GP1-LQA4 學號:_____ 系級:_____姓名: _____ 得分:_____

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填充,計算題須寫出計算過程,並且將答案填入空格。

Problem 1

有一個彈簧彈性係數=k，震盪物體的質量=m，初始位置x=A，初始速度v0=0。假如我們在t=0釋放這個物體，當物體到達x=A/2的位置>請計算其(a)彈性位能U_{sp}，(b)動能，(c)速度v，(d)系統的力學能E？ (04小題)

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01 (a)U_{sp}=____ [m,k,A] 分數= 4

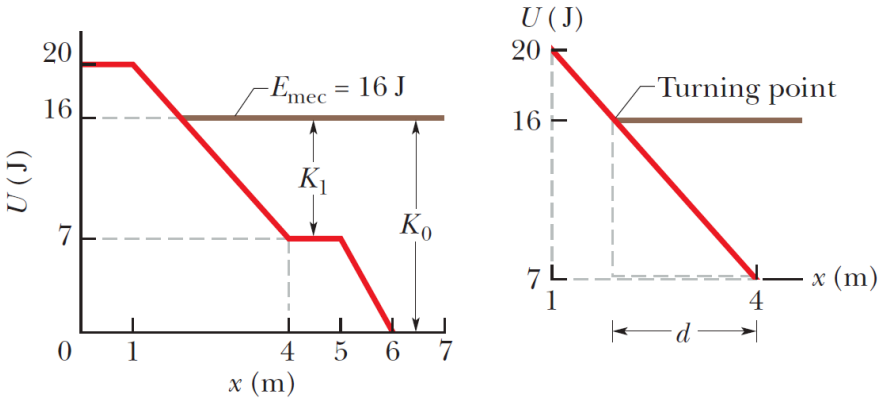
02 (b)K=____ [m,k,A] 分數= 4

03 (c)v=____ [m,k,A] 分數= 4

04 (d)E=____ [m,k,A] 分數= 3

Problem 2

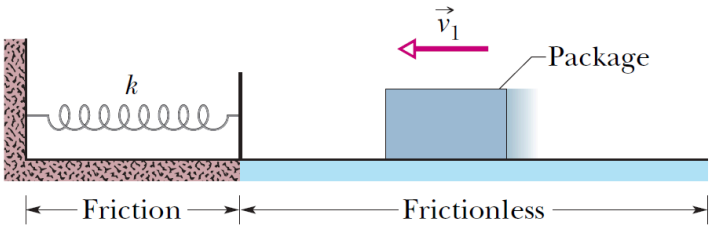
A 4.00 kg particle moves along an x axis in one-dimensional motion while a conservative force along that axis acts on it. The potential energy U(x) associated with the force is plotted in the figure. That is, if the particle were placed at any position between x=0 and x=7 m, it would have the plotted value of U. At x=6.5,the particle has velocity $v_0 = -\sqrt{8}\hat{i}$ m. (a) From the figure, determine the particle's speed at $x_1 = 4.5$ m. (b) Determine the particle's turning point. (c) Evaluate the acceleration of the particle when it is in the region $2.5 < x < 3.5$m.



(03小題) 05 (a)v=____ m/s 分數= 5 06 (b)for the turning point, d=_____ m 分數= 5 07 (c)the acceleration, a=____ m/s^2 分數= 5

Problem 3

A. In the figure, a package of mass m slides along a floor with speed v. It then runs into and compresses a spring, until the package momentarily stops. Its path to the initially relaxed spring is frictionless, but as it compresses the spring, a kinetic frictional force from the floor, of magnitude f, acts on the package. If the spring constant is k, by what distance d is the spring compressed when the package stops? (01小題)



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08 (a)d=____ [m,v,k,f] 分數= 5

Problem 3

B. Following previous problem, let's take $m = 2$ kg, $v = 4$ m/s, $k = 10000$ N/m, f=15 N. Calculate d. (01小題) 09 d=____ m 分數= 5

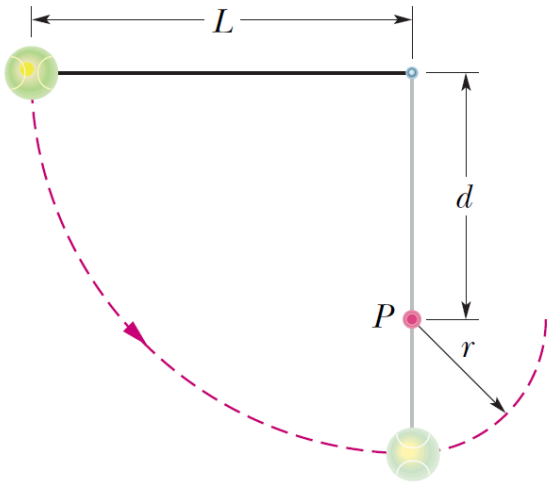
Problem 4

A pendulum consists of a 2.0 kg stone swinging on a 4.0 m string of negligible mass. The stone has a speed of 8.0 m/s when it passes its lowest point. (a) What is the speed when the string is at 60° to the vertical? (b) What is the greatest angle with the vertical that the string will reach during the stone's motion? (c) If the potential energy of the pendulum–Earth system is taken to be zero at the stone's lowest point, what is the total mechanical energy of the system? (03小題) 10 (a)the speed when the string is at 60° to the vertical, v =___ m/s 分數= 5 11 (b)the greatest angle, θ_{max}=____ degree 分數= 5 12 (c)total mechanical energy, E=____ J 分數= 5

Problem 5

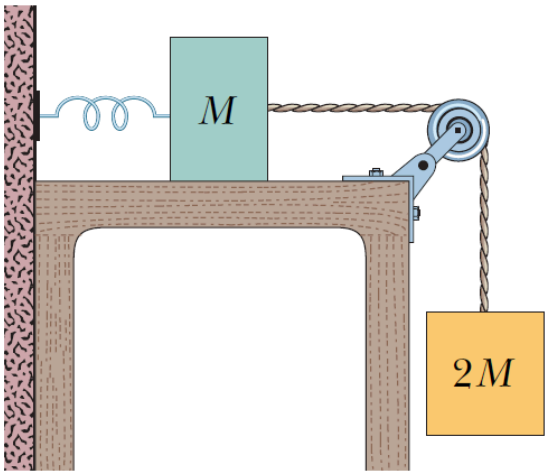
The length of the string in the figure is L=1.2 m, has a ball attached to one end, and is fixed at its other end. The distance from the fixed end to a fixed peg at point P is d=0.75 m. When the initially stationary ball is released with the string horizontal as shown, it will swing along the dashed arc. What is its speed when it reaches (a) its lowest point(v_L) and (b) its highest point after the string catches on the peg(v_P)? (03小題)

13 (a)v_L=____ m/s 分數= 5 14 (b)v_P=____ m/s 分數= 5 15 (c)If the ball is to swing completely around the peg, what value must distance d exceed($d > d_c$)? d_c=___ 分數= 5



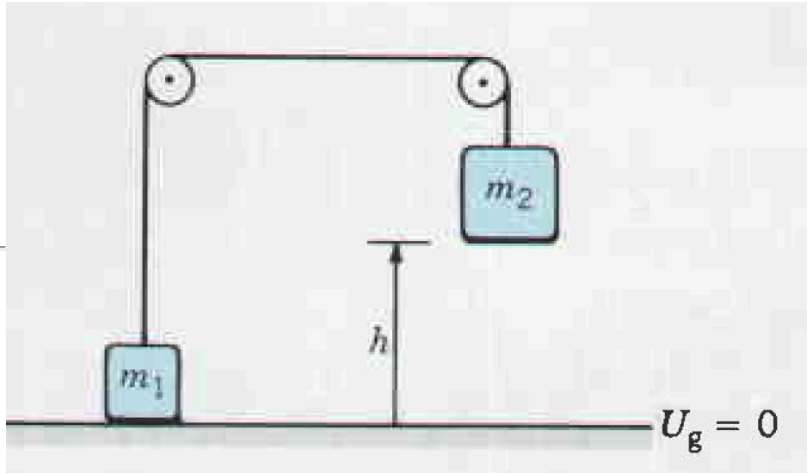
Problem 6

Two blocks, of masses M= 2.0 kg and 2M, are connected to a spring of spring constant k=200 N/m that has one end fixed, as shown in the figure. The horizontal surface and the pulley are frictionless, and the pulley has negligible mass. The blocks are released from rest with the spring relaxed. (a) What is the combined kinetic energy of the two blocks when the hanging block has fallen 0.090 m? (b) What is the kinetic energy of the hanging block when it has fallen that 0.090 m? (c) What maximum distance does the hanging block fall before momentarily stopping? (03小題) 16 (a)the total kinetic energy=____ J 分數= 5 17 (b)kinetic energy of the hanging block=____ J 分數= 5 18 (c)maximum distance=____ m 分數 = 5



Problem 7

Two blocks with masses m_1 and m_2 are connected by a light string that slides over two frictionless pegs as in the figure. Initially m_2 is held h off the floor while m_1 is on the floor. The system is then released. At what speed does m_2 hit the floor? (01小題)



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19 the speed of m_2=____ [m_1,m_2,g,h] 分數= 10

Problem 8
A block of mass m is attached to a spring whose constant is k . It slides on a frictionless surface. The spring is extended by A and then released. (a) Find the maximum speed of the block. (b) At what points are the kinetic energy and potential energy equal? (c) At what points is the speed half its maximum value? (04小題)

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20 (a) maximum speed=_____ [k,m,A] 分數= 5

21 (b) kinetic energy and potential energy equal, x=___ [k,m,A] $x > 0$. 分數= 5

22 (c)the speed is half its maximum value, x=____ [k,m,A,vx], vx=v_{max} 分數= 5

23 (d)following (c), x=____ [A] 分數= 5