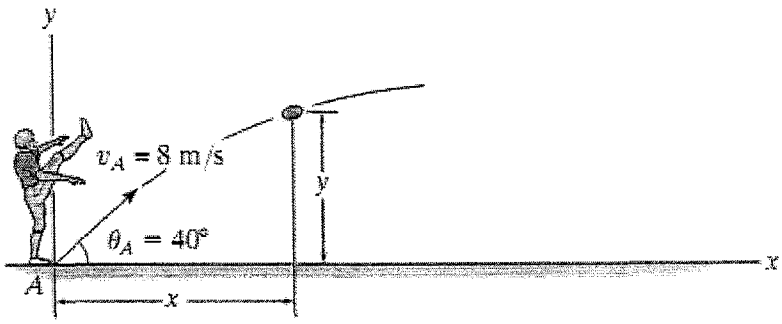
Mansoura University
Faculty of Engineering
BME-CIE Programs
Mech 2 (MATH004)

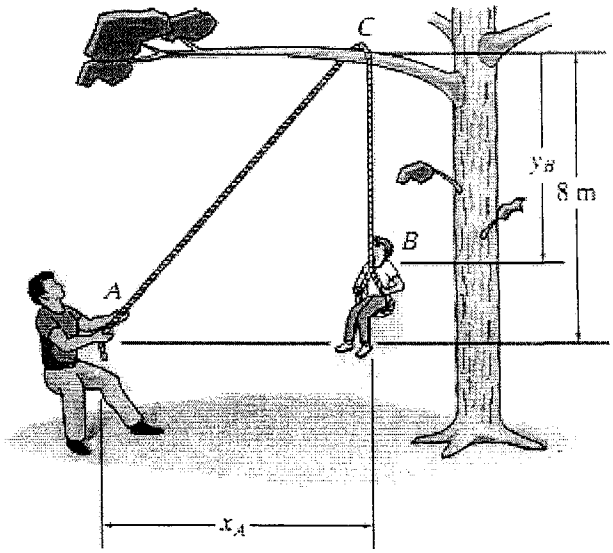
Final Exam
Time: 2 Hrs
Date: May 2018
Total Marks: 50 marks

Solve the following questions:

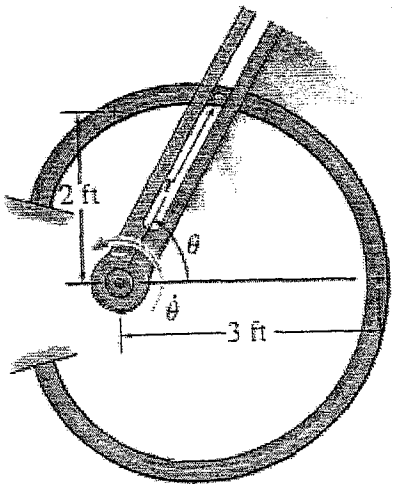
(1) The ball is kicked with an initial speed of 8 m/sec at an angle $\theta = 45$ with the horizontal. Find the equation of the path $= f(x)$, and then determine the normal and tangential components of its acceleration when t=0.25 sec. [11 marks]



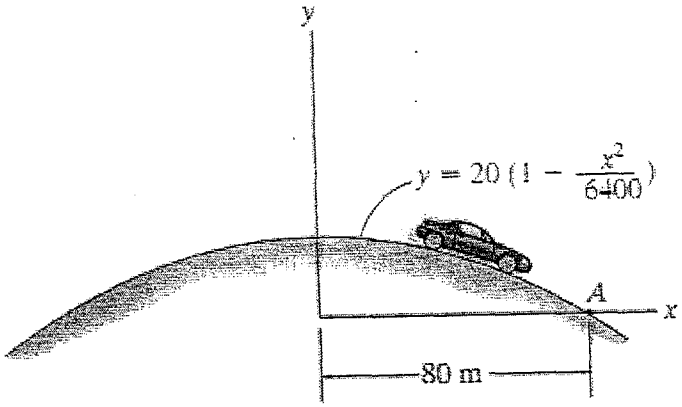
(2) The man pulls the boy up to the tree limb C by walking backward. If he starts from rest when $x_A = 0$ and moves backward with a constant acceleration $a_A = 0.2$ m/sec^2, determine the speed of the boy at the instant $y_B = 4\ m$. Neglect the size of the limb. The rope is 16 m long. [11 marks]



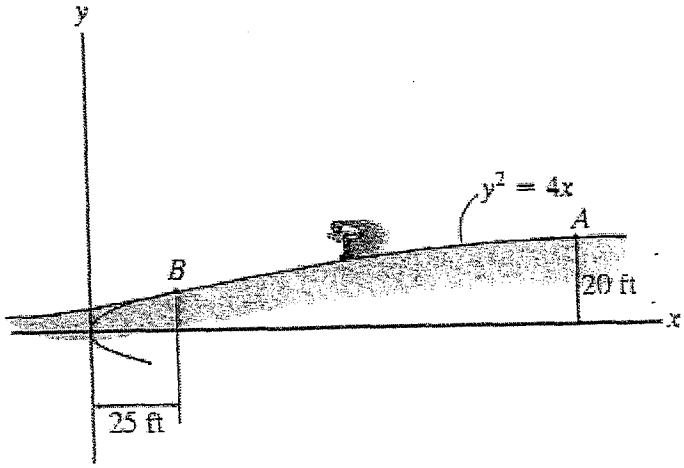
(3) The forked rod is used to move the smooth 2-lb particle around the horizontal path in the shape of a limaçon, $r = 2 + cos\,\theta$ m. If $\theta = 0.5t^2\ rad$, where t is in seconds, determine the force which the rod exerts on the particle at the instant $t = 1\ sec$. The fork and path contact the particle on only one side. [11 marks]



(4) The 0.8-Mg car travels over the hill having the shape of a parabola. When the car is at point A, it is traveling at 9 m s and increasing its speed at 3 m/sec^2. Determine both the resultant normal force and the resultant frictional force that all the wheels of the car exert on the road at this instant. Neglect the size of the car. [11 marks]



(5) The 150-lb skater passes point A with a speed of 6 ft/sec. Determine his speed when he reaches point B and the normal force exerted on him by the track at this point. Neglect friction. (ملحوظة) Hint: First, use principle of work and energy between A&B. Then, apply Newton's second law at B. [11 marks]



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