

TENTATIF ANSWER Q1 PAPER 3

NO	MARK SCHEME	MARKS																				
1(a)	<p>[Classifying]</p> <p>Able to classify Diagram 1 correctly under the apparatus and materials using suitable materials // 7 correct ticks.</p> <p>Sample answers:</p> <table border="1" data-bbox="312 566 1251 1050"> <thead> <tr> <th data-bbox="312 566 624 640">Variables <i>PembolehUbah</i></th> <th data-bbox="624 566 938 640">Apparatus <i>Radas</i></th> <th data-bbox="938 566 1251 640">Material <i>Bahan</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="312 640 624 831">Manipulated <i>Dimanipulasikan</i></td> <td data-bbox="624 640 938 831">Glass cup <i>Cawan gelas</i> atau Bottle <i>Botol</i></td> <td data-bbox="938 640 1251 831">Drinking water <i>Air minuman</i></td> </tr> <tr> <td data-bbox="312 831 624 938">Responding <i>Bergerakbalas</i></td> <td data-bbox="624 831 938 938">Measuring cylinder <i>Silinder Penyukat</i></td> <td data-bbox="938 831 1251 938">Urine <i>Air kencing</i></td> </tr> <tr> <td data-bbox="312 938 624 1050">Constant <i>Malar</i></td> <td data-bbox="624 938 938 1050">Stopwatch <i>Jam randik</i></td> <td data-bbox="938 938 1251 1050">Students <i>Murid</i></td> </tr> </tbody> </table>	Variables <i>PembolehUbah</i>	Apparatus <i>Radas</i>	Material <i>Bahan</i>	Manipulated <i>Dimanipulasikan</i>	Glass cup <i>Cawan gelas</i> atau Bottle <i>Botol</i>	Drinking water <i>Air minuman</i>	Responding <i>Bergerakbalas</i>	Measuring cylinder <i>Silinder Penyukat</i>	Urine <i>Air kencing</i>	Constant <i>Malar</i>	Stopwatch <i>Jam randik</i>	Students <i>Murid</i>	3								
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1(b)	<p>[Measuring using Numbers]</p> <p>Able to record all the correct volumes of urine // 7 - 8 volumes of urine released by student 1 and student 2 correctly .</p> <p>Sample answers:</p> <table border="1" data-bbox="312 1529 1227 1980"> <thead> <tr> <th data-bbox="312 1529 520 1823" rowspan="2">Student's group of the same age <i>Kumpulan murid-murid pada umur yang sama</i></th> <th data-bbox="520 1529 727 1823" rowspan="2">Volume of drinking water drank (ml) <i>Isipadu air minuman yang diminum (ml)</i></th> <th colspan="2" data-bbox="727 1529 1227 1753">Volume of urine released by two different students after 1 hour (ml) <i>Isipadu air kencing yang dibebaskan oleh dua orang murid yang berbeza selepas 1 jam (ml)</i></th> </tr> <tr> <th data-bbox="727 1753 999 1823">Student 1 <i>Murid 1</i></th> <th data-bbox="999 1753 1227 1823">Student 2 <i>Murid 2</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="312 1823 520 1899" rowspan="2">A</td> <td data-bbox="520 1823 727 1861">200</td> <td data-bbox="727 1823 999 1861">33</td> <td data-bbox="999 1823 1227 1861">43</td> </tr> <tr> <td data-bbox="520 1861 727 1899">400</td> <td data-bbox="727 1861 999 1899">96</td> <td data-bbox="999 1861 1227 1899">93</td> </tr> <tr> <td data-bbox="312 1899 520 1980" rowspan="2">B</td> <td data-bbox="520 1899 727 1937">600</td> <td data-bbox="727 1899 999 1937">93</td> <td data-bbox="999 1899 1227 1937">123</td> </tr> <tr> <td data-bbox="520 1937 727 1980">800</td> <td data-bbox="727 1937 999 1980">113</td> <td data-bbox="999 1937 1227 1980">136</td> </tr> </tbody> </table>	Student's group of the same age <i>Kumpulan murid-murid pada umur yang sama</i>	Volume of drinking water drank (ml) <i>Isipadu air minuman yang diminum (ml)</i>	Volume of urine released by two different students after 1 hour (ml) <i>Isipadu air kencing yang dibebaskan oleh dua orang murid yang berbeza selepas 1 jam (ml)</i>		Student 1 <i>Murid 1</i>	Student 2 <i>Murid 2</i>	A	200	33	43	400	96	93	B	600	93	123	800	113	136	3
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	Able to record any 4-6 volumes of urine released correctly	2
	Able to record any 1-3 volumes of urine released correctly	1
	No response or incorrect response	0
1(c)(i)	<p>[Observations]</p> <p>Able to state two different observations correctly based on the following aspects:</p> <p>P1: Manipulated variable : Volume of water drank by each group of student</p> <p>P2: Responding variable : Volume of urine released by two different students (student 1 and student 2) after 1 hour.</p> <p>Sample answers:</p> <p>1. When student A drank 200ml / 400ml volume of drinking water, the volume of urine released/ produced after 1 hour by student 1 is 33 ml/96ml and student 2 is 43 ml/ 93 ml. <i>Apabila murid A meminum 200 ml/400ml air minuman, isipadu air kencing yang dibebaskan / dihasilkanselepas 1 jam oleh murid 1 adalah 33 ml/96ml dan murid 2 adalah 43 ml/93 ml.</i></p> <p>2. When student B drank 600ml/800 ml volume of drinking water, the volume of urine released/ produced after 1 hour by student 1 is 93ml/113ml and student 2 is /123ml/136 ml. <i>Apabila murid B meminum600ml/800 ml air minuman, isipadu air kencing yang dibebaskan / dihasilkan selepas 1 jam oleh murid 1 adalah 93ml/113 ml dan murid 2 adalah 123ml/136 ml.</i></p>	3
	<p>Able to state two observations inaccurately</p> <p>Sample answers:</p> <p>1. At lowest / highest volume of water drank, the volume of urine released (after 1 hour) is the lowest / highest <i>Pada isipadu air yang diminum sangat rendah / sangat tinggi, isipadu air kencing yang dibebaskan (selepas 1 jam) adalah sangat rendah (kecil)/sangat tinggi</i></p> <p>2. When student A drank 200 ml/400 ml volume of drinking water, the Average volume of urine released/ produced after 1 hour is 38 ml/ 94.5ml. <i>Apabila murid A meminum 200 ml/400 ml air minuman, purata isipadu air kencing yang dibebaskan / dihasilkan selepas 1 jam adalah 38ml / 94.5ml</i></p> <p>3. When student B drank 600ml/800 ml volume of drinking water, the Average volume of urine released/ produced after 1 hour is 108ml/124.5 ml</p>	2

	<p><i>Apabila murid B meminum 600ml/800 ml air minuman, purata isipadu air kencing yang dibebaskan / dihasilkan selepas 1 jam adalah 108ml/124.5 ml</i></p> <p>4. When student A drank 200/400ml ml volume of drinking water, the total volume of urine released after 1 hour is 76ml/189ml <i>Apabila murid A meminum 200ml/400 ml air minuman, jumlah isipadu air kencing dibebaskan selepas 1 jam adalah 76ml /189ml</i></p> <p>// When student B drank 600ml/ 800 ml volume of drinking water, the Total volume of urine released after 1 hour is 216ml/249ml <i>Apabila murid B meminum 600ml /800 ml air minuman, jumlah isipadu air kencing dibebaskan selepas 1 jam adalah 216ml/249ml.</i></p>	
	<p>Able to state observations at idea level.</p> <p>Sample answer:</p> <p>1. Volume of water drank by students affects volume of urine released/produced. <i>Isipadu air yang diminum oleh murid-murid mempengaruhi isipadu air kencing dibebaskan / dihasilkan.</i></p> <p>2. Volume of urine released/ produced changes. <i>Isipadu air kencing dibebaskan / dihasilkan berubah-ubah.</i></p> <p>3. Student B produced more urine than student A / vice versa. <i>Murid B menghasilkan banyak air kencing berbanding murid A/ sebaliknya/</i></p>	1
	No response or incorrect response	0
1(c)(ii)	<p>[Inferences]</p> <p>Able to make two inferences correctly based on any two aspects:</p> <p>P1: Low / High blood osmotic pressure // solute in blood is more / less.</p> <p>P2: Less / More ADH by Pituitary gland // Less /More absorption of water at Kidney tubule // Kidney less / more permeable to water</p> <p>Sample answer:</p> <p>1. (Student A drank 200/400 ml of water) Blood osmotic pressure is high / more solute in blood, causing kidney tubule more permeable to water // more ADH produced by Pituitary gland / more absorption of water at Kidney tubule . Hence less urine/ concentrated urine produced. <i>(Murid A meminum 200 ml/400ml air) Tekanan osmosis darah adalah tinggi / bahan larut adalah tinggi, menyebabkan tubul ginjal lebih telap kepada air // banyak ADH dihasilkan oleh</i></p>	3

	<p><i>Kelenjar Pituitari /lebih banyak penyerapan semula air di tubul ginjal. Maka air kencing sedikit / lebih pekat dihasilkan.</i></p> <p>2. (Student B drank 600ml /800 ml of water) Blood osmotic pressure is low /less solute in blood, causing Kidney tubule less permeable to water// less ADH produced by Pituitary gland / less absorption of water at Kidney tubule. Hence more urine / diluted urine produced. <i>(Murid B meminum 600ml /800 ml air) Tekanan osmosis darah adalah rendah / bahan larut adalah rendah menyebabkan tubul ginjal kurang telap kepada air // sedikit ADH dihasilkan oleh kelenjar Pituitari / sedikit penyerapan semula air di tubul ginjal. Maka air kencing banyak / lebih cair dihasilkan.</i></p>	
	<p>Able to state two inferences inaccurately based on any one aspect Sample answers:</p> <p>1. (Student A drank 200 ml of water) Blood osmotic pressure is high // more solute in blood // Kidney tubule more permeable to water // more ADH by Pituitary gland // more absorption of water at Kidney tubule. <i>(Murid A meminum 200 ml air) Tekanan osmosis darah adalah tinggi //bahan larut adalah tinggi //tubul ginjal lebih telap kepada air // banyak ADH dihasilkan oleh Kelenjar Pituitari // /lebih banyak penyerapan semula air di tubul ginjal.</i></p> <p>2. (Student B drank 800 ml of water) Blood osmotic pressure is low // less solute in blood // Kidney tubule less permeable to water// less ADH produced by Pituitary gland // less absorption of water at Kidney tubule. <i>(Murid B meminum 800 ml air) Tekanan osmosis darah adalah rendah//bahan larut adalah rendah //tubul ginjal kurang telap kepada air // sedikit ADH dihasilkan oleh kelenjar Pituitari // sedikit penyerapan semula air di tubul ginjal.</i></p>	2
	<p>Able to state two inferences at idea level Sample answers:</p> <p>1. Blood osmotic pressure affects volume of urine (produced) <i>Tekanan osmosis darah mempengaruhi isipadu air kencing (dihasilkan)</i></p> <p>2. Permeability of kidney tubule causes different amount of urine <i>Ketelapan tubul ginjal menyebabkan kandungan air kencing berlainan.</i></p>	1
	<p>No response or incorrect response</p>	0

1(d)	<p>[Variables] Able to state all 6 variables and the method to handle the variables correctly // all 6 ticks</p> <p>Sample answers:</p> <table border="1" data-bbox="312 376 1225 1816"> <thead> <tr> <th data-bbox="312 376 691 416">Variables</th> <th data-bbox="691 376 1225 416">Method to handle the variables</th> </tr> </thead> <tbody> <tr> <td data-bbox="312 416 691 712"> Manipulated variable: 1. Volume of drinking water drank // volume of water drank <i>Isipadu air minuman yang diminum// isipadu air yang diminum.</i> </td> <td data-bbox="691 416 1225 712"> Change volume of water drank from 200ml to 400ml, 600ml and 800ml // used different volume of water drank <i>Tukar isipadu air yang diminum dari 200ml ke 400m., 600ml dan 800ml. // Gunakan isipadu air yang berlainan untuk diminum</i> </td> </tr> <tr> <td data-bbox="312 712 691 1554"> Responding variable: 1. Volume of urine released by two different students (student 1 and student 2) (collected after 1 hour.) <i>Isipadu air kencing dibebaskan oleh dua murid-murid yang berlainan (murid 1 dan murid 2) 9 dikumpul selepas 1 jam)</i> 2. Average volume of urine collected <i>Purata isipadu air kencing yang dikumpul.</i> </td> <td data-bbox="691 712 1225 1554"> Record the volume of urine released by two students using measuring cylinder. <i>Rekod isipadu air kencing dibebaskan oleh 2 murid menggunakan silinder penyukat.</i> //Calculate average volume of urine using formula: $\frac{\text{Volume of urine student 1} + \text{student 2}}{2}$ <i>Hitung purata isipadu air kencing menggunakan rumus:</i> $\frac{\text{Isipadu air kencing murid 1} + \text{murid 2}}{2}$ </td> </tr> <tr> <td data-bbox="312 1554 691 1816"> Fixed variable: 1. Type of water (drank) <i>Jenis air (diminum)</i> 2. Age of student <i>Umur murid</i> </td> <td data-bbox="691 1554 1225 1816"> Used drinking water <i>Gunakan jenis air minuman yang sama</i> // student of same age <i>Murid umur yang sama</i> </td> </tr> </tbody> </table>	Variables	Method to handle the variables	Manipulated variable: 1. Volume of drinking water drank // volume of water drank <i>Isipadu air minuman yang diminum// isipadu air yang diminum.</i>	Change volume of water drank from 200ml to 400ml, 600ml and 800ml // used different volume of water drank <i>Tukar isipadu air yang diminum dari 200ml ke 400m., 600ml dan 800ml. // Gunakan isipadu air yang berlainan untuk diminum</i>	Responding variable: 1. Volume of urine released by two different students (student 1 and student 2) (collected after 1 hour.) <i>Isipadu air kencing dibebaskan oleh dua murid-murid yang berlainan (murid 1 dan murid 2) 9 dikumpul selepas 1 jam)</i> 2. Average volume of urine collected <i>Purata isipadu air kencing yang dikumpul.</i>	Record the volume of urine released by two students using measuring cylinder. <i>Rekod isipadu air kencing dibebaskan oleh 2 murid menggunakan silinder penyukat.</i> //Calculate average volume of urine using formula: $\frac{\text{Volume of urine student 1} + \text{student 2}}{2}$ <i>Hitung purata isipadu air kencing menggunakan rumus:</i> $\frac{\text{Isipadu air kencing murid 1} + \text{murid 2}}{2}$	Fixed variable: 1. Type of water (drank) <i>Jenis air (diminum)</i> 2. Age of student <i>Umur murid</i>	Used drinking water <i>Gunakan jenis air minuman yang sama</i> // student of same age <i>Murid umur yang sama</i>	3
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	Able to state 4 – 5 ticks correctly	2								
	Able to state 1- 3 ticks correctly	1								

	No response or incorrect response	0
1(e)	<p>[Hypothesis]</p> <p>Able to make a hypothesis correctly based on the following aspects:</p> <p>P1: Manipulated variable Volume of water drank // Group of student</p> <p>P2: Responding variable / Volume of urine released (by two different students (student 1 and student 2) after 1 hour) // permeability to water at kidney tubule.</p> <p>H: relationship</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The more/ higher the volume of water drank , the higher/ more the volume of urine released by two different students after 1 hour. <i>Semakin banyak / tinggi isipadu air diminum, semakin tinggi / banyak isipadu air kencing dibebaskan oleh dua murid yang berlainan selepas 1 jam.</i> Student 2 from group B produces most / highest volume of urine released than student 2 from group A. <i>Murid 2 dari kumpulan B menghasilkan paling tinggi/ banyak isipadu air kencing berbanding murid 2 dari kumpulan A.</i> As blood osmotic pressure decreases, the more volume of urine produced by kidney/ less permeable to water at kidney tubule. <i>Semakin tekanan osmosis darah berkurang, semakin banyak isipadu air kencing dihasilkan oleh ginjal / tubul ginjal kurang telap kepada air.</i> 	3
	<p>Able to make hypothesis based on any two correct aspects:</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The higher the volume of water drank, the lower the blood osmotic pressure. <i>Semakin banyak isipadu air diminum, semakin rendah tekanan osmosis darah.</i> The more the volume of urine released by students, the less permeable the kidney tubule to water. <i>Semakin banyak isipadu air kencing dibebaskan oleh murid-murid, semakin kurang telap tubul ginjal terhadap air,</i> Blood osmotic pressure affects the amount of urine produced. <i>Tekanan osmosis darah mempengaruhi kandungan air kencing dihasilkan.</i> 	2

	<p>Able to make a hypothesis correctly based on any one aspect / at idea level.</p> <p>Sample answers:</p> <p>1. 200 ml/ 800 ml volume of water drank is low/ high. <i>200 ml / 800 ml isipadu air diminum adalah rendah / tinggi.</i></p> <p>2. 200 ml water drank has high blood osmotic pressure // 800 ml water drank has low blood osmotic pressure <i>200ml air diminum mempunyai tekanan osmosis darah yang tinggi // 800ml air diminum mempunyai tekanan osmosis darah yang rendah</i></p> <p>3. The higher the volume of urine released, the higher the volume of water drank.(reverse) <i>Semakin tinggi isipadu air kencing dibebaskan, semakin tinggi isipadu air yang diminum.</i></p>	1																															
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1(f)(i)	<p>[Communication – Data tabulation]</p> <p>Able to construct a table and record all the data correctly based on the following aspects:</p> <p>T: Titles with correct units1 mark D: Data recorded correctly1 mark C: Calculate average volume of urine and scale of blood osmotic pressure correctly.1 mark</p> <p>Sample answers:</p> <table border="1" data-bbox="312 1294 1174 1895"> <thead> <tr> <th rowspan="2">Student's group of the same age <i>Kumpulan murid-murid pada umur yang sama</i></th> <th rowspan="2">Volume of drinking water drank (ml) <i>Isipadu air minuman yang diminum (ml)</i></th> <th colspan="3">Volume of urine released by two different students after 1 hour (ml) <i>Isipadu air kencing yang dibebaskan oleh dua orang murid yang berbeza selepas 1 jam (ml)</i></th> <th rowspan="2">Blood osmotic pressure</th> </tr> <tr> <th>Student 1 <i>Murid 1</i></th> <th>Student 2 <i>Murid 2</i></th> <th>Average volume of urine</th> </tr> </thead> <tbody> <tr> <td rowspan="2">A</td> <td>200</td> <td>33</td> <td>43</td> <td>38.0</td> <td>4</td> </tr> <tr> <td>400</td> <td>96</td> <td>93</td> <td>94.5</td> <td>3</td> </tr> <tr> <td rowspan="2">B</td> <td>600</td> <td>93</td> <td>123</td> <td>108.0</td> <td>2</td> </tr> <tr> <td>800</td> <td>113</td> <td>136</td> <td>124.5</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;"> T 1 m </p> <p style="text-align: center;"> D 1m C 1m </p>	Student's group of the same age <i>Kumpulan murid-murid pada umur yang sama</i>	Volume of drinking water drank (ml) <i>Isipadu air minuman yang diminum (ml)</i>	Volume of urine released by two different students after 1 hour (ml) <i>Isipadu air kencing yang dibebaskan oleh dua orang murid yang berbeza selepas 1 jam (ml)</i>			Blood osmotic pressure	Student 1 <i>Murid 1</i>	Student 2 <i>Murid 2</i>	Average volume of urine	A	200	33	43	38.0	4	400	96	93	94.5	3	B	600	93	123	108.0	2	800	113	136	124.5	1	3
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	Able to state any one correct aspect	1										
	No response or incorrect response	0										
1(f)(ii)	<p>[Time and Space – Communication]</p> <p>Able to draw a line graph to show the relationship between the average volume of urine collected against the volume of water intake correctly based on the following aspects:</p> <p>Axes / <i>Paksi (P)</i> : Both axis with uniform scales 1 mark Points/ <i>Titik (T)</i>: All point plotted correctly1 mark Shape/ <i>Bentuk(B)</i>: Correct bar chart shape1 mark</p> <table border="1"> <caption>Data points from the line graph</caption> <thead> <tr> <th>Volume of water drunk (ml)</th> <th>Average volume of urine released (ml)</th> </tr> </thead> <tbody> <tr> <td>200</td> <td>40</td> </tr> <tr> <td>400</td> <td>100</td> </tr> <tr> <td>600</td> <td>110</td> </tr> <tr> <td>800</td> <td>130</td> </tr> </tbody> </table>	Volume of water drunk (ml)	Average volume of urine released (ml)	200	40	400	100	600	110	800	130	3
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800	130											
	Able to plot graph on any two aspects	2										
	Able to plot graph on any one aspect	1										
	No response or incorrect response	0										
1(g)	<p>[Interprate the graph]</p> <p>Able to state the relationship between the volume of water intake and the average volume of urine collected based on aspects:</p> <p>R: correct relationship The higher the volume of water drank / intake, the higher the volume of urine collected / produced.</p> <p>P1: because the blood osmotic pressure decreases P2: More water is absorps by kidney tubule// Kidney becomes less permeable to water // less ADH produced by Pituitary gland.</p>	3										

	<p>Sample answers:</p> <p>1. The higher the volume of water drank / intake, the higher the volume of urine collected / produced because the blood osmotic pressure decreases. This is due to less water is absorbed by kidney tubule// Kidney becomes less permeable to water // less ADH produced by Pituitary gland.</p> <p><i>Semakin tinggi isipadu air yang diminum/diambil, semakin tinggi isipadu air kencing dikumpul/ dihasilkan kerana tekanan osmosis darah berkurangan. Ini disebabkan oleh sedikit air diserap semula oleh tubul ginjal // Ginjal menjadi kurang telap kepada air // sedikit ADH dihasilkan oleh kelenjar Pituitari</i></p>	
	Able to state the relationship based on R and any one P// R and P1/P2	2
	Able to state an idea of the relationship / only R	1
	No response or incorrect response	0
1(h)	<p>[Operational definition]</p> <p>Able to define operationally on high blood osmotic pressure based on the following aspects:</p> <p>P1: more solute in blood or content of drinking water in blood is less/ low at student A and B // condition of less frequent urination/ less volume of urine by student A and student B</p> <p>P2: shown by the volume of urine released by two students after 1 hour.</p> <p>P3: which are affected by the volume of water drank</p> <p>Sample answers:</p> <p>High blood osmotic pressure is refer to more solute in blood or content of drinking water in blood is less/ low at student A and B // condition of less frequent urination/ less volume of urine by student A and student B that is shown by the volume of urine released by two students after 1 hour. Blood osmotic pressure is affected by the volume of water intake/ drank.</p> <p><i>Tekanan osmosis darah yang tinggi adalah banyak zat larut dalam darah atau kandungan air minuman dalam darah adalah rendah / kurang dalam pelajar A dan B// Keadaan kurang kerap menghasilkan air kencing / sedikit isipadu air kencing murid A dan Murid B yang mana ditunjukkan oleh isipadu air kencing dihasilkan oleh kedua-dua murid selepas 1 jam. Tekanan osmosis darah adalah dipengaruhi oleh isipadu air diminum/ diambil.</i></p>	3
	Able to define operationally based on any two aspects	2
	Able to define operationally based on any one aspect	1

	No response or incorrect response	0
1(i)	<p>[Prediction]</p> <p>Able to predict the volume of urine produced by this student correctly based on:</p> <p>P1: (Volume of urine) increases / more than 33ml / any value above 33ml/ logic.</p> <p>P2: Caffein is diuretic / causes more urine.</p> <p>P3: Blood osmotic pressure is low // Kidney less permeable to water //Less water is reabsorbs at kidney tubule.</p> <p>Sample answer: (Volume of urine) increases / more than 33ml / any value above 33ml because caffein in coffee is diuretic or causes more urine. Hence blood osmotic pressure is low // Kidney less permeable to water //Less water is reabsorbs at kidney tubule. <i>(Isipadu air kencing) bertambah / lebih daripada 33ml / sebarang nilai melebihi 33ml kerana kaffein dalam kopi adalah diuretic atau menyebabkan lebih banyak air kencing. Justeru itu tekanan osmosis darah adalah rendah // Ginjal kurang telap kepada air // sedikit air diserap ke dalam tubul ginjal.</i></p>	3
	Able to predict based on any 2 aspects // P1 and P2/P3	2
	Able to predict based on any 1 aspect // P1 only	1
	No response or incorrect response	1

Suggested answer – question 2

No	Items	Scoring	Remark
2(a)	<p>Problem Statement:</p> <p>Able to form a correct problem statement by relating the manipulated variable and responding variable in a question form based on the following aspects:</p> <p>P1: Manipulated variables : Fruit juice P,Q and R</p> <p>P2 : Responding variables:. Content of vitamin C/ Volume of fruit juice to decolourise DCPIP solution / percentage of vitamin C</p> <p>H : Question form.</p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> Does fruit juice P has the highest content /amount / percentage of vitamin C compare to Q and R ? // vice versa Does fruit juice P has the highest volume of fruit juice to decolourise the DCPIP solution compare to Q and R? // vice versa Which fruit juices has the highest content / amount /percentage 	3	

	of vitamin C / volume of fruit juice to decolourise the DCPIP solution ?		
	Able to state problem statement correctly based on any two aspects//P1 & H // P2 and H 1. Fruit juice P has the highest content /amount of vitamin C compare to Q and R. 2. Different fruit juice has different content / amount / percentage of vitamin C 3. Does fruit juice P has the highest content /amount / percentage of vitamin C compare to Q and R.	2	
	Able to state problem statement correctly based on any one aspect//P1 // P2 only 1. P has the highest content /amount / percentage of vitamin C.	1	
	No response or wrong answer	0	
2(b)	Hypothesis		
	Able to state correct hypothesis based on 3 aspects: P1: Manipulated variables : Fruit juice P,Q and R P2 : Responding variables:. Content / percentage of vitamin C/ Volume of fruit juice to decolourise DCPIP solution H : Relationship. <u>Sample answer:</u> 1. Fruit juice P has the highest content /amount of vitamin C compare to Q and R.// The content/ amount/ percentage of vitamin C in fruit juice P is higher than Q and R. 2. Fruit juice Q has the highest content / amount of vitamin C compare to R and P. 3. Fruit juice Q has the smallest volume to decolourise the DCPIP solution compare to R and P.	3	
	Able to state correct hypothesis based on any 2 aspects. 1. Different fruit juice has different content / amount / percentage of vitamin C	2	
	Able to state correct hypothesis based on any 1 aspect/ at idea level. 1. Fruit juice P/Q/R contains vitamin C	1	
	No response or wrong answer	0	
2(c)	Variables:		
	Able to state all the variables correctly base on the following aspects: 1. Manipulated variable: Fruit juice P,Q and R 2. Responding variable: Content of vitamin C/ Volume of fruit juice to decolourise DCPIP solution/ amount of vitamin C / percentage of vitamin C 3. Constant variable: Concentration of ascorbic acid/ volume of DCPIP solution.	3	

	Any two aspects correctly	2	
	Any 1 aspect correctly	1	
	No response or wrong answer	0	
2(d)	List of apparatus and materials		
	Able to list all the 4 materials (M) and 7-8 apparatus (A) correctly: Sample answer: Fruit juices P,Q,R (lemon, papaya, strawberry), ascorbic acid, DCPIP solution, distilled water, specimen bottles, syringes with needles, marker pen/ label paper, beaker, blender, gauze cloth, knife, white tile	3	
	Any 2-3 M + 3-6 A	2	
	Any 1M + 1-2 A	1	
	No response or wrong answer	0	
2(e)	Experimental procedure		
	Able to state all the 5K as follows: K1: setting apparatus (at least 6 steps) K2: operating fixed variable K3: operating responding variable K4: operating manipulated variable K5: precaution } (at least 1 step)	3	
	Sample answer: 1. Place 1cm ³ of DCPIP solution into a specimen bottle by using a syringe with needle.	K1 / K2	Note : K1 must have 6 steps K2/K3/K4/ K5 only one step
	2. Fill the syringe (with needle) with 5cm ³ of 0.1% ascorbic acid.	K1 / K2	
	3. Drop the ascorbic acid slowly into the specimen bottle until DCPIP solution is decolourised	K1	
	4. Make sure the needle is totally immersed into the DCPIP solution and don't shake the bottle.	K5	
	5. Record the volume of ascorbic acid to decolourise the DCPIP solution by using the syringe.	K3	
	6. Repeat steps 1 to 5 to find the average volume of ascorbic acid to decolourise the DCPIP solution.	K5	
	7. Place fruit P on a white tile, peel of the skin then place into the blender.	K1	
	8. Add in 100cm ³ of distilled water into the blender to make the juice.	K1/ K2	
	9. Filter juice P with the gauze cloth into a small beaker	K1	
	10. A 5cm ³ syringe is filled with juice P.	K1 / K2	
	11. Drop juice P slowly into the specimen bottle containing 1cm ³ of DCPIP solution.	K1 / K2	
	12. Make sure the needle is immersed into the DCPIP solution and don't shake the bottle.	K5	
	13. Record the volume of fruit juice P to decolourised the DCPIP solution using a syringe	K3	
	14. Repeat this experiment twice to get an average volume of fruit juice P .	K5	

	<p>15. Calculate the content / percentage of vitamin C by using the formula: $\frac{\text{Volume of ascorbic acid} \times 0.1\%}{\text{Volume of fruit juice P}}$</p> <p>16. Repeat steps 7 to 15 with fruit juice Q and R. 17. All results are recorded in a table.</p>	K3																													
	Presentation of Data																														
2(f)	<p>Able to draw a table based on the following aspects: P1: MV; type of fruit juices // Juice P, Q and R P2: RV: Volume to decolourise DCPIP solution / Content /percentage of vitamin C</p> <p>Sample answer:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">Type of fruit juice</th> <th colspan="3">Volume of fruit juice to decolourise 1cm³ of DCPIP solution (cm³)</th> <th rowspan="2">Content / percentage of vitamin C (%)</th> </tr> <tr> <th>1</th> <th>2</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>Ascorbic acid</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>P</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Q</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Type of fruit juice	Volume of fruit juice to decolourise 1cm ³ of DCPIP solution (cm ³)			Content / percentage of vitamin C (%)	1	2	Average	Ascorbic acid					P					Q					R						
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