香港考試及評核局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

香港中學文憑考試
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

練習卷
PRACTICE PAPER

組合科學(生物部分)
COMBINED SCIENCE (BIOLOGY PART)

評卷參考
MARKING SCHEME

(2012年2月24日修訂稿)
(updated as at 24 Feb 2012)

本評卷參考乃香港考試及評核局專爲本科練習卷而編寫，供教師和學生參考之用。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。

This marking scheme has been prepared by the Hong Kong Examinations and Assessment Authority for teachers' and students' reference. This marking scheme should NOT be regarded 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.

Section A

Question No.	Key	Question No.	Key
1	D	21	B
2	A	22	B
3	D	23	A
4	B	24	B
5	B		
6	A		
7	D		
8	A		
9	D		
10	C		
11	B		
12	D		
13	C		
14	D		
15	C		
16	A		
17	C		
18	C		
19	C		
20	A		

Section B

Marking Scheme

General Notes for Teachers on Marking

1. This marking scheme has been updated, with revisions made after the scrutiny of actual samples of student performance in the practice papers. 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.

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 the required number, the extra answers should not be marked. For instance, in a question asking students to provide two examples, and if a student gives three answers, only the first two should be marked.

1. Cholera: B
   Dengue fever: E 1

2. (a) The cell membrane is composed of a phospholipid bilayer. 1
   Being non-polar, the fatty acids can dissolve in the phospholipid layer and diffuse through the cell membrane. 1

   (b) Being polar, the amino acids are repelled by the phospholipid bilayer / cannot dissolve in the phospholipid bilayer (1) and thus cannot diffuse across the cell membrane. max. 3
   Some proteins spanning across the phospholipid bilayer (1)
   provide (hydrophilic) channels for the passage of the amino acids / act as carriers for transporting the amino acids across the membrane. (1)
   Transport of amino acids by these protein channels / carriers is unidirectional. (1)

3. (a)
   - No replicate is carried out and so the results may not be representative.)
   - Quadrat sampling is not accurate for determining the number of mobile animals like crabs.) any 3 1x 3
   - Burrowing bivalves will be missed if only animals on the surface are collected.)
   - Sampling is not random and hence a biased sample may be taken.)

   (b) The population size of the crabs remains constant (1) 2
   as the crabs will eat more snails when the abundance of clams is reduced. (1)
   OR
   The population size of the crabs may be reduced (1)
   as more snails are consumed when the number of clams is reduced. The number of snails may not be enough to maintain the population size of the crab. (1)

4. (a) Any **one** set of the following: 1+1
   - The carbon monoxide in the smoke binds readily with the haemoglobins in the red blood cells. (1+) This prevents the haemoglobins from binding with oxygen and lowers the oxygenation of the blood. (1)
   - The tar in the smoke coats the surface of the air sacs. (1+) This reduces the surface area for oxygen to diffuse to the blood capillaries and lowers the oxygenation of the blood. (1)

   (Accept other correct alternatives.)

   (b) The no. of air sacs in the lungs of a smoker is fewer than that in a non-smoker. 1
   This reduces the surface area for gas exchange 1
   and hence the rate of oxygen diffusion to the blood (/ removal of carbon dioxide from the body) is lowered in the lungs of the smoker, 1
   so the body of the smoker responds with very rapid breathing to meet the extra demand for oxygen (/ remove the carbon dioxide produced from respiration) during vigorous exercise.

5. Being a sex-link trait, the allele for colour blindness is located on the X-chromosome. 1
   As the X chromosome of individual D must come from the mother (B), 1
   the mother must have an X chromosome with an allele for colour blindness. 1
   Being normal, the mother must bear the allele for normal colour vision on the other X chromosome. 1
   Hence, the genotype of the mother must be heterozygous / X^BX^b (where B is the allele for normal colour vision & b is the allele for colour blindness). 1

6. (a) (Primary / ecological) succession

(b) (i) nitrogen fixing bacteria 1

(ii) The bacteria fixed atmospheric nitrogen into ammonium compounds 1
and supplied the nitrogenous compounds for plant species A and B to synthesise proteins. 1
The decay / decomposition of the plant species A and B after their death released the fixed nitrogen to the soil. 1
This increased the soil nitrogen content in Stages 1 and 2.

7. (a) (i) Any **two** of the following: 1×2
- The presence of stomata allows carbon dioxide to diffuse rapidly from the atmosphere into the leaf. (1)
- The large spaces among the spongy mesophyll cells allow the carbon dioxide to diffuse freely to the palisade mesophyll cells for photosynthesis. (1)
- The leaf is thin, which reduces the distance over which carbon dioxide has to diffuse from the lower part of the leaf to the palisade mesophyll cells for photosynthesis. (1)

(ii) Being always exposed to a high light intensity, the sunny leaves have a higher evaporation rate. 1
The thick cuticle prevents the sun leaves from excessive loss of water through the cuticle. 1

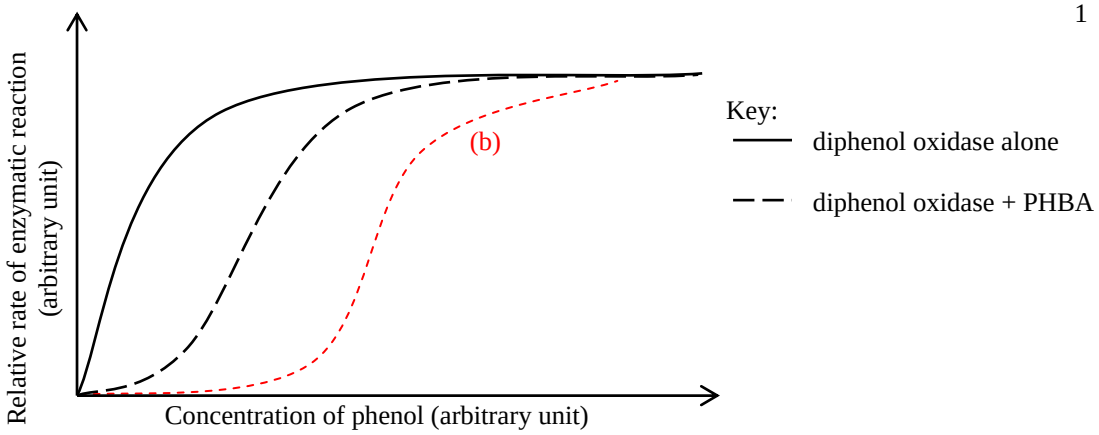
(b) (i) A positive net uptake of carbon dioxide implies that the photosynthetic rate of the plant exceeds its rate of respiration / implies a net production of food in a plant. 1

(ii) When grown in a shady place, the leaves of species P have a lower compensation point than those grown in a sunny place. 1
This ensures that the plant can still attain positive growth in an environment with low light intensity. 1

(iii) A workable set-up illustrated with a labelled diagram. 2
Keep the controlled variables (environmental conditions, e.g. temperature) identical for both set-ups. 1
Subject the set-ups to very low light intensity for a fixed period of time (e.g. 30 minutes) and note the colour of the indicator. Repeat this step with increasing light intensity (i.e. by reducing the distance between the light source and the plant OR adjusting the dimmer-control to increase the brightness of the light bulb). 1
Determine the light intensity at which the indicator in each set-up remains red. 1
Compare these light intensities.

8. (a) PHBA reduces the rate of enzymatic reaction.
However, the rate of enzymatic reaction is increased and reaches a rate which is comparable to that without PHBA when the substrate concentration is increased. 1
This shows that PHBA is a competitive inhibitor of the enzyme diphenol oxidase. 1

(b) 1



(c) pH 1
A change in pH may cause conformational change in the active site / change in the shape of the active site of the enzyme. 1
The substrate then cannot fit into the active site of the enzyme to form the enzyme-substrate complex 1
and hence would affect the activity of the enzyme.

9. Positive phototropic response of the shoot (1) enables the leaves to be brought into positions that enable them to receive maximum sunlight for photosynthesis (1) 2
OR
Negative phototropic response of the root (1) enables the root to grow deep into the soil for firm anchorage / obtain water from deeper ground. (1)

Nature:
Tropic response is a directional growth response of some parts of the plant to a unidirectional stimulus (1)
whereas reflex action is a stereotyped response to a stimulus. (1)
[i.e. growth response Vs non-growth response; unidirectional stimulus Vs stimulus not necessarily be unidirectional]

Process:
Tropic response is mediated by auxins / chemical substances while reflex action is mediated by nerve impulses which are electrochemical in nature. (1) max. 5
The response in tropism is slow whereas the reflex response is always fast. (1)
Different effectors (e.g. shoot tips / root tips) can show different responses (positive or negative) to the same stimulus (e.g. unidirectional light). However, the effectors in the reflex action always give the same response. (1)
The same stimulus can cause tropic responses in different parts of the plants (e.g. root tips and shoot tips), but the response in reflex action is localised. (1)

Communication 3

Mark award for communication:

Mark	Clarity of expression and relevance to the question	Logical and systematic presentation
3	• Answers are easy to understand. They are fluent showing good command of language. • There is no or little irrelevant material.	• Answers are well structured showing coherence of thought and organisation of ideas.
2	• Language used is understandable, but there is some inappropriate use of words. • A little irrelevant material is included, but does not mar the overall answer.	• Answers are organised, but there is some repetition of ideas.
1	• Markers have to spend some time and effort on understanding the answer(s). • Irrelevant material obscures some minor ideas.	• Answers are a bit disorganised, but paragraphing is evident. Repetition is noticeable.
0	• Language used is incomprehensible. • Irrelevant material buries the major ideas required by the question.	• Ideas are not coherent and systematic. Candidate shows no attempt to organise thoughts.