

Class	Register Number	Name
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南洋女子中學校
Nanyang Girls' High School
End-of-Year Examination 2021
Secondary Three

A

IP BIOLOGY
Paper 2

1 hour 45 minutes
0845 – 1030

Thursday 7 October 2021

READ THESE INSTRUCTIONS FIRST

Do not open this document until you are told to do so.

Write your name, register number and class in the spaces at the top of this page.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer three questions.

Question 11 is in the form of an Either/Or question. Only one part should be answered.

Tick **11 Either** or **11 Or** in the grid-box on the cover page to indicate the question answered.

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

The use of an approved scientific calculator is expected, where appropriate

EXAMINER'S USE

Paper 1
(30 marks)

Paper 2

Section A (40 marks)

1
(5 marks)

2
(5 marks)

3
(5 marks)

4
(4 marks)

5
(5 marks)

6
(4 marks)

7
(7 marks)

8
(5 marks)

Section B (30 marks)

9 (10 marks)

10 (10 marks)

tick: 11 Either
(10 marks)

tick: 11 Or
(10 marks)

TOTAL
(100 marks)

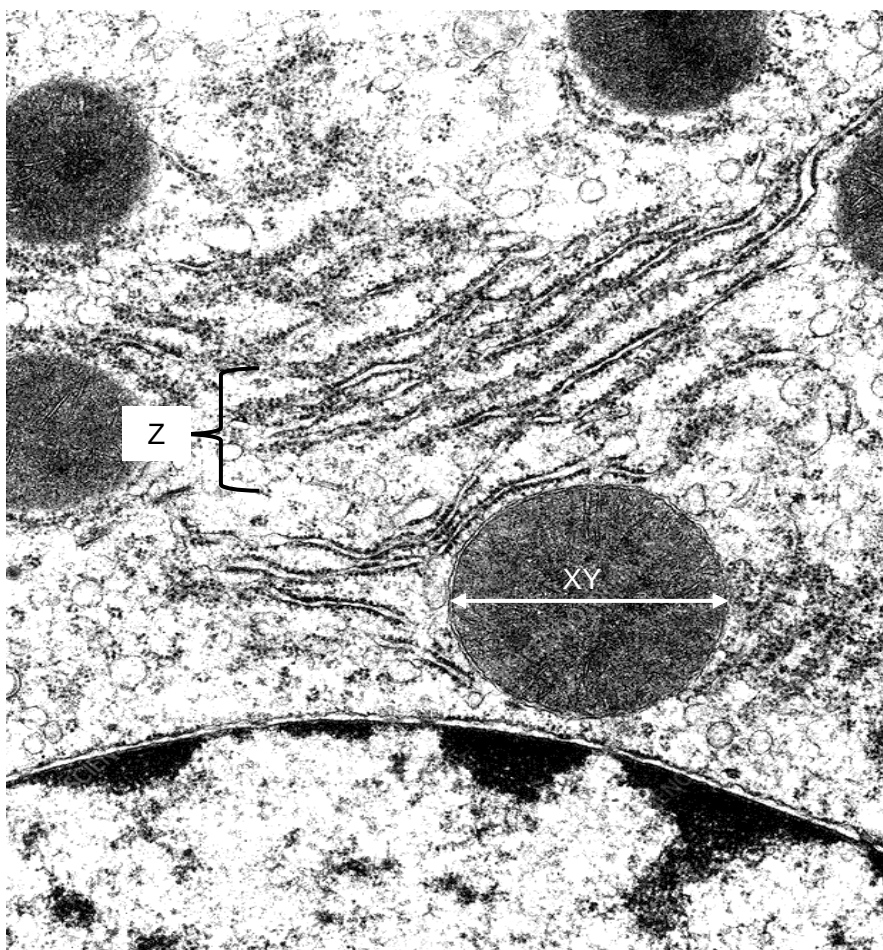
This document consists of **15** printed pages and **1** blank page

Setters: LZJ, TZZ

NANYANG GIRLS' HIGH SCHOOL

[Turn over

- 1 Fig. 1.1 shows an electron micrograph of part of a cell from the liver of a mouse.



x 47 500

Fig. 1.1

- (a) Calculate the actual length of the mitochondrion, represented by line XY, in micrometres (μm).
Show your working clearly in the space provided. Give your answer to 2 decimal places.

[2]

- (b) The liver carries out detoxification which requires a variety of enzymes. Suggest why large numbers of mitochondria and Z are required in a liver cell.

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.....[3]

[Total:5]

2 Deoxyribonucleic acid (DNA) contains *genes* that store genetic information.

(a) Define the term *gene*.

.....
.....[1]

(b) A DNA molecule was found to contain 30% of adenine.

State the percentage of cytosine in the same DNA molecule.

.....[1]

(c) About 85 % of the DNA of a mouse is the same as that of a human.

Use ideas about the function of DNA and genes to suggest why mice are very different in appearance to humans.

.....
.....
.....
.....[2]

(d) Genetic engineering can be used to manipulate the genes of organisms.

Suggest **one** social or ethical implication of genetic engineering in plants.

.....
.....[1]

[Total: 5]

3 *Drosophila* is a fruit fly that is commonly used in genetic research.

They can be easily bred and grown in the laboratory. The diet of the *Drosophila* fruit fly consists of banana, yeast and maize. Females can lay on average 100 eggs at once and it takes 24 hours for the eggs to hatch. The life cycle of the fruit fly, from egg fertilisation to adult is 10 days. The maximum lifespan of a *Drosophila* fruit fly is about 80 days.

Fig. 3.1 shows two varieties of the *Drosophila* fruit fly.

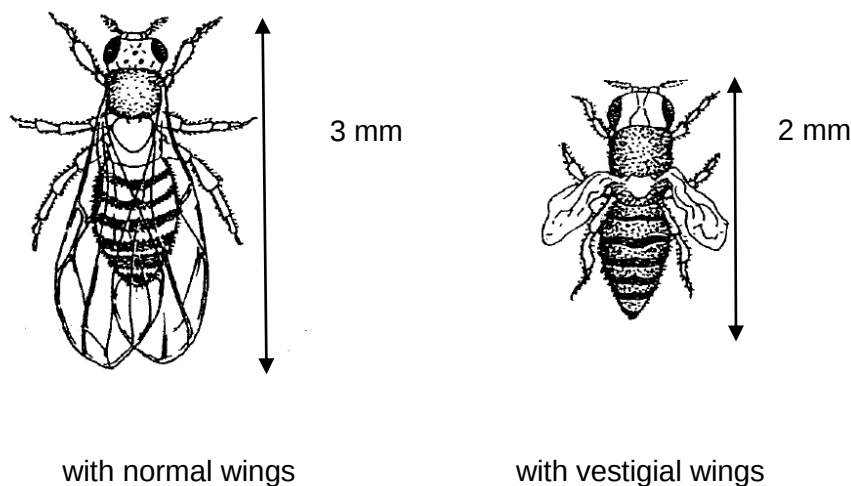


Fig. 3.1

(a) Suggest a reason why *Drosophila* fruit flies are often used in genetic experiments.

.....
.....[1]

- (b) In an experiment, two *Drosophila* fruit flies with normal wings were allowed to mate.

Table 3.1 shows the variety and number of offspring obtained.

Table 3.1

variety	numbers
normal wings	80
vestigial wings	25

Using a genetic diagram, explain the results of the experiment.

[4]

[Total: 5]

4 Fig. 4.1 shows movements that take place within a cell during mitosis.

0 marks the time when chromosomes line up on the equator of the cell.

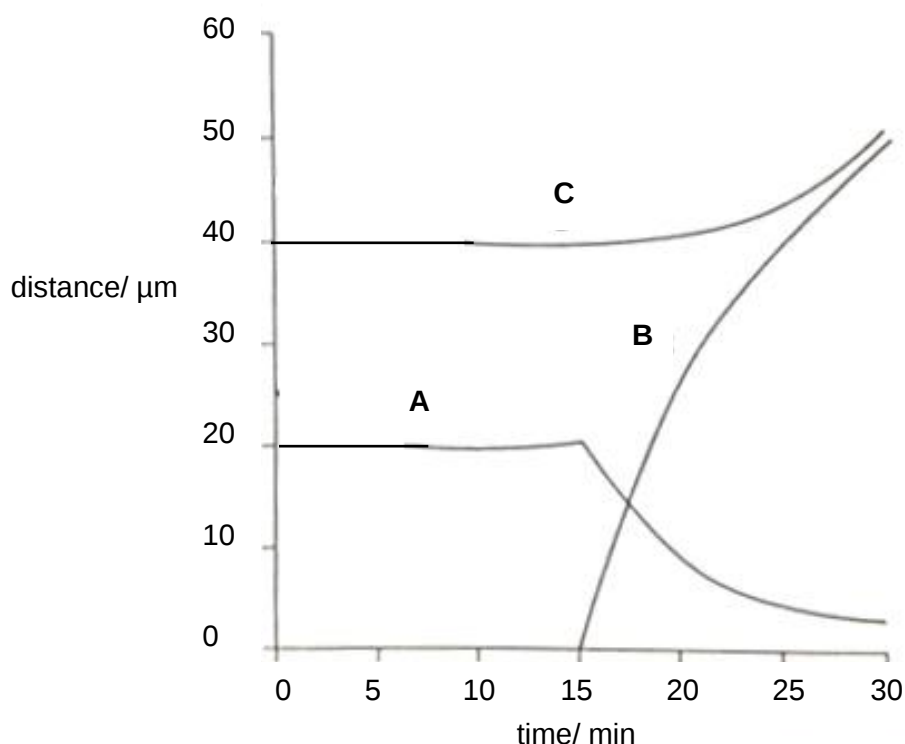


Fig. 4.1

(a) The following statements describe the change in distance between some structures in the cell over a period of 30 minutes.

Match the curves **A**, **B** and **C** correctly to the change in distance between the structures.

curve	descriptions
	change in distance between centromeres of sister chromatids
	change in distance between centromeres and poles of the spindle
	change in distance between the poles of the cell

[1]

(b) With reference to Fig. 4.1 describe what happens to the sister chromatids after 15 minutes.

.....

[2]

- (b)** Describe what happens to the chromatids after 30 mins.

.....

.....[1]

[Total: 4]

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- 5 Fig. 5.1 illustrates a section of the *fluid mosaic* model of a cell surface membrane.

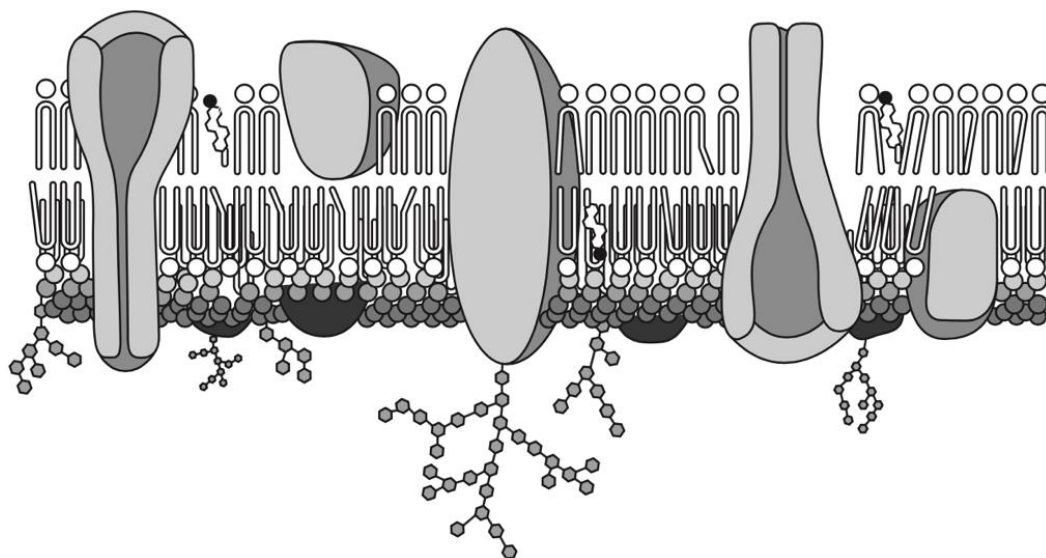


Fig. 5.1

- (a) On Fig. 5.1, label and name **one** structure which allow glucose molecules to move across the cell surface membrane. [1]
- (b) Describe what is meant by the term *fluid mosaic*.

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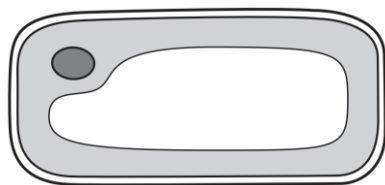
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.....[2]

(c) Fig. 5.1 and Fig. 5.2 show two plant cells.

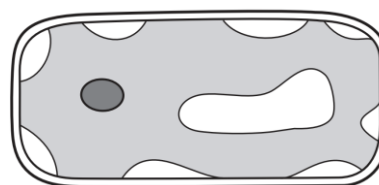
Fig. 5.1 shows the appearance of the cell **before** being immersed in any solution.

Fig. 5.2 shows the appearance of the cell **after** being immersed in concentrated salt solution.



before immersion in solution

Fig. 5.1



after immersion in solution

Fig. 5.2

Explain the changes to the cell from Fig. 5.1 that would result in the cell shown in Fig. 5.2.

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.....[2]

[Total: 5]

- 6 Students investigated the effect of pH on the activity of collagenase (enzyme) extracted from a bacterium. The results are shown in Fig. 6.1.

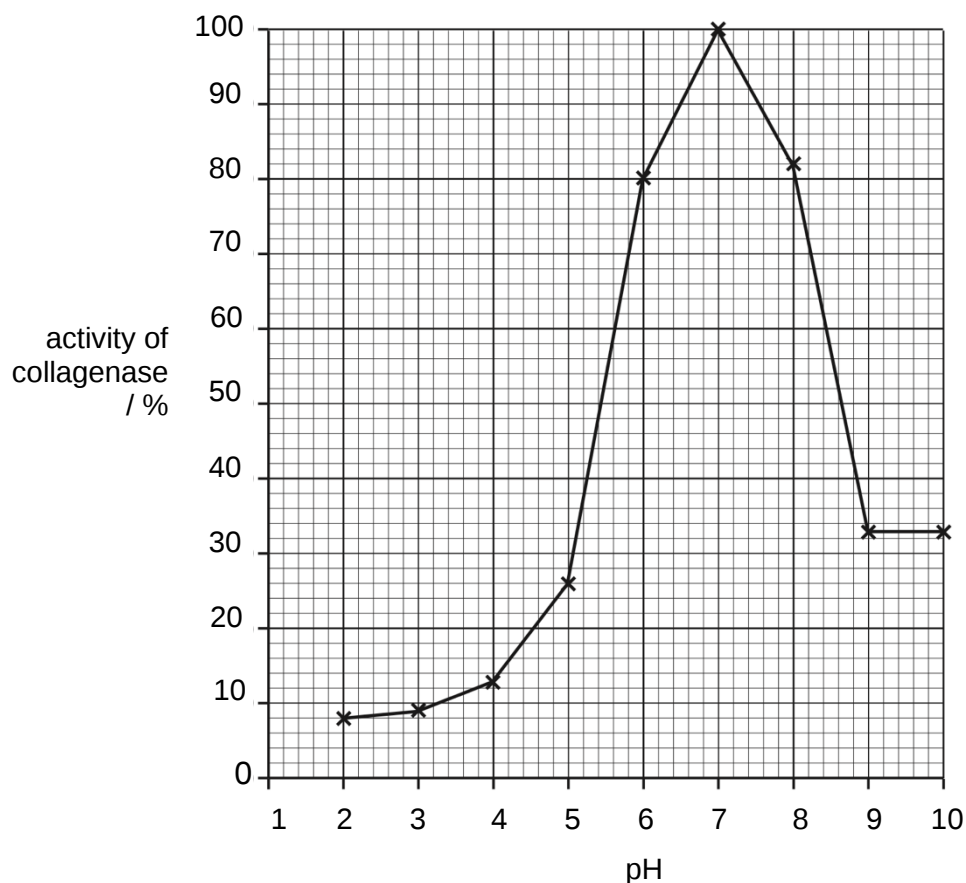


Fig. 6.1

- (a) State the change in the activity of collagenase as pH changes from 2 to 6.

.....[1]

- (b) Account for the shape of the graph in Fig. 6.1.

.....

[3]

[Total: 4]

- 7 Fig. 7.1 shows the associated organs of the digestive system and its blood vessels.

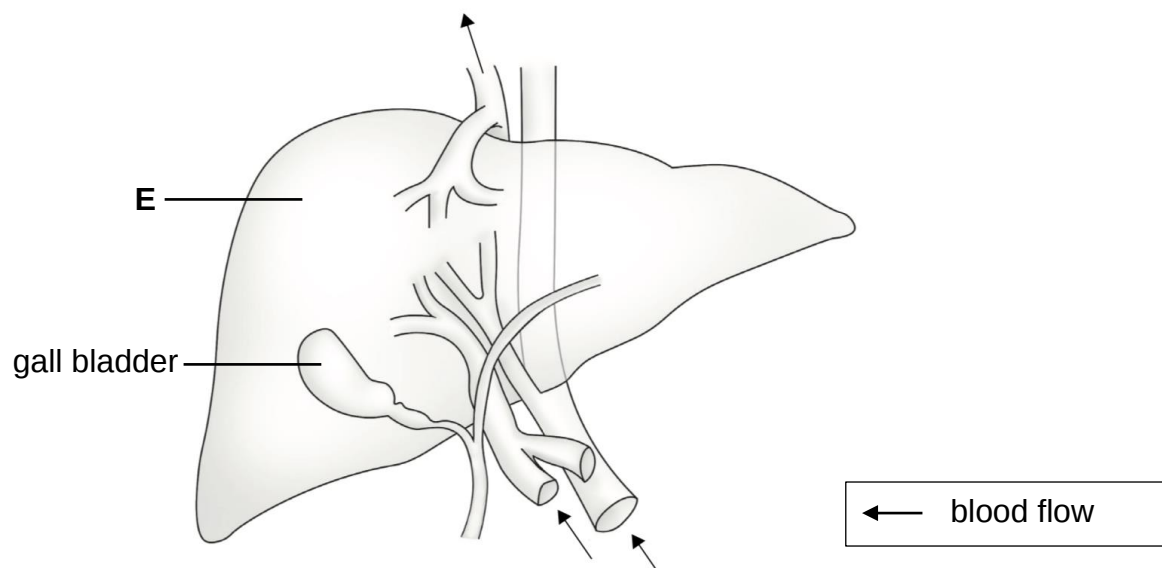


Fig. 7.1

- (a) State **two** functions of the organ labelled **E** in Fig. 7.1.

1

2 [2]

- (b) Gallstones could be formed in the gall bladder. These stones may become large enough to block the bile duct.

Suggest how the gallstones can affect the digestion of fat.

.....

.....

.....

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..... [3]

The stomach of young cows can produce rennin.

The proteins in the milk will clot to form solid lumps in the presence of rennin.

(c) State the organ directly located **before** the stomach.

.....[1]

(d) Suggest a possible nutritional advantage from the action of renin for the young cows.

.....
.....[1]

[Total: 7]

- 8 Fig. 8.1 shows the leaves of *Victoria amazonica* floating on the surface of water.



Fig. 8.1

- (a) Write down the chemical equation of photosynthesis. Include the conditions for photosynthesis to occur.

.....[1]

- (b) Fig. 8.2 shows a section through its leaf.

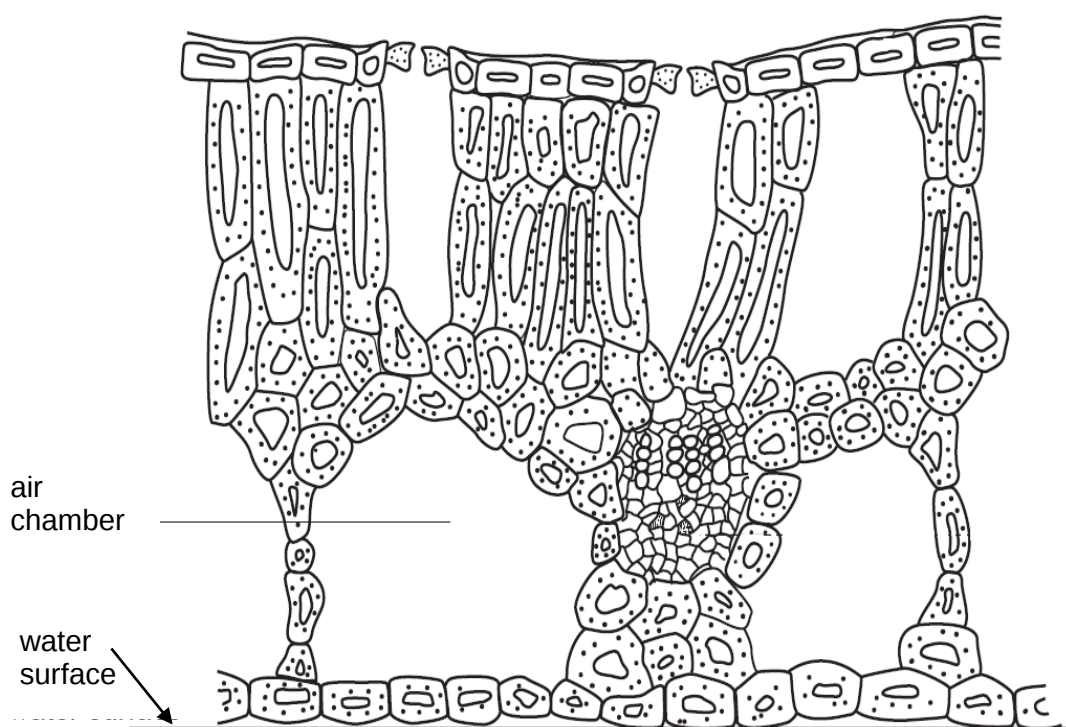


Fig. 8.2

With reference to Fig. 8.2, explain two ways in which the internal leaf structure of the *Victoria amazonica* is different from that of a typical leaf and how these differences help it adapt well to the environment.

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.....[4]

[Total: 5]

End of Section A

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