



# **MODUL PINTAS TINGKATAN 5**

Peperiksaan Percubaan Tahun 2019

Skema Jawapan Biology

Kertas 3 4551/3

**PEPERIKSAAN PERCUBAAN SPM 2019**  
**PERATURAN PEMARKAHAN BIOLOGI KERTAS 3**

**Question 1**

**1 (a) [KB0603 – Measuring Using Number]**

Mark scheme				Score								
Able to record all three readings correctly				3								
<u>Sample answer</u> <table><tr><td>Test tube <i>Tabung uji</i></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Time taken for the starch to be hydrolysed completely (minutes) <i>Masa yang diambil untuk kanji dihidrolisiskan dengan lengkap (minit)</i></td><td>18</td><td>12</td><td>10</td></tr></table>				Test tube <i>Tabung uji</i>	A	B	C	Time taken for the starch to be hydrolysed completely (minutes) <i>Masa yang diambil untuk kanji dihidrolisiskan dengan lengkap (minit)</i>	18	12	10	
Test tube <i>Tabung uji</i>	A	B	C									
Time taken for the starch to be hydrolysed completely (minutes) <i>Masa yang diambil untuk kanji dihidrolisiskan dengan lengkap (minit)</i>	18	12	10									
Able to record 2 readings correctly				2								
Able to record 1 reading correctly				1								
Unable to record readings correctly				0								

Scoring for observation and inference				
Correct	Inaccurate	Idea	Wrong	Score
2	-	-	-	3
1	1	-	-	2
-	2	-	-	
1	-	1	-	1
-	-	2	-	
1	-	-	1	
-	1	1	-	
-	1	-	1	0
-	-	1	1	

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

Mark scheme	Score
<p>Able to state two different observations correctly based on two criteria:</p> <p>P1: Manipulated variable - Amylase enzyme concentration; 0.5%, 1% and 1.5%</p> <p>P2: Responding variable – Time taken for starch to be hydrolysed completely.</p> <p>P3: Data</p> <p>* Unit Wajib - minit</p> <p><u>Sample answer</u></p> <p>1. At 0.5% concentration of amylase enzyme, the time taken for starch to be hydrolysed completely is 18 minutes // At 1.5% concentration of amylase enzyme, the time taken for starch to be hydrolysed completely is 10 minutes <i>Pada kepekatan enzim amilase 0.5%, masa yang diambil untuk kanji dihidrolisiskan dengan lengkap adalah 18 minit // Pada kepekatan enzim amilase 1.5%, masa yang diambil untuk kanji dihidrolisiskan dengan lengkap adalah 10 minit</i></p> <p>2. Test tube A // C shows the longest // shortest time taken for starch to be hydrolysed completely <i>Tabung uji A // C menunjukkan masa yang paling lama // pendek diambil untuk kanji dihidrolisiskan dengan lengkap.</i></p> <p>3. Time taken for starch to be hydrolysed completely in test tube C is the least. <i>Masa yang diambil untuk kanji dihidrolisiskan dengan lengkap dalam tabung uji C adalah yang paling pendek.</i></p>	3
<p>Able to state one correct observation and one inaccurate observation or able to state two inaccurate observations.</p> <p><u>Sample answer</u></p> <p>1. Time taken for starch to be hydrolysed completely in test tube A//C is the longest//shortest. <i>Masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap dalam tabung uji A // C adalah paling lama // pendek</i></p> <p>2. When 0.5% // 1.5% concentration of amylase enzyme is used, the time taken for starch to be hydrolysed completely is slow // fast. <i>Apabila kepekatan enzim amilase 0.5% // 1.5% digunakan, masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap adalah perlahan // cepat.</i></p> <p>3. At lower // higher concentration of amylase enzyme, the time taken for starch to be hydrolysed completely is the longest // shortest. <i>Pada kepekatan enzim amylase yang rendah // tinggi, masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap adalah yang paling lama // pendek.</i></p>	2

Able to state observations at idea level. <u>Sample answer</u> 1. The time taken for starch to be hydrolysed completely is depend on the concentration of amylase enzyme. <i>Masa yang diambil oleh kanji untuk dihirolisiskan dengan lengkap adalah bergantung kepada kepekatan enzim amilase.</i>  2. Different concentration of amylase enzyme. <i>Perbezaan kepekatan enzim amilase.</i>	1
No response or incorrect response	0

**1 (b) (ii) [KB0604 - Making inferences]**

<b>Mark scheme</b>	<b>Score</b>
Able to state two inferences for each observation based on 2 criteria: P1 – concentration of amylase enzyme (MV) P2 – rate of enzyme reaction (RV)  <u>Sample answer</u> 1. In test tube A // C, the concentration of amylase enzyme is low // high. So, the rate of amylase enzyme reaction decreases // increases. <i>Dalam tabung uji A // C, kepekatan enzim amilase adalah rendah // tinggi. Oleh itu, kadar tindak balas enzim amilase adalah rendah // tinggi.</i>	3
Able to make one correct inferences and one inaccurate inference  <u>Sample answer</u> 1. Different concentration of amylase enzyme will give different rate of enzyme reaction. <i>Kepekatan enzim amilase yang berbeza akan memberikan kadar tindak balas yang berbeza.</i>	2
Able to state two inferences at idea level.  <u>Sample answer</u> 1. Different rate of enzyme reaction. <i>Kadar tindak balas enzim amilase yang berbeza.</i>	1
No response or incorrect response	0

**1 (c) [KB061001 - Controlling Variables]**

Mark scheme		Score
Able to state <b>all</b> the variables and the method to handle the variables correctly. (6 ticks)		3
<u>Sample answer</u>		
Variables	Method to handle the variables	
<u>Manipulated variable</u> The concentration of enzyme <i>Kepekatan enzim</i>	<b>Use different</b> concentration of amylase enzyme // Use the concentration of amylase enzyme at 0.5%, 1.0% and 1.5%. <i>Menggunakan kepekatan enzim amilase yang berbeza // Menggunakan kepekatan enzim amilase pada 0.5%, 1.0% dan 1.5%.</i>	
<u>Responding variable</u> Time taken for starch to be hydrolysed completely // the mixtures fail to turn blue-black. <i>Masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap // campuran larutan tidak bertukar menjadi warna biru gelap</i>	<b>Measure and record</b> the time taken for the starch to be hydrolysed completely // the mixtures fail to turn blue-black when tested with iodine solution by using a stopwatch. <i>Ukur dan rekod masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap // campuran tidak bertukar kepada biru tua apabila diuji dengan larutan iodin, dengan menggunakan jam randik.</i>	
Rate of enzyme reaction. <i>Kadar tindak balas enzim.</i>	Calculate the rate of enzyme reaction by using formula, $= \frac{1}{\text{time taken for starch to be hydrolysed completely (t)}}$ <i>Mengira kadar tindak balas enzim dengan menggunakan formula,</i> $= \frac{1}{\text{masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap (t)}}$	

<u>Constant variable</u> Volume of amylase solution <i>Isipadu larutan amilase</i>  Water bath temperature <i>Suhu kukus air</i>	<b>Fix</b> the volume of amylase solution, 2 ml <i>Tetapkan</i> isipadu larutan amylase, 2 ml  <b>Fix</b> the temperature of water bath, 37 °C <i>Tetapkan</i> suhu kukus air, 37 °C	
Able to state <b>4 - 5</b> of the variables and the method to handle the variables correctly.		2
Able to state <b>2 - 3</b> of the variables and the method to handle the variables correctly.		1
No response or incorrect response or one tick only		0

#### 1 (d) [KB0611 - Making Hypothesis]

Mark scheme	Score
Able to state a hypothesis to show a <b>relationship between the manipulated variable and responding variable</b> and the hypothesis can be validated, base on 3 criteria: P1 Manipulated variable P2 Responding variable P3 Relationship (increases/decreases)  <u>Sample answer</u> 1. When the concentration of the amylase enzyme is lower, the rate of enzyme reaction decreases. <i>Apabila kepekatan enzim amilase rendah, kadar tindak balas enzim rendah.</i>  2. As the concentration of amylase enzyme increases, rate of enzyme reaction increases. <i>Semakin bertambah kepekatan enzim amilase, semakin meningkat kadar tindak balas enzim.</i>  3. When the concentration of amylase enzyme increases, time taken for starch to be hydrolysed completely decreases. <i>Apabila kepekatan enzim amilase meningkat, masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap berkurangan.</i>	3
Able to state <b>less accurate</b> hypothesis to show a relationship between manipulated variable and responding variable base on 2 criteria.  <u>Sample answer</u> 1. The rate of enzyme reaction depends on the concentration of amylase enzyme <i>Kadar tindak balas enzim bergantung kepada kepekatan enzim amilase.</i>	2

Able to state <b>idea</b> of hypothesis to show a relationship between manipulated variable and responding variable base on 1 criterion.	1
<u>Sample answer</u> 1. The concentration of amylase enzyme affect the rate of enzyme reaction. <i>Kepekatan enzim amilase mempengaruhi kadar tindak balas enzim.</i>	
No response or incorrect response	0

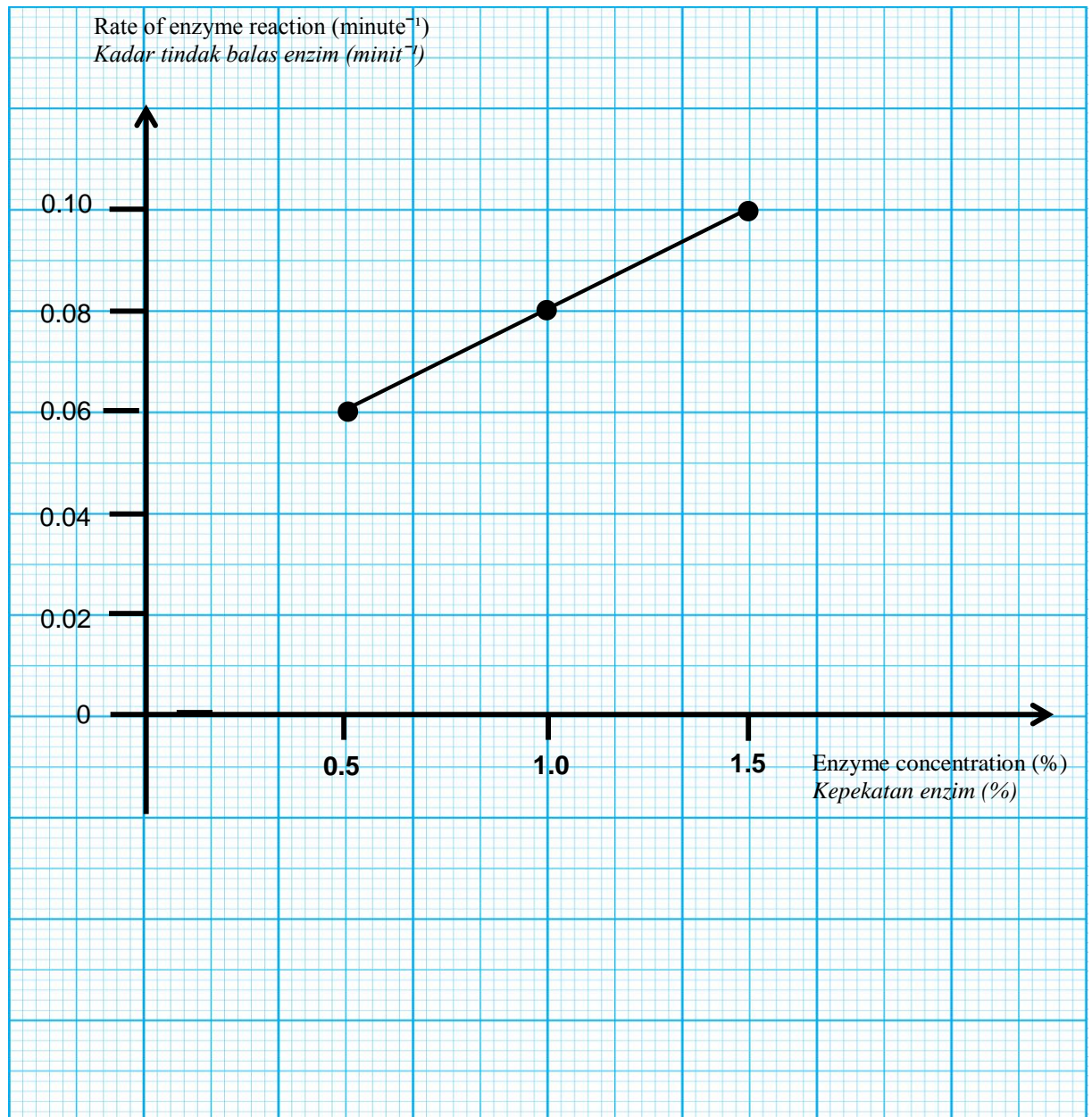
**1 (e) (i) [KB0606 – Communicating data]**

Mark scheme			Score
Able to tabulate a table and fill in data accurately base on three criteria:  P1: Able to state the 3 titles with units correctly. P2: Able to record all data correctly. P3: Able to calculate the rate of enzyme reaction.			3
Ezyme concentration (%) <i>Kepekatan enzim (%)</i>	Time taken for starch to be hydrolysed completely (minute). <i>Masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap (minit)</i>	The rate of enzyme reaction (minute <sup>-1</sup> ) <i>Kadar tindak balas enzim (minit<sup>-1</sup>)</i>	
0.5	18	0.06	
1.0	12	0.08	
1.5	10	0.10	
Any <b>two</b> criteria correct			2
Any <b>one</b> criteria correct			1
No response or wrong response			0

**1 e (ii) [KB0608 – Relationship between space and time]**

Mark scheme	Score
Able to plot the graph correctly based on <b>three</b> criteria:  P1: The X-axis and Y-axis are marked with appropriate value and constant scale P2: All points transferred correctly P3: Smooth/straight line touching all points	3
Any <b>two</b> criteria correct	2
Any <b>one</b> criteria correct	1
No response or wrong response	0

**Rate of enzyme reaction against enzyme concentration**  
*Kadar tindak balas enzim melawan kepekatan enzim*





**1 (f) [KB 0608 - Interpreting data]**

Mark scheme	Score
<p>Able to explain the relationship between the concentration of enzyme and rate of enzyme reaction.</p> <p><b>Relationship</b> R – the higher the concentration of amylase enzyme, the higher the rate of enzyme reaction.</p> <p><b>Explanation</b> E1 - more enzyme molecules to act on substrate (starch) E2 - more product is produced</p> <p><b>Note: If R wrong, reject E1 &amp; E2</b></p> <p><u>Sample answer</u> 1. The higher the concentration of amylase enzyme, the higher the rate of enzyme reaction because more enzyme molecules to act on substrate/starch. So, more product is produced. <b>(1R + 2E)</b> <i>Semakin tinggi kepekatan enzim amilase, semakin tinggi kadar tindak balas enzim kerana lebih banyak molekul enzim bertindak ke atas substrat/kanji. Oleh itu, lebih banyak produk dihasilkan.</i></p>	3
<p>Able to explain the relationship incompletely Two aspects including <b>R</b> Example: R1 + E1 / R1 + E2</p>	2
<p>Able to explain the relationship at idea level or only state the relationship. Example: Only <b>R</b> is stated</p>	1
No response or wrong response	0

**1 (g) [KB0605 – Predicting]**

Mark scheme	Score
<p>Able to predict correctly and explain the prediction based on the following criteria:</p> <p>P – correct prediction: the time taken for the starch to be hydrolysed completely is longer than 18 minutes E2 – reason: high temperature E3 – enzymes are denatured</p> <p><u>Sample answer</u> 1. The time taken for the starch to be hydrolysed completely is longer than 18 minutes. At high temperature more than 37°C, enzymes are denatured. <i>Masa yang diambil oleh kanji untuk dihidrolisiskan dengan lengkap adalah lebih lama dari 18 minit. Pada suhu yang lebih tinggi dari 37°C, enzim ternyahasli.</i></p>	3

Any two correct: Example: P(idea) + E1 // P1 (idea) + E2	2
Any one correct: Example: Only P is stated.	1
No response or wrong response	0

**1 (h) [KB0609 – Defining by operation]**

Mark scheme	Score
<b>Able to state the definition of rate of enzyme reaction based on the following criteria:</b>  P1 – time taken for the enzyme to digest substrate per minute P2 – shown by time taken for hydrolysis of starch to be completed P3 – affected by the concentration of enzyme  <u>Sample answer:</u> Rate of enzyme reaction is the time taken for the enzyme to digest substrate per minute, shown by time taken for hydrolysis of starch to be completed and affected by the enzyme concentration <i>Kadar tindak balas enzim adalah masa yang diambil oleh enzim untuk mencernakan substrat per minit, ditunjukkan oleh masa yang diambil untuk menghidrolisis kanji dengan lengkap dan, dipengaruhi oleh kepekatan enzim.</i>	3
Any two correct / 2 P's	2
Any one correct / 1 P	1
No response or wrong response	0

**1 (i) [KB0602 – Classifying]**

Mark scheme		Score											
Able to classify all the materials and apparatus in table correctly.		3											
<table><tr><th>Materials</th><th colspan="2">Apparatus</th></tr><tr><td>Amylase <i>Amilase</i></td><td>Thermometer <i>Thermometer</i></td><td>Beaker <i>Bikar</i></td></tr><tr><td>Starch solution <i>Larutan kanji</i></td><td>Test tubes <i>Tabung uji</i></td><td>Dropper <i>Penitis</i></td></tr><tr><td>Iodine solution <i>Larutan iodin</i></td><td>Water bath <i>Kukus air</i></td><td>White tiles with groove <i>Jubin putih</i></td></tr></table>	Materials	Apparatus		Amylase <i>Amilase</i>	Thermometer <i>Thermometer</i>	Beaker <i>Bikar</i>	Starch solution <i>Larutan kanji</i>	Test tubes <i>Tabung uji</i>	Dropper <i>Penitis</i>	Iodine solution <i>Larutan iodin</i>	Water bath <i>Kukus air</i>	White tiles with groove <i>Jubin putih</i>	
Materials	Apparatus												
Amylase <i>Amilase</i>	Thermometer <i>Thermometer</i>	Beaker <i>Bikar</i>											
Starch solution <i>Larutan kanji</i>	Test tubes <i>Tabung uji</i>	Dropper <i>Penitis</i>											
Iodine solution <i>Larutan iodin</i>	Water bath <i>Kukus air</i>	White tiles with groove <i>Jubin putih</i>											
Able to list 4-6 substances correctly		2											
Able to list 1-3 substances correctly		1											
No response or wrong response		0											

## QUESTION 2

KB061201 – (KB061203 – Statement of Identified Problem)		
No.	Criteria	Score
2 (i)	<p>Able to state a problem statement relating the manipulated variable with the responding variable correctly.</p> <p>P1: Manipulated Variable – volume of water intake  P2: Responding Variables – the volume of urine produced  P3: Question form and have question mark</p> <p><u>Sample Answer:</u></p> <ol style="list-style-type: none"> <li>What is the effect of the different volume of water intake (P1) on the volume of urine produced (P2)? (P3)  <i>Apakah kesan pengambilan isipadu air yang berbeza terhadap isipadu urin yang dihasilkan?</i></li> <li>How does the different volume of water intake affect the volume of urine produced?  <i>Bagaimanakah kesan pengambilan isipadu air yang berbeza terhadap isipadu urin yang dihasilkan?</i></li> </ol>	3
	<p>Able to state problem statement inaccurately.</p> <p><u>Sample Answer:</u></p> <ol style="list-style-type: none"> <li>What is the effect of the different volume of water intake on the volume of urine produced.  <i>Apakah kesan pengambilan isipadu air yang berbeza terhadap isipadu urin yang dihasilkan.</i></li> <li>What factors affect the volume of urine produced?  <i>Apakah faktor-faktor yang mempengaruhi isipadu urin yang dihasilkan?</i></li> </ol>	2
	<p>Able to state the problem statement correctly based on any one aspect or at idea level.</p> <p><u>Sample Answer:</u></p> <ol style="list-style-type: none"> <li>Water intake give effect on the volume of urine produced.  <i>Pengambilan air memberi kesan terhadap isipadu urin yang dihasilkan.</i></li> </ol>	1
	No response or wrong answer	0

KB061202 (KB061203 – Making Hypothesis)		
No.	Criteria	Score
2 (ii)	<p>Able to state hypothesis correctly based on the following aspect:</p> <p>P1: Manipulated Variable – different volume of water intake  P2: Responding Variables – the volume of urine produced  H: relationship</p> <p><u>Sample Answer</u>  1. The more water is drunk, the more urine is produced.  <i>Lebih banyak air yang diminum, lebih banyak urin yang dihasilkan.</i></p>	3
	<p>Able to state a hypothesis inaccurately</p> <p><u>Sample Answer</u>  1. Different volume of water intake, different volume urine is produced.  <i>Pengambilan isipadu air yang berbeza, menghasilkan isipadu urin yang berbeza.</i></p>	2
	<p>Able to state a hypothesis at idea level.</p> <p><u>Sample Answer:</u>  1. Urine is produced when drinks water.  <i>Urin dihasilkan apabila meminum air.</i></p>	1
	No response or wrong response	0

(KB061203-Controlling variable)		
No.	Criteria	Score
2 (iii)	<p>Able to state all the 3 variables correctly</p> <ol style="list-style-type: none"> <li>1. Manipulated Variable – different volume of water intake</li> <li>2. Responding Variables – the volume of urine produced</li> <li>3. Constant Variables – surrounding temperature, gender, age and size of the body, time taken to collect urine.</li> </ol>	3
	Able to state any <b>two</b> variables correctly	2
	Able to state any <b>two</b> variables correctly	1
	No response or wrong answer	0

<b>KB061205 (KB061203 - Listing of Materials and Apparatus)</b>		
<b>No.</b>	<b>Criteria</b>	<b>Score</b>
2 (iv)	Able to list all the important apparatus and material correctly	3
	Materials (M): Students, drinking water <i>Bahan: Murid, air minuman</i>	
	Apparatus (A) : Paper cup, measuring cylinder, stopwatch <i>Radas Cawan kertas, silinder penyukat, jam randik</i>	
	2M + 3A	
	Able to list 2M and any 2A related to the experiment	2
	Able to list 2M and any 1A related to the experiment	1
	No response or wrong answer	0

<b>KB061204 (KB061203 - Method / procedure of investigation) – 3 M</b>		
<b>No.</b>	<b>Criteria</b>	<b>Score</b>
2 (v)	<p>K1: Preparation of materials and apparatus  K2: Operating the constant variable  K3: Operating the responding variable  K4: Operating the manipulated variable  K5: Steps to increase reliability of results accurately / precaution step</p> <p>Able to describe all the 5K</p> <ol style="list-style-type: none"> <li>Choose A, B, C and D, who are of the same size, gender and age. (K1, K2)  <i>Pilih empat orang murid, A, B, C dan D, yang mempunyai umur, jantina dan saiz badan yang sama.</i></li> <li>Students empty his bladder before they start the experiment. (K1, K5)  <i>Murid-murid mengosongkan pundi kencing sebelum mereka memulakan eksperimen.</i></li> <li>Each students drink different volume of drinking water; 200 ml, 500 ml, 800 ml and 1000 ml. (K1, K2, K4)  <i>Setiap murid minum isipadu air minuman yang berbeza; 200 ml, 500 ml, 800 ml dan 1000 ml.</i></li> <li>Start stopwatch immediately after the students has consumed the drinking water. (K1, K2)  <i>Mulakan jam randik sebaik selepas murid meminum air minuman.</i></li> </ol>	3

	<p>5. Students stay in one room during the experiment. They are not allowed to eat or perform vigorous activities within that time. (K1, K2)  <i>Murid-murid berada di dalam satu bilik semasa eksperimen dijalankan. Mereka tidak dibenarkan makan dan menjalankan aktiviti cergas dalam tempoh tersebut.</i></p> <p>6. Students empty their bladder at 30-minute intervals for two hours. (K1, K3)  <i>Murid-murid mengosongkan pundi kencing mereka dalam selang masa 30 minit untuk tempoh dua jam.</i></p> <p>7. Collect the urine produced in paper cups and measured by using measuring cylinders. (K1, K3)  <i>Kumpulkan urin yang dihasilkan di dalam cawan kertas dan diukur dengan menggunakan silinder penyukat.</i></p> <p>8. Record the total volume of urine produced by each student in a table. (K3)  <i>Rekodkan jumlah isipadu urin yang dihasilkan oleh setiap murid di dalam jadual.</i></p> <table border="1"> <tr> <td>K1</td><td>Step 1, 2, 3, 4, 5, 6, 7 and 8</td><td>any 5</td></tr> <tr> <td>K2</td><td>Step 1, 3, and 5</td><td>any 1</td></tr> <tr> <td>K3</td><td>Step 6, 7 and 8.</td><td>any 1</td></tr> <tr> <td>K4</td><td>Step 3</td><td>1</td></tr> <tr> <td>K5</td><td>Step 2</td><td>1</td></tr> </table>	K1	Step 1, 2, 3, 4, 5, 6, 7 and 8	any 5	K2	Step 1, 3, and 5	any 1	K3	Step 6, 7 and 8.	any 1	K4	Step 3	1	K5	Step 2	1	
K1	Step 1, 2, 3, 4, 5, 6, 7 and 8	any 5															
K2	Step 1, 3, and 5	any 1															
K3	Step 6, 7 and 8.	any 1															
K4	Step 3	1															
K5	Step 2	1															
	Able to state 3K - 4 K	2															
	Able to state 1K - 2 K	1															
	No response or wrong answer	0															

KB061203 – Planning Investigation (KB061203 - Data Presentation) - 2m																	
No.	Criteria	Score															
2 (iv)	<p>Able to construct a table to record data with units</p> <ul style="list-style-type: none"><li>- All titles with unit 1m</li><li>- Manipulated data 1m</li></ul> <p>Sample Answer</p> <table><tr><th>Student <i>Murid</i></th><th>Volume of drinking water intake (ml) <i>Isipadu air minuman yang diambil (ml)</i></th><th>Volume of urine produced (ml) <i>Isipadu urin dihasilkan (ml)</i></th></tr><tr><td>A</td><td>200</td><td></td></tr><tr><td>B</td><td>500</td><td></td></tr><tr><td>C</td><td>800</td><td></td></tr><tr><td>D</td><td>1000</td><td></td></tr></table>	Student <i>Murid</i>	Volume of drinking water intake (ml) <i>Isipadu air minuman yang diambil (ml)</i>	Volume of urine produced (ml) <i>Isipadu urin dihasilkan (ml)</i>	A	200		B	500		C	800		D	1000		2
Student <i>Murid</i>	Volume of drinking water intake (ml) <i>Isipadu air minuman yang diambil (ml)</i>	Volume of urine produced (ml) <i>Isipadu urin dihasilkan (ml)</i>															
A	200																
B	500																
C	800																
D	1000																
	Able to state any one aspect.	1															
	No response or wrong answer	0															

**END OF MARKING SCHEME**  
**SKIMA PEMARKAHAN TAMAT**