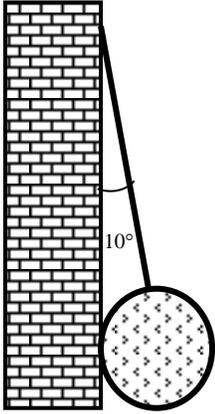


Review Problems for Unit 3

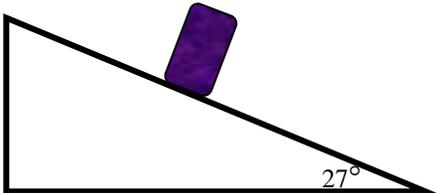
For each problem draw a force diagram that would be accepted on the AP exam, show all work, and write out the sum of force/equation that is needed.

1. A 1240 kg wrecking ball is pulled up and over by a wire. (a) What is the tension in the wire and (b) how hard is the wall pushing on the ball?



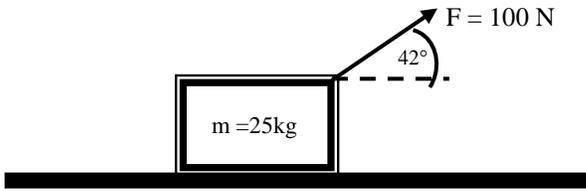
(a) $T = 12,591.29 \text{ N}$ (b) $F_{\text{wall}} = 2,186.45 \text{ N}$

2. A 9.34 kg object slides down the hill. (a) What is the normal force on the object? (b) What is the frictional force on the object if it moves at a constant velocity? (c) If the surface has a coefficient of friction equal to 0.3, what is the new frictional force and what is the acceleration of the object?



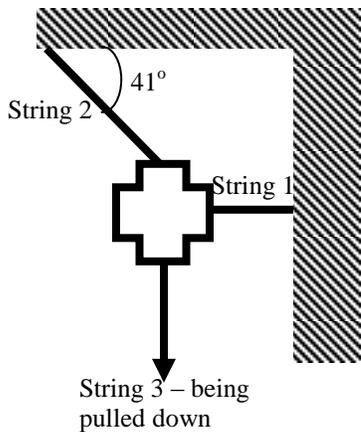
(a) $F_N = 83.22 \text{ N}$ (b) $F_f = -42.40 \text{ N}$ (c) $F_f = -24.97 \text{ N}$ $a = 1.87 \text{ m/s}^2$

3. (a) What is the normal force and (b) what is the force of friction for the situation below if the box isn't moving? (c) What would be the coefficient of friction if the box accelerates at 2 m/s^2 to the right?



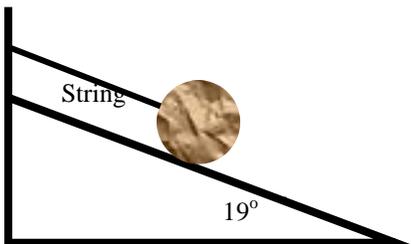
(a) $F_N = 183.07 \text{ N}$ (b) $F_f = -74.31 \text{ N}$ (c) $\mu = .0038$

4. A mass of 15 kg hangs as shown below with 3 strings attached. The tension in string 1 is 283 N, find the tension in the other two strings.



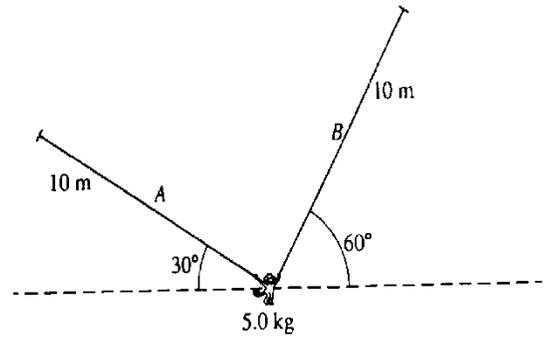
$T_2 = 374.98 \text{ N}$ $T_3 = -96.01 \text{ N}$

5. A 50 kg ball rests motionless on the incline because of the tension in the rope. Assuming there is no friction, (a) what is the tension in the rope and (b) the normal force acting on the ball?

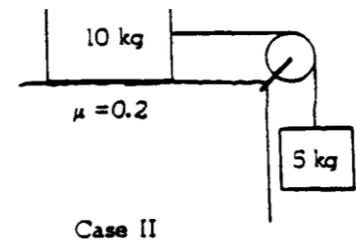
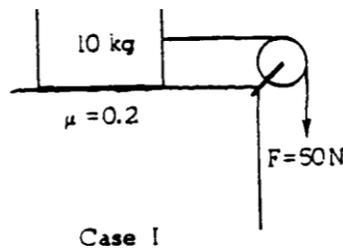


(a) $T = -162.78 \text{ N}$ (b) $F_N = 472.76 \text{ N}$

6. A 5.0-kilogram monkey hangs initially at rest from two vines, *A* and *B*, as shown above. Each of the vines has length 10 meters and negligible mass. Determine the tension in vine *B* while the monkey is at rest.



$$T_A = 25\text{ N} \quad T_B = 43.3\text{ N}$$



7. A 10-kilogram block rests initially on a table as shown in cases I and II above. The coefficient of sliding friction between the block and the table is 0.2. The block is connected to a cord of negligible mass, which hangs over a massless frictionless pulley. In case I a force of 50 N is applied to the cord. In case II an object of mass 5 kilograms is hung on the bottom of the cord. (a) Calculate the acceleration of the 10-kilogram block in case I. (b) Calculate the acceleration of the 10-kilogram block in case II. (c) Find the tension in the cable for Case II.

(a) 3 m/s^2 (b) 2 m/s^2 (c) 40 N

8. A 55 kg woman is in an elevator at rest. (a) What is the normal force acting on the woman if the elevator starts to accelerate down at 4 m/s^2 ? (b) What is the normal force acting on the woman when the elevator starts to slow down at 2 m/s^2 ?

(a) 330 N (b) 660 N

9. A rotten pumpkin that has a mass of 9 kg is dropped and is moving at a speed of 17 m/s right before it hits the ground. (a) What is the acceleration of the pumpkin during impact if it stops in 0.22 s ? (b) What force does the ground exert on the pumpkin during impact with the ground? (c) What force does the pumpkin apply to the ground during impact?

(a) 77.27 m/s^2 (b) 785.43 N (c) -785.43 N