

A1 $\Delta\theta = \omega t = \omega^2 t^2 = 10$ (4) (3)

A2 $q = \omega^2 R = 4\pi^2 \nu^2 R$ (2)

A3 (1)

A4 $mg = kx \Rightarrow$ (4)

A5 $F = mg = 240$ (H) (4)

A6 $E = \frac{kx^2}{2} \Rightarrow \frac{E_1}{E_2} = \left(\frac{x_1}{x_2}\right)^2$ (4)

A7 $\lambda = \frac{v}{\nu} = \frac{340}{2000} = 0,17$ (m) (2)

A8 $v_x < 0 \Rightarrow \Delta v_x > 0 \Rightarrow a_x > 0$ (2)

A9 $m \omega \cos \alpha = (m+M) \omega ; E_{kin} = \frac{(m+M)\omega^2}{2} = \frac{m^2 \omega^2 \cos^2 \alpha}{2(m+M)} \Rightarrow M = \frac{m^2 \omega^2 \cos^2 \alpha}{2E_{kin}} - m = 95$ (kg) (3)

A10 $P = \frac{\rho}{M} R \Gamma \Rightarrow M = \frac{\rho R \Gamma}{P} = \frac{25 \cdot 831 \cdot 224}{1,66 \cdot 10^5} = 28 \cdot 10^{-3}$ (kg/m³) (4)

A11 $\Delta U = \frac{3}{2} \Delta R \Delta T ; P \Delta V = \Delta R \Delta T \Rightarrow \Delta V < 0 \Rightarrow \Delta T < 0 \Rightarrow \Delta U < 0$ (2)

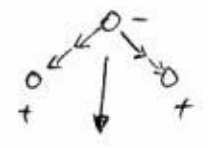
A12 (1)

A13 (3)

A14 $\Delta U = Q - A ; A = S = 2 \cdot 10^5$ (J) (200 kJ) $\Rightarrow \Delta U = 500 - 200 = 300$ (kJ) (4)

A15 $\eta = 1 - \frac{T_x}{T_H} \Rightarrow T_H = \frac{T_x}{1-\eta} = \frac{1000}{1-0,7} = 3300$ (K) (1)

A16 $0 \quad 0$



A17 $c = \frac{2865}{d}$ (1)

A18 $\varepsilon = J(2+R) = 2(1+4) = 10$ (B) (4)

A19 $P = \frac{U^2}{R} \Rightarrow P_1 R_1 = P_2 R_2 \Rightarrow R_2 = \frac{P_1}{P_2} R_1 = 30$ (ohm) (4)

A20 $\varepsilon = 2 \frac{\Delta J}{\Delta t} \Rightarrow \Delta J = \frac{\varepsilon \Delta t}{2} = \frac{0,2 \cdot 0,2}{2} = 0,02$ (J) $\Rightarrow J_k = 2 + 8 = 10$ (A) (1)

A21 $\Delta r = |r_1 - r_2| = k \lambda$ (3)

A22 (2)

A23 (1)

A24 $\sin \alpha_{uy} = \frac{h \nu}{h c \nu} \Rightarrow n_{cs} = \frac{h \nu}{h c \alpha} = \frac{4}{3} \cdot \frac{9}{8} = 1,5$ (2)

A25 (3)

A26 (1)

A27 (2)

A28 ${}_{93}^{237} Np \rightarrow a \cdot {}_2^4 \alpha + b \cdot {}_{-1}^0 \beta + {}_{83}^{209} Bi$

$\left. \begin{aligned} 237 &= 4a + 209 \\ 93 &= 2a - b + 83 \end{aligned} \right\} \Rightarrow a = 7, b = 4 \Rightarrow$ (2)

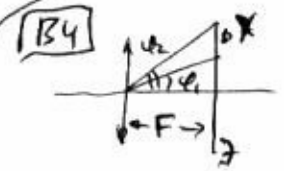
A29 $\frac{h c}{\lambda} = h \nu_{cy} + \frac{m \nu^2}{2} \Rightarrow \nu_{cy} = \frac{c}{\lambda} - \frac{m \nu^2}{2h} = 5,6 \cdot 10^{14}$ (Hz) (3)

A30 (3)

B1 $E_{kin} = E_{pot} = \frac{k A^2}{2} = \frac{200 \cdot (0,01)^2}{2} = 0,01$ (J) (2)

B2 $P = \frac{\rho}{M} R \Gamma \Rightarrow M = \frac{\rho R \Gamma}{P} = \frac{25 \cdot 83 \cdot 223}{10^5} = 0,0588 = 59$ (g/m³)

B3 $F_A = B l J \sin \alpha = 0,6 \cdot 0,2 \cdot 2 \cdot 30 = 0,12$ (N)



$d \sin \alpha = k \lambda \Rightarrow d \sin \alpha = \lambda$
 $F \sin \alpha = d x \Rightarrow \sin \alpha = \frac{d x}{F}$
 $\Rightarrow d = \frac{\lambda F}{\Delta x} = 4,4$ (mm)
 $\lambda = 90$