（令７）

理科 物理

解 答

1

問1 (1) $T\cos(\phi_1-\theta_1)\times l_1 - m\,g\sin\theta_1\times l_0 = 0$

(2) 水平 $T\cos\phi_1 - R_x = 0$

(2) 垂直 $T\sin\phi_1 + R_y - mg = 0$

問2 (3) $\dfrac{l_0(mg\sin\theta_1 + ma\cos\theta_1)}{l_1\cos(\phi_1-\theta_1)}$

(4) $R_x = T\cos\phi_1 - ma$

(4) $R_y = mg - T\sin\phi_1$

問3 (5) $\dfrac{a}{g}$

(6) $-\dfrac{m\sqrt{a^2+g^2}}{l_0}$

(7) $2\pi\sqrt{\dfrac{l_0}{\sqrt{a^2+g^2}}}$

2

問1 (1) eV

(2) $\dfrac{eV}{kL}$

(3) $\dfrac{e^2V^2}{kL^2}$

問2 (4) $\dfrac{eV}{mL}$

(5) $\dfrac{eVT}{mL}$

問3 (6) $\dfrac{2eV}{kL}$

3

問1 (1) $2fl$

(2) $3f$

(3) $\dfrac{4}{3}fl$

(4) $\dfrac{M'}{M} = \dfrac{4}{9}$

問2 (5)① $\dfrac{\pi n}{l}$

(5)② $\dfrac{lc}{\pi n}$

(5)③ $\dfrac{2\pi}{c}$

(6)④ 2

(6)⑤ l

(7)⑥ 14

(7)⑦ $\dfrac{l}{7}$

4

問1 (1) $T_2 = T_1\left(\dfrac{V_1}{V_2}\right)^{\frac{2}{3}}$

(2) $\Delta U_{12} = \dfrac{3}{2}p_1V_1\left\{\left(\dfrac{V_1}{V_2}\right)^{\frac{2}{3}} - 1\right\}$

問2 (3) $T_3 = \dfrac{p_3}{p_2}T_2$

(4) $Q_{23} = \dfrac{3}{2}V_2(p_3 - p_2)$

問3 (5) $T_4 = \dfrac{p_4}{p_1}T_1$

(6) $W_{34} = \dfrac{3}{2}p_4V_1\left\{1 - \left(\dfrac{V_1}{V_2}\right)^{\frac{2}{3}}\right\}$

(7) 式 $\dfrac{Q_{41}}{W_{34}} = \dfrac{1-\left(\dfrac{V_1}{V_2}\right)^{\frac{5}{3}}}{1-\left(\dfrac{V_1}{V_2}\right)^{\frac{2}{3}}}$

(7) 数値 $\dfrac{Q_{41}}{W_{34}} = 1.29$