23rd of Sep, 2025

سؤال ④ ص 34

قبل	بعد
$m_A = 2\ kg$, $v_{Ai} = v$, $x+$	$m_B = ??$, $v_{Bi} = 0$

نلاحظ $m = m_A + m_B$ وبما أن كمية الحركة

$v_f = \frac{1}{4} v\ m/s$, $x+$

① $\Delta P = P_f - P_i = 0$

$(m_A + m_B) v_f - [m_A v_{Ai} + m_B v_{Ai}] = 0$

$(2 + m_B) \times \frac{1}{4} v - [2(v) + m_B(0)] = 0$

$\frac{1}{2} v + \frac{1}{4} v m_B - 2v = 0$

$4 \times (-\frac{3}{2} v + \frac{1}{4} v m_B = 0) \times 4$

$m_B = 6\ kg$

سؤال ⑤ ص 34

$m_A = m_B$, $v_{Ai} = v$, 1.2 , $x+$, $v_{Bi} = v$, $x+$, $v_{Af} = v$, $x+$, $v_{Bf} = v + 1.2$, $x2$

$\Delta Me = Me_f - Me_i$

$= (Pe_f + Ke_f) - (Pe_i + Ke_i)$

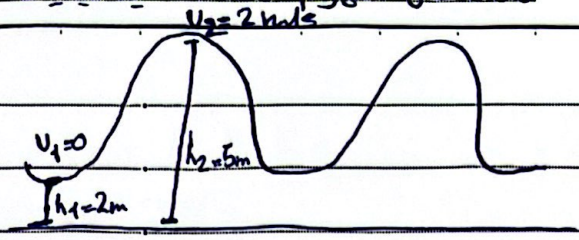
$= Ke_f - Ke_i$

$= (\frac{1}{2} m v_{Af}^2 + \frac{1}{2} m v_{Bf}^2) - (\frac{1}{2} m_{Ai} v_{Ai}^2 + \frac{1}{2} m v_{Bi}^2)$

$= \frac{1}{2} m v^2 + \frac{1}{2} m (v + 1.2)^2 - \frac{1}{2} m (v + 1.2)^2 - \frac{1}{2} m v^2$

$= 0$ ✓

مثال على مفهوم الطاقة الميكانيكية



طاقة وضع طاقة حركية

$$Me = Ke + Pe$$

$$= \frac{1}{2} m v_1^2 + mgh$$

$$= \frac{1}{2}(20)(0)^2 + (20)(10)(2)$$

$$= 400\ J$$

$$Me = Ke + Pe$$

$$= \frac{1}{2} m v_2 + mgh$$

$$= \frac{1}{2}(20)(\frac{2}{5})^2 + (20)(10)(5)$$

$$= 40 + 1000$$

$$= 1040\ J$$

الطاقة الميكانيكية غير محفوظة

$$\Delta Me = Me_2 - Me_1$$

$$= 1040 - 400$$

$$= 640\ J$$

سؤال ⑧ فرع (3,4)

$m_A = 0.8\ Kg$, $V_{Ai} = 5\ m/s$, x+

$m_B = 2.4 Kg$, $V_{Bi} = 0$

③ V_{Bf}

④ Ke_{Bf}

الزخم محفوظ — تصادم مرن — $\Delta Ke = 0$

[1] $\Sigma P_i = \Sigma P_f$

$P_{Ai} + P_{Bi} = P_{Af} + P_{Bf}$

$m_A V_{Ai} + m_B V_{Bi} = m_A V_{Af} + m_B V_{Bf}$

$(0.8)(5) + (2.4)(0) = (0.8)(V_{Af} + 2.4 V_{Bf}$

$\boxed{4 = 0.8 V_{Af} + 2.4 V_{Bf}}$ ①

$\Delta Ke = 0$

$Ke_f - Ke_i = 0$

$(Ke_f + Pe_f) - (Ke_i + Pe_i) = 0$

$Ke_{fA} + Ke_{fB} - (Ke_{iA} + Ke_{iB}) = 0$

$\frac{1}{2} m_A V_{Af}^2 + \frac{1}{2} m_B V_{Bf}^2 - (\frac{1}{2} m_A V_{Ai}^2 + \frac{1}{2} m_B V_{Bi}^2) = 0$

$\frac{1}{2}(0.8)(V_{Af})^2 + \frac{1}{2}(2.4)(V_{Bf})^2 - (\frac{1}{2}(0.8)(5)^2 + \frac{1}{2}(2.4)(0)^2) = 0$

$0.4 V_{Af}^2 + 1.2 V_{Bf}^2 - 10 = 0$

لا الطاقة الميكانيكية محفوظة لأن تربيع نستخدم

$V_{Ai} + V_{Af} = V_{Bi} + V_{Bf}$ ← نستخدم فقط في التصادم المرن

$5 + V_{Af} = 0 + V_{Bf}$

$\boxed{5 + V_{Af} = V_{Bf}}$ ②

$$\frac{5 + V_{Af}}{1} = \frac{4 - 0.8\,V_{Bf}}{2.4}$$

$$(5)(2.4) + 2.4\,V_{Af} = 4 - 0.8\,V_{Af}$$

$$12 + 2.4\,V_{Af} + 0.8\,V_{Af} - 4 = 0$$

$$8 + 3.2\,V_{Af} = 0$$

$$\frac{3.2\,V_{Af}}{3.2} = \frac{-8}{3.2}$$

$$V_{Af} = -2.5 \text{ m/s} \longrightarrow 2.5 \text{ m/s}, +x$$

$$V_{Bf} = \frac{4 - 0.8\,V_{Af}}{2.4}$$

$$= \frac{4 - 0.8\,(-2.5)}{2.4}$$

$$V_{Bf} = 2.5 \text{ m/s}, +x$$

④ في

$$KE_{Bf} = \frac{1}{2} m v_{Bf}^2$$

$$= \frac{1}{2}(2.4)(2.5)^2$$

$$= 7.5\ \text{J}$$

مراجعة الوحدة

24th of Sep, 2025

5) $I = \Delta p = \sum F \cdot \Delta t$

$I_A = I_B$

$\Delta p_A = \Delta p_B$

$p_{Af} - p_{Ai} = p_{Bf} - p_{Bi}$

$p_{Af} = p_{Bf}$

$m_A v_{Af} = m_B v_{Bf}$

$m_A > m_B \rightarrow v_{Af} < v_{Bf}$.

سؤال 1 (6) فرع

$v_i = v_1 \hat{x}^+$

$v_f = v_1 \hat{x}^-$

$\Delta p = p_f - p_i$

$\Delta p = mv_f - mv_i$

$\Delta p = mv_f - mv_i$

$= m(-v) - m(+v)$

$= -mv - mv$

$= -2mv \rightarrow 2mv, \hat{x} - (2.)$

7) $\begin{pmatrix} m = 5kg \\ v_i = 200\ m/s\ \hat{x}^+ \end{pmatrix} \rightarrow$ قبل الانفجار

$M_A = 3kg \quad v_A = 100\ m/s\ \hat{x}^+$

$M_B = 2kg$

$\sum p_i = \sum p_f$

$m \times v_i = m_A \times v_A + m_B \cdot v_B$

$5 \times 200 = 3 \times 100 + 2 \times v_B$

27/9/2025

$1000 = 300 + 2 \times V_B$

$-300 \quad -300$

$\frac{700}{2} = \frac{2}{2} \times V_B \rightarrow V_B = 350\ m/s\ x^+$

8)

$m_{\text{الكرة}} = 0.2\ kg$, $v_{\text{الكرة}} = 0\ m/s$, $v_{\text{الكرة}} = 4\ m/s\ , y^-$

$V_f = 4\ m/s$

$I = \Delta p = \Sigma F \cdot \Delta t$

$\Delta p = p_f - p_i$

$= 0.2(3) - 0.2(-4)$

$= 0.6 + 0.8$

$= 1.4\ N.S\ , y+$

9) $\Delta KE = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$

$= \frac{1}{2}(0.2)(3)^2 - \frac{1}{2}(0.2)(-4)^2$

$= 0.9 - 1.6$

$= -0.7$

الاشارة تعني

10)

$M_A = M_B$

(A) ← (B)

$V_{Ai} = 2\ m/s\ x^- \quad V_{Bi} = 0$

(الزخم محفوظ) $\Sigma p_i =$ ← تصادم مرن ←

(الطاقة الحركية محفوظة) $\Delta KE = 0$ ←

$PE + KE$

↓ ↓

الارتفاع (h) السرعة $\to$ V

لا يوجد حركة

h نقص y لا

> ① $\Sigma p_i = \Sigma p_f$
> ② $\Delta KE = 0$

$m_A V_{Ai} + m_B V_{Bi} = m_A V_{Af} + m_B V_{Bf}$

$m_A(-2) + m_B(0) = m_A(V_{Af}) + m_A(V_{Bf})$

$-2 = V_{Af} + V_{Bf}$ ...... ①

$V_{Ai} + V_{Af} = V_{Bi} + V_{Bf}$

$-2 + V_{Af} = 0 + V_{Bf}$

$-2 + V_{Af} = 0 + V_{Bf}$

$V_{Af} - 2 = V_{Bf}$ ...... ②

$-2 = V_{Af} + V_{Bf}$

$-2 = V_{Bf} - V_{Af}$

$\frac{-4}{2} = \frac{2V_{Bf}}{2} \Rightarrow V_{Bf} = -2$

$2\,m/s,\ x^-$

---

11) $V_{oi} = 4.0\,m/s\ x^+$ $\quad m_B = 90\,kg$

$V_{Bi} = 1.5\,m/s\ x^+$ $\quad m_o = 60\,kg$.

$\Sigma p_i = \Sigma p_f$

$m_o V_{oi} + m_B V_{Bi} = (m_o + m_B)\,V_f$

$60(4.0) + 90(1.5) = (90 + 60)\,V_f$

$240 + 135 = 150(V_f)$

$\frac{375}{150} = \frac{150\,(V_f)}{150}$

$V_f = 2.5\,m/s\ \hat{x}^+$

12.) $m_B = 300\,kg$ $\hat{x}^+$

$V_{Bi} = 0$ $V_{AF} = 3\,m/s$ $V_{Bi} = 0$

$m_A = 50kg$, $V_{Ai} = 0$

$$\Sigma p_i = \Sigma p_f$$

$$m_A V_{Ai} + m_B V_{Bi} = m_A V_{Af} + m_B V_{Bf}$$

$$50(0) + 300(0) = 50(3) + 300(V_{Bf})$$

$$0 = 150 + 300\,V_{Bf}$$

$$-150 \quad -150$$

$$\frac{-150}{300} = \frac{300}{300} V_{Bf} \rightarrow \frac{-1}{2}$$

13.) $m_A = 1 \times 10^3\,kg$

$V_{Ai} = 10\,m/s$, $\hat{x}^+$

$m_B = 4 \times 10^3\,kg$

$V_{f\,A,B} = 2\,m/s$, $\hat{x}^-$

$V_{Bi} = ?$

$$\Sigma p_i = \Sigma p_f$$

$$(1\times10^3)(10) + (4\times10^3)V_{Bi} = (1\times10^3 + 4\times10^3)(-2)$$

$$1\times10^4 + 4\times10^3 V_{Bi} = -1\times10^4$$

$$V_{Bi} = \frac{-1\times10^4 - 1\times10^4}{4\times10^3}$$

$$v_{Bi} = \frac{-2 \times 10^4}{4 \times 10^3}$$

$$v_{Bi} = -5 \text{ m/s}$$

$$= 5 \text{ m/s}, \leftarrow \quad (2)$$

(4) Σp_i

$$= 1 \times 10^3 (10) + (4 \times 10^3)(-5)$$

$$= 1 \times 10^4 - 20 \times 10^3$$

$$= 1 \times 10^4 - 2 \times 10^4$$

$$= 1 \times 10^4 \text{ kg.m/s} \quad (P)$$

(5) $\Delta KE = KE_f - KE_i$

~~$(\frac{1}{2} m_A v_{Af}^2 + \frac{1}{2} m_B v_{Bf}^2) - (\frac{1}{2} m_A v_{Ai}^2 + \frac{1}{2} m_B v_{Bi}^2)$~~

$$\frac{1}{2}(1 \times 10^3)(\quad) + \frac{1}{2}(4 \times 10^3)(-2) - (\frac{1}{2})(1 \times 10^3)(10) + \frac{1}{2}(4 \times 10^3)(-5)$$

~~$(1 \times 10^3 - 4 \times 10^3) = 5 \times 10^3 + 10 \times 10^3$~~

$$2 \times 10^3 + 8 \times 10^3 - 50 \times 10^3 - 50 \times 10^3$$

$$= 90 \times 10^3$$

(0)

سؤال 6 ص 39

$m = 1.35 \times 10^3$ Kg , $v_i = 15$ m/s, x^- , $v_f = 0$ m/s, $\Delta t = 0.115$ s

① ΔP ② $\overline{F}$

① $\Delta P = P_f - P_i$

$= (1.35 \times 10^3)(0) - (1.35 \times 10^3)(15)$

$= -20.25 \times 10^3$

$= -2.025 \times 10^4$

$\therefore 2.025 \times 10^4$ Kg.m/s , x^-

② $\overline{F}$

$I = \Sigma F \cdot \Delta t$

$\frac{-2.025 \times 10^4}{0.115} = \Sigma F \cdot \frac{0.115}{0.115}$

$\Sigma F = 176.08 \times 10^4$ N, x^-

سؤال ⑦ ص 39

$m_A = 1.1 \times 10^3$ Kg ; $v_{A_i} = 6.4$ m/s, x^+ , $v_{B_i} = 0$, $m_B = 1.2 \times 10^3$ Kg

① v_f بعد التصادم ② $I_B \rightarrow I_A$

① $\Sigma P_i = \Sigma P_f$

$(1.1 \times 10^3)(6.4) + (1.2 \times 10^3)(0) = (1.1 \times 10^3 + 1.2 \times 10^3) v_f$

$\frac{7.04 \times 10^3}{2.3 \times 10^3} = \frac{2.3 \times 10^3}{2.3 \times 10^3} v_f$

$v_f = 3.060$ m/s, x^+

② $I = \Delta P$

$= m (v_f - v_{Ai})$

$= 1.1 \times 10^3 (3.060 - 6.4)$

$= -3.674$ N.S

$= 3.674$ N.S , x-

سؤال ⑧ ص 39

$\Sigma F = 1 \times 10^3$ N , $v_i = 0$ m/s , $m_B = 10$ Kg , $\Delta t = 0.01$ s

① ΔP ② v_f

ⓐ $\Delta P = I = \Sigma F . \Delta t$

$= 1 \times 10^3 \times 0.01$

$= 10$ Kg.m/s , x+

② v_f

$\Delta P = P_f - P_i$

$\frac{10}{10} = \frac{10}{10} v_f - \frac{100}{10}$

$v_f = 1$ m/s , x+

سؤال ⑨ ص 39

$m_i = 3600$ Kg , $v_i = 4900$ Km/s $= 4.9 \times 10^6$ m/s, y+ , $m_A = 1200$ Kg , $v_A = 5700$ Km/s ⓐ 5.7×10^3 m/s, y+

① v_{Bf} ② ΔKE

① $m_B = 3600 - 1200$

$= 2400$ Kg

$\Sigma P_i = \Sigma P_f$

$3600 \times 4.9 \times 10^6 = 1200 \times 5.7 \times 10^3 + 2400 \, v_{Bf}$

$1200 \times 5.7 \times 10^3 + 2400$ $1200 \times 5.7 \times 10^3 + 2400$

$v_{Bf} =$