

Module 09-Lesson 5

Work and Potential Energy

Question 1: A roller coaster (see Fig. 1) starts from rest at a height of 20 m above the ground level. What speed will a cart travelling down the track have at ground level when starting from rest, if the friction force is negligible?

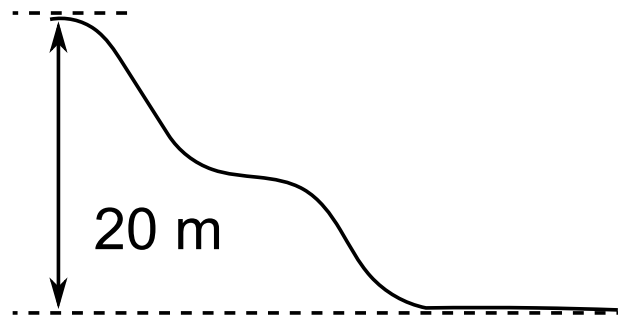


FIG. 1: A roller coaster with a maximum height of 20 m.

Question 2: Work W_A is required to stretch spring A for a distance L . Twice as much work is required to stretch spring B a distance $L/2$ from its equilibrium position. Compare the spring constants of the two springs.

Problem: A child of mass m is on a swing with chains of length L . You hold the swing and slowly pull back until the swing makes an angle θ with the vertical. Show that the work you do is equal to $mgL(1 - \cos \theta)$.