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

End-of-Year Examination 2018  
Secondary Three

**A**

**IP BIOLOGY**  
**Paper 2 Theory Paper**

**Friday**

Additional materials: Nil

**5 October 2018**

**1 hour 45 minutes**  
**1000 – 1145**

**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.

At the end of the examination,

1. fasten all your work securely together;
2. tick **8 Either** or **8 Or** in the grid-box to indicate the question answered.

You are advised to spend no longer than 1 hour on **Section A**, and no longer than 45 minutes on **Section B**. 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<br>(30 marks)        |  |
| Paper 2                      |  |
| Section A (40 marks)         |  |
| 1<br>(7 marks)               |  |
| 2<br>(8 marks)               |  |
| 3<br>(7 marks)               |  |
| 4<br>(9 marks)               |  |
| 5<br>(9 marks)               |  |
| Section B (30 marks)         |  |
| 6<br>(10 marks)              |  |
| 7<br>(10 marks)              |  |
| tick: 8 Either<br>(10 marks) |  |
| tick: 8 Or<br>(10 marks)     |  |
| TOTAL<br>(100 marks)         |  |

This document consists of **11** printed pages and **1** blank page.

**Setter: LZJ**

**NANYANG GIRLS' HIGH SCHOOL**

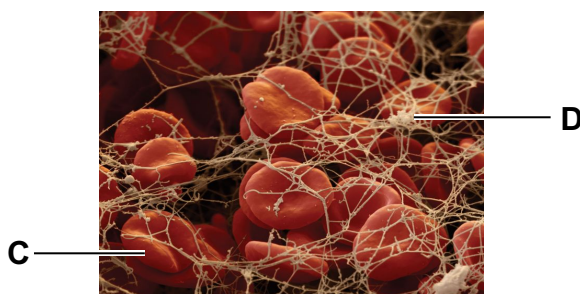
**[Turn over**

### Section A

Answer **all** questions.

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows an electron micrograph of a blood clot.



**Fig. 1.1**

[adapted from Principles of Anatomy and Physiology, 14th Edition, Tortora et. al.]

- (a) Name the structures **C** and **D**.

**C** ..... **D** ..... [2]

- (b) Explain how a blood clot is formed.

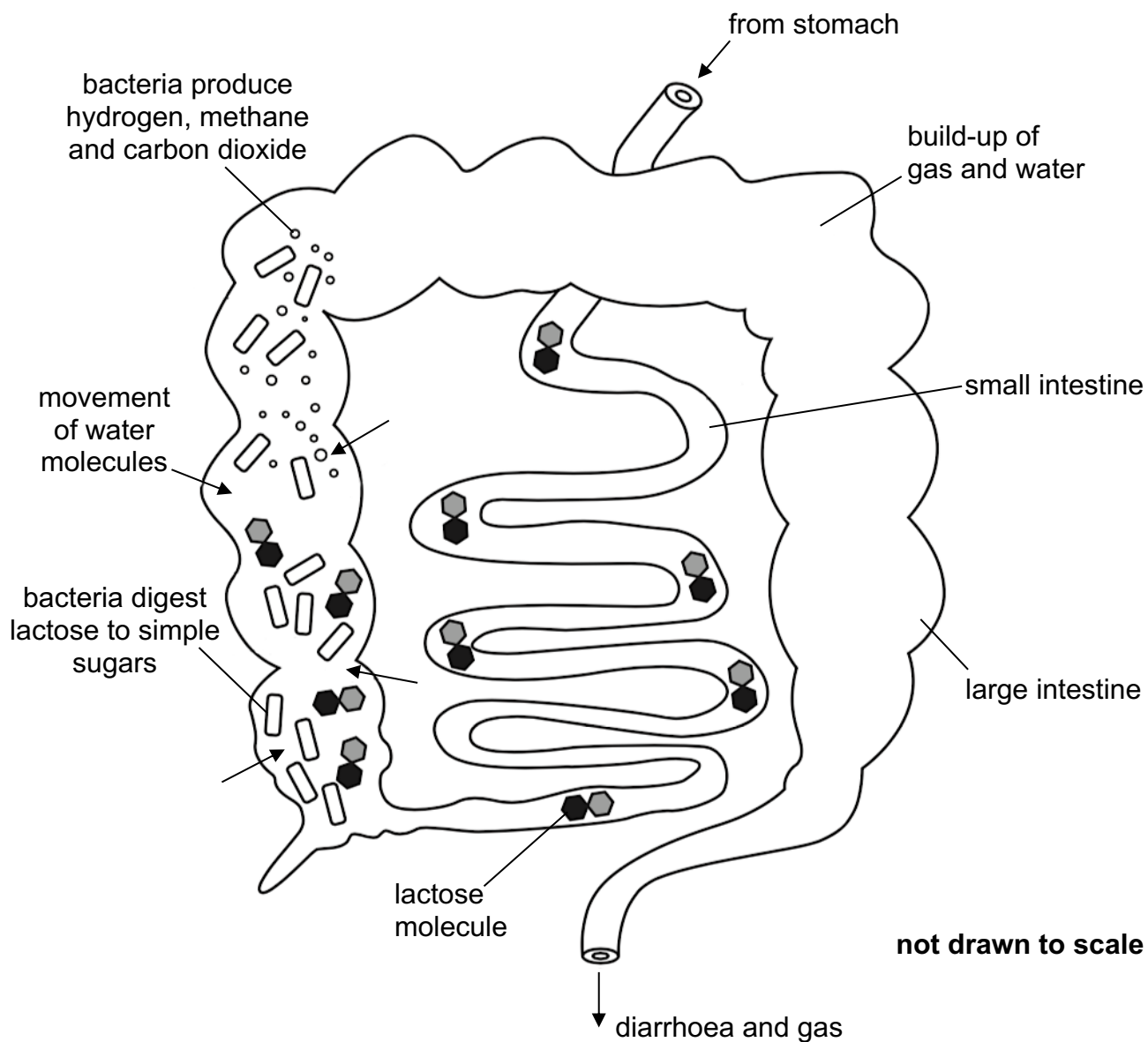
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.....  
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.....  
.....[3]

- (c) Sometimes blood clots can form inside a coronary artery. Explain how the blockage may affect the heart.

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

**[Total: 7]**

- 2 Some people are unable to hydrolyse lactose (milk sugar) and have a condition known as lactose intolerance. Fig. 2.1 shows what happens in the intestine of a person who is lactose intolerant if they eat food containing large amounts of lactose.



**Fig. 2.1**

[adapted from Biology November 2016/P4]

- (a) Write a word equation for the hydrolysis of lactose.

.....[2]

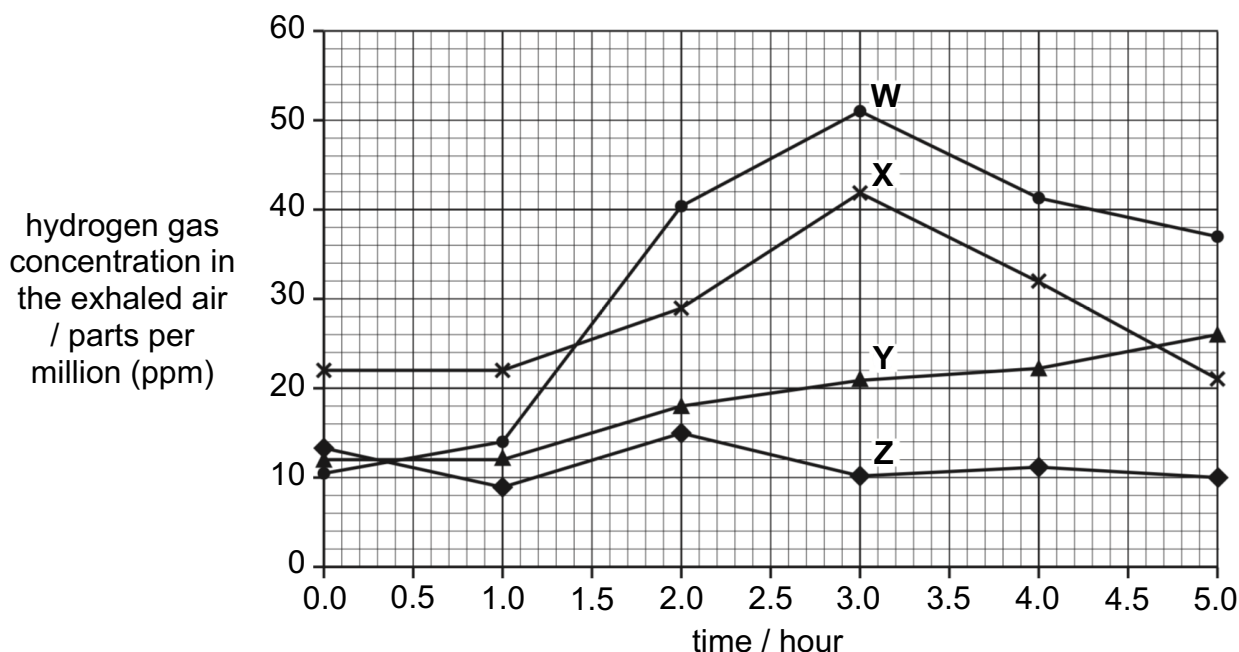
- (b) In the large intestine, the hydrolysis of lactose by the bacteria produces hydrogen gas. The gas is absorbed into the blood and removed through the lungs. Lactose intolerance can be monitored by measuring the hydrogen gas concentration in the exhaled air of a person.

People who were lactose intolerance consumed the following milk products:

- milk treated with lactase immediately before drinking
- milk treated with lactase two days before drinking
- yoghurt made by bacteria that hydrolysed the lactose in the milk
- untreated milk

The hydrogen gas concentration in the exhaled air was measured hourly for five hours following the consumption of each milk product.

The average results are shown in Fig. 2.2.



**Fig. 2.2**

[adapted from Biology November 2016/P4]

- (i) Based on the results in Fig. 2.2, complete Table 2.1.

**Table 2.1**

| graph    | milk product consumed |
|----------|-----------------------|
| <b>W</b> |                       |
| <b>X</b> |                       |
| <b>Y</b> |                       |
| <b>Z</b> |                       |

[1]

- (ii) Suggest one impact of severe diarrhoea caused by lactose intolerance on the human health.

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

- (iii) Use the results in Fig. 2.2 to explain why milk product **Z** is the **best** for people with lactose intolerance.

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

- (c) Villi are found in the small intestine.

Describe and explain **two** ways in which a villus is adapted for the absorption of digested food.

1. ....  
.....  
2. ....  
.....[2]

[Total: 8]

- 3 (a) Both the Golgi apparatus and the rough endoplasmic reticulum (rER) are part of the internal network of membranes in cells.

Describe two structural features that distinguish Golgi apparatus from the rough endoplasmic reticulum (rER).

.....

.....

.....

.....[2]

- (b) The inner and outer membranes of a mitochondrion have a fluid mosaic structure similar to other cell membranes.

Suggest **one** way in which the structure of the inner membrane may differ from that of the outer membrane resulting in a **less permeable** inner membrane.

.....

.....[1]

- (c) An experiment was carried out to trace the route of amino acids in animal cells.

The cells were incubated for 5 minutes in a medium containing radioactively labelled amino acids. The radioactive amino acids were then washed off and the cells were incubated in a medium containing non-radioactive amino acids.

Samples of the cells were taken at 5, 10 and 45 minutes after the start of the experiment and the sites of radioactivity in the cells were determined.

The results are shown in Table 3.1.

**Table 3.1**

| organelle                   | percentage of total radioactivity / % |               |               |
|-----------------------------|---------------------------------------|---------------|---------------|
|                             | at 5 minutes                          | at 10 minutes | at 45 minutes |
| rough endoplasmic reticulum | 80                                    | 15            | 5             |
| Golgi apparatus             | 10                                    | 65            | 25            |
| secretory vesicles          | 0                                     | 5             | 70            |

- (i) Explain why most of the radioactive amino acids move to the rough endoplasmic reticulum (rER) after 5 minutes.

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

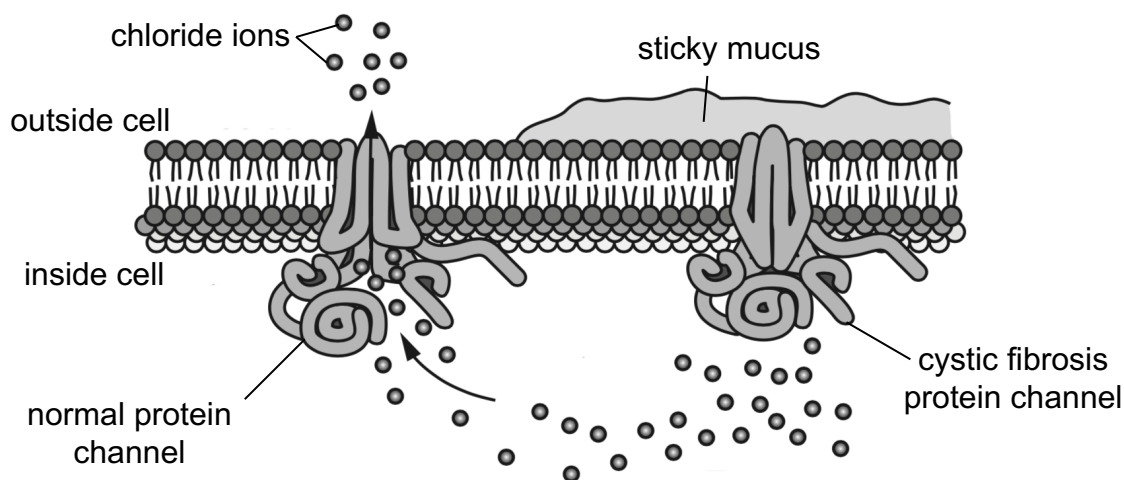
- (ii) Using the data from Table 3.1, describe **and** explain the changes in the percentage of radioactivity in the Golgi apparatus over the course of the experiment.

.....  
 .....  
 .....  
 .....  
 .....  
 .....[3]

**[Total: 7]**

- 4 Cystic fibrosis is a genetic disease which affects the 3-dimensional (3D) conformation of a protein that is responsible for the transport of chloride ions across cell membranes.

Fig. 4.1 shows how a normal protein channel allows the transport of chloride ions to occur, which does **not** occur in cystic fibrosis protein channel.



**Fig. 4.1**  
[adapted from OCR Biology 2017/B2]

- (a) With reference to Fig. 4.1, describe what is meant by *facilitated diffusion*.

.....

.....

.....

.....[2]

- (b) The mucus of a patient suffering from cystic fibrosis has mucus that is stickier than a healthy person. Using your knowledge of osmosis, explain this observation.

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.....[4]

- (c) In a patient diagnosed with cystic fibrosis, his/her pancreatic duct can become blocked by sticky mucus.

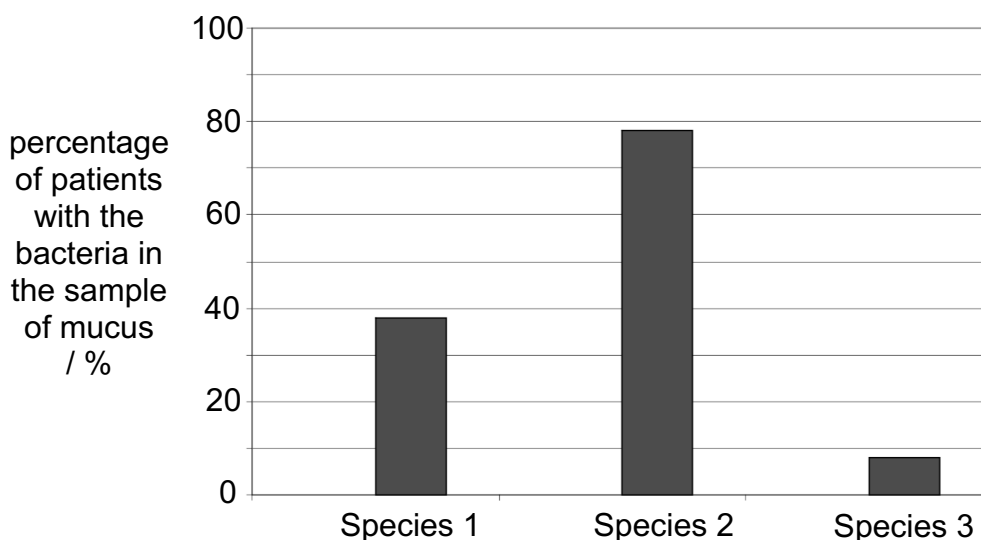
Suggest how a blocked pancreatic duct may affect digestion in his/her body.

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

- (d) Cystic fibrosis commonly leads to lung infections caused by different species of bacteria.

Tests were done on 200 patients with cystic fibrosis. The species of bacteria present were determined from the sample of mucus obtained from each patient.

Fig. 4.2 shows the test results.



**Fig. 4.2**

[adapted from OCR Biology 2017/B2]

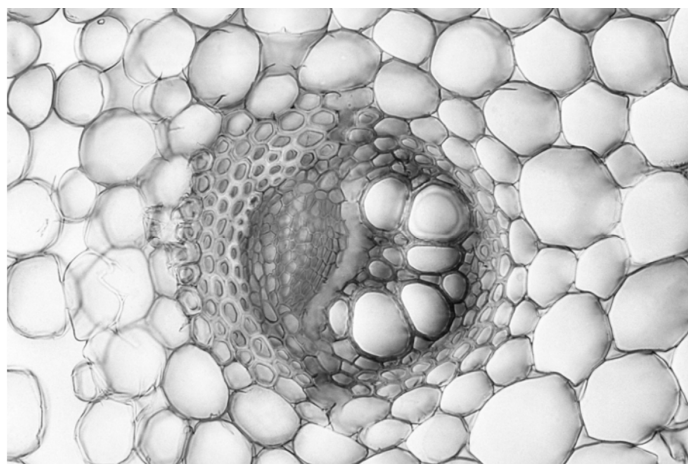
Using data from Fig. 4.2, explain if a patient can be infected with more than a single species of bacteria.

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

**[Total: 9]**

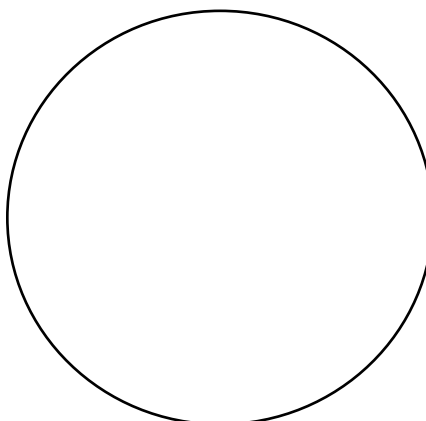
- 5 Fig. 5.1 shows a cross section of a stem of buttercup, *Ranunculus*, containing a single vascular bundle.

Fig. 5.2 is an outline drawing of one vascular bundle from the stem of *Ranunculus*.



**Fig. 5.1**

[adapted from Herve Conge Science Photo Library]



**Fig. 5.2**

- (a) Draw **and** label the positions of the xylem and the phloem in the outline of the vascular bundle in Fig. 5.2. [2]

- (b) State the carbohydrate that is transported in the phloem.

.....[1]

- (c) Certain species of the buttercup can grow to great heights of more than 2 metres.

Outline briefly how water is moved to the top of tall plants.

.....

.....

.....

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.....[2]

- (d) (i) The sap, seeds, and leaves of buttercup are considered toxic to humans upon contact. Most victims do recover within 24 hours, after accidental consumption of the buttercup.

State the organ in the human body which breaks down the toxins in the buttercup.

.....[1]

- (ii) An example of a toxin that the human body breaks down is alcohol.

Describe how alcohol is being broken down in the human body.

.....

.....[1]

- (iii) Describe **one** short-term and **one** long-term effects of excessive alcohol consumption.

.....

.....

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.....[2]

[Total: 9]

END OF SECTION A

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