MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Physics

Physics 8.01X Fall Term 2001

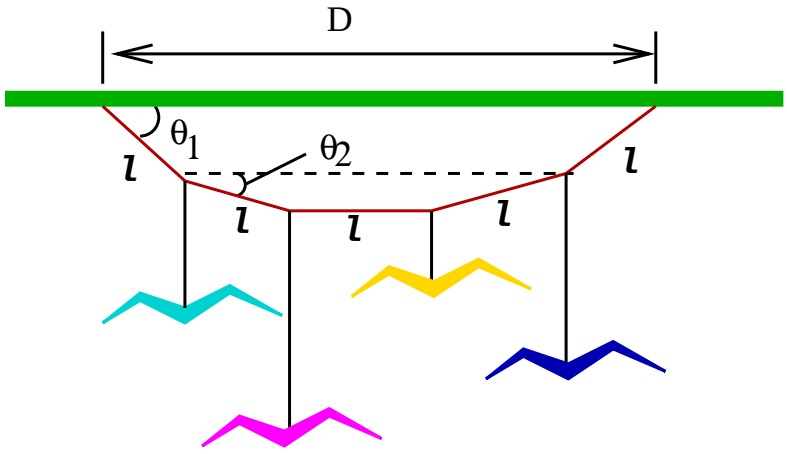
PROBLEM SET 4

Handed out: September 28
Due: October 5 at 5 pm in 4-339B.

Please write your name, subject, recitation number, and the name of the recitation instructor on the top right corner of the first page of your homework solutions. The solutions should be placed in the appropriate box in room 4-339B.

Problem 1:

A mobile is formed by hanging four bird sculptures of equal mass m from a string of total length L. The points of support are evenly spaced a distance l apart. The string forms an angle θ_1 with the ceiling at each end point. The center section of the string is horizontal.



a. Find the angle θ_2 in terms of θ_1, that the sections of string between the outside and inside sculptures form with the horizontal.

b. Find the tension in each section of the string as a function of θ_1, m and g.

c. Find the distance D between the endpoints of the string in terms of L, θ_1 and θ_2.

Problem 2:

The earth is orbiting the sun with a period of approximately 365.25 days. The distance from the earth to the sun is 1.5×10^{11} m.

a. What is your velocity as you undergo circular motion around the sun?

b. What is your centripetal acceleration?