

Physics 12

Assignment #8

Statics and Inclined Planes

Friday, May 18th, 2018

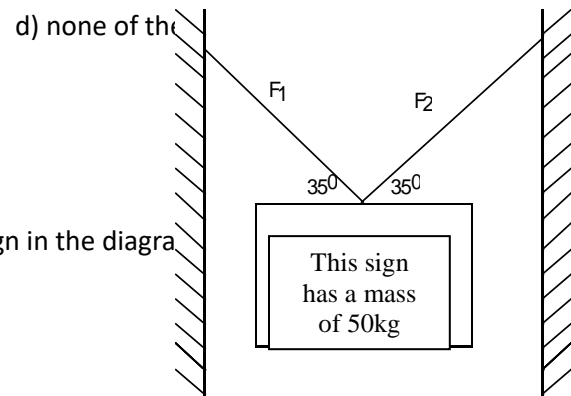
(Include all diagrams)

1. A large 200kg crate is placed on a ramp that has an angle of 10° . The force of friction is 500N. How much force is required to push the crate up the ramp?
a) 160N b) 500N c) 840N d) 2460N

2. How much force is required to push the crate in question 1 down the ramp?
a) 160N b) 500N c) 840N d) 1460N

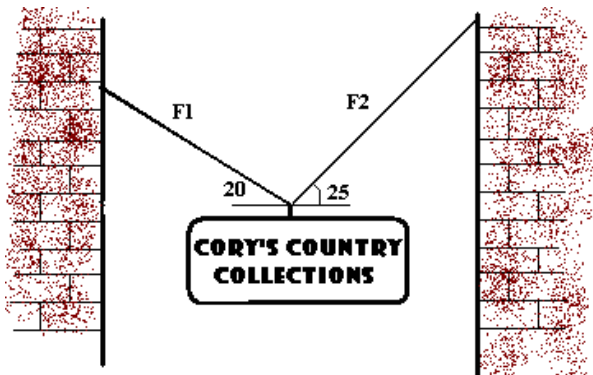
3. A 100 kg box sits on a ramp. What is the maximum angle that I can set up an inclined plane at in order for the box not to slide down the ramp if $\mu = 0.21$?
a) 12.12° b) 77.88° c) 11.86° d) none of the above

4. The force in each cable in the diagram to the right is:
a) 245N b) 281N c) 490N d) 427N



Problems

5. Determine the force in each cable that is required to support the sign in the diagram below.



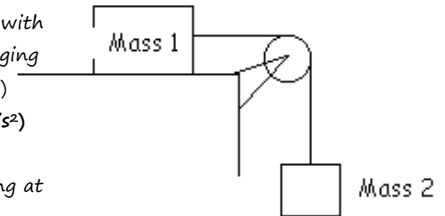
6. A 7.25kg block sits on an inclined plane that makes an angle of 40° with the horizontal. The coefficient of friction is 0.12. The block is attached by a string, over a pulley at the top, to a hanging mass of 6kg. A) What is the acceleration of the objects? B) What is the tension in the string when the objects are moving?

7. An Atwood Machine is set up such that the mass on the left is 2kg. The other mass is unknown. If the 2kg mass has an upward acceleration of 0.5m/s^2 determine a) The mass of the unknown masked mass. b) the tension in the cable.

Practice Questions

8. Hank is pushing a shopping cart that has a mass of 30kg at a constant velocity. a) If the force of friction is 80N, determine the force on the handle if the force is applied at an angle of 55° with the horizontal. b) Determine the required force to move the cart at a constant velocity if the mass of the shopping cart is increased to 60kg. (139.48N, 118.16N)

9. A modified Atwood machine is set up such that one mass is sitting on a table top with a coefficient of friction of 0.25. It has a mass of 100 kg and is attached to a hanging mass. a) Determine the acceleration of the masses if the hanging mass is 20kg. b) Determine the acceleration of the masses if the hanging mass is 50kg. (0, 1.63m/s^2)



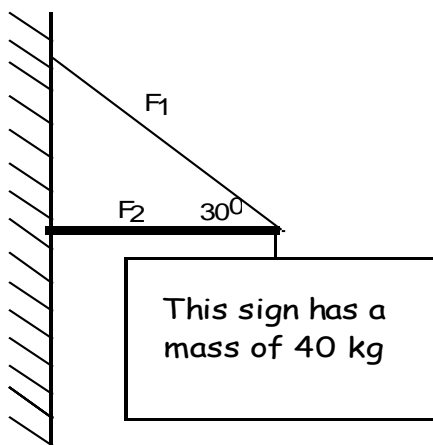
10. A 2.0kg cart is given a shove up a long, smooth 30° incline. If the cart is travelling at 8.0m/s after the shove, how much time elapses until the cart returns to its initial position. (Smooth usually indicates neglect friction) (3.2s)

11. A 3 m long inclined plane is used to load bricks into the back of a truck which is 0.9 m high. a) If each pack of bricks has a mass of 45kg, and the coefficient of friction between the surfaces is 0.35, how much force is needed in order to slide the bricks up the ramp at a constant velocity? b). The same ramp is now used to unload the bricks, will they slide down by themselves? If not, how much force is going to be required in order to make them slide? If they will, what is the acceleration? (279.45N, 14.85N)

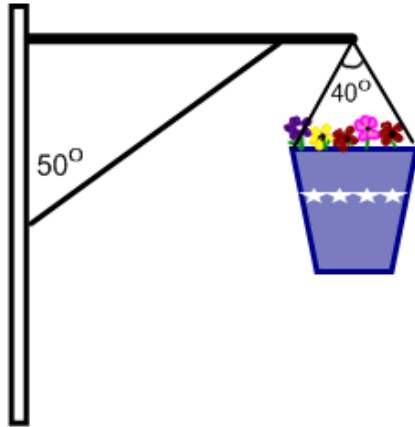
12. A load of lumber is being unloaded from a goose neck trailer. The trailer is designed such that the front of it will lift to allow the load to slide off the deck of the trailer. The hydraulic system is designed such that the rotational velocity is 2.0 rads/min. a) If the μ_s is 0.80 and μ_k is 0.45 and the weight of the load is 400 lbs determine how long it takes (to the closet whole second) to get the front of the trailer to the height required to make the load slide off. b) If the trailer is 25 ft long and 3ft off the ground how high is the front of the trailer when the load slides off?



13. a) Determine the force in the cable if the mass of the support pole is 10 kg. Use figure below. (882N)



14. Determine the forces in the two cables that support the flower pot in the figure below. The cables are attached to a solid beam that is 4ft long and weighs 5lbs. The beam is supported by another beam that is applying a force of 30lbs and is attached at a point 3ft from the wall.



15. Determine the force that the firefighter must apply to support the women shown in figure 9.2, if she weighs 130lbs. (33lbs)

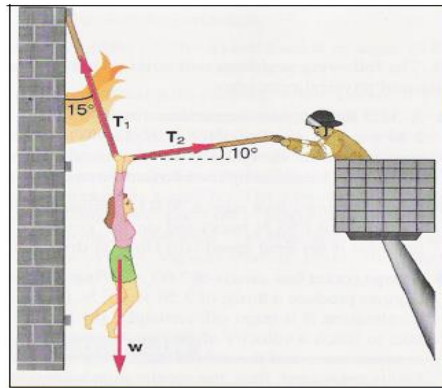


Figure 9.2