

~~Ex 3B~~ 3B

① (a) $KE = \frac{1}{2} \times 0.2 \times 10^2 = 10 \text{ J}$

(b) $KE = \frac{1}{2} \times 2 \times 2^2 = 4 \text{ J}$

(c) $KE = \frac{1}{2} \times 10 \times 5^2 = 125 \text{ J}$

(d) $KE = \frac{1}{2} \times 0.015 \times 500^2 = 1875 \text{ J}$

(e) $KE = \frac{1}{2} \times 750 \times 17^2 = 108000 \text{ J}$

(f) $KE = \frac{1}{2} \times 65 \times 5^2 = 813 \text{ J}$

② (a) $PE = 0.5 \times 9.8 \times 7 = 34.3 \text{ J gain}$

(b) $PE = 65 \times 9.8 \times 20 = 12700 \text{ J loss}$

(c) $PE = 600 \times 9.8 \times 40 = 235000 \text{ J gain}$

(d) $PE = 70 \times 9.8 \times 100 = 68600 \text{ J gain}$

(e) $PE = 10 \times 9.8 \times 22 = 2160 \text{ J gain}$

(f) $PE = 900 \times 9.8 \times 30 = 265000 \text{ J gain loss}$

③ gain $KE = \frac{1}{2} M(V^2 - u^2) = \frac{1}{2} \times 0.5(7^2 - 5^2) = 6 \text{ J}$

④ $KE \text{ loss} = \frac{1}{2} \times 750(5^2 - 30^2) = -328000 \text{ J}$

⑤ $15 = \frac{1}{2} \times 0.5(V^2 - 2^2) \quad 60 = V^2 - 4 \quad V = 8 \text{ ms}^{-1}$

⑥ $-140 = \frac{1}{2} \times 40(V^2 - 4^2) \quad -7 = V^2 - 16 \quad V = 3 \text{ ms}^{-1}$

⑦ $PE \text{ lost} = 30 \times 9.8 \times 55 - 40 = 945 \text{ J}$

⑧ $F = ma \quad 10 = 5a \quad \therefore a = 2 \text{ ms}^{-2}$

$u = 2 \quad a = 2 \quad t = 2 \quad V = 2 + 2 \times 2 = 6 \text{ ms}^{-1}$

$\therefore KE \text{ gain} = \frac{1}{2} \times 5(6^2 - 2^2) = 80 \text{ J}$

⑨ $a = -2 \quad t = 4 \quad u = 40 \quad V = ? \quad V = 40 + (-2) \times 4 = 32 \text{ ms}^{-1}$

$\therefore KE \text{ loss} = \frac{1}{2} \times 750(32^2 - 40^2) = -216000 \text{ J}$

$$(10) \quad u = 0 \quad a = 9.8 \quad s = 1.5 \quad v = ?$$

$$v^2 = 0^2 + 2 \times 9.8 \times 1.5$$

$$v = 5.42 \text{ ms}^{-1}$$

$$\therefore \text{KE at impact} = \frac{1}{2} \times 0.8 \times 5.42^2 = \underline{\underline{11.8 \text{ J}}}$$

$$\text{KE lost} = \frac{1}{2} \times 0.8 \times 2.1^2 - 11.8 = \underline{\underline{-10.0 \text{ J}}}$$