

BIOLOGY KERTAS 1

No	Answer
1	B
2	D
3	C
4	A
5	A
6	B
7	D
8	C
9	C
10	B
11	A
12	C
13	D
14	D
15	D
16	A
17	D
18	A
19	C
20	D
21	D
22	C
23	C
24	D
25	A

No	Answer
26	C
27	B
28	A
29	A
30	B
31	B
32	C
33	C
34	B
35	B
36	D
37	B
38	B
39	B
40	B
41	D
42	A
43	C
44	B
45	B
46	D
47	D
48	C
49	C
50	A

BIOLOGY KERTAS 2

SECTION A

ITEM NO	SCORING CRITERIA			MARKS		REMARKS
1(a)(i)	Organ			1	1	
(ii)	P	: Epidermal (cell)		1	2	
	Q	: Palisade mesophyll cell		1		
(b)	F1	: (The cells / Q) have many chloroplasts		1	2	Any F with P
	P1	: to absorb more sunlight / light energy (during photosynthesis)		1		
	F2	: Near to upper epidermis layer		1		
	P2	: to receive the maximum amount of sunlight / light energy		1		
	F3	: Packed tightly (in cylindrical shape)		1		
	P3	: to receive the maximum amount of sunlight / light energy		1		
(c) (i)	P1	: Transport water and (dissolved) mineral salts (from the root to the stem and leaves)		1	1	Any 1
	P2	: Provides mechanical support for the plant		1		
(ii)		Phloem	Xylem	1	2	Any 2 P
	P1	Consist of sieve tubes and companion cells.	Consist of xylem vessels and tracheids.			
	P2	Mainly contains living cell	Mainly contains dead cells			
	P3	The sieve tube has pore / sieve tubes contains cytoplasmic strands / cytoplasm	Xylem vessel are hollow / does not contain cytoplasmic strands / cytoplasm			
	P4	End walls of sieve tube has sieve plate	End walls of xylem are open			
	P5	Cell wall is not thickened with lignin	Cell wall is thickened with lignin			

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
(d)	F1 : The plant cannot stand upright P1 : Xylem will collapse P2 : No mechanical support for plant / no woody plant OR F2 : Plant will wilt / die P3 : Cannot transport water (and dissolve mineral)	1		F1 with any
		1		P1/ P2
		1		
		1		F2 with P3
		1	2	
(e)	P1: (High) light intensity stimulate / increase photosynthesis in guard cells P2: Guard cells produce glucose // Potassium ion (K^+) diffuse into guard cells by active transport P3: The guard cells become hypertonic compared neighbouring / adjacent cells P4: Water diffuse into guards cells by osmosis P5: Guard cell become turgid P6: Guard cell bend / curved outwards	1		
		1		
		1		
		1		
		1		Any 2 P
		1	2	
		1		
TOTAL			12	

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
2(a)(i)	Structure X : Quarternary (structure)	1		
	Structure Z : Tertiary (structure)	1	2	
(ii)	F : Tertiary structure / Z forms enzyme	1		
	P1 : The alpha -heliks chains or beta- pleated sheet are folded to form a globular protein.	1	2	
(b)(i)	P1 : Proteins are synthesized in the ribosomes	1		
	P2 : The protein are transported to Golgi apparatus (via transport vesicles)	1		
	P3 : The proteins are modified into enzyme in the Golgi apparatus	1		
	P4 : Secretory vesicles containing the enzyme bud off from Golgi apparatus	1		
	P5 : The vesicles fuse with the plasma membrane to release the enzyme out of the cell (as extracellular enzyme)	1	3	Any 3
(ii)	F 1 : Amylase	1		Any P + F
	P1 : To hydrolyse starch to maltose			
	F2 : Trypsin			
	P2 : To hydrolyse polypeptides to peptides			
	F3 : Lipase			
P3 : To hydrolyse lipids to fatty acids and glycerol	1	2		
(c)	F : The nucleus contains DNA which carries the information for enzyme synthesis	1		
	P1 : Nitrogenous base sequence in the DNA strand changes due to mutation //Mutation changes CTC to CAC	1		
	P2 : Leads to changes in amino acid /protein coding //Different protein is formed	1		
	P3 : Which forms different types of enzyme	1	3	Any 3
	TOTAL		12	

ITEM NO	SCORING CRITERIA	MARKS		REMARKS									
3 (a) (i)	P : Centriole Q: Chromosome // (sister) chromatid	1 1	2	Reject : chromatin, homologous chromosome									
(ii)	To form spindle fibres (during cell division)	1	1										
(iii)	Cell X: Growth // Repair damaged cells // Replace dead cells Cell Y: Produce (haploid) gametes // Maintain the diploid number of chromosome // Produce genetic variation	1 1	2										
(b) (i)	<table border="1"> <thead> <tr> <th></th> <th>Cell X</th> <th>Cell Y</th> </tr> </thead> <tbody> <tr> <td>D1</td> <td>Undergoes mitosis / anaphase</td> <td>Undergoes meiosis / meiosis 1 / Anaphase 1</td> </tr> <tr> <td>D2</td> <td>Chromosome / sister chromatids separated and pulled to opposites poles</td> <td>Homologous chromosome separated and pulled to opposites poles</td> </tr> </tbody> </table>		Cell X	Cell Y	D1	Undergoes mitosis / anaphase	Undergoes meiosis / meiosis 1 / Anaphase 1	D2	Chromosome / sister chromatids separated and pulled to opposites poles	Homologous chromosome separated and pulled to opposites poles	1 1	2	
	Cell X	Cell Y											
D1	Undergoes mitosis / anaphase	Undergoes meiosis / meiosis 1 / Anaphase 1											
D2	Chromosome / sister chromatids separated and pulled to opposites poles	Homologous chromosome separated and pulled to opposites poles											
(b)(ii)	F1 : daughter cells have more / less number of chromosomes P1: due to the homologous chromosomes not separated / divided equally / correctly P2: lead to chromosomal mutation	1 1 1	2	F with any P									
(c)	P1: Lizard's tail undergoes regeneration. P2: Each cell around the cut tail undergoes mitosis. P3: To form identical daughter cells.	1 1 1	3										
TOTAL		12											

ITEM NO	SCORING CRITERIA		MARKS		REMARKS
4(a)(i)	Artificially (acquired) active immunity		1	1	
(ii)	P1: The first dose/injection results in the production of a low level of antibody concentration		1	3	Any 3P
	P2: Which is not sufficient to protect a person against a disease		1		
	P3: The booster dose/second injection increases antibody production		1		
	P4: To a level of immunity that protects a person against a disease		1		
(iii)	Measles/hepatitis B/mumps/rubella		1	1	Accept any suitable answer
(b)(i)	P1: Injection of serum containing antibodies //antiserum against rabies		1	2	
	P2: Offers immediate / temporary protection against the disease		1		
(ii)	Artificially (acquired) passive immunity		1	1	
(iii)	Artificial active immunity	Artificial passive immunity	1	2	Any 2
	Injection of vaccine	Injection of serum containing antibodies /antiserum			
	Antibodies produced by the body itself/immunity system/lymphocytes produce antibodies	Antibodies are obtained from antiserum/other sources			
	Long-lasting immunity	Short-lived immunity			
	Does not give immediate effect	Gives immediate effect			

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
4(c)	P1: Virus is an antigen P2: Which stimulates lymphocytes to produce antibody (to fight the antigens) P3: During an infection the body temperature rises P4: Fever kills (heat sensitive) viruses//denatures proteins of pathogens P5: Retards growth/replication of pathogens	1	2	Any two P
TOTAL		12		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
5(a)(i)	P1: Encloses and protects the spinal cord P2: Supports head P3: Point of attachment for the ribs, pelvic girdle and the muscles of the back and neck.	1		Any 1
		1		
		1	1	
(a)(ii)	P1: Makes it flexible / create support P2: Not easily fractured P3: Provide distribution of body weight.	1		Any 2
		1		
		1	2	
(b)	P1: The thoracic vertebrae have spinous processes that are long and directed downwards. P2: The lumbar vertebrae have largest centrum	1		
		1	2	
(c)(i)	P1: Absorb (vertical) shock. P2: Reduce friction	1		Any 1
		1	1	
(c)(ii)	P1: Accident P2: Obesity/ over weight P3: Incorrect position or body posture when doing heavy work/ sitting	1		Any 1 *Any suitable answer
		1	1	
		1		
(c)(iii)	P1: Increase friction between the vertebrae P2: Less shock absorption P3: Press on nerves	1		Any 2
		1	2	
		1		
(d)	P1: Bent backbone P2: Give pressure on the digestive system P3: Pain in the neck and back P4: Reduces lungs function/ difficulty in breathing P5: Varicose veins	1		Any 3
		1		
		1	3	
		1		
		1		
TOTAL		12		

SECTION B

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
6(a)	<p><u>Glucose</u> P1 : Excess glucose in the blood is converted to glycogen P2 : and stored in the liver P3 : When glucose level in the blood is low, glycogen is converted to glucose (in the liver) P4 : Excess glucose is converted to lipids (by the liver) P5 : In the body cells , glucose is oxidized to release energy in cellular respiration</p> <p><u>Amino acids</u> P6 : Amino acids is used to synthesis protein (in the liver). P7 : Excess amino acids undergo <u>deamination</u> to produce urea (in the liver). P8 : Urea is then eliminated by the kidney P9 : Amino acid is used to synthesise enzymes /antibodies / hormones/new protoplasm/ repair damaged tissues in body cells</p> <p><u>Lipids</u> P10 : Excess lipids is stored in adipose tissues P11 : Phospholipids and cholesterol make up the plasma membrane.</p>	1 1 1 1 1 1 1 1 1 1 1 1	10	
6(b)	<p>P1 : Physchological disorder P2 : Diagram 6.2 shows a person suffering from anorexia nervosa P3 : Very conscious about putting on weight P4 : Skipping meals for a long period of time P5 : Tissue repair cannot takes place due to lack of lack of protein P6 : Get advices from the psychiatrist / counselor P7 : She should takes a balanced diet</p> <p>F2 : Diagram 6.3 shows a person suffering obesity P7 : Excess 20 % of BMI //Excess storage of fat P8 : Imbalance between the food intake and the energy used P9 : She takes excessive amount of food rich in fat P10 : She should takes balanced diet / less fat P11 : Exercise regularly</p>	1 1 1 1 1 1 1 1 1 1 1 1	10	Any 10
	TOTAL	20		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
7(a)	P1: During vigorous exercise, the intake of oxygen is not able to meet the demand of the cells P2: The muscles are in a state of oxygen deficiency P3: The muscles undergo anaerobic respiration. P4: Glucose molecules are oxidised incompletely. P5: Accumulation of lactic acid occur. O1: He needs to breathe in deep and fast O2: in order to inhale more oxygen O3: to oxidise lactic acid completely.	1 1 1 1 1 1 1 1	6	Any 6
(b)	P1: The higher level of carbon dioxide in the blood results in a drop in the pH value of the blood P2: Because carbon dioxide reacts with water to form carbonic acid, P3: (The drop in pH) is detected by central chemoreceptors (found in the medulla oblongata). P4: The drop in pH is detected by peripheral chemoreceptor / carotid bodies and aortic bodies. P5: (The central chemoreceptors and peripheral chemoreceptors) send impulses to the respiratory centre. P6: The respiratory centre then send nerve impulses to the intercostal muscles and the diaphragm. P7: Causing the respiratory muscles to contract and relax faster. P8: Increases the breathing and ventilation rates. P9: Heart beat rates also increases. P10: As excess carbon dioxide is eliminated from the body, P11: Carbon dioxide concentration / pH value of the blood return to normal level.	1 1 1 1 1 1 1 1 1 1 1 1	10	Any 10
(c)	P1: When doing vigorous activity, breathing rate is higher than during resting. P2: More oxygen is needed P3: To oxidise glucose P4: To produce more energy. P5: for muscles to contract.	1 1 1 1 1	4	Any 4
TOTAL		20		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
8 (a)	P1: the ears detect the (screaming) sound / the eyes detect the girl drowning. P2 : (receptor) generate nerve impulse in neurons P3: nerve impulses send to the hypothalamus P4 : (the hypothalamus) sends nerve impulses directly to the adrenal glands / adrenal medulla / stimulate adrenal gland P5 : (Adrenal gland) secretes adrenaline / noradrenaline hormone P6: Adrenaline hormone stimulate heart to increase heartbeat / breathing rate / blood pressure P7 : to pump more oxygen / increase blood flow to muscle P8: increase blood glucose level P9: Rate of (cellular) respiration in muscle increase P10: more energy produce (to help fight in stressful situation) P11: muscles contract to pull / help the girls out (any suitable answer)	1 1 1 1 1 1 1 1 1 1 1 1	10	Any 10
(b)	F: The plant hormones is auxin. P1 Auxins are produced at the shoot tips and root tips P2 Auxins diffuse to the lower side of shoot and roots due to pull of gravity P3 More auxins accumulate on the lower side of the shoot tips and root tips P4 High concentration of auxin inhibits cell elongation at root tips P5 Low concentration of auxins at upper side of the root P6 Stimulate the cell elongation / cell elongates faster P7 Growth rate of upper side is higher than lower side P8 (as a result) the root grow and bend downwards P9 (the root) showing positive geotropism. P10 High concentration of auxin promote cell elongation at shoot tips P12 Growth rate of lower side is higher than upper side P13 (as a result) the shoot tips grow and bend upwards P14 (the shoot tips) showing negative geotropism.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10	Any 10
	TOTAL	20		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
9 (a)	F1 : Have long, branched cable root / prop root P1: To support the plant in soft ground F2: Have root called pneumatophores / root that protrude out of the ground P2: for gaseous exchange efficiently // as breathing root F3: Cell sap of mangroves root is hypertonic to seawater /cell sap has a salt content higher than sea water P3: Able to withstand the high salt content that is higher than sea water F4:Have hydathodes at the lower epidermis of the leaves P4: to eliminate excess salt from sea water which enters the root by osmosis F6: Have viviparous seeds P6: The seed germinates / radicle grows when it is still attached to the parent tree P7: Seedlings can float on water / anchored into the mud F8: Leaves has thick cuticle / sunken stomata P8: To reduce transpiration F9: Have succulent leave P9: To store water	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10	F with related P
(b)	P1: Both situation will cause thermal pollution P2:(Thermal pollution) occurs when excessive heat is released into the surrounding environment /atmosphere in 9.2 (a) P3: It also occurs when there is an increase in the temperature of a water source in 9.2 (b) <u>Diagram 9.2 (a)</u> P4: The sun radiant energy is reflected back by the glass surface towards the sky P5: It will cause atmospheric temperature increase <u>Diagram 9.2 (b)</u> P6: power plant are built near rivers / lakes to facilitate the supply of water as cooling medium P7: The hot water is channeled back to the river / lakes, causing raising the temperature of the aquatic environment. P8: (when the temperature increases) causing less oxygen dissolved. P9: aquatic organism / fish die P10: (The rise in temperature) encourage rapid growth of the algae / contribute to an algal bloom P11:Decomposition of organic matter increase the BOD of water P12: Many aquatic organism will die due suffocation	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10	Any 10 P
	TOTAL		20	

BIOLOGY PAPER 3 (QUESTION 1)

1 (a) KB0603 – Measuring Using Numbers

Score	Mark Scheme																						
3	<p>Able to record all 8 data for the volume of urine produced correctly. Sample Answer:</p> <table border="1"> <thead> <tr> <th rowspan="2">Group</th> <th rowspan="2">Concentration of sodium chloride solution intake (%)</th> <th colspan="2">Volume of urine produced (ml)</th> </tr> <tr> <th>Student 1</th> <th>Student 2</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>0.0</td> <td>305</td> <td>303</td> </tr> <tr> <td>Q</td> <td>0.5</td> <td>205</td> <td>207</td> </tr> <tr> <td>R</td> <td>1.0</td> <td>134</td> <td>136</td> </tr> <tr> <td>S</td> <td>1.5</td> <td>80</td> <td>80</td> </tr> </tbody> </table>	Group	Concentration of sodium chloride solution intake (%)	Volume of urine produced (ml)		Student 1	Student 2	P	0.0	305	303	Q	0.5	205	207	R	1.0	134	136	S	1.5	80	80
Group	Concentration of sodium chloride solution intake (%)			Volume of urine produced (ml)																			
		Student 1	Student 2																				
P	0.0	305	303																				
Q	0.5	205	207																				
R	1.0	134	136																				
S	1.5	80	80																				
2	Able to list 5-7 readings correctly.																						
1	Able to list 2-4 readings correctly.																						
0	Able to list 1 reading correctly or no response or incorrect response																						

1 (b) (i) [KB0601 - Observation]

Score	Explanation
3	<p>Able to state two different observations correctly based on the following criteria : P1 : Concentration of sodium chloride intake P2 : Volume of urine produced by Student 1 and Student 2 <i>(Reject: average volume)</i> P3 : Reading Sample answer: 1. When the concentration of sodium chloride solution intake is 0.0/0.5/1.0/1.5 %, the volume of urine produced (by student 1) is 305/205/134/80 ml and (by student 2) is 303/207/136/80 ml.</p>
2	<p>Able to state one observation correctly OR two inaccurate observations. Sample answer: 1. When the concentration of sodium chloride solution intake is 0.0/1.5 %, the volume of urine produced is the highest/lowest. 2. When the concentration of sodium chloride solution intake is 0.5/1.0 %, the volume of urine produced by student 2 is higher (compared to student 1) // inversely. 3. The volume of urine produced in first experiment and second experiment is influenced by the concentration of sodium chloride solution intake.</p>
1	<p>Able to state two different observations at idea level. Sample answers: 1. The volume of urine produced is different. 2. The volume of urine produced is increasing / decreasing 3. The volume of urine produced is influenced by concentration of sodium chloride solution intake.</p>
0	No response or incorrect response.

1 (b) (ii) [KB0604 – Making inference]

Score	Explanation
3	<p>Able to make two inferences correctly based on following aspects : <i>Note: Inference must match observation</i> P1 : Concentration of sodium chloride solution intake and the condition of volume of urine collected P2 : Osmotic pressure increases / decreases P3 : Secretion of ADH // permeability of kidney tubule // volume of water reabsorbed OR P3 : Secretion of aldosterone // permeability of collecting duct // volume of salt reabsorbed</p> <p><u>Sample answers :</u> 1. When the concentration of sodium chloride solution intake is lower / the lowest, the volume of urine collected is high / the highest, because (blood) osmotic pressure decreases, therefore less ADH is secreted // kidney tubule is less permeable to water // volume of water reabsorb (into blood capillaries) decreases // more aldosterone is secreted // collecting duct is more permeable to salts // more salts reabsorbed. 2. When the concentration of sodium chloride solution intake is higher / the highest, the volume of urine collected is lower / the lowest, because (blood) osmotic pressure increases, therefore more ADH is secreted // kidney tubule is more permeable to water // volume of water reabsorb (into blood capillaries) increases // less aldosterone is secreted // collecting duct less permeable to salts // less salts reabsorbed. Any 2P</p>
2	<p>Able to make two inferences inaccurately based on any two aspects. <u>Sample answers:</u> 1. The volume of urine collected is the highest because osmotic pressure decreases. 2. The volume of urine collected is the lowest because osmotic pressure // the secretion of ADH // permeability of kidney tubule to water // volume of water reabsorbed increases. Any 1P</p>
1	<p>Able to make two inferences at idea level. <u>Sample answers:</u> 1. Volume of urine collected depends on the concentration of sodium chloride solution intake. 2. Osmoregulation occurs. 3. Water is reabsorbed. 4. ADH is secreted. 5. Osmotic pressure increases.</p>
0	No response or incorrect response.

Scoring: Observation and inference

Score	Correct	Inaccurate	Idea	Wrong
3	2	-	-	-
2	1	1	-	-
	-	2	-	-
1	1	-	1	-
	-	-	2	-
	-	1	1	-
	1	-	-	1
0	-	1	-	1
	-	-	-	-
	-	-	1	1

1 (c) [KB0610 – Controlling Variables]

Score	Explanation										
3	<p>Able to state all 3 variables and the methods to handle the variable correctly. Sample Answer :</p> <table border="1"> <thead> <tr> <th>Variables</th> <th>Method to handle the variable correctly</th> </tr> </thead> <tbody> <tr> <td><u>Manipulated variable:</u> Concentration of sodium chloride solution intake</td> <td>Use <u>different</u> concentration of sodium chloride solution (which are 0.0%, 0.5%, 1.0% and 1.5%).</td> </tr> <tr> <td><u>Responding variable :</u> Volume of urine produced</td> <td>Measure and <u>record</u> the volume of urine produced by using a <u>measuring cylinder</u>.</td> </tr> <tr> <td>Average volume of urine produced</td> <td><u>Calculate</u> average volume of urine produced by using <u>formula</u> = $\frac{\text{Volume of urine produced by student 1} + \text{Volume of urine produced by student 2}}{2}$</td> </tr> <tr> <td><u>Constant variable:</u> Number of student Time taken to collect urine Gender Volume of sodium chloride solution</td> <td>Fix the number of student in each group that is 2 Fix the time taken to collect urine at 1 hour Use the same gender of students that is male/female Fix the volume of sodium chloride solution that is 500 ml</td> </tr> </tbody> </table> <p>6 ticks</p>	Variables	Method to handle the variable correctly	<u>Manipulated variable:</u> Concentration of sodium chloride solution intake	Use <u>different</u> concentration of sodium chloride solution (which are 0.0%, 0.5%, 1.0% and 1.5%).	<u>Responding variable :</u> Volume of urine produced	Measure and <u>record</u> the volume of urine produced by using a <u>measuring cylinder</u> .	Average volume of urine produced	<u>Calculate</u> average volume of urine produced by using <u>formula</u> = $\frac{\text{Volume of urine produced by student 1} + \text{Volume of urine produced by student 2}}{2}$	<u>Constant variable:</u> Number of student Time taken to collect urine Gender Volume of sodium chloride solution	Fix the number of student in each group that is 2 Fix the time taken to collect urine at 1 hour Use the same gender of students that is male/female Fix the volume of sodium chloride solution that is 500 ml
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	<u>Manipulated variable:</u> Concentration of sodium chloride solution intake	Use <u>different</u> concentration of sodium chloride solution (which are 0.0%, 0.5%, 1.0% and 1.5%).									
	<u>Responding variable :</u> Volume of urine produced	Measure and <u>record</u> the volume of urine produced by using a <u>measuring cylinder</u> .									
	Average volume of urine produced	<u>Calculate</u> average volume of urine produced by using <u>formula</u> = $\frac{\text{Volume of urine produced by student 1} + \text{Volume of urine produced by student 2}}{2}$									
<u>Constant variable:</u> Number of student Time taken to collect urine Gender Volume of sodium chloride solution	Fix the number of student in each group that is 2 Fix the time taken to collect urine at 1 hour Use the same gender of students that is male/female Fix the volume of sodium chloride solution that is 500 ml										
2	4-5 ticks										
1	1-3 ticks										
0	No response or incorrect response.										

1 (d) [KB0611 – Making Hypothesis]

Score	Mark scheme
3	<p>Able to make a hypothesis correctly based on the following aspects : P1 : Manipulated variable (Concentration of sodium chloride solution intake) P2 : Responding variable (Volume/average volume of urine produced) P3 : Relationship</p> <p><u>Sample answer</u> : 1. The higher the concentration of sodium chloride solution intake, the lower the volume of urine produced / vice versa.</p>
2	<p>Able to make a hypothesis based on any two aspects. <u>Sample answer</u> : 1. The volume of urine produced depends on the concentration of sodium chloride solution intake. 2. Different concentration of sodium chloride solution intake has different volume of urine produced.</p>
1	<p>Able to make a hypothesis at idea level. <u>Sample answer</u> : 1. Volume of urine produced is different.</p>
0	No response or incorrect response

1 (e) (i) [KB0606 – Communication]

Score	Mark scheme																						
3	<p>Able to construct a table correctly based on the following aspects: T: Title with the correct unit – 1mark D : Data transferred correctly - 1mark C : Calculation - 1mark</p> <p>Sample answers :</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th rowspan="2">Concentration of sodium chloride solution intake (%)</th> <th colspan="2">Volume of urine produced (ml)</th> <th rowspan="2">Average of urine produced (ml)</th> </tr> <tr> <th>Student 1</th> <th>Student 2</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>305</td> <td>303</td> <td>304</td> </tr> <tr> <td>0.5</td> <td>205</td> <td>207</td> <td>206</td> </tr> <tr> <td>1.0</td> <td>134</td> <td>136</td> <td>135</td> </tr> <tr> <td>1.5</td> <td>80</td> <td>80</td> <td>80</td> </tr> </tbody> </table>	Concentration of sodium chloride solution intake (%)	Volume of urine produced (ml)		Average of urine produced (ml)	Student 1	Student 2	0.0	305	303	304	0.5	205	207	206	1.0	134	136	135	1.5	80	80	80
Concentration of sodium chloride solution intake (%)	Volume of urine produced (ml)		Average of urine produced (ml)																				
	Student 1	Student 2																					
0.0	305	303	304																				
0.5	205	207	206																				
1.0	134	136	135																				
1.5	80	80	80																				
2	Able to state any two correct aspects.																						
1	Able to state any one correct aspect.																						
0	No response or incorrect response.																						

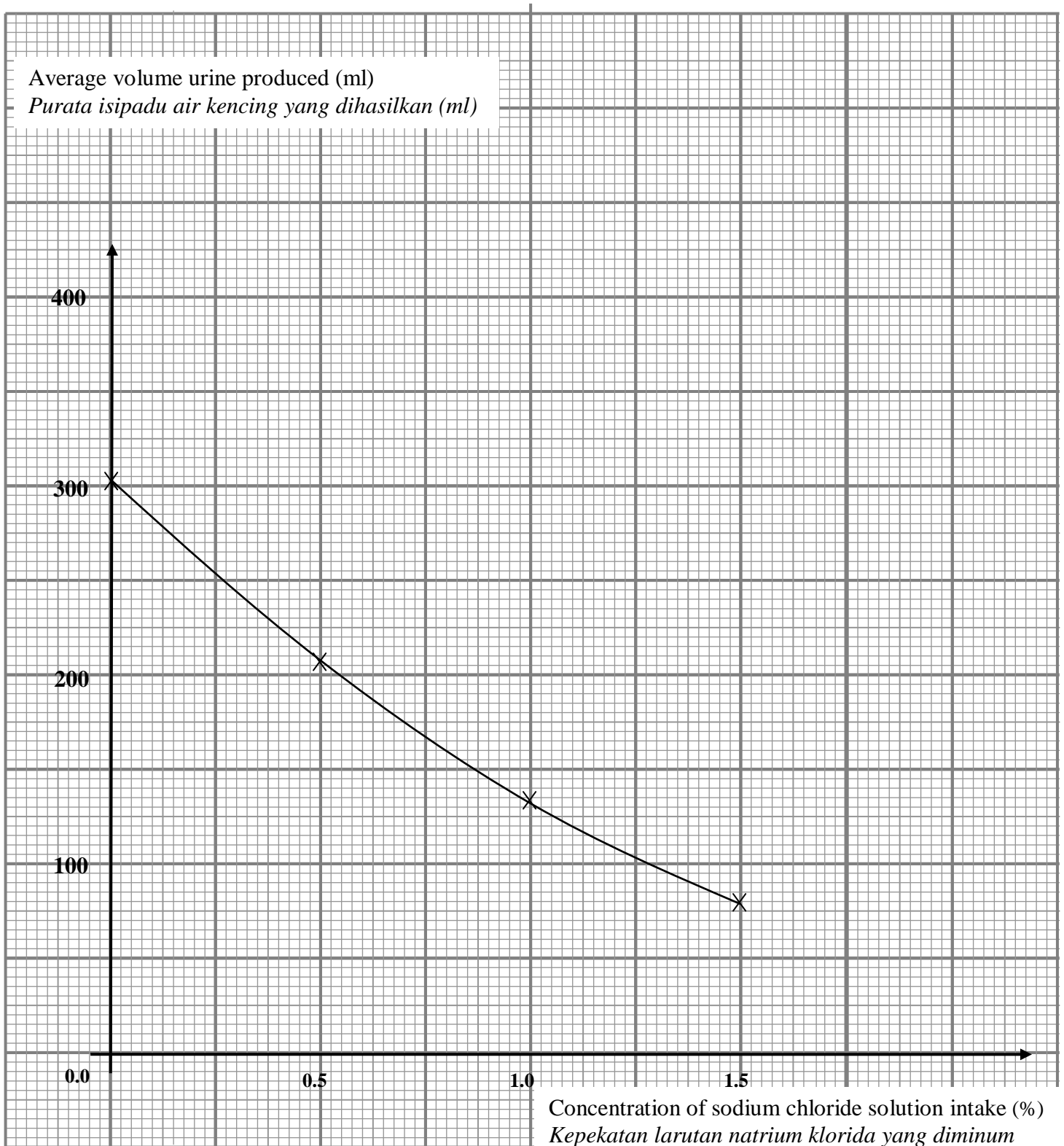
1 (e)(ii) [KB0612 – Plotting a graph]

Score	Explanation
3	<p>Able to draw the graph based on three following aspects:</p> <p>P : Uniform scales for the both axes - 1 mark T : All 3 points plotted correctly - 1 mark B : All points connected smoothly - 1 mark</p>
2	Any two correct aspect.
1	Any one correct aspect
0	No response or incorrect response.

1 (f) [KB0608 – Interpreting Data]

Score	Mark Scheme
3	<p>Able to explain the relationship between the concentration of sodium chloride solution intake to the average volume of urine produced correctly based on the following aspects :</p> <p>R : Relationship – The higher the concentration of sodium chloride solution intake, the lower the average volume of urine produced // correct hypothesis (*Reject reverse hypothesis)</p> <p>E1 : (Blood) osmotic pressure increases E2 : More water is reabsorbed (from tubule of kidney) // more ADH is produced // Kidney tubules become less permeable to water</p> <p>OR</p> <p>E2 : Less salt is reabsorbed (from tubule of kidney) // less aldosterone is produced // Collecting duct is less permeable to salt</p> <p><u>Sample answers :</u> The higher the concentration of sodium chloride solution intake, the lower the average volume of urine produced because the (blood) osmotic pressure increases so more water is reabsorbed into the blood capillaries // more ADH secreted // kidney tubule is more permeable to water / vice versa.</p> <p>OR The higher the concentration of sodium chloride solution intake, the lower the average volume of urine produced because the (blood) osmotic pressure increases so less salt is reabsorbed (from tubule of kidney into the blood capillaries) // less aldosterone secreted // collecting duct is less permeable to salts.</p>
2	Able to state the relationship based on R and E1/ E2 .
1	Able to state an idea of the relationship R // idea + E1/ E2
0	No response or incorrect response or no R .

Average volume of urine produced against the concentration of sodium chloride solution intake
Purata isipadu air kencing yang dihasilkan melawan kepekatan larutan natrium klorida yang diminum



1 (g) [KB0605 – Predicting]

Score	Explanation
3	<p>Able to predict and explain the volume of urine produced correctly based on the following aspects :</p> <p>P : Average volume of urine produced is less than 80 ml</p> <p>E1 : because (blood) osmotic pressure increases / blood contains more salt // salted potato chips contains salt (** reject : less water in the blood)</p> <p>E2 : increase ADH secretion / increase permeability of tubule of kidney / more water is reabsorbed (from tubule of kidney into the blood capillaries)</p> <p>OR</p> <p>E2 : decrease aldosterone secretion / decrease permeability of collecting duct / less salt reabsorbed (from tubule of kidney into the blood capillaries)</p> <p><u>Sample answers :</u> The average volume of urine produced is less than 80 ml because (blood) osmotic pressure increases; therefore more water is reabsorbed (from tubule of kidney into the blood capillaries).</p>
2	<p>Able to the predict average volume of urine produced based on P and E1 / E2 P+E1 // P + E2 // idea + E1 + E2</p>
1	<p>Able to the predict average volume of urine produced based on P and E1/E2 P only // idea + E1 // idea + E2</p>
0	<p>No response or incorrect response / No P or wrong P</p>

1 (h) [KB0609 –Defining by Operation]

Score	Mark scheme
3	<p>Able to define osmotic pressure operationally based on the following aspects:</p> <p>P1: Classification and facts (based on experiment) Classification: condition Facts : lower (concentration of) water/ higher (concentration of) salt in the blood (plasma) / body fluid students group P//Q//R//S</p> <p>P2: shown by the volume of urine produced</p> <p>P3: blood osmotic pressure is affected by different concentration of sodium chloride solution intake</p> <p><u>Sample answers :</u> Blood osmotic pressure is the concentration of water/salt in the blood (plasma) / body fluid students group P//Q//R//S, shown by the volume of urine produced. Blood osmotic pressure is affected by different concentration of sodium chloride solution intake.</p>
2	<p>Able to define operationally based on two aspects.</p>
1	<p>Able to define operationally based on one aspect.</p>
0	<p>No response or incorrect response.</p>

1 (i) [KB0602 – Classifying]

Score	Mark scheme				
3	<p>Able to classify the activities of the men and the blood osmotic pressure correctly.</p> <p><u>Sample answer</u></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;">High blood osmotic pressure</td> <td style="width: 50%;">Low blood osmotic pressure</td> </tr> <tr> <td>M, N, P</td> <td>O, Q</td> </tr> </table> <p>All 5 activities classified correctly</p>	High blood osmotic pressure	Low blood osmotic pressure	M, N, P	O, Q
High blood osmotic pressure	Low blood osmotic pressure				
M, N, P	O, Q				
2	2-4 activities classified correctly				
1	1 activity classified correctly				
0	No response or incorrect response				

QUESTION 2

No.	Criteria	Score
2 (i)	<p>Able to state the problem statement relating the manipulated variable with the responding variable correctly which include these criteria:</p> <p>P1 : Manipulated variable (Type of fruit juice)</p> <p>P2 : Responding variable (Concentration of Vitamin C)</p> <p>P3 : Relation in question form and question symbol [?]</p> <p><u>Sample answers :</u></p> <p>1. What is the concentration of vitamin C in watermelon <u>juice</u>, lemon <u>juice</u> and pineapple <u>juice</u>?</p> <p>2. Does lemon <u>juice</u> contain more vitamin C than watermelon <u>juice</u> and pineapple <u>juice</u>? // or vice versa</p> <p style="text-align: right;">P1 + P2 + P3</p>	3
	<p>Able to state the problem statement of the experiment with any 2 criteria.</p> <p><u>Sample answers :</u></p> <p>1. Does pineapple contain more vitamin C than watermelon?</p> <p>2. Do different fruits contain different concentration of vitamin C?</p> <p style="text-align: right;">Any 2Ps</p>	2
	<p>Able to state the of problem statement with any 1 criterion.</p> <p><u>Sample answers :</u></p> <p>1. Fruits contain vitamin C.</p> <p style="text-align: right;">Any 1P</p>	1
	No response or incorrect response	0

No.	Criteria	Score
2 (ii)	<p>Able to state the hypothesis relating the manipulated variable to the responding variable correctly : P1 : Manipulate variables (Type of fruit juice) P2 : Responding variables (Concentration of Vitamin C) P3 : Correct relationship</p> <p><u>Sample answers :</u> 1. Lemon juice contains more vitamin C than watermelon juice and pineapple juice. 2. The concentration of vitamin C in lemon juice is higher than in watermelon juice and pineapple juice.</p> <p style="text-align: right;">P1+P2+P3</p>	3
	<p>Able to state the hypothesis with any 2 criteria</p> <p><u>Sample answers :</u> 1. The concentration of vitamin C in lemon, watermelon and pineapple juice is different.</p> <p style="text-align: right;">Any 2Ps</p>	2
	<p>Able to state the idea of the hypothesis.</p> <p><u>Sample answers :</u> 1. Fruits contain vitamin C.</p> <p style="text-align: right;">Any 1P</p>	1
	No response or incorrect response	0

No.	Criteria	Score
2 (iii)	<p>Able to state all <u>three</u> variables correctly</p> <p><u>Sample answers :</u> 1. <u>Manipulated variable:</u> Type of fruit <u>juice</u> // Watermelon, lemon and pineapple juices 2. <u>Responding variable:</u> The concentration of vitamin C // volume of fruit juice needed to decolourise DCPIP solution 3. <u>Controlled variable:</u> Concentration of DCPIP solution / concentration of ascorbic acid solution // Temperature // Volume of DCPIP solution</p>	3
	Able to state any <u>two</u> variables correctly	2
	Able to state any <u>one</u> variable correctly	1
	No response or incorrect response	0

No.	Criteria	Score
2 (iv)	Able to list all 5 the important apparatus and 3 materials correctly <u>Sample answers:</u> Apparatus: Syringe (with needle), test tube/ beaker, specimen tube, measuring cylinder, muslin cloth / filter paper Materials: Lemon, watermelon and pineapple fruit juice*, DCPIP solution* and 0.1% ascorbic acid solution 4-5A + 3M (compulsory 2*)	3
	Able to state 2-4 apparatus and 2 materials correctly 2-3A + 2M (compulsory 2*)	2
	Able to state 1 apparatus and 1 material correctly 1A + 1M (compulsory 1*)	1
	No response or incorrect response	0

No.	Criteria	Score
2 (v)	<p>Able to describe the steps of the experiment procedure or method correctly</p> <p><u>Sample answer :</u></p> <p>Procedures:</p> <ol style="list-style-type: none"> <u>Fill</u> a specimen tube with <u>1ml</u> of <u>0.1%</u> DCPIP solution (using a syringe). <u>Do not shake the specimen tube.</u> <u>Fill up</u> a syringe with 5 ml of <u>0.1%</u> ascorbic acid solution. <u>Add</u> the ascorbic acid into the DCPIP solution, <u>drop by drop</u> until the DCPIP solution decolourised. <u>Immerse the needle of the syringe in the DCPIP solution.</u> <u>Stir with the needle slowly.</u> <u>Record</u> the volume of ascorbic acid that decolourised the DCPIP solution <u>using a syringe.</u> <u>Cut</u> watermelon fruits into small pieces. <u>Prepare fresh</u> watermelon juice. <u>Put</u> the fruits into a muslin cloth. <u>Squeeze</u> the fruits to extract the juice. <u>Collect</u> the juice in a beaker. Repeat steps 1 to 3 by replacing the ascorbic acid with <u>watermelon, lemon and pineapple (juices).</u> <u>Record</u> the volume of fruit juices that decolourise the DCPIP solution <u>using a syringe.</u> <u>Calculate</u> the concentration of vitamin C in the fruit (juices) by <u>using the formula :</u> <p style="text-align: center;">Concentration of vitamin C = $\frac{\text{Volume of 0.1\% ascorbic acid used}}{\text{Volume of fruit juice}} \text{ mgcm}^{-3}$</p> <ol style="list-style-type: none"> <u>Tabulate</u> the data // data is recorded in a <u>table.</u> Repeat the experiment <u>two to three times to get average readings.</u> <p>Notes :</p> <p><i>K1 : Preparation of materials & apparatus</i> <i>K2 : Operating fix variable</i> <i>K3 : Operating responding variable</i> <i>K4 : Operating manipulated variable</i> <i>K5 : Precaution step</i></p> <p>Note:</p> <ol style="list-style-type: none"> At least 4K1 K2,K3,K4 and K5 at least one <p>All 5K</p>	<p>3</p> <p>K1, K2 K5</p> <p>K1, K2</p> <p>K1, K5 K5 K5</p> <p>K3</p> <p>K1</p> <p>K1, K5</p> <p>K1</p> <p>K1</p> <p>K4</p> <p>K3</p> <p>K3</p> <p>K1</p> <p>K5</p>
	Able to state 3- 4 K	2
	Able to state 1-2 K	1
	No response or incorrect response	0

No.	Criteria	Score															
2 (v)	<p>Able to construct a table of data with 2 criteria:</p> <ul style="list-style-type: none"> ▪ (i) Correct title and units ▪ (ii) Manipulated variable <p>Sample answers:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th data-bbox="321 470 594 653">Fruit juice (/ Solution)</th> <th data-bbox="594 470 808 653">Volume needed to decolourise 1ml DCPIP solution (ml)</th> <th data-bbox="808 470 1187 653">Concentration of vitamin C (mgcm^{-3})</th> </tr> </thead> <tbody> <tr> <td data-bbox="321 653 594 730">(0.1% Ascorbic acid)</td> <td data-bbox="594 653 808 730"></td> <td data-bbox="808 653 1187 730"></td> </tr> <tr> <td data-bbox="321 730 594 768">Watermelon</td> <td data-bbox="594 730 808 768"></td> <td data-bbox="808 730 1187 768"></td> </tr> <tr> <td data-bbox="321 768 594 806">Pineapple</td> <td data-bbox="594 768 808 806"></td> <td data-bbox="808 768 1187 806"></td> </tr> <tr> <td data-bbox="321 806 594 844">Lemon</td> <td data-bbox="594 806 808 844"></td> <td data-bbox="808 806 1187 844"></td> </tr> </tbody> </table>	Fruit juice (/ Solution)	Volume needed to decolourise 1ml DCPIP solution (ml)	Concentration of vitamin C (mgcm^{-3})	(0.1% Ascorbic acid)			Watermelon			Pineapple			Lemon			2
Fruit juice (/ Solution)	Volume needed to decolourise 1ml DCPIP solution (ml)	Concentration of vitamin C (mgcm^{-3})															
(0.1% Ascorbic acid)																	
Watermelon																	
Pineapple																	
Lemon																	
	Able to tabulate the data with any 1 criterion.	1															
	No response or incorrect response	0															

END OF MARKING SCHEME