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Requirements of the DSE Integrated Science Examination

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Manager; HKEAA

12 Jan 2012

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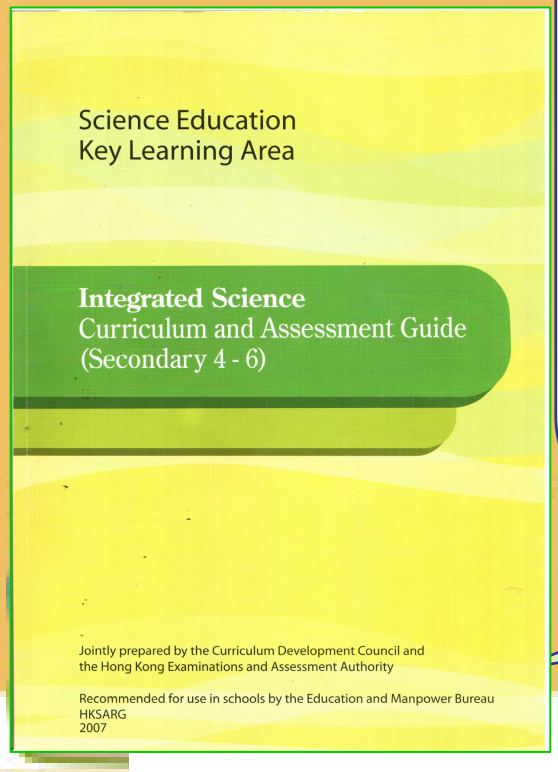
Some principles guiding public assessment



- **Alignment with the curriculum**: the public assessment for Integrated Science will place emphasis on testing candidates' ***ability to apply and integrate knowledge in authentic and novel situations***.
- **Inclusiveness** : the public examination will contain questions which test candidates ***knowledge of the foundations and selected areas in science, and assess higher-order thinking skills***.

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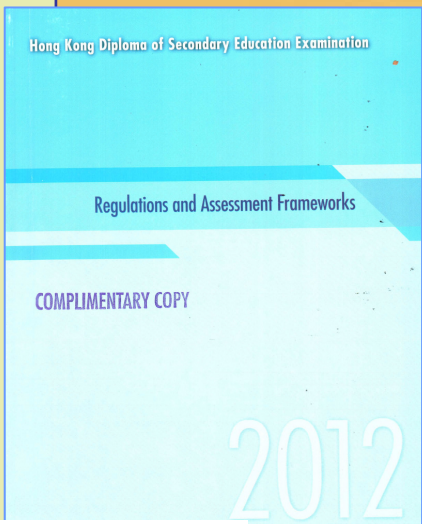
Assessment Objectives of Integrated Scien

The assessment objectives are to evaluate the following abilities of candidates:

1. to recall and show understanding of facts, concepts and principles of science, and the relationships between different topic areas of the curriculum framework;
2. to apply scientific knowledge, concepts and principles to explain phenomena and observations, and to solve problems;
3. to formulate working hypotheses, to plan and to perform tests for them;
4. to show practical skills related to the study of science;
5. to present data in various forms, such as tables, graphs, charts, drawings, diagrams, and to transpose them from one form into another;
6. to analyse and interpret data including numerical and non-numerical data such as those in the form of continuous prose, diagrams, photographs, charts and graphs; to make inferences, logical deductions and draw conclusions from them;
7. to formulate arguments, justify claims, evaluate evidence and detect errors;
8. to select, synthesise, and communicate ideas and information clearly, precisely and logically;
9. to show understanding of the applications of science to daily life and the contributions of science to the modern world;
10. to show awareness of the ethical, moral, social, economic and technological implications of science, and to critically evaluate science-related issues; and
11. to make suggestions, choices and judgements based on scientific knowledge and principles.



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Public Examination

- Paper 1 (45%)
  - 2 hours
  - 90 marks
  - Questions on C1 to C8
    - Structured Questions
    - Essay

      (2 marks for communication)

- Paper 2 (35%)
  - 1½ hour
  - Section A
    - 32 MCQs on C1 to C8
  - Section B
    - A choice of 2 Qs out of 3 Qs; 20 marks/Q
    - 1 Q on E1
    - 1 Q on E2
    - 1 Q on E3

Assessing candidates' ability to apply and integrate knowledge learnt from different modules in daily life / unfamiliar situations

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Paper 1 Q.2

2. Mr. Chan was driving along a horizontal, straight road. He suddenly saw a box on the road and applied the brakes. The speed–time graph of the car is shown in Figure 1. The moment he saw the box is taken as time $t = 0$.

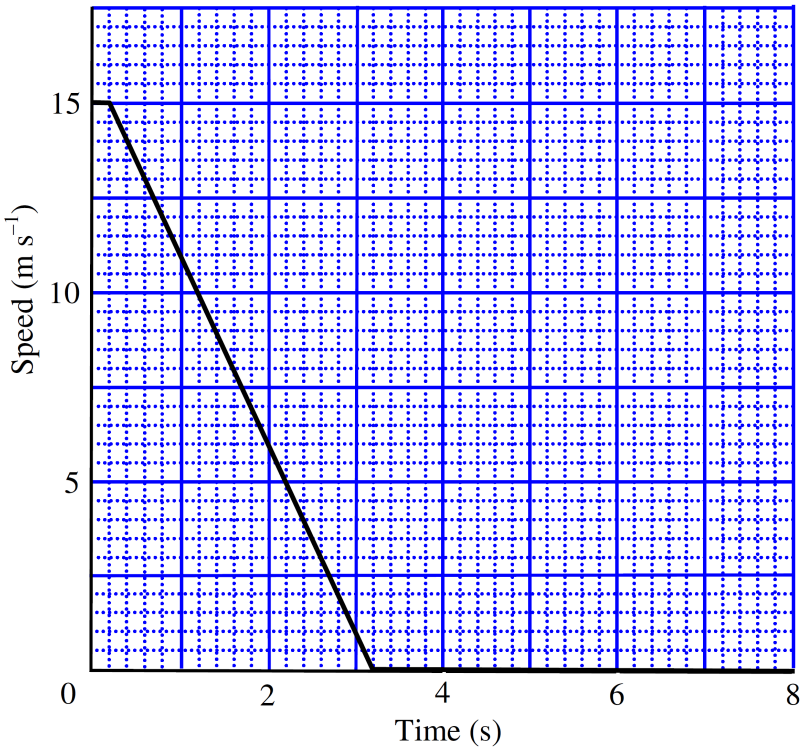

Figure 1

Assessing candidates' ability to

- **apply the laws and principles of mechanics learnt in C3 (in the context of a sprint) to other areas of everyday life**
- **apply and integrate knowledge learnt in different modules (C2 and C3) in a daily life context**

(a) The speed limit for this road is 70 km h^{-1}. Was Mr. Chan speeding at $t = 0$? Support your answer with a calculation. (1 mark)

✓ **Interpret graphical data and make conclusion**

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(b) Describe how the different parts of Mr. Chan's nervous system enabled him to see the box a
initiate the response of applying the brakes. (4 marks)

✓ **Show understanding of nervous coordination (C2) and apply knowledge in an *unfamiliar* situation**

(c) Given that the box was 30 m away from the car at $t = 0$, determine whether the car hit the box.
(3 marks)

✓ **Show understanding of laws of mechanics (C3); apply knowledge and concepts**

(d) (i) If Mr. Chan had consumed some alcoholic drinks, which part of his central nervous system would have been affected? (1 mark)

✓ **Recall of facts**

(ii) If Mr. Chan was drunk, his reaction time would have been longer. In addition, he would have applied a smaller force to the brake. In Figure 1, sketch the speed–time graph of the car. (Assume the speed of the car at $t = 0$ is the same as that in (a).) (2 marks)

✓ **Show understanding of the speed-time graph and apply knowledge**

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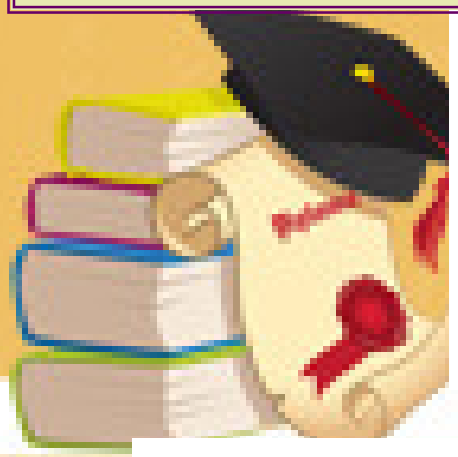
Paper 1 Q.4

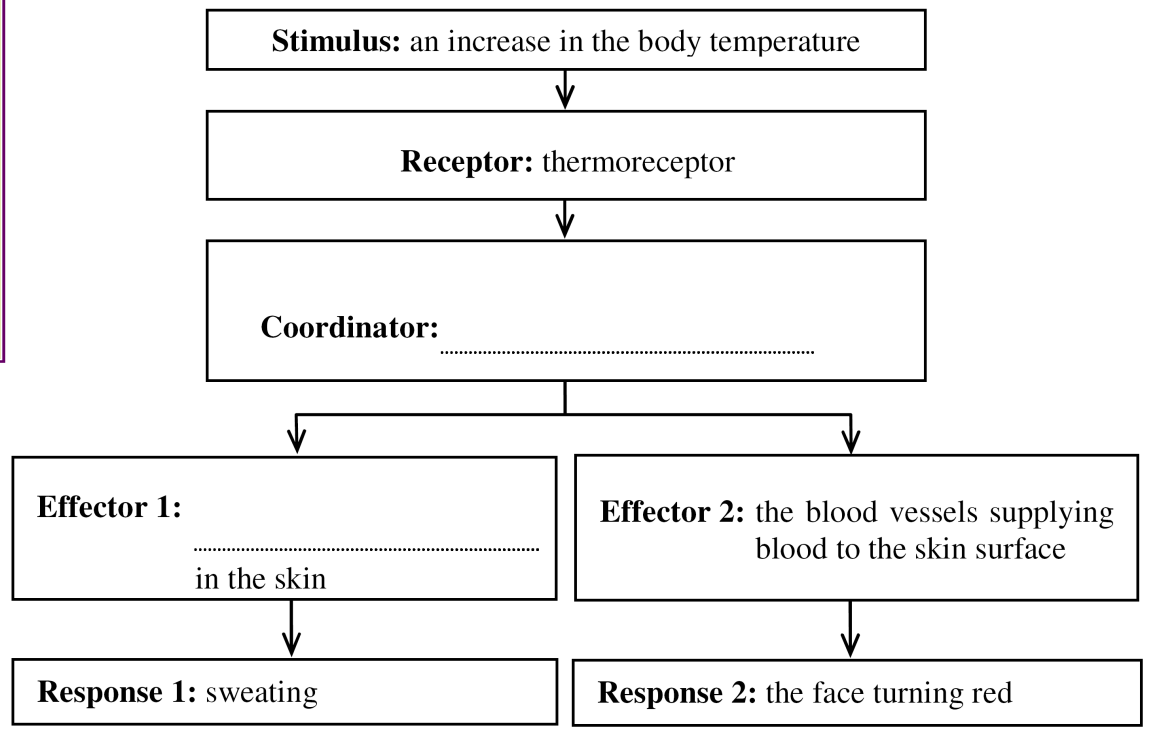
4. It was a warm day and Rosy was walking quickly up a hill. She was breathing heavily and her heart was beating fast. She felt hot and her face had turned red. She wiped off the sweat and drank some water.

(a) Explain how heavier breathing and a faster heartbeat helped Rosy's body cope with the vigorous activity. (3 marks)

(b) (i) Fill in each blank in the flow chart below with suitable word(s) to show how Rosy's body responded to the increase in body temperature. (2 marks)

Assessing candidates' ability to apply and integrate knowledge learnt in different modules (C1, C2 and C3) in a daily life context





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Paper 1 Q.4

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(a) Explain how heavier breathing and a faster heartbeat helped Rosy's body cope with the vigorous activity. (3 marks)

(b) (i) Fill in each blank in the flow chart below with suitable word(s) to show how Rosy's body responded to the increase in body temperature. (2 marks)

✓ **Show understanding of aerobic respiration (C3)**

✓ **Recall knowledge (C2)**

Stimulus: an increase in the body temperature

↓

Receptor: thermoreceptor

↓

Coordinator: .....

↓

Effector 1: ..... in the skin

Effector 2: the blood vessels supplying blood to the skin surface

↓

Response 1: sweating

Response 2: the face turning red

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(ii) Describe how **Effector 2** caused **Response 2**. State the significance of the response.

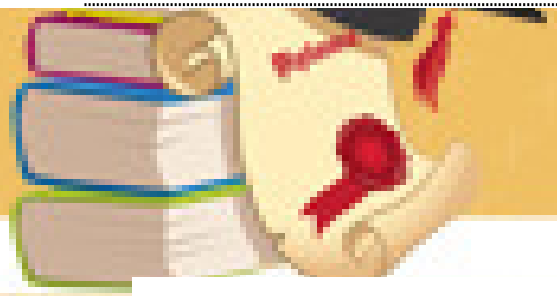
(3 mark

✓ **Show understanding of homeostatic response (C2)**

(c) Give **one** reason why it was important for Rosy to drink water after the vigorous activity.

(1 mark)

✓ **Show understanding of uses of water (C1)**



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Paper 1 Q.6

Assessing candidates' ability to apply knowledge in an unfamiliar situation

6. (a) In 1819, Oersted accidentally discovered that a current-carrying wire could deflect a nearby compass needle. One of his early ideas about the magnetic effect (i.e. magnetic field in present scientific terms) produced by a current-carrying wire was as follows:

Idea: The magnetic effect (→) is parallel to the current-carrying wire (—) (Figure 1).

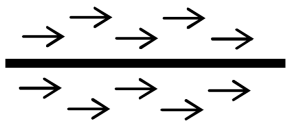
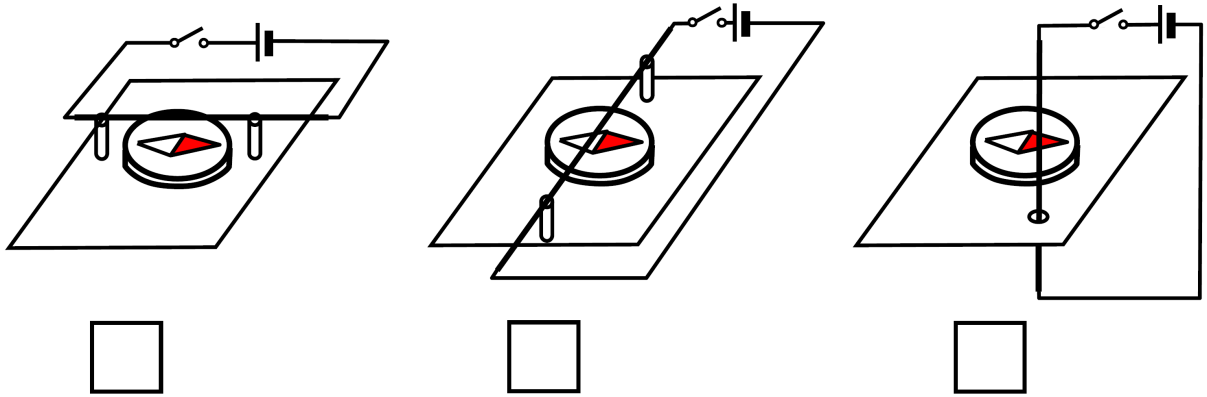


Figure 1

Curriculum element: Nature of Science – scientific thinking and practice

(i) Which of the following set-ups would you use to test Oersted's idea? Put a '✓' in the appropriate box and predict the result of the test if Oersted's idea was correct. (2 marks)

✓ **Plan a test for a hypothesis**
✓ **Make logical predication**



The predicted result if

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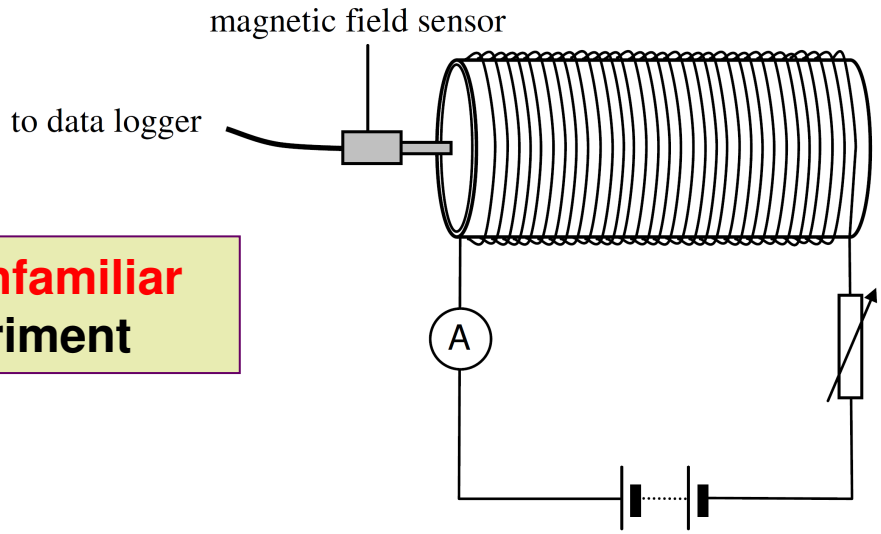
(b) Based on Oersted's discovery, Ampere invented the solenoid. A student used the set-up shown in Figure 3 to investigate the relationship between the magnitude of the magnetic field (B) of a solenoid and its number of turns per metre (n).



An unfamiliar experiment

Figure 3

The student measured the values of B for solenoids of different n with a constant current. The results are shown in the following table:

Number of turns	50	100	150	200
Length of solenoid (m)	0.1	0.1	0.1	0.1
Number of turns per metre n (m^{-1})				
Magnitude of the magnetic field B ($\times 10^{-6}$ T)	310	600	980	1260

Note: The unit of B is tesla, which is abbreviated as T.

✓ **Process data**

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(ii) Plot a graph of B against n. (3 ma

✓ **Present data in the form of a graph**

(iii) What can be concluded from the graph plotted in (ii)? (1 mark)

✓ **Draw conclusion from data**

(iv) State and explain **one** precaution to improve the accuracy of the measurements. (2 marks)

✓ **Apply knowledge in designing an experiment**

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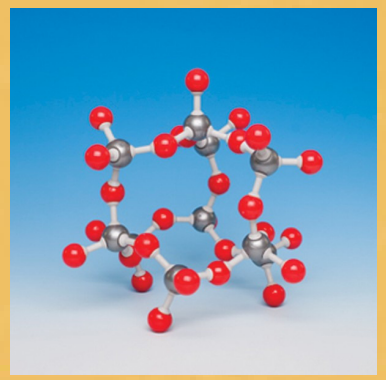
Paper 1 Q.3(b)

✓ Make logical deductions based on scientific evidence

(iii) Silicon and carbon belong to the same group in the periodic table. Knowing that silicon forms an oxide, SiO_2, a student proposed that SiO_2 has a molecular structure similar to that of CO_2. However, after he had found from the data book that SiO_2 has a melting point of 1610°C, he realised that his proposal was wrong. Suggest why this information caused him to realise that his proposal was wrong. (2 marks)

Curriculum element:

Nature of Science – scientific attitude and thinking



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Paper 1 Q.8(d)

✓ make judgement based on scientific knowledge

Two radiologists *P* and *Q* are discussing how frequently images of the kidneys of a patient with mild kidney problems should be taken in one year.

P: The condition of the patient should be monitored closely. We should take an image of the patient's kidneys once every month.

Q: It is sufficient for diagnostic purposes to take an image of the patient's kidneys once every 6 months.

Technetium–99m with an initial activity of 370 MBq is injected into the patient in order to take images of the kidneys. In each injection, the radiation dose is about 0.0015 Sv.

With reference to the effects of radiation dose on the human body as shown in Table 2, comment on the two radiologists' different approaches to using technetium–99m. (4 marks)

Annual dose	< 0.08 Sv	0.08 – 2.00 Sv	2 – 8 Sv
Effects on human body	No health effects observed	Some increase in cancer rates, mutation induction	Various symptoms observed

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Paper 1 Q.9

- ✓ **select, synthesise, and communicate ideas clearly, precisely and logically**

For question 9, candidates are required to present their answers in essay form. 6 marks will be allocated to knowledge and 2 marks to logical presentation and clarity of expression.

9. In recent years, large areas of forest have been cleared in some countries in order to build cities or grow crops. Comment on the socioeconomic and ecological impacts of this practice. (8 marks)

Organisation and presentation (2 marks)
Mark by impression. The guidelines for awarding marks for organisation and presentation are as follows:

2	Answers are well structured, showing coherence of thought and organisation of ideas with no or little irrelevant materials. Shows a good command of language.
1	Answers are organised but lack clarity and fluency. The language used is comprehensible.
0	Answers are chaotic, showing no attempt at organising thought, and contain a lot of superfluous materials. The language used is incomprehensible.

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Paper 2 A (Multiple-choice Questions)

Requirements similar to those in Paper 1;
e.g. assessing candidates' ability

- ✓ **to recall and show understanding of facts, concepts and principles of science in the topics in the curriculum**
- ✓ **to apply scientific knowledge, concepts and principles in familiar and unfamiliar situations**
- ✓ **to analyse and interpret data including numerical and those in the form of diagrams, photographs, charts and graphs**
- ✓ **to make inferences, logical deductions and draw conclusions from data**

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✓ **Recall and show understanding of facts, concepts and principles of science in the topics in the curriculum**

✓ **Apply scientific knowledge, concepts and principles in familiar and unfamiliar situations**

17. Which of the following trends in the properties of Group VII elements is correct?

A. The melting point decreases down the group.
B. The atomic size decreases down the group.
C. The reactivity decreases down the group.
D. The density decreases down the group.

21. Some specifications of Susan's monitor are shown below:

Voltage	AC 120 / 230 V
Power (operational)	45 W
Power (standby)	2 W

Susan uses the monitor 6 hours every day. Instead of switching off the monitor, she leaves it in standby mode after use. What is the extra cost of electricity in 365 days due to not switching the monitor off? (Given: Each unit of electricity (kWh) costs $0.8.)

A. $ 3.5
B. $ 10.5
C. $ 75.3
D. $ 226.0

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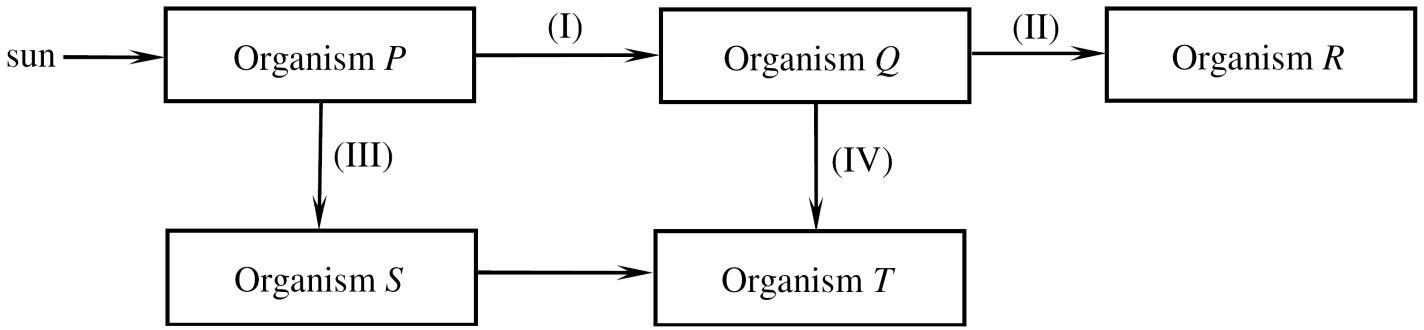
Directions: Questions 23 and 24 refer to the following diagram, which shows the energy flow among five groups of organisms in a food web in an ecosystem:



23. Which organism(s) is/are the primary consumer(s) in this food web?

A. *P* only
B. *Q* and *R* only
C. *Q* and *S* only
D. *R* and *T* only

24. If organism *P*'s population stores 100 000 units of energy in their biomass, which of the following descriptions of the energy transfer is/are correct?

(1) The energy transferred via (I) is more than that via (II).
(2) The energy transferred via (II) and (IV) is the same.
(3) The sum of the energy transferred via (I) and (III) is 100 000 units.

A. (1) only
B. (2) only
C. (1) and (3) only

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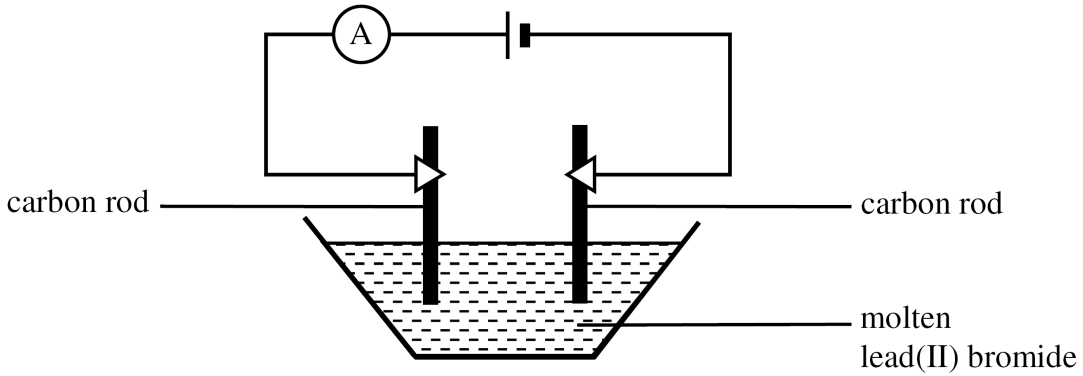
✓ Analyse and interpret data; make inferences and draw conclusions from d

2. A student tested lemon juice and rain water with pH paper. The result showed that the pH value of lemon juice was 2 and that of rain water was 6. What can he conclude?

A. Rain water is more acidic than lemon juice.
B. The carbon dioxide in air dissolves slightly in water.
C. The number of hydrogen ions in lemon juice is greater than that in rain water.
D. The concentration of hydrogen ions in lemon juice is higher than that in rain water.

14. When electricity is applied to molten lead(II) bromide, a gas appears at the positive electrode and a metal is formed at the negative electrode.



Which of the following statements can be inferred from this experiment?

A. Molten lead(II) bromide contains mobile ions.
B. Lead(II) ions and bromide ions in lead(II) bromide are attracted to each other by ionic bonds.
C. Lead forms ions with two units of positive charges and bromine forms ions with one unit of negative charge.
D. Lead(II) ions are attracted to the positive electrode and bromide ions are attracted to

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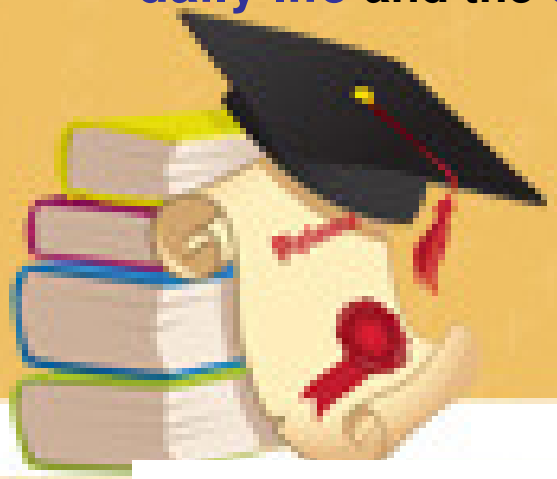
Paper 2 B Questions set on E1 to E3

Requirements similar to those in Paper 1 & Paper 2A;
e.g. assessing candidates' ability

- ✓ **to recall and show understanding of facts, concepts and principles of science in the topics specified in each elective module**
- ✓ **to apply scientific knowledge, concepts and principles in familiar and unfamiliar situations**
- ✓ **to analyse and interpret data including numerical and those in the form of diagrams, photographs, charts and graphs**
- ✓ **to make inferences, logical deductions and draw conclusions from data**
- ✓ **to show understanding of the applications of science to daily life and the contributions of science to the modern world;**



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E1 - Q1 (c)

✓Apply scientific knowledge, concepts and principles in an unfamiliar situation (sandstorm)

✓ Analyse and interpret data in the form of diagrams, photographs, charts (weather charts in E1) and graphs

(ii) On the weather chart in Figure 1.3, the mass of fine particles that battered Tai
21 March 2010 is shown. Figure 1.4 shows the RSP concentrations measured during
period of 21 to 23 March 2010 from the general air quality monitoring station at Tap Mu
a rural island in Hong Kong's waters.

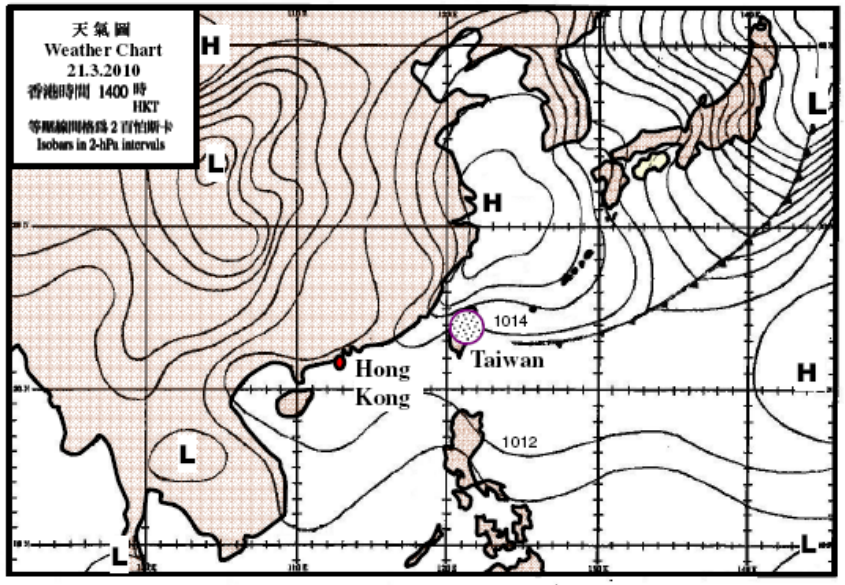

Figure 1.3

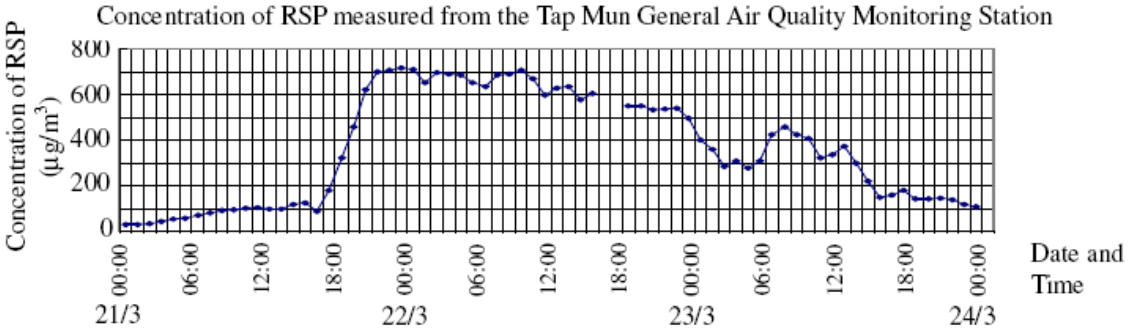

Figure 1.4

(1) As shown in Figure 1.4, there was a rise in RSP concentration from 16:30 to 21:30 on 21 March in Hong Kong. With reference to Figure 1.3, identify the weather system that caused the rise in RSP concentration in Hong Kong. Explain how this

(arks)

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E2 – Q2(b) (ii)

✓ Show understanding of concepts (risk factor in E2)

✓ Analyse and interpret numerical data and draw conclusion

(ii) In a study to identify the risk factors for liver cancer, 107 liver cancer patients and 10[illegible] sex- and age-matched people without liver cancer (i.e. the control group) were interviewed. The table below shows the data of some factors investigated, including smoking, infection by hepatitis B virus (HBV) and fruit consumption:

Group	No. of liver cancer patients	No. in the control group	Probability of liver cancer	Relative risk
Smokers	80	21	0.792	3.31
Non-smokers	27	86	0.239	
People infected with HBV	88	17	0.838	x
People not infected with HBV	19	90	0.174	
People consuming fruit frequently	89	93	0.489	y
People consuming little or no fruit	18	14	0.563	

(1) Calculate the relative risk of getting liver cancer for those infected with HBV (x) and the relative risk of getting liver cancer for those who frequently consume fruit (y).
(2 marks)

(2) In this study, smoking was concluded to be a risk factor for liver cancer. Hence, determine whether infection by HBV and consumption of fruit are risk factors.
(1 mark)

(3) Why is it that smoking can be shown from the results of this study to be only a 'risk factor' but not a 'cause' of liver cancer? (2 marks)

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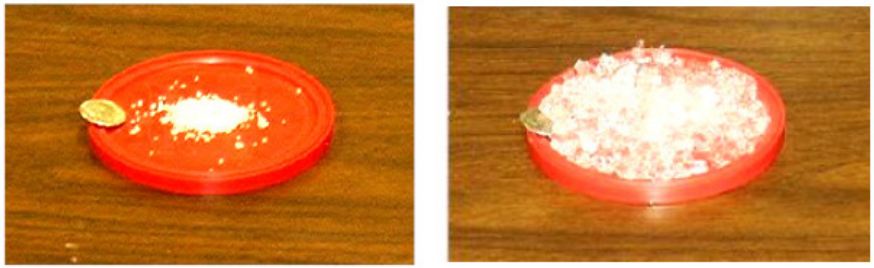
E3 – Q1(b) (ii)

✓ **Apply scientific knowledge, concepts and principles in an unfamiliar situation** ***(relating the water absorbency to the formation of hydrogen bonds (C1 & C4) between water and polyacrylamide molecules)***

✓ **Show understanding of the applications of science to daily life and the contributions of science to the modern world**

(a) Polyacrylamide is a water absorbing synthetic polymer. It can absorb water up to a [illegible] its own volume. Figure 3.1 shows a sample of polyacrylamide before and after absor[illegible] Figure 3.2 shows the structure of the monomer of polyacrylamide.



Polyacrylamide before absorbing water

Polyacrylamide after absorbing water

Figure 3.1

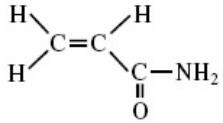


Figure 3.2

(i) State the type of polymerisation involved in the formation of polyacrylamide. Hence, draw the structure of polyacrylamide. (2 marks)

(ii) Suggest why polyacrylamide has a high affinity for water. (2 marks)

(iii) Cellulose was used as the water absorbing material in disposable baby diapers. However, polyacrylamide's very high affinity for water makes it the most commonly used material in baby diapers now (Figure 3.3).

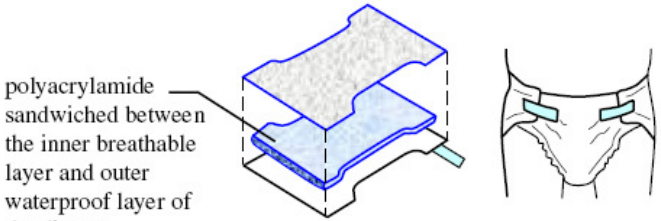


Figure 3.3

considered (1 mark)

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Piloting of Practice Papers

- Students' scripts are marked with the Marking Schemes which are revised after the standardisation meeting
- Students' performance will be reported in the PD course "**Developing Assessment Tasks to Promote Assessment for Learning (2nd round)**"

Date: 29 February 2012 (Wednesday)
Time: 2:00 – 5:30 pm
Venue: W425, West Block,
EDB Kowloon Tong Education Services Centre,
19 Suffolk Road, Kowloon Tong , Kowloon
Method of enrolment: TCS

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HKDSE Integrated Science
General Guidelines in Marking the Practice Papers

Grace YAU
Manager; HKEAA
12 Jan 2012

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Things to note

本評卷參考乃香港考試及評核局專爲本科練習卷而編寫，供教師參考之用。教師應提醒學生，不應將評卷參考視爲標準答案，硬背死記，活剝生吞。這種學習態度，既無助學生改善學習，學懂應對及解難，亦有違考試着重理解能力與運用技巧之旨。因此，本局籲請各位教師通力合作，堅守上述原則。

This marking scheme has been prepared by the Hong Kong Examinations and Assessment Authority for teachers' reference. Teachers should remind their students NOT to regard this marking scheme as a set of model answers. Our examinations emphasise the testing of understanding, the practical application of knowledge and the use of processing skills. Hence the use of model answers, or anything else which encourages rote memorisation, will not help students to improve their learning nor develop their abilities in addressing and solving problems. The Authority is counting on the co-operation of teachers in this regard.

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General Notes for Teachers

1. The marking scheme is the preliminary version before the normal standardisation process and some revisions may be necessary after actual samples of performance have been collected and scrutinised by the HKEAA. Teachers are strongly advised to conduct their own internal standardisation procedures before applying the marking schemes. After standardisation, teachers should adhere to the marking scheme to ensure a uniform standard of marking within the school.

2. The marking scheme may not exhaust all possible answers for each question. Teachers should exercise their professional discretion and judgment in accepting alternative answers that are not in the marking scheme but are correct and well reasoned.

- Understand clearly the marking scheme, and the marking principles
- Adhere closely to the MS and apply it accurately
- Read through the meaning. DO NOT just mark by keywords
- Exercise professional judgment on atypical cases based on the marking principles

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Some General Guidelines

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3. The following symbols are used:

( )	Bracketed words, figures or ideas are not essential for the candidate to be awarded the point.
/	A single slash indicates an acceptable alternative within an answer.
+	A plus sign indicates that there are two pieces of information necessary to be awarded the point: the first piece of information comes before the plus sign and the second after.
*	Correct spelling required

4. In questions asking for a specified number of reasons or examples etc. and a student gives more than required number, the extra answers should not be marked. For instance, in a question asking students provide two examples, and if a student gives three answers, only the first two should be marked.

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Spelling mistakes

(*) If CORRECT spelling required

Accept singular or plural

中文須完全書寫正確，接受簡筆字。

Q4(b)(i) 下丘腦 ≠ 下憂腦

下丘腦 = 下丘脳

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Spelling mistakes

If CORRECT spelling NOT specifically required

May accept those words that do **not** have other misleading meaning

Examples : hydrogen bondeng ✓ hydrogen bending ✗

若意思無誤導性，可酌情接受錯別字。

例：氫鍵✓ 參透作用✗ 惱部✗ 消化細菌✗

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‘1+1’ marking

Paper 1
Q.6(b)(iv)

1st part	2nd part	Marking	Score
✓	✓	1+1	1,1
✓	✗	1+0	1
Answer not clear	✓	0+1	1
not answered	✓	0+ 0	0
✗	✓	0+0	0
✗	✗	0+0	0

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Paper1 Q.6(b)(iv)

– The experiment should be conducted far away from magnets / other electromagnetic devices (e.g. electromagnet) so that the magnetic field due to the solenoid is not affected. (1+1)

- Do not put the set-up near some magnets ✓ because it will break the set-up ✗ **(1+0 = 1)**

- Do not put the set-up near some materials ✗ that can affect the magnetic field produced by the solenoid ✓ **(0+1 = 1)**

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Paper1 Q.6(b)(iv)

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– The experiment should be conducted far away from magnets / other electromagnetic devices (e.g. electromagnet) so that the magnetic field due to the solenoid is not affected. (1+ 1)

- Take precaution ~~so~~ as not to affect the magnetic field produced by the solenoid ✓

(0+0 = 0)

- Replace the ammeter with a voltmeter ~~so that~~ the magnetic field produced by the solenoid is not affected ✓

(0+0 = 0)

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Awarding mark for 'Organisation and presentation' (Q.9)

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Mark scale: 2,1, 0

Organisation and presentation (2 marks)
Mark by impression. The guidelines for awarding marks for organisation and presentation are as follows:

2	Answers are well structured, showing coherence of thought and organisation of ideas with no or little irrelevant materials. Shows a good command of language.
1	Answers are organised but lack clarity and fluency. The language used is comprehensible.
0	Answers are chaotic, showing no attempt at organising thought, and contain a lot of superfluous materials. The language used is incomprehensible.

- **Should award '0' for 'organisation and presentation' if the answer scores no marks for the 'knowledge' part**

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Specified number of reasons / examples

Examples:

Paper 1 Q.4 (c) ***one*** **reason**

Paper 2 Q.3(a)(iii)(3) ***two*** **advantages**

If two points required, only mark first 2 points

(continue marking 照改)

1st Point 第一點

2nd Point 第二點

3rd Point 第三點 ✗

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Attempting 3 Qs in Paper 2 Section B

- Candidates are free to choose **ANY** two question in Paper 2 Section B
- On-screen Marking is adopted in the DSE Examination
- Though all questions attempted will be marked and the scores from the two Qs with the highest scores will be taken, the candidates risk insufficient time for answering the questions well

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Marking Scheme interpretation Paper 1

12 January 2012

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Q.1

(a)	(i)	Hydrogen bonding	1
	(ii)	In ice, the water molecules are set apart and neatly arranged by hydrogen bonds to form an open structure. (No mark for 'hexagonal structure' only.) Thus, the water molecules in ice are less closely packed than those in water.	1 1
	(iii)	Ice floats on water forming an insulating layer on the top of a lake. Organisms can continue to live in water beneath the layer of ice when the lake has not entirely frozen.	1 1

Try marking Sample 1 and Sample 2 on Q.1 (a) (ii)

Marked
ts

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(b) (i) Water collected in reservoirs / from rain water *[not accept: underground water]*
The amount of rainfall / water held in reservoirs became insufficient to meet the increasing demand for fresh water due to the rapid growth of population / industries. 1

(ii) (1) $E = mc\Delta T + ml$
$= 1000 \times 4200 \times 80 + 1000 \times 2.26 \times 10^6$ 1
$= 2.60 \times 10^9$ J *[no unit → no mark]* 1
(1 mark for the method; 1 mark for the correct answer.)

(2) The cost of desalination is very high
because a large input of energy is required / a large amount of fuel is needed to provide the energy required to bring water to boil for distillation, 1
due to the high latent heat of vaporisation and high specific heat capacity of water. 1

(2) With reference to the properties of water, explain why desalinating seawater by distillation is costly. (2 marks)

Because water have a high specific heat capacity, it needs large amount of energy to raise it temperature. Desalinating seawater need to turn seawater into steam, it needs large amount of energy and so it is costly. ✓

Answers written in the margin 1

The quality of Dongjiang water showed signs of deterioration in the 1990s

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Q.1(b)

(iii) (1) The discharge of domestic / industrial / agricultural waste water into the Dongjiang *[not accept: just state some pollutants, e,g, heavy metals, DDT because they are not source]* 1

(2) Any ONE of the following: 1

- Delivering Dongjiang water directly to Hong Kong in closed pipes / aqueducts to protect the water from possible pollution sources. (1)
- Treating all sewage before discharging it into the Dongjiang catchment. (1)
- Increasing the penalty for illegal sewage discharge into the Dongjiang catchment. (1)

(Accept other correct alternatives, *e.g. close monitoring of water quality*.)

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Q.2

(a) Speed limit = 70 km h^{-1} = 70 × 1000 ÷ 3600 = 19.4 m s^{-1}
Initial speed of the car = 15 m s^{-1}, which is smaller than the speed limit (19.4 m s^{-1}). 1
Therefore, the driver was not speeding.
(Alternative method: initial speed of car = 15 m s^{-1} = 15 × 3600 ÷ 1000 = 54 km h^{-1}
54 km h^{-1} < 70 km h^{-1}, therefore the driver was not speeding.)

(b) Light receptors *(/rods /cones)* in the eyes were stimulated and set up nerve impulses. 1
The impulses were transmitted to the brain along the (sensory) neurone / (optic) nerve. 1
The brain *(/ cerebrum)* interpreted the nerve impulses so that the driver could see the box. 1
The brain made a decision and sent out nerve impulses (via the motor neurons) to relevant muscles for coordinated contraction to apply the brakes. 1

Try marking Sample 1 and Sample 2 on Q.2 (b)

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(c) Distance travelled by the car before it stopped = area under the speed–time graph 1

= (0.2 + 3.2) × 15 ÷ 2

= 25.5 m 1

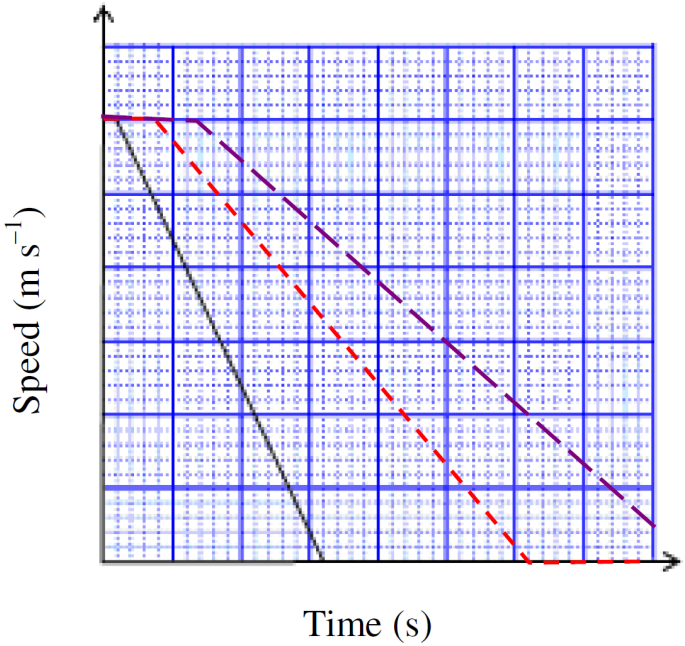
The distance travelled by the car is 25.5 m, which is <u>smaller</u> than 30 m. 1

Therefore the car did not hit the box.

(1 mark for the method; 1 mark for the correct answer; 1 mark for comparing the distances for making the judgement.)

(d) (i) The brain *(/ cerebrum / cerebellum)* 1

(ii)



Both dotted lines shown are acceptable answers. The speed–time graph should show:

– a longer reaction time 1

– a smaller slope for the deceleration part 1

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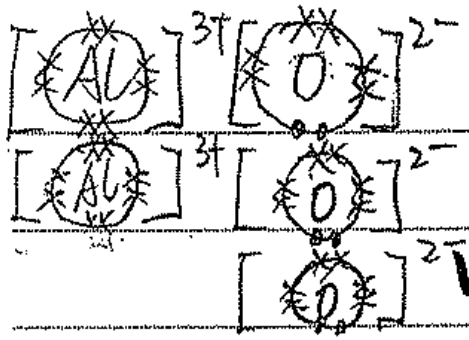
Q.3

(a) (i) $2[Al]^{3+}\ 3[\ O\ ]^{2-}$ 1

By transferring electrons from aluminium to oxygen, *[not accept: by the loss of electrons from Al]* 1

both aluminium and oxygen can attain a stable noble gas electron arrangement. *[accept: Octet]* 1

鋁形成氧化物 Al_2O_3。根據週期表的資料，繪畫 Al_2O_3 的電子圖（只須顯示最外層電子），並加以解說。 (3 分)



因为铝原子释放三粒电子而形成电子排列近似氖原子的稳定电子排列，而氧原子倾向吸收两粒电子形成电子排列近似氖原子的电子排列来稳定外围电子。所以两个铝原子共释放六粒电子，三个氧原子吸收六粒电子，形成 Al_2O_3

寫於邊界以內

在 1875 年，法國化學家布瓦博得朗發現了鎵(符號：Ga)。在這項發現之

Try

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Q.3

(b)	(i)	The linear shape of the molecule makes the dipoles resulting from the 2 C=O bonds cancel each other.	1
	(ii)	van der Waal's forces	1
	(iii)	In his proposal, SiO_2 has a simple molecular structure	1
		in which molecules are held by weak van der Waal's forces.	1
		Thus, it should have a melting point much lower than 1610°C.	

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Q.4

(a)	Increased breathing rate allowed Rosy to take in more oxygen and give out more carbon dioxide.		1
	Her heart beat increased to speed up circulation of oxygen and *[/ or]* nutrients to the cells		1
	so that more energy could be released through cellular respiration for the vigorous activity.		1
(b)	(i)	hypothalamus *	1
		sweat gland*	1
	(ii)	Effector 2 dilated *[not accept: relax / expand]* (i.e. vasodilation).	1
		More blood flowed to the skin surface of Rosy's face, turning her face red.	1
		This allowed more effective heat dissipation to cool her down.	1
(c)	It replenished the water lost through sweating. / This helped to cool her body down.		1

Try marking Sample 1 and Sample 2 on Q.4 (a)

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Q.5

(a) (i) Identical twins occur when a fertilized egg splits and develops into two embryos. 1

(ii) Although identical twins share the same genetic make-up (genotype), *[not accept: same gene / genetic material]* 1

the expression of the genes controlling the fingerprint pattern (phenotype) can be affected by environmental factors. 1

(b) (i) Husband: *Tt* , Wife: *Tt* (1 mark for both answers are correct.) 1

(ii) Punette square: 1

	T	*t*
T	*TT*	*Tt*
t	*Tt*	*tt*

View: 1

Yes, because there is only ¼ chance of having an affected child (*tt*). (1)

OR

No, it is too risky as there is ¼ chance of having an affected child (*tt*). (1)

(1 mark for the correctly drawn Punette square; 1 mark for supporting the view with the predicted chance.)

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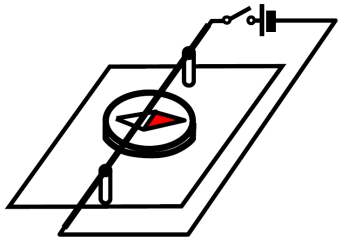
Q.6

(a) (i) Choice of set-up:

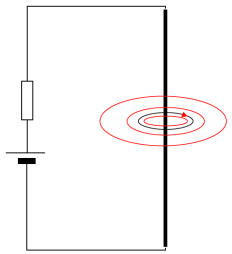


1

Predicted result: The compass needle will turn and come to a position that is parallel to the current-carrying wire. *[accept : turn 90°]* 1

(ii) (1) The arrowhead drawn on the magnetic field line should indicate a clockwise direction. 1

(2)



(The drawing should show that the magnetic field lines near the wire are denser while the magnetic field lines further away from the wire are sparsely packed.) 1

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(b)	(i)	500, 1000, 1500, 2000 (1 mark for all answers being correct.)	
	(ii)	correct axes with labels, in appropriate scale	1
		correctly plotted points (any 3 correctly plotted points; ± 1 box)	1
		best fit line drawn	1
	(iii)	The magnitude of the magnetic field is <u>directly proportional</u> to the number of turns per unit length of the solenoid (i.e. <u>$B \propto n$</u>).	1
	(iv)	Any ONE of the following:	1+1
		– The relative positions between the solenoid and the sensor must be fixed	(1+
		because the magnitude of the magnetic field outside the solenoid is different at different positions.	1)
		– The experiment should be conducted far away from magnets / other electromagnetic devices (e.g. electromagnet)	(1+
		so that the magnetic field due to the solenoid is not affected.	1)
		– Put the sensor inside the solenoid	(1+
		because the magnetic field is uniform inside the solenoid.	1)
		(1 mark for the precaution; 1 mark for the explanation.)	

把其他在四周的电器移離實驗，因电器會發出磁場，影響準確度 ✓

1+0

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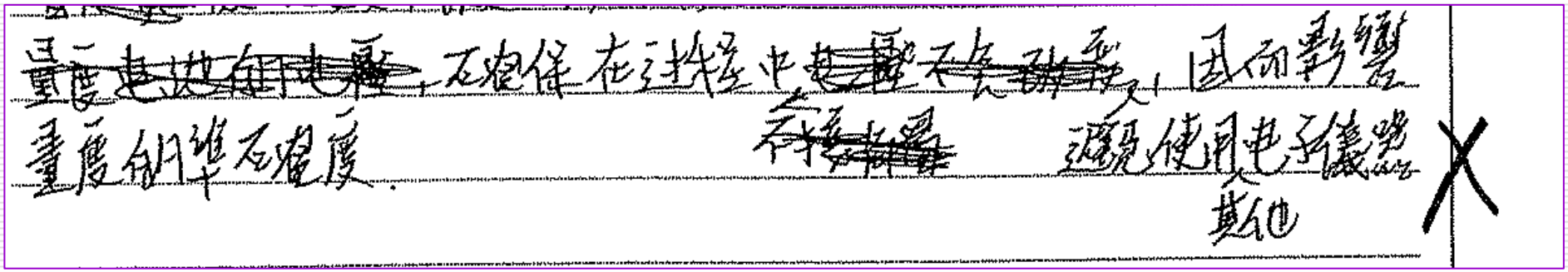
(iv) Any ONE of the following:

– The relative positions between the solenoid and the sensor must be fixed (1+
because the magnitude of the magnetic field outside the solenoid is different at different positions. 1)

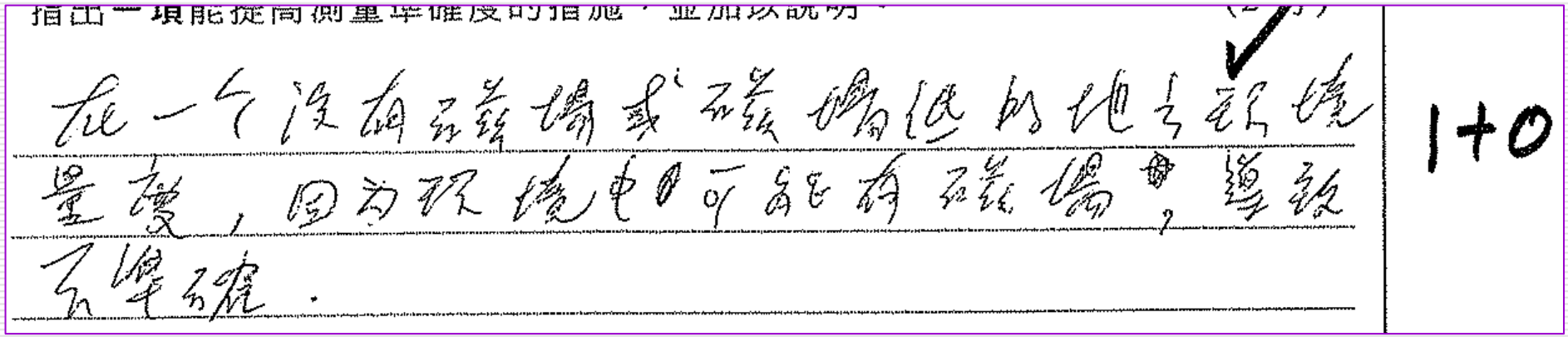
– The experiment should be conducted far away from magnets / other electromagnetic devices (e.g. electromagnet) (1+
so that the magnetic field due to the solenoid is not affected. 1)

– Put the sensor inside the solenoid (1+
because the magnetic field is uniform inside the solenoid. 1)

(1 mark for the precaution; 1 mark for the explanation.)



X



1+0

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Q.7

(a)	Any ONE of the following:	1
	– Proper irrigation / The use of fertilizers provides the necessary raw materials (water / minerals) for better crop growth.	(1)
	– Growing crops in a greenhouse provides a suitable temperature for better crop growth.	(1)
	– The use of insecticides / Growing crops in a greenhouse protects the crops from damage by pests.	(1)
	– By selective breeding, farmers can obtain crops that are better adapted to growth in a particular environment.	(1)
(b)	When an insecticide is first applied, most insects are killed while those with resistance to the insecticide survive.	1
	These resistant insects grow, mature and reproduce to pass this resistance to their offspring.	1
	After repeated rounds of selection by the same insecticide, the proportion / percentage of resistant individuals in the population increases, rendering the insecticide less effective.	1

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Q.7

(c)	Nutrients in soil, which are taken up by crops for growth, are removed after the crops are harvested.	1
	The remains of crops and dried animal manure are decomposed by decomposers / bacteria / fungi / microbes to inorganic nutrients.	1
	These inorganic nutrients are then available to the crops in next planting / maintain the fertility of the soil to maintain the crop yield.	1
(d)	Genes from different species are made up of the same 4 types of nucleotides.	1
	Since codon usage is universal / the same codon codes apply for the same amino acids in different species,	1
	the transferred gene can be correctly decoded (i.e. transcribed) to make the same gene product (i.e. translated into protein) in the new host.	1

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Q.8

(a) $^{99}_{43}Tc^{*} \rightarrow {}^{99}_{43}Tc + \gamma$ 1

(b) (i) Decay is a <u>random</u> process. Activity, which is the number of decays per second, therefore exhibits randomness. 1

(ii) Half-life of Technetium–99m = 6 hours *[no unit → no mark]* 1
(Accept an answer within the range 5.5 – 6.5 hours, as estimated from the graph.)

(iii) No. of half-lives = 24 hours ÷ 6 hours = 4 *[accept 3.69 -4.36 half-lives]* 1
Activity of the Technetium–99m in the patient 24 hours later
= 370 MBq × $(½)^4$
= 23.1 MBq *[accept17.9 -28.6 MBq] [no unit → no mark]* 1
(1 mark for the method; 1 mark for the correct answer.)

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Q.8

(c) *X* is not suitable because it has a long half–life. It will accumulate in the body for a long time, rendering it hazardous to health. 1

Y is not suitable because the α radiation emitted has a strong ionization power, which causes damage to body cells. *[not accept: α radiation has a low penetrating power]* 1

(d) In the approach taken by radiologist P, the annual dose
= 0.0015 Sv × 12
= 0.018 Sv 1

In the approach taken by radiologist Q, the annual dose
= 0.0015 Sv × 2
= 0.003 Sv 1

For either approach, the annual dose is within the 'no health effects observed' zone. 1

Comment on either one of the approaches: 1

– Radiologist Q adopts the ALARA (As Low As Reasonably Achievable) principle, i.e. the use of radioisotopes is kept to a minimum as long as diagnosis can be made. (1)

– Without causing any health effects on the patient, radiologist P's approach allows a close monitoring of the patient's condition (1)

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Q.9

Knowledge (6 marks)

Socioeconomic impact: max.3

- Building cities can bring about improvements in living standards. (1)
- Building cities can provide more employment opportunities. (1)
- Growing crops can provide more food. (1)
- Growing cash crops can bring in income. (1)
- Timber obtained from the cleared forests can bring in income. (1)

Ecological impact: max.3

- A reduced number of producers may upset the stability of the food web. (1)
- With fewer trees to absorb carbon dioxide, there may be a net increase in the concentration of the atmospheric carbon dioxide. This may speed up global warming. (1)
- The clearing of forests leads to a loss of habitats for many organisms, (1)
  and hence may cause a reduction in biodiversity. (1)
- The water retentivity of the soil in the area is reduced, which may lead to soil erosion or flooding. (1)

2	Answers are well structured, showing coherence of thought and organisation of ideas with no or little irrelevant materials. Shows a good command of language.
1	Answers are organised but lack clarity and fluency. The language used is comprehensible.
0	Answers are chaotic, showing no attempt at organising thought, and contain a lot of

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Q.9

Try marking the sample on Q.9

Marked scripts

這些国家的做法会為社会经濟和生態造成嚴重負面影响。

首先，把大範圍的樹林砍除，会為樹林内的动物受到影响，如欠缺食物或居所等，嚴重減少生物多樣式，对生態造成負面影响。

其次，砍伐大量樹林亦会導致国家碳排放提高，因為它們缺乏大量樹木進行光合作用和吸收二氧化碳，会到全球都受到影响。

再者，興建城市的時候会產生大量不同的污染，如，噪音，空氣等，這些污染都会令到社会经濟和生態兩方面都受到負面影响。

最後，大量土地進行農耕会令到泥土鬆軟，亦容易造成沙漠化，這樣，对社会健康及生態都受到影响。

總括而言，擴展土地而把大量樹林砍伐去，都会对社会和生態方面造成不良

寫於邊界以外的答案，將不予評閱。

S=0
E=2
P=1
3

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THANK YOU!

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Q.1(a)(ii)

Sample 1

(ii) With reference to the structures of ice and water, explain why the density of ice is lower than that of water. (2 marks)

Water has a highest density at 4°C and the molecules start arranging neatly to form hexagons from free molecules when the temperature decreases after 4°C.

Sample 2

(ii) 參照冰和水的結構，解釋爲什麼冰的密度較水的密度低。 (2 分)

液态的氢键无法长久维持，水分子排列较乱，液态水在4°C时密度最大。随着温度下降，水分子排列趋于整齐，形成蜂巢状的晶体结构，所以冰的水分子与水分子之间有较大空间，故冰的密度较水低。 1

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Q.1(b)(ii)(2)

(2) 參照水的性質，解釋爲什麼使用蒸餾法把海水化淡的成本昂貴。

(2 分)

因為水的汽化比潛熱高，需要較多能量才可將水升高1°C，所以故此成本昂貴。

果，將不予評閱。

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Q.2(b)

Sample 1

(b) Describe how the different parts of Mr. Chan's nervous system enabled him to see the box and initiate the response of applying the brakes. (4 marks)

An

Sensory neuron in Mr Chan's eyes saw the box. ✗

Signals are transmitted to the inter neuron in the spinal cord ✗

~~motor neuron receive~~

signals are then sent to the brain for analysis. ✓

Signals are sent back to the motor neuron from the brain.

motor neuron initiate ✗ response and apply the brake.

1

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Q.2(b)

Sample 2

(b) 說明陳先生的神經系統內不同部位如何協作，使他能看見盒子，並啓動制動汽車的反應。 (4 分)

陳先生先要以眼睛作為感受器，看到前方有盒子，就立即以神經脈衝將訊息傳送至中樞調器 — 中樞神經至大腦，然後決定要停下車輛，就再以神經脈衝將訊息傳至效應器 — 腳部踏下減速掣，從而制動汽車。

1

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Q.3(a)(i)

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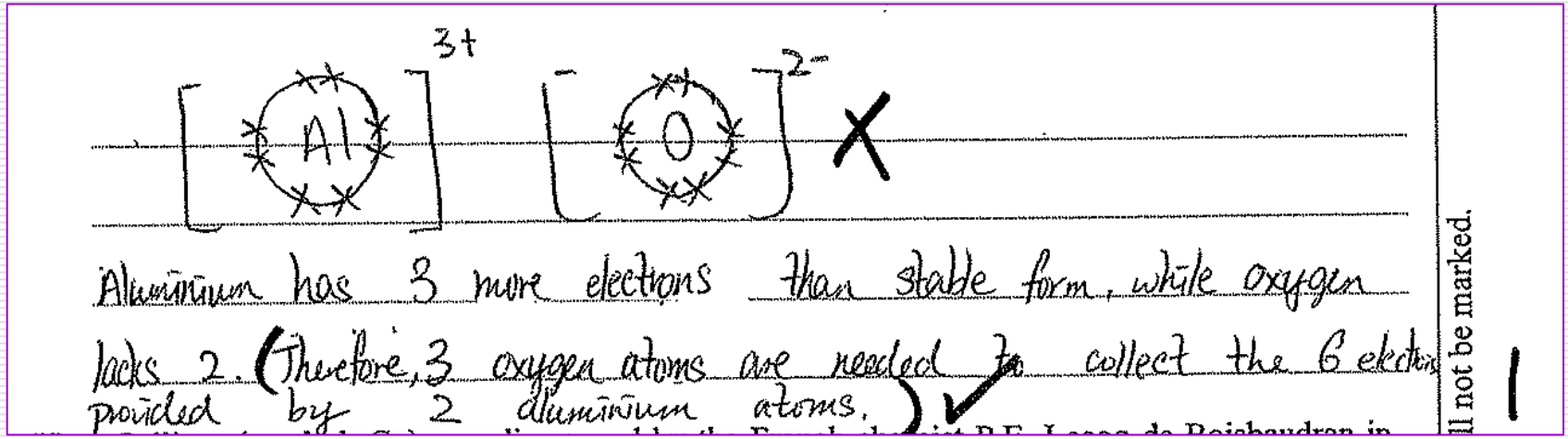
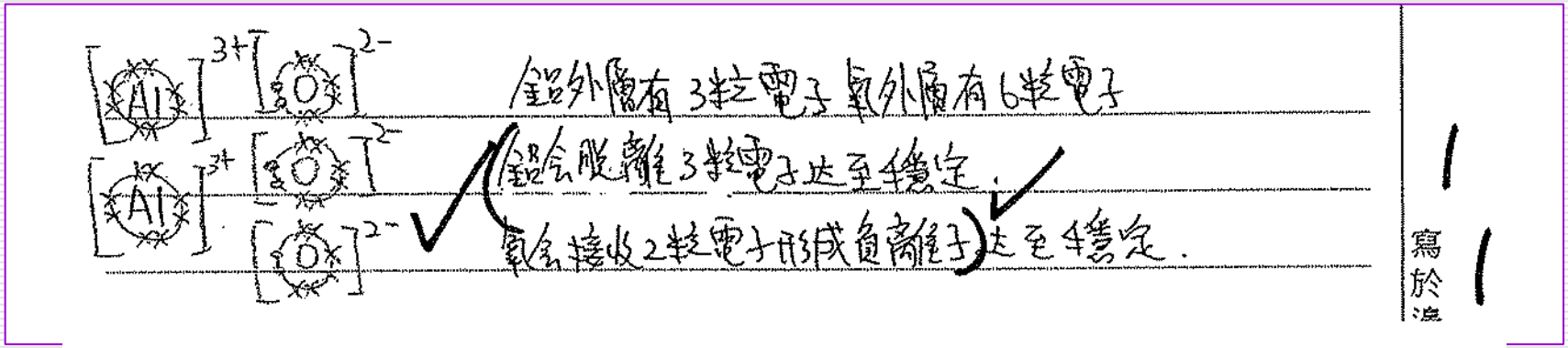
Sample 1



Sample 2



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Q.4(a)

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Sample 1

厌氧氧

進行剧烈活动时，肌肉去不断收缩需要能量才可支持肌肉收缩。

而呼吸加深可使人吸取更多氧氧，心跳加速可使心脏提供更多血液至肌肉，所以两者均可应付剧烈活动

Sample 2

呼吸加深可以吸入更多氧气，加快呼吸作用发生，氧气与葡萄糖发生反应，释放多能量，以支持这项剧烈运动。

心跳加速可以加快新鲜血液的供应，更多血液经过肺部，携更多氧气运送到全身不同地方，为提供给~~呼吸作用者~~细胞产生更多能量，来支持剧烈运动。

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In recent years, large areas of forest have been cleared in some countries in order to build cities or grow crops. There are a ~~various~~ variety of impacts to the society, economy and the ecology through this act. Let's give a brief description to them!

From the point of view of the society and economy, there are quite a large number of positive effects than the negative ones. First, as there are is a new city for the country, it can become a place for internal residences residents to dwell in and therefore increase the working ~~capital flow~~ of the economy. (Besides, the tourism and financial industry can also be boosted due to an increase in tourist attractions and a place for trading to occur, which attract the money flow and from foreign countries ✓ Some may say that building cities may result in ~~good effects~~ hinder the performance of other ~~countries~~ cities, however, the truth is there are more competitions among cities and to ensure their reputation, they will be ~~more~~ working harder in order to stay competitive, resulting in a ~~rapid~~ growth of the whole country. Therefore, it is quite positive in ~~the~~ terms of the socio-economic impacts.

However, from the ecological impacts, which includes the animals, ecology and even the environment, the impact is devastating ~~disastrous~~. Since the building of cities are based on clearing of large areas of forest, there can be numerous effects. First, animals in the forest may die eventually due to a lack of place to live ~~and die out eventually~~ ✓

Forest is an important many place for a large amount of animals including birds and mammals, the clearing may result in their death, which also hinder those animals which treated them as food or being eaten by them. ✓ those It is because those ~~who~~ should be eaten are not eaten, which results in a massive population, and those who cannot live without them will also die due to lack of food. Second, deforestation results in a lack of place for surface runoff and results in drought due to soil erosion ✓ flooding due to too much rainfall without proper place to go, like underground. This will actually affect the society too but if the sewage system is properly constructed, this problem can sort of being prevented. Third, building a city result in pollution including air pollution, water pollution and land pollution ✓ It affects the environment totally due to the ~~big~~ enormous scale, therefore analysis has to be properly made before building the cities but usually the environmental effects are underestimated.

In conclusion, it really depends on which aspects the country is aiming at and it has quite different effects and impacts toward the society, economy and ecology and therefore deep consideration and balance should be made before clearing the large areas of forest. Total: 8 marks

END OF PAPER

Answers written in the margins will not be marked.

S = 1
E = 3 (max)
P = 1
5

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Marking Scheme interpretation Paper 2 Section B

12 January 2012

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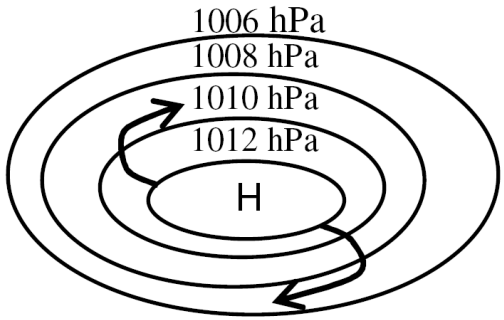
Q.1 (on module E1)

(a) (i) 當一個區域的表面溫度低，該區域上的氣塊溫度亦會低。 1
於是，氣塊收縮，令其密度較周圍空氣的爲高，氣塊因而下沉。 1
周圍的空氣會補充氣塊上方的空間，令該區域的氣壓變高。 1

(ii) 科里奧利效應是由地球的自轉所致。 1

(iii) 1



共 5 分

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(b) (i) (1) 更多的穿過大氣的太陽輻射被西伯利亞的冰面反射和散射到大氣。 1
因此，減少了地面吸收的太陽輻射，而由地球表面再發射的長波紅外線亦減少。 1
結果是被大氣中的溫室氣體反射回地面加熱地面的紅外輻射減少。 1
所以，冬季時在西伯利亞的日間，平均溫度持續極低。

(2) 因爲冷空氣可含的水汽較熱空氣的少，所以西伯利亞的空氣在冬季時較乾。 1

(ii) 因爲陸地的比熱容較水的小， 1
西伯利亞的大片陸地較其附近的海水(如太平洋)更快降溫。 1
在這大片陸地形成的高壓令冷空氣從西伯利亞爆發出來，這就成爲香港在冬季盛行的東北季候風。 1

共 7 分

11b(ii) 西伯利亞溫度低，形成高壓區，風由高壓區吹往低壓區。海洋溫度比陸地高，~~海洋氣壓~~空壓比內陸低。香港接近海洋，風由西伯利亞吹來，因科里奧利效應，~~風~~會吹東北風，✓ 1

Try marking THE Sample on Paper 2 Q.1(b)(ii)

Marked pts

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(c)	(i)	它可導致敏感或誘發哮喘。／長期而言，它會降低肺功能。	1
	(ii)	(1) 如圖 1.3 所示，在台灣有一高壓區，	1
		所以，在香港盛行東風*[接受：東北風]*。	1
		風把沙塵暴從台灣帶來香港。	1
		這導致 3 月 21 日的 RSP 濃度上升。	
		(2) 當 RSP 濃度高時，光線會被空氣中的懸浮粒子或微細塵埃散射，	1
		令從物體而來並進入我們眼睛的光線減少，造成能見度低。	1
		(3) 水汽會被雨水洗刷掉，	1
		空氣質素隨空氣中的 RSP 減少而有所改善。	1
			共 8 分

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Q.2 (on module E2)

(a)	(i)	(1)	確保志願者在實驗前從未受登革熱病毒感染。／在有登革熱的地方，難以確保志願者在實驗前從未受登革熱病毒感染。	1
		(2)	白血細胞(吞噬細胞) 會把病毒吞噬，以清除病毒(吞噬作用)。	1 1

1) 有登革熱的地方，居住其中的市民有機會上登革熱，但仍在潛服期，還未病發 ✓ 1

Q.7(1). 因為要探究出登革熱是否由蚊子傳播，如在有登革熱的地方進行，會病毒我們便不能辨別出病毒是經蚊子還是其他因素傳播。✓ 1

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Q.2 (a)(i)(3)

在第一次對抗病毒感染時，記憶細胞會把該登革熱病毒亞型的抗原記錄下來。 1

當再次被同一登革熱病毒亞型感染時，記憶細胞會把那病毒認出，並觸發免疫系統在短時間內大量製造抗體／殺手 T 細胞。 1

這些入侵的病毒，未及在人體內大量繁殖及引發病症前，已被清除。 1

Try marking Sample 1 and Sample 2 on Paper 2 Q.2(a)(i)(3)

Marked scripts

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(ii)	(1)	登革熱個案跟全球氣溫一同上升。*[不接受：成正比例]*	
	(2)	較高的氣溫有利作爲傳播媒介的蚊子生長。	1
		在全球暖化下，更多地方會變得更溫暖且適合蚊子生存。／在全球暖化下，我們可在從前沒有蚊子的地方找到蚊子。	1
		登革熱在全球的散播將更廣泛。／更多人將受登革熱威脅。	1
(iii)		– 清除器皿／水桶／花盆底的積水 **或** 把器皿／水箱／水桶蓋上	1
		– 以消除蚊子的產卵地。	1

(2) As shown in the figure, when global temperature rises, incidence of dengue fever also rise, it may because of rised global temperature increase the rate and produce more suitable environment for mosquitoes to breed ✓ also, rising temperature makes diseases like flu or even dengue fever spread more quickly. ✓

Answers writte

1
1

寫於邊界以外的答案，將不予評閱。

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(ii)	(1)	登革熱個案跟全球氣溫一同上升。*[不接受：成正比例]*	1
	(2)	較高的氣溫有利作爲傳播媒介的蚊子生長。	1
		在全球暖化下，更多地方會變得更溫暖且適合蚊子生存。／在全球暖化下，我們可在從前沒有蚊子的地方找到蚊子。	1
		登革熱在全球的散播將更廣泛。／更多人將受登革熱威脅。	1

2. 全球暖化令蚊的繁殖速率加快，蚊是登革熱的傳播媒介，而溫度上升有利蚊子繁殖，同時病毒也會隨着溫度上升而增加其活性，令病毒潛伏在蚊子中，蚊子由於其擴散及繁殖速率快，令登革熱可以在全球暖化的情況下向全球散播。	1 1

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(b) (i) 男性
男性的肝癌原發率一貫的比女性爲高。 1

(ii) (1) 相對風險(曾受 HBV 感染)： $x = 4.82$ 1
相對風險(常食用水果)： $y = 0.869$ 1

(2) 曾受 HBV 感染是一高危因素，而常食用水果則不是。 1

(3) – 高的相對風險值足以在統計學上顯示吸煙與患肝癌的相關性强。 1
或
吸煙者較非吸煙者更易患上肝癌，所以可得出吸煙是肝癌的一個高危因素。
– 然而，研究結果並没有提供所需資料以支持其因果關係。所需資料包括：多吸煙與患肝癌的相關性更强；顯示吸煙可引致肝癌的實驗測試等。 1

(iii) 服用抑制免疫系統的藥物是爲了防止經移植的肝臟遭到排斥／被白血細胞或殺手 T 細胞攻擊。 1
隔離病人是爲了在其防禦力弱的時候保護他，以免他受感染／以免他因受感染而出現併發症。 1

共 8 分

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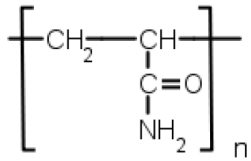
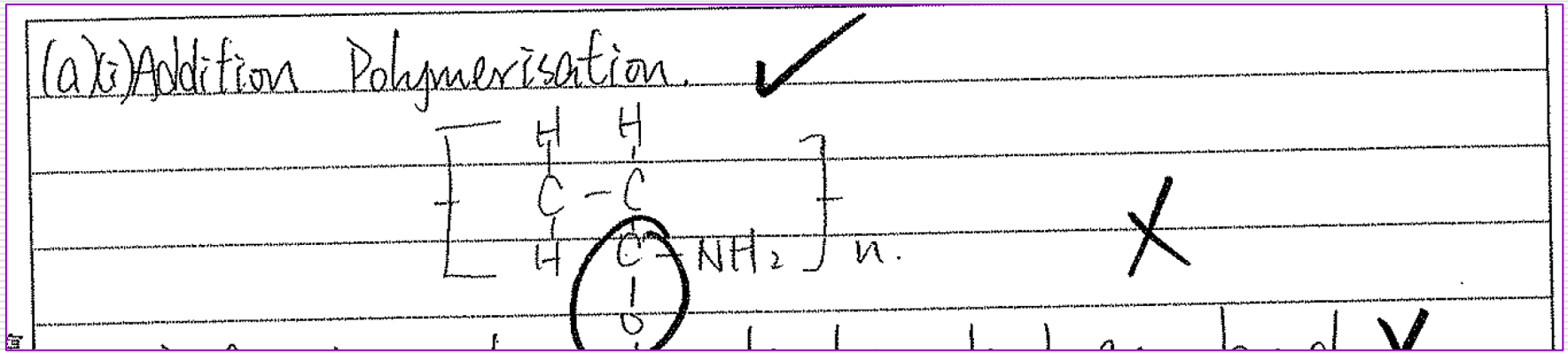
Q.3 (on module E3)

(a) (i) 加成聚合作用 1

聚丙烯酰胺的結構： 1





Try marking Sample Paper 2 Q.3(a)(i)

Marked scripts

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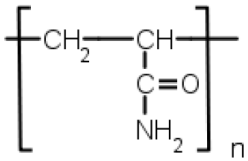
Q.3 (on module E3)

(a) (i) 加成聚合作用 1

聚丙烯酰胺的結構： 1



(ii) 在聚合物的每個重複單位裏，(-$CONH_2$的)氧／氮原子上的孤電子對可和水分子形成氫鍵。 1 1

或

在聚合物的每個重複單位裏，(-$CONH_2$的)氫原子(1)可和水分子(的氧原子)形成氫鍵。(1)[不接受：-CH_2CH_2- 的氫原子和水分子形成氫鍵)

(iii) (1) 尿片物料不應對皮膚造成過敏。／它是無毒的。 1

[接受其他正確答案，如不會破壞環境。]

(2) 纖維素是可生物降解的。 1

製造聚丙烯酰胺需使用石油，而石油是不可再生的資源。 1

(3) 以下任何兩項： 2

- 聚丙烯酰胺可以改善泥土保存水分的能力，能節省灌溉的用水量。 (1)
- 聚丙烯酰胺可以改善泥土保存水分的能力，讓農夫可在水源短缺的地區種植。 (1)
- 聚丙烯酰胺保存的水把泥土粒子黏起來，有助防止土壤侵蝕。 (1)

9 分

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(b)	(i)	(1)	可逆反應	1
			在可逆反應中，部分生成物會轉化成反應物。	1
		(2)	高壓有助提升產量。	1
			由於生成物一方的氣體體積小於反應物一方，	1
			當壓強增加，會有利正向反應／會使平衡位置移向生成物一方。	1
	(ii)	(1)	氮氣分子裏的兩個氮原子被三價共價鍵相連着。	1
			需要高的活化能來破壞這化學鍵。	1
		(2)	以下任何一組：	2
			– 固氮細菌	(1)
			會把大氣中的氮轉化成氨化合物。	(1)
			– 透過閃電，	(1)
			大氣中的氮轉化成硝酸。	(1)
		(3)	氮肥爲水中的藻類提供營養，引致它們過度生長(藻花)。	1
			過度生長的藻類會降低水的溶氧量，使其他水生生物死亡。	1

共 11 分

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THANK YOU!

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Paper 2 Q.1(b)(ii) - Sample

(ii) The prevailing wind pattern is that the wind will blow from siberia to Hong Kong. Because in winter, the land absorb and release heat faster than the sea, the colder temperature build up the high pressure here, and in the sea, by the high specific heat capacity, it get warmer and become lower pressure belt, air will more from the high pressure belt to low air pressure belt. so the wind will blow from siberia to Hong Kong in winter.

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Sample 1

(3) For the first immune response, the body's memory cell recognized the subtypes of the virus. For the second immune response, it is when patients come across same subtypes of denegue virus, the memory cell will stimulate the plasmid cell to produce antibodies and stimulate developing of Killer T cell. Thus, the certain subtypes of dengue virus will be destroyed by our body, and prevent us from getting sick.

寫於邊界以外的答案，將不予評閱。

1

Sample 2

当病毒进入病者身体后，身体中的T细胞会作出反应，变为杀手T细胞和记忆T细胞。杀手T细胞会根据受病毒感染细胞的抗原来把它消灭，而记忆T细胞则会记下该病毒的特征，当有相同病毒再入侵时，记忆T细胞便能根据记忆产生大量杀手T细胞对付病毒，所以才会对此有免疫力。

迅速

迅速把它们消灭

1

1

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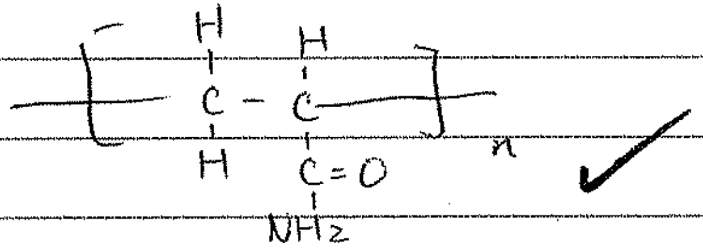
Q.3(a)(i) - Sample

(a) (i) Additional polymerization. ✗



✓

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(ii) It's because the structure of polyacrylamide is surrounding by ~~to~~ hydrogen and oxygen, which can form ~~to~~ hydrogen bonds with water easily. ✓ ✓ 1 1

(iii) (1) Whether the material would cause allergy on baby skins ✓ 1

(2) It's because the production of cellulose only involve natural resources but those of polyacrylamide ~~e~~ involve manmade materials and cost energy. Also, cellulose is natural materials that can be biodegradable ✓ while polyacrylamide cannot 1

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(3) First, it can help to hold water in the soil to make sure the ~~not~~ soil is moist enough for the crops. ✓

Secondly, it can help hold the crops into the soil to prevent being lost by flowing. ✗

(b)(a)(i) It stands for a reversible reaction. ✓

The yield is never 100% because ~~the~~ part of the product will turn back into the reactants during the process. ✓

(2) There are 4 reactants ~~for~~. The gaseous volume is higher thus the pressure will be greater. However, there ~~is~~ are only 2 NH_3 as the product, the pressure ✓ is lower as the gaseous volume is lower. ✓ Operate the process at a high pressure can transfer the equilibrium point to the product side ✓ as the pressure there is lower. This can increase the product yield. ✓

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(ii) (1) It's because the ~~molecules~~ atoms of nitrogen is always connected with covalent bonds, which are strong and ~~not~~ cannot be broken easily ✓ 1

(2) Lightening ✓ The ~~a~~ mass amount of energy released during lightening can break the strong covalent bond ~~between~~ inside the nitrogen molecules ✓ 1

(3) It will cause the rapid growth of algae ✓ and cause algae bloom, which kills lots of aquatic lives by lackage of oxygen ✓ 1

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ot be marked.

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HKDSE Integrated Science
Students' Performance on Practice Papers

Ms Grace YAU

HKEAA

29 Feb 2012

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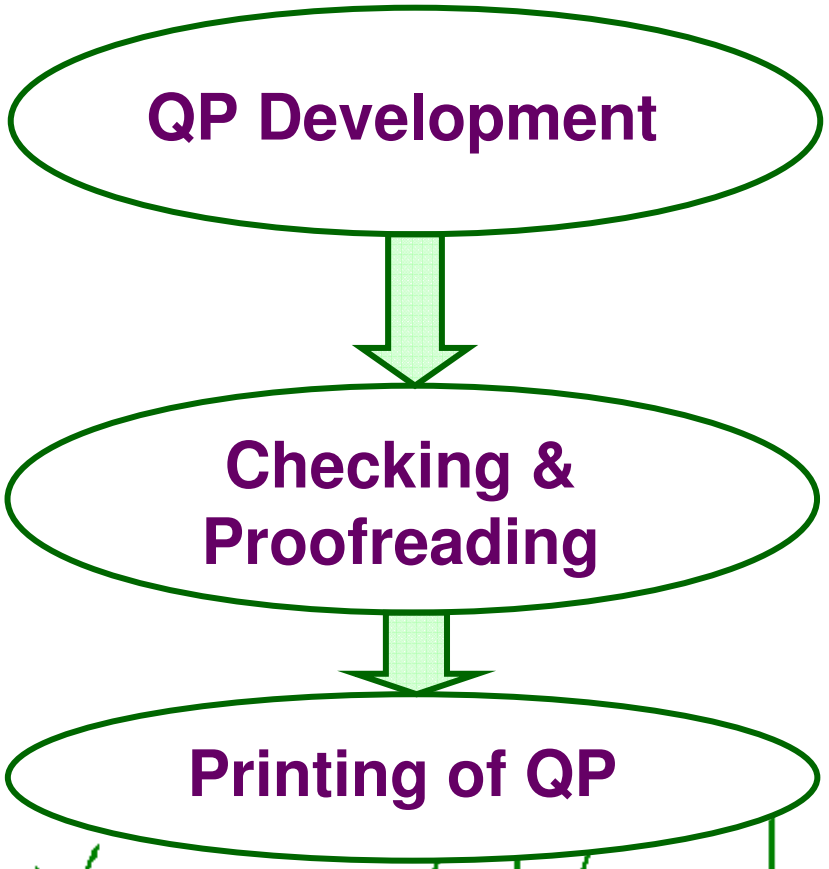
Development of Examination Papers
(Pre-exam Work)



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- Chief Examiner(s)
- Moderators
- Setter(s)
- MC Contributor(s)

- Assessors
- Proofreaders

GLD Printing Unit

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Marking and Grading
(Post-exam Work)

Marking of scripts

- **Examiners' Meeting**
- **Markers' Meeting**
- **Checkmarking of scripts**

Grading & Standards-referenced Reporting

Appeal of examination results

- **Rechecking and Remarking**

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The panel of judges will set cut scores based on:

- **Level descriptors**
- **Selected marked live scripts**
- **Statistical data - Group Ability Index (GAI) to reflect overall performance (ability) in the core subjects for all candidates taking a subject (group)**
- **Markers' feedbacks on the level of difficulty**
- **Students samples from SRR Information Package**

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Levels 5* and 5**

- Level 5** will be awarded to the highest-achieving 10% (approximately) of Level 5 candidates
- Level 5* will be awarded to the next highest-achieving 30% (approximately) of Level 5 candidates

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Piloting of Practice Papers

Production of QP

- Moderation
- Checking & proofreading
- Printing

Date of piloting:
7 Jan 2012

70+ students
from 4 school

Marking of scripts

2 standardisation meetings;
marking scheme revised

Briefing Sessions for teachers

1. 12 Jan 2012
   - Requirements of the IS Exam
   - Marking schemes interpretation
   - Trial marking
2. 29 Feb 2012
   - Reporting students' performance

Report on students' performance &
Samples of student scripts
uploaded to HKEAA's site

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http://www.hkeaa.edu.hk/en/hkdse/Practice_Papers/

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Students' Performance in Paper 2 Section A

(Multiple-choice Questions)

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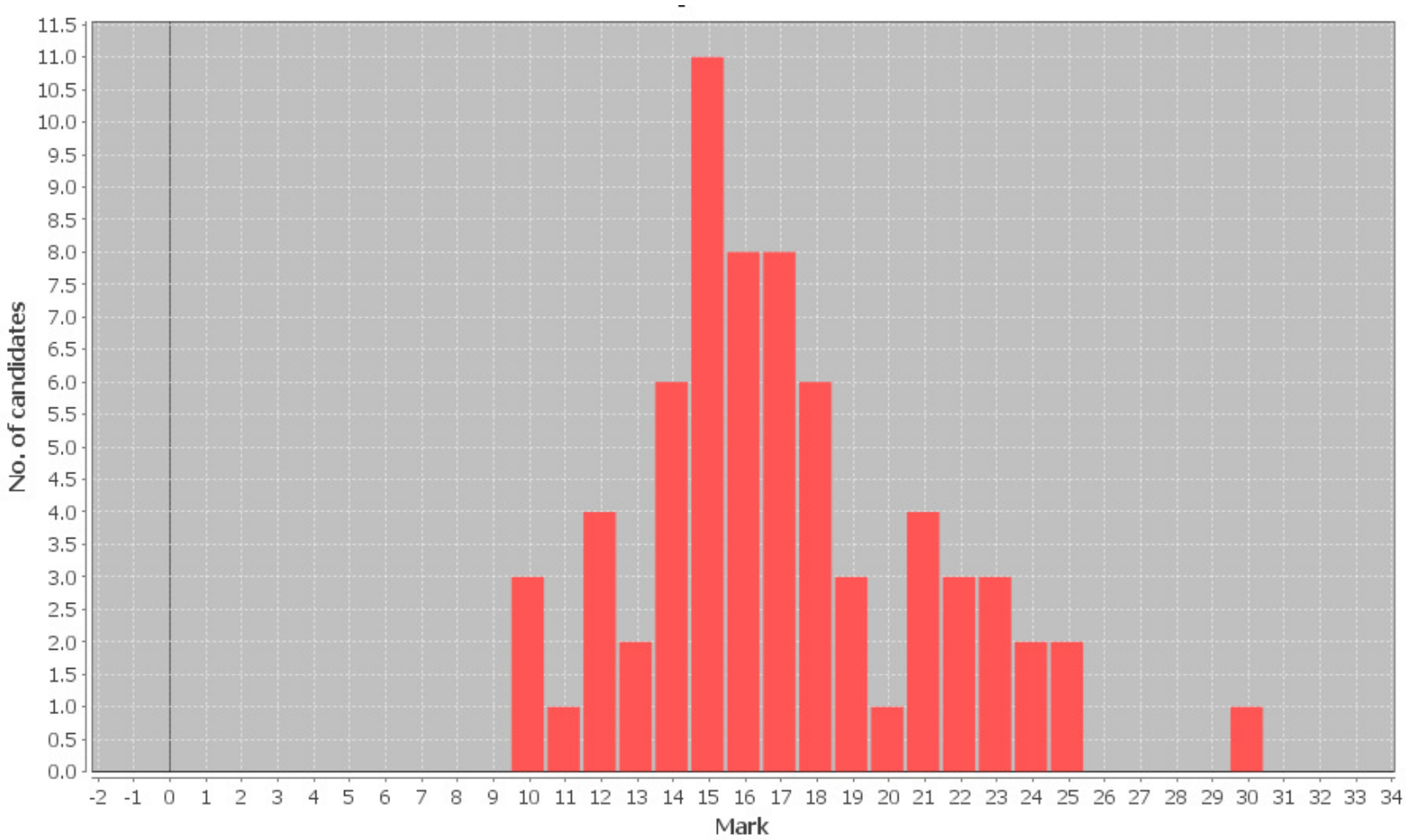
- Number of schools = 4; No. of scripts = 68
- Mean = 17.1 (53.3 %); S.D. = 4.0 (12.6 %)
- Highest mark = 30; Lowest mark = 10



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Most poorly answered

31. If an mRNA sequence has 1200 nucleotides from the start codon to the stop codon inclusive, how many amino acids does the polypeptide translated from this mRNA sequence have?

A.	398	**(10%)**
B.	399	**(4%)**
C.	400	**(51%)**
D.	1200	**(34%)**

- **Lots of the students knew that each amino acid is coded by 3 nucleotides, but only 4% of the students remembered that a stop codon terminates the translation process by coding for no amino acids.**
- **Some students might have wrongly thought that the start codon also codes for no amino acids and chose option A.**

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6. In a 100 metre sprint, a girl completed the first 35 m in 6.3 s. What was her average acceleration during this period?

A.	0.88 m s^{-2}	(22%)
B.	1.76 m s^{-2}	(22%)
C.	5.56 m s^{-2}	(51%)
D.	11.1 m s^{-2}	(5%)

- Require students to apply their knowledge of linear motion to a daily situation
- 51% of the students divided the distance (35 m) by the time (6.3s); which gives the *speed* but not the acceleration.
- Should use '$s = ut + \frac{1}{2}at^2$'
- Careless in their calculation:
  - forgetting to multiply *s* by 2 and arrived at the wrong option A
  - dividing *s* by *t* instead of t^2 and wrongly chose option D

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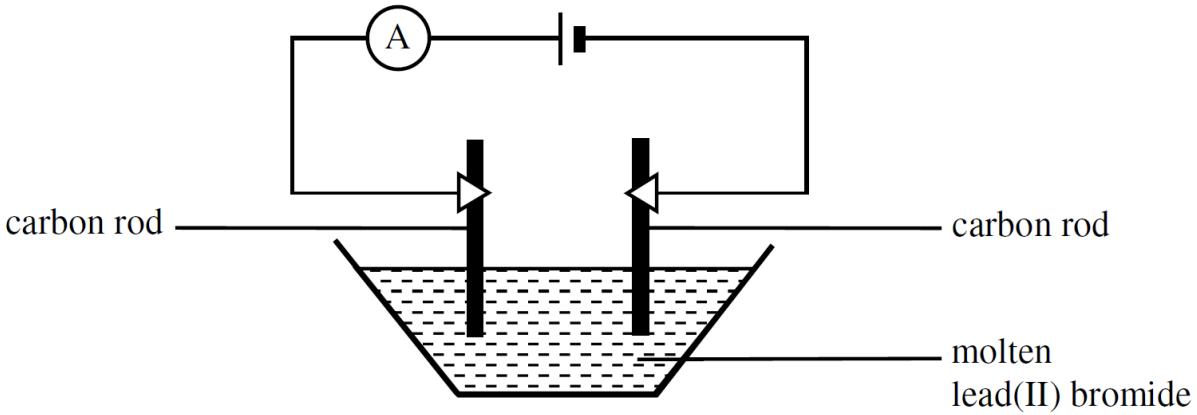
14. When electricity is applied to molten lead(II) bromide, a gas appears at the positive electrode and a met is formed at the negative electrode.



Which of the following statements can be inferred from this experiment?

(34%) A. Molten lead(II) bromide contains mobile ions.

(20%) B. Lead(II) ions and bromide ions in lead(II) bromide are attracted to each other by ionic bonds.

(21%) C. Lead forms ions with two units of positive charges and bromine forms ions with one unit of negative charge.

(25%) D. Lead(II) ions are attracted to the positive electrode and bromide ions are attracted to the negative electrode.

- **Require students to make an appropriate inference from an experiment**
- **All except option D are facts**
- **Neither the number of units of charges of each ion, nor the type of attraction between the two ions cannot be inferred from this experiment**

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19. Which of the following is an application of electromagnetic induction?

A.	generator	(28%)
B.	fuel cell	(3%)
C.	motor	(23%)
D.	electromagnet	(46%)

- **Require an understanding of 'electromagnetic induction' and the working principles of the devices**
- **Confusing 'magnetic effect of a current-carrying solenoid' (in an electromagnet) with 'generation of electricity by means of magnetism' (i.e. electromagnetic induction).**

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Students' Performance in Paper 1 & Paper 2 Section B

(Questions set on E1 to E3)

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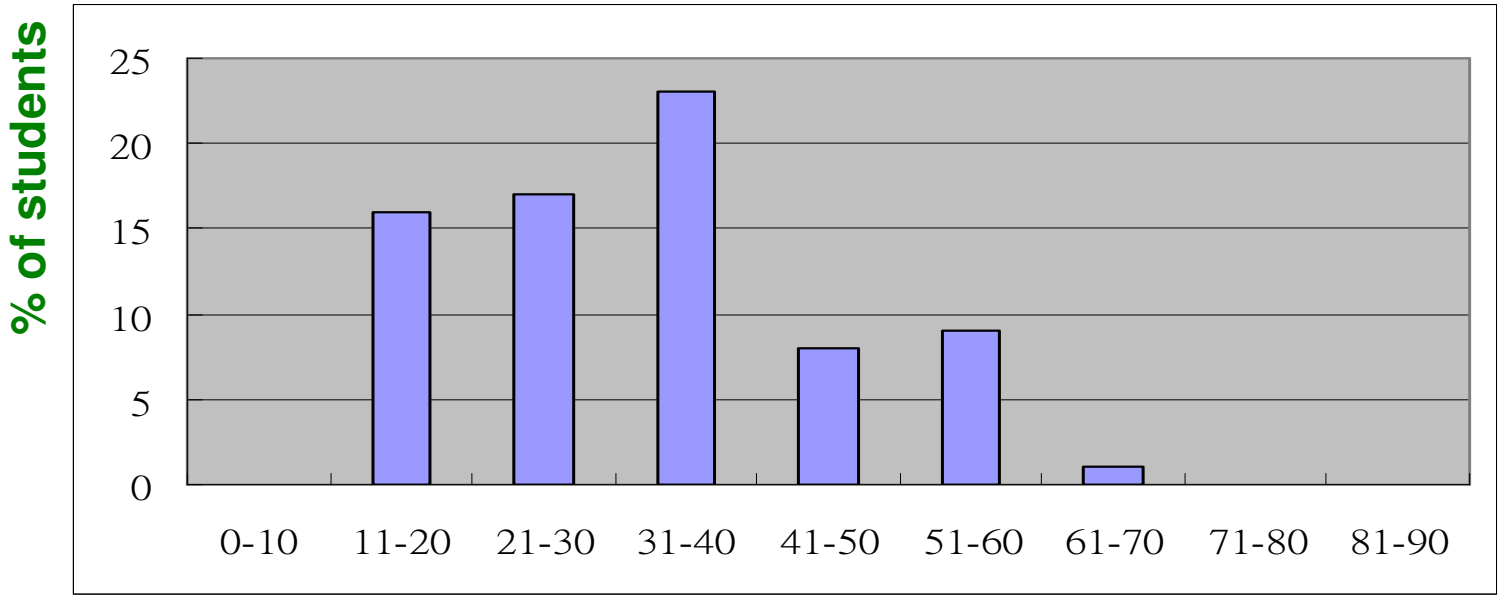
Students' Performance in Paper 1

- Number of schools = 4; No. of scripts = 74
- Mean = 33.1 (36.7%); S.D. = 12.6 (14%)
- Highest mark = 64; Lowest mark = 11



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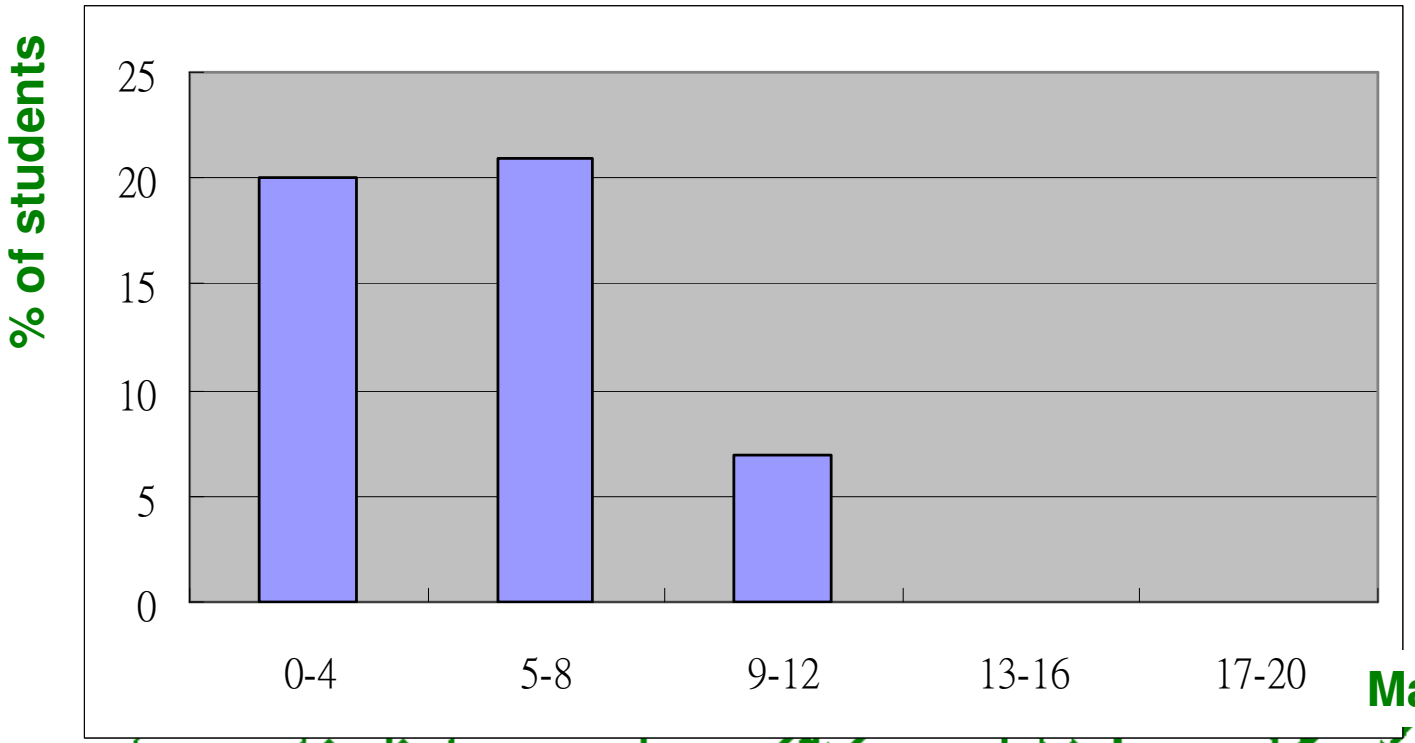
Q.1 Energy, Weather and Air Quality

- No. of scripts =48
- Mean score = 5.5; SD = 2.6



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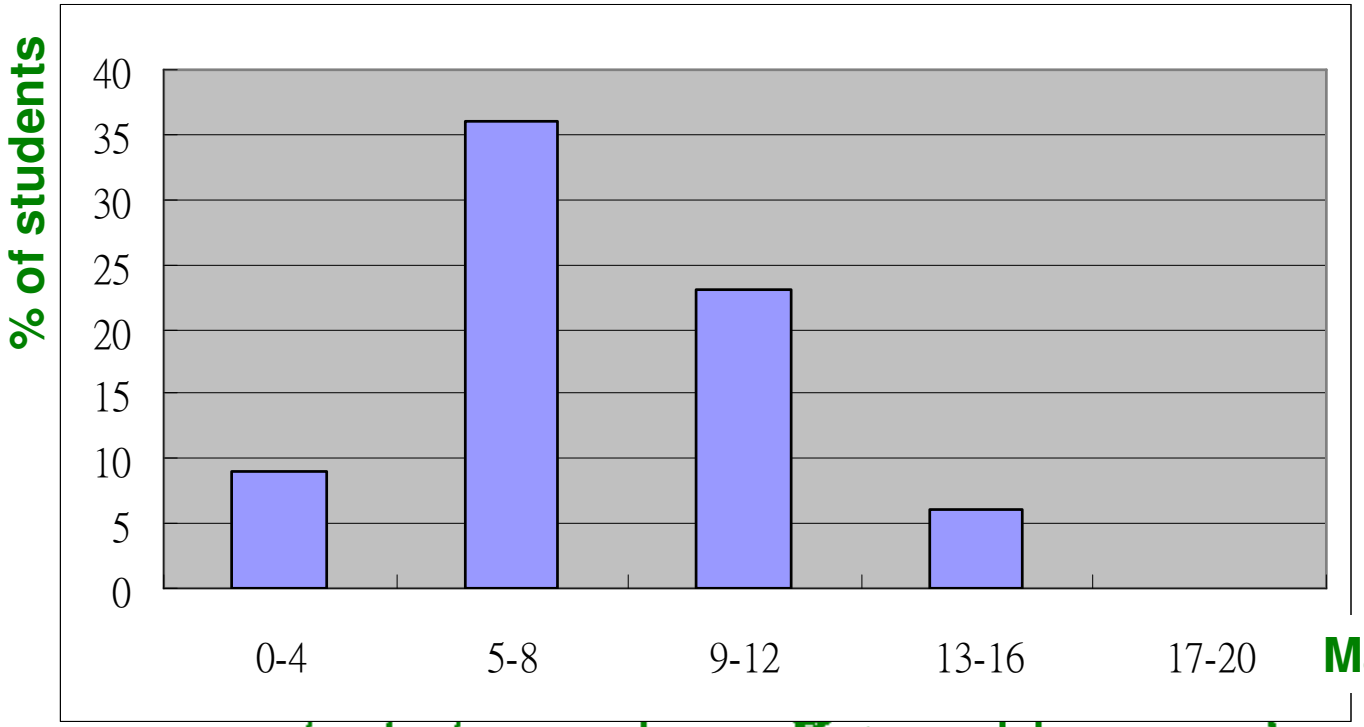
Q.2 Keeping Ourselves Healthy

- No. of scripts =74
- Mean score = 7.9; SD = 3.1



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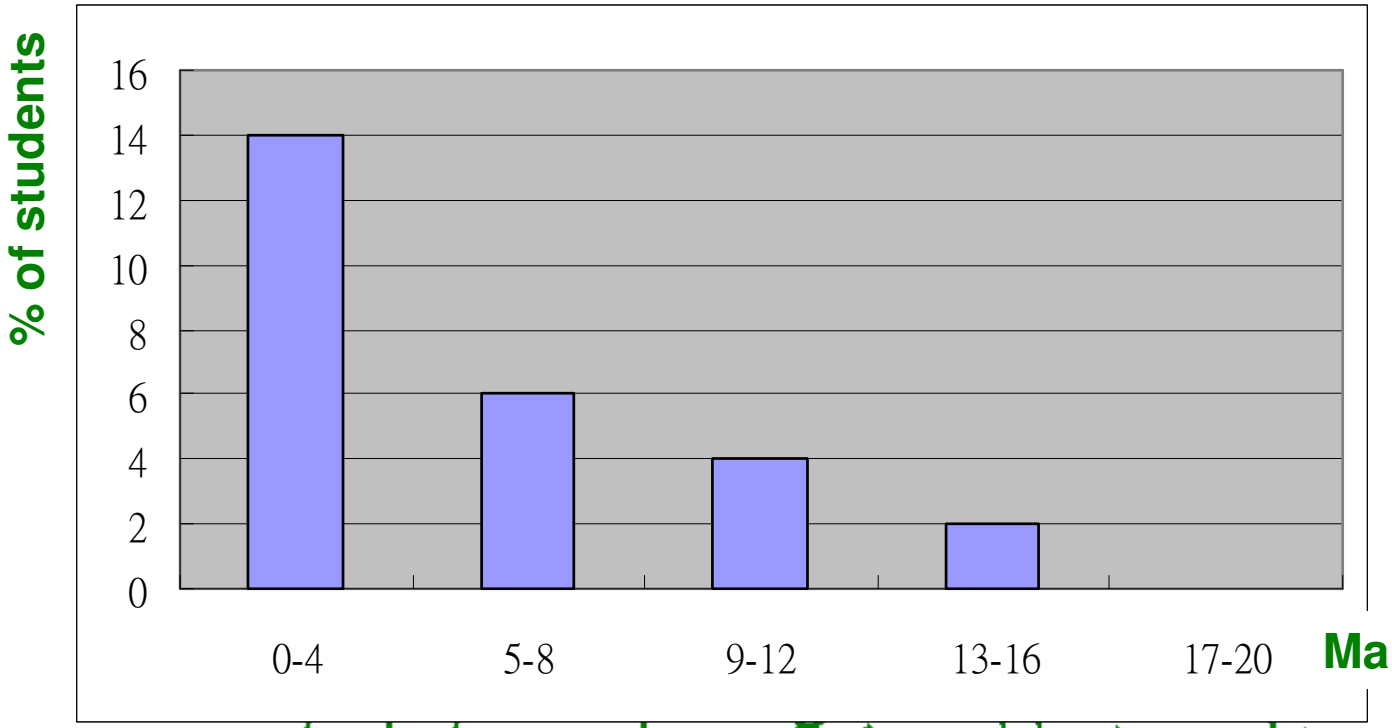
Q.3 Chemistry for World Needs

- No. of scripts = 26
- Mean score = 5.4; SD = 3.8



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Areas to be strengthened

- **Plotting and interpreting graphs**
  - **Plotting a graph - Paper 1 Q.6(b)**
    - **Choosing the correct axes (the y-axis should be *B* and x-axis be *n* in this case)**
    - **Including the units when labelling the axes**
    - **Joining the points with a best fit line**

Number of turns	50	100	150	200
Length of solenoid (m)	0.1	0.1	0.1	0.1
Number of turns per metre n (m^{-1})				
Magnitude of the magnetic field B ($\times 10^{-6}$ T)	310	600	980	1260

Note: The unit of B is tesla, which is abbreviated as T.

(ii) Plot a graph of B against n. (3 marks)

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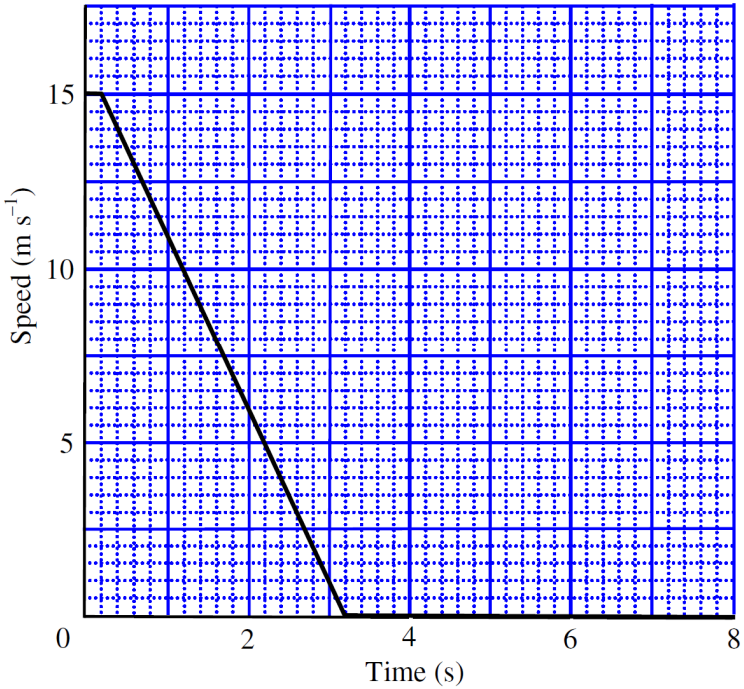
Areas to be strengthened

- Plotting and interpreting graphs
  - Interpreting a graph – Paper 1 Q.2(c)
    - An understanding of the physical meaning of the slope and the area under the graph of a *v-t* graph is important
    - Slope = deceleration
    - Area under the graph = distance



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Areas to be strengthened

- **Drawing electron diagrams, chemical structure and writing equations**
  - **Indicate the no. of charges of each ion and the number of each ions in the compound (Paper 1 Q.3(a))**

(i) Aluminum forms an oxide, Al_2O_3. Using the information in the periodic table, draw the electron diagram of Al_2O_3 (showing electrons in the outermost shells only). Explain your answer. (3 marks)

  - **Proper way of presenting a polymer (Paper 2 Q.3(a)(i))**

(i) State the type of polymerisation involved in the formation of polyacrylamide. Hence, draw the structure of polyacrylamide. (2 marks)

  - **Balancing the equation (Paper 1 Q.3(b))**

(2) Lecoq de Boisbaudran obtained gallium from the electrolysis of molten gallium hydroxide. Write the ionic half equation to show the chemical change at the negative electrode during the electrolysis. (1 mark)

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Areas to be strengthened

- **Paying attention to the context in the question and its requirements**
  - **e.g. Paper 1 Q.8(c), should choose the property that makes the radioisotope unsuitable for use a *medical tracers.***

Explain why **neither** *X* **nor** *Y* is suitable for replacing technetium–99m as medical tracers.
(2 marks)

  - **e.g. Paper 1 Q.5(b), punette square required, not genetic diagram**

(ii) Draw a punette square to work out the chance of this couple having another affected child in the next birth. Based on the predicted chance, state your view on whether this couple should give birth to another child. (2 marks)

  - **e.g. Paper 2 Q.1(b)**

(1) Hence, explain, in terms of surface–atmosphere radiation exchange, why the average temperature of Siberia during the daytime in winter is persistently very low (–20°C). (3 marks)

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Areas to be strengthened

- **Understanding of the meaning of some terms, and the use of proper scientific terms to communicate ideas**
  - **Paper 1 Q.2 (b)**
    - **'impulse' ≠ 'signal'; eye is a 'sense organ', not a 'receptor'**

(b) Describe how the different parts of Mr. Chan's nervous system enabled him to see the box and initiate the response of applying the brakes. (4 marks)

  - **Paper 1 Q.2 (d)**
    - **neurone is the basic unit of the nervous system, not a specific 'part in the central nervous system'**

(d) (i) If Mr. Chan had consumed some alcoholic drinks, which part of his central nervous system would have been affected? (1 mark)

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Areas to be strengthened

- **Organising an answer**
  - **organising the answer in order of the sequence of the events**

    (Paper 1 Q.2 (b))

(b) Describe how the different parts of Mr. Chan's nervous system enabled him to see the box and initiate the response of applying the brakes. (4 marks)

  - **organising the answers by categorising the points/ arguments (Paper 1 Q.9)**

9. In recent years, large areas of forest have been cleared in some countries in order to build cities or grow crops. Comment on the socioeconomic and ecological impacts of this practice. (8 marks)

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Performance in individual questions

Contained in the
‘Report on Student Performance
in the Practice Papers’

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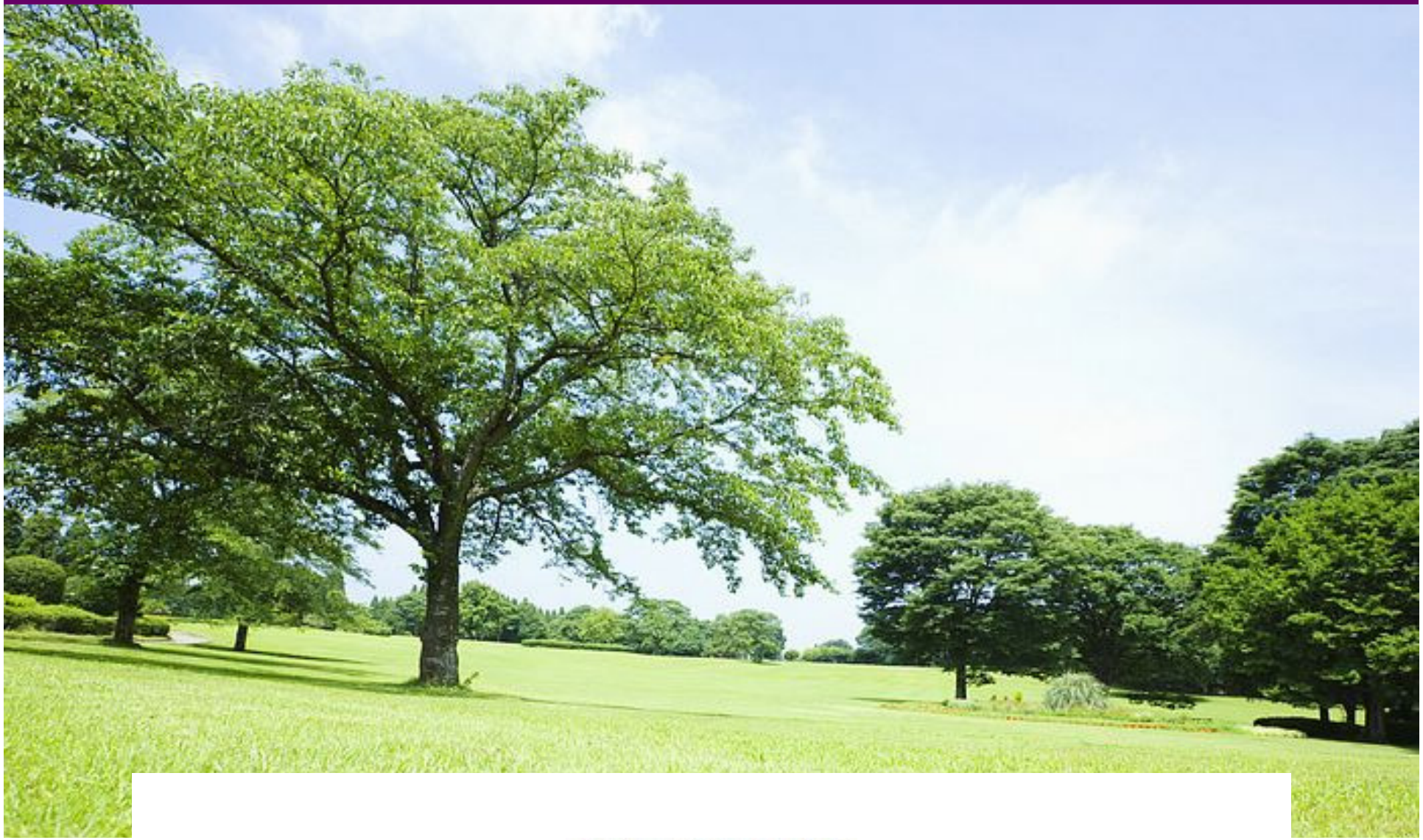
THANK YOU !



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