HKCEE PHYSICS

2008 HKCEE Physics Paper II

Suggested Solutions

Prepared by Andy Lai

2008 HKCEE Physics Paper II Suggested Answer

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

*** - Questions may be deleted in live paper**

Section A

1. A

黎 Sir 提提你 :

Method 1: Equations of motion

Take downwards as negative!

Given $u = 0$, $v = ?$, $a = -10$, $s = -0.5$, $t = ?$

By $v^2 = u^2 + 2as$,

$v^2 = 0 + 2(-10)(-0.5)$

$v^2 = 10$

$v = -3.16\ ms^{-2}$ **or** $v = 3.16\ ms^{-2}$ **(rejected)**

$\therefore$ **The speed is** $3.16\ ms^{-2}$

Method 2: Law of conservation of energy

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

$\frac{1}{2}mv^2 = mgh$

$v^2 = 2gh$

$v^2 = 2(10)(0.5)$

$v = -3.16\ ms^{-2}$ **or** $v = 3.16\ ms^{-2}$ **(rejected)**

$\therefore$ **The speed is** $3.16\ ms^{-2}$

2. A

黎 Sir 提提你 :

By $s = ut + \frac{1}{2}at^2$**, the relationship between displacement and the time is "square"!, not linear. Moreover, there is nothing to do with the mass and the weight of the object in Free fall body motion. Therefore, the results can only be due to the shorter in constant time interval.**

Remarks: Free fall body motion is independent of mass and weight of a object!

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3. **D**

黎 Sir 提提你 :

(1) (True)

By $s = vt$,

$s = 15(8)$

$s = 120m$

(2) True

By Newton's first law $f_{air.resistance} = F_{driving.force}$

$$F_{driving.force} = 500N$$

The workdone by the car in overcoming the resisting force:

$F_{driving.force} \times s = (500)(120)$

$= 60kJ$

(3) True

By $P = Fv$,

$P = (500)(15)$

$P = 7500W$

$P = 7.5kW$

4. **A**

黎 Sir 提提你 :

(1) True

Area under the v-t graph = displacement ($vt = s$)

(2) False

Slope of the v-t graph = acceleration ($\frac{v}{t} = a$)

(3) False

The velocity is changing throughout the journey

$\Rightarrow$ **The kinetic energy of the car is changing throughout the journey.**

(K.E. increasing first, then remains unchanged, then decreasing and finally become zero.)

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5.	**C**	**黎 Sir 提提你 :** **Consider A and B as a whole system:** **By Newton's 2nd Law,** $F_{net} = ma$ **,** $10 - 4 = (m + m)a$ $a = 6/2m$ $a = 3/m$ **Consider B as a whole system:** **By Newton's 2nd Law,** $F_{net} = ma$ **,** $T - 4 = ma$ $T = 4 + m(3/m)$ $T = 7N$ **Remarks: It is a standard skill to consider all the blocks together to find out the acceleration first! Then everything is easy!**

6.	**D**	**黎 Sir 提提你 :** **At t = 10s, Displacement of the car =** $\frac{1}{2}(10)(10) = 50$ **m** **At t = 10s, Displacement of the truck =** $(10)(10) = 100$ **m** **At t = 20s, Displacement of the car =** $\frac{1}{2}(20)(20) = 200$ **m** **At t = 20s, Displacement of the truck =** $(10)(20) = 200$ **m** **Therefore, At t = 20s, the car catches up the truck.**

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7. **C**

黎 Sir 提提你 :

F_1 = Weight of the block
= Force acting on the block by the Earth
F_2 = Force exerted by the block on the table
F_3 = Force exerted by the table on the block (Normal Reaction!)

(1) False
Obviously, F_1 and F_2 are two different forces provided by different bodies although it is acting on the same bodies.

(2) True
The block is at rest,
By Newton's 1st Law, $F_{net} = 0N$,
$$F_1 = F_3$$

(3) True
Obviously, F_2 and F_3 forms an action-and-reaction pair ($F_{A.on.B} = F_{B.on.A}$)

8. **B**

黎 Sir 提提你 :

Take downwards as negative!

Given $u = 0$, $v = ?$, $a = -g$, $s = ?$, $t = ?$

By $v = u + at$,
$$v = 0 + (-g)t$$
$$v^2 = (-g)^2 t^2$$
$$v^2 = g^2 t^2$$
$$\frac{1}{2}mv^2 = \frac{1}{2}mg^2 t^2$$
$$\frac{1}{2}mv^2 = pt^2 \quad \text{where} \quad p = \frac{1}{2}mg^2 > 0$$

Compared with $y = ax^2$ where $a > 0$, therefore the curve is a parabola and opening upwards.

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9.	**D**	**黎 Sir 提提你 :** **(1) True.** **Aluminium is a metal which is a good conductor of heat.** **(2) False.** **Aluminium sliver in color will transfer heat away by radiation poorly.** **(3) True.** **Larger surface area will facilitate the heat transfer away by conduction to air.**

10.	**A**	**黎 Sir 提提你 :** **By Law of conservation of energy,** **Energy supplied = Energy absorbed by the water and Energy Loss** $Pt = mc(\Delta T) + Energy.Loss$ $(100)(3)(60) = (0.5)(4200)(30-25) + Energy.Loss$ $\therefore$ **Energy Loss = 7500 J**

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11. **B**

黎 Sir 提提你 :

(1) False

Energy transfer from an object with higher Temperature to an object with lower temperature due to their temperature difference. This is so-called "Heat".
Higher in internal energy may not means higher in temperature since Internal Energy is equal to Kinetic Energy and Potential Energy.

(2) False

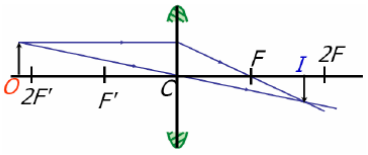
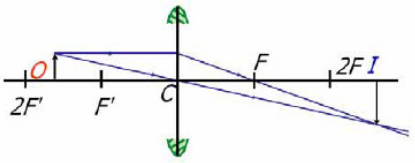
When changing state, Energy may be absorbed from or released to, which depends on the direction of the state changed.
e.g. Solid -> Liquid -> Gas (Energy Absorption)
e.g. Gas -> Liquid -> Solid (Energy Release)

(3) True

Energy transfer from an object with higher Temperature to an object with lower temperature due to their temperature difference. This is so-called "Heat".

12. **C**

黎 Sir 提提你 :

Original Situation: **Real and Diminished image**	**Required Situation:** **Real and Magnified image**
 **Object: beyond 2F** **Image: Between F and 2F, Real, inverted, Diminished**	 **Object: Between F and 2F** **Image: Beyond 2F, Real, Inverted, Magnified**

∵ **The lens cannot be moved,**

∴ **Both the object O and the screen S have to be moved to the right.**

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13. **A**

黎 Sir 提提你 :

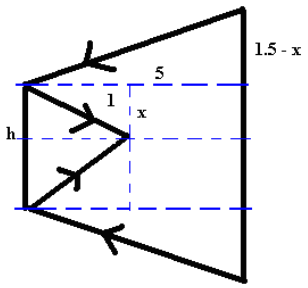
By Similar Triangle,

$$\frac{1}{5} = \frac{x}{1.5 - x}$$

$$x = 0.25m$$

$$h = 0.25(2)$$

$$h = 0.5m$$



14. **A**

黎 Sir 提提你 :

By $v = f\lambda$ **,**

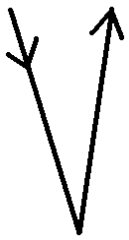
$$\lambda = (1400)/(30000)$$

$$\lambda = 4.67 \times 10^{-2}\ \mathbf{m}$$

By $s = vt$

$$s = (1400)(2.5)$$

$$s = 3500\ \mathbf{m}$$



15. **B**

黎 Sir 提提你 :

(1) False.

Light rays traveling parallel to the principle axis will pass through the principle focus, But the two light rays are not coincident on the principle axis.

(2) False.

The upper light ray is a diverging light ray. Therefore, it is impossible.

(3) True.

Both light ray are converging and therefore they are possible.

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16.	**B**	**黎 Sir 提提你 :** **(1) False** **OX is the refracted light ray.** **(2) False** **PQ is the glass-air boundary because OX is bend away from the normal RS** **(3) True** **The refracted light ray OX bends away from the normal.**

17.	**D**	**黎 Sir 提提你 :** **Refractive Index:** $m = \frac{\sin i_{air}}{\sin r_{materials}}$ $m = \frac{\sin(90^\circ - \phi)}{\sin(90^\circ - \theta)}$ **Remarks: When calculating refractive index of a substance, the incident angle must be in air.**

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18.	**B**	**黎 Sir 提提你 :** **Let the total resistance of the resistance wire be R:** **For X, There are 2 resistor in parallel, each of them is R/2.** **Therefore, the equivalent resistance = R/4** **For Y and Z, There are 2 resistor in parallel, one of them is R/4 and the other of them is 3R/4.** **Therefore, the equivalent resistance = 3R/16** $\therefore X > Y = Z$ **Remarks:** **1. Equivalent resistance in parallel:** $R = \frac{R_1 R_2}{R_1 + R_2}$ **2. Resistance of a wire:** $R = \rho \frac{l}{A}$.

19.	**A**	**黎 Sir 提提你 :** **(1) True.** **By Fleming's left hand rule, there are attractive forces between two wires with current flowing in the same direction. They are action-and-reaction pair.** **(2) True.** **By Fleming's left hand rule, there are attractive forces between two wires with current flowing in the same direction. They are action-and-reaction pair.** **(3) False.** **You can just reverse the paper by** 180° **and you will find the results are the same.**

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20.	**A**	**黎 Sir 提提你 :** **(1) True** **By Potential Divider,** $V_1 = V(\frac{R_1}{R_1 + R_2})$**.** **Larger voltage in-series means larger resistance.** **(2) False** **For resistance in-series, the current is the same at any point in the same loop.** **(3) False** **By** $P = I^2R$**, The power of the light bulb depends on its resistance since the current is the same at any points in the same loop.** $\therefore$ **A is brighter than B.**

21.	**C**	**黎 Sir 提提你 :** **The potential difference (p.d.) across two** 6Ω **resistors in parallel:** $V = IR$ $V = (0.3)(6)$ $V = 1.8V$ **The potential difference (p.d) across the** 12Ω **resistor:** $V = IR$ $V = (0.3 + 0.3)(12)$ $V = 7.2V$ $\therefore$ **The voltage of the battery:** $V = 1.8 + 7.2$ $V = 9V$

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22.	**B**	**黎 Sir 提提你 :** **By** $P=\frac{V^2}{R}$**, The power of a light bulb** $P=\frac{(\frac{220}{3})^2}{\frac{220^2}{30}}$ $\therefore$ **The total power dissipation:** $P=\frac{(\frac{220}{3})^2}{\frac{220^2}{30}}\times 3=10W$
23.	**D**	**黎 Sir 提提你 :** **By** $V=\frac{U}{Q}$ **and** $I=\frac{Q}{t}$, $\therefore U=VIt$ $U=(1.2)(0.225)(10)(3600)$ $U=9720J$
24.	**D**	**黎 Sir 提提你 :** **Definition of half life:** **The time for half of the radioactive nuclei of the substance to decay.**
25.	***D**	**黎 Sir 提提你 :** **By common sense!** **Remarks: I guess it may be deleted in live paper.**

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26.	**A**	**黎 Sir 提提你 :** **Nuclear fission is a chain reaction and is initiated by a neutron bombarded with an unstable atom. The results will give out more neutrons which are used to bombard with other unstable atom to continue the reaction.**

27.	**B**	**黎 Sir 提提你 :** **β is fast-moving electrons and so it can be deflected by a magnetic field.**

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Section B		
28.	**C**	**黎 Sir 提提你 :** **If the net force is equal to zero** **⇒ Air resistance = weight** **⇒ Moving with constant velocity (i.e. Terminal Velocity)** **⇒ Kinetic energy ($\frac{1}{2}mv^2$) of the substance will remain unchanged.** **⇒ Power (Fv) in overcoming air resistance will remain unchanged.** **⇒ Gravitational Potential (mgh) will decrease as the height is decreasing.**
29.	**D**	**黎 Sir 提提你 :** **By Law of conservation of momentum,** $0 = 0.3(3) + x(-1)$ $x = 0.9$ **kg** **By Newton's 2nd Law,** $F = ma$ $F = \frac{0.9(-1-0)}{0.25-0.05}$ $F = -4.5N$
30.	**C**	**黎 Sir 提提你 :** **(1) True.** **By inertia, the bob will have a tendency to remain its own position and therefore it stay in the same direction and fall behind in view of the train. i.e. to the east** **(2) True** **By inertia, the bob will have a tendency to remain its own position and therefore it stay in the same direction and fall behind in view of the train. i.e. to the east** **(3) False** **By inertia, the bob will have a tendency to remain its own position and therefore it stay in the same direction and fall behind in view of the train. i.e. to the west**

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31.	**D**	**黎 Sir 提提你 :** **By Law of conservation of momentum,** $4m_A - m_B = (m_A + m_B)2$ $\frac{m_A}{m_B} = \frac{3}{2}$ $m_A : m_B = 3:2$

32.	**A**	**黎 Sir 提提你 :** **(1) True** **From A to B, When the elastic cord is not stretched, it is a free fall motion since only the weight acting on it.** **(2) False** **From B to C, it is decreasing in height and therefore the gravitational potential energy is decreasing** **(3) False** **Although it is at rest in C, the net force is not equal to zero. It is equal to the difference between the tension in the elastic cord and the weight of the body.** **Remarks:** **1.** $F_{net} = 0N$ $\Rightarrow$ **constant velocity or at rest (It is a right concept!)** **2. Constant velocity or at rest** $\Rightarrow$ $F_{net} = 0N$ **(It is a wrong concept!)** **e.g. At the maximum point, the K.E. is changed totally to P.E. of the substance** **3. In my opinion, Option (3) is quite difficult and it involves a concept of simple harmonic motion which is not included in the HKCEE syllabus. However, "Choose" the best answer will let you choose the correct answer.**

33.	**B**	**The direction along the inclined plane:** $mg\sin\theta - ma = f$ **The direction perpendicular to the inclined plane.** $mg\cos\theta = R$

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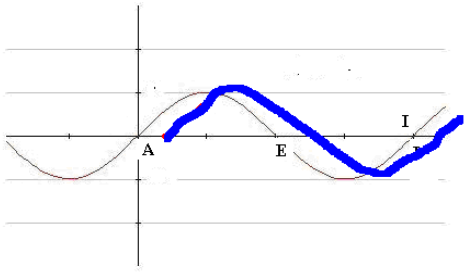
34.	**D**	**黎 Sir 提提你 :** Average speed of the molecules depends on the average temperature of the substance. **Higher in temperature ⇒ the highest average speed of the molecule**

35.	**B**	**黎 Sir 提提你 :** **(1) True** **Temperature is a measure of the degree of hotness of the object** **(2) False** **Internal Energy = Kinetic Energy + Potential** **(3) True** **Temperature is a measure of the average kinetic energy of the object**

36.	**C**	**黎 Sir 提提你 :** **Y: Constructive Interference** **X: Destructive Interference** **After switching off, A and B can swim by himself**

37.	**C**	**黎 Sir 提提你 :** **Take left as positive and right as negative** **Displacement-time graph** **Black thin line: The old one** **Blue thick line: The next moment** **The displacement-time graph of all particle is C after half a period.** 

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38.	**B**	**黎 Sir 提提你 :** **1. Two necessary conditions for total internal reflection to occur:** **i. From Denser medium to Less dense medium** **ii. Angle of incident > Critical Angle** **(1) False** **Angle of incident > Critical Angle** **(2) False** **Only Reflected ray appear** **(3) True** **From Denser medium to Less dense medium**

39.	**B**	**黎 Sir 提提你 :** **(1) False.** **When the switch is closed, there is a sudden change in external magnetic field (by current in coil A) in coil B, therefore, current will flows through the ammeter momentarily, not steadily** **(2) True.** **When the switch is closed, there is a sudden change in external magnetic field (by current in coil A) in coil B, therefore, current will flows through the ammeter momentarily to oppose the change in magnetic field.** **(3) False.** **If the iron is replaced by a glass rod, it will decrease the current induced in the coil B.**

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40.	**C**	**黎 Sir 提提你 :** **When the coil is moving out the magnetic field, by Lenz' Law, there will be an induced current to flow to provide a magnetic field to oppose the change in magnetic field. Therefore, by right hand grip rule, there is current flowing through the coil clockwise.** **On the left side of the coil, current is flowing form the bottom to the top, by fleming's left hand rule, there will be a magnetic force acting on the wire to the left.** **Remarks: Lenz' law is simply an application of conservation of energy. All the energy provided by the applied force is changed to the electrical energy inside the coil.**

41.	**A**	**黎 Sir 提提你 :** **For ideal transformer,** **Power Input = Useful Power output** $V_1 I_1 = V_2 I_2$ $(220)(I_1) = (12)(0.1)$ $I_1 = 5.5mA$

42.	**C**	**黎 Sir 提提你 :** **By Fleming's left hand rule, there is force (out of paper) acting on the left wire and force (into paper) acting on the right wire.** **Therefore, the Resultant magnetic force acting on the rectangular loop is Zero.** **However, it will rotate in clock-wise direction in the observer's eye.** **Remarks:** **1. Translation Equilibrium = A body will not move linearly:** $F_{net} = 0N$ **2. Rotational Equilibrium = A body will not rotate: Principle of moment, which is out of HKCEE syllabus, however, by common sense, you have to know how to determine the direction of the rotation of motor.**

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43.	**C**	**黎 Sir 提提你 :** **By right hand grip rule, the current will flow from Q to P through the coil to provide a north pole on the left side and a south pole on the right side.** **The direction of the compass will follow the direction of the magnetic field line, therefore, the north pole point to the left inside the coil.**

44.	**D**	**黎 Sir 提提你 :** **1st Statement: False** **The centre of rarefaction is at the equilibrium position.** **2nd Statement: True** **It is the definition of rarefaction.**

45.	**D**	**黎 Sir 提提你 :** **1st Statement: False** **Soft iron is easier to be magnetized and demagnetized than copper. Therefore, energy lost is smaller** **2nd Statement: True** **Copper is a better conductor than soft iron.**

The End.

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黎 Sir 教室 A Lai Learning Center

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

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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

上課地址: 香港九龍旺角煙廠街 9 號興發商業大廈 706 室

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