P8.

1.B

A 重力在速度方向上的分力，大小在变，a_τ 不为恒量

B 正确

$$F_N - mg\sin\theta = ma_n = m\frac{v^2}{R}$$

$$F_N = m\frac{v^2}{R} + mg\sin\theta$$

$$\theta\uparrow\ v\uparrow\ F_N\uparrow$$

C 合外力为重力和支持力的合力，错

D 错

2.C

说的是“静摩擦力”，应和重力构成平衡力。

3A

$$s = \frac{1}{2}at^2$$

$$t = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2\cdot 2R\cos\theta}{g\cos\theta}}$$

$$= 2\sqrt{\frac{R}{g}}$$

4D

$$mg = F\cos\theta$$

$$F\sin\theta = \frac{mg}{\cos\theta}\sin\theta = mr\omega^2$$

$$mg\tan\theta = m\cdot L\sin\theta\cdot(\frac{2\pi}{T})^2$$

$$\frac{g}{\cos\theta} = L\cdot(\frac{2\pi}{T})^2$$

$$\frac{2\pi}{T} = \sqrt{\frac{g}{L\cos\theta}}$$

$$T = 2\pi\sqrt{\frac{L\cos\theta}{g}}$$

5A

$$mg = k(v_{\max})^2$$

$$v_{\max} = \sqrt{\frac{mg}{k}}$$

6

对m_2:

$$F + N = m_2a$$

对m_1:

$$F - N = m_1a$$

$$F + N > F - N$$

$$0 < N < F$$

7B

$$\mu\cdot F\cos\theta + G \geq F\sin\theta$$

$$\mu\cdot F\frac{\sqrt{3}}{2} + G \geq F\frac{1}{2}$$

$$\mu\cdot \geq (F\frac{1}{2} - G)/F\frac{\sqrt{3}}{2}$$

$$\mu\cdot \geq \frac{1-\frac{2G}{F}}{\sqrt{3}}$$

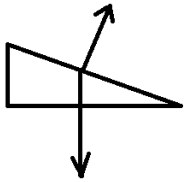
$$\because F\frac{1}{2} - G > 0$$

$$\therefore F > 2G$$

$$\therefore 1-\frac{2G}{F} < 1, F\to\infty, 1-\frac{2G}{F} = 1$$

$$\mu\cdot \geq \frac{1}{\sqrt{3}}$$

8B

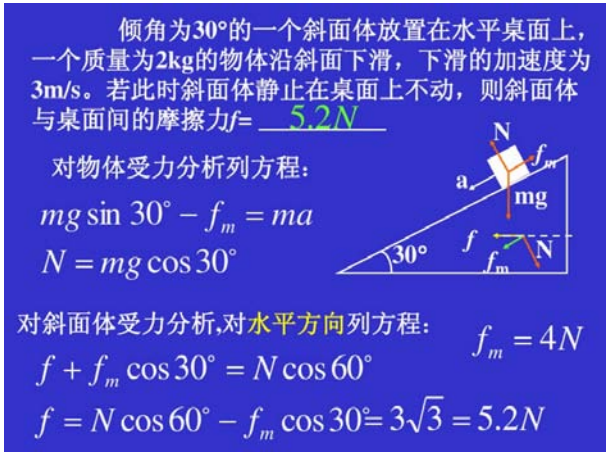


$$\begin{cases} N\sin\theta = m\dfrac{v^2}{R} \\ N\cos\theta = mg \end{cases}$$

$$v = \sqrt{Rgtg\theta}$$

9

5.2N



10

$\dfrac{F_0}{m\omega^2}(1-\cos\omega t)+x_0$

$$a = \frac{dv}{dt} = \frac{F_0}{m}\cos\omega t$$

$$\int_0^v dv = \int_0^t \frac{F_0}{m}\cos\omega t\cdot dt$$

$$v = \frac{dx}{dt} = \frac{F_0}{\omega m}\sin\omega t$$

$$\int_{x_0}^x dx = \int_0^t \frac{F_0}{\omega m}\sin\omega t\cdot dt$$

$$x - x_0 = -\frac{F_0}{\omega^2 m}\cos\omega t + \frac{F_0}{\omega^2 m}$$

$$x = \frac{F_0}{\omega^2 m}(1-\cos\omega t) + x_0$$

11

$$F - m_2 g = (m_1 + m_2)a$$

$$a = \frac{F - m_2 g}{m_1 + m_2}$$

$$T - m_2 g = m_2 a$$

$$T = m_2(a+g)$$

$$= \frac{m_2 F - m_2^{\,2} g}{m_1 + m_2} + m_2 g$$

12B

小珠所在处圆环半径偏离竖直方向的角度为 θ

$$\begin{cases} N\cos\theta = mg \\ N\sin\theta = m\omega^2 R\sin\theta \end{cases}$$

所以，可得：$\cos\theta = \dfrac{g}{\omega^2 R}$

13D

$$(MA+MB)g - N = (MA+MB)a$$

$$(MA+MB)(g-a) = N$$

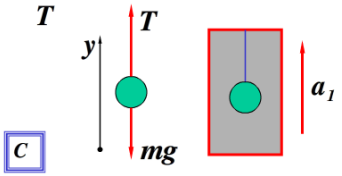
14C

$$\frac{1}{2}T - mg = ma_1$$

$$T - mg = ma$$

得：$a = 2a_1 + g$

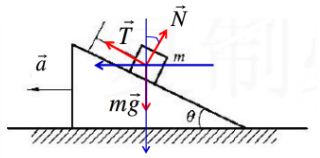
C

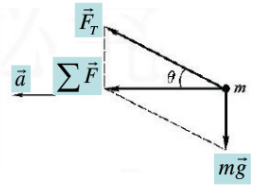


15

如图所示，质量为**m**的物体用平行于斜面的细线联结置于光滑的斜面上，若斜面向左方作加速运动，当物体刚脱离斜面时，它的加速度的大小为(**D**)

$(A)g\sin\theta$　　$(B)g\cos\theta$　　$(C)g\tan\theta$　　$(D)g\cot\theta$





$$\begin{cases} T\cos\theta - N\sin\theta = ma \\ T\sin\theta + N\cos\theta = mg \end{cases}$$ 或 $$\frac{mg}{\tan\theta} = ma$$

16

$$a=\frac{4}{5}g$$

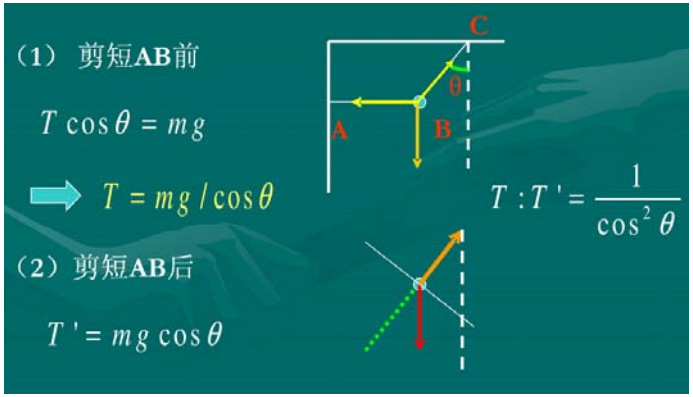
绳子张力 F

$$B: 2F = m\cdot\frac{a}{2}$$

$$A: mg - F = ma$$

$$a=\frac{4}{5}g$$

17



18

解：设绳子与水平方向的夹角为θ，则 $\sin\theta = h/l$

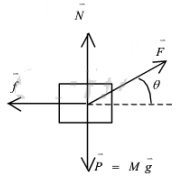
木箱受力如图所示，匀速前进时, 拉力为F, 有

$$F\cos\theta - f = 0$$

$$F\sin\theta + N - Mg = 0$$

$$f = \mu N$$

得 $$F = \frac{\mu Mg}{\cos\theta + \mu\sin\theta}$$



令 $$\frac{dF}{d\theta} = -\frac{\mu Mg(-\sin\theta + \mu\cos\theta)}{(\cos\theta + \mu\sin\theta)^2} = 0$$

$\Rightarrow$ $\operatorname{tg}\theta = \mu$　　$\theta = 30.1°$

又 $$\frac{d^2F}{d\theta^2} > 0$$

所以$l = h/\sin\theta = 2.99$ m时，最省力