Mekaniikka, harjoitus 7 palautettava ma 27.10. klo 12 mennessä

Huom. 1: Palautus vasta välikokeen jälkeisellä viikolla!

Huom. 2: Välikoe järjestetään ke 22.10. klo 9 - 13 Exactumin salissa A111. Tarkempaa infoa ilmestyy kurssin kotisivulle.

MP 1. It's your birthday, and to celebrate you're going to make your first bungee jump. You stand on a bridge 120 m above a raging river and attach a 31-m-long bungee cord to your harness. A bungee cord, for practical purposes, is just a long spring, and this cord has a spring constant of 42 N/m. Assume that your mass is 80 kg. After a long hesitation, you dive off the bridge.

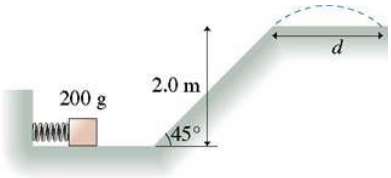
How far are you above the water when the cord reaches its maximum elongation?

MP 2. A box of mass m is sliding along a horizontal surface.

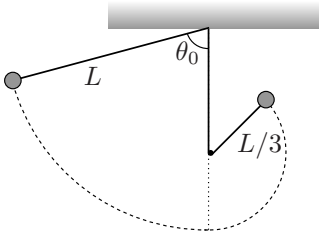
(a) The box leaves position $x = 0$ with speed v_0. The box is slowed by a constant frictional force until it comes to rest at position $x = x_1$. Find F_f, the magnitude of the average frictional force that acts on the box. (Since you don't know the coefficient of friction, don't include it in your answer.) Express the frictional force in terms of m, v_0, and x_1.

(b) After the box comes to rest at position x_1, a person starts pushing the box, giving it a speed v_1. When the box reaches position x_2 (where $x_2 > x_1$), how much work W_p has the person done on the box? Assume that the box reaches x_2 after the person has accelerated it from rest to speed v_1. Express the work in terms of m, v_0, x_1, x_2, and v_1.

MP 3. The spring in the figure has a spring constant of 1400 N/m. It is compressed 15,0 cm, then launches a 200 g block. The horizontal surface is frictionless, but the block's coefficient of kinetic friction on the incline is 0,180. What distance d does the block sail through the air?



4. Heilurin langan pituus on L ja langan päässä on pieni m-massainen punnus. Korkeudella $L/3$ heilurin alimmasta pisteestä on kuvan mukaisesti pieni tappi. Kuinka suuri lähtökulman θ_0 on oltava, jotta punnus heilahtaisi tapin ympäri langan löystymättä?



5. Pieni kappale lähtee R-säteisen puolipallon laelta levosta kitkattomaan liukuun pitkin pallon pintaa. Missä kohdassa se erkanee pinnasta?