

MODUL ULANGKAJI BERFOKUS SPM 2019

PERATURAN PEMARKAHAN

BIOLOGI

Kertas 3 (SET B)

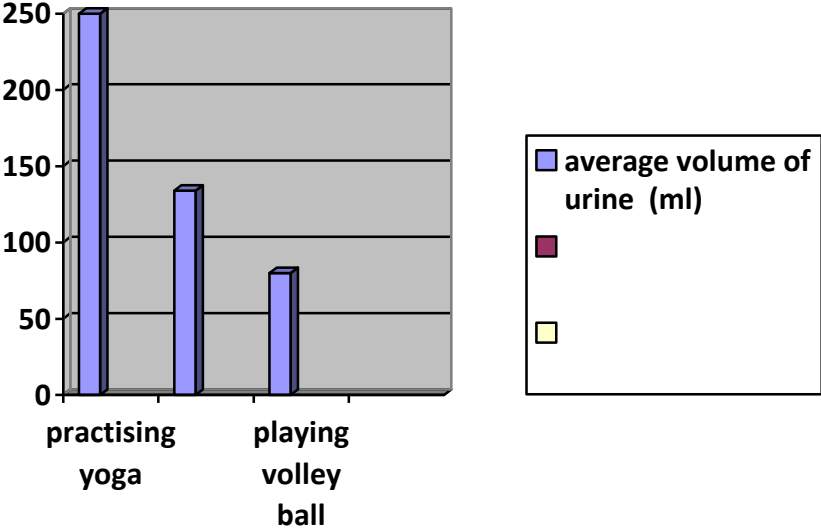
Soalan 1

No	Mark Scheme	Score															
1(a)	<p>Able to record all 6 data for the volume of urine produced and the average volume of urine produced correctly.</p> <p><u>Sample answers :</u></p> <table border="1"> <thead> <tr> <th>Group / kumpulan</th> <th colspan="2">Volume of urine produced,ml <i>Isipadu air kencing dihasilkan, ml</i></th> </tr> <tr> <td></td> <th>Reading / Bacaan 1</th> <th>Reading / Bacaan 2</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>205</td> <td>207</td> </tr> <tr> <td>T</td> <td>134</td> <td>136</td> </tr> <tr> <td>U</td> <td>80</td> <td>80</td> </tr> </tbody> </table>	Group / kumpulan	Volume of urine produced,ml <i>Isipadu air kencing dihasilkan, ml</i>			Reading / Bacaan 1	Reading / Bacaan 2	S	205	207	T	134	136	U	80	80	3
Group / kumpulan	Volume of urine produced,ml <i>Isipadu air kencing dihasilkan, ml</i>																
	Reading / Bacaan 1	Reading / Bacaan 2															
S	205	207															
T	134	136															
U	80	80															
	Able to record 4-5 data correctly	2															
	Able to record 2-3 data correctly	1															
	Able to record only 0 - 1 data or not able to respond / wrong response.	0															
(b)(i)	<p>Able to state two different observations correctly based on two criteria:</p> <p>P1- physical activities // Group <i>aktiviti fizikal // kumpulan</i></p> <p>P2 - Volume of urine produced after one hour <i>Isipadu air kencing dihasilkan selepas satu jam</i></p> <p><u>Sample answers</u> (correct observation):</p> <p>1. When the physical activity is practising yoga / cycling / playing volley ball, volume of urine produced after 1 hour in reading 1 is 250 ml and reading 2 is 270 ml // reading 1 is 134 ml and reading 2 is 136 ml // reading 1 and 2 are 80 ml.</p> <p><i>Apabila aktiviti fizikal adalah menjalani latihan yoga / berbasikal / bermain bola tampar, isipadu air kencing dihasilkan selepas sejam dalam bacaan 1 ialah 250 ml dan bacaan 2 ialah 270 ml // bacaan 1 ialah 134 ml dan bacaan 2 ialah 136 ml // kedua-dua bacaan 1 dan 2 ialah 80 ml</i></p> <p><u>Sample answer</u> (inaccurate observation):</p> <p>1. When the physical activity is practising yoga / cycling / playing volley ball, volume of urine produced after 1 hour is high / the highest the least / less</p> <p><u>Sample answer</u> (idea level):</p> <p>1. The volume of urine produced is different. 2. The physical activities affects the volume of urine produced.</p>	3															
	Able to state inaccurate observation	2															
	Able to state only one correct observation or two observation at idea level.	1															

	NO response or incorrect response or one idea only.	0																																				
(b)(ii)	<p>Able to make two accurate inferences based on two criteria: P1 – Less /more vigorous activity P2 – less / more urine produced P3 - low / high osmotic pressure // reabsorption of water</p> <p><i>P1 – kurang / lebih aktiviti cergas</i> <i>P2 – kurang / sedikit air kencing dihasilkan</i> <i>P3 - sedikit / tinggi tekanan osmosis // penyerapan semula air</i></p> <p><u>Sample answer:</u></p> <p>1. More/high/much/ (amount) of water reabsorbed due to high osmotic pressure // vice versa <i>Banyak / sedikit (jumlah) penyerapan semula air kerana tekanan osmosis rendah / tinggi // vice versa</i></p> <p>2. Less / more urine produced due to less / more vigorous activity <i>Sedikit / banyak air kencing dihasilkan kerana kurang / lebih aktiviti cergas</i></p>	3																																				
	<p>Able to state one correct inference and one inaccurate inference or able to state two inaccurate inferences.</p> <p><u>Sample answer (inaccurate)</u></p> <p>1. More/high/much/ (amount) of water reabsorbed // inversely 2. Higher / high / lower / low osmotic pressure. 3. Less / more ADH is secreted to the kidney tubule.</p>	2																																				
	<p>Able to state one correct inference or two inferences at idea level. <u>Sample answer for idea level:</u></p> <p>1. ADH is secreted. 2. Salt reabsorbed 3. Water reabsorbed.</p>	1																																				
	No response or inaccurate respons	0																																				
<p>Summary of scoring for 1(b)(1) and 1(b)(II) :</p> <table border="1"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">2</td> <td>1</td> <td>1</td> <td></td> <td>-</td> </tr> <tr> <td>“</td> <td>2</td> <td></td> <td>-</td> </tr> <tr> <td rowspan="4">1</td> <td>1</td> <td>-</td> <td>1</td> <td></td> </tr> <tr> <td>-</td> <td>-</td> <td></td> <td>-</td> </tr> <tr> <td>1</td> <td>-</td> <td></td> <td>1</td> </tr> <tr> <td>-</td> <td>1</td> <td>1</td> <td>-</td> </tr> </tbody> </table>			Score	Correct	Inaccurate	Idea	Wrong	3	2	-	-	-	2	1	1		-	“	2		-	1	1	-	1		-	-		-	1	-		1	-	1	1	-
Score	Correct	Inaccurate	Idea	Wrong																																		
3	2	-	-	-																																		
2	1	1		-																																		
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	<table border="1"> <tr> <td>0</td> <td>-</td> <td>1</td> <td></td> <td>1</td> </tr> <tr> <td>o</td> <td>-</td> <td>-</td> <td>1</td> <td>1</td> </tr> </table>	0	-	1		1	o	-	-	1	1	
0	-	1		1								
o	-	-	1	1								
(c)	<p>Able to state all 3 variables and methods to handle each variable correctly.</p> <p><u>Sample answer</u></p> <table border="1"> <thead> <tr> <th>Variable</th> <th>Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td>Manipulated variable Physical activity</td> <td>Change the physical activity / practising yoga, cycling, playing volley ball.</td> </tr> <tr> <td>Responding Variable: volume of urine produced (after one hour) Average volume of urine produced</td> <td>Measure and <u>record</u> the volume of urine collected by using a <u>measuring cylinder</u>. // Calculate and record the average volume of urine produced by using formula: $\frac{\text{Reading 1} + \text{reading 2}}{2}$</td> </tr> <tr> <td>Constant variable Volume of (plain) water // type of water // time</td> <td>Fix the volume to 200 ml // use plain water // fix the time at one hour</td> </tr> </tbody> </table>	Variable	Method to handle the variable	Manipulated variable Physical activity	Change the physical activity / practising yoga, cycling, playing volley ball.	Responding Variable: volume of urine produced (after one hour) Average volume of urine produced	Measure and <u>record</u> the volume of urine collected by using a <u>measuring cylinder</u> . // Calculate and record the average volume of urine produced by using formula: $\frac{\text{Reading 1} + \text{reading 2}}{2}$	Constant variable Volume of (plain) water // type of water // time	Fix the volume to 200 ml // use plain water // fix the time at one hour	3		
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Constant variable Volume of (plain) water // type of water // time	Fix the volume to 200 ml // use plain water // fix the time at one hour											
	Able to state 4-5 ticks	2										
	Able to state 2-3 ticks	1										
	No response or incorrect response or 1 tick only	0										
(d)	<p>Able to state the hypothesis relating the manipulated variable and the responding variable correctly based on three criteria:</p> <p>P1 : manipulated variable (physical activity) P2 : responding variable (Volume of urine produced) H : relationship <u>Sample answer</u> (P1 +P2 + H) 1. Physical activity, playing volley ball has the highest volume of urine produced after one hour</p>	3										
	<p>Able to slate a hypothesis based on any two criteria. <u>Sample answer</u>: (P1 + P2//P1/P2 + H) 1. The volume of urine produced depends on the physical activity 2. Different physical activity has different volume of urine produced.</p>	2										
	Able to state a hypothesis based on any one criterion or at idea level. <u>Sample answer</u>											

	1. Volume of urine produced is different	1																		
	No response or incorrect respons	0																		
(e)(i)	<p>Able to construct a table correctly with the following aspects T : Titles with correct units - 1 mark D : Data - 1 mark C : Average volume of urine produced - 1 mark</p> <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th rowspan="2">Physical activity</th> <th colspan="2">Volume of urine produced, ml</th> <th rowspan="2">Average volume of urine produced, ml</th> </tr> <tr> <th>Reading 1</th> <th>Reading 2</th> </tr> </thead> <tbody> <tr> <td>Practising yoga</td> <td>205</td> <td>207</td> <td>206</td> </tr> <tr> <td>Cycling</td> <td>134</td> <td>136</td> <td>134</td> </tr> <tr> <td>Playing volley ball</td> <td>80</td> <td>80</td> <td>80</td> </tr> </tbody> </table>	Physical activity	Volume of urine produced, ml		Average volume of urine produced, ml	Reading 1	Reading 2	Practising yoga	205	207	206	Cycling	134	136	134	Playing volley ball	80	80	80	3
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	Any two correct aspect	2																		
	Any one aspect correct	1																		
	No response or incorrect respons	0																		
(e)(ii)	<p>Able to draw the graph of average volume of urine produced against volume of water intake based on the following aspects :</p> <p>P(paksi) : title of x-axis and y-axis -1 mark T(Titik) : four points plotted correctly - 1 mark B(bentuk) : all points connected smoothly - 1 mark</p>	3																		

	 <p>All three correct aspects</p>	
	Any two correct aspects	2
	Any one aspect correct	1
	No response or incorrect response	0
(f)	<p>Able to explain the relationship between the physical activity to the volume of urine produced based on the following criteria:</p> <p>R : Relationship – playing volley ball has the lowest (average) volume of urine produced E1 : because more vigorous activity E2: osmotic pressure increases E3 : more water reabsorbed (from the kidney)</p> <p><u>Sample answer:</u> Playing volley ball / practising yoga has the lowest / highest (average) volume of urine produced because more / less vigorous activity / the osmotic pressure increases / decreases. Thus, more/ less water reabsorbed (from the kidney).</p>	3
	Able to explain the relationship using any two aspects	2
	Able to explain the relationship using one aspect only	1
	No response or incorrect response	0
(g)	<p>Able to predict and explain the volume of urine produced based on the following criteria:</p> <p>P : Prediction - volume of urine less than 80 ml // any value less than 80 ml E1 : Osmotic pressure unchange E2 : same water reabsorbed (from the kidney)</p>	

	<u>Sample answer</u> Volume of urine in same as 80 ml Because the isotonic drinks has the same concentration of water to the body fluid. Rate of water reabsorbed (from the kidney) is same.	3						
	Able to predict and explain the volume of urine produced based on any two criteria	2						
	Able to predict and explain the volume of urine produced based on any one criteria	1						
	No response or incorrect response	0						
(h)	Able to define osmoregulation operationally based on the following criteria. D1 : A process occur in kidney to produce urine // a process of maintaining blood osmotic pressure D2 : (Average) volume of urine produced by each group / S,T and U after one hour D3 : depends on (different) physical activity // hypothesis form. <u>Sample answer:</u> Osmoregulation is the process that occur in kidney to produce urine .It is shown by the (average) volume of urine produced by each group S, T and U after one hour and depends on the (different) physical activity	3						
	Any two criteria stated	2						
	Any one criteria stated	1						
	No response or incorrect response	0						
(i)	Able to classify apparatus and materials into their respective variables <u>Sample answer:</u> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Concentrated and less urine produced <i>Air kencing pekat dan sedikit</i></td> <td style="text-align: center;">Less concentrated and more urine produced <i>Air kencing cair dan banyak</i></td> </tr> <tr> <td style="text-align: center;">W</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">Z</td> <td style="text-align: center;">Y</td> </tr> </table> All 4 corrects	Concentrated and less urine produced <i>Air kencing pekat dan sedikit</i>	Less concentrated and more urine produced <i>Air kencing cair dan banyak</i>	W	X	Z	Y	3
Concentrated and less urine produced <i>Air kencing pekat dan sedikit</i>	Less concentrated and more urine produced <i>Air kencing cair dan banyak</i>							
W	X							
Z	Y							
	2-3 ticks	2						
	1 tick	1						
	0 tick or no response	0						

Suggested answer for Question 2
KB061201 – (Problem statement)

Question Soalan	Score Skor	Explanation Penerangan	Remarks Nota
2 (i)	3	<p>Able to state the problem statement correctly:</p> <p>P1: Water samples Station A, B and C <i>P1: sampel air daripada stesen A, B dan C</i></p> <p>P2: Time taken for decolourisation of Methylene blue solution // BOD value // Level of water pollution <i>P2: Masa pelunturan larutan metilena biru // nilai BOD // tahap pencemaran air</i></p> <p>H: Question form <i>H: bentuk soalan</i></p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Which of the station of water samples will be more polluted // give the highest BOD value? <i>Stesen sampel air manakah lebih tercemar // mempunyai nilai BOD tertinggi?</i> 2. How do water sources /samples from Station A, B and C affect the time taken for decolourisation of methylene blue solution? <i>Bagaimanakah sumber / sampel air daripada stesen A, B dan C mempengaruhi masa pelunturan larutan metilena biru?</i> 	
	2	<p>Able to state a problem statement less accurately.</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. Which station will be the most polluted water?/ have highest BOD value? <i>Stesen manakah paling tercemar / mempunyai nilai BOD tertinggi?</i> 2. How do water at station A, B and C affect the methylene blue solution? <i>Bagaimanakah air di stesen A, B dan C mempengaruhi larutan metilena biru?</i> 	
	1	<p>Able to state a problem statement at idea level</p> <p>Sample Answer:</p> <ol style="list-style-type: none"> 1. BOD value / water pollution is influenced by different station./ water sources <i>Nilai BOD / pencemaran air dipengaruhi oleh stesen</i> 	

		<i>berbeza</i>	
	0	No response or wrong response	

KB061202 (KB061203 – Making Hypothesis)

Question Soalan	Score Skor	Explanation Penerangan	Remarks Nota
2 (ii)	3	<p>Able to state the hypothesis based on the following aspects:</p> <p>P1 = Manipulated variable = Water sources / sample from Station A, B and C. <i>P1 = pemboleh ubah dimanipulasi</i> = sumber / sampel air daripada stesen A, B dan C</p> <p>P2 = Responding variable = Time taken for decolourisation of Methylene blue Solution // BOD value / Level of water pollution <i>P2 = Pemboleh ubah dimanipulasi</i> = masa pelunturan larutan metilena biru // nilai BOD / tahap pencemaran air</p> <p>R = Relationship / hubungan</p> <p><u>Sample answer:</u></p> <p>1. Station C has the highest water pollution level <i>Stesen C mempunyai tahap pencemaran air paling tinggi</i></p> <p>2. Station A has shorter time taken for the methylene blue solution to turn colourless than stations B and C. <i>Stesen A mempunyai masa pelunturan larutan metilena biru lebih singkat berbanding stesen B dan C.</i></p>	
	2	Able to write a hypothesis statement less accurately	
	1	Able to state a hypothesis at idea level	
	0	No response or wrong response	

KB061203 (Variables)

Question	Score	Explanation	Remarks
2 (iii)	3	<p>Able to state all the three variables correctly</p> <p><u>Sample answers:</u></p> <p>1. Manipulated variable = Water sources/ samples from Station A, B and C</p> <p>2. Responding variable = Time taken for decolourisation of Methylene blue Solution // BOD value / Level of water pollution</p> <p>3. Constant variable 1. Volume of water sources / samples</p>	

		2. Concentration / volume of methylene blue solution 3. Temperature	
	2	Able to state any two variables correctly	
	1	Able to state any one variable correctly	
	0	No response or incorrect response	

KB061204 - (Apparatus and materials)

Question	Score	Explanation	Remarks
2(iv)	3	Able to list out all the important apparatus and materials correctly. (6 Apparatus and 2 materials) <u>Sample answers:</u> Apparatus: 1.Reagent bottles 2.syringe 3.cupboard / black paper 4.stop watch, 5.label paper / marker pen 6.measuring cylinder Materials: Water sources / sample from Station A, B and C Methylene blue solution	
	2	Able to list 5-6 apparatus and 2 materials correctly	
	1	Able to list 2-4 apparatus and 2 materials correctly	
	0	No response or incorrect response	

KB061205 (Experimental Procedure)

Question	Score	Explanation	Remarks
2(v)	3	Able to describe all the steps of the experiment correctly <u>Sample answers:</u> 1. 250 ml of water sources from Station A, B and C were taken and brought back to the laboratory. <i>250 ml sumber air daripada stesen A,B dan C diambil dan dibawa ke makmal</i> 2. 100 ml of water sources from Station A were measured by using a measuring cylinder and then poured into the	K2 K1 K2 K1

	<p>reagent bottle. <i>100 ml sumber air daripada stesen A diukur menggunakan silinder penyukat dan dituangkan ke dalam botol reagen</i></p>	
	<p>3. By using a syringe, 1 ml of 0.1% methylene solution is added to the bottom of each water sources / samples. <i>1 ml 0.1 % larutan metilena ditambah ke dasar sumber / sampel air menggunakan picagari</i></p>	K2, K1
	<p>4. The reagent bottle is closed quickly with a glass stopper and labeled as A <i>Botol reagen ditutup dengan segera dengan penutup kaca dan dilabel sebagai A</i></p>	K5 K1
	<p>5. And don't shake the bottle. <i>Dan jangan goncang botol</i></p>	K5
	<p>6. Steps 1 to 4 were repeated by using water sources / samples from Station B and C and labeled as B and C. <i>Langkah 1- 4 diulang menggunakan sumber / sampel air daripada stesen B dan C dan dilabel sebagai B dan C.</i></p>	K4
	<p>7. All the reagent bottles are kept in a dark cupboard / wrap with black or sugar paper. <i>Semua botol disimpan dalam almari gelap / dibalut dengan pembalut / kertas hitam</i></p>	K5
	<p>8. The time taken for decolourisation of methylene blue solution is recorded using stopwatch <i>Masa pelunturan larutan metilena biru direkod menggunakan jam randik</i></p>	K3
	<p>9. The rate of water pollution is calculated using formula:</p> $\frac{1}{\text{Time taken of methylene blue solution to decolorise (minute}^{-1}\text{)}}$ <p><i>Kadar pencemaran air dikira menggunakan formula</i></p> $\frac{1}{\text{Masa pelunturan larutan metilena biru (minit}^{-1}\text{)}}$	K3
	<p>10. At intervals of one hour for a period of four hours, each reagent bottle is examined. <i>Pada sela masa sejam setiap botol reagen diperiksa</i></p>	K1

		11. All data are recorded in a table. <i>Data dijadualkan.</i>	K1
		Note: K1: Steps 1,2,3,4,10,11 (Setting apparatus– at least 4 steps) K2: Step 1,2,3 (Operating fixed variable- any one) K3: Step 8, 9 (Operating responding variable- any one) K4: Step 6 (Operating manipulated variable) K5: Step 4,5 ,7(Precaution- any one)	
	3	All the 5 K's	
	2	Any 3-4 K	
	1	Any 1-2 K	
	0	No response or incorrect response	

KB061206 (Presentation of Data)

Question	Score	Explanation	Remarks												
2(v)	2	Able to present all the data with units correctly Sample answer: <table border="1"> <thead> <tr> <th>Water sources / sample Station</th> <th>Time taken for decolourisation of methylene blue solution (Hours)</th> <th>BOD value and pollution level</th> </tr> </thead> <tbody> <tr> <td>A</td> <td></td> <td></td> </tr> <tr> <td>B</td> <td></td> <td></td> </tr> <tr> <td>C</td> <td></td> <td></td> </tr> </tbody> </table>	Water sources / sample Station	Time taken for decolourisation of methylene blue solution (Hours)	BOD value and pollution level	A			B			C			
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A															
B															
C															
	1	Able to present at least one data without unit or incorrect unit													
	0	No response or incorrect response													