HKCEE PHYSICS

2007 HKCEE Physics Paper II

Suggested Solutions

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2007 HKCEE Physics Paper II Suggested Answer

1	B		6	A		11	D		16	B		21	A		26	C	
2	D		7	C		12	D		17	B		22	B		27	D	
3	D		8	C		13	A		18	B		23	D		28	C	
4	D		9	B		14	B		19	A		24	A		29	B	
5	D		10	C		15	C		20	C		25	C		30	A	

31	A/B	*	36	D		41	A									
32	A		37	B		42	D									
33	A		38	C		43	D									
34	A		39	A		44	C									
35	C		40	B		45	C									

*** - Question to be discussed**

Section A

1. **B**

黎 Sir 提提你 :

Given $u = 0$, $v = ?$, $a = ?$, $s = 100$, $t = 9.77$

By $s = ut + \frac{1}{2}at^2$,

$$100 = 0 + \frac{1}{2}a(9.77)^2$$

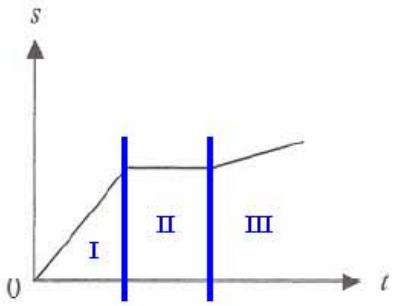
$$a = \frac{200}{9.77^2}$$

$$\underline{\underline{a = 2.10\ ms^{-2}}}$$

2. **D**

黎 Sir 提提你 :

1. **Slope on s-t graph = velocity**
2. **The deeper the slope, the faster the velocity**



3.	**D**	**黎 Sir 提提你 :** **Consider A and B as a whole system,** **By Newton's second Law** $F = ma$ **,** $12 = (1+3)a$ $a = 3$ **Consider B as a system only,** **By Newton's second Law** $F_{on.B.by.A} = ma$ $F_{on.B.by.A} = (3)(3)$ $F_{on.B.by.A} = 9N$ **.**

4.	**D**	**黎 Sir 提提你 :** **By law of conversation of energy,** **↓G.P.E. = ↑K.E. + Work done against friction.** **↑K.E. = ↓G.P.E. - Work done against friction < ↓G.P.E. finally!!!**

5.	**D**	**黎 Sir 提提你 :** **1. Friction is always to oppose the motion.** **2. When the block is pulled forward, friction is acting backward on it to oppose its' motion.** **3. When the horse is stepping backward, it will give a force on the ground backward and the ground will give an reaction force on it forward.** **4. The said reaction force is the friction acting on the horse by the ground.**

6.	**A**	**黎 Sir 提提你 :** **Action and Reaction Pair:** $F_{on.B.by.A} = F_{on.A.by.B}$ **(1) Correct, between 2 bodies only, force is opposite in direction** **(2) Wrong. Among 3 bodies.** **(3) Wrong. Among 3 bodies**

7.	**C**	**黎 Sir 提提你 :** **Change in Temperature ⇔ Specific Heat Capacity** **Change State ⇔ Specific Latent Heat** **(1) This should be explained by Specific Heat Capacity of Water** **(2) This should be explained by Specific Heat Capacity of Water** **(3) This should be explained by Specific Latent Heat of Water**

8.	**C**	**黎 Sir 提提你 :** $Power = \frac{Energy}{Time}$, $Power = \frac{mc(\Delta T) + ml}{t}$ $Power = \frac{2(4200)(100-20) + (0.3)(2.26\times10^6)}{(20)(60)}$ $Power = 1125W$

9.	**B**	**黎 Sir 提提你 :** **(1) Trapped Air is a poor conductor of heat.** **(2) Object white in color is not a good radiator of heat.** **(3) Trapped Air is a poor conductor of heat.**

10.	**C**	**黎 Sir 提提你 :** $E = mc(\Delta T)$ $Pt = mc(\Delta T)$ $\frac{\Delta T}{t} = \frac{P}{mc}$, ∵ **Heated at the same rate (Same Power) and Same Mass.** ∴ **For comparison,** $\frac{\Delta T}{t} = \frac{1}{c}$ **i.e. Slope of the graph** $= \frac{1}{c}$. $\uparrow c \Rightarrow \downarrow slope$ **, from the graph, the slope of R is the least.**

11.	**D**	**黎 Sir 提提你 :** **1. Object Distance = Image Distance**

12.	**D**	**黎 Sir 提提你 :** **1. Convex lens is a converging lens. Only S is the only refracted ray which is converging.**

13.	**A**	**黎 Sir 提提你 :** **1. Less Dense to Dense $\Rightarrow$ Light bends towards the normal.** **2. Dense to Less Dense $\Rightarrow$ Light bends away from the normal.** **3. Water $\Rightarrow$ Air $\Rightarrow$ Water** **Away Towards**

14.	**B**	**黎 Sir 提提你 :** $\frac{\sin 50^\circ}{\sin r} = n$ **and** $\frac{\sin r^\circ}{\sin 35^\circ} = n$ **(Law of Reversibility of Light)** $\frac{\sin 50^\circ}{\sin r} = \frac{\sin r^\circ}{\sin 35^\circ}$ $\sin^2 r^\circ = \sin 35^\circ \sin 50^\circ$ $r^\circ = 41.5^\circ$

15.	**C**	**黎 Sir 提提你 :** **(1) True. Only convex lens can form a real image.** **(2) False. Concave lens can only form a virtual image and so it cannot be formed on a screen.** **(3) True. Real image can be formed on a screen.**

16.	**B**	**黎 Sir 提提你 :** **Change in Wave Speed in different medium** **⇒ Change in Wave direction.** **(1) Direction of travel will change due to the change in speed** **(2) Change in Speed due to the wave traveling in different medium** **(3) Frequency of a wave depends on the source only.**

17.	**B**	**黎 Sir 提提你 :** **EM Wave ⇒ Travel through vacuum** **Mechanical Wave ⇒ Cannot Travel through vacuum** **(1) This is not related to the features of light being EM wave. This is refraction of light** **(2) This is not related to the features of light being EM wave. This is reflection of light** **(3) Travel through vacuum demonstrates it is EM wave.**

18.	**B**	**黎 Sir 提提你 :** **Total current in main branch of a Parallel Circuit** **⇒ Adding the current in different branches** $P = VI \Rightarrow I = \frac{P}{V}$ **Max. Current allowed of circuit breaker ≥ Main Branch Current** $15 \geq \frac{1100}{220} + \frac{550}{220} + n\frac{100}{220}$ $n \geq 16.5$ ∴ **The max. no. of light bulbs = 16.**

19.	**A**	**黎 Sir 提提你 :** **(1) True. P and Q must carry like charge, no matter +ve or –ve charge, because like charge repels.** **(2) False. Even R is neutral and S is positive, There will be induced charge on R and so they will also attract each other.** **(3) False. Same amount of net charge is not needed since the force acting on this two body is action-reaction pair, therefore, the forces acting between them must be equal no matter the net charge is the same or not.**

20.	**C**	**黎 Sir 提提你 :** **Parallel Circuit $\Rightarrow$ p.d. across the parallel braches are the same.** **In-series Circuit $\Rightarrow$ Same current through each resistor.** **Current passing through 8Ω =** $\frac{V}{R}=\frac{10}{8+2}=1A$**.**

21.	**A**	**黎 Sir 提提你 :** **Equivalence Resistance in // resistors =** $\frac{R_1R_2}{R_1+R_2}$ **(Product over Sum!)** **Equivalence Resistance in series =** R_1+R_2 $\therefore V=IR=(3)(\frac{1\times5}{1+5}+2)=8.5V$**.**

22.	**B**	**黎 Sir 提提你 :** $P=VI=V(\frac{Q}{t})$ $P=3.6(\frac{700\times10^{-3}}{15})$ **[no need to change the unit of time to second!!!]** $P=0.168W$ **Remarks: Beware of the unit** $700mAh$ **!!! h = hour**

23.	**D**	**黎 Sir 提提你 :** **Maximum Brightness = Maximum Power** $\because P = VI$ **Max. V $\Rightarrow$ Closed Switch X** **Max. I $\Rightarrow$ Min. R** **$\Rightarrow$ Open switch Y (Parallel Circuit) and Closed Switch X**

24.	**A**	**黎 Sir 提提你 :** **Background radiation = 50** **Radiation from the source =** $350 - 50$ **Half life: The time at count rate =** $350 - \frac{350-50}{2} = 200$**.** **From the graph,** $t = 4\,\text{min}$**.**

25.	**C**	**黎 Sir 提提你 :** $^{1}_{0}n + {}^{14}_{7}N \rightarrow {}^{p}_{q}X + {}^{1}_{1}H$ $\Rightarrow$ $1+14 = p+1$ **and** $0+7 = q+1$ $\Rightarrow$ $p = 14$ **and** $q = 6$ $^{14}_{6}X \rightarrow {}^{r}_{s}Y + {}^{0}_{-1}\beta$ $\Rightarrow$ $14 = r+0$ **and** $6 = s-1$ $\Rightarrow$ $r = 14$ **and** $s = 7$

26.	**C**	**黎 Sir 提提你 :** **Radioactive active substance should be stored in a box surrounding by lead since lead can absorb part of radiation.**

27.	**D**	**黎 Sir 提提你 :** **Statement 1: False** **Motion in horizontal direction is independent from the motion in vertical direction. The motion in horizontal direction on the moon should be in the same situation of that on the Earth. Therefore, the forces needed are the same.** **Statement 2: True** $Weight = mg$ **, the gravity on moon is only** $\frac{1}{6}$ **of that on the Earth.**

28.	**C**	**黎 Sir 提提你 :** **1. Total momentum is conserved for explosion.** **(Law of conversation of Momentum!)** **2. At rest:** $K.E. = zero$ **After explosion:** $\uparrow K.E. = \frac{1}{2}mv^2$ **(It seems to violate the law of conversation of energy? But do you consider the chemical energy inside in bomb?)**

Section B

29. B

黎 Sir 提提你 :

By law of conversation of momentum,

Consider The total momentum when Tom throws the ball,

$0 = (30)(-1) + (3)(v_2)$

$v_2 = 10$

Consider The total momentum when John receives the ball,

$(3)(10) + 0 = (27 + 3)(v_2)$

$(3)(10) + 0 = (27 + 3)(v_2)$

$v_2 = \frac{30}{30} = 1\ ms^{-1}$.

30. A

黎 Sir 提提你 :

Horizontally: $T\sin\theta = 3$

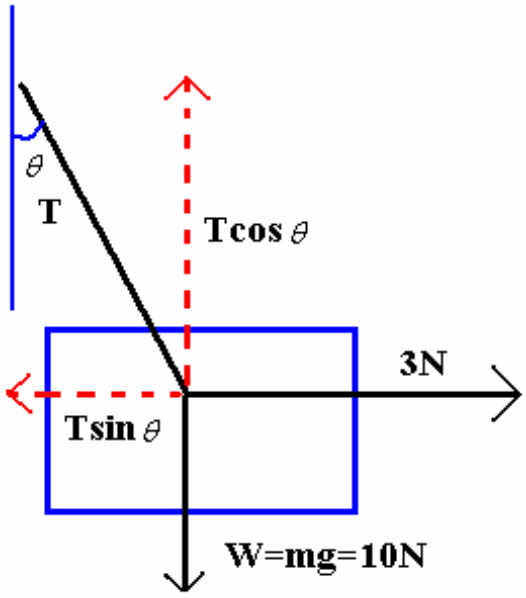
Vertically: $T\cos\theta = 10$

$\tan\theta = \frac{3}{10}$,

$\theta = \tan^{-1}\frac{3}{10} = 16.70$.

$T^2(\sin^2\theta + \cos^2\theta) = 3^2 + 10^2$

$T = \sqrt{3^2 + 10^2} = 10.44$



31. **A***

黎 Sir 提提你 : (Andy's point of view solutions)

Along the inclined plane:

$f = F$ **(Newton's 3rd Law)**

$f = mg\sin 30^\circ$ **(Newton's 1st Law)**

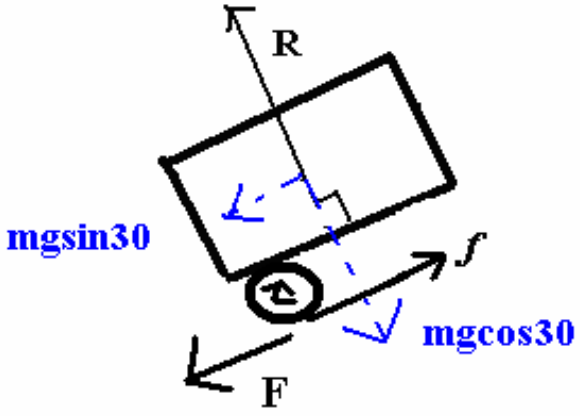
$\therefore F = \frac{1}{2}mg$

Average Power:

$P = \frac{1}{2}mgv$

$= \frac{1}{2}mgv$

Remarks: This question describes the motion of a car!



F **: The force acting on the ground by the type (Car).**
i.e. The Force provided by the car engine.

f **: The force acting type (Car) by the ground**
i.e. The Friction

B

黎 Sir 提提你 : (HKEA Official Answers)

Along the inclined plane:

$mg\sin 30^\circ + f = F$

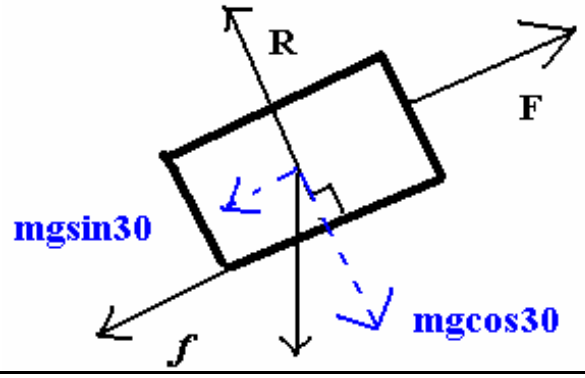
$mg\sin 30^\circ + \frac{1}{2}mg = F$

$F = mg$

Average Power:

$P = Fv$

$= mgv$



Remarks:

1. **Andy's point of view: If the electrical toy car is climbing up by itself, then friction between the surface of the road and the tyre acts on the tyre forward and provides the driving force,**
2. **HKEA's point of view: However, if the electrical toy car is pulled by an external force, then the toy is not driving, it is skiing. Then the friction between the surface of the road and the tyre is acting on the tyre backward, the external force, balancing the component of weight ($mg\sin 30^\circ$) and the weight, provide the driving force.**
3. **Conclusion: In HKCEE level (Even in HKALE after 2006), No body will rotate and so no need to consider rotational motion!!!**

32.	**A**	**黎 Sir 提提你 :** **Constant speed ⇒ K.E. is conserved.** **⇒ Gain in K.E. = zero.** **Work done against friction. = ↓G.P.E.** $= mgh$ $= (1)(10)(2\sin 30^\circ)$ $= 10J$

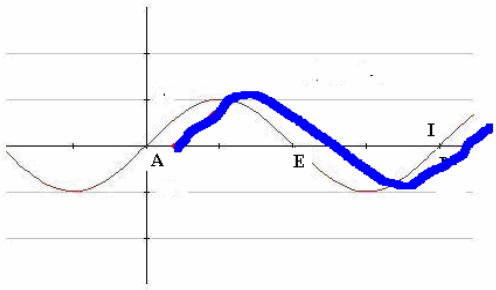
33.	**A**	**黎 Sir 提提你 :** **By** $v^2 - u^2 = 2as$ **,** $v^2 = 2as + u^2$ **Comparing** $y = mx + c$ $m = 2a$ $2a = \frac{2-1}{1-0}$ $a = 0.5ms^{-2}$

34.	**A**	**黎 Sir 提提你 :** **(1) True. The energy is enough to evaporate the water molecules on the surface of the liquid.** **(2) True. ↑Temperature ⇒ ↑Rate of evaporation.** **(3) False. After evaporation, the average kinetic energy of the remaining liquid molecules will decrease.**

35.	**C**	**黎 Sir 提提你 :** **Similar Triangle:** $\frac{A_1}{A_2}=(\frac{l_1}{l_2})^2$ $\frac{\frac{1}{2}(0.6)(1.5)}{\frac{1}{2}(x)(1.5+3000)}=(\frac{1.5}{3000+1.5})^2$ $\frac{0.6}{(x)}=\frac{1.5}{3001.5}$ $x=1200.6$ $v=\frac{1200.6}{20}$ $v=60ms^{-1}$

36.	**D**	**黎 Sir 提提你 :** **The definition of ultrasonic wave is the frequency is over 20000Hz, which is higher than the audible sound waves.**

37.	**B**	**黎 Sir 提提你 :** **Max: Constructive Interference** $0.4-0.2=n\lambda$ **where n is a integer.** $n=\frac{0.2}{\lambda}$ **where n is a integer.** **Min: Destructive Interference** $0.9-0.4=(m+0.5)\lambda$ $m=\frac{0.5}{\lambda}-\frac{1}{2}$ **where m is a integer.** **Only** $\lambda=0.2$ **make both m and n be a integer.**

38.	**C**	**黎 Sir 提提你 :** **The line black in color: t= 0 s** **The line blue in color: next moment** 

39.	**A**	**黎 Sir 提提你 :** **(1) True** **(2) True** **(3) False. The key word of the question is "Block the noise". The noise is diffracted at the top edge means it cannot block the noise.** **Remarks: I guess this question may be deleted at last.**

40.	**B**	**黎 Sir 提提你 :** **By Newton's first law of motion, uniform speed means Net force acting on the metal rod = Zero.** **The external applied force is acting on the metal rod to the right, it means that there must be a force (equals in magnitude, opposite in direction) acting on the metal rod to the left. This force is the magnetic force, caused by the current flowing through the metal rod under the external magnetic field.** **By Fleming's right hand rule, there must be a current flowing through the metal rod from Q to P.** **By Fleming's right hand rule, because of the current flowing through the metal rod from Q to P, there must be a magnetic force acting on the rod to the left.** **(1) False. By the above explanations, the current flowing through the ammeter is from R to Q.** **(2) False. If the magnetic field is reversed, the metal rod will still keep constant speed since the magnetic force induced by the current remains acting to the left of the rod. It can be proved by using Fleming's right hand rule (to know the induced current direction) and Fleming's left hand rule (to know the magnetic force direction).** **(3) True. By Fleming's right hand rule, the current will flow in the opposite direction if the magnetic field is reversed.** **Remarks:** **1. Please pay attention that Fleming's right hand rule is needed to know the direction of the induced current first, then Fleming's left hand rule is needed to know the direction of the magnetic force.** **2. In my opinion, this is quite a difficult concept for HKCEE student to understand!!! It is simply a question with HKALE difficulty but HKCEE concepts! Unfortunately, it is a popular trend for HKCEE questions. Therefore, you have to understand the theory thoroughly. Good luck for all 2008 candidates!**

41.	**A**	**黎 Sir 提提你 :** **(1) True.** $V = IR$, $\because V$ **is constant,** $\therefore \downarrow R \Rightarrow \uparrow I$ **(2) False.** $I = \frac{V}{R}$, $\because I$ **is constant,** $\therefore \downarrow R \Rightarrow \downarrow V$ **(3) False.** $\downarrow R \Rightarrow \downarrow V$ **but** $\downarrow R \Rightarrow \uparrow I$, $\therefore V$ **is inversely proportional to** I**.**

42.	**D**	**黎 Sir 提提你 :** **(1) False. One of the factor of the size of the current is the magnetic field strength, but the magnet is not radial.** **(2) True. That's the principle of using a pair of carbon brushes and split ring.** **(3) True. By Fleming's right hand rule.**

43.	**D**	**黎 Sir 提提你 :** **By Lenz's Law, There will be an induced current flowing through the coil to produce a magnetic field to repel the bar magnet. i.e. South pole on the top and North pole at the bottom. Therefore, the force acting on the scale is the sum of the weight of the copper coil and the magnetic force by repulsion.**

44.	**C**	**黎 Sir 提提你 :** **(1) False.** $\frac{V_1}{V_2}=\frac{N_1}{N_2}$**, Therefore, no. of turns in primary coil should be halved and the number of turns of the secondary coil remains unchanged / any combination of no. of turns of primary coil to the no. of turns of secondary coil makes** $\frac{N_1}{N_2}$ **halve.** **(2) False.** $\frac{V_1}{V_2}=\frac{N_1}{N_2}$ **and** $\frac{I_2}{I_1}=\frac{N_1}{N_2}$**, Therefore, the ratio of** $\frac{I_2}{I_1}$ **is halved, but no information about the change in** I_1***.** **(3) True.** $P=\frac{V^2}{R}$**,** $\therefore$ **Output power is 4 times as before if V is 2 times.** **Remarks:** **1. It is very important to know the correct procedure for solving input current** I_1**:** **Step 1: Output Power:** $P=\frac{V^2}{R}$**, V doubled** $\Rightarrow$ **P four times! (Square relationship!)** **Step 2: Output Power:** $P=VI$**, P is four times and V is doubled** $\Rightarrow$ **I is doubled** **Step 3: By** $\frac{I_2}{I_1}=\frac{N_1}{N_2}$**,** I_2 **is doubled and** $\frac{N_1}{N_2}$ **is halved** $\Rightarrow$ I_1 **is 4 four times as before** **2. It is very important to understand that the Output Power can be found easily by using** $P=\frac{V^2}{R}$**. We cannot use** $P=VI$ **to find out the output power since V and I are both changing. In fact, we use** $P=VI$ **to determine the Output Current** I_2 **when we know the Output Power** P_2 **and Output Voltage** V_2**.**

45.	**C**	**黎 Sir 提提你 :** **Statement 1: True. Resistance in parallel, p.d. across them is equal.** **By** $P=\frac{V^2}{R}$**.** $\uparrow R \Rightarrow \downarrow P$**.** **Statement 2: False. Resistance in parallel, p.d. across them is equal.**

The End.

黎 sir 教室 導師簡介:

- 所有數學/物理/綜合科學/經濟科: 黎 sir BEng (Hons, CUHK)
- 生物/化學科: 高考狀元 Mr. William Cheng BSc (Hons, HKU)
- 中文科: 工商管理碩士 Miss Fonnie Wong MBA, BA (Hons, HKU)
- 初中全科導師: 商業管理碩士 Miss Enve Tam MBA, BBA (Hons)
- Oral English: Mr. Hugo Ma Native English Speaker

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/GCSE/IGCSE/GCE 所有數學/物理/經濟科經驗, 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%. 同時更被公司評選爲"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 爲了教學理想, 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

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爲藍本.
- 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.
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