Homework of chapter 4

Date: Name: Student ID:

Submit time: Jun. 11th

1、A 300-kg space vehicle traveling with a velocity $v_0 = (360m/s)i$ pass through the origin O at t=0.Explosive charges then separate the vehicle into three parts A, B and C, with mass, respectively, 150kg, 100kg, and 50kg. Knowing that at t=4s, the position of parts A and B are observed to be A (1170m, -290m, -585m) and B (1975m, 365m, 800m), determine the corresponding position of part C. Neglect the effect of gravity.

2、A system consists of three particles *A*, *B*, and *C*. We know that m_A=3 kg, m_B =4 kg, and m_C =5 kg and that the velocities of the particles expressed in m/s are, respectively, $\mathbf{v}_A = -4\mathbf{i}+4\mathbf{j}+6\mathbf{k}$, $\mathbf{v}_B = -6\mathbf{i}+8\mathbf{j}+4\mathbf{k}$, and $\mathbf{v}_C = 2\mathbf{i}-6\mathbf{j}-4\mathbf{k}$. Determine the angular momentum $\mathbf{H}_O$ of the system about *O*.

3、In a game of pool, ball A is moving with a velocity v_0 when it strikes balls B and C which are at rest and aligned as known, Knowing that after the collision the three balls move in the directions indicated and that $v_0 = 12\,ft/s$ and $v_C = 6.29\,ft/s$ .Determine the magnitude of the velocity of ball A and ball B.

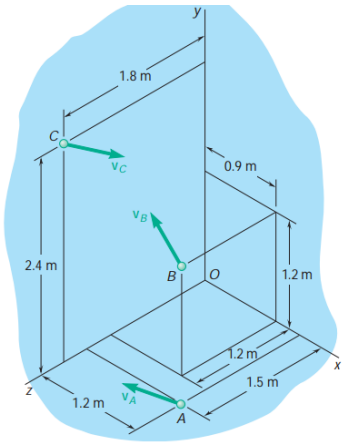

Fig.2

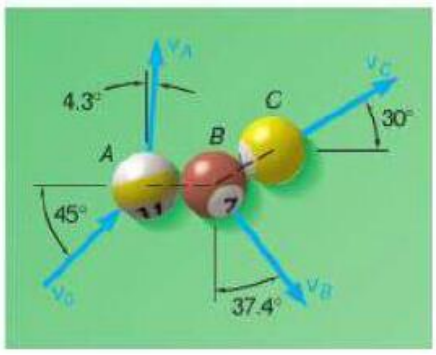

Fig.3

- Ball *B*, of mass m_B, is suspended from a cord of length *l* attached to cart *A*, of mass m_A, which can roll freely on a frictionless horizontal track. If the ball is given an initial horizontal velocity $\mathbf{v}_0$ while the cart is at rest, determine (*a*) the velocity of *B* as it reaches its maximum elevation, (*b*) the maximum vertical distance *h* through which *B* will rise. (It is assumed that $v_0^2 < 2gl$.)

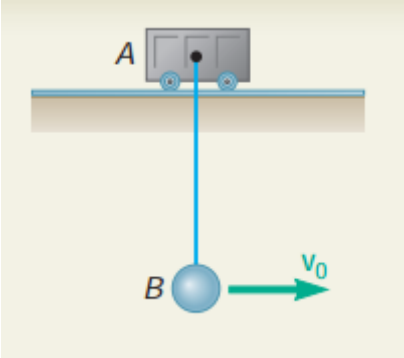

Fig.4