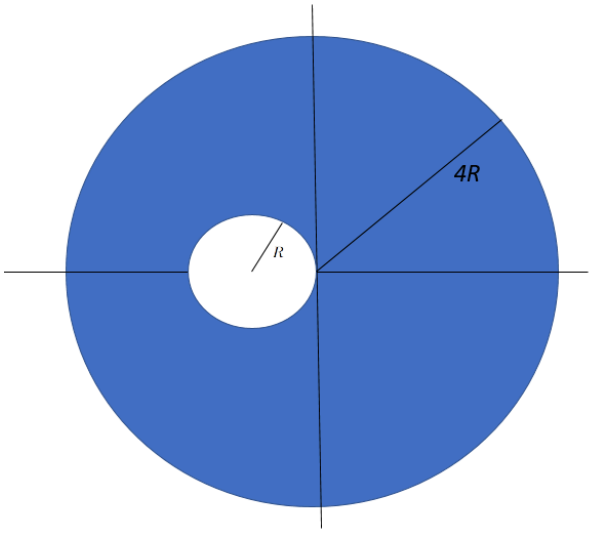
GP1-LQC04 學號:_____ 系級:_____姓名: _____ 得分:_____

力 篤 求
行 信 真

填充,計算題須寫出計算過程,並且將答案填入空格。

Problem 1

The figure shows a uniform metal plate P of radius 4R from which a disk of radius R has been stamped out (removed) in an assembly line. Using the xy coordinate system shown, locate the center of mass $\vec{r}_{com}$ of the plate. (02小題) 01 (a)x_{com}=_____ R 分數= 5 02 (b)y_{com}=_____ R 分數= 5



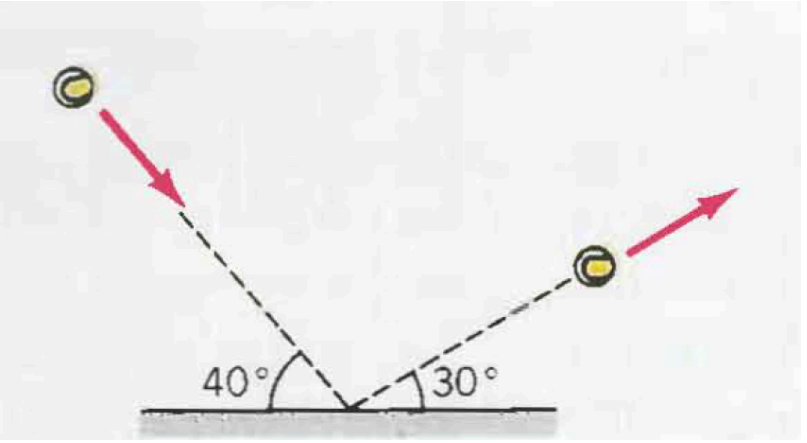
Problem 2

一個60公克的球以25 m/s的速度，與水平夾角40度撞擊地面，然後以30度的角度，20 m/s的速度反彈。請計算地面作用在這個球的衝量。假設這個碰撞經歷的時間經過5毫秒(5 ms)，請計算平均力。 (04小題) 03 (a)衝量 $\vec{I} = I_x\hat{i} + I_y\hat{j}$,

I_x=____ kg.m/s 分數= 5 04 I_y=____ kg.m/s 分數= 5 05

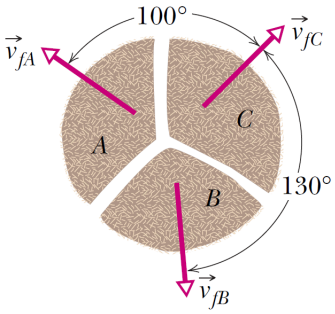
(b)平均力,$\vec{F}_{avg} = F_x\hat{i} + F_y\hat{j}$,

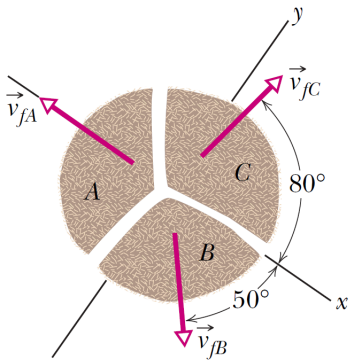
F_x=____ N 分數= 5 06 F_y=____ N 分數= 5



Problem 3

我們有一個質量是M的椰子，在這個椰子當中塞了一些火藥。起初椰子放在沒有摩擦的地板上，假設瞬間將火要點燃造成爆炸，這個椰子被炸成3塊，其中C塊的質量是0.3M，其速度是5 m/s，如圖所示。(a)請計算質量為0.2 M 的B的速度。(b)請計算A的速度。 (02小題) 07 (a)v_B=____ m/s 分數= 5 08 (b)v_A=____ m/s 分數 = 5





Problem 4

A. A 0.90 kg ball moving horizontally at 6.0 m/s strikes a vertical wall and rebounds with speed 4.5 m/s. What is the magnitude of the change in its linear momentum? (01小題) 09 change in linear momentum Δp=_____kg·m/s 分數= 5

Problem 4

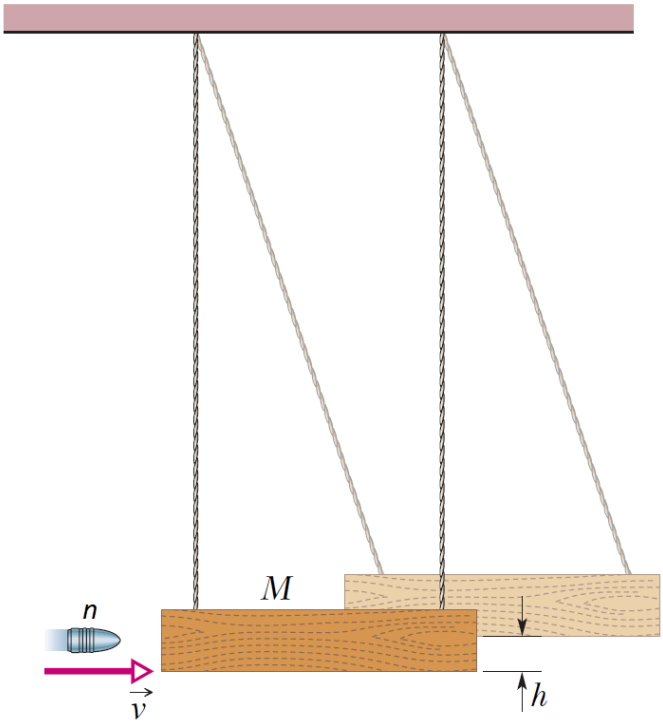
B. A 75 kg man lying on a surface of negligible friction shoves a 200 g stone away from himself, giving it a speed of 6 m/s. What speed does the man acquire as a result? (01小題) 10 speed v=_____m/s 分數= 5

Problem 4

C. A box with mass $m = 6.0$ kg slides with speed $v = 4.0$ m/s across a frictionless floor in the positive direction of an x axis. The box explodes into two pieces. One piece, with mass $m_1 = 2.0$ kg, moves in the positive direction of the x axis at $v_1 = 8.0$ m/s. What is the velocity of the second piece, with mass m_2? (01小題) 11 v_2=_____ m/s 分數= 5

Problem 5

The ballistic pendulum was used to measure the speeds of bullets before electronic timing devices were developed. The version shown in the figure consists of a large block of wood of mass M, hanging from two long cords. A bullet of mass n is fired into the block, coming quickly to rest. The block-bullet then swing upward, their center of mass rising a vertical distance h before the pendulum comes momentarily to rest at the end of its arc. What is the speed of the bullet just prior to the collision? (01小題)

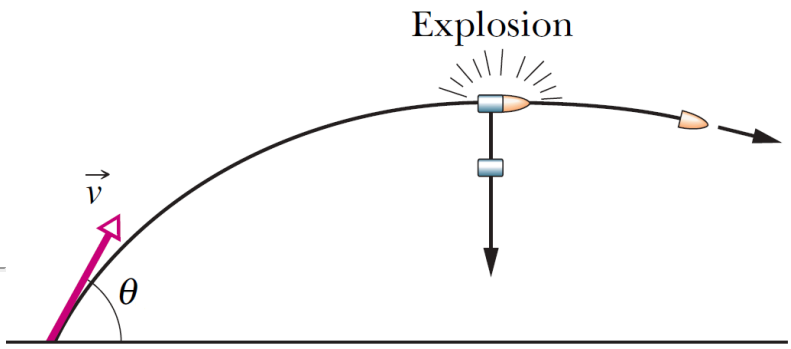


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12 the speed of the bullet v=_____ [n,M,g,h] 分數= 10

Problem 6

A shell is shot with an initial velocity of v, at an angle of θ =theta with the horizontal. At the top of the trajectory, the shell explodes into two fragments of equal mass (figure). One fragment, whose speed immediately after the explosion is zero, falls vertically. How far from the gun does the other fragment land, assuming that the ground is flat and that air drag is negligible? (03小題)



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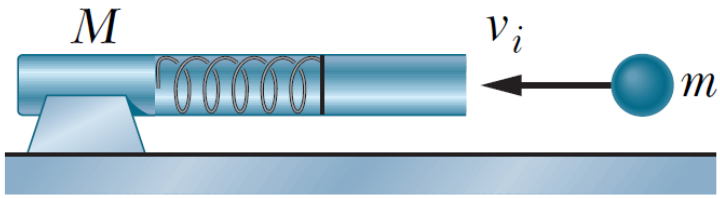
13 (a)the time of the explosion, t=____ [v,g] 分數= 5

14 (b)the x coordinate of the explosion point, x0=_____ [theta,g,v] 分數= 5

15 (c)the distance of landing point of the far fragment to the gun=____[x0,theta, v, g] x0=the x coordinate of the explosion point. 分數= 5

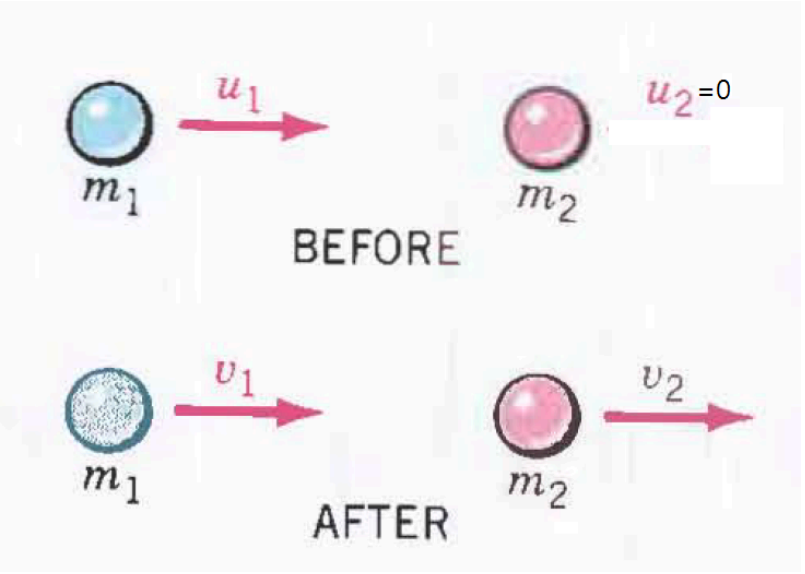
Problem 7

In the figure, a ball of mass m = 60 g is shot with speed $v_i = 40$ m/s into the barrel of a spring gun of mass $M = 300$ g initially at rest on a frictionless surface. The ball sticks in the barrel at the point of maximum compression of the spring. Assume that the increase in thermal energy due to friction between the ball and the barrel is negligible. (a) What is the speed of the spring gun after the ball stops in the barrel? (b)What fraction of the initial kinetic energy of the ball is stored in the spring? (02小題) 16 (a)the speed of the spring gun=____ m/s 分數= 5 17 (b)the fraction=____ 分數= 5



Problem 8

The figure depicts a one-dimensional elastic collision between two balls. All the velocities are drawn in the same direction to simplify the analysis. The quantities u_1 and u_2 are the speed of m_1 and m_2, respectively before collision while v_1 and v_2 are the speed of m_1 and m_2, respectively after collision. Find v_1 and v_2. (02小題)



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18 (a)v_1=____ [m_1,m_2,u_1] 分數= 5

19 (b)v_2=____ [m_1,m_2,u_1] 分數= 5

Problem 8

A particle of mass m_1 and with speed u makes a one dimensional elastic collision with a particle of mass m_2 initially at rest. Find their final velocities(v_1, v_2) given that: (a) $m_1 = 3m_2$; (b) $m_2 = 3m_1$. (04小題) 20 (a) $m_1 = 3m_2$, v_1=___ u 分數= 4 21 v_1=___ u 分數= 4 22 (b)$m_2 = 3m_1$, v_1=___ u 分數= 4 23 v_1=___ u 分數= 4