

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2014
Secondary Three

BIOLOGY

Paper 2

Theory Paper

Tuesday

30 September 2014

Additional materials: Writing papers

1 hour 45 minutes

0915 – 1100

READ THESE INSTRUCTIONS FIRST

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

Write your name, register number and class in the spaces at the top of this page and on any separate answer paper used.

Section A (40 marks)

Answer **all** questions.

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

Section B (30 marks)

Answer **all** questions including questions 7, 8 and 9 *Either* or 9 *Or*.

Write your answers on the separate writing paper provided.

At the end of the examination,

1. fasten all your work securely together;
2. tick 9 *Either* (for *Either*) or 9 *Or* (for *Or*) in the grid below to indicate which question you have answered.

INFORMATION FOR CANDIDATES

The intended number of marks is given in the brackets [] at the end of each question or part question. You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

Examiner's Use	
Section A	
Section B	
7	
8	
9 <i>Either</i>	
9 <i>Or</i>	
Total	

This document consists of 13 printed pages.

Setters: MG, JL, OC

NANYANG GIRLS' HIGH SCHOOL

[Turn over

Section A

Answer **all** questions.

Write your answers in the spaces provided.

- A1** A student was asked to make a model of a plant cell. She took a length of tubing made from a substance that allows only water molecules to pass through and enclosed it in a flexible permeable membrane as shown in **Figure 1.1**.

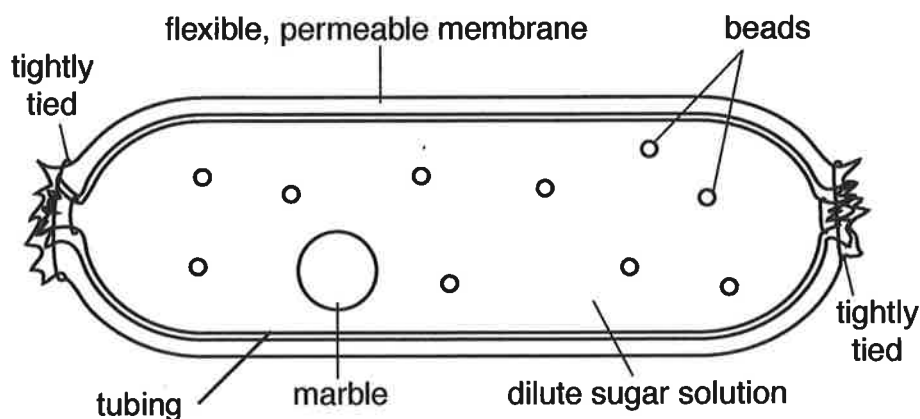


Figure 1.1

- (a) Name the structures found in a plant mesophyll cell that are best represented by the following items used in her model: [3]

the marble _____

the beads _____

the tubing _____

- (b) State **two** structures found in a plant cell that are **not** represented in the student's model. [2]

- (c) The student then placed her model into a concentrated sugar solution for half an hour. Explain in detail, all the changes that will occur to the model plant cell. [4]

- (d) Based on what is observed in (c), compare and contrast the changes observed if a real plant cell was placed in the same concentrated sugar solution. [2]

Total [11]

- A2 (a)** Figure 2.1 shows the results of an experiment in which samples containing the same concentration of enzyme and substrate were kept at different temperatures for periods of one, two and five hours. The quantities of product formed were then determined.

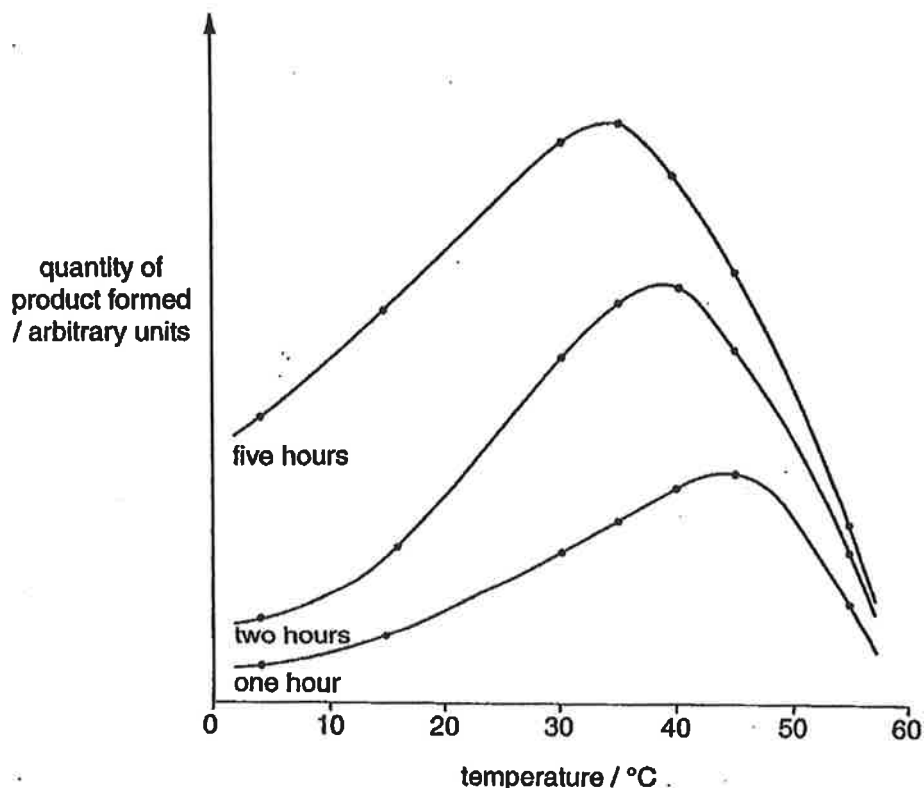


Figure 2.1

Explain the effect of increasing temperature on the quantity of product formed for the samples kept at different temperatures for one hour. [3]

- (b)** Suggest why the optimum temperature is lower if the quantity of product formed is measured after five hours instead of one hour. [1]

Figure 2.2 shows the effect of increasing substrate concentrations on the initial rate of an enzyme-catalysed reaction. All other variables were controlled.

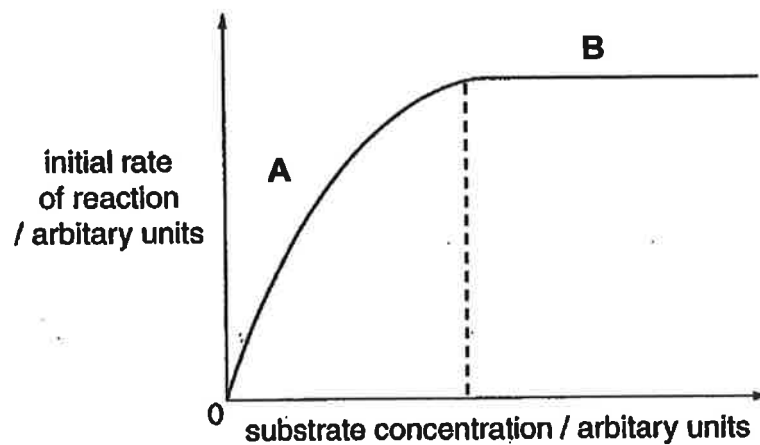


Figure 2.2

- (c) Explain why an increase in substrate concentration at section A increases the initial rate of reaction but an increase at section B does not do so. [2]

- (d) State the change in condition that would cause an increase in the initial rate of reaction at high substrate concentrations. [1]

Total [7]

- A3** In an experiment to investigate starch production by a plant, three similar plants, each with variegated (green and white) leaves were set up as shown in **Figure 3.1**.

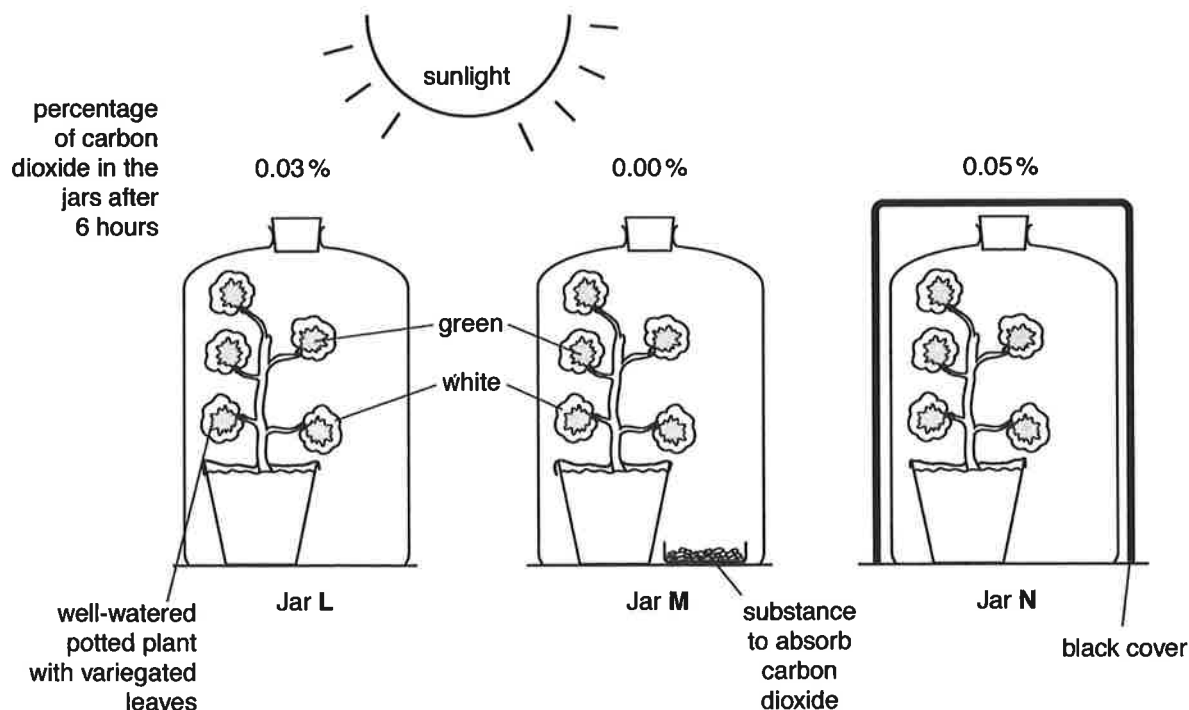


Figure 3.1

- (a) At the end of the experiment, a leaf was taken from each plant and tested for the presence of starch. On the outlines in **Figure 3.2**, clearly label the colours (brown or blue-black) of each leaf after the starch test. Do not colour in the leaves. [1]

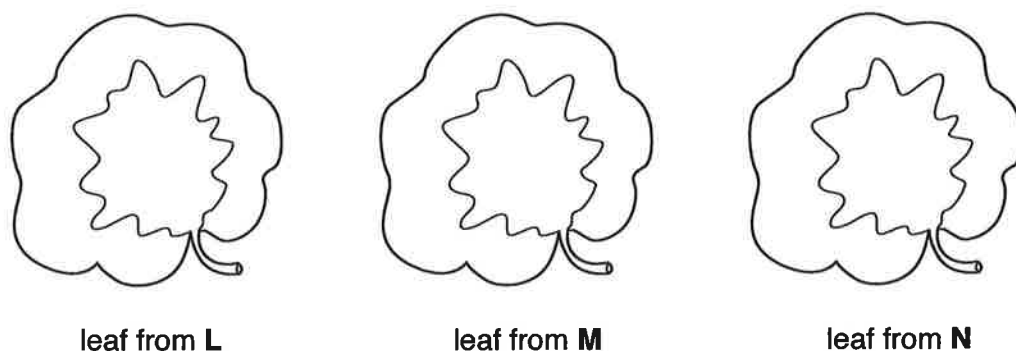


Figure 3.2

- (b) When the air was first trapped under the jars, it contained 0.04% carbon dioxide. For each of the jars, explain why this percentage has changed by the end of the experiment.

L: _____ [2]

M: _____ [2]

N: _____ [2]

Total [7]

A4 Fatty liver, or steatosis, is a broad term that describes the buildup of fats in the liver. Having fat in your liver is normal, but if more than 5 to 10 percent is fat, then it is called fatty liver disease.

Fatty liver is a reversible condition and usually goes away on its own. Fatty liver often has no symptoms and does not cause any permanent damage. [line 5]

The liver is the second largest organ in the body. The liver's function is to process everything we eat or drink and filter any harmful substances from the blood. If too much fat has accumulated in the liver then this process is interfered with. The liver commonly repairs itself by rebuilding new liver cells when the old ones are damaged. When there is repeated damage to the liver, permanent [line10] scarring takes place. This is called cirrhosis.

Fatty liver is quite common. 10 to 20 percent of Americans have too much fat in their liver, but no inflammation or damage is present. Most cases of fatty liver are detected between ages 50 and 60. When fatty liver is caused by an underlying condition, it can become harmful to the liver if the cause is not [line15] recognized and treated.

(Article adapted from <http://www.healthline.com/health/fatty-liver#Overview1>)

(a) In line 8, the article mentioned that "this process is interfered with". Describe how some of the processes which the liver is involved in will be affected. [4]

(b) Suggest how this fatty liver condition occurred. [1]

Total [5]

A5 Figure 5.1 shows the cardiac cycle.

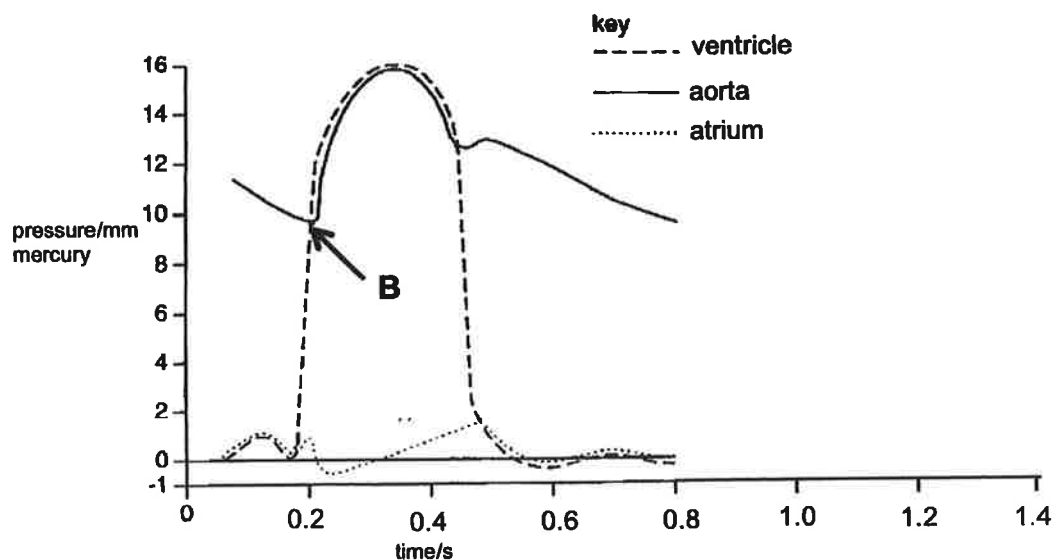


Figure 5.1

- (a) State what has happened at point B. [1]

- (b) (i) Sketch, until 1.4s, an extension in blue pen (on Figure 5.1) of the ventricular pressure graph to show what would happen if the bicuspid valve failed to close. [1]
- (ii) Explain your sketch in (b)(i). [2]

Total [4]

A6 **Figure 6.1** shows the human respiratory system.

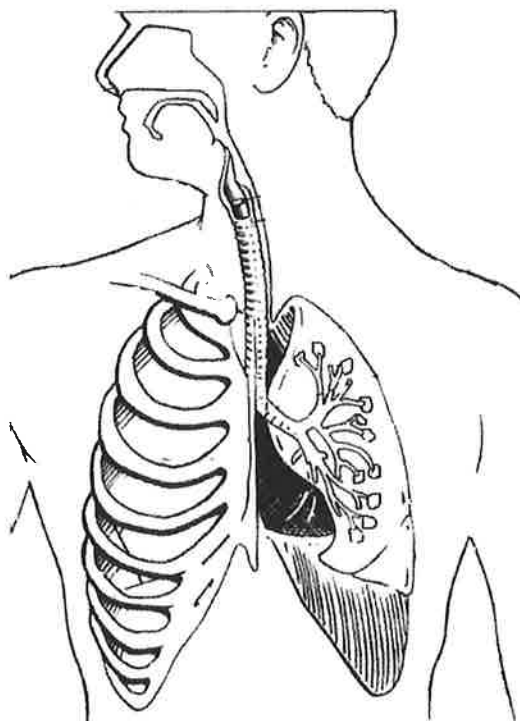


Figure 6.1

- (a) (i) **Label** on **Figure 6.1** the part of the respiratory system that would be harmed by a **named** chemical found in cigarette smoke. [2]
- (ii) State the harmful effect caused by the chemical in (a) (i). [1]

- (b) Design an experiment to test the expected effects of the harmful chemical stated in (a). [1]

- (c) Evaluate and explain whether the suggested method in (b) is ethical or not. [2]

Total [6]

Section B

Answer all **three** questions from this section.

The last question is in the form of either/or and only **one** of the alternatives should be attempted.

Each question carries **ten** marks.

- B7** Figure 7.1 shows part of a summer squash, *C. pepo*. Figure 7.2 is a high power drawing of an area of phloem from a transverse section of the stem of *C. pepo*.

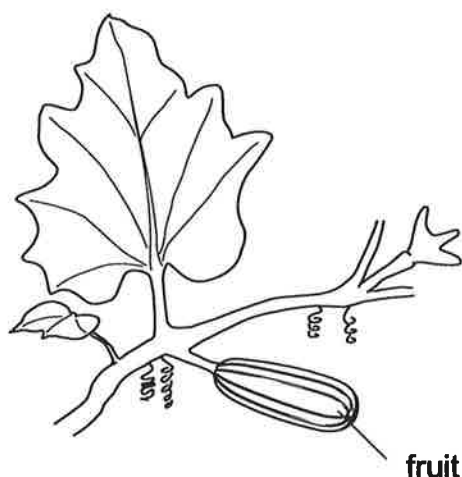


Figure 7.1

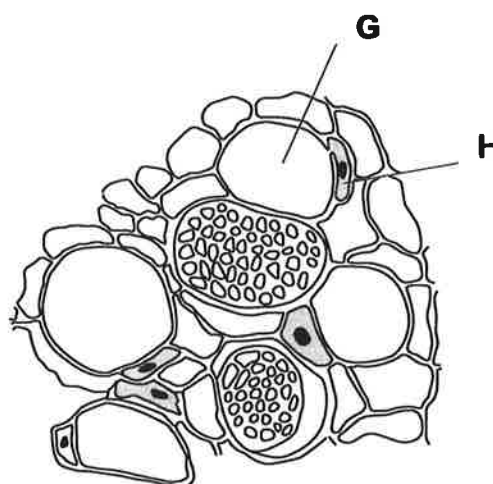


Figure 7.2

- (a) Name structures **G** and **H**. [1]
- (b) Describe three ways in which the structure of a xylem vessel differs from the structure of cell **G**. [3]
- (c) The liquid extracted from the phloem of *C. pepo* contains sucrose. Explain how sucrose is transported in the phloem along the stem from the leaf to the fruit. [4]
- (d) Most of the sucrose transported in the phloem enters the fruit. Explain why summer squash fruits are not sweet. [2]
- B8** (a) Explain why glycogen is suited to perform its role as a storage molecule. [3]
- (b) Describe how the inner wall of the small intestine of humans is adapted to its function of absorbing digested food substances. [5]
- (c) Suggest why villi are present in the small intestine but not in the stomach. [2]

- B9** (a) State two differences between blood in the pulmonary artery and the hepatic artery. [2]
Either
- (b) Table 9.1 shows Amy's recent blood test results. [8]

Blood component	Amy's cell count /L	Normal range /L
red blood cells	2.9×10^{12}	$4.0 - 5.2 \times 10^{12}$
white blood cells	3.6×10^9	$4.0 - 10.0 \times 10^9$
platelets	77×10^9	$130 - 400 \times 10^9$

Table 9.1

Amy went hiking and fell down because she felt faint. She scraped her leg and it would not stop bleeding. After a few days, she noticed that her wound had become badly infected.

With reference to Table 9.1, explain what happened to Amy.

- B9** (a) State two differences between the right ventricle and the left ventricle. [2]
Or
- (b) Table 9.2 shows the profiles of four people.

Name	Weight	Perceived amount of stress	Smoker/ non-smoker	Exercise/ times per week (each 0.5 hours)	Family history of heart disease
Ang	Underweight	High	Non-Smoker	0	Yes
Bok	Normal	Medium	Smoker	1	No
Chew	Overweight	Low	Smoker	3	Yes
Ding	Overweight	Medium	Non-smoker	4	No

Table 9.2

- (i) State which of these four people is at highest risk of getting heart disease. Explain your answer. [2]
- (ii) State one other factor, not shown in Table 9.2, which could also contribute towards risk of heart disease. [1]

- (c) **Figure 9.3** shows a patient's heart with blockages at points **A**, **B** and **C**. Describe how this patient can be treated.

[5]

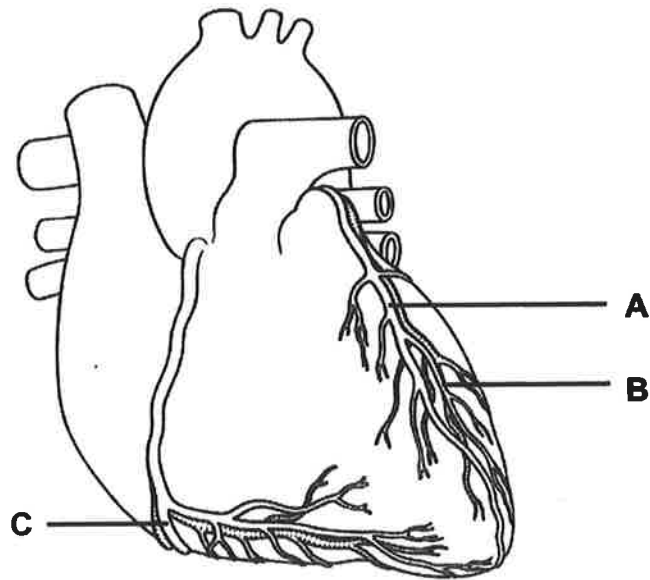


Figure 9.3

End of paper

