

Objective question 4

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$$F_{av} = \frac{m(v_f - v_i)}{(\Delta t)} = \frac{(57 \cdot 10^{-3} \text{ kg})(25 + 21)}{0.06} =$$

$$= 43.7 \text{ N}$$

$$I = F_{av}(\Delta t) = m v_f - m v_i$$

Problem 15 and Problem 29

Problem 15

$$(a) \quad m v_i + 3m v_{2i} = 4m v_f$$

$$v_f = \frac{4 + 3(2)}{4} = \underline{2.5 \text{ m/s}}$$

$$(b) \quad K_f - K_i = \frac{1}{2}(4m)v_f^2 - \left(\frac{1}{2}m v_i^2 + \frac{1}{2}3m v_{2i}^2 \right)$$

$$= \frac{1}{2} \cdot 2.5 \cdot 10^4 (4 \cdot 2.5^2 - 4^2 - 3 \cdot 2^2) = \underline{-3.75 \cdot 10^4 \text{ J}}$$

Problem 29

$$5 \text{ m/s} + 0 = 4.33 \cdot \cos 30^\circ + v_{2fx}$$

$$v_{2fx} = 1.25 \text{ m/s}$$

$$0 = 4.33 \cdot \sin 30^\circ + v_{2fy}$$

$$v_{2fy} = -2.16 \text{ m/s}$$

$$v_{2f} = 2.50 \text{ m/s} \text{ at } -60^\circ$$

Problem 37

I couldn't solve this one.

Problem 46

Problem 46

(a) $Q - Q = Q_e \ln \left(\frac{M_i}{M_f} \right) = -Q_e \ln \left(\frac{M_f}{M_i} \right)$

$Q = \frac{M_i}{k} \ln \left(\frac{M_i}{M_f} \right)$

(b) $Q = - (1500 \text{ m/s}) \ln \left(1 - \frac{t}{1448} \right)$

(c) $Q(t) = \frac{dQ}{dt} = \frac{d}{dt} \left(-Q_e \ln \left(1 - \frac{t}{T_p} \right) \right) = -Q_e \left(\frac{1}{1 - \frac{t}{T_p}} \right) \left(-\frac{1}{T_p} \right)$

$Q(t) = \frac{Q_e}{T_p - t}$

(d) $x(t) = Q_e T_p \left(\left(1 - \frac{t}{T_p} \right) \ln \left(1 - \frac{t}{T_p} \right) - \left(1 - \frac{t}{T_p} \right) \right)$

$x(t) = Q_e \left(T_p - t \right) \ln \left(1 - \frac{t}{T_p} \right) + Q_e t$

Thank you

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