

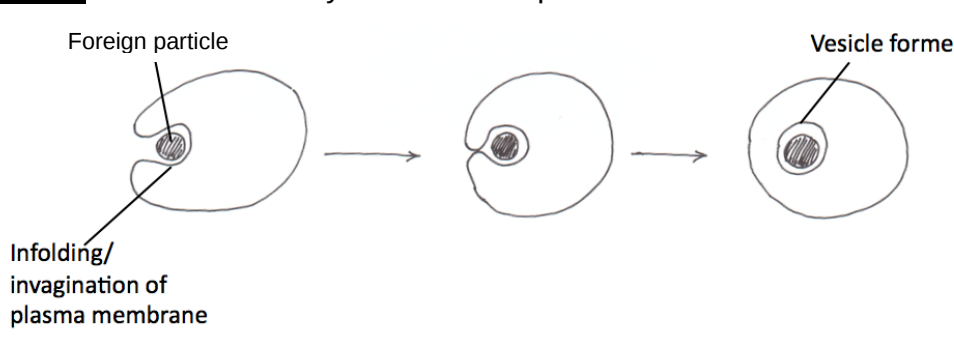
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2013
Secondary Three

BIOLOGY

Paper 1

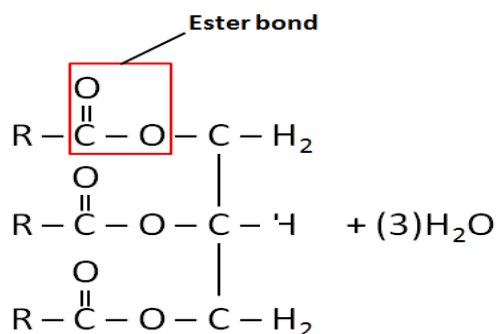
1	B	7	A	13	C	19	C	25	C
2	D	8	C	14	B	20	D	26	B
3	B	9	C	15	B	21	A	27	C
4	B	10	D	16	C	22	C	28	C
5	A	11	A	17	C	23	D	29	D
6	D	12	B	18	B	24	B	30	A

Paper 2 - Section A

Qn	Answers	Marks
A1a	Plant: S / chloroplast , Animal: T / flagellum/tail;	1
A1b	Allows organism to move towards an area where sunlight is available/ escape from predators/ move away from undesirable conditions/ search for nutrients/food; <u>Allow:</u> ECF from (a) <u>Reject:</u> increases mobility – does not explain how it increases survival.	1
A1c	 1m – drawing of infolding/ invagination + explanation/labeling; 1m – drawing of vesicle formed;	2
A1d	Foreign particles would combine with vesicles released from structure Q/ GA; Foreign particles will (combine and) be digested by (enzymes in) lysosomes; Foreign particles will be (digested and) sent to Q/R; Foreign particles will be digested <u>by enzymes</u> ;	1

A2a

2



A2b

1

Ester bond + circle $\begin{array}{c} \text{O} \\ || \\ \text{C} - \text{O} \end{array}$ (see A2a);

A2c

4

Allow: ECF from A2a, circles COO- for ester bond

Benedict's solution can be used;

since fructose is a reducing sugar;

Take Solution C and make a series of dilutions of known concentrations;

Carry out Benedict's test for each known concentration + record colour/amount of precipitate;

Carry out Benedict's test for Solutions A and B + observe colour /amount of precipitate OR compare colour/amount of precipitate to Solution C;

Max 3marks if student only describes comparison of Solution A and B against colour and amount of precipitate of Solution C:

- Benedict's solution can be used;
- since fructose is a reducing sugar;
- Carry out Benedict's test for Solutions A, B and C + observe colour /amount of precipitate OR compare colour/amount of precipitate to Solution C;

Max 1mark if student uses potato strip experiment as potato strips have a certain amount of fructose concentration which is unknown and will affect the accuracy of the results. Also, length/mass of potato strip may be the same after immersion in all 3 solutions and experiment will be inconclusive.

Reject:

- compare time taken to form brick-red precipitate (concentration not determined by time taken, but by colour and amt of precipitate formed)
- darker colour/ lighter colour of precipitate formed
- experiments involving Visking Tubings
(Concept error as fructose is a monosaccharide, unlike sucrose which is a disaccharide. Fructose will diffuse in/out of V.T. freely and there will be no change in turgidity of V.T.)

A3ai Draw narrow curve, pH range between 1- 6, optimum pH 2 must be labeled. 1
(note: actual pH range is from 1-3)

A3aii Increase in rate of reaction less steep than pepsin; 1
Enzyme active over a wider range of pH values than pepsin;
Optimum enzyme activity over a range of 3 pH units, larger than pepsin that is only 1 pH unit;
Alcalase works best in alkaline conditions/ pH 6-8 while pepsin works best in acidic conditions/ pH 2;

Any 1 point

A3b Addition of more enzymes/ substrates/increase in temperature. 1

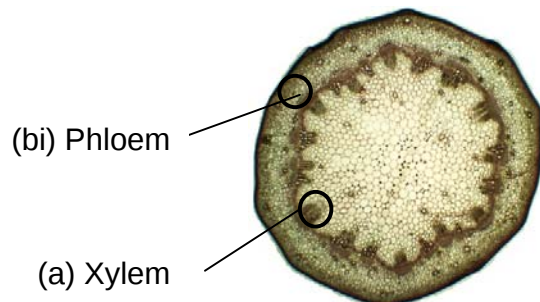
Reject: change temp to optimum/ increase or decrease temp to optimum

A4a Must label both correctly for 1m X = Granum / thylakoid Y = Stroma; 1

A4b Z = Starch grain; **Reject:** vacuole (Q asked for ONLY found in chloroplast in day time) 1

A4c There is no membrane in the isolated state,; 3
There is no capturing of electrons released;
Electrons caused the glow;
Reject: Electrons not released (False as chlorophyll is still excited with light)

A5a 1
bi 1



A5bii Seed develops root-like structure / root to penetrate the stem; 2
Accept: Seed germinated / seed grow
To reach sucrose / amino acids (located in the phloem);
Accept: To reach food in the phloem
Accept: ECF from Q(b)(i)

A6a Insulin is released at **B** ; 1

When blood glucose goes higher than normal, body will release insulin to let liver cells absorb more glucose. (1m) 1

A6b At time D, the person may be fasting / exercising vigorously and this leads to a drop in the blood glucose level below the normal range; 1

When blood glucose level drops below normal, pancreas will release glucagon. Glucagon promotes conversion of glycogen to glucose, bring the level back to the norm ; 1

A7a	When blood vessels are damaged, damaged tissues and blood platelets release thrombokinase. Thrombokinase converts prothrombin into thrombin (calcium ions must be present for this to occur); Thrombin catalyses the conversion of fibrinogen to insoluble threads of fibrin; Fibrin threads entangle blood cells and the whole mass forms a clot. The clot seals the wound, preventing entry of microorganisms;	3
A7b	The inner lining of blood vessels is extremely smooth, thus prevents the adhesion of platelets; Heparin, an anti-clotting substance, is present in blood;	1 1
A7c	The chance of a clot (thrombus) forming is increased when fat is deposited inside the vessel walls; This roughens the inner lining, causing platelets to adhere, disintegrate and initiate the clotting mechanism Accept: lining becomes rough [no mark given if no explanation is given]	1
A8a	Blood passes through the heart twice as it moves from the pulmonary circulation and into the systemic circulation; Accept: Blood flows through the heart twice in one (complete) circuit	1
A8b	Closed circulatory systems have the blood closed at all times within vessels of different size and wall thickness;	1
A8c	In an open circulatory system, blood is pumped from the heart through blood vessels but then it leaves the blood vessels [1 mark] and enters body cavities, where the organs are bathed in blood, or sinuses (spaces) within the organs; Blood flows slowly in an open circulatory system because there is no blood pressure after the blood leaves the blood vessels [1 mark]; [max 1 mark]	1
A8d	Jellyfish do not have a circulatory system because it has no heart and blood; Jellyfish is in contact with water and absorb oxygen through diffusion; [max 1 mark]	1
A9a	Must state both structures C & D; Reject: Lung which is A	1
A9b	<i>No need to explain as Q is on "Suggest what happens"</i> Lungs remain deflated / lungs collapse / lungs will not inflate; (during inspiration when the diaphragm is pulled down, air now enter through the open wound into the space between the lungs and ribcage) Accept: Intercostal muscles injured so difficulty in breathing Reject: Fractured rib "prevent" chest from expanding (cos diaphragm still able to contract) Reject: Lung punctured (Q: only chest punctured)	1

Paper 2 - Section B

Qn	Answers	Marks
B1a	At O to Q there was no digestion of proteins in the buccal cavity and oesophagus. Section R is the stomach where pepsin digests some of the proteins. Section S and T represents the duodenum and ileum where enzymes from the pancreas and intestinal glands convert it into amino acids. Digestion is completed at Section T.	3
B1b	Milk contains proteins, fats and milk sugar lactose(carbohydrate). When milk passes through section O – Q, nothing will be digested as milk do not contain starch. When milk passes through section R, some proteins will be digested by pepsin secreted from the stomach. The fats and milk sugar remain undigested.	3
	The pancreas secretes enzymes to digestion of proteins, carbohydrates and fatty acids and releases the enzymes into the duodenum. A person with pancreatic failure will not be able to release these enzymes.	2
	At sections S and T, there will be incomplete digestion of protein, carbohydrates and fats as there are less enzymes acting on them at the same given time.	2
B2a	One – The pulmonary artery connecting the heart and lungs was not developed (pulmonary atresia.); this makes it impossible for the heart to pump blood into the lungs to pick up oxygen; Two – Wrong aorta connection; the aorta, which supplies oxygen-rich blood to the body, was connected to the right ventricle containing deoxygenated blood. It should be connected to the left ventricle instead; Three - Disconnected branches of the pulmonary artery; the left and right branches of the pulmonary artery were not joined to each other, so deoxygenated blood could not flow through them; Four - Ventricular septal defect; there was a large hole in the wall separating the lower chambers of the heart, or ventricles. As a result, oxygenated and deoxygenated blood were mixed within the heart; Five – Lack of/ incomplete formation of bicuspid and tricuspid valves. Resulting in loss of blood pressure or mixing of oxygenated and deoxygenated blood. <u>Reject:</u> chordae tendinae absent or size of chamber as it is a baby's heart.	8
B2b	Perform a tissue match to ensure that the tissues of both the donor and recipient are as genetically close as possible; Use of immunosuppressive drugs, which inhibit the responses of the recipient's immune system;	2

B3E

- a** *Must state how each feature enable the ONE alveolus to function efficiently in order to be awarded 1m else max 1m out of 2m for just stating two features without referring to the function.* 2
- The wall of the alveolus is only one cell thick + to provide a short diffusion distance for oxygen into blood;
The wall of the alveolus is richly supplied with blood capillaries + to maintain the concentration gradient for faster diffusion of oxygen into blood;
A thin film of moisture covers the surface of the alveolus + to allow oxygen to dissolve in it;
Alveolus has a large surface area to volume ratio / is highly folded + for rapid rate of gaseous exchange;
[max 2 marks]
Reject: A cluster of alveoli to increase surface area to volume ratio as Q is on one alveolus only.
- b** The stimulus for breathing is a high concentration of carbon dioxide; 2
Hence the breathing rate increased due to the higher concentration of carbon dioxide in the crowded room exhaled from the people in the room;
Reject: lack of oxygen in the room caused increase in breathing rate (False)
- ci** N95 masks can filter particles even smaller than haze particles; 2
N95 masks are cup shaped / tightly strapped / designed to seal to the face of the wearer. This way, most of the air that the wearer breathes in has to go through the filter and not through the gaps between the mask and the wearer's face;
- cii** Fine particles may be irritants; hence paralyse cilia lining the air passages; 4
So fine particles trapped in the mucus lining the air passages cannot be removed / coughing hard cannot remove the trapped fine particles;
Increased in the risks of chronic bronchitis; and emphysema;
Accept:
Fine particles may cause excessive secretion of mucus / increased production of phlegm; so reduces air flow in air passages so breathing may become difficult;
Fine particles may be carcinogenic; so may cause lung cancer;
Fine particles may trigger the air passages to constrict; so cutting off air flow to certain parts of the lungs;
Fine particles may cause an allergic reaction; hence trigger an asthma attack;
May cause infection / viral infection / bacterial infection / heart disease;
[max 4 marks]
Reject: Fine particles diffuse "through" wall of alveolus to enter blood capillary (False)

B3Or

- ai** Anaerobic respiration is the release of a relatively small amount of energy by the breakdown of food substances in the absence of oxygen / low amounts of oxygen; 1
- aii** Glucose → Alcohol + Carbon dioxide + (Small amount of) Energy; 1
Reject: Lactic acid (for man)
Reject: If not “word” equation as asked in Q
- b** In order to meet the energy demand, both aerobic respiration and anaerobic respiration must take place instead of just aerobic respiration; 2
The anaerobic respiration will yield additional two ATP / additional small amount of ATP to meet the energy demand;
- ci** **Reject:** Merely repeating the Q using words like “unclog”, “cough”, “infection” 3
(Unclogging the air passage by coughing helps to reduce the chance of infection as)
The lining of the air passage may be damaged (by coughing action);
The chance of getting (chronic) bronchitis will increase (by coughing action);
The chance of getting emphysema will increase (by coughing action);
Accept:
The mucus may trap bacteria (that cause infection);
The mucus may trap irritants; that paralyse cilia; (so dust particles cannot be removed increasing the risk of infection)
Unclogging the air passage helps to reduce shortness of breath / wheezing;
[max 3 marks]
- cii** Inhaled antibiotics is more suitable as it reach air passages directly / quickly / easily; (The medicines go into a cup / nebulizer that is attached to a small air compressor. The compressor blows air through the cup and makes a mist.) 3
Oral form of antibiotics may not be fully absorbed hence not all can reach the lungs;
Intravenous form of antibiotics takes some time before it can reach the lungs via the blood;
Accept:
ECF if intravenous form of antibiotics was wrongly chosen as more suitable. E.g. Inhaled form of antibiotics may not reach the lungs as the infection at the air passages block the antibiotics.