Ch.9.

13. $v_{0x} = v_0 \cos\theta_0 = 10\,m/s$. $v_{0y} = 10\sqrt{3}\,m/s$

系统动量守恒 $v' = 20\,m/s$

系统能量守恒 ~~$\frac{1}{2}mv_0^2 = \frac{1}{2}\cdot 2m\cdot v^2$~~

~~$2x = v\cdot t = 10\sqrt{3}\,m/s$~~

$H_B = 10\cdot\frac{10\sqrt{3}}{g} + x$

又 $t = \sqrt{\frac{2h}{g}}$ $\therefore x = v\cdot t = 10\sqrt{3}\cdot\sqrt{\frac{300}{g^2}} \approx \frac{35.3m}{\sqrt{300}\cdot 10\sqrt{3}} = \frac{100\sqrt{6}}{g} \approx 25.0m$ $\approx 52m$.

14.

(a) $v_{0y} = \sqrt{400+400} = 20\sqrt{3}\,m/s$. $h_{max} = \frac{v_{0y}^2}{2g} = 15.3\,m$

$\therefore H_{max} = \frac{m_2 y_{max}}{m_1} = 5.74m$

(b) $a_{com} = 3.68\,m/s^2$.

$\vec{a}_{com} = (-3.68\,m/s^2)\vec{j}$.

24.

~~$0 - mv = (mg$~~

(a) 动能定理 $0 - \frac{1}{2}mv^2 = -(F - mg)h$. $\therefore h = \frac{\frac{1}{2}mv^2}{F - mg} = 1.12\,m$.

(b) $I = F\cdot t$.

又 $0 - mv = Ft + mg\cdot t = (mg - F)\cdot t$.

$\therefore t = \frac{mv}{F - mg}$ $\therefore I = F\cdot t = 4793.7$ ~~N·s~~ $kg\cdot m\cdot s^{-2}$.

32. (a) $I = \frac{(4+2)\times 10}{2} = (30\,kg\cdot m\cdot s^{-2})\hat{i}$.

(b) $I = \frac{(6+2)\times 10}{2} - \frac{1\times 5}{2} = 40 - 2.5 = (37.5\,kg\cdot m\cdot s^{-2})\hat{i}$.

(c) $\vec{v} = \frac{40 - 10}{2.5} = \frac{120}{10} = (12\,m/s)\hat{i}$.

48 $\because 2m\cdot v_a = m\cdot v_b$

~~$\frac{v_b}{v_a} = 2$~~ $\frac{v_b^2}{v_a^2} = 4$.

动能 $\frac{1}{2}\cdot 2m\cdot v_a^2 + \frac{1}{2}m\cdot v_b^2 = 80$.

$\therefore \frac{E_b}{E_a} = 2$ $\therefore E_A = \frac{80}{3}J$ $E_B = \frac{160}{3}J$.

52. $\Delta p_b = \Delta v\cdot m = |700\,m/s\cdot 0.01| = 7\,kg\cdot m/s$.

$\therefore v_{fR} = 1.4\,m/s$ $\therefore h = \frac{v^2}{2g} = \frac{1.4^2}{2\times 9.8} = 0.1\,m$

64.

(4)

$v = \sqrt{2gh} = \frac{7\sqrt{7}}{5}$ m/s

碰撞

$v_{碰前} = \frac{0.6 - 2.8}{3.4} \cdot v = -2.0$ m/s

$v_B = \frac{1.2}{3.4} \cdot v = \frac{4\sqrt{7}}{85} = 1.31$ m/s

73.