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

2012年香港中學文憑考試
**HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2012**

# 生物　試卷一乙
# BIOLOGY　PAPER 1B

本評卷參考乃香港考試及評核局專為今年本科考試而編寫，供閱卷員參考之用。閱卷員在完成閱卷工作後，若將本評卷參考提供其任教會考班的本科同事參閱，本局不表反對，但須切記，在任何情況下均不得容許本評卷參考落入學生手中。學生若索閱或求取此等文件，閱卷員/教師應嚴詞拒絕，因學生極可能將評卷參考視為標準答案，以致但知硬背死記，活剝生吞。這種落伍的學習態度，既不符現代教育原則，亦有違考試着重理解能力與運用技巧之旨。因此，本局籲請各閱卷員/教師通力合作，堅守上述原則。

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**Paper 1 Section B**
**Questions 1 to 5 are common items. Bio and CS Bio share the same MS.**

Marks

1. C (1)
A (1)
B (1)
3 marks

2.

| *Method* | *How it works* | *Comment (advantage or disadvantage)* | |
|---|---|---|---|
| Spraying of pesticides or larvicidal oil to mosquito's habitat | Directly kill the larvae / adult mosquitoes (1) so that they cannot serve as vector | Pros: quickly put mosquito population down in short term (1)<br>Cons: mosquitoes may develop resistance to the pesticides (1) / environmental contamination when pesticides leak to water bodies / pesticides are toxic to humans | 1,1 |
| Clearance of accumulated water in the neighbourhood | Eradicate the breeding places of mosquitoes (1) | Pros: does not have adverse impacts on environment (1)<br>Cons: it is vritually impossible to clear up all stagnant water (1) | 1,1 |

4 marks

3. (a) • the cell wall of cell type Q is much thicker than that of cell type P (1) (1)
(✓ accept other answers such as spiral thickening or thickened with ring structures)
(× cell type Q being hollow not accepted)

(b) • when there is ample supply of water (1) (1)
• cell type P provides turgidity to the plant (1) (1)
• cell type Q has thickened cell wall (1) (1)
• which provides rigidity to the plant (1) (1)
5 marks

4. (a) • Class A (1) (1)

(b) • the light intensity of the habitat is very low / the habitat is completely dark (1) (1)
• as organism X does not have eyes to survive in the habitat (1) (1)

(c) • the key is constructed based on the morphological characteristics of exisiting organism found (1) / not all the morphological characteristics of the phylum are listed in the key (1)

(d) • carry out a comparative study about the amino acid sequence of similar proteins / base sequence of DNA template / mRNA of similar proteins found in organism Y and other organisms in this phylum (1) (1)
(✓ accept comparison of developmental process / cellular structure / chemical composition )
• to establish the phylogenetic relationship between them (1) (1)
6 marks

5. (a) • 7:00 and 18:00 (1) (1)

(b) • shorter light period (1), overall rate lower (1) (1,1)

(c) • the area below the line showing oxygen production rate represents the food production in 24 hrs (1) (1)
• whereas the area below the line showing carbon dioxide production rate represents the food consumption in 24 hrs (1) (1)
• it is therefore important for food production to be greater than food consumption such that there is a net amount of food produced (1) (1)
• as a result, this provide energy for the plant to survive, grow and produce fruits (1) (1)
7 marks

Marks

**Question 6 is a common item which is equivalent to CS Bio question 7.**

6. (a) (10 000 000 – 1 000 000) / 10 000 000 x 100% = 90% (Remark: accept -90%)
Method / equation 1 mark
Correct answer 1 mark (1,1)

(b)
- some energy is not obtained by the organisms of higher trophic level as part of the body of prey is not consumed (1) / part of the food is not digestible or is egested (1) (1)
- some energy is lost by the organisms at the higher trophic level through excretion (1) / respiration (1) / in the form of heat (1) (1)

Remarks:
- Any two of the above.
- The words "higher trophic level" are not required. However, if the wrong trophic level is mentioned, the mark will not be awarded.
- some individuals escape from predation is not accepted.

(c)
- the percentage decrease in energy content is greater (1) (1)
- as caterpillars mainly feed on leaves of trees, leaving most of the part of the biomass of tress unconsumed (1) / lignin is not consumed (1)

6 marks

**This is an item for Biology only.**

7. (a)
- despite the high blood glucose level detected in his blood, his fasting blood insulin level was lower than that of the healthy person (1) (1)
- although there is an increase in blood glucose level, the insulin level only shows little change (1) (1)
- this shows that Tom failed to produce the normal amount of insulin (1) (1)
- therefore, Tom suffered from insulin-dependent diabetes (1) / type I diabetes (1)

(b)
- with insufficient insulin, his body cells will not take up extra glucose from the blood as efficiently as the healthy person (1)
- as a result, the blood glucose concentration rised to a higher level (1) after glucose consumption (3)
- and remains high for a longer time / decreases slower than the healthy person (1)

Remarks: conversion of glucose to glycogen by insulin is not acceptable

(c)
- by injection of insulin (1) / aerosal spray of insulin applied to nasal cavity (1)

8 marks



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Marks

**Question 8 is a common item which is equivalent to CS Bio question 6.**

8. (a)
- soluble sugars lower the water potential of the kernels (1) while (1)
- starch, being insoluble in water, does not affect the water potential of the kernels (1) (1)
- during development, kernels of sweet corns draw in a larger amount of / more water by osmosis than those of starch kernels (1) (1)
- later on, when the kernels dry up, kernels of sweet corn shrinks as a result of lossing large amount of water (1) (1)
- as the skin is not elastic (1), thus the kernels of sweet corns become wrinkled (1)

max. 4

(b) (i)
- as both parents are pure-bred plants, the $F_1$ produced are all heterozygous (1) (1)
- in heterozygous condition, dominant alleles will be expressed while recessive alleles will be masked (1) (Remark: gene instead of allele is not accepted.) (1)
- therefore, purple colour and smooth surface are the dominant phenotypes (1) (1) (Remark: allele instead of phenotype is not accepted.)

If symbols are used in the explanation, the symbols must be defined at the very beginning.

(ii)
- as the individuals in $F_1$ generation are heterozygous with and the genes for the two traits are located on different chromosomes, the alleles for the traits are assorted independently (1) (1)
- only one type of gametes for the pre-bred corn plant with yellow and wrinkled kernels (1) (1)
- and four different types of gametes will be resulted from the $F_1$ generation (1)
- after random fertilisation, zygotes with four different combinations of genotypes will be produced (1)
- leading to the expressions of all the possible phenotypes (A, B, C and D) in the $F_2$ generation (1) (Remarks: This answer cannot get 1 mark if it is mentioned that the ratio is 9:3:3:1.)

(max. 2)

(c)
- Mendel collected a large amount of experimental evidence (1) (1)
- and based on his observation on the number of offspring with different phenotypes (1) (1)
- he worked out a possible explanation for the observation by logical deduction (1) (1)

Remarks:
- The first mark is given to the point that a large number of experiments on different traits were conducted.
- The second mark is given to the observation of the ratio of different phenotypes.
- The third mark is given to the reasoning of the experimental results.

14 marks

**This is an item for Biology only.**

9. (a)
- drug X inhibits glycolysis (1) (do not accept more than 1 process) (1)
- as glycolysis is the first step in the respiratory pathway, the inhibition of glycolysis will halt the processes that follow, i.e. Krebs cycle and oxidative phosphorylation (1) (1)
- hence, the overall production of pyruvate, ATP and NADH are greatly reduced, showing that the whole respiratory pathway was jeopardized (1) (1)

Remarks:
- No mark will be given to bullet point 1 when minor steps in each process instead of the key process are mentioned.

Alternative answer:
- Pyruvate is the product of glycolysis (1)
- As the production of pyruvate is greatly reduced after treating with drug X (1)
- Glycolysis is inhibited in this case (1)



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(b)
- drug Y inhibits Krebs cycle (1) (do not accept more than 1 process) (1)
- when the respiratory pathway is halted at Krebs cycle, pyruvate would not be metabolised (1) (1)
- but glycolysis still proceeds as usual and produce pyruvate (1), as a result, pyruvate will accumulate (1)

(c)
- in anaerobic conditions, muscle cells undergoes anaerobic respiration and produce less ATP (1) and less NADH (1) than aerobic respiration (1,1)
- at the same time, lactic acid level rises as it is produced (1) as a result of incomplete oxidation (1)

(d)
- glycolysis: cytoplasm (1) (1)
- Krebs cycle: mitochondrial matrix (1) (1)
- oxidative phosphorylation: mitochondrial inner membrane (1) (1)

Remarks:
- if the key processes are not mentioned but the three cellular components are mentioned in the correct sequence, 3 marks will be given
- if only two or one cellular component(s) are mentioned, no mark will be scored

12 marks

**This is an item for Biology only.**

10. (a)
- bile salts emulsify fat into droplets (1) (1)
- such that there is an increase in surface area for the action of the lipase / enzyme (1) (1)

(b)
- as the bile supplementation increased, the fat content of the faeces decreased (1) (1)
- this indicates increased digestion of fat (1) (1)

Remarks: If absorption instead of digestion is mentioned, no mark will be given

(c)
- to show that the addition of bile supplementation does not adversely affect the growth of the pigs (1) / indicate the effectiveness of the bile supplementation on promoting piglets' growth / effectiveness of fat absorption (1)

(d)

Concept for mark award:
- 1st pt: suitable substrate and correct enzyme used in the experiment
- 2nd pt: the identification of parameter for meausring the dependent variable
- 3rd pt: provide expected results

e.g.
- prepare a mixture of lipase, (bile salts) and oil (1) (1)
- add pH indicator into the mixture / use a data logger with pH sensor/ pH meter to show the change in pH of the mxiture (1) (1)
- the faster the drop in the pH of the mixture, the faster the digestion of fat (1) (1)

Accept other reasonable experiments

8 marks



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Marks

Question 11 is a common item which is equivalent to CS Bio question 8.

11.

| ***Differences*** | ***Significance*** | |
|---|---|---|
| • Pairing of homologous chromosomes along the equatorial plane in first division of meiosis but no such process in mitosis (1)<br>• The pairs of homologous chromosomes segregate into the daughter nuclei during the first meiotic cell division (1) | • Such that the daughter cells formed contain the whole set of chromosome / one member of each homologous pairs (1) after meiosis<br>• Random segregation of homologous chromosomes results in variations between gametes formed in meiosis (1)<br>• Crossing over may occurs, the exchange of genetic materials between non-sister chromatids gives rises to new genetic combinations (1) | (5) |
| • Mitosis involves one division only but meiosis involves two divisions (1) | • The daughter cells resulted from mitosis are genetically identical to the parent cell (1) which is important for growth of the organisms (1) / asexual reproduction<br>• The daughter cells / gametes formed in resulted from meiosis contain half / haploid the genetic content of the parent cell (1) such that the amount of genetic content can be restored after fertilisation (1) | (5) |
| **D = (3)** | **S = max.5** | Max. 8 |

Communication **C = max.3**

11 marks

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.<br>• 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.<br>• A little relevant 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).<br>• Irrelevant material obscures some minor ideas. | • Answers are a bit disorganised, but paragraphing is evident. Repetition is noticeable. |
| 0 | • Language used is incomprehensible.<br>• Irrelevant material buries the major ideas required by the question. | • Ideas are not coherent and systematic. Candidates show no attempt to organise thoughts. |



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