Class	Register Number	Name

南洋女子中学校

NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2013
Secondary Three

BIOLOGY

Paper 2 **Theory Paper** **1 hour 45 minutes**
Tuesday **8 October 2013** **0915 - 1100**
Additional materials: Writing papers

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 **B1, B2** and **B3** ***Either*** or **B3** ***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 **B3** ***Either*** (for *Either*) or **B3** ***Or*** (for *Or*) next to the question number **B3** 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	
B1	
B2	
B3 ***Either***	
B3 ***Or***	
Total	

Section A

Answer **all** questions.

Write your answers in the spaces provided.

A1 **Fig. A1** shows the diagram of an organism.

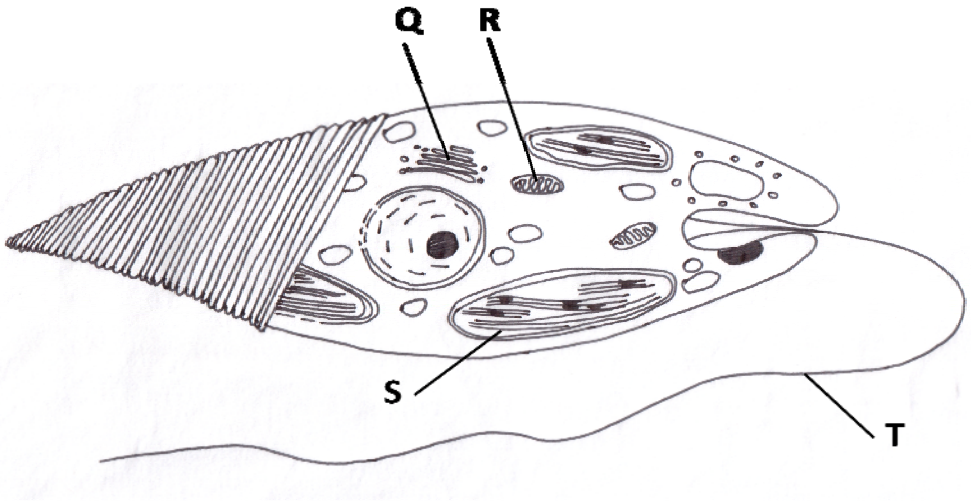


Fig. A1

(a) "This organism displays both plant-like and animal-like properties." [1]
Which of the labeled structures support this statement?

Plant-like:..... **Animal-like:**.....

(b) Suggest how the presence of the animal-like structure in **(a)** helps to increase its ability to survive. [1]

.....

.....

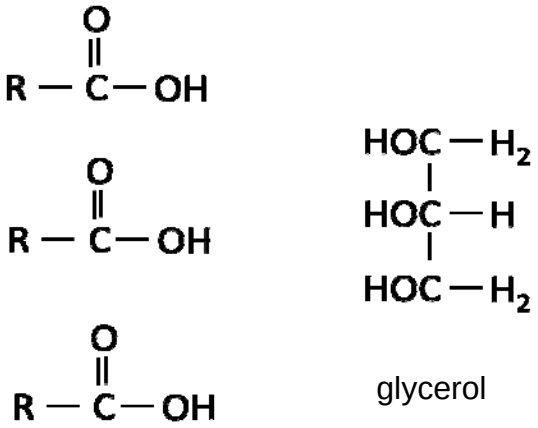
(c) In the absence of light, the organism in **Fig. A1** may feed by taking in foreign particles through phagocytosis.

Draw a diagram to explain the process of phagocytosis of the foreign particles. [2]

(d) Suggest the fate of the foreign particles after phagocytosis, using information from **Fig. A1**. [1]

Total [5]

A2 **Fig. A2** below shows the substrates of a condensation reaction to form a triglyceride.



3 fatty acids

glycerol

Fig. A2

(a) In the space below, draw the final products of such a condensation reaction. [2]

(b) In your drawing in **(a)**, circle and name the bond formed from the condensation reaction. [1]

(c) You are provided with two solutions containing different concentrations of fructose (Solution **A** and Solution **B**), and one solution of known concentration (Solution **C**). [4]

Describe how you would carry out an experiment to determine the concentrations of fructose in Solutions **A** and **B**.

Total [7]

A3 **Fig. A3** shows the activity of a commercial protease enzyme Alcalase at different pH values, at 35 °C.

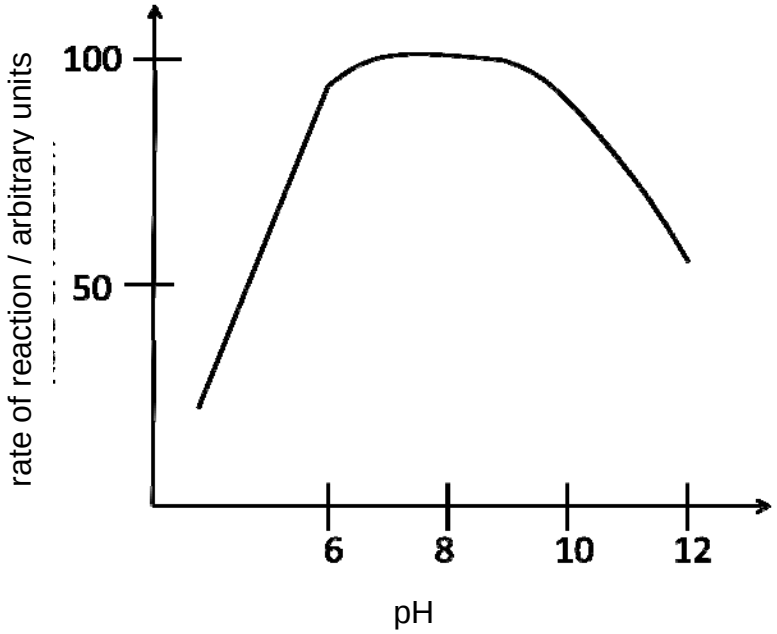


Fig. A3

(a)(i) Draw on **Fig. A3**, the pH curve of pepsin, a digestive enzyme found in the human stomach. [1]

(a)(ii) How does this curve compare to the pH curve of pepsin, a digestive enzyme found in the human stomach? [1]

(b) What change in conditions would allow for an increase in the rate of reaction at pH 7? [1]

Total [3]

A4 **Fig. A4** shows an electron micrograph of a chloroplast in a section of plant cell.

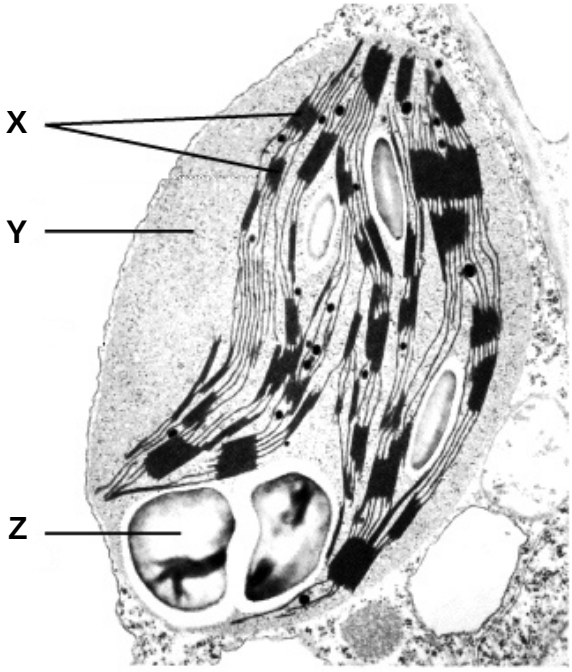


Fig. A4
(Source from http://bioweb.wku.edu/courses/biol22000/11Organelles/Fig.html)

(a) Identify structure **X** and structure **Y** in the chloroplast. [1]

Structure **X** = _____ Structure **Y** = _____

(b) Identify structure **Z** that is only found in the chloroplast in the daytime. [1]

Structure **Z** = _____

(c) When chlorophyll in an intact chloroplast gets excited with light, an electron is released and is passed along the inner membrane and the chlorophyll does not glow. [3]
Suggest a reason why in the laboratory, a chlorophyll solution that is isolated from the chloroplast will fluoresce with a red-orange glow when excited with light.

Total [5]

A5 **Fig. A5** shows a cross section of a dicotyledonous stem.

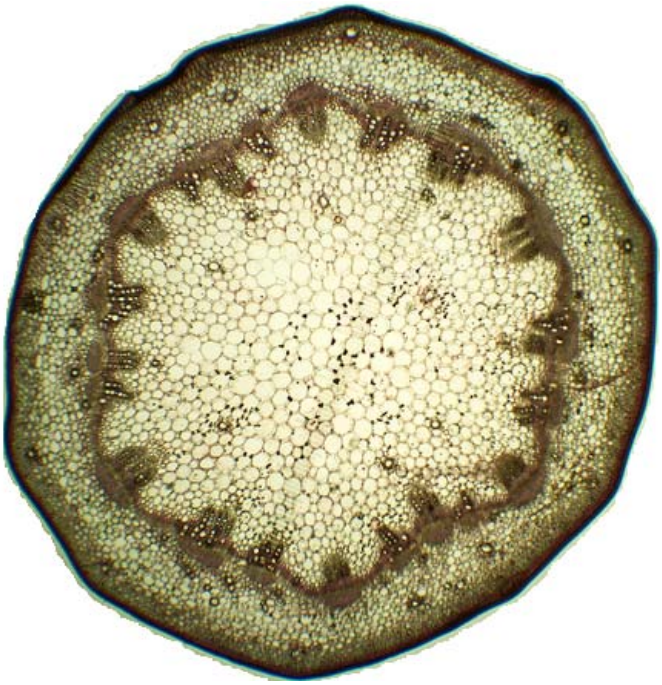


Fig. A5
(Source from flickr photo - Dicot stem by Shihchuan)

(a) Mark and label on **Fig. A5** the tissue that transports water. [1]

(b) A common stem parasite is the mistletoe plant. After the black bird *Phainopepla nitens* eats the berries of the desert mistletoe *Phoradendron californicum*, the seeds will be dispersed in the bird droppings on a new stem.

(i) Mark and label on **Fig. A5** the tissue where the seed will be getting its food. [1]

(ii) Suggest how the seed can steal all of its food from the stem. [2]

Total [4]

A6 **Fig. A6** shows the blood glucose level of a person over a period of time A – D.

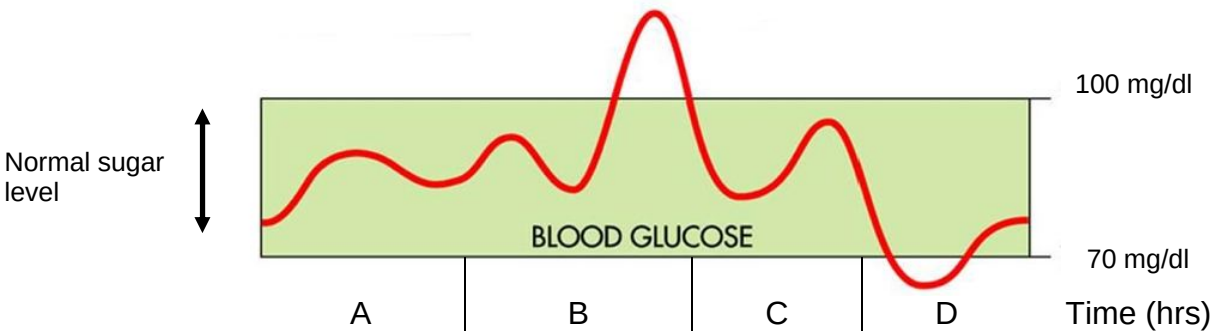


Fig. A6

(a) State the time(s) insulin is probably released into the body. Give an explanation for your answer. [2]

(b) Give an explanation for what happens at time D. [2]

Total [4]

A7 **(a)** Explain how clotting occurs. [3]

(b) How is the body able to prevent clotting from occurring within the vessels? [2]

(c) Predict the tendency of clot formation to be increased or decreased if fat is being deposited inside the vessel wall. Explain your answer. [1]

Total [6]

A8 **(a)** The human body is described as having double circulation. Describe what double circulation means. [1]

(b) The human circulatory system is also described as a closed system. Explain what closed system is. [1]

(c) Most arthropods like insects, spiders and crabs, have an open circulatory system. How is this open circulatory system different from a closed circulatory system? [1]

(d) Under what circumstances would a circulatory system **not** be needed? Explain your answer with reference to a jellyfish. [1]

Total [4]

A9 **Fig. A9** shows the human respiratory system.

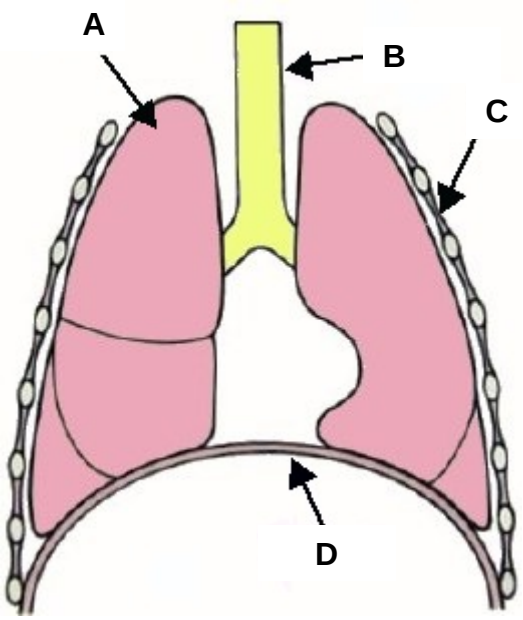


Fig. A9
(Source from http://www.sciencequiz.net/jcscience/jcbiology/respirsystem.jpg)

(a) Identify **two** structures in **Fig. A9** that are involved in inspiration. [1]

_____

(b) Pneumothorax may occur following an injury to the chest wall such as a fractured rib puncturing the chest. [1]
Suggest what happens during inspiration for a man with pneumothorax.

.....

.....

.....

Total [2]

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.

B1 The table below shows the progress of protein, carbohydrates and fats digestion in the human alimentary canal. Sections **O** to **T** represent different parts of the alimentary canal.

Section of the human alimentary canal	**Percentage of completed digestion / %**		
	Protein	Carbohydrates	Fats
O	0	0	0
P	0	15	0
Q	0	25	0
R	30	25	0
S	70	80	43
T	99	98	97

(a) Explain the results illustrated in the table above for protein digestion. [3]

(b) A person with pancreatic failure drinks a glass of milk as advised by his doctor. How will his digestion be different from the table above? Give an explanation for your answer. [7]

Total [10]

B2 **Fig. B2** shows a baby's heart born with structural defects.

(a) Identify the defects and explain each defect. [8]

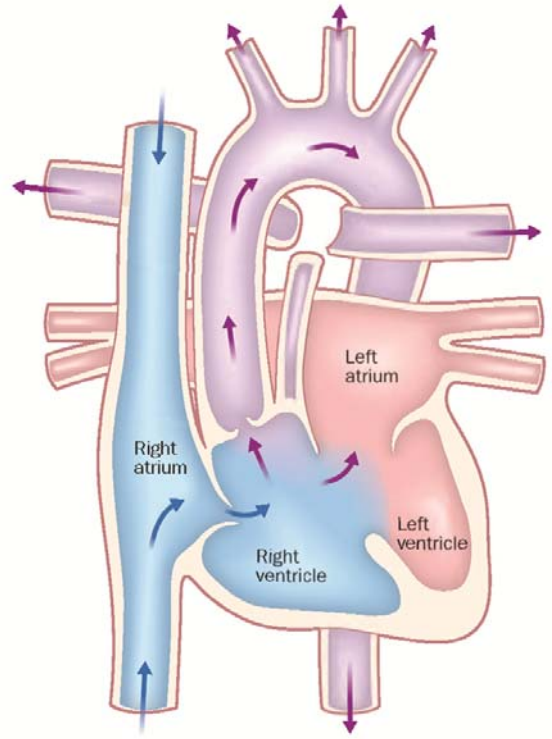


Fig. B2

(b) The baby requires a heart transplant. [2]
Suggest two ways to reduce or prevent rejection of the donor's heart.

Total [10]

B3 Either

(a) State **two** features which enable the alveolus to function efficiently. [2]

(b) While in a crowded room, Sandy's breathing rate increased. [2]
Explain why there is an increased in breathing rate.

(c) Studies have shown that N95 masks do provide good protection against the haze. Haze particles are predominantly made up of fine particles that are 2.5 microns or smaller (PM2.5).

(i) Suggest **two** reasons why N95 masks do provide good protection. [2]

(ii) Evaluate how these fine particles in haze may affect the respiratory system. [4]

Total [10]

B3 Or

(a) Some prokaryotes extract chemical energy by anaerobic respiration in which substances other than oxygen are used.

(i) Define anaerobic respiration in the prokaryotes. [1]

(ii) State the word equation for anaerobic respiration in prokaryotes. [1]

(b) In a 400 metre race, muscular contractions are so vigorous that maximum aerobic respiration is unable to release energy fast enough to meet the demand. [2]
What must happen in order to meet the energy demand?

(c) Cystic fibrosis is an inherited chronic disease that affects the lungs. The disease causes the body to produce unusually thick, sticky mucus that clogs the lungs and leads to life-threatening lung infections.

(i) Kalydeco™ is a pill that allows salt and fluid to move into the air passages to thin the mucus so that it is easier to cough out. [3]
Suggest why unclogging the air passages in the lungs helps to reduce the chance of infection.

(ii) Antibiotics are an important part of regular care for lung infections. [3]
Suggest **three** reasons why one of the following forms of antibiotics may be more suitable to treat lung infections: oral, intravenous or inhaled.

Total [10]

End of paper