HKCEE PHYSICS

2006 HKCEE Physics Paper II

Suggested Solutions

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2006 HKCEE Physics Paper II Suggested Answer

1.	B	2.	*D	3.	B	4.	D	5.	C
6.	A	7.	C	8.	C	9.	A	10.	D
11.	D	12.	A	13.	B	14.	C	15.	A
16.	B	17.	A	18.	C	19.	B	20.	A
21.	B	22.	B	23.	D	24.	A	25.	D
26.	C	27.	D	28.	A	29.	B	30.	D
31.	B	32.	D	33.	A	34.	D	35.	B
36.	B	37.	C	38.	D	39.	C	40.	A
41.	A	42.	C	43.	D	44.	C	45.	*D

*** Deleted in live paper**

Section A

1. **B**

黎 Sir 提提你 :

(1)

Average Velocity = Total Displacement / Total Time Taken

Total Displacement = Area under the curve of v-t graph

$\because$ Area under the curve A $\neq$ Area under curve B

$\Rightarrow$ Total displacement of A $\neq$ Total displacement of B

$\Rightarrow$ Average Velocity of A $\neq$ Average Velocity of B

(2)

$$\text{Average Acceleration} = \frac{\text{Final Velocity - Initial Velocity}}{\text{Total Time Taken}}$$

$\because$ Final Velocity of A = Final Velocity of B

$\because$ Final Velocity of A = Final Velocity of B

$\because$ Total Time Taken of A = Total Time Taken of B

$\Rightarrow$ Average Acceleration of A = Acceleration of B

(3)

Total Displacement = Area under the curve of v-t graph

$\because$ Area under the curve A $\neq$ Area under curve B

$\Rightarrow$ Total displacement of A $\neq$ Total displacement of B

2. ***D**

黎 Sir 提提你 :

(1)

If the vehicle stops suddenly, by inertia, the passengers will keep go forward and may rush to the front windows. However, with the seat belts, it will provide a backward force and stop the passenger go forward.

(2)

Mass is a measure of Inertia. ***

Mass $\uparrow \Rightarrow$ Inertia $\uparrow \Rightarrow$ More difficult to stop the vehicle.

(3)

Speed $\uparrow \Rightarrow$ More difficult to stop the car with the same velocity

Remarks: This question is deleted in live paper.

3. **B**

黎 Sir 提提你 :

(1)

Law of Conversation of Energy:
Energy in a system cannot be created or destroyed,
it can only be changed from one form to another form. ***

Loss of P.E. = Gain in K.E.

$\Rightarrow$ Same Speed when the marble reaches the ends of both rails, But the direction of the velocity is not the same.

(2)

$\theta_A > \theta_B$,
$u_A = u_B = 0$,
$v_A = v_B$,
$a_A = mg\sin\theta_A > a_B = mg\sin\theta_B$,

By Law of conversation of Energy,
Loss of P.E. = Gain in K.E.
$\Rightarrow$K.E. is the same when it reaches the ends of both rails

(3)

By $a = \dfrac{v-u}{t}$

Rail A: $a_A = \dfrac{v_A - u_A}{t_A} \Rightarrow t_A = \dfrac{v_A}{a_A} = \dfrac{v_A}{mg\sin\theta_A}$

Rail B: $a_B = \dfrac{v_B - u_B}{t_B} \Rightarrow t_B = \dfrac{v_A}{a_B} = \dfrac{v_A}{mg\sin\theta_B} > t_A$

So marble travel through rail A will reach the end first.

4. **D**

黎 Sir 提提你 :

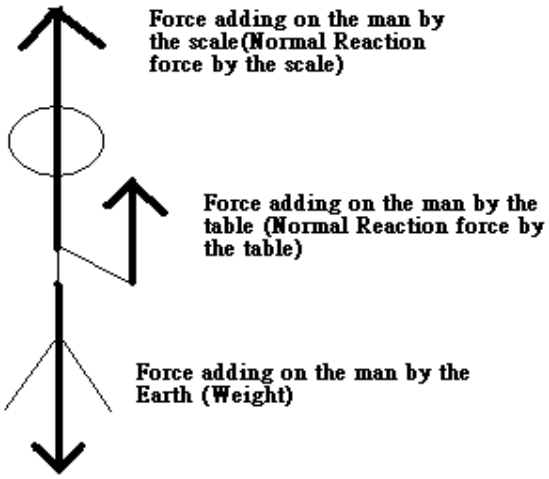
By **Newton's 2nd Law: F = ma**

$Friction(f) = ma$,
$-0.65mg = ma$,
$a = -0.65g$,
$v^2 - u^2 = 2as$
$0 - u^2 = 2*(-0.65g)*(22.3)$
$u^2 = 289.9$
$u = 17.02 \approx 17 ms^{-1}$

5.	**C**	**黎 Sir 提提你 :** 1. When the high-diver jumps up into the air $\Rightarrow$ K.E. is max, 2. During the high-diver is jumping up $\Rightarrow$ P.E. $\uparrow$ $\Rightarrow$ K.E. $\downarrow$, 3. At the highest pt, $\Rightarrow$ P.E. is max. $\Rightarrow$ K.E. = zero, 4. After reaching the highest pt, he falls down $\Rightarrow$ P.E. $\downarrow$ $\Rightarrow$ K.E. $\uparrow$

6.	**A**	**黎 Sir 提提你 :** By Law of conservation of momentum, the total momentum of the whole system wills remains unchanged provided that there is no external force adding on the system. In this case, there is no external force acting on the system. Therefore, the trolley remains stationery.

7.	**C**	**黎 Sir 提提你 :** 1. Free Fall Body $\Rightarrow$ Acceleration is due to Gravity (g) only 2. v-t graph, slope=acceleration=gravity 3. $g_{Moon} = \frac{1}{6} g_{Earth}$, Slope of Earth>Slope of Moon

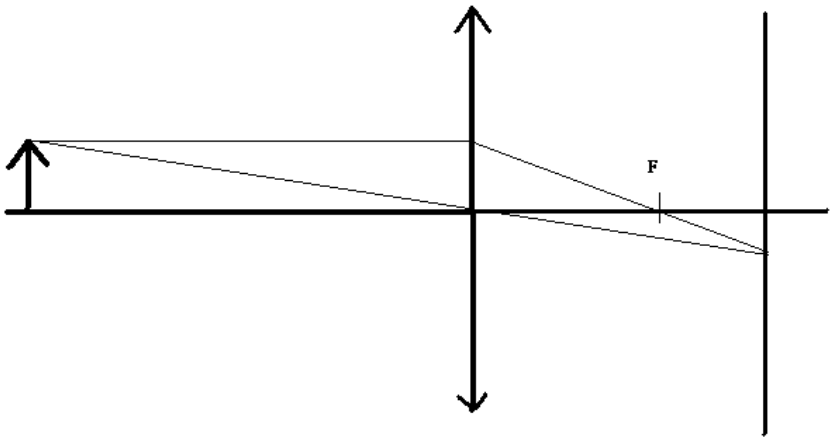
8.	**C**	**黎 Sir 提提你 :** 1. The Reading of the Scale = The Force adding on the scale by the man. 2. By Newton's 3rd law, The Force adding on the scale by the man = The Force adding on the man by the scale. i.e. $F_{AB} = F_{BA}$ 3. The Force adding on the man by the scale is so-called "Normal Reaction(R)". 4. By Newton's 3rd law, The Force adding on the table by the man = The Force adding on the man by the table. i.e. $F_{AB} = F_{BA}$ 5. In conclusion, The Force Diagram of the man will be shown as follows:  Without F, R=W With F, R+F=W $\Rightarrow$ R=W-F

9.	**A**	**黎 Sir 提提你 :** (3) Vacuum can reduce heat loss by conduction. Radiation can travel through Vacuum.

10.	**D**	**黎 Sir 提提你 :** (1) "Heat Shields" have to be a good insulator of heat rather than a good conductor of heat. (2) A high melting point make the space shuttle not melt easily. (3) High Specific Heat Capacity means a lot of Energy is needed to increase the temperature of the space shuttle.

11.	**D**	**黎 Sir 提提你 :** $E = ml$ (Changing State) E=P*t, $E = ml \Rightarrow l = \frac{P}{m}t$ $\Rightarrow$ The shorter the time, the larger the latent heat $\Rightarrow$ The specific latent heat of fusion of X is smaller than the specific latent heat of vaporization of X

12.	**A**	**黎 Sir 提提你 :** Energy loss by the juice = Energy gained by the ice cubes $mc\Delta T = ml + mc\Delta T$ (2)(4700)(80-20)=(n)(0.15)* $3.34x10^5$ +(n)(0.15)*(4200)*(20-0) 564000=50100n+12600n n=8.99 ~ 9

13.	**B**	**黎 Sir 提提你 :** By Construction Ray Diagram below, you will find the focal length is between 8 cm and 10 cm. 

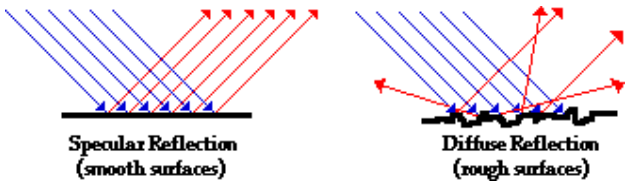
14.	**C**	**黎 Sir 提提你 :** (1) Image of water pond = image of a plane mirror = virtual image (2) Image of a magnifying glass is always virtual, magnified and erect (3) A real image can be formed on a screen. This is definition of real image.

15.	**A**	**黎 Sir 提提你 :** (1) When Q reaches medium B, it bend always from the normal means the speed of the wave increase (2) By wave equation, $v = f\lambda$, so the wavelength will increase due to the increase in the speed.

16.	**B**	**黎 Sir 提提你 :** By $v = f\lambda$, $v = \frac{s}{t} = f\lambda$, $\frac{1500000}{t} = 2*100$, $t = \frac{1500000}{200}$, $t = 2.08hour \sim 2hours$

17.	**A**	**黎 Sir 提提你 :** (1) It true since λ is directly proportional to $\frac{1}{f}$, it means wavelength is inversely proportional to its frequency. (2) Slope = $\frac{\lambda}{\frac{1}{f}} = f\lambda = v$ (3) It is totally wrong, the speed of sound is constant for all frequency.

18.	**C**	**黎 Sir 提提你 :** (1) Sound wave is longitudinal wave (2) Speed of sound wave in solid is faster than the Speed of sound wave in air (3) The frequency of sound depends on the source only, not depends the medium of travel

19.	**B**	**黎 Sir 提提你 :**  (1) A blackboard is a rough surface, so Diffuse Reflection occurs. (2) A polished metal surface is a smooth surface, so Diffuse Reflection does not occur (3) A page is a rough surface, so Diffuse Reflection occurs.

20.	**A**	**黎 Sir 提提你 :** (1) The velocity of water waves in the deep water is different from the velocity of water wavers in the shallow water. (2) This due the the velocity of light in air is different from the velocity of light in water (3) This is the phenomenon is called Interference.
21.	**B**	**黎 Sir 提提你 :** Electric Power = $\frac{24}{600} x \frac{1}{2/60} x1000 = 1200W$
22.	**B**	**黎 Sir 提提你 :** (1) Unlike charges attract. (2) Uncharged materials cannot attract each others. (3) The charge in the ruler will induce an opposite charge in the paper scraps when the ruler bring near the paper scraps.
23.	**D**	**黎 Sir 提提你 :** $I = \frac{Q}{t}$, $0.8 = \frac{Q}{60}$, Q=48C, so no. of electron = $\frac{48}{1.6x10^{-19}} = 3x10^{20}$
24.	**A**	**黎 Sir 提提你 :** The current through pt. P = 1+1+1+1=4A $P = VI$, $P = (6)(1) = 6W$
25.	**D**	**黎 Sir 提提你 :** (1) If the resistance is too large, the current will decrease and will decrease the chance of blowing the fuses. (2) If short-circuited, the resistance will become extremely small and the current will become extremely high and may blow the fuses (3) If the rated value is too small, the operating current may be larger than the current rating of the fuse.

26.	**C**	**黎 Sir 提提你 :** If Z breaks, the potential difference across Y will increase since the equivalent resistance (before is Z//Y, now is only Y) between Y will be doubled. Therefore, the brightness of Y will increase. So the potential difference between X will drop and so do the brightness of X will decrease.

27.	**D**	**黎 Sir 提提你 :** The gamma ray only pass through the food and will not make the foods radioactive.

The End of Section A.

Section B		
28.	**A**	**黎 Sir 提提你 :** Undergo uniform acceleration, The speed will increase constantly. Therefore, the time traveling the 1st half > the time traveling the 2nd half. For v_1, since it is the speed at the instant when half of the journey time from A to B is elapsed, so it must behind the midway of AB. Therefore, $v_1 > v_2$.
29.	**B**	**黎 Sir 提提你 :** In equilibrium, $mg = 2T\cos\theta$ $T = \frac{mg}{2\cos\theta}$, since $0^\circ < \theta < 60^\circ$, $\cos 60^\circ < \cos\theta < \cos 0°$, $0.866 < \cos\theta < 1$ $\therefore mg > T > \frac{mg}{2}$
30.	**D**	**黎 Sir 提提你 :** $F = 50\cos 40^\circ x2 = 76.6N$
31.	**B**	**黎 Sir 提提你 :** F=ma, To deduce the relationship between the acceleration and the net force acting on the trolley, the total mass of the loaded trolley have to be fixed.
32.	**D**	**黎 Sir 提提你 :** From the diagram, we can deduce the fact that the critical angle, C, of the prism $\leq 45°$, by $C = \sin^{-1}(\frac{1}{n}) \leq 45°$, by trial and error, n = 1.45 or 1.55

33.	**A**	**黎 Sir 提提你 :** (1) Speed of infrared = $3x10^8 ms^{-1}$, while Speed of Ultrasonic Wave = Speed of sound wave = $330ms^{-1}$ (2) It is irrelevant. The infrared is emitted by the flash lamp, not by the object. (3) Ultrasonic wave is sound wave with frequency higher than 20000 Hz, human cannot hear such high frequency sound and so will not feel annoyed.

34.	**D**	**黎 Sir 提提你 :** (1) Higher Pitch means Higher Frequency (2) Louder the note means Higher Intensity Level (3) This is due to the overtones of the note by piano are different form that by guitar, although their fundamental frequencies are the same.

35.	**B**	**黎 Sir 提提你 :** $P = VI = (3.6)(\frac{0.8x3600}{3x24x3600}) = 40mW$

36.	**B**	**黎 Sir 提提你 :** All (1) and (3) can increase magnetic field induced by the coil when a signal passing through it.

37.	**C**	**黎 Sir 提提你 :** By $\frac{V_p}{V_s} = \frac{N_p}{N_s}$, since V_p, N_p, N_s remains unchanged, so V_s remains unchanged., for light bulb X, $P = \frac{V^2}{R}$, therefore, the brightness of X will remain unchanged. However, due to the absence of branch Y, the current in the secondary I_s will decrease. By $\frac{I_s}{I_p} = \frac{N_p}{N_s}$, I_p will decrease and so the ammeter reading will decrease.

38. **D**

黎 Sir 提提你 :

(1) That's one of the primary purpose of the adaptor. Moreover, 220V to human is very dangerous

(2) Many circuit design in electronic circuit is using direct current.

(3) Black in color can radiate heat quicker. That's also the reason why the spacesuit of astronaut is also sliver in color, not black in color, to reduce the rate of heat loss.

39. **C**

黎 Sir 提提你 :

The potential difference between the live and the neutral wire should be 220V, and there should be no current passing through the Earth Wire.

40. **A**

黎 Sir 提提你 :

$$P = \frac{V^2}{R},\quad R_1 = \frac{V^2}{P} = \frac{220^2}{50}, R_2 = \frac{V^2}{P} = \frac{220^2}{100},$$

$$I = \frac{V}{R} = \frac{220}{(\frac{220^2}{50} + \frac{220^2}{100})} = 0.15A$$

41. **A**

黎 Sir 提提你 :

$$\frac{V^2}{R} = 600,\quad P_{new} = \frac{V^2}{6R} = \frac{600}{6} = 100W$$

42. **C**

黎 Sir 提提你 :

After	X	Y
2 days	N/2	8N/2x2=2N
4 days	N/4	2N/2x2=N/2
6 days	N/8	N/2x2x2=N/8

43. **D**

黎 Sir 提提你 :

α decay: -2 p, -2n
β decay: +1p, -1n
γ decay: 0p, 0n

	No. of Proton	No. of Neutron
X	A	b
Y	a-2	b-2
Z	a-2+1=a-1	b-2-1=b-3
P	a-2	b-2
Q	a-2+1=a-1	b-2-1=b-3
R	a-1+1=a	b-3-1=b-4
S	a-2	b-4-2=b-6

44. **C**

黎 Sir 提提你 :

$W - R = -ma$

$R = W + ma$

$\therefore$ The reading of the scale becomes greater.

However, the gravitational force (W) acting on the woman is the same.

45. ***D**

黎 Sir 提提你 :

The white mist appearing above a cup of hot tea is water in liquid state floating in the air. The formation of white mist is because of the cold air above the air.

The water molecules on the surface of the hot tea get enough kinetic energy to escape. This phenomenon is called evaporation.

Remarks: This question is deleted in live paper.

The End.

黎 Sir 教室 A Lai Learning Center

HKCEE / HKALE / HKDSE / F.1 - F.7 / MO

AP / SAT / IB / GCSE / IGCSE / GCE / HSC

資深中學補習導師 小組補習 事半功倍!!!

黎 sir 簡介

- ✧ 畢業於香港中文大學，黎 sir 教室創辦人之一.
- ✧ 多年教授會考 / 高考 / 中學文憑 / IB Diploma / SAT / AP / GCSE / IGCSE / GCE/ HSC 課程經驗，信心保證.
- ✧ 現於黎 sir 教室及中學任教補習班，學生就讀於英文中學，中文中學，國際學校及英國留學生.
- ✧ 熟悉近年出題趨勢，教授考試取分技巧；鼓勵同學獨立思考，增強同學理解能力
- ✧ 善用生活化例子講解，教法生動，增加學習趣味；深入淺出，明白學生學習上的困難和需要.
- ✧ 中英對照筆記，適合中文和英文中學學生就讀；精心編制練習和試題，協助同學盡快掌握答題技巧.
- ✧ 黎 sir 在中學和大學時代已是一名傑出學生，曾獲取多項學業上和運動上的獎學金及獎項；
  曾代表香港參加國際性運動比賽，取得優異成績，「又讀得又玩得」，絕不是死讀書的書呆子.
- ✧ 黎 sir 在就讀大學時曾於全球最大美資電腦公司任實習生超過一年，大學畢業後旋即於全港最大英資電腦公司，
  負責主理該公司所代理的全球最大美資電腦公司儲存系統銷售業務(當時黎 sir 只得 24 歲).
- ✧ 於短短半年內將該產品線銷售業績提升超過 50%. 同時更被公司評選為"傑出表現員工 Outstanding Performer”，
  成功將書本上的知識靈活運用於工作上.
- ✧ 黎 sir 為了教學理想，毅然辭去工作，全身投入教學事業，希望將自己的一套獨特的學習方法教授學生
- ✧ 黎 sir 學生於 2009 年公開考試成績優異，包括:
- ✧ 兩位學生成功拔尖，入讀港大科學系和中大法律系;
- ✧ 國際預科文憑 (IB Diploma) 經濟科獲取最高等級 (7 級) 成績;
- ✧ 多位學生於英國普通教育文憑(GCE)及英國普通中學教育文憑(GCSE)獲取 A/A*成績;
- ✧ 2009 年度 8 位學生參加香港中學會考, 6 位取得 20 分以上佳績，並且所有科目皆取得 ABC 等等級，其中 1 位文
  科生更獲取 26 分佳績，整體 ABC 率達 78%，整體合格率達 100%. 名符其實是小班教學，事半功倍.

課程特色

- ✧ 小組教學(1 – 6 人)，導師親身教學；照顧每位學生需要，事半功倍.
- ✧ 精心編制筆記，練習以近 20 年本地和外國公開試題為藍本.
- ✧ 概念理解，取分技巧並重；協助同學盡快掌握答題技巧.
- ✧ 歡迎自由組合小組上課，時間及課程內容編排更有彈性.
- ✧ 時間及課程請瀏覽以下網址: www.andylai.hk

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