Question 1/ *Soalan 1*

<table>
<tr><th>ITEM</th><th>SCORE</th><th>CRITERIA</th><th>REMARKS</th></tr>
<tr><td>(a)</td><td>3</td><td>Able to record all the data correctly
Dapat merekodkan semua data dengan betul
Sample:
<table>
<tr><th>Type of fruit juice
Jenis jus buah</th><th>Volume of fruit juice used to decolourised 1 ml DCPIP (ml)
Isipadu jus buah yang digunakan untuk melunturkan 1 ml larutan DCPIP (ml)</th></tr>
<tr><td>Guava
Jambu batu</td><td>1.6</td></tr>
<tr><td>Orange
Oren</td><td>2.2</td></tr>
<tr><td>Starfruit
Belimbing</td><td>2.8</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>2</td><td>Able to record 2 data correctly
Dapat merekod 2 data dengan betul</td><td></td></tr>
<tr><td></td><td>1</td><td>Able to record 1 data correctly
Dapat merekod 1 data dengan betul</td><td></td></tr>
<tr><td></td><td>0</td><td>Not able to give any response or wrong response
Tiada respon atau respon yang salah</td><td></td></tr>
<tr><td>(b) (i)</td><td>3</td><td>Able to state any two observations correctly
Dapat menyatakan 2 pemerhatian dengan betul
Sample answer : (mv + RV + nilai dan unit)
1. Volume of Guava juice to decolourise 1ml DCPIP solution is 1.6ml
Isipadu jus jambu batu untuk melunturkan 1 ml larutan DCPIP ialah 1.6 ml
2. Volume of Starfruit juice to decolourise 1ml DCPIP solution is 2.8ml
Isipadu jus jambu batu untuk melunturkan 1 ml larutan DCPIP ialah 2.8 ml</td><td>Accepted : Any suitable answer
Accepted : Any suitable answer
Terima : Semua jawapan yang sesuai</td></tr>
<tr><td></td><td>2</td><td>Able to state any correct observation and one idea of observation or two inaccurate observations
Dapat menyatakan satu permerhatian yang betul dan satu idea atau dua pemerhatian yang tidak tepat</td><td></td></tr>
</table>

		Sample answer : *Sampel jawapan:* 1. Volume of Guava juice to decolourise 1ml DCPIP solution is low/less *Isipadu jus jambu batu untuk melunturkan 1 ml larutan DCPIP ialah rendah/sedikit* 2. Volume of Starfruit juice to decolourise 1ml DCPIP solution is high/more *Isipadu jus belimbing untuk melunturkan 1 ml larutan DCPIP ialah tinggi/ lebih*	
	1	Able to state two ideas of the above observations correctly *Dapat menyatakan 2 idea untuk pemerhatian dengan betul* Sample answer : *Sampel jawapan* 1. Volume of Guava juice is less *Isipadu jus jambu batu ialah kurang* 2. Volume of Starfruit juice is less *Isipadu jus belimbing ialah kurang*	
	0	Not able to give any response or wrong response	

(b) (ii)	3	Able to state one possible inference for each observation *Dapat menyatakan satu inferen yang tepat untuk setiap pemerhatian* Sample answer	

		Sampel jawapan: 1. Guava juice contains the highest percentage / concentration of vitamin C *Jus jambu batu mempunyai kandungan /kepekatan vitamin C yang paling tinggi.* 2. Starfruit juice contains the lowest percentage / concentration of vitamin C *Jus belimbing mengandungi kandungan/kepekatan vitamin C yang paling rendah.*	
	2	Able to state one correct and one inaccurate inference or two inaccurate inferences *Dapat menyatakan satu inferen yang tepat dan satu inferen yang tidak tepat atau dua inferens yang tidak tepat.* Sample answer *Sampel jawapan* 1. Guava juice contains more percentage / concentration of vitamin C *Jus jambu batu mengandungi lebih peratus / kepekatan vitamin C.* 2. Starfruit juice contains less percentage / concentration of vitamins C *Jus belimbing mengandungi kurang peratus /kepekatan vitamin C*	
	1	Able to state two inferences at idea level *Dapat menyatakan dua inferens pada aras idea* Sample answer *Sampel Jawpan :* 1. Percentage / concentration of vitamin C is affected by fruit juice *Peratusan/ kepekatan vitamin C dipengaruhi oleh jus buah* 2. Percentage / concentration of vitamin C is affected by ascorbic acids *Peratusan /kepekatan vitamin C dipengaruhi oleh asid askorbik*	
	0	Not able to give any response or wrong response *Tiada respon atau respon yang salah*	

(c)	3	Able to state all the variables and ways operating the variables correctly *Dapat menyatakan semua pembolehubah dan cara mengendalikan pembolehubah dengan betul* Sample answer *Sampel Jawapan*	

Variable *Pembolehubah*	Operating the variable *Cara mengendalikan pembolehubah*
Manipulated variable *Pembolehubah manipulasi* type of fruit juice// guava juice, orange and starfruit juice *Jenis jus buah//jus jambu batu, oren dan belimbing besi*	Used different type of fruit juice (such as guava juice, orange juice and starfruit juice) *Menggunakan jenis jus buah yang berbeza iaitu jus buah jambu batu, oren dan belimbing.*
Responding variable *Pembolehubah bergerakbalas:* Volume of fuit juice used to decolourise (1ml) DCPIP solution // the percentage/ concentration of vitamin C *Isipaau jus buah yang digunakan untuk melunturkan 1 ml larutan DCPIP// peratus kepekatan Vitamin C*	Measure and record the volume of fruit juice used to decolourise 1ml DCPIP solution by using a syringe //calculate the percentage/concentrationof vitamin C by using formula: =Volume of 0.1% ascorbic acids solution X 0.1% Volume of fruit juice OR Volume of 0.1% ascorbic acids solution X 1.0mgcm^{-3} Volume of fruit juice *Menyukat dan merekod isipadu jus buah yang digunakan untuk melunturkan 1 ml larutan DCPIP// peratus kepekatan Vitamin C* *Menghitung peratusan /kepekatan vitamin C dengan menggunakan formula berikut:* *Isipadu 0.1% larutan asid askorbik* X 0.1% *Isipadu jus buah* *Atau* *Isipadu 0.1% larutan asid askorbik* X 1.0 mgcm^{-3} *Isipadu jus buah*
Constant variable Volume of DCPIP solution	Fixed the same volume of DCPIP solution at 1ml in each experiment. *Menetapkan isipadu larutan DCPIP iaitu 1 ml untuk*

		Pembolehubah dimalarkan *Isipadu larutan DCPIP*	~~*setiap eksperimen*~~
	2	Able to state any 3- 4 items from the above *Menyatakan mana-mana 3-4 item dari atas*	
	1	Able to state any 2 items from the above *Menyatakan mana-mana 2 item dari atas*	
	0		

(d)	3	Able to write a complete hypothesis statement based on the following aspect : *Dapat menyatakan hipotesis dengan lengkap berdasarkan aspek berikut :* P1 = Manipulated variable / *Pembolehubah dimanipulasi* P2 = responding variable / *Pembolehubah bergerakbalas* H = Relationship / Link / *Hubungan* Sample answer : 1. Guava juice has the highest percentage /concentration of vitamin C than orange juice and guava juice *Jus jambu mempunyai peratus / kepekatan vitamin C yang paling tinggi berbanding jus oren dan jus belimbing* 2. The volume of guava juice used to decolourise 1ml DCPIP solution is the least compare the volume of orange juice and starfruit juice *Isipadu jus jambu yang diperlukan untuk melunturkan 1ml larutan DCPIP adalah paling rendah berbanding jus oren dan jus belimbing*	P I-Type of fruit juice / *Jenis jus buah* //guava juice, orange juice and starfruit juice P2-Volume of fruit juice to decclourise 1ml DCPIP solution// the percentage/ concentration of vitamin C *-Isipadu jus buah yang diperlukan untuk melunturkan larutan 1ml DCPIP* H- relationship - *Hubungan* *wrong hypothesis is accepted*

	2	Able to write any two aspect : *Dapat menyatakan mana mana dua aspek :* P1 and P2 // P1 and H // P2 and H Sample answer : *Sampel jawapan* The percentage /concentration of fruit juice, the different the volume of fruit juice to decolourise 1ml DCPIP solution *Peratus / kepekatan jus buah, isipadu jus buah yang berbeza diperlukan untuk melunturkan 1 ml larutan DCPIP*	
	1	Able to write any one aspect : *Dapat menyatakan mana mana satu aspek* Sample answer : *Sampel jawapan* The percentage /concentration of vitamin C is influenced by different fruit juice *Peratus/ kepekatan vitamin C dipengaruhi oleh jenis jus buah*	
	0	Not able to give a response or wrong response *Tak dapat memberi respon ATAU respon salah*	
(e)(i)	3	Able to construct a table and show the following : *Dapat membina jadual dan menunjukkan perkara perkara berikut;* H- Heading in the table are labelled with correct units *Kepala tajuk jadual ditulis dengan unit yang betul* D- All data are correct *Semua data betul* P- The correct calculation of percentage and concentration of vitamin C *Pengiraan kepekatan dan peratus vitamin C adalah betul*	

		Sample answer : Type of fruit juice *Jenis Jus buah* / Volume of fruit juice to decolourise 1ml DCPIP solution (ml) *Isipadu jus buah untuk melunturkan 1 ml larutan DCPIP (ml)* / Percentage of vitamin C (%) *Peratus vitamin (5)* / Concentration of vitamin C ($mgcm^{-3}$) *Kepekatan vitamin C ($mgcm^{-3}$)* Guava *Jambu* — 1.6 — 0.063 — 0.625 Orange *Oren* — 2.2 — 0.045 — 0.454 Starfruit *Belimbing* — 2.8 — 0.036 — 0.357	
	2	Able to construct a table with all the data to Plot a graph and show the following criteria *Dapat membina jadual yang lengkap dengan data untuk melakar graf mengikut kriteria berikut* 1. H and D // D and P // H and P *1. H dan D // D dan P // H dan P* *1.*	
	1	Able to construct a table with all the data to Plot a graph and show the following criteria *Dapat membina jadual yang lengkap dengan data untuk melakar graf mengikut kriteria berikut* 1. Either H or D or P *Samada H atau D atau P*	
(e)(ii)	3	Able to plot a graph with the following aspect *Dapat melakar graf dengan mengikut aspek berikut* P – all axis with uniform scale and correct units *Semua paksi dengan skala dan unit yang betul* T – all point is transferred correctly *Semua titik di tanda dengan betul* B – Able to draw the correct shape / line of the graph *Dapat melukis bentuk / garis yang betul pada graf*	

	2	Able to give any two aspect *Dapat memberi mana mana dua aspek*	
	1	Able to give any one aspect *Dapat memberi mana mana satu aspek*	
	0	Not able to give response or wrong response *Tiada respon / Respon salah*	
(f)	3	Able to explain the relationship between the concentration of vitamin C and the sample of fruit juice *Dapat menerangkan hubungan antara kepekatan vitamin C dan sampel jus buah* Sample answer : *Sampel jawapan :* E1 - Guava juice has the highiest concentration of vitamin C than orange juice and starfruit juice - *Jus jambu mengandungi kepekatan vitamin C paling tinggi* E1 - Because it c ontains more ascorbic acids - *Kerana mengandungi lebih asid askorbik* E3 - causing less volume of guava juice used to decolourise 1ml DCPIP solution - *Menyebabkan sedikit jus jambu diperlukan untuk melunturkan 1ml larutan DCPIP*	
	2	Able to write any two from the above *Dapat menulis mana mana dua di atas* E1 and E2// E1 and E3 //E2 and E3 *E1 dan E2// E2 dan E3 // E2 dan E3*	
	1	E1// E2 //E3	
	0	Wrong response *Respon salah*	

(g)	3	~~Able to predict volume of orange juice that needs to~~ decolourise 1 ml DCPIP based on *Dapat meramalkan isipadu jus oren yang diperlukan untuk melunturkan 1ml larutan DCPIP* F : the volume of orange juice is increase more than 2.2 ml // accept any relevant figure *Isipadu jus oren meningkat melebihi 2.2 ml// terima sebarang nilai yang releven* E1: contain less ascorbic asid / vitamin C *Mengandungi kurang asid askorbik/ vitamin C* E2: because ascorbic asid in overnight orange juice has been oxidized *Kerana asid askorbik yang disimpan semalaman telah teroksida*	Include F, E1 and any E2 / E3
	2	Able to predict based on any two aspect *Dapat meramal berdasarkan mana mana 2 aspek*	
	1	Able to predict based on any one aspect *Dapat meramal berdasarkan salah satu aspek*	
	0	Wrong response *Respon salah*	
(h)	3	Able to describe the concept of vitamin C based on the following aspect *Dapat menjelaskan tentang konsep vitamin C berdasarkan aspek berikut* E1 - the content of ascorbic acids in a fruit juice *kandungan asid askorbik dalam jus buah* E2 - that can be determined with the volume of fruit juice to decolourise 1ml DCPIP solution - *Yang dapat ditentukan dengan kandungan jus buah yang dapat melunturkan 1ml larutan DCPIP* E3 - and it is affected by the different type of fruit juice - *dan dapat dipengaruhi oleh jus buah yang berbeza*	

<table>
<tr><td></td><td>2</td><td>Able to define based on any two aspects
Dapat mendefinisikan berdasarkan mana mana dua aspek</td><td></td></tr>
<tr><td></td><td>1</td><td>Able to define based on any one aspect
Dapat mendefinisikan berdasarkan mana mana satu aspek</td><td></td></tr>
<tr><td></td><td>0</td><td>Wrong response
Respon salah</td><td></td></tr>
<tr><td>(i)</td><td>3</td><td>Able to complete Table 3 by listing all the apparatus and materials.
Dapat melengkapkan Jadual dengan menenaraikan alat radas dan bahan dengan betul

<table><tr><th>Apparatus</th><th>Material</th></tr><tr><td>Syringe with needle
Picagari dengan jarum

Reagent botile
Botol Reagen

Beaker
Bikar</td><td>Orange juice
Jus Oren

Guava juice
Jus Jambu

Starfruit juice
Jus Belimbing

Ascorbic asid
Asid Askorbik

DCPIP solution
Larutan DCPIP</td></tr></table>
3A + 5M</td><td></td></tr>
<tr><td></td><td>2</td><td>Able to state the apparatus and materials correctly.
Dapat menyatakan alat radas dan bahan dengan betul
2A + 4M</td><td></td></tr>
<tr><td></td><td>1</td><td>Able to state the apparatus and materials correctly.
Dapat menyatakan alat radas dan bahan dengan betul
1A + 3M</td><td></td></tr>
<tr><td></td><td>0</td><td>Wrong response
Respon salah</td><td></td></tr>
</table>

EXAMPLE OF A FORMAT FOR PLANNING AN EXPERIMENT (RUBRIC)

SOALAN 2 :

Problem statement Pernyataan masalah	MV : The concentation of an external solution/sucrose solution *Kepekatan larutan luar/ larutan sukrosa* RV : which has no effect on potato cells / no effect on the length/ mass of potato strip *Tiada kesan terhadap sel ubi kentang / tiada kesan terhadap panjang/jisim jalur ubi kentang* Q : Relation in question form and question symbol [?] *Hubungan dalam ayat soalan dan mesti ada tanda (?)* Sample Answer: 1. What is the concentration of the an external solution which has no effect on potato cells? *Apakah kepekatan satu larutan luar yang tidak mempunyai kesan ke atas sel ubi kentang?* 2. What is the concentration of the an external solution which has no effect on the length/mass of potato strip? *Apakah kepekatan satu larutan luar yang tidak mempunyai kesan ke atas panjang/jisim jalur ubi kentang?*	3m
Hypothesis Hipotesis	MV : The concentation of an external solution/sucrose solution *Kepekatan larutan luar / larutan sukrosa* RV : which has no effect on potato cells / no effect on the length/ mass of potato strip *Tiada kesan terhadap sel ubi kentang / tiada kesan terhadap panjang/jisim ubi kentang*	3m

	H : Relationship *Hubungan* Sample Answer : 1. The concentation of an external solution which has no effect on potato cells has no effect on the length/ mass of potato strip *Kepekatan satu larutan luar/larutan sukrosa yang tiada kesan terhadap sel ubi kentang / tiada kesan terhadap panjang/ jisim jalur ubi kentang*	
Pembolehubah	MV : The concentation of sucrose solution *Kepekatan larutan sukrosa* RV : length/ mass of potato strip *panjang/jisim ubi kentang* CV : surrounding temperature and time *Suhu persekitaran dan masa*	3m
Apparatus and Material *Radas (A) & Bahan (M)*	Material : potatoes, distilled water,sucrose solution with concentration of 0.1 M, 0.2 M, 0.3 M, 0.4 M, 0.5 M and 0.6 M, filter paper, graph paper *Bahan (M) : ubi kentang, air suling, larutan sukrosa dengan kepekatan 0.1 M, 0.2 M, 0.3 M, 0.4 M, 0.5 M and 0.6 M, kertas turas, kertas graf* Apparatus : petri dish, forceps, cork borer, scalpel, ruler/electronic balance, beaker, white tile, *Radas piring petri, forsep, penebuk gabus, skalpel, pembaris/penimbang elektronik, bikar, jubin putih* 7A-6A +5M = 3m , 5A-4A+4M =2m , 3A-2A+3M = 1m	3m
Procedure Prosedur	Able to state K1,K2,K3, K4 and K5 correctly. K1 : The set up of apparatus– at least 5. K2 : Operating fixed variable – at least 1 K3 : Operating responding variable– at least 1. K4 : Operating manipulated variable– at least 1 K5 : Precaution / Accuracy of statement – at least 1	

5K = 3m

1. Label 7 petri dishes as A, B, C, D, E, F and G 9 (K1)
Label 7 piring petri sebagai A, B, C, D, E, F dan G (K1)

3K-4K = 2m

2. Fill each petri dish with the following solutions :(K1)(K4)
Isikan setiap piring petri dengan larutan berikut (K1)(K4)

2K = 1m

Petri dish *Piring petri*	Solution *Larutan*
A	Distilled water *Air suling*
B	0.1 M sucrose solution *Larutan sukrosa 0.1M*
C	0.2 M sucrose solution *Larutan sukrosa 0.1M*
D	0.3 M sucrose solution *Larutan sukrosa 0.1M*
E	0.4 M sucrose solution *Larutan sukrosa 0.1M*
F	0.5 M sucrose solution *Larutan sukrosa 0.1M*
G	0.6 M sucrose solution *Larutan sukrosa 0.1M*

3. Use a cork borer to get 7 cylindrical strips of potato. (K1)
Guna satu penebuk gabus untuk mendapatkan 7 jalur silinder ubi kentang.(K1)

4. Measure and cut each strip to a length of 4 cm (K2)
Ukur dan potong setiap jalur sepanjang 4 cm. (K2)

5. Put one potato strip into each petri dish and let it soaked for 1 hour (K1)(K2)
Letak satu jalur ubi kentang ke dalam setiap piring petri dan biarkan selama 1 jam (K1) (K2)

6. After an hour, use a forceps to take out the potato strips. (K1) Wipe each potato dry with a piece of filter paper. (K5) Measure the length/weight the mass of potato strip using the ruler/electronic balance .(K3)
Selepas satu jam, gunakan forsep untuk mengambil keluar jalur

ubi kentang.(K1) Keringkan setiap jalur ubi kentang dengan sehelai kertas turas.(K5) Ukur panjang/timbang jisim jalur ubi kentang dengan menggunakan pembaris/neraca penimbang. (K3)

7. Record the data obtained in a table. (K1)

   Rekod data yang diperolehi dalam satu jadual. (K1)

8. Draw a graph of change in length / mass of potato strip against the concentration of sucrose solution.(k3)

   Lukis satu graf perubahan dalam panjang/ jisim jalur ubi kentang melawan kepekatan larutan sukrosa.(K3)

9. The concentration of the sucrose solution in which the change in length/mass of potato strip is zero is the solution which has no effect on potato cells (K3)

   Kepekatan larutan sukrosa yang mana perubahan dalam panjang/ jisim jalur ubi kentang ialah sifar adalah larutan yang tidak ada kesan ke atas sel ubi kentang. (K3)

Data

P1 : MV with corret unit
P2 : RV with correct unit

(P1) Petri dish *Piring petri*	(P1) Solution *Larutan*	Length/mass of potato strip (cm) *Panjang/ jisim jalur ubi kentang(cm)*		(P2) Change in length/mass (cm) *Perubahan panjang/ jisim(cm)*	(P2) Percentage difference in length/mass(%) *Peratusan perbezaan panjang/jisim (%)*
		Initial *Awal*	Final *Akhir*		
A	0.1 M				
B	0.2 M				
C	0.3 M				
D	0.4 M				
E	0.5 M				
F	0.6 M				
G	0.7 M				

2in