

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2019
Secondary Three IP

A

IP BIOLOGY
Paper 2 Theory Paper

Friday

11 October 2019

1 hour 45 minutes
1000-1145

Additional materials: Nil

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

Tick **10 Either** or **10 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 (4 marks)	
2 (4 marks)	
3 (6 marks)	
4 (10 marks)	
5 (6 marks)	
6 (5 marks)	
7 (5 marks)	
Section B (30 marks)	
8 (10 marks)	
9 (10 marks)	
tick: 10 Either (10 marks)	
tick: 10 Or (10 marks)	
TOTAL (80 marks)	

This document consists of **12** printed pages.

Setters: OC, TZZ

NANYANG GIRLS' HIGH SCHOOL

[Turn over

Section A (40 marks)
Answer **all** questions.
Write your answers in the spaces provided.

- 1 Fig. 1.1 shows a biological drawing of the cross-section of a tomato fruit.

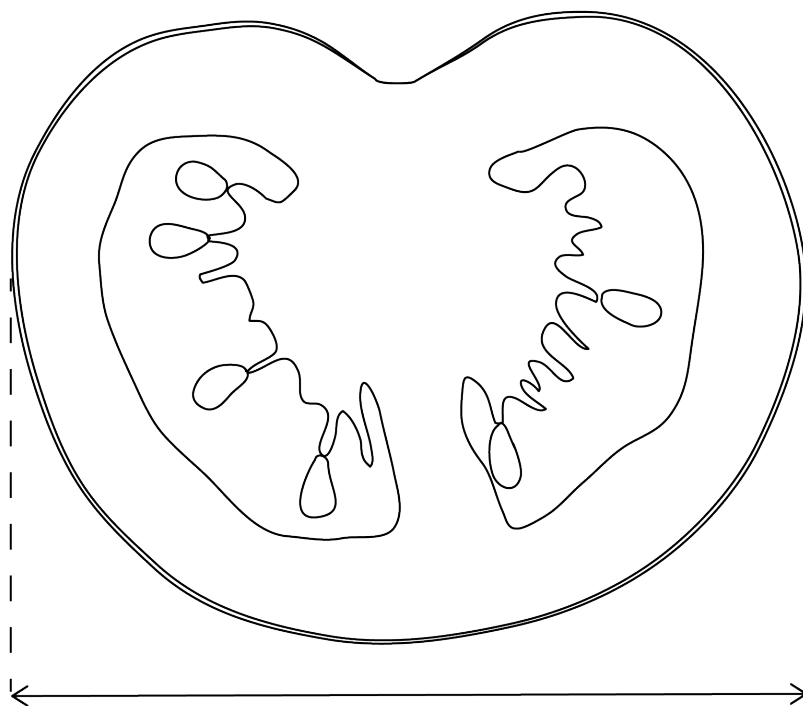


Fig. 1.1

- (a) Given that the magnification of the drawing is 2.1X, calculate the actual width of the tomato fruit. The width of the drawing is indicated by the double-headed arrow. Show your working clearly. Give your answer to 1 decimal place.

Width of the fruit : [2]

- (b) In normal cells, the Golgi apparatus consists of a stack of flattened membrane-bound bodies known as cisternae.

In 2017, some scientists performed a 'knockout' experiment on cells. They removed two types of Golgi reassembly stacking proteins, GRASP65 and GRASP55, from cells. As a result, the experimental cells had Golgi apparatus that could not form a stack of cisternae, and only had single cisterna.

[source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5638586/>]

Suggest two possible effects if the Golgi apparatus cannot form into a stack.

1.....

.....

2.....

.....

[2]

[total: 4]

2 Fig. 2.1 below shows a reaction that occurs in a part of the alimentary canal.

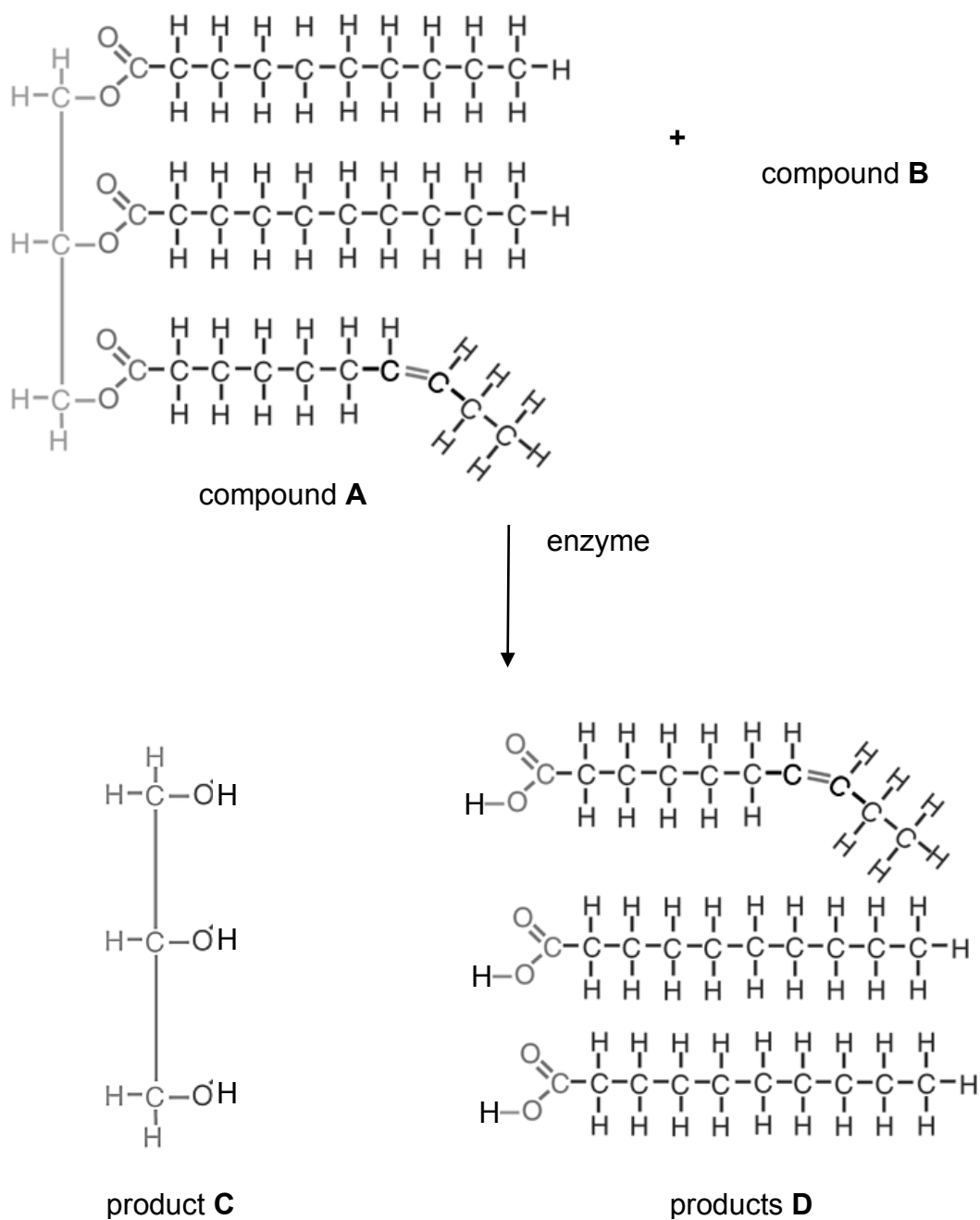


Fig. 2.1

(a) (i) Identify compound B.

..... [1]

(ii) Name the type of reaction represented in Fig. 2.1.

..... [1]

- (b) Identify the products **C** and **D** of the reaction.

Product **C**:

.....

Products **D**:

.....

[1]

- (c) People living in the Arctic regions have a diet high in content of compound **A**. Explain why this is necessary.

.....

.....

[1]

[total: 4]

- 3 The “meat” patty used in a vegan burger is made from mycoprotein obtained from the fungus, *Fusarium venenatum*.

Table 3.1 shows the composition of mycoprotein and beef.

Table 3.1

nutrient	dry mass/ g per 100 g	
	mycoprotein	uncooked beef
protein	45.0	52.6
fat	11.2	47.4
fibre	21.4	0.0
carbohydrate	21.7	0.0

- (a) Using data from table 3.1, state two reasons why eating mycoprotein is healthier than eating beef.

.....

.....

.....

.....

[2]

- (b) Fig. 3.2 shows how the mass of fat in beef changes as it passes through the alimentary canal. The width of each band indicates the mass of nutrients present.

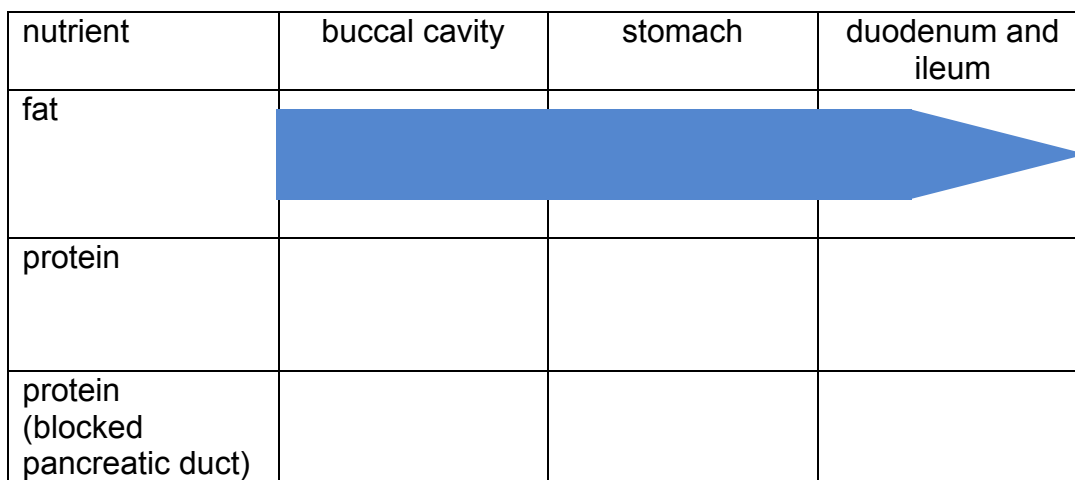


Fig. 3.2

Suggest why the mass of fat in the beef did not decrease immediately after entering the duodenum.

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

- (c) (i) On Fig. 3.2, draw how the mass of protein changes as the beef passes through the alimentary canal. [1]
- (ii) Due to pancreatic stones, the pancreatic duct of a person was completely blocked. On Fig. 3.2, draw how the mass of protein will change as the beef passes through the alimentary canal. [1]
- (iii) Explain why the answer from (c)(ii) is different from (c)(i).

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

[total: 6]

- 4 (a) Table 4.1 shows the volume of air taken in by two healthy 21-year-old men after running at their maximum effort for a minute.

One has stayed at an altitude of 3500 m all his life and the other has lived at sea level all his life.

Table 4.1

	volume of air taken in per minute/ $\text{dm}^3 \text{ min}^{-1}$
man living at high altitude	151
man living at sea level	130

Based on the data given in Table 4.1, suggest two differences in the internal structure of the lungs of the two men.

1.

.....
.....

2.

.....
.....

[2]

Fig. 4.2 shows the oxygen uptake before and during a run done by the man living at sea level.

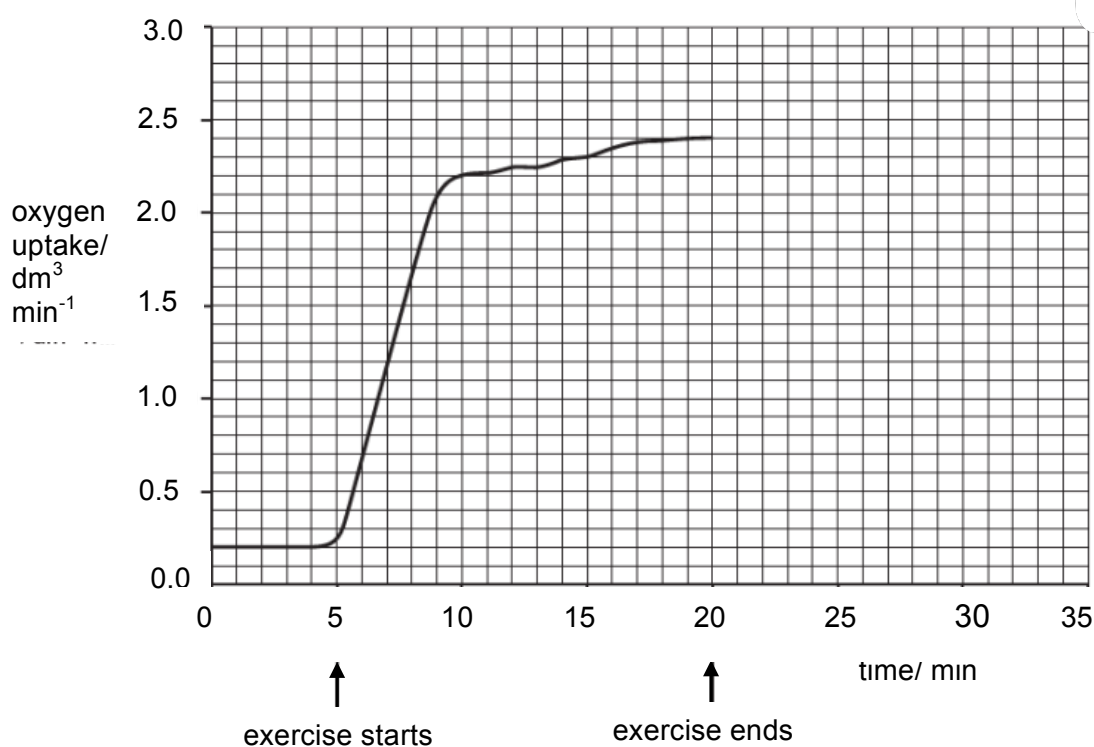


Fig. 4.2

- 5 The kidney is made up of tiny units called kidney tubules, which work in two steps.

Step 1: Small substances, both waste materials and useful substances, are filtered out of the blood. The filtrate from this process is shown in Fig. 5.1 as solution **U**.
Step 2: Useful substances such as water and ions are taken from solution **U** back into the blood. What remains of solution **U** forms urine.

Fig. 5.1 illustrates how Step 2 occurs. It shows some cells of a kidney tubule next to a blood vessel. The area in grey represents solution **U**. The cells can take in water from solution **U**, as shown by process **Y**. This water then moves from the cells into blood. Taking water from solution **U** back into the blood helps to prevent excessive water lost from the body.

Under certain conditions, water channels called aquaporins are transferred to the cell membrane, as shown by process **X**. Transferring more aquaporins to the cell membrane would allow the cells to take in more water. This in turn allows more water to enter the bloodstream.

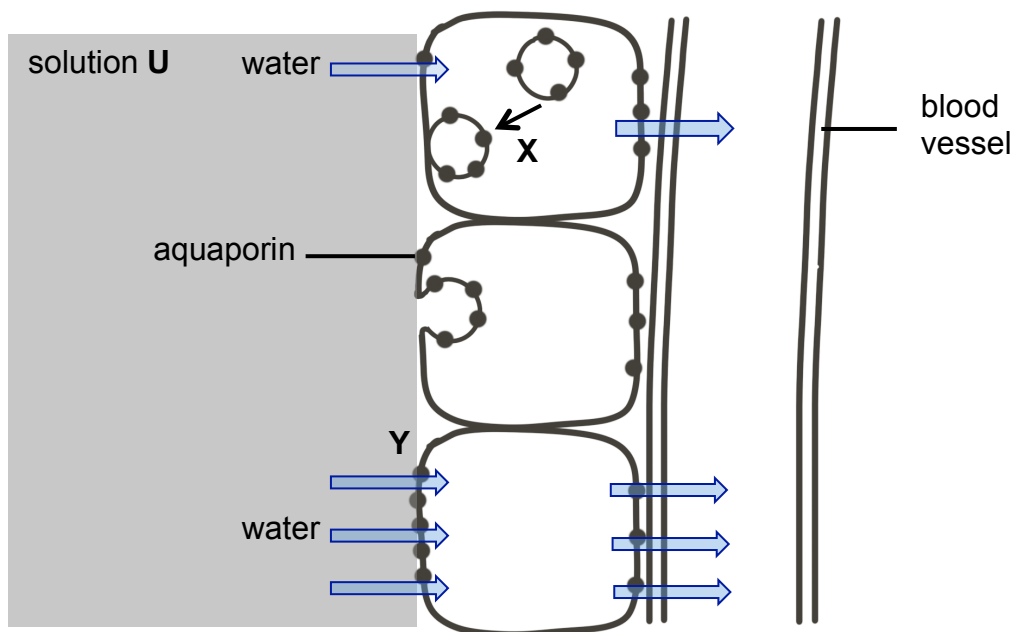


Fig. 5.1

- (a) Identify processes **X** and **Y**.

X

Y

[2]

- (b) Complete Fig 5.2 by drawing in the aquaporin (water channel) in the cell membrane.

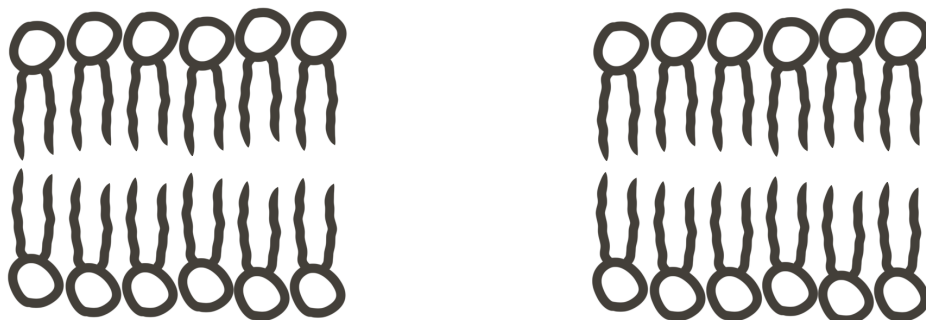


Fig. 5.2

[1]

- (c) Predict and explain how increasing the number of aquaporins on the cell membrane would affect the colour and volume of urine formed. You may assume that the original colour of urine is light yellow. A pigment called urochrome gives urine its yellow colour.

Colour

Volume

Explanation

.....

[3]

[total: 6]

- 6 (a)** Some mutant *Arabidopsis* plants show a decrease in the amount of cellulose in their cell walls, and a corresponding decrease in the amount of lignin.

[source: <https://www.sciencedaily.com/releases/2012/11/121125192840.htm>]

Suggest and explain what such a mutant plant would look like.

.....

.....

.....

..... [2]

- (b)** Fig. 6.1 shows a typical plan layout of a classroom in Nanyang Girls' High School.

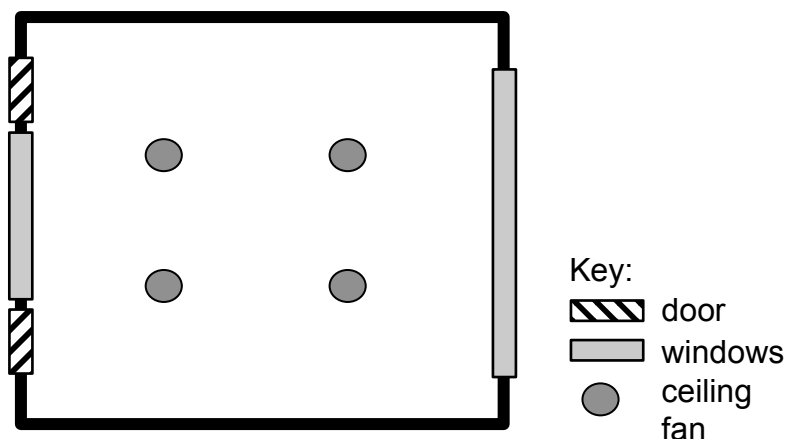


Fig. 6.1

- (i)** Define *transpiration*.

.....

..... [1]

- (ii)** Draw an X on the diagram to suggest where a plant should be placed in order to keep its transpiration rate to the minimum.

You may assume that all doors and windows are open and fans are switched on. [1]

- (iii)** Explain your answer in **(b)(ii)**.

.....

..... [1]

[total: 5]

7 Some children are born with a heart that contains a single ventricle instead of two.

(a) State two possible symptoms a child might show if he has a single ventricle.

1

.....

2

.....

[2]

(b) Fig. 7.1 shows a heart that has a single ventricle. On one side of the heart, the atrioventricular valve is fused and unable to open. A hole between the two atria allows blood to flow between them.

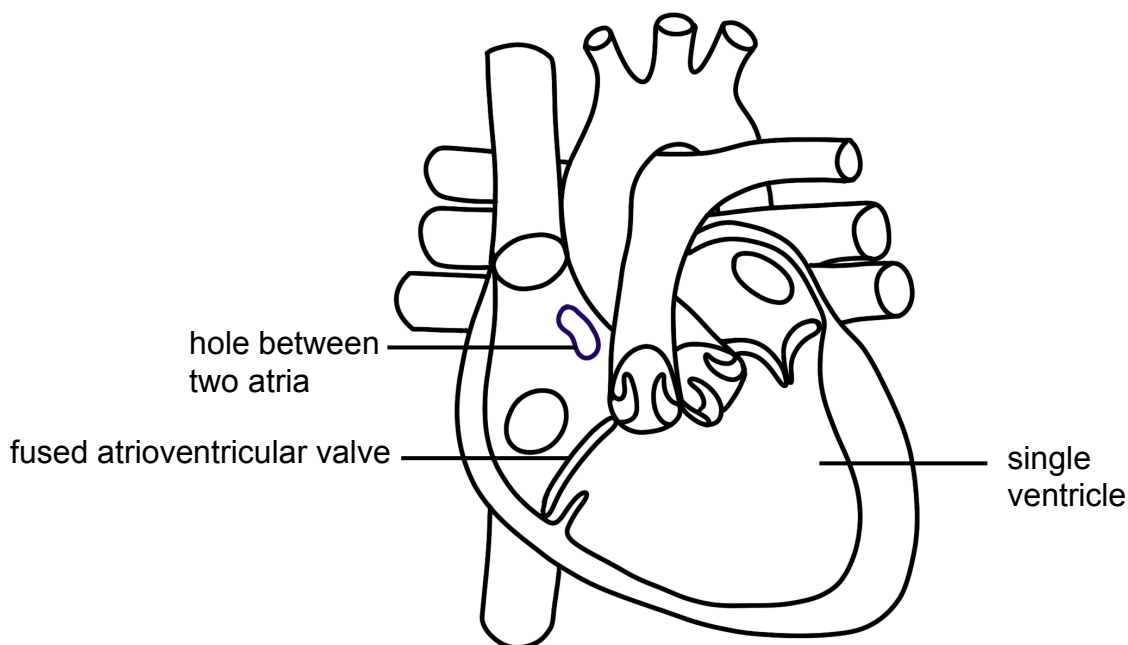


Fig. 7.1

(i) Label, on Fig. 7.1, the aorta and the pulmonary artery. [2]

(ii) Draw an arrow to trace the flow of blood from the superior vena cava to the single ventricle. [1]

[total: 5]

END OF SECTION A