

物理参考答案

一、选择题

题号	1	2	3	4	5	6	7	8	9	10
答案	C	B	B	D	C	D	B	BD	BCD	ACD

二、实验题

11、(1)B (2)0.50 1.44 12、(1) $\frac{d}{\Delta t}$ (2)b 2b/a

三、计算题

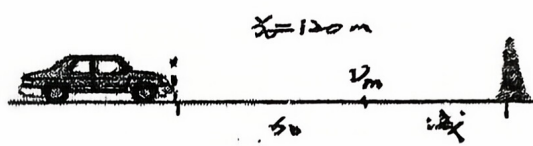
13、解：经分析可知，当赛车恰好与雪糕筒接触时刹车点最晚

$$\frac{1}{2}a_1 t_1^2 + \frac{1}{2}a_2 t_2^2 = 120$$

$$a_1 t_1 = a_2 t_2$$

$$\Rightarrow \begin{cases} t_1 = 6 \text{ s} \\ t_2 = 4 \text{ s} \end{cases}$$

$$\begin{aligned} x_2 &= \frac{1}{2}a_2 t_2^2 \\ &= 48 \text{ m} \end{aligned}$$



14、解：A 刚要运动时对 A 物块做受力分析

$$\begin{aligned} \text{① } \text{对 A: } & \begin{cases} F + kx_0 = \mu m_2 g \\ = 3 \text{ N} \end{cases} \end{aligned}$$



$$\text{② } \text{对 B: } \begin{cases} k(x_0 - x) = \mu m_1 g \\ x = 0.05 \text{ m} \end{cases}$$

③ 当 $0 < x < 0.05 \text{ m}$ 时.

$$F + k(x_0 - x) = \mu m_2 g$$

$$F = 200x + 3 \text{ (N)}$$

④ 当 $0.05 \text{ m} < x < 0.06 \text{ m}$ 时.

B 块静止.

$$\text{对 A: } \begin{cases} F - kx_2 = \mu m_2 g \\ kx_2 = \mu m_1 g \end{cases}$$

$$x_2 = 0.05 \text{ m}$$

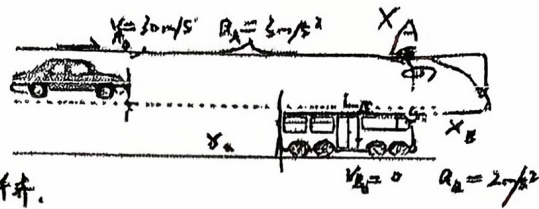
$$\begin{aligned} \text{对 A: } & \begin{cases} F - k(x - 0.05) = \mu m_2 g \\ = 200x + 3 \text{ (N)} \end{cases} \end{aligned}$$

$$\text{综上: } F = 200x + 3 \text{ (N)} \quad (0 \leq x \leq 0.06 \text{ m})$$

15、解：(温馨提示)做好示意图→分析运动过程

$$v_A^2 = 2a_A x_A$$

$$x_A = 150\text{m}$$



ii. 共速时，小车的车头恰与大客车车头并齐。

$$v_A - a_A t = a_B t$$

$$\text{即 } 30 - 3t = 2t \Rightarrow t = 6\text{s}$$

$$x_A = x_0 + x_B + L_0$$

$$\text{即 } 30 \times 6 - \frac{1}{2} \times 3 \times 6^2 = x_0 + \frac{1}{2} \times 2 \times 6^2 + 8$$

$$\Rightarrow x_0 = 82\text{m}$$

从A刹车到小车的车头与大客车车尾用时 t_1

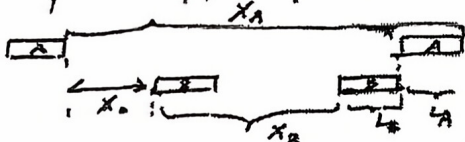
$$x_A = x_0 + x_B$$

$$v_A t_1 - \frac{1}{2} a_A t_1^2 = 27.5 + \frac{1}{2} a_B t_1^2$$

$$\text{解得 } t_1 = 1\text{s} \text{ 或 } t_2 = 11\text{s}$$

$$\text{A 停车用时 } t_{A1} = \frac{v_A}{a_A} = 10\text{s}, 11\text{s}$$

从A刹车到小车的车尾离开大客车车尾用时 t_2



$$x_A = x_0 + x_B + L_B + L_A$$

$$v_A t_2 - \frac{1}{2} a_A t_2^2 = 27.5 + 8 + \frac{1}{2} a_B t_2^2 + 10$$

$$\text{解得 } t_2 = 10\text{s} \text{ 或 } t_2 = 10.175\text{s}$$

$$\text{即 } t_2 = 10\text{s} \text{ 或 } t_2 = 10.175\text{s} > 10\text{s} \text{ (舍)}$$

$$\text{第一次超车用时 } \Delta t_1 = 10 - 1 = 9\text{s}$$



$$\text{A 停车时, } x_A = \frac{v_A^2}{2a_A} = 150\text{m}$$

$$x_B = \frac{1}{2} a_B t_1^2 = 100\text{m}$$



$$\text{此时 B 车头落后 A 车尾 } \Delta x$$

$$\Delta x = 150 - 100 - 27.5 - 3 \times 7.5 - 8 = 10.625\text{m}$$

$$v_B = a_B t_{B1} = 20\text{m/s}$$

A 停车后 B 再以 t_4 到达 A 的后部

$$v_B t_4 + \frac{1}{2} a_B t_4^2 = \Delta x$$

$$\text{即 } 20t_4 + \frac{1}{2} t_4^2 = 10.625$$

$$t_4 = 10 + \sqrt{\frac{21.25}{2}} \text{ 或 } 10 - \sqrt{\frac{21.25}{2}}$$

A 停后, B 再以 t_5 到 A 的车头.



$$v_B t_5 + \frac{1}{2} a_B t_5^2 = \Delta x + L_A + L_B$$

$$\text{即 } 20t_5 + \frac{1}{2} t_5^2 = 22.5$$

$$t_5 = 10 + \sqrt{\frac{21.25}{2}} \text{ 或 } 10 - \sqrt{\frac{21.25}{2}}$$

$$\Delta t_2 = t_5 - t_4$$

$$= \sqrt{\frac{21.25}{2}} - \sqrt{\frac{21.25}{2}}$$

$$\Rightarrow \Delta t = \frac{1}{2} + \sqrt{\frac{21.25}{2}} - \sqrt{\frac{21.25}{2}}$$