4551/1 PERCUBAAN SPM MARA 2014 (BIOLOGI)-KERTAS 1

NO SOALAN	SUBTOPIK	KONSTRUK	ARAS KESUKARAN	STIMULUS	JAWAPAN	CATATAN
1	B1.1	PB0101	R	Diagram 1	D	Konstruk
2	B1.2	PB0101	R	Diagram 2	C	PB01 : 21
3	B1.1	KB0101	S	Statement	D	KB01 : 20
4	B2.1	PB0101	R	-	D	KB02 : 9
5	B2.2	KB0102	S	Diagram 3	C	
6	B3.1	PB0101	S	Diagram 4	B	Jawapan
7	B3.2	PB0101	R	Statement	C	A : 13
8	B3.3	PB0101	S	Diagram 5	A	B : 12
9	B4.1	KB0101	R	Statement	A	C : 14
10	B4.2	KB0101	T	Diagram 6	B	D : 11
11	C1.1	PB0101	S	Diagram 7	A	
12	C1.12	KB0201	T	Table 1	C	Aras
13	C1.2	KB0201	R	Diagram 8	A	R : 20
14	C1.4	PB0103	S	-	B	S : 21
15	C1.5	PB0101	R	Diagram 9	A	T : 9
16	C1.10	KB0101	R	Diagram 10	D	
17	C1.11	PB0101	R	Diagram 11	B	
18	C1.14	KB0202	S	Diagram 12	D	
19	C1.12	PB0103	S	-	C	
20	C2.6	KB0201	S	Diagram 13	D	
21	C2.4	KB0102	T	-	C	
22	C2.5	KB0103	S	Diagram 14	D	
23	C2.6	KB0102	S	Diagram 15	B	
24	D1.3	PB0101	R	Diagram 15	D	
25	D1.2	KB0102	T	Diagram 16	D	
26	D1.2	KB0101	T	Diagram17	B	
27	D1.5	PB0101	S	Diagram 18	A	
28	D1.3	KB0201	S	Table 2	B	
29	D2.1	KB0201	S	Table 3	C	
30	D2.1	KB0102	S	Statement	C	
31	D2.2	KB0101	R	Diagram 19	B	
32	E1.2	KB0101	T	Statement	A	
33	E1.5	PB0102	S	Diagram 20	B	
34	E1.4	PB0102	S	Diagram 21	A	
35	E1.4	KB0101	S	Diagram 22	C	
36	E2.1	KB0101	R	Diagram 23	A	
37	E3.2	KB0101	R	Diagram 24	C	
38	E3.2	PB0101	R	Diagram 25	B	
39	E3.6	PB0101	R	-	A	
40	E3.4	KB0101	S	Diagram 26	A	
41	E3.4	KB0102	T	Statement	C	
42	E4.1	KB0201	T	-	C	
43	E4.5	KB0101	S	Diagram 27	D	
44	E4.4	KB0201	S	-	A	
45	E4.7	PB0102	R	Diagram 28	B	
46	E4.2	PB0102	R	-	A	
47	F1.2	KB0201	T	Diagram 29	C	
48	F2.2	PB0102	R	-	B	
49	F2.1	PB0101	R	-	C	
50	F2.2	KB0101	R	Diagram 30	D	

A : 13 B : 12 C : 14 D : 11 R : 20 S : 21 T : 9

4551/1 PERCUBAAN SPM MARA 2014 (BIOLOGI)-KERTAS 1

NO SOALAN	JAWAPAN
1	D
2	C
3	D
4	D
5	C
6	B
7	C
8	A
9	A
10	B
11	A
12	C
13	A
14	B
15	A
16	D
17	B
18	D
19	C
20	D
21	C
22	D
23	B
24	D
25	D
26	B
27	A
28	B
29	C
30	C
31	B
32	A
33	B
34	A
35	C
36	A
37	C
38	B
39	A
40	A
41	C
42	C
43	D
44	A
45	B
46	A
47	C
48	B
49	C
50	D

MARKING SCHEMES PAPER 2 (STRUCTURE) TRIAL SPM 2014 BIOLOGY

QUESTION 1			
ITEMS	**MARKING CRITERIA**	**MARKS**	
(a)	*Able to name the structure correctly* **Answer:** Q : Chloroplast R : Mitochondrion	 1 1	 2
(b)	*Able to explain the adaptation of organelle R to perform its function more efficiently correctly* **Answers:** F1 : (Inner) membrane folded E1 : (Total) surface area increase E2 : To generate **more** energy // **increase** oxidation of glucose **OR** F2 : Contain (a lot of) respiratory enzyme E3 : Rate of cellular respiration increase // **increase** oxidation of glucose E4 : To generate **more** energy	 1 1 1 1 1 1	 3
(c)(i)	*Able to name point U correctly* **Answer:** U : Compensation point	 1	
(ii)	*Able to explain the process that occur at point U* **Answers:** F1 : The absorption of CO_2 in organelle Q and releasing of CO_2 in organelle R is equal E1 : Because rate of photosynthesis (in Q) is equal to rate of respiration (in R) .	 1 1	 3
(d)(i).	*Able to name the molecule* **Sample answers:** Sucrose	 1	 1
(ii).	*Able to explain how the molecule filled up region S* **Sample answer** F1 : Cell wall is **fully** permeable. E1 : Concentration of sucrose outside is higher than inside the cell E2 : Sucrose diffuse into region S by simple diffusion.	 1 1 1	 3

	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : Cell wall is **fully** permeable. P1 : Concentration of sucrose outside is higher than inside the cell P2 : Sucrose diffuse into region S by simple diffusion.	 1 1 1	 3
		TOTAL	**12**

QUESTION 2			
ITEM	**MARKING CRITERIA**	**MARKS**	
(a)(i)	*Able to name the pioneer species and second successor correctly* **Answer:** Pioneer : White mould Second successor : Black mould	 1 1	 2
(ii)	*Able to give the correct explanation* : **Answers:** Pioneer species : White mould is the first species that colonised (on day 2) Second successor : Black mould replaced Yellow mould (on day 10,12 and 14)	 1 1	 2
(b)	*Able to explain why the bread mould can grow on the bread even though it is kept in a dark room* **Answer:** F1 : Bread mould is a saprophyte E1 : Does not undergo photosynthesis // does not require light to obtain food E2 : Get nutrient from the bread / dead and decayed substances	 1 1 1	 2
(c)	*Able to give the definition of competition (operationally)* **Answer:** E1 : Interspecific competition // competition between different species E2 : Which are among **white, yellow and black** mould species E3 : For the bread / same resources / habitat / space	 1 1 1 Max 2	 2
	Alternative using science text Cl = Classification Ch = Characteristic/s Cl : Interspecific competition // competition between different species Ch1 : Which are among **white, yellow and black** mould species Ch2 : For the bread / same resources / habitat / space	 1 1 1 Max 2	 2
(d)	*Able to explain why percentage coverage of yellow mould decreased on the 14th day* **Answer :** F1 : The Yellow mould has change the environment E1 : To become less moist / drier. E2 : (On day 14), the environment / bread is not suitable for Yellow / favourable for Black mould to grow. **(Any two)**	 1 1 1	 2

	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : The Yellow mould has change the environment P1 : To become less moist / drier. R : (On day 14), the environment / bread is not suitable for Yellow / favourable for Black mould to grow. **(Any two)**	 1 1 1 Max 2	 2
(e)	*Able to explain why there was no growth of mould on the bread* **Answer :** F1 : Low temperature E1 : Enzyme inactive / low rate of enzyme reaction. E2 : Less energy for reproduction / cell division. **OR** F2 : Less oxygen in the refrigerator. E2 : Less respiration of the mould. **OR** F3 : Dry condition in the refrigerator. E3 : Less water for metabolism/ activities of the mould. **(Any F+respective E)**	 1 1 1 1 1 1 1	 2
		TOTAL	**12**

QUESTIONS 3

ITEM	MARKING CRITERIA	MARKS	
(a)(i).	*Able to state the name of the neurone correctly* **Answer:** X : Afferent / sensory neurone Z : Efferent / motor neurone	 1 1	 2
(ii).	Able to give 2 differences between neurone X and Z correctly **Answer:**		

Neuron **X**	Neuron **Z**	
F1: The cell body of neurone X is located in between the axon and the dendron / middle	The cell body of neurone Z is at one end of the neurone	1
F2:There are dendrites at the cell body of neurone X	There are no dendrites at the cell body of neurone Z	1
F3: Neurone X has long dendrites	Neurone Z has short dendrites	1
F4: Neurone X has short axon	Neurone Z has long axon	1
	(Any 2 F)	Max 2

(b)	*Able to explain the reflex arc incolved.* **Answers:** F1 :**Thermoreceptor** / hot receptor detect the heat from hot object and **triggers** / **generate** nerve impulses F2 : Impulses is transmitted from afferent neurone to interneurone (in the spinal cord) F3 : Across a synapse F4 : Impulse is then transmitted from interneuron to efferent neurone F5 : Across a synapse F6 : Efferent neurone transmit impulse to muscle / biceps effector F7 : Biceps / muscle / effector contract to bend the arm / pull away from the flame **(Any 3F)** **(F3 and F5 – 1m only)**	 1 1 1 1 1 1 1 Max 3	 3

	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC :**Thermoreceptor** / hot receptor detect the heat from hot object and **triggers** / **generate** nerve impulses P1 : Impulses is transmitted from afferent neurone to interneurone (in the spinal cord) P2 : Across a synapse P3 : Impulse is then transmitted from interneuron to efferent neurone P4 : Across a synapse P5 : Efferent neurone transmit impulse to muscle / biceps effector R : Biceps / muscle / effector contract to bend the arm / pull away from the flame	1 1 1 1 1 1 1 Max 3	3
(c)	*Able to explain if ventral root is injured during an accident* **Answers:** F1 : Ventral root contains efferent neurone E1 :Efferent neurone cannot transmit the nerve impulses (from CNS) to effector / muscle. E2 :Effector / muscle cannot // the arm cannot be bend // cannot produce respond. **Any two**	 1 1 1	2
	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : Ventral root contains efferent neurone P1 :Efferent neurone cannot transmit the nerve impulses (from CNS) to effector / muscle. P2 :Effector / muscle cannot // the arm cannot be bend // cannot produce respond. **Any two**	 1 1 1 Max 2	2

(d)	*Able to explain why reflex action of a person suffering from Parkinson disease is less rapid compare to normal person.* **Answer:** E1 : No new neurons are formed. to replace dead / damaged neurons E2 : Less neurotransmitter / dopamine produced. E3 : Synaptic contact decreases E4 : Slow impulse transmission. E5 : Brain capacity / ability to send and receive impulses decreases E6 : The ability of the brain to process / interpret / integrate the information is low / slower. **(Any 3E)**	1 1 1 1 1 1 Max 3	3
		TOTAL	**12**

QUESTION 4			
ITEM	**MARKING CRITERIA**	**MARKS**	
(a)	*Able to name vessel Q and Vessel R* **Answer:** Vessel Q : Blood capillary Vessel R : Lymph capillary	 1 1	 2
(b)	*Able to explain how interstitial fluid is formed.* **Answer:** F1 : Fluid Z is interstitial fluid E1 : Diameter of arterial end is bigger than the capillaries // heart pump the blood in high pressure into the capillaries. E2 : High hydrostatic pressure occur at the arterial end of the capillaries E3 : Some of the blood plasma / any two examples (glucose, amino acid, water, fatty acid) is **filtered out / forced out** from the blood capillary to the interstitial spaces / intercellular spaces ***(Reject: diffuses out)*** **(F + any E)**	 1 1 1 1 Max 2	 2
	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC1 : Diameter of arterial end is bigger than the capillaries // heart pump the blood in high pressure into the capillaries. P1 : High hydrostatic pressure occur at the arterial end of the capillaries P2 : Some of the blood plasma / any two examples (glucose, amino acid, water, fatty acid) is **filtered out / forced out** from the blood capillary to the interstitial spaces / intercellular spaces ***(Reject: diffuses out)*** R : Fluid Z is interstitial fluid	 1 1 1 1 Max 2	 2
(c)	*Able to Explain what happen if the excess interstitial fluid is not returned to the vessel Q* **Answer:** F : Oedema **(reject : elephantiasis)** E1 : Too much fluid is retained / accumulated in the intercellular space / spaces between the cell E2 : Body tissue swollen	 1 1 1	 3

(d)	*Able to explain the mechanism of antibody-antigen* **Answer:** F : Agglutination E1 : Antibodies clump pathogens / antigen together E2 : Easy for phagocytes to capture and destroy pathogen / antigen **(F + any E)**	 1 1 1 Max 2	 2
	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : Antibodies clump pathogens / antigen together P : Easy for phagocytes to capture and destroy pathogen / antigen R : Agglutination	 1 1 1 Max 2	 2
(e)	*Able to explain why A person that having sore throat will experience fever and swollen lymph nodes at her neck* **Answer:** F : lymph node become (more) active E1: To produce **more** white blood cells / leucocytes /lymphocytes. **(reject : phagocytes)** E2: To produce **more** antibodies E3: To destroy antigen / pathogen / bacteria // interaction between antibody and antigen / pathogen / bacteria. **(reject : virus)** **(any two)** *Able to state why the doctor suggested an antibiotic to the patient* **Answer:** To destroy / kill the pathogen / bacteria / antigen	 1 1 1 1 Max 2 1	 3
		TOTAL	**12**

Question 5

ITEM	MARKING CRITERIA	MARK	
(a)	*Able to state the genotypes of cat Q correctly* **Answer:** Genotype N: TtFf	1	1
(b)	*Able to complete the Punnet square and show possible genotypes if cat P and cat S are crossed together :* **Answer:** Gamet M / Gamet P: TF | **Tf** | **tF** | tf TF: TTFF | **TTFf** | **TtFF** | TtFf **Tf**: **TTFf** | **TTff** | **TtFF** | **TTff** **tF**: **TtFF** | **TtFf** | **ttFF** | **ttFf** tf: Ttff | **Ttff** | **ttFf** | ttff * Correct male gametes (bold) * Correct female gametes (bold) * All correct genotypes (bold)	1 1 1	3
(c)	*Able to explain how a cat with long tail and white fur is obtained correctly* **Answers:** F1 : Parent R has short tail and black fur with genotype TtBb E1 : Gametes produced (from TtBb) are **TB, Tb, tB and tb** F2 : Parents W has long tail and white fur with genotype ttbb E2 : Gametes produced (from ttbb) is **tb** E3 : If gamete **tb** (from the parent R) fertilises with gamete tb (from parent W) E4 : A long tail and white fur cat is produced with genotype ttbb **(F1/E1 + F2/E2 + E3/E4)**	1 1 1 1 1 1 Max 3	3
(d)	*Able to explain the process that causes variation correctly* **Answers:** E1 : Occur during prophase 1 E2 : Exchange of DNA segments / genetic information occur E3 : between 2 non sister chromatids at the chiasmata E4 : As a result, the genes sequence will be different // the gametes produced have different genes constitution / various combination of genes **Any 3E**	1 1 1 1 Max 3	3

	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : Between 2 non sister chromatids at the chiasmata P1 : Exchange of DNA segments / genetic information occur P2 : Occur during prophase 1 R : As a result, the genes sequence will be different // the gametes produced have different genes constitution / various combination of genes	 1 1 1 1 Max 3	 3
(e)	*Able to explain how mutation occur* **Answers :** F : (Normal chromosome exposed to) X ray cause chromosomal mutation E1 : Causes 3 repeated (DE) genes // duplication of genes E3 : result in permanent change in the structure of chromosome. **(F+any E)**	 1 1 1 Max 2	 2
	Alternative using science text O = Object C = Condition P = Process / Phenomenon R = Result OC : Normal chromosome exposed to X ray P1 : cause chromosomal mutation P2 : causes 3 repeated (DE) genes // duplication of genes R : result in permanent change in the structure of chromosome.	 1 1 1	 2
		TOTAL	**12**

MARKING SCHEMES PAPER 2 (ESSAY) SPM 2014 BIOLOGY

QUESTION 6

ITEMS	MARKING CRITERIA	MARKS	
6 (a)	*Able to explain the result of the experiment* F : The level of water/solution (in the straw) increased E1 : Egg membrane is a semipermeable membrane E2 : Distilled water is hypotonic to the albumen/solution in the egg E3 : Water **diffuses into** the egg by **osmosis** (reject: move / enter / flow) E4 : through the egg membrane / semi permeable membrane (F + any 3E)	1 1 1 1 1	4
	ALTERNATIF (using science text) O = object C = condition P = process/phenomena R = result *Able to explain the result of the experiment* **Answer :** OC 1 : Egg membrane is a semi permeable membrane OC 2 : Distilled water is hypotonic to the albumen /solution in the egg OCP 3 : water molecule **diffuses into** the egg via **osmosis** R : The level of water/solution (in the straw) increased	1 1 1 1 1	4

(b)	*Able to explain the process based on type of movement.* **Proximal convoluted tubule** F1 : **Reabsorption** process occur E1: Water is reabsorbed from the tubule into the blood capillary by **osmosis**. E2 : **All glucose** is reabsorbed from the tubule into the blood capillary by **active transport**. E3 : **All Amino acids** is reabsorbed from the tubule into the blood by **active transport**. E4 : Mineral ions / K^+ / Na^+ is reabsorbed from the tubule into the blood capillary by **active transport.** **Loop of Henle** F2 : **Reabsorption** process occur E5 : Water is reabsorbed from the tubule into the blood capillary by **osmosis**. E6 : Mineral ions / Cl^- / Na^+ is reabsorbed from the tubule into the blood capillary by **active transport.** **Distal convoluted tubule** F3 : **Reabsorption** process occur E7 : Water is reabsorbed from the tubule into the blood capillary by **osmosis**. E8 : Mineral ions / Cl^- / Na^+ is reabsorbed from the tubule into the blood capillary by **active transport**. F4: **Secretion** process occur E9 : Urea is secreted from the blood capillary into the tubule by **active transport** (Any 10)	1 1 1 1 1 1 1 1 1 1 1 1 1	10

ALTERNATIF (using science text)

O = object C = condition P = process/phenomena R = result

Proximal convoluted tubule

O1 : Water molecules	
C/P1 : reabsorbed from the tubule into the blood capillary by **osmosis**	1
O2 : **All glucose**	
C/P2 : reabsorbed from the tubule into the blood capillary by **active transport**	1
O3 : **All amino acids**	
C/P3 : reabsorbed from the tubule into the blood by **active transport**	1
O4 : Mineral ions / K^+ / Na^+	
C/P4 : reabsorbed from the tubule into the blood capillary by **active transport**	
R : **Reabsorption** process occur	1

Loop of Henle

O1 : Water molecules	
C/P1 : reabsorbed from the tubule into the blood capillary by **osmosis**	1
O2 : Mineral ions / K^+ / Na^+	
C/P2 : reabsorbed from the tubule into the blood capillary by **active transport**	1
R : **Reabsorption** process occur	1

Distal convoluted tubule

O1 : Water molecules	
C/P1 : reabsorbed from the tubule into the blood capillary by **osmosis**	1
O2 : Mineral ions / K^+ / Na^+	
C/P2 : reabsorbed from the tubule into the blood capillary by **active transport**	1
R : **Reabsorption** process occur	1
O3 : Urea	
C/P3 : secreted from the blood capillary into the tubule	1
R : **Secretion** process occur	2

(c)(i)	**ALTERNATIF** (using science text) O = object C = condition P = process/phenomena R = result O1 : liquid fertilizers C1/P1 : dissolved in soil water O2 : soil water C2/P2 : hypertonic to the **cell sap of the plant cell** C3/P2 : water diffused out from the cell sap into the soil solution by **osmosis** O3 : vacuole / cytoplasm expand / plasma membrane C4/P4 : pushed towards the cell wall R : The potted plant wilt	1 1 1 1 1	4
	TOTAL		**20**

QUESTION 7

ITEMS	MARKING CRITERIA	MARKS	
7 (a)(i)	Able to differentiate between the two bones structure F1 : The bone in Diagram 7.1 (ii) is **more** porous/**more** brittle/**more** air spaces than the bone in Diagram 7.1 (i) // vice versa E1 : because it contain **less** bone tissues / less calcium / less phosphate	1 1	2
(a) (ii)	Able to explain the life style and eating habit of individual in Diagram 7.1(i) **Diagram 7.1 (i)** **Life style :** F1 : The individual carries out regular / more exercise E1 : to maintain development of bones/to increase bone mass/to strengthen bones **Eating habit** F1 : Take food rich in calcium / phosphate E1 : to form more bone tissues/formation of stronger bones F2: high / sufficient intake of vit D E2:for **absorption** of more calcium and phosphorus F3: high / sufficient intake of vit. C E3: to increase bones mass Any Correct F and corresponding E	1 1 1 1 1 1 1 1	2 2

7(b)	Able to explain the adaptation of a fish F1 : streamline body shape E1 : to reduce water resistance F2 : scales are arranged backward/posterior E2 : to reduce water resistance F3 : has tail/ caudal fin E3 : to produce a forward thrust to drive fish to the forward F4 : has pectoral fins E4 : help in slowing down/ stopping/brake F5 : has pelvic fins/pectoral fins E5 : to control /prevent pitching F6 : has dorsal/ventral fins E61 : to control/prevent yawing of the fish. F7: has dorsal/ventral/pectoral/pelvic E7:to prevent rolling F8 : has a pair of antagonistic muscles /myotomes muscle E8 : contract and relax to produce forward thrust (Correct F and corresponding E)	1 1 1 1 1 1 1 1	6
7 (c)	Able to explain ways to maintain the musculoskeletal system F1 : Take balanced diet/ intake of food rich in calcium/ phosphate/Vit D E1 : to prevent osteoporosis F2 : having good posture when doing activities such as sitting / walking / standing E2 : bad body posture may cause backache / headache / fatigue F3 : Wearing proper attire/wear loose and comfortable clothing at all time E1 : tight clothing may restrict blood circulation and movement	1 1 1 1 1 1	

	F4: always wear flat shoes/do not wear high heels E4: the body tends to lean forward and this causes pressure on spine and knee joint//improper foot wear causes pain and diffulty in walking/body weight exerted on the front part of the feet F5:warm up before doing vigorous activity E5: to loosen up muscle/ to increase temperature/to prevent muscle cramp. F6: Carry out proper exercise/ use correct technique E6: to prevent injury of our musculoskeletal system Any 4F and any 1 respective E	1 1 1 1 1 1	8
	TOTAL		20

QUESTION 8

<table>
<tr><th>ITEM NUMBER</th><th>MARKING CRITERIA</th><th colspan="2">MARKS</th></tr>
<tr><td>8 (a) (i)</td><td>Able to explain the difference blood pressure in blood vessel P and R.

F1 : Blood pressure P/arteries/arterioles is high/120 mm/Hg while Blood pressure in R / veins / venules is low / 70 mm/Hg
E1: Blood vessel P is arteries / arterioles while blood vessel R is vein/venules
E2 : Blood vessel P receives blood directly from the heart, while blood vessel R received blood from the blood capillaries
E3 : Size of lumen P is smaller, while size of lumen R is bigger</td><td>1

1

1

1</td><td>3</td></tr>
<tr><td></td><td>ScienceText

<table><tr><th>Criteria</th><th>P</th><th>R</th></tr><tr><td>Terminology</td><td>Arteries/Arteriole</td><td>Veins/Venule</td></tr><tr><td>Quality</td><td>High pressure/120 mm Hg</td><td>Low pressure/70mmHg</td></tr><tr><td>Quality</td><td>Received blood from the heart/ventricle</td><td>Received blood from the blood capillary</td></tr><tr><td>Structure</td><td>Lumen size smaller</td><td>Lumen size bigger</td></tr></table></td><td>1
1

1

1</td><td>3</td></tr>
<tr><td>8(a)(ii)</td><td>Able to explain the characteristics of blood vessel that help to carry out the function efficiently.

Vessel P:
F1 : The wall of blood vessel P is thick
E1 : Strong enough
E2 : To withstand high pressure of blood from the heart

F2 : Lumen of blood vessel P is small
E2 : to allow / maintain blood flow in high pressure
(reject: elastic wall because not shown in diagram)

(Any F + corresponding E)
Vessel Q:
F3 : The wall of blood vessel Q is very thin / only one cell thick
E3 : To allow movement of substances to and from the body tissues / exchange of substances

(Any F + corresponding E)
Vessel R:</td><td>1
1
1

1
1

1

1</td><td></td></tr>
</table>

	F4 : The wall of blood vessel R is thin E4 : Suitable for low blood pressure F5 : blood vessel R has large / big lumen E5 : to allow more blood flow / blood flow efficiently (reject: **has valve** because not shown in diagram) (Any F + corresponding E)	1 1 1 1 Max 7	7
	ALTERNATIF (using science text) [N: name, C: characterestic, F: function] N1: blood vessel P C1: The wall is thick F1: Strong enough F2: To withstand high pressure of blood from the heart C2: Lumen of blood vessel P is small F1: to allow / maintain blood flow in high pressure N2: blood vessel Q C2: The wall of blood vessel Q is very thin / only one cell thick F2: To allow movement of substances to and from the body tissues / exchange of substances N3: blood vessel R C3: The wall is thin F3: Suitable for low blood pressure N3: blood vessel R C3: has large / big lumen F3: to allow more blood flow / blood flow efficiently (reject: **has valve** because not shown in diagram) (Any F + corresponding E)	 1 1 1 1 1 1 1 1 1 1 1	7

(b)(i)	*Able to explain the health problem caused by condition X in coronary artery* F : Suffering heart attack // atherosclerosis // arteriosclerosis // myocardial infarction (reject: coronary thrombosis // heart / cardiovascular disease) E1 : decrease supply of oxygen to the heart muscle / cardiac muscle E2 : Rate of cellular respiration decrease E3 : Less energy for contraction of muscle E4 : Lack of energy / tiredness E5 : Pumping of the heart / transport of oxygenated blood to the whole is body less efficient (Any 3E)	1 1 1 1 1 1	1 3
	ALTERNATIF (using science text) O : the heart muscle / cardiac muscle C1/ P1: decrease supply of oxygen C2/ P2: Rate of cellular respiration decrease C3/ P3: Less energy for contraction of muscle C4/ P4: Lack of energy / tiredness R: Suffering heart attack // atherosclerosis // arteriosclerosis // myocardial infarction (reject: coronary thrombosis // heart / cardiovascular disease)	1 1 1 1 1 1	 1
(b)(ii)	*Able to explain the life style which lead to the condition* **Life style** F1 : taking an unbalanced diet / High amount of fat / lipid / carbohydrates / cholesterol E1 : causing deposition of cholesterol at the inner wall of the artery F2 : smoking E2 : heat from the smoke damages the artery//tar deposited causing the lumen of the artery become narrower F3 : diet low in fiber/ lack of fruits /vegetables in diet E3 : less antioxidant vitamins and minerals (provided by fruits and vegetables which lead to atherosclerosis)	1 1 1 1 1 1	

	F4 : lack of exercises E4 : Low rate of metabolism/burning of fat/ cholesterol which give rise to deposition of cholesterol F5: stress E5: increase the level of stress hormone/adrenaline/cortisol which lead to heart attack/stroke/cardiovascular disease (Any 3F with corresponding E) 3F with any 3E	1 1 1 1	6
	TOTAL		20

Question 9

ITEM NUMBER	MARKING CRITERIA	MARKS	
9 (a) (i)	*Able to discuss how the phenomenon occurs and the impacts on the environment* F1 : The phenomenon is Greenhouse effects E1 : factories released greenhouse gases / carbon dioxide / sulphur dioxide / oxide of nitrogen E2 : vehicles releases gases such as / carbon dioxide / sulphur dioxide / oxide of nitrogen E3 : deforestation / lodging activities reduced number of trees E4 : reduces absorption of carbon dioxide // increase the concentration of carbon dioxide in the atmosphere E5: form thicker layer of greenhouse gases / carbon dioxide / sulphur dioxide / oxide of nitrogen in the atmosphere E6 : trapped **more** heat E7 : will increase the Earth's temperature (Any 5E)	1 1 1 1 1 1 1 1	1 5
9 (a) (ii)	**Impact to the ecosystem** E1 : occurrence of floods E2 : high temperature melts polar ice and glaciers E3 : which cause a rise in sea levels /rise E4 : climate change / changes in wind direction / distribution of rainfall E5 : occurrence of drought E6 : which cause the land to become dry and infertile E7 : yield of crops decline E8 : population of fish / predator / prey / organisms decline Any 4E	 1 1 1 1 1 1 1 1	 4

9 (b)	*Able to explain differences based on the criteria given.*		
	F1 : pH value for waterfall area is neutral but farming area is low / acidic	1	
	E1 : Concentration of carbon dioxide in farming area is higher due to decomposition of organic matter	1	
	F2 : Water sample from waterfall area is clearer than farming area	1	
	E2 : Less sediments / suspended materials / silt / mud / in the water sample	1	
	F3 : Population of algae in waterfall area is less than farming area	1	
	E3 : Less organic matters in the water	1	
	F4 : Amount of carbon dioxide in waterfall area is lower than farming area	1	
	E4 : Less decomposition of organic matters by microbes / decomposers	1	
	F5 : Amount of organic matters in waterfall area is lower than farming area	1	
	E5 : Less waste products in the water from waterfall area than in water from farming area	1	
	F6 : Level of BOD in waterfall area is lower than farming area	1	
	E6 : The amount of dissolved oxygen in waterfall area is higher than farming area	1	10
	(Any 5F with respective E)		
	TOTAL		**20**

QUESTION 6

ITEMS	MARKING CRITERIA	MARKS	
6 (c)(i)	F: Liquid fertilizer/soil water is hypertonic to cell sap of root hair/plant cell. E1: Water diffuse out by osmosis. E2: From cell sap to the soil (solution). E3: Cytoplasm pull away from plasma membrane//vacuole become shrink//plant cell become plasmolysed. E4: The plant become wilt/flaccid. E4: The plant become wilt/flaccid. (F + any 3E) = Max: 4 marks.	1 1 1 1 1	4
(c) (ii)	F: Watered the soil/plant. E1: Vacuole/cytoplasm expand/plasma membrane push toward the cell wall. E2: The plant become turgid. (F + any 1E) = Max: 2 marks.	1 1 1	2

ANSWER SCHEME PAPER 3
TRIAL BIOLOGY 2014

MAJLIS AMANAH RAKYAT

ANSWER SCHEME
BIOLOGY
PAPER 3
4551/3

TRIAL SPM
2014

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TRIAL BIOLOGY 2014

<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td>1(a)</td><td>Able to record all right total surface area covered by solid pollutants
Sample answer
<table><tr><th>Location</th><th>Total surface area covered by the solid pollutants/cm^2</th></tr><tr><td>Bukit Nanas Forest Reserve</td><td>8</td></tr><tr><td>Pudu Sentral Bus Terminal</td><td>26</td></tr><tr><td>Kampung Baru Residential Area</td><td>15</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to record any 2 readings correctly</td><td>2</td></tr>
<tr><td></td><td>Able to record any 1 reading correctly</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
<tr><td>1(b)(i)</td><td>Able to state 2 different observations correctly following these criteria:
MV - Locations
RV -Total Surface Area covered by solid pollutants with unit

Sample answer

1. In Bukit Nanas Forest Reserve, the total surface area covered by solid pollutants is 8 cm^2.

2. In Pudu Sentral Bus Terminal, the total surface area covered by solid pollutants is 26 cm^2.</td><td>3</td></tr>
<tr><td></td><td>Able to state one observations correctly and one - two inaccurate observation
Sample answer

1. In Bukit Nanas Forest Reserve, the total surface area covered by solid pollutants is low / 8 (without unit).

2. The location affects the total surface area covered by the solid pollutants.</td><td>2</td></tr>
<tr><td></td><td>Able to state the observation at idea level
Sample answer
1.The total surface area covered by soild pollutants is 9/8/26/15 cm^2.</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
</table>

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1(b)(ii)	**Able to state two inferences correctly based on the following aspects:** Note : inferences must match to the observation **CRV : amount of solid pollutants: more/less // air contains solid pollutants; give one example** **ARV / Compare : the rate/level of air pollution is high/low** **Reason 1 : more oxygen/less carbon dioxide/less smoke/less soot** **Reason 2 : area far away from source of pollution** Sample answer 1. (Bukit Nanas Forest Reserve) has the least amount of solid pollutants, so the level/rate of air pollution is lowest due more oxygen/less carbon dioxide/less smoke/less soot available because the area is far away from source of pollution. 2. (Pudu Sentral Bus Terminal) has the most amount of solid pollutants, so the level/rate of air pollution is highest due to exhaust fumes from buses emit large amount of soot/smoke because the area is nearer away from source of pollution. .	3
	Able to make two correct inference and one inaccurate inference Sample answer 1. (Pudu Sentral Bus Terminal) has more/large amount of solid pollutants. 2, (Pudu Sentral Bus Terminal) level/rate of air pollution is highest	2
	Able to state the inference at idea level Sample answers 1.Air contains solid pollutants 2. Different locations has different level of air pollutions.	1
	No response or incorrect response	0

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<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td>1(c)</td><td>Able to state all 3 variables and the 3 methods to handle the variable

Sample answers

<table>
<tr><th>Variable</th><th>Method to handle the variable</th></tr>
<tr><td>Manipulated variable
Locations</td><td>Use different locations// Put the glass grid at different locations such as National Zoo, Bukit Nanas Forest Reserve, Pudu Sentral Bus Terminal and Kg Baru Residential Area</td></tr>
<tr><td>Responding variable

Total surface area covered by the solid pollutants

OR

Rate of pollution</td><td>Count and record the total surface area covered by the solid pollutants by using grid.

Calculate and <u>record</u> the level of pollution using formula
Rate of air pollution =

<u>TSA covered by the solid pollutants</u>
Time

*accept one week and 7 days only</td></tr>
<tr><td>Constant Variable

Size of grid (box)

Size of scale

Type of grid</td><td>

Fix the size of grid at 10cm X 10cm

Fix the size of scale at 1cm X 1cm

Fix the same type of grid which is sticky surface grid

*reject time taken /duration because it is part of RV.</td></tr>
</table>
All corrects</td><td>3</td></tr>
<tr><td></td><td>Able to state any 4-5 correct</td><td>2</td></tr>
<tr><td></td><td>Able to state 2-3 correct</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
</table>

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No.	Mark Scheme	Score
1(d)	**Able to make a hypothesis based on the following aspects :** MV : *Manipulated variable* **Locations** RV : *Responding variable* **Total surface area covered by solid pollutants // Rate of pollution** R : Relationship (Compare) <u>Sample answer :</u> 1. Bukit Nanas Forest Reserve has the lowest total surface area covered by solid pollutants / level of air pollution compared to National Zoo, Kg. Baru Residential Area and Pudu Sentral Bus Terminal. 2. Pudu Sentral Bus Terminal has the highest total surface area covered by solid pollutants / level of air pollution compared to Kg Baru Residential Area, National Zoo and Bukit Nanas Forest Reserve. ***must contains all listed MV***	3
	Able to make a hypothesis relating the manipulated variable and the responding variable inaccurately <u>Sample answer :</u> 1. Different locations causing different total surface area covered by solid pollutants / level of air pollution. 2. Locations affect the total surface area covered by solid pollutants / level of air pollution.	2
	Able to make a hypothesis at idea level <u>Sample answer :</u> 1. Air contains solid pollutants.	1
	No response or incorrect response	0

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<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td>1(e)(i)</td><td>

Able to construct a table which contain the following aspects :

P1 : Title and unit
P2 : Data recorded correctly
P3 : Rate of air pollution calculated correctly

Sample answer

<table>
<tr><th>Location</th><th>Total surface area covered by solid pollutants, cm^2</th><th>Rate of Air pollution, cm^2 / day</th></tr>
<tr><td>National Zoo</td><td>9</td><td>1.29</td></tr>
<tr><td>Bukit Nanas Forest Reserve</td><td>8</td><td>1.14</td></tr>
<tr><td>Puduraya Bus Station</td><td>26</td><td>3.71</td></tr>
<tr><td>Kg. Baru Housing Residential</td><td>15</td><td>2.14</td></tr>
</table>

Note :
(T) Titles with correct unit - 1 mark
(D) Record all the data correctly – 1 mark
(C) Calculate and record all the rate of air pollution – 1 mark

</td><td>3</td></tr>
<tr><td></td><td>**Any two correct**</td><td>2</td></tr>
<tr><td></td><td>**Any one correct**</td><td>1</td></tr>
<tr><td></td><td>**No response or incorrect response**</td><td>0</td></tr>
</table>

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No.	Mark Scheme	Score
1(e)(ii)	**Able to draw a bar chart correctly which include the following aspects :** Axes : Uniform scale for both axis Points : Bars with correct height Curve : 4 bars drawn separately Refer to graph provided	3
	Any two criteria correct	2
	Any one criteria correct	1
	No response or incorrect response	0
1(f)	**Able to state and explain the relationship between the locations and the rate of air pollution correctly.** R : Location (MV) + Rate of air pollution (RV) + relationship (R) E1 : exhaust fumes from buses emit large amount of soot/smoke/carbon E2 : due to combustion of fuel <u>Sample answer</u> : Pudu Sentral Bus Terminal has the highest rate of air pollution compare to Kg. Baru Residential Area, National Zoo and Bukit Nanas Forest Reserve due to exhaust fumes from buses emit large amount of soot/smoke/carbon and combustion of fuel **(R must correct; R + 2E)**	3
	Able to interpret the relationship incompletely R + 1E	2
	Able to interpret the relationship at idea level R only	1
	No response or incorrect response	0

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No.	Mark Scheme	Score
1(g)	Able to state operational definition for air pollution based on all the following aspects: Classification : Air pollution is an (air sample /condition/ phenomenon) with the presence of solid pollutants on the grid cellophane tape CRV + CV : shown by the total surface area covered by solid pollutants in a week MV : depends on the different locations <u>Sample answer :</u> Air pollution is an air sample/phenomenon/condition with the presence of solid pollutants on the grid glass shown by the total surface area covered by solid pollutants in a week depends on the different locations. All	3
	Any two aspects	2
	Any one aspect	1
	No response or incorrect response	0
1(h)	**Able to predict the outcome of the experiment correctly based on the following criteria**: P1 = Relationship (more/less) with value suggested (with unit) E1 = Reason E2 = Effect <u>Sample answers</u> The rate of air pollution is **more than 3.71 cm^2** *(accept any value more than 3.71cm^2)*/ day because there will be **more** dust/soot present in the air due to the explosives used to break the hills (to get the stones). **P must correct; P +2E**	3
	Able to predict the outcome of the experiment incompletely **P + 1E**	2
	Able to predict the outcome of the experiment at idea level **P only**	1
	No response or incorrect response **P wrong**	0

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<table>
<tr><td rowspan="4">1(i)</td><td>Able to classify type of pollutants with appropriete type of pollution

<u>Sample answer</u>

<table><tr><td>Air pollution</td><td>Water pollution</td><td>Thermal pollution</td></tr><tr><td>Carbon monoxide
Sulphur dioxide
Soot</td><td>Fertilizers
Detergents
Nitrates</td><td>Hot water</td></tr></table></td><td>3</td></tr>
<tr><td>Able to list 5-7 condition correctly</td><td>2</td></tr>
<tr><td>Able to list 2-4- condition correctly</td><td>1</td></tr>
<tr><td>No response or incorrect response</td><td>0</td></tr>
</table>

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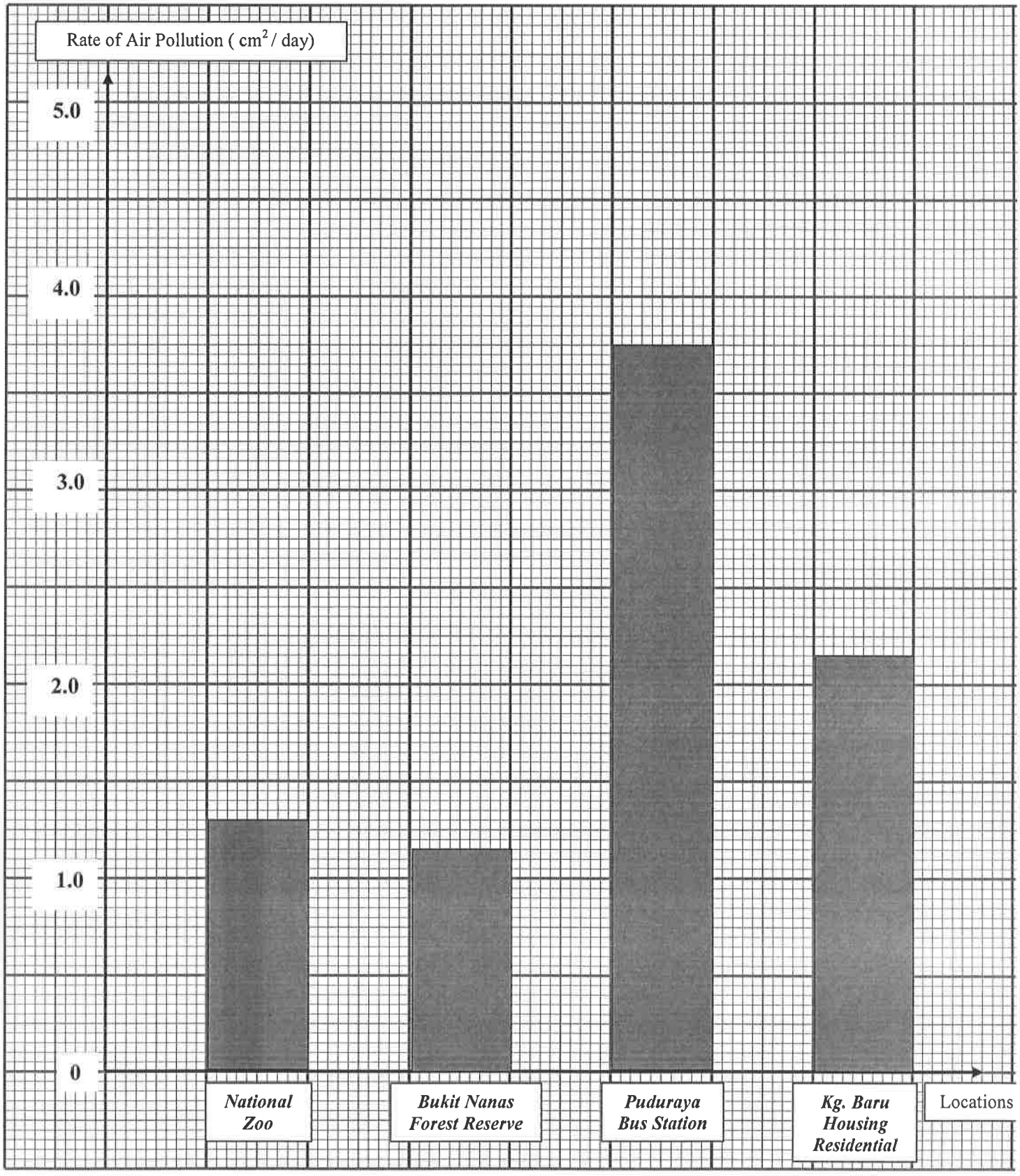
Bar chart of Rate of Air Pollution against Locations



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No.	Mark Scheme	Score
2(i)	**Able to state the problem correctly based on the following aspects:** MV : Manipulated : Type of fruit (juice) RV : Responding : Percentage vitamin C / Volume of fruit juice needed to decolorize DCPIP Relationship : Relationship between the variable in a question form (Question form) **Sample answers:** 1. Does guava/mangosteen/mango contain highest percentage of vitamin C compared to guava/mangosteen/mango? (must contain 2 fruits) 2. What is the percentage of vitamin C in guava, mangosteen and mango?	3
	Able to state a problem statement inaccurately **Sample answers:** 1.Does guava/mangosteen/mango has high percentage of vitamin C? 2. What is the content of vitamin C in the guava/mangosteen/mango? 3. Which fruit juice has the highest percentage of vitamin C?	2
	Able to state a of problem statement at idea level <u>Sample answers:</u> 1.Does guava/mangosteen/mango contain vitamin C? 2.Does the fruits contain vitamin C?	1
	No response or incorrect response	0

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No.	Mark Scheme	Marks
2(ii)	**Able to state the hypothesis correctly based on the following aspects:** **MV** – Manipulate Variable **RV** – Responding Variable Relationship – Relationship of the variables <u>Sample answers:</u> 1. Guava/Mangosteen/Mango contains the highest percentage of vitamin C compared to Guava/Mangosteen/Mango (must contain 2 friuts). Eg: Guava contains the highest percentageof Vitamin C compared to mangosteen and mango. 2. Guava/Mangosteen/Mango juice uses the least amout /volume to decolourise DCPIP solution.	3
	Able to state a hypothesis inaccurately <u>Sample answers:</u> 1. Guava/Mangosteen/Mango has the highest percentage of vitamin C. 2. Guava/Mangosteen/Mango has the highest percentage of vitamin C compare to Guava/Mangosteen/Mango (mention only one fruit)	2
	Able to state the **idea** of the hypothesis. <u>Sample answers:</u> 1. Guava/Mangosteen/Mangocontains vitamin C 2. Fruits contain vitamin C.	1
	No response or incorrect response	0

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<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td>2(iii)</td><td>Able to state all <u>three</u> variables correctly
Sample answers:

1: Manipulated variable: Type of fruit (juice)

2: Responding variable: Percentage of vitamin C //
Volume of fruit juice needed to decolorize DCPIP

3:Controlled/constant variable : Volume of DCPIP solution//
Concentration of DCPIP solution//
Concentration of ascorbic Acid</td><td>3</td></tr>
<tr><td></td><td>Able to state any <u>two</u> variables correctly</td><td>2</td></tr>
<tr><td></td><td>Able to state any <u>one</u> variables correctly</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
</table>

<table>
<tr><td>2(iv)</td><td>Able to list all the important apparatus and materials correctly

Sample Answer

Apparatus: syringe (5ml) with needle, syringe 1ml, knife, beaker and specimen tubes.

Materials: 1 % DCPIP solution, 0.1% ascorbic acid solution, guava (juice), mango (juice) and mangosteen (juice).

*
<table>
<tr><th></th><th>Apparatus</th><th>Materials</th></tr>
<tr><td>MV</td><td>A1: Specimen tubes
A2: Beaker</td><td>M1: Fruit juice (3 types) mango juice, mangosteen juice, guava juice</td></tr>
<tr><td>RV</td><td>A3: Knife</td><td></td></tr>
<tr><td>CV</td><td>A2: Syringe with needle</td><td>M2: Ascorbic acid
M3: DCPIP</td></tr>
</table>
5A + 5M</td><td>3</td></tr>
<tr><td></td><td>Able to state/list at least 3 of the apparatus and 3 materials correctly</td><td>2</td></tr>
<tr><td></td><td>Able to state/list at least 1 both of the apparatus materials correctly</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect response</td><td>0</td></tr>
</table>

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No.	Mark Scheme	Marks	
2(v)	**Able to describe the steps of the experiment procedure or method correctly based on the following aspects:** *K1 : Preparation of materials & apparatus (at least 5K's)* *K2 : Operating the constant variable* *K3 : Operating the responding variable* *K4 : Operating the manipulated variable* *K5: Steps to increase reliability of result accurately/precaution* Sample answer :	K's	

No	Description	Keywords	K's
1	Diagram of experiment setup with at least 5 labels	Diagram	K1/MA
2	**Cut** and squeeze the fruits to prepare the juice	Cut ... juice	K1/MA
3	1 ml of DCPIP solution is **placed** in the specimen tube using a 1 ml syringe.	1ml DCPIP.. placed.. specimen tube	K1/MA
4	The 5 ml syringe is **filled** with **0.1% ascorbic** acid solution.	0.1% ascorbic acid.. filled	K4/CV K1/MA
5	The needle of the syringe is **placed** into the DCPIP solution	placed... DCPIP	K1/MA
6	Immerse the needle of the syringe into the DCPIP solution	Immerse...needle	K5
7	Ascorbic acid solution is **added** drop by drop to the DCPIP solution, and gently stirred with the needle of the syringe (do not shake the tube vigorously).	added drop by drop... gently stirred/ do not shake	K1/MA K5
8	The ascorbic acid solution is continuously **added** until the DCPIP solution is decolorized.	added...DCPIP.. decolorized	K1/MA
9	The volume of ascorbic acid solution used is measured and recorded using syringe. *Ascorbic acid is not MV; not as K3 because the data obtained is only an initial result.	Record...volume.. ascorbic acid.. syringe	K1/MA
10	Steps 1 to 6 are repeated using fresh guava/mangosteen/mango.	Repeated	K2/MV
11	Repeat step 1 – 10 by using the **same volume** of DCPIP solution which is **1ml**.	Same volume	K2
12	The volume of fruit juice used to decolourise the DCPIP solution in each fruit juice is **measured** and **recorded** using **syringe**.	Measure... record... volume of juice ...syringe	K3/RV
13	The percentage of vitamin C in each fruit juice are calculated using the formula: Percentage of Vitamin C = Volume of ascorbic acid used X 0.1% Volume of fruit juice used	Calculate.. record.. formula	K3/RV
14	Record all data in a table// **Tabulate** date	Record... in a table/ Tabulate data	K1/MA
15	Repeat the experiment for each fruit to get the average	Repeat...Average	K5

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	Sample Procedure : 1. 1 ml of DCPIP solution is placed in the specimen tube using a 1 ml syringe. 2. The 5 ml syringe is filled with 0.1% ascorbic acid solution. 3. The needle of the syringe is placed into the DCPIP solution 4. Ascorbic acid solution is added drop by drop to the DCPIP solution, and gently stirred with the needle of the syringe (do not shake the tube vigorously). 5. The ascorbic acid solution is continuously added until the DCPIP solution is decolourised. 6. The volume of ascorbic acid solution used is measured and recorded using syringe. 7. Steps 1 to 6 are repeated using fresh watermelon, pineapple and lemon juice. 8. Steps 1 – 7 is repeated by using the same volume of DCPIP solution. 9. The volume of fruit juice used to decolorize the DCPIP solution in each fruit juice is measured using syringe. 10. The percentage of vitamin C in each fruit juice are calculated using the formula: Percentage of Vitamin C = $\frac{\text{Volume of ascorbic acid used}}{\text{Volume of fruit juice used}}$ X 0.1% 11. All data are recorded in a table.		
	Able to state all 5K		**3**
	Able to state at least 3 - 4K		**2**
	Able to state 1 - 2K		**1**
	No response or incorrect response		0

No.	Mark Scheme	Marks
2(vi)	**Able to construct a table to record data based on the following aspects:** P1: Manipulated variable P2: Correct Operating/ Responding variables with units (must have both CRV and ARV) Sample answers:	2

Solution/fruit juice	Volume of solution/fruit juice needed to decolourise 1ml of DCPIP solution (ml)	Percentage of Vit C (%)
0.1% Ascorbic Acid		
Guava Juice		
Mangosteen Juice		
Mango Juice		

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