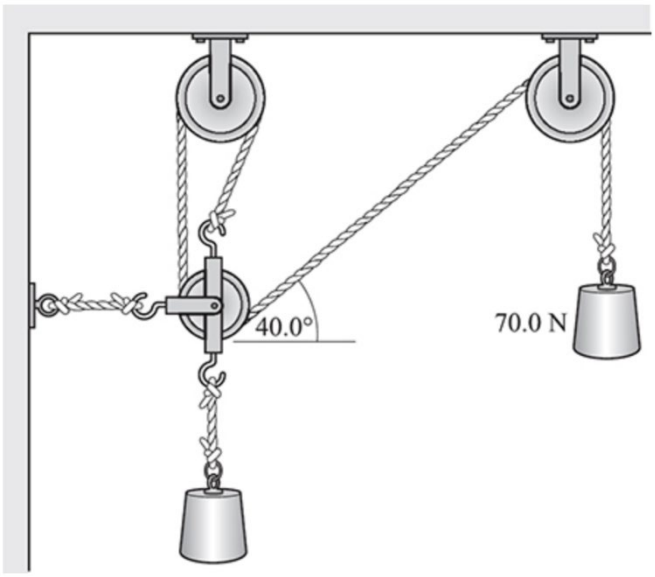
12. (Sch-CP p68#4.29) Refer to the equilibrium situation shown in the figure on the right. The cords are strong enough to withstand a maximum tension of 80 N. What is the largest value of F_W that they can support as shown?



13. (Sch-CP p68#4.30) The hanging object in the figure below is in equilibrium and has a weight F_W = 80 N. Find FT1, FT2, FT3, and FT4.



14. (Sch-CP p68#4.31) The pulleys shown in the figure below have negligible weight and friction. The long rope has one section that is at 40°; assume its other segments are vertical. What is the value of FW if the system is at equilibrium?



15. (Sch-CP p68#4.33) The block in the figure below is just on the verge of slipping. If FW = 8.0 N, what is the coefficient of static friction between the block and tabletop?