

# 作业九

Noflowerzzk

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## 4 - 20

(1)  $y$  轴正方向

(2)  $H = \sqrt{2}L$

## 4 - 21

$a = \frac{2}{3}g$  竖直向下,  $T = \frac{1}{3}mg$ , 沿绳向上.

## 4 - 22

$mg(R+r) = \frac{1}{2}m(\omega r)^2 + \frac{1}{2}J\omega^2$  得  $v = \sqrt{\frac{10}{7}g(R+r)}$ . 又  $N - mg = m\frac{v^2}{R+r}$  有  $N = \frac{17}{7}mg$

## 4 - 23

球与地面接触点为  $A$ , 易得球对  $A$  角动量守恒.  $L_0 = Ih = m(\omega R)R + \frac{2}{5}mR^2\omega$ . 有  $\omega = \frac{5Ih}{7mR^2}$

## 5 - 1

$$\Delta l = l_0 \left(1 - \sqrt{1 - \beta^2}\right) = 1.25 \times 10^{-14}\text{m}$$

## 5 - 2

$$v = 0.5c$$
$$\Delta t_0 = \Delta t \sqrt{1 - \beta^2} = 0.866s$$

## 5 - 3

$$v = \frac{c + 0.8c}{1 + 0.8} = c$$