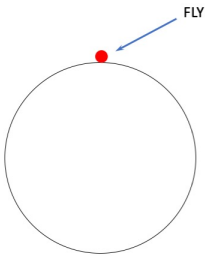
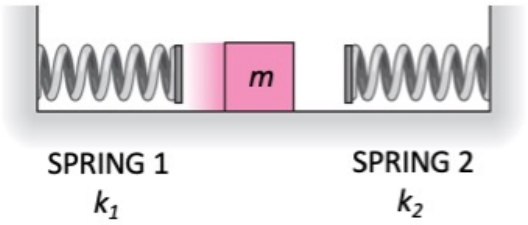
Chapter 7 Written Homework Problems
DUE: March 3rd at the beginning of class
SHOW ALL WORK FOR FULL CREDIT

1. In class last Tuesday I attached a mass to the end of a spring that was hanging vertically in its equilibrium position. I then slowly lowered the combination to its new equilibrium position, where the end of the spring was 1 m from its original position. If instead I placed the mass on the end of the spring and let it drop, how far would the spring have stretched – assuming the arrangement was high enough to not hit the floor?

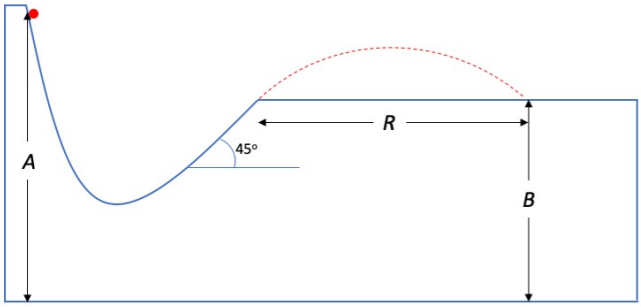
2. A fly lands on top of a ball having a radius *R*, see Figure. The surface of the ball is so slippery that it can be assumed to be frictionless. *(a)* In terms of *R*, how far in vertical distance does the fly slide before coming off of the ball? *(b)* If the ball is not frictionless, would the fly side further, or not as far, down the side of the ball before falling off? Qualitatively justify your answer.



3. Two springs are arranged as shown in the figure. A mass *m* bounces back-and-forth between them riding on a frictionless surface. Spring 1 has a maximum compression of *d* meters. *(a)* What is the maximum compression of spring 2 in terms of k_1, k_2, and *d* where k_1 and k_2 are the spring constants for spring 1 and 2 respectively? *(b)* What is the velocity of the mass when it is not in contact with the springs if k_1 = 100 N/m, m = 1 g, and d = 10 cm?



4. A point mass slides down the frictionless surface shown in the Figure. What is *R* in terms of *A* and *B*? Ignore air resistance.



5. Similar to your possible quiz problem for this chapter two plates, are joined by a spring with spring constant *k*. The plates each have a mass of *m*. At rest the distance between the masses (= length of the spring) is *h* and the lower plate rests on the ground. Find the conditions on *k* in terms of *m*, *h*, and *g* (the acceleration due to gravity) such that it is just possible to compress the spring by *h* and have the lower plate raised off ground by then upward motion of the upper plate after it is released.