

Marking Scheme

SUBJECT: BIOLOGY

EXAMINATION: END-OF-YEAR

LEVEL: YEAR 3 OP

Paper 1

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

Paper 2

Section A:

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)
1ai)	Gland cell
ii)	To secrete mucus to trap dust particles and micro-organisms.
bi)	Increase in volume will lead to decrease in pressure of thoracic cavity. Inversely proportional
ii)	Internal intercostal muscle contracts, external intercostal muscle relaxes; Ribcage and sternum moves downwards and inwards; Diaphragm relaxes and arches upwards; This leads to decrease in thoracic cavity volume and increase in pressure of thoracic cavity; Pressure in the thoracic cavity is higher than the surrounding and air leaves the lungs;
c)	Carbon monoxide binds permanently with haemoglobin to form carboxyl haemoglobin;

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)
	This results in lesser oxygen being transported in the body; Lower rate of aerobic respiration, less energy released+ person will feel fatigued; Increase fatty deposits on the arteries; Lesser oxygen supplied to heart muscles+ lower rate of aerobic respiration+ higher chance of coronary heart disease
2a	0.3s 0.1-0.4s
b)	During ventricular systole, ventricle walls contract. Pressure in the ventricles is higher than the atria+ This increase in pressure in the ventricles causes the bicuspid and tricuspid valves to close to prevent backflow of blood into the atria. This produces a 'lub' sound. During ventricular diastole, the ventricle walls relax. Pressure in the ventricles is lower than the atria+ The lowered pressure in the ventricles causes the semilunar valves to close. This produces a 'dub' sound.
ci)	$138-64/64 \times 100\% = 116\%$
ii)	Increase in heartbeat+ Increase in breathing rate; (no explanation) Increase in muscular contractions during the exercise + requires large amount of energy Increase rate of aerobic respiration to meet the increase in energy demand; Increase in heartbeat to supply blood containing oxygen and glucose at a faster rate +to muscle tissues; Increase in breathing rate to supply oxygen for aerobic respiration and to remove carbon dioxide produced;
iii)	Produced during anaerobic respiration in muscle cells, when insufficient oxygen is available for aerobic respiration. Accumulation of lactic acid in muscles may cause fatigue, muscular pains and cramps.

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)
3a	capillary, Any two from: blood cells move in Vessel B in single file AW / running between body cells / <u>walls</u> are one-cell thick (<i>not a valid answer as not shown in fig. 3.1 at all, only accepted for current exam</i>) / substances diffuse / move out of vessel B at C / part of a network of vessels,
3b	<u>Either: discussion on formation of tissue fluid</u> High hydrostatic pressure in the blood capillaries; Forces small molecules (water molecules / glucose / amino acids) out of the blood capillaries into the tissue fluid ; <u>Or: discussion on diffusion of molecules / ions OUT of blood capillary at C</u> Diffusion of molecules such as glucose / amino acids / oxygen ; from blood plasma into the tissue fluid ;
3ci	B – phagocyte C – lymphocyte ;
3cii	problem:

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)
	reduced immunity / immune response / less able to fight infection / kill microorganisms or pathogens / more likely to suffer (infectious) disease* ; explanation: refer to how less phagocytosis by phagocytes will occur ; refer to how less antibody production by lymphocytes will occur; refer to function of antibody and how the lacking of antibody will affect the killing / destruction of microorganisms / pathogens/bacteria/viruses ; remain in blood / body / not destroyed, leading to infection / infectious disease * ; * should only be awarded once in this entire question
4a	Final mass is higher than initial mass ; Sucrose solution has lower water potential compared to distilled water ; Net movement of <u>water molecules</u> from the distilled water into the sucrose solution, across the <u>partially-permeable membrane</u>, via <u>osmosis</u> ;
4bi	Similarity: both has partially-permeable membrane; Differences: Epithelial cells has microvilli, while Visking tubing do not ;
4bii	Sucrose molecules are <u>large molecules</u> and therefore unable to move across the partially-permeable membrane of the Visking tubing ;
4biii	Digestion is the break down of <u>large, complex food molecules</u> into <u>smaller, simpler and diffusible ones</u>; Only small molecules can diffuse through the partially-permeable cell membrane of the epithelial cells in the villi, allowing for absorption to take place ;

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)
4c	When in high concentrations, starch molecules are large molecules that cannot diffuse out of the cell due to the partially-permeable membrane, unlike glucose, allows for storage of glucose molecules in a cell; Structure of starch molecules are more compact compared to individual molecules of glucose, allowing for more space to store more glucose molecules; Accept: Starch molecules do not dissolve in water, unlike glucose, thus will not change the water potential of the cell sap;
5a)	Carbon dioxide + water → glucose + oxygen Conditions: chlorophyll + light energy
b)	Type of plant; light intensity
c)	carbon dioxide uptake of J is higher (at all temperatures except at 10 °C) ; peak / optimum / maximum / best, uptake of J is at a higher temperature+ quote data from x/y axis correct use of comparative data between J and H, quote data from both x/y axis values with correct units
di)	temperature is a limiting factor ; photosynthesis is an enzyme catalysed reaction; increases, kinetic energy / the movement of molecules / diffusion ; more collisions between substrate and enzymes to form enzyme-substrate complexes ;
ii)	enzymes are denatured ; loss of active site + no enzyme-substrate complex formed;

QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)	
6a	MP1 Concentration of glucose in Q is higher than P;	
	MP2 (in liver) Glucose molecules diffuse from blood capillaries into the liver cells and is used for aerobic respiration ;	
	MP3 Liver cells converts excess glucose in to glycogen for storage ;	
6b	MP1 Liver cells secrete <u>bile</u> which emulsifies fats (in which large fat globules becomes smaller oil droplets) ;	
	MP2 Increases surface area-to-volume ratio of the globules, increases rate of digestion of fats by lipase	
	MP3 Without bile, rate of fats digestion by lipase decreases in the small intestine + not absorbed and end up in large intestine + egested as part of faeces	
	MP4 Deamination of excess amino acids occurs in the liver cells	
	MP5 Without this process, no urea is formed and transported to the kidneys , where urine formation occurs;	
	MP6 Liver cells contain alcohol dehydrogenase that detoxify / breaks down alcohol into harmless molecules / glucose / acetaldehyde ;	
	MP7 Without which, alcohol is transported to the brain , which results in dizziness/ slower reflexes	
7a	MP1 <u>water molecules</u> evaporates from the thin film of moisture on the spongy mesophyll to form water vapour ;	
	MP2 Accumulation and increase of concentration of water vapour molecules in the intercellular air spaces ;	
	MP3 (water vapour molecules) <u>diffuse</u> from the intercellular air spaces to the atmosphere ;	
	MP4 Through the <u>stomata</u> ;	
7b	MP1 Creates a suction force known as transpirational pull ;	
	MP2 Allows for transport of water and mineral salts from roots to leaves via the xylems;	

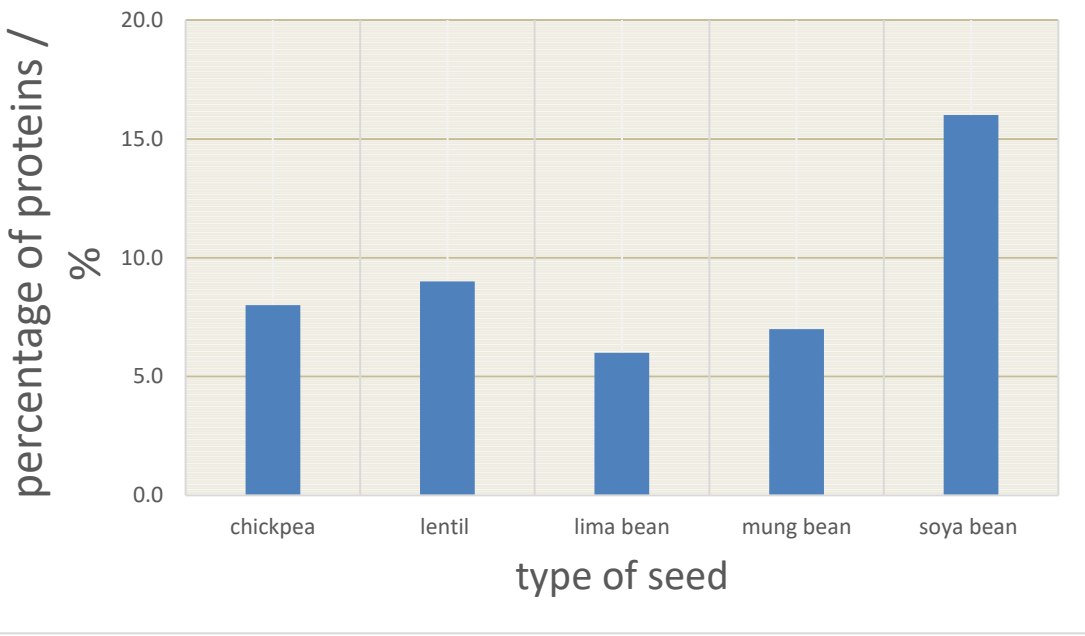
QN NO.	SUGGESTED ANSWER SCHEME (PAPER 2 SECTION A)	
	MP3	Allows for the cells of the leaves to be turgid, increases surface area of the leaf lamina for maximum absorption of light for photosynthesis ;
	MP4	Water molecules are used in the process of photosynthesis in the mesophyll cells, to produce glucose;
	MP4 a	Glucose is broken down during respiration to release energy for cell activities;
	MP5	Mineral ions, such as nitrate ions, combines with glucose to form amino acids ;
	MP6	Amino acids are used to make proteins , allowing for plant growth ;
	MP7	Evaporation of water at the surface of the mesophyll helps to cool down the plant ;
	MP7 a	Prevents denaturation of enzymes ;
	MP8	By removing latent heat of vaporisation ;

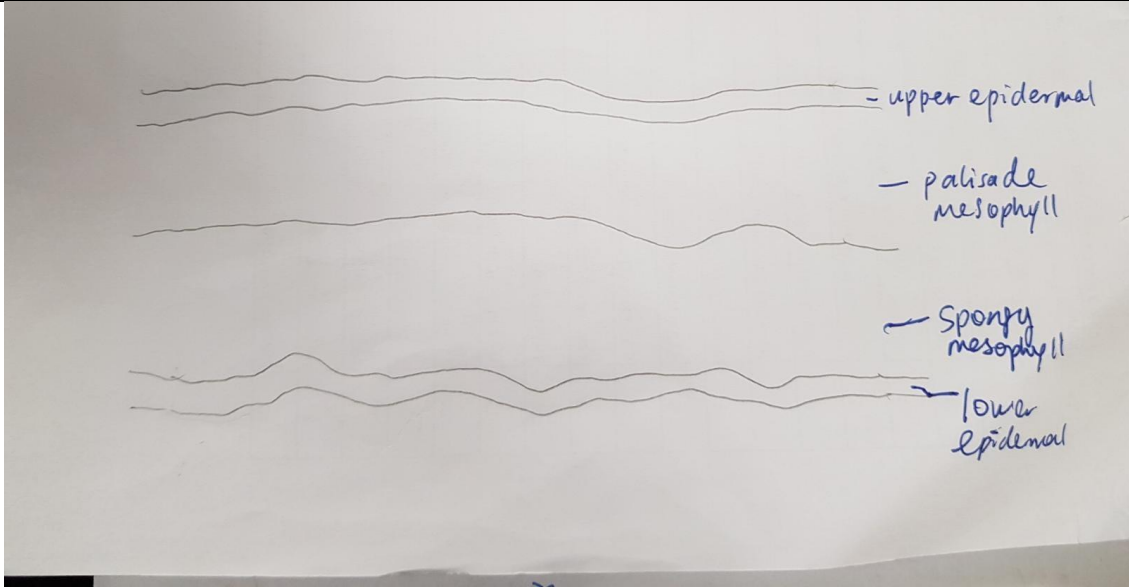
Paper 3

QN NO.	SUGGESTED ANSWER SCHEME						
1(a)(i)							
	Test tube	pH Conditions	Stage of clotting at time interval /min				
			1	2	3	4	5
	A	Acidic	B	B	B	C	C
	B	Neutral	A	A	A	A	A
	C	Alkaline	A	A	A	A	A
	Heading- column / row headings with appropriate units for each heading						
	Data- five clots records for each of three test-tubes (15 in all);						
	Trend-correct trend (shows increase clotting in A only);						
	Format- neat table with ruled lines;						
(ii)	idea that rennin or enzyme acts / forms clots quickest;						
	idea that rennin or enzyme acts / forms clots more slowly in water / neutral + alkaline/basic condition						
	is best, in acid conditions ; (accept optimal also)						
	denature at alkaline/neutral conditions;						

QN NO.	SUGGESTED ANSWER SCHEME
(iii)	idea of equilibration / allowing time for test-tube contents to reach the same temperature / all test-tubes at the same temperature ;
(iv)	volume / 5 cm ³ / mass of milk ; volume / 1 cm ³ , of enzyme / rennin ; concentration / 0.1%, of enzyme / rennin ; temperature / 40 °C ; volume / 0.2 cm ³ of acid / alkali / distilled water ; equilibration time / 3 minutes or total time / 5 minutes (for investigation) ;
(v)	add biuret (reagent) (to liquid part) ; purple / mauve / lilac, colour indicates, presence of protein / is a positive result ;
(vi)	subjective nature of deciding on clotting point ; E: end point recorded may be earlier or longer than expected test-tubes are observed at different times (step 12) / different mixing times (step 10) ; E: time lapse in observation, last test tube may have a longer time for reaction than the first test tube, resulting it to reach end point earlier. tip and rotate not standardised ; E: Affects the mixing of the solutions and time of enzyme-substrate reaction may be longer or shorter than expected temperature of water-bath not maintained hence temperature at the start and the end are different ; E: rate of reaction may be different due to the change in temperature and not pH.
(vii)	IV - Water baths of different temperatures;

QN NO.	SUGGESTED ANSWER SCHEME
	IV 2 - Specify temperature of water baths, at least 3 stated temperature values: 40 °C and at least one above and one below ; T - method of maintaining temperature given (e.g. add hot/cold water, use thermometer to monitor ; CV - mention at least 2 variables to be kept constant, with specific quantity and unit stated; same sample of milk/ same pH (pH 7) of solutions/ same concentration / volume, of enzyme / (named) protease/ equilibrate temperature of enzyme and milk solutions before mixing / DV - time how long for samples to show clotting or shortest time has, greatest activity (a way of measuring of the results should at least be provided)
(b)(i)	Plotting bar chart Size and Scale – plots to fill half or more on both axes and even scale (every 10 boxes, increment with a factor of 1 / 2 / 5) ; A – labelled axes + units ; P – correct plot (each bar should have equal width. The top of each bar should be levelled) ; C – columns do not touch;

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	 <table border="1"> <thead> <tr> <th>type of seed</th> <th>percentage of proteins / %</th> </tr> </thead> <tbody> <tr> <td>chickpea</td> <td>8.0</td> </tr> <tr> <td>lentil</td> <td>9.0</td> </tr> <tr> <td>lima bean</td> <td>6.0</td> </tr> <tr> <td>mung bean</td> <td>7.0</td> </tr> <tr> <td>soya bean</td> <td>16.0</td> </tr> </tbody> </table>	type of seed	percentage of proteins / %	chickpea	8.0	lentil	9.0	lima bean	6.0	mung bean	7.0	soya bean	16.0
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(ii)	soya (bean);												
2(a)	line: clear single continuous lines without shading ; size: occupies at least half the space available ; detail: layers in correct proportions ;												

QN NO.	SUGGESTED ANSWER SCHEME
	 The diagram shows a cross-section of a leaf with four distinct layers. From top to bottom, they are labeled: 'upper epidermal' (a single layer of cells), 'palisade mesophyll' (two layers of columnar cells), 'spongy mesophyll' (a layer of cells with large air spaces), and 'lower epidermal' (a single layer of cells). Hand-drawn lines and arrows point from the labels to the corresponding layers.
(b)	length of line AB = 39 mm ; actual length = 0.39 mm ;;