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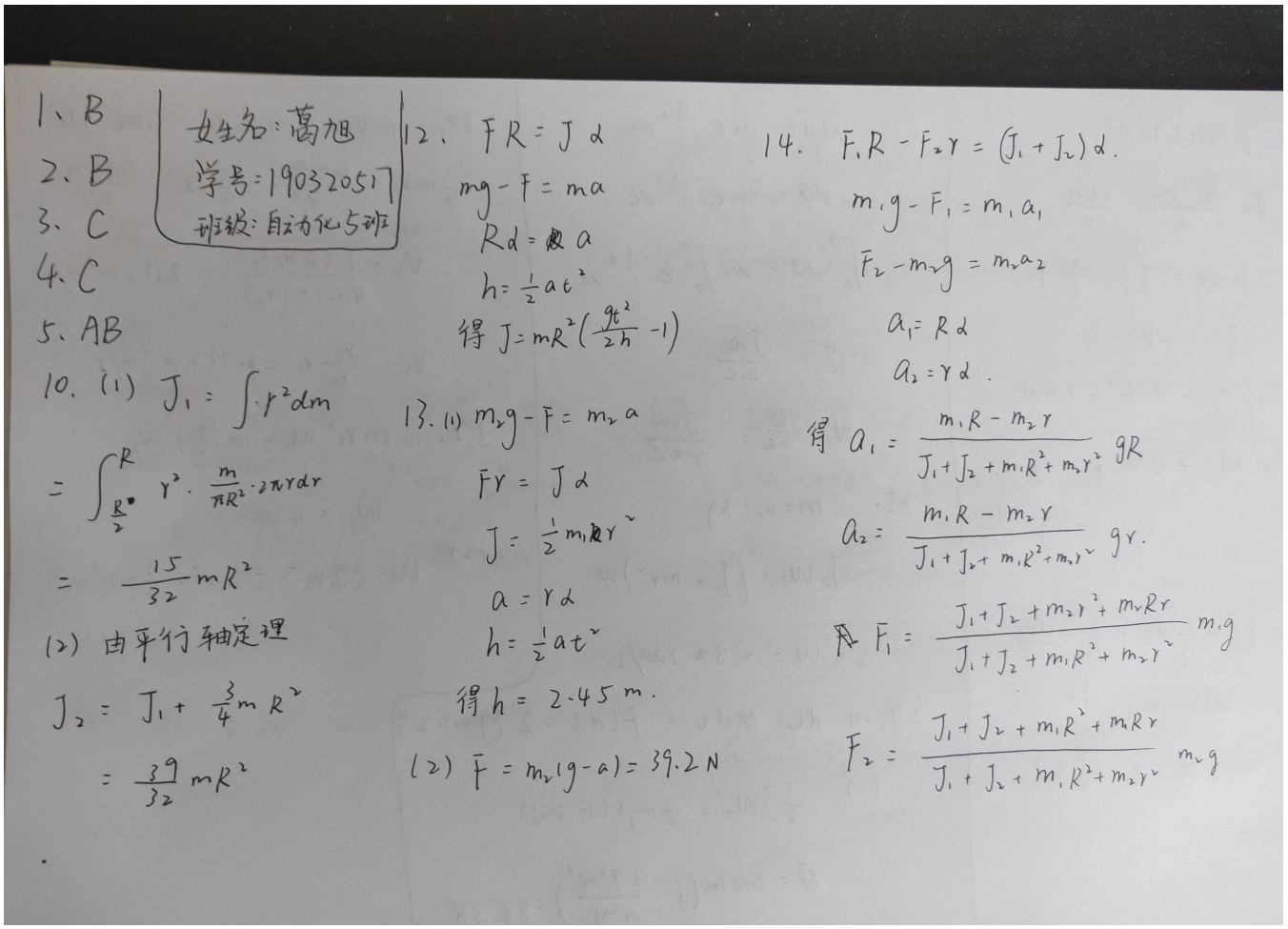

1、B
2、B
3、C
4、C
5、AB

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10. (1) $J_1 = \int r^2 dm$

$= \int_{\frac{R}{2}}^{R} r^2 \cdot \frac{m}{\pi R^2} \cdot 2\pi r dr$

$= \frac{15}{32} m R^2$

(2) 由平行轴定理

$J_2 = J_1 + \frac{3}{4} m R^2$

$= \frac{39}{32} m R^2$

12、$FR = J\alpha$

$mg - F = ma$

$R\alpha = a$

$h = \frac{1}{2} a t^2$

得 $J = mR^2\left(\frac{gt^2}{2h} - 1\right)$

13. (1) $m_2 g - F = m_2 a$

$Fr = J\alpha$

$J = \frac{1}{2} m_1 r^2$

$a = r\alpha$

$h = \frac{1}{2} a t^2$

得 $h = 2.45\ m$.

(2) $F = m_2(g-a) = 39.2\ N$

14. $F_1 R - F_2 r = (J_1 + J_2)\alpha$.

$m_1 g - F_1 = m_1 a_1$

$F_2 - m_2 g = m_2 a_2$

$a_1 = R\alpha$

$a_2 = r\alpha$.

得 $a_1 = \frac{m_1 R - m_2 r}{J_1 + J_2 + m_1 R^2 + m_2 r^2} gR$

$a_2 = \frac{m_1 R - m_2 r}{J_1 + J_2 + m_1 R^2 + m_2 r^2} gr$.

$F_1 = \frac{J_1 + J_2 + m_2 r^2 + m_2 R r}{J_1 + J_2 + m_1 R^2 + m_2 r^2} m_1 g$

$F_2 = \frac{J_1 + J_2 + m_1 R^2 + m_1 R r}{J_1 + J_2 + m_1 R^2 + m_2 r^2} m_2 g$

16. $F(l_1+l_2)=Nl_1$

$\alpha=\left|\frac{w-w_0}{t}\right|=\frac{2\pi n}{t}$

$-\mu NR=J\left(-\frac{2\pi n}{t}\right)$

$J=\frac{1}{2}mR^2$

得 $F=3.14\times10^2=314N$

18. (1) $M=-cw=J\alpha$.

$=J\cdot\frac{dw}{dt}$.

$\therefore\int_0^t-\frac{c}{J}dt=\int_{w_0}^{w}\frac{dw}{w}$

$w=w_0e^{-\frac{c}{J}t}$

$w=\frac{1}{2}w_0\quad t=\frac{J}{c}\ln^2$

(2) $w\,dt=w_0e^{-\frac{c}{J}t}dt$

$d\theta=w_0e^{-\frac{c}{J}t}dt$

$\int_0^\theta d\theta=w_0\int_0^t e^{-\frac{c}{J}t}dt$

$\theta=\frac{Jw_0}{2c}$

$N=\frac{\theta}{2\pi}=\frac{Jw_0}{4\pi c}$

25. $m=0.1kg$

$J_0w_0=(J_0+mr^2)w$

$w=0.8\pi\ rad/s$.

29. (1) $dL=M\,dt=\bar{F}l\,dt=2\ kg\cdot m^2\cdot s^{-1}$

(2) $\frac{1}{2}Jw_0^2=\frac{1}{2}mgl(1-\cos\theta)$

$\theta=\arccos\left(1-\frac{3F^2\Delta t^2}{m^2gl}\right)=88°38'$

30. $mv_1r_1=mv_2r_2\quad Gm_E=gr_E^2$.

$\frac{1}{2}mv_1^2-\frac{Gmm_E}{r_1^2}=\frac{1}{2}mv_2^2-\frac{Gmm_E}{r_2^2}$

$v_1=\sqrt{\frac{2GM_Er_2}{r_1(r_1+r_2)}}=8.11\times10^3\ m/s$

$v_2=\frac{r_1}{r_2}v_1=6.31\times10^3\ m/s$.

32. (1) $mr_2^2w_0=m\left(\frac{r_2}{2}\right)^2w_1$

$w_1=4w_0$

(2) $W=\frac{1}{2}J_1w_1^2-\frac{1}{2}J_0w_0^2=\frac{3}{2}mr_0^2w_0^2$

33. (1) $M = J\alpha$.

$J = \frac{1}{3}ml^2$

得 $\alpha = \frac{M}{J} = \frac{mg\cdot\frac{1}{2}l\cos\theta}{\frac{1}{3}ml^2} = \frac{3g\cos 60°}{2l}$

$\alpha = 18.4\ rad/s^2$

~~(2) $E_k =$~~ $\alpha = \frac{dw}{dt} = \frac{dw}{d\theta}\frac{d\theta}{dt} = \frac{w\,dw}{d\theta}$

$\alpha\,d\theta = w\,dw$ $\int_0^\theta \frac{3g\cos\theta}{2l}d\theta = \int_0^w w\,dw$

$w = \sqrt{\frac{3g\sin\theta}{l}}\Big|_0^{60°} = 7.98\ rad/s$.

(2) $E_k = mg\frac{l}{2} = 0.98\ J$

(3) $E_k = \frac{1}{2}Jw^2$ $w = 8.57\ rad/s$.

35. 由角动量守恒.

$mv_0 l = \left(\frac{1}{3}m'l^2 + m'l^2\right)w + m\frac{4}{2}l$

由 $\frac{1}{2}\left(\frac{1}{3}m'l^2 + m'l^2\right)w^2 = m'gl + 2m'gl$

$V = \frac{4m'}{m}\sqrt{2gl}$

37. $J_0 w_0 = (J_0 + mR^2)w_1$

$\frac{1}{2}J_0 w_0^2 + mgR = \frac{1}{2}(J_0 + mR^2)w_1^2 + \frac{1}{2}mV_t^2$

$w_1 = \frac{J_0 w_0}{J_0 + mR^2}$

$V_2 = \sqrt{2gR + \frac{J_0 w_0^2 R}{J_0 + mR^2}}$

在 C 点 $V_2 = \sqrt{4gR}$.

$w_2 = w_0$.

39. $mv_0 = (m+m')V_1$

$(m+m')l_0 V_1 = (m+m')lV\sin\theta$

$\frac{1}{2}(m+m')V_1^2 = \frac{1}{2}(m+m')V^2 + \frac{1}{2}k(l-l_0)^2$

$V = \sqrt{\left(\frac{m}{m'+m}\right)^2 v_0^2 - \frac{k(l-l_0)^2}{m'+m}}$

$\theta = \arcsin\frac{mv_0 l_0}{(m'+m)vl}$

40. (1) $\bar{F}\,\Delta t = mv_c$

$-\bar{F}\frac{l}{2}\Delta t = J(w'-w)$

$J = \frac{1}{12}ml^2$

$v_c = \frac{l}{2}w'$

$w' = \frac{J}{J + \frac{1}{4}ml^2}w = \frac{1}{4}w$

(2) $\Delta E_k = \frac{1}{2}J'w'^2 - \frac{1}{2}Jw^2 = -\frac{1}{32}ml^2w^2$