黎 sir 教室 A Lai Learning Center

HKCEE / HKALE / GCE / GCSE / IB / F.1 – F.7 / P.1 – P.6

HKCEE PHYSICS

	2009 HKCEE Physics Paper II			
	Suggested Solutions			
	Prepared by Andy Lai			

MC 係分 ABC Grade 既地方,

越出越煩, 越出越深,

同學一定要快又要好小心!

2009 HKCEE Physics Paper II Suggested Answers

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

Section A	
1.	**C** 黎 **Sir** 提提你 : $v = \dfrac{50 \times 1000}{3600} \ m \ s^{-1}$ $t = 500 \div \dfrac{125}{9} = 36s$

2.	**A** 黎 **Sir** 提提你 : **(1). True.** **Displacement of P3 = Displacement of P1 = Displacement of P2** **(2). False.** **Distance of P3 > Distance of P1 > Distance of P2** **(3). False.** **Average Speed = Total Distance / Total Time taken** **Different distance $\Rightarrow$ Different Time taken**

3.	**C** 黎 **Sir** 提提你 : **By** $F_{net} = ma$, $\qquad -3 = 0.5 \times a$ $\qquad a = -6$ **By** $v^2 - u^2 = 2as$, $\qquad 0 - u^2 = 2(-6)(10)$ $\qquad u^2 = 120$ $\qquad u = \sqrt{120}$ $\qquad u = 10.9 \approx 11 \ m \ s^{-1}$

4.	A	

黎 **Sir** 提提你 🧑 **:**

At Rest $\Rightarrow$ $F_{net} = 0N$ **!**

Remarks: This is not direct interpretation of Newton's first Law!
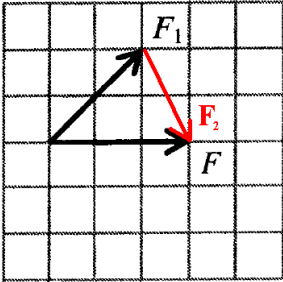
5.	A	

黎 **Sir** 提提你 🧑 **:**

(1) False.

Initial Speed of P > Initial Speed of Q.

(2) True.

Reaction time is the time range for no change in the initial speed!

(3) False.

Total Braking distances = Area of Triangle

Area of Triangle of P > Area of Triangle of Q.

$\Rightarrow$ **Total distance of P > Total distance of Q.**

6.	B	

黎 **Sir** 提提你 🧑 **:**

By $P = Fv$ **,**

$$P = F(u + at)$$
$$P = Fat$$

By $F_{net} = ma$ **, F = constant and m = constant** $\Rightarrow$ **a is also constant.**

By comparing with $y = mx + c$ **,**

$\Rightarrow$ **P-t graph is a straight line through origin.**

7.	A	黎 Sir 提提你 : **From the diagram below, by tip-to-tail method:** Remarks: Vectors are the same if the magnitude and direction are the same, no matter where they are.

8.	C	黎 Sir 提提你 : **By** $W = mg$ **,** $\quad 120 = m(10)$ $\quad\quad m = 12kg$ **Mass is Universal. i.e. always constant.** **By** $W = mg$ **,** $\quad W_{moon} = 12(\frac{1}{6})(10)$ $\quad W_{moon} = 20N$
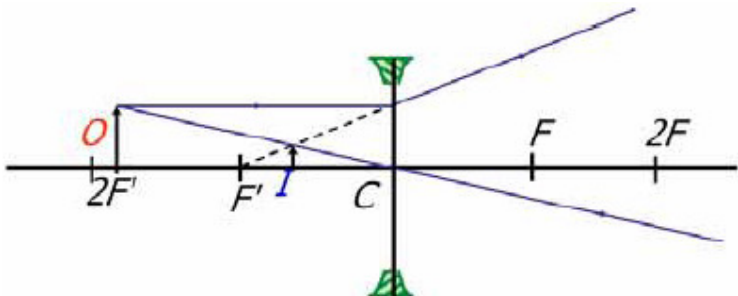
9.	C	黎 Sir 提提你 🧑 :

(1) False.

Internal energy = Total Kinetic energy + Total Potential energy.

Same Temperature $\Rightarrow$ Same average kinetic energy Only

Same state $\Rightarrow$ Same average potential energy Only

But Larger masses

$\Rightarrow$**Larger numbers of molecules**

$\Rightarrow$**Larger Internal energy!**

(2) True.

Hotter $\Rightarrow$ Larger average kinetic energy $\Rightarrow$ More Internal energy

(3) True.

Average Potential energy of water at $0°$ > Average Potential energy of ice at $0°$.

Average Kinetic energy of water at $0°$ = Average Kinetic energy of ice at $0°$.

$\therefore$ Internal Energy of water at $0°$ > Internal Energy of ice at $0°$.

10.	B	黎 Sir 提提你 🧑 :

$$m \times 3.34 \times 10^5 = 0.3 \times 5300 \times (20 - 0)$$
$$m = 0.10 kg$$

11.	D	黎 Sir 提提你 🧑 :

Greater Mass

$\Rightarrow$ **More energy is required to increase the same range of temperature**

$\Rightarrow$ **More time is needed ($\because$ Constant Power!)**

$\Rightarrow$ **Less steep of the slope!**

Same materials $\Rightarrow$ Same boiling point!

12.	D	黎 Sir 提提你 :

(I)

Water splashes out of the polystryene cup

$\Rightarrow$ Less energy is used!

$\Rightarrow$ Specific latent heat decreases!

(II)

Water vapour condenses

$\Rightarrow$ More Energy is needed to re-boil the water

$\Rightarrow$ Specific latent heat increases!

Remarks: Don't simply use the equation $l = \dfrac{E}{m}$ or you will fall into a trap!

13.	D	黎 Sir 提提你 :

Erect and diminished image $\Rightarrow$ concave lens only!

Lens away the paper $\Rightarrow$ Draw light rays diagram to prove $\Rightarrow$ diminished!

(or you just use your short-sighted glass to do the experiment!)

14.	C	黎 Sir 提提你 :

The wavelength = $\dfrac{0.4}{2} = 0.2m$

Distance travel for a wave to make the cork to the first crest = $\dfrac{3}{4}\lambda = 0.15m$

Time required = $\dfrac{0.6}{0.2} + \dfrac{0.15}{0.2} = 3.75s$

15.	A	黎 Sir 提提你 :

All EM wave travels at the same speed of $v = 3 \times 10^8 \ m \ s^{-1}$

By $\dfrac{v_{air}}{v_{glass}} = \dfrac{\sin \theta_{air}}{\sin \theta_{glass}} = \dfrac{n_{glass}}{n_{air}}$**, Given** v_{air} **and** $\sin \theta_{glass}$ **are the same**

$\uparrow \sin \theta_{air} \Rightarrow \uparrow n_{glass}$**,** $n_{glass-X} > n_{glass-Y}$

16.	C	黎 Sir 提提你 :

All EM wave travels at the same speed of $v = 3 \times 10^8 \ m \ s^{-1}$ **in vaccum!**
(1) True.
The velocity is constant no matter what the frequency is.

(2) False.
By $v = f\lambda$**, its frequency is inversely proportional to its wavelength.**

(3) True.
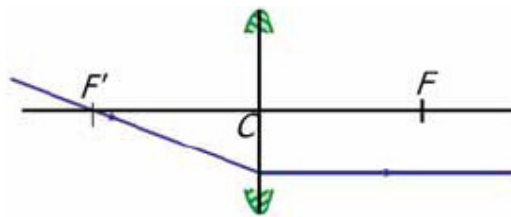**The velocity is constant no matter what the wavelength is.**
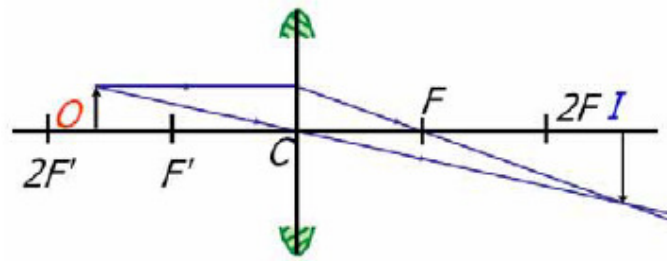
17.	A	黎 Sir 提提你 ： **Original Situation** **Light ray through focus ⇒ Parallel light rays!** **True. Refer to the figure above.** **True. Refer to the figure above.** **False. Concave lens can only produce a virtual image.**

18.	B	黎 Sir 提提你 ： **The current passing through X = 0.4 A** **The current passing through Y = 0.4 A** **The power consumed by X =** $VI = 220 \times 0.4 = 88W$ The power consumed by Y = $VI = 220 \times 0.4 = 88W$ Total power consumed by X and Y = $88 + 88 = 176W$ Total energy consumed by X and Y in 5 hours = $Pt = 176 \times 5 = 880Wh = 0.88kWh$

19.	C	黎 Sir 提提你 🧑 : **When S is open, the reading of the voltmeter** **= e.m.f. of the battery** **= 12V.** **When S is closed, the reading of the voltmeter** **= p.d. / voltage across the resistor** $$=12\times\frac{R}{R+R}$$ = 6 V

20.	B	黎 Sir 提提你 🧑 : **The question says: Both light bulbs are working WITHIN the rated power, NOT with the rated power!** **For light bulb 1: Max. p.d. / voltage across it is:** $V^2 = P\times R$ $V = \sqrt{24\times 6} = 12V$ **For light bulb 2: Max p.d. / voltage across it is:** $V^2 = P\times R$ $V = \sqrt{9\times 4} = 6V$ **Therefore, the maximum voltage across them is 6V. (∵ connected in parallel!)** **Maximum current drawn from the power supply =** $\frac{V_1}{R_1}+\frac{V_2}{R_2} = \frac{6}{6}+\frac{6}{4} = 2.5A$

21.	D	黎 Sir 提提你 : **By Right hand grip rule, the direction of the both fields should be anti-clockwise.** **There is a neutral point in between 2 magnetic field.**

22.	D	黎 Sir 提提你 : **By Fleming's left hand rule,** **(I) True.** **The direction of the magnetic field should be pointing from X to Y. i.e. X should be the north pole and Y should be the south pole.** **(II) True.** **If the current is reversed, then F is also reversed.** **(III) True.** **Strong magnet $\Rightarrow$ Larger Force.**

23.	D	黎 Sir 提提你 : **Fuse should be connected in live wire $\Rightarrow$ Y is the live wire.** **Neutral wire is the return path to complete the circuit $\Rightarrow$ X is the neutral wire.** **Earth wire should be connected to the case of the kettle $\Rightarrow$ Z is the Earth wire.**

24.	B	黎 Sir 提提你 : $^{2}_{1}H + ^{3}_{1}H \rightarrow ^{4}_{2}He + n \Rightarrow$ **Nuclear Fusion!**

25. | **B**

黎 Sir 提提你 :

	Type of Decay	No. of protons	No. of neutrons	No. of electrons
X		**A**	**B**	**A**
Y	$^4_2\alpha$	**A-2**	**B-2**	**0**
Z	$^0_1\beta$	**A-2+1 = A-1**	**B-2-1=B-3**	**A**

(I)   False.

No. of protons of X and Z are different.

(II)   False.

No. of neutrons of Z is 3 more than that of X.

(III) True.

No. of protons of Z is 1 more than that of Y.

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26. | **D**

黎 Sir 提提你 :

Let X be the count rate of the radioactive sources

Y be the background count rate

$$X + Y = 1000$$

$$\frac{X}{2} + Y = 528$$

(1) $-$ (2) gives $\dfrac{X}{2} = 472$

$$X = 944.$$

Therefore, Y = $1000 - 944 = 56$

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27. | **B**

黎 Sir 提提你 :

For Nuclear fission, the necessary condition to sustain the chain reaction is

1.   There is at least one no. of neutron is released in each fission to collide with other uranium-235

2.   The mass of uranium-235 > Critical Mass!

Section B		
28.	**C**	黎 **Sir** 提提你 🧑 : **At t = 0.3s, the diver attains maximum point** ($\because v = 0$) **At t = 1.6s, the diver arrive at the water surface.** ($\because v = \max.$) **At t = 2s, the diver attains its minimum point t** ($\because v = 0$ **again!**) **Distance from P to Q =** $\dfrac{3 \times 0.3}{2} + \dfrac{(2-0.3) \times 13}{2}$ **= 0.45 + 11.05 = 11.5 meters** **Height of the platform =** $\dfrac{(1.6-0.3) \times 13}{2} - \dfrac{3 \times 0.3}{2}$ **= 8.45 – 0.45 = 8 meters**

29.	**C**	黎 **Sir** 提提你 🧑 : $\begin{cases} S_1 \sin 30^\circ = 50 \\ S_1 \cos 30^\circ = S_2 \end{cases}$ **Eq.1 / Eq.2 gives** $\tan 30^\circ = \dfrac{50}{S_2}$ $S_2 = \dfrac{50}{\tan 30^\circ} = 86.6 N$

30.	**D**	黎 **Sir** 提提你 🧑 : **Moving along smooth horizontal surface freely** $\Rightarrow$ $F_{net} = 0N$ $\Rightarrow$ **v = constant!** **Moving forward uniformly** $\Rightarrow$ **Positive constant Momentum (or Negative constant Momentum)** **Going backward uniformly** $\Rightarrow$ **Negative constant Momentum (or Positive constant Momentum)** **Only Option D shows an change in direction (signs) of constant momentum.** **The magnitude of the momentum is smaller after collision because there is a Net** **Force (the Force acting on the block by the wall) acting on it.** **i.e. Total momentum of the ball is not conserved!**

31.	C	黎 Sir 提提你 🎩 : **Energy required = G.P.E. + Work done against friction** $\quad = mgh + fs$ $\quad = (1500)(10)(100\sin 30^\circ) + (200)(100)$ $\quad = 770kJ$

32.	B	黎 Sir 提提你 🎩 : **(1). By** $s = ut + \dfrac{1}{2}at^2$, $s_1 = \dfrac{1}{2}at_1^2$ **and** $s_2 = \dfrac{1}{2}at_2^2$ **But** $2s_1 = s_2 \Rightarrow 2(\dfrac{1}{2}at_1^2) = \dfrac{1}{2}at_2^2 \Rightarrow 2t_1^2 = t_2^2 \Rightarrow \sqrt{2}t_1 = t_2 \Rightarrow t_2 = 1.41t_1$ **By** $v = u + at$, $v_1 = at_1$, $v_2 = at_2$, $v_2/v_1 = t_2/t_1 = 1.41$ **(2). From (1),** $t_2 = 1.41t_1$ **(3). Loss in P.E. = Gain in K.E.** **K.E. of the object at** t_2 $= \dfrac{mgh}{2}$ **K.E. of the object at** t_1 $= mgh$

33.	A	黎 Sir 提提你 🎩 : **(1). True.** **Stored in a refrigerator for a few days** $\Rightarrow$ **No temperature difference between the bottle, water and the air inside the refrigerator!** **(2). True.** **Same Temperature** $\Rightarrow$ **Average Kinetic Energy of water molecules!** **(3). True.** **Total Potential Energy depends on how many molecules they have.** **Different mass** $\Rightarrow$ **Different total potential energy, even though they are in same state and of same materials!**

| 34. | B | 黎 Sir 提提你 :

By $n = \dfrac{1}{\sin C}$, $\uparrow C \Rightarrow \downarrow n$.

The critical angle of X < The critical angle of Z < The critical angel of Y.
Therefore, $n_X > n_Z > n_Y$. |
|---|---|---|

| 35. | A | 黎 Sir 提提你 :

By $v = f\lambda$, $\lambda = 330/660 = 0.5m$

Path difference at X = $\left| S_1 X - S_2 X \right|$ = 4 – 2 m = 2 m $= 2/0.5 = 4\lambda$

Therefore, Constructive interference occurs at X.
Path difference at Y = 0 m
Therefore, Constructive interference occurs at Y. |
|---|---|---|

| 36. | C | 黎 Sir 提提你 :
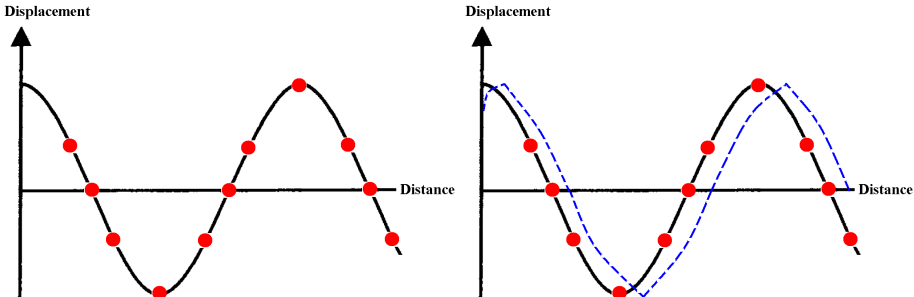
(right side of equilibrium: positive, left side of equilibrium: negative)
(Solid line: This moment, Blue dotted-line: Next moment)

Particle c is going back to the equilibrium position form the left side, i.e. to the right.
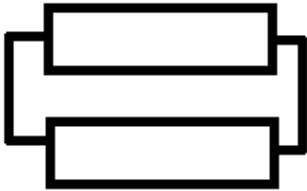Particle f is leaving the equilibrium position to the left side, i.e. to the left. |
|---|---|---|

| 37. | B | 黎 Sir 提提你 🙂:

(1). Ture.
Wavelength depends of wave speed only. $(\because v = f\lambda)$ **!**

(2). True.
Frequency of a wave $\Rightarrow$ **Depends on vibrating source only!**

(3). True.
Different medium of transfer $\Rightarrow$ **Different wave speed!** |
|---|---|---|

| 38. | D | 黎 Sir 提提你 🙂:

Trough + Trough = Constructive Interference!
Therefore, P is the position where constructive interference ALWAYS occurs.
Therefore, the amplitude of the wave at P is ALWAYS maximum and is a trough!
Downward displacement is negative direction.
Moreover, the wave will go forward, therefore, it will become a trough, crest,
trough, … repeat and repeat again. |
|---|---|---|

| 39. | D | 黎 Sir 提提你 🙂:

When the magnet is approaching the solenoid PQ,
a north pole is induced at end Q implies that the polarity of end X of the magnet
should be north. (By Lenz's law + Right hand grip rule)
Therefore, the polarity of end Y should be south.

When the magnet is leaving the solenoid PQ, a north pole will induced at end P.
(By Lenz's Law + Right hand grip rule) |
|---|---|---|

| 40. | D | 黎 Sir 提提你 🙂:

By Fleming's right hand rule, The current will flow from P to Q across the load.
Moreover, the coil is parallel the direction of the magnetic field lines, the current
induced is maximum. |
|---|---|---|

41.	A	黎 **Sir** 提提你 :

Equivalent resistance = $\dfrac{1}{2}R$

Power of the heater $= \dfrac{V^2}{R/2} = \dfrac{2V^2}{R} = P$

S_1 **and** S_2 **closed,** S_3 **is open**

Equivalent resistance = $2R$

Power of the heater $= \dfrac{V^2}{2R} = \dfrac{P}{4} = 0.25P$

S_1 **and** S_2 **open,** S_3 **is closed**

42.	C	黎 **Sir** 提提你 :

Statement 1 is true.

At the highest point, the object is momentarily at rest. Therefore, its velocity is zero.

Statement 2 is wrong.

During free falling motion, the acceleration of the object is always equal to acceleration due to gravity, i.e. $a = -10 \ m \ s^{-2}$ **(Negative sign means "downward"!)**

43.	D	黎 Sir 提提你 😊 : **Statement 1 is false.** **Ultrasonic wave is a sound wave which frequency is higher than 20000 Hz.** **Therefore, its wavelength is much more shorter than that of audible sound waves** **(frequency of audible sound waves is below 20000 Hz).** **Shorter wavelength implies less significant of diffraction.** **Statement 2 is true.** **Ultrasonic wave is a sound wave which frequency is higher than 20000 Hz.** **Audible sound wave is a sound wave which frequency is between 20 Hz and** **20000 Hz.**

44.	A	黎 Sir 提提你 😊 : **Statement 1 is true.** **a.c. power supply should be used to produce a varying magnetic field.** **Dry cell can only provide a steady d.c. and so a steady magnetic field.** **Steady magnetic field cannot induce current in the secondary coil.** **Statement 2 is true.** **Dry cell can only provide a steady d.c. and so a steady magnetic field.** **Steady magnetic field cannot induce current in the secondary coil.** **Statement 2 is the correct explanation of Statement 1.**

45.	B	黎 Sir 提提你 😊 : **Statement 1 is true.** **For Beta decay, One neutron will be split into two parts: one proton and one** **electron, the electron will be emitted.** **Statement 2 is also true.** **Beta particles are fast moving electrons.** **However, Statement 2 is not the correct explanation of Statement 1.**

MC 係分 ABC Grade 既地方,

越出越煩, 越出越難!

轉數快, 概念清! 缺一不可!

同學一定要快又要好小心!

Andy's predicted M.C. Grade boundaries:

A: 39 / 45   B: 36 / 45   C: 32 / 45

D: 25 / 45   C: 20 / 45

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**

上課地址: 香港九龍旺角煙廠街 9 號興發商業大廈 706 室

地鐵: 旺角 E2 出口, 油麻地 A2 出口
小巴: 21K, 74, 74S

黎Sir教室 A Lai Learning Center

報名熱線: 6772 3001
電郵: **enquiry@andylai.hk**
網址: **www.andylai.hk**