



南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2018
Secondary Three
IP BIOLOGY

Answers with Explanation and Feedback

PAPER 1 [30 Marks]

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

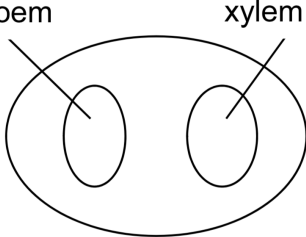
PAPER 2 / SECTION A [30 Marks]

Q 1	Answer	Guidance
(a)	C red blood cell (reject: red blood cells) D fibrin (thread / fibre) (accept: plural)	
(b)	Damaged tissue and platelets release (reject: form) thrombokinase. In presence of <u>calcium ions</u> (reject: calcium), thrombokinase <u>activates</u> prothrombin into thrombin. Thrombin converts soluble fibrinogen into insoluble fibrin which <u>trap/entangle</u> red blood cells.	
(c)	Blood carrying glucose and oxygen will not be transported to heart cells / <u>tissues</u> for respiration. Heart muscles cannot <u>contract / die / damaged</u> , and heart stops <u>pumping / heart attack</u> results.	
		[Total: 7]
Q 2	Answer	Guidance
(a)	lactose $\xrightarrow{\text{lactase}}$ glucose + galactose	
(b) (i)	W untreated milk X milk treated with lactase immediately before drinking Y milk treated with lactase two days before drinking Z yoghurt made by bacteria that hydrolysed the lactose in the milk	
(b) (ii)	<i>Patients could suffer from:</i> dehydration / loss of water (molecules)/ lack of water absorbed loss / poor absorption of nutrients / nutrients not absorbed/ be malnutrition.	
(b) (iii)	<u>Concentration</u> of hydrogen gas in the exhaled air present is the lowest / least with exhaled air [1] between 9 to 15 ($\pm$ 1) ppm / not higher than 15 ($\pm$ 1) ppm. [quote data [1]] <u>Concentration</u> of hydrogen gas in the exhaled air presence has small fluctuations / <u>changes over 5 hours</u> .	

(c)	Villus has <u>one-cell thick epithelium</u>/ walls of villus is <u>one-cell thick to reduce distance</u> for diffusion / active transport of nutrients / digested food / named. Villus has <u>microvilli</u> to increase surface area to volume ratio for faster diffusion / active transport. Villus has dense / rich network of blood <u>capillaries</u> to <u>transport</u> (dissolved) nutrients / digested food / named quickly from the digestive system.	
		[Total: 8]

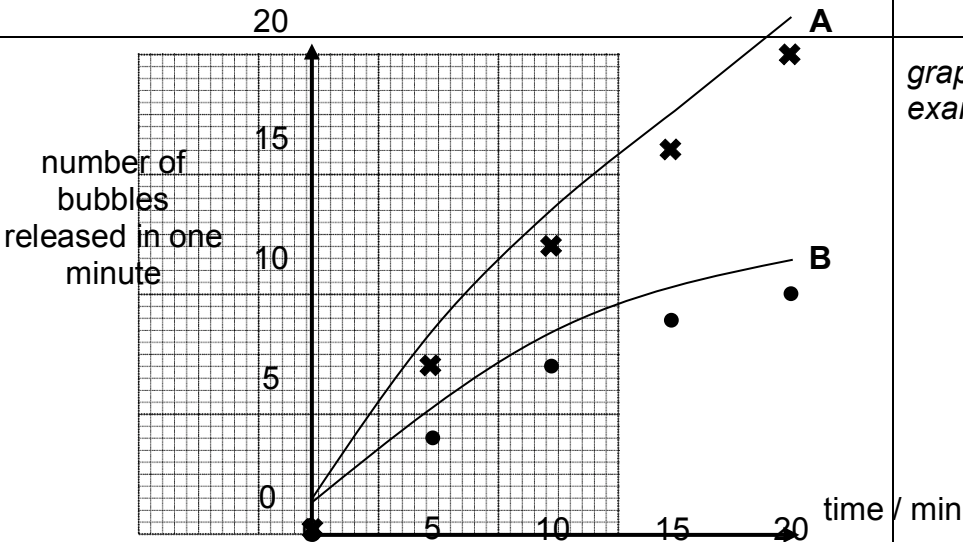
Q 3	Answer	Guidance
(a)	Golgi apparatus has flattened sacs with layered appearance / no connection between <u>membranes</u>. Golgi apparatus is not connected / contiguous / connected with (outer membrane) of <u>nuclear envelope</u>. Golgi apparatus has swellings / vesicle formation at <u>ends</u> of sacs. No ribosomes are <u>attached</u> to the Golgi apparatus.	
(b)	More <u>cholesterol</u> among the phospholipid layer. Higher proportion of phospholipids with <u>saturated</u> fatty acids / lesser <u>kinks</u> in fatty acids (chains). Lesser transport / named (channel / carrier) <u>protein</u>.	
(c) (i)	<u>Ribosomes</u> attached to / on the rough endoplasmic reticulum are the sites for protein / polypeptide synthesis / condensation of amino acids.	
(c) (ii)	Radioactivity first shows an increase of 55% within 5 minutes, and a decrease of 40% within 35 minutes. Transport <u>vesicles</u> containing radioactive <u>proteins</u> (Reject amino acids) move from rough endoplasmic reticulum to the Golgi apparatus, causing the increase. Golgi apparatus chemically <u>modify</u> and <u>packaged</u> the radioactive <u>proteins</u> into <u>secretory vesicles</u>, which then <u>bud</u> off from the Golgi apparatus, causing the decrease.	
		[Total: 7]

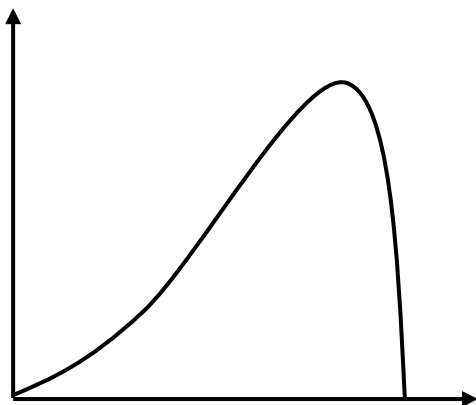
Q 4	Answer	Guidance
(a)	The movement of chloride ions from inside cell with a higher concentration to outside cell with a lower concentration. This movement across membrane requires transport / channel / carrier <u>protein</u>.	
(b)	No (build-up) of chloride ions on the opposite side of membrane / outside cell / extracellularly. Water potential outside cell will be <u>less negative</u> in cystic fibrosis person / than a normal person / ora. No (net) movement of water <u>molecules</u> across the (selectively permeable) membrane / no osmosis from surrounding (environment) to the mucus. Hence, mucus becomes more <u>concentrated</u> with less water present / ora.	
(c)	Pancreatic juice / named enzyme is not released / secreted into the duodenum / small intestine, hence (chemical) digestion / hydrolysis of food will occur slowly.	
(d)	The percentages for all three species of bacteria add up to more than 100%. The data could represent <u>repeated</u> counts of patient.	
		[Total: 9]

Q 5	Answer	Guidance
(a)	<i>Draw:</i> phloem (left-side) + xylem (right-side) <i>Label:</i> phloem + xylem 	
(b)	sucrose	
(c)	Transpiration involves evaporation of water for the continuous diffusion of water vapour through stomata in leaves that reduces (hydrostatic) pressure at the top of plant, resulting in <u>transpiration pull</u>. Water transported continuously up the xylem (vessel) is maintained by <u>cohesion</u> between water molecules and <u>adhesion</u> of water to xylem walls.	
(d) (i)	liver	
(d) (ii)	Alcohol dehydrogenase will hydrolyse alcohol / ethanol into acetaldehyde / ethanal.	
(d) (iii)	Excessive alcohol consumption increases reaction time / reduced self-control / acts as depressant / AW. Excessive alcohol consumption increases risks for liver damage / named (cirrhosis, cancer) / gastric ulcers / (relevant) negative social implications / AW.	
		[Total: 9]

PAPER 2 / SECTION B [30 Marks]

Q 6	Answer	Guidance
(a) (i)	Size (at least 75% of gridlines) Plotting of points for A and B Lines for A and B (with labelled lines) Axes: Y-axis (number of bubbles released in one minute) X-axis (time / min) Title: <u>Graph to show the number of bubbles released in one minute against time / min</u>	

	 graph plot – example	
(a) (ii)	<i>description</i> The number of bubbles released in a minute increases <u>with time</u> from 0 to 20 for A and 0 to 10 for B. The released bubbles / foam formation in A is faster / more i.e. 10 bubbles / 2.5cm thicker (than B) / ora. <i>explanation</i> <u>Aerobic</u> respiration occurs in A but <u>anaerobic</u> respiration occurs in B. The rate of carbon dioxide gas released in aerobic respiration is higher than anaerobic respiration / ora.	
(b)	Glucose / substrate is used up, hence no further / lower rate of respiration. Warm water cools down causing lower (effective) collisions between enzymes and substrates / lower rate of enzyme-substrate complex formation / substrate binding to active site of enzymes.	
		[Total: 10]

Q 7	Answer	Guidance
(a)	light + chlorophyll $6 \text{ CO}_2 + 6 \text{ H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$	
(b)	Removes / hydrolyse the sugar-phosphate group from <u>active site</u> of rubisco.	
(c)	Both photosynthesis and photorespiration share the same enzyme (rubisco) and one of the reactants (RuBP). There is competition for the enzyme and reactant, hence when the rate of one process decrease, the other will increase. High light intensity increases the rate of photolysis, hence producing more oxygen, leading to an increase in the rate of photorespiration. High light intensity causes stomata to open and more oxygen to diffuse into the leaves. More RuBP combined with oxygen.	
(d) (i)	<i>graph shape</i> Rate of photosynthesis increase as temperature increase towards optimum + Rate of photosynthesis decrease <u>sharply</u> beyond optimum temperature.	
		
(d) (ii)	Increase in temperature results in increased frequency of effective <u>collisions</u> between photosynthetic enzymes and substrates / increased number of <u>enzyme-substrate complexes</u> formed. Beyond optimum temperature, enzymes denature hence rate of photosynthesis drops drastically.	
		[Total: 10]

Q 8 Either	Answer	Guidance
(a)	Carbon dioxide diffuses from cells into red blood cells in capillaries Carbonic anhydrase catalyses reaction between carbon dioxide and water to form <u>carbonic acid</u>. (Hence) There will be formation of / conversion into hydrogencarbonate / bicarbonate ions to allow carbon dioxide to be carried / transported in the blood. Carbonic anhydrase catalyses (reverse) reaction from <u>carbonic acid</u> into carbon dioxide and water. (Hence) Carbon dioxide will diffuse from red blood cells (at the lungs) into alveolus / alveolar space.	
(b)	<i>definition</i> Blood passes through the heart twice via <u>pulmonary</u> circulation and <u>systemic</u> circulation. <i>significance</i> Oxygen-poor blood enters the lungs at low(er) (blood) <u>pressure</u> (via pulmonary arteries), (hence) allow sufficient / longer time for blood to be well-oxygenated. Oxygen-rich blood is pumped by heart (muscles) to different body parts (via aorta) at high(er) (blood) <u>pressure</u>, (hence) allow rapid / quicker distribution of (dissolved) materials / named. The separation of oxygenated and deoxygenated blood allows a more efficient supply of oxygen to body cells.	
		[Total: 10]

Q 8 Or	Answer	Guidance
(a)	Lipids have a high(er) (metabolic) energy / calorific value (per unit mass). Lipids have less bulky / more compact / less dense structures (to allow ease of movements / locomotion). Lipids provide the human body with better absorb mechanical <u>shock</u> / protect from mechanical <u>injury</u> for the internal organs. Lipids provide the human body with heat insulation. Lipids are insoluble, hence do not affect the water potential of cells.	
(b)	Blood containing (excess) amino acids are carried from the small intestine / ileum to the liver. Excess amino acids are <u>deaminated</u> into <u>urea</u>. Urea will be <u>dissolved</u> in the blood (plasma). Blood containing urea will be carried from the liver to the heart. Blood containing urea will be carried / pumped from the heart into the lungs, and from the lungs back to the heart. Blood containing urea will be carried / pumped from the heart to the kidneys. Urine is removed from the body through the urethra.	
		[Total: 10]