



TEMASEK JUNIOR COLLEGE

Preliminary Examinations 2015

BIOLOGY

Higher 1

Paper 2

8875/02

Friday, 28 August

2 hours

Candidate Name: _____

Civics Group: _____

READ THESE INSTRUCTIONS FIRST

Write your name and civics group on all answer papers used.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A (Part I and Part II)

Answer **all** questions.

Section B

Answer any **one** question.

At the end of the examination, fasten the answer papers securely and hand up separately.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section A	
1	/ 10
2	/ 8
3	/ 10
4	/ 12
Section B	
5 / 6	/20
TOTAL	/ 60

This document consists of **11** printed pages.

[Turn over

1 Fig. 1.1 shows two organelles from an animal cell involved in digestion.

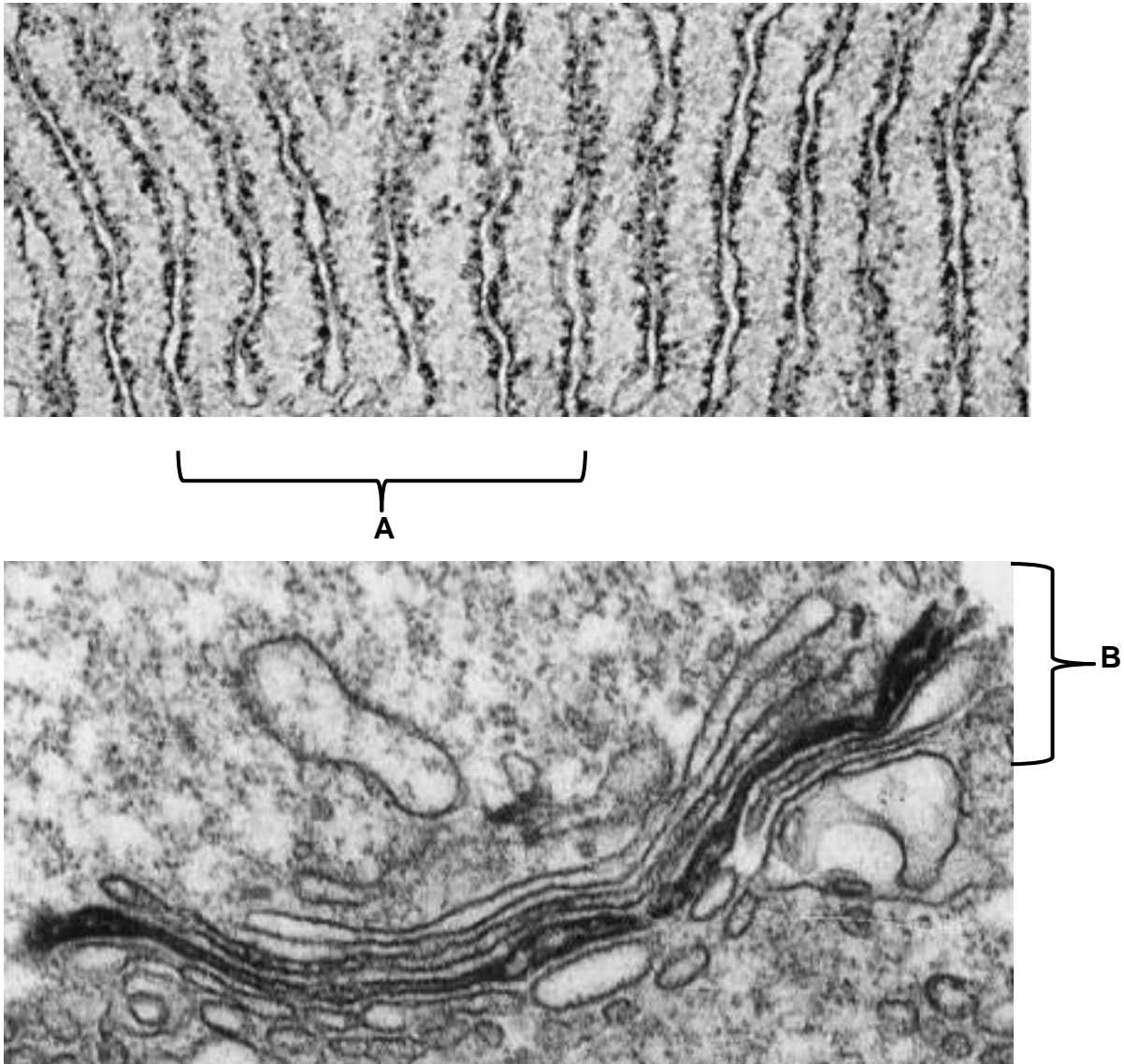


Fig. 1.1

(a) (i) Identify organelles **A** and **B**.

A: _____

B: _____ [2]

(ii) Describe how a biomolecule synthesized in **A** is transported to **B**.

[2]

(b) The passage of most molecules through the cell membrane is regulated by proteins. State the roles of these proteins.

[2]

A study was conducted to investigate the effect of disrupting the plasma membrane of a cell. The plasma membrane was disrupted by poking it with a fine needle.

Fig. 1.2 shows the observation made by the researcher 10 s after the membrane was disrupted.

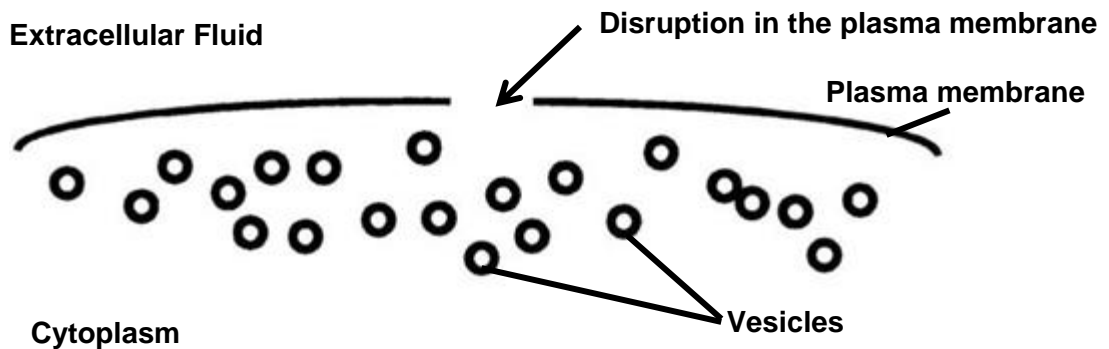


Fig. 1.2

After which, the plasma membrane was resealed, as shown in Fig. 1.3.

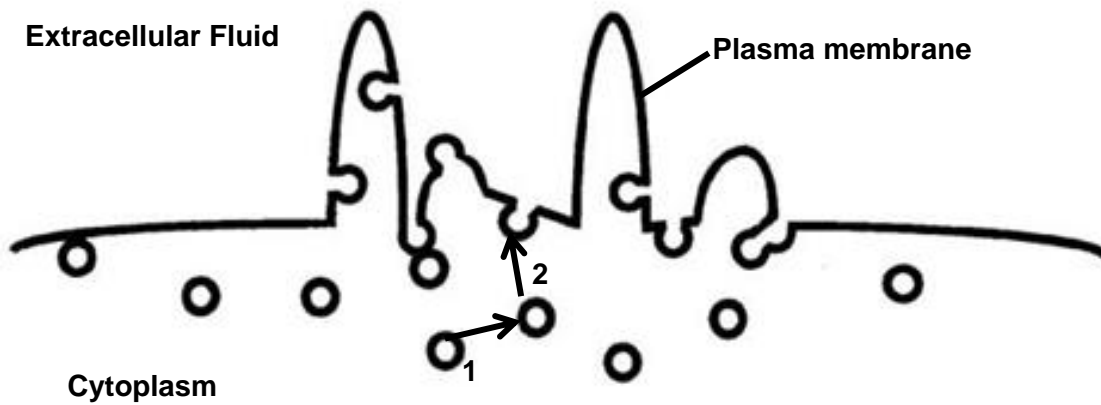


Fig. 1.3

- (c) Numbers 1 and 2 in Fig. 1.3 represent a sequence of events occurring in the cell. Describe the process that is taking place in Fig. 1.3.

[4]

[Total: 10]

- 2 Petal colour in camellia flowers is controlled by a single gene. A cross between a plant with red flowers and a plant with white flowers produces offspring with flowers that exhibit both red and white colours on the petals, as shown in Fig. 2.1.



Fig. 2.1

- (a) State the meaning of the term *allele*.

[1]

- (b) State the type of interaction between the two alleles for red and white colours.

[1]

- (c) (i) Using the symbols C^R for red colour and C^W for white colour, draw a genetic diagram to find the probability of obtaining a plant with white flowers when plants with flowers that exhibit both red and white colours on petals are crossed.

Probability of getting a plant with white flowers: _____ [4]

- (ii) Using Mendel's law of segregation, explain your answer to (c)(i).

[2]

[Total: 8]



TEMASEK JUNIOR COLLEGE
H1 BIOLOGY
JC2 / IP YEAR 6 2015

PRELIMINARY EXAMINATIONS

BIOLOGY SECTION A [PART II]:

Structured Questions

Name: _____ ()

Civics Group: _____/14

Q3	/ 10
Q4	/12

- 3 Widely dispersed organisms, such as plants with small, light, wind blown seeds, are the most frequent colonisers of remote oceanic islands. However, reduction in dispersal ability is a characteristic of many organisms after they have colonised oceanic islands.

A recent investigation into changes in the size of seeds of a short lived, wind dispersed species of a plant on islands was carried out. It showed that increasing size and mass of seeds reduced dispersal potential, relative to the original mainland populations.

- (a) (i) State the phenotypic difference between the seeds of the original mainland populations and colonizers of the oceanic islands.

_____ [1]

- (ii) Suggest why the seeds from the original mainland populations are short lived.

_____ [1]

(b) Explain how natural selection

(i) favours the **initial** colonisation of islands by some mainland plants;

[2]

(ii) would operate on plants **after** they have colonised the islands.

[2]

Another common pattern seen in plants that colonize islands is the development of dioecy, where male and female flowers are on different plants.

(c) Suggest why this trait is an evolutionary advantage.

[2]

(d) Describe how researchers can determine the evolutionary relationship of the two plant populations.

[2]

[Total: 10]

[Turn over

- 4 The Atlantic salmon has been genetically modified with a 4061 bp transgene that comprises two DNA sequences – a 3351 bp regulatory gene sequence of an anti-freeze gene from an ocean pout, and a 710 bp growth hormone gene from a Chinook salmon.

Fig. 4.1 shows the recombinant plasmid opAFP-GHc2 that will be used for microinjection into the fertilized eggs of wild Atlantic salmon.

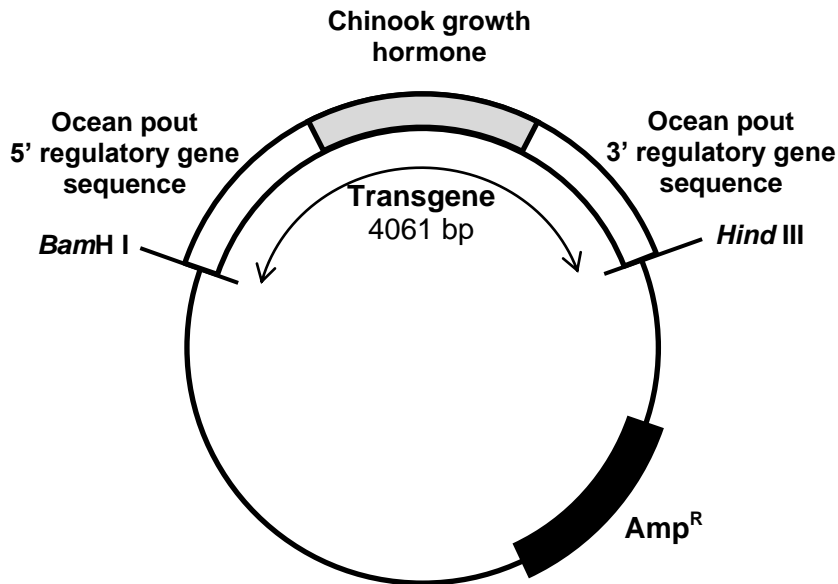


Fig. 4.1

- (a) Explain why plasmids can be used to clone genes involving **any** species of organism.

[2]

The transgene has been modified to include sticky ends generated by two different restriction enzymes – *BamH I* and *Hind III*.

- (b) (i) Explain why **two** different restriction enzymes are used.

[2]

[Turn over

- (ii) With reference to Fig. 4.1, describe how the recombinant plasmid is formed using the 4061 bp transgene.

[3]

In order to determine the stability of the transgene, each year genomic DNA was isolated from the transgenic Atlantic salmon and the transgene is amplified using polymerase chain reaction and visualized using gel electrophoresis.

- (c) Outline how polymerase chain reaction and gel electrophoresis can be used to distinguish between transgenic salmon and non-transgenic salmon.

[3]

- (d) Explain why the development of transgenic salmon raises ethical concerns.

[2]

[Total: 12]

SECTION B**Answer one question.**

Write your answers on the separate answer paper provided.

Your answers should be illustrated by large, clearly labelled diagrams, where appropriate.

Your answers must be in continuous prose, where appropriate.

Your answers must be set out in sections **(a)**, **(b)** etc., as indicated in the question.

- 5** **(a)** Outline the molecular structure of phospholipids in relation to their function in cell membranes. [6]
- (b)** Compare oxidative phosphorylation and photophosphorylation. [8]
- (c)** Yeast cells undergo respiration to produce carbon dioxide.
- Describe an experimental procedure to investigate the effect of temperature on the rate of respiration of yeast cells by measuring the release of carbon dioxide. [6]
- 6** **(a)** Explain how the structure of collagen and haemoglobin are related to their function. [8]
- (b)** Outline the main features of anaerobic respiration. [6]
- (c)** Compare competitive and non-competitive inhibitors. [6]