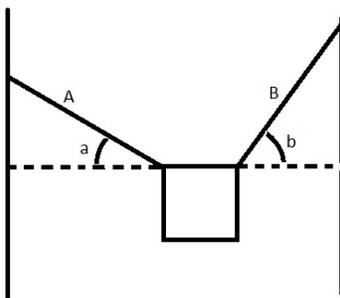


PHYS 211 Homework Assignment

Chapter 5

Problem 1 A 0.150 kg particle moves along the x axis according to $x(t) = -13.00 + 2.00t + 4.00t^2 - 3.00t^3$, with x in meters and t in seconds. What is the net force acting on the particle at $t = 3.40$ s?

Problem 2 You notice a box hanging from two ropes (rope A and rope B). You are told that rope A is applying a force of 15 N to the box at an angle of 20° above x -axis ($a = 20^\circ$). Rope B is applying a force of 20 N to the box at an angle of 45° above the x -axis ($b = 45^\circ$). What is the mass of the box?



Problem 3 An elevator, hanging from a single cable, moves from floor to floor of a tall building. Friction and air resistance can be neglected. In the following cases, is the tension in the cable greater than, less than, or equal to the gravitational force on the elevator?

- (a) It moves upward at a constant speed.
- (b) It moves down but slowing to a stop.
- (c) It moves up but is slowing down.
- (d) It moves down but is speeding up.

Problem 4 A 600 kg piano is being lowered into position at a constant speed by a crane while two people steady it with ropes pulling to the sides. Bob's rope pulls to the left, 15° below horizontal, with 400 N of tension. Ellen's rope pulls towards the right, 25° below horizontal.

- (a) What tension must Ellen maintain in her rope to keep the piano steady?
- (b) What is the tension in the main cable holding the piano?

Problem 5 A 3 kg rocket is fired into the air at an angle of 75° above the horizontal. The rocket's thrust applies a force of 50 N.

- (a) What is the net force on the rocket?
- (b) What is the acceleration in the x -direction? y -direction?
- (c) If the fuel burns up after 15 seconds, how high will the rocket be at this time?