解　　答

2026	科目名	物理情報：力学

問１

$$I_r > I_d > I_s$$

問２　　球

問３

$$I_r = Ma^2$$

$$I_d = \frac{1}{2}Ma^2$$

問４

(i)

並進運動：　$M\dfrac{d^2x}{dt^2} = Mg\sin\theta - F$

回転運動：　$I\dfrac{d^2\varphi}{dt^2} = N = aF$

(ii)

$$\ddot{x} = \frac{2}{3}g\sin\theta$$

(iii)

$$\frac{1}{2}M\dot{x}^2 = \frac{1}{2}M\cdot\frac{4}{9}g^2\sin^2\theta\cdot t^2 = \frac{2}{3}Mg\ell\sin\theta$$

$$\frac{1}{2}I\dot{\varphi}^2 = \frac{1}{2}\cdot\frac{1}{2}Ma^2\cdot\left(\frac{\dot{x}}{a}\right)^2 = \frac{1}{3}Mg\ell\sin\theta$$

$$\therefore\quad Mg\ell\sin\theta = \frac{2}{3}Mg\ell\sin\theta + \frac{1}{3}Mg\ell\sin\theta \quad \Rightarrow 2:1$$

問５　　1：1