

SULIT
4551/3

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Biologi
Kertas 3
2017

MODUL 1 BIOLOGI KERTAS 3
MPSM KEDAH 2017

PERATURAN PERMARKAHAN BIOLOGI
Kertas 3

PERATURAN PEMARKAHAN MODUL 1 BIOLOGI KERTAS 3 MPSM KEDAH 2017

QUESTION 1

(a)[KB0603-measuring using number]

Score	Item	Criteria												
3	1(a)	<p>Able to record the length of maize plant roots correctly Sample answer:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Solution</th> <th colspan="2">The final length length of maize plants roots agter 3 days (cm)</th> </tr> <tr> <td></td> <th>Maize plant root 1</th> <th>Maize plant roots 2</th> </tr> </thead> <tbody> <tr> <td>A</td> <td style="text-align: center;">3.2 cm</td> <td style="text-align: center;">4.4 cm</td> </tr> <tr> <td>B</td> <td style="text-align: center;">1.2cm</td> <td style="text-align: center;">1.6cm</td> </tr> </tbody> </table> <p>Notes : not accepted 1. Answers without units 2. Average of final length of maize plant roots</p>	Solution	The final length length of maize plants roots agter 3 days (cm)			Maize plant root 1	Maize plant roots 2	A	3.2 cm	4.4 cm	B	1.2cm	1.6cm
Solution	The final length length of maize plants roots agter 3 days (cm)													
	Maize plant root 1	Maize plant roots 2												
A	3.2 cm	4.4 cm												
B	1.2cm	1.6cm												
2		Able to record 3 readings correctly												
1		Able to record 1- 2 reading correctly												
0		Not able to response or wrong response												

(b) (i) [KB0601 - Observation]

Score	Item	Criteria
3	1(b)(i)	<p>Able to state the correct observations based on the following criteria:</p> <p>P1: Manipulated variable (type of solution) P2: Responding variable (the final length of maize plant roots 1 and 2)</p> <p>Sample answer: 1. In solution A/ complete Knop's solution, the length of maize roots 1 is 3.2 cm and the length of maize roots 2 is 4.4 cm 2. In solution B/ incomplete Knop's solution, the length of maize roots 1 is 1.2 cm and the length of maize root 2 is 1.6 cm</p> <p>Notes: Average length / change in length of maize plant roots is not accepted</p>
2		<p>Able to state any one observation correctly with <i>or any two incomplete</i> observations.</p> <p>Sample answer : 1. In solution A, the length of maize roots 1 and 2 is longer 2. In solution B, the length of maize root 1 and 2 is shorter</p>
1		Able to state any one idea of observation
0		Not able to response or wrong response

(b) (ii) [KB0602- Making Inference]

Score	Item	Criteria
3		<p>Able to state correct inference for each observation based on any two aspects: (any 2P)</p> <p>P1: more/ less minerals // phosphate presence/absence // complete / incomplete Knop's solution P2: more/ less growth <u>rate</u> of maize plants roots</p> <p><u>Sample answer:</u> Inference 1: The length of maize plant root is longer because all mineral required are presence/ phosphate presence /complete / Knop's solution, so the growth rate of maize plant root is higher</p> <p>Inference 2: The length of maize plant root is shorter because lack of mineral / phosphorus / incomplete Knop's solution, so the growth rate of maize plant root is lower</p>
2		<p>Able to state any one inference correctly or any two incomplete inferences based on at least one criteria</p> <p>Sample answer: 1. All mineral required are presence / complete Knop's solution, so the growth of maize plant root is high (P1 x P3)</p>
1		<p>Able to state any one idea of inference</p> <p>Sample answer: 1. The length of maize plant root is long.</p>
0		Not able to response or wrong response

(c) [KB0610 – controlling variable]

Score	Item	Criteria						
3	1(c)	<p>Able to state all the variables and method to handle correctly. [6 items]</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Variable</th> <th>Method to handle the variable</th> </tr> </thead> <tbody> <tr> <td> <u>Manipulated variable:</u> Types of solution // complete or incomplete Knop's solution // the absence or presence of phosphate in Knop's solution </td> <td>Used different // change types of solution which is complete Knop's solution to incomplete Knop's solution // the presence to absence of phosphate in Knop's solution</td> </tr> <tr> <td> <u>Responding variable:</u> The length of maize plant root 1 and root 2 // The change in length of maize plant root 1 and 2// </td> <td>Record the length of maize plant roots 1 and roots 2 by using ruler. Calculate the change in length of maize plant roots 1 and 2 by using formula</td> </tr> </tbody> </table>	Variable	Method to handle the variable	<u>Manipulated variable:</u> Types of solution // complete or incomplete Knop's solution // the absence or presence of phosphate in Knop's solution	Used different // change types of solution which is complete Knop's solution to incomplete Knop's solution // the presence to absence of phosphate in Knop's solution	<u>Responding variable:</u> The length of maize plant root 1 and root 2 // The change in length of maize plant root 1 and 2//	Record the length of maize plant roots 1 and roots 2 by using ruler. Calculate the change in length of maize plant roots 1 and 2 by using formula
Variable	Method to handle the variable							
<u>Manipulated variable:</u> Types of solution // complete or incomplete Knop's solution // the absence or presence of phosphate in Knop's solution	Used different // change types of solution which is complete Knop's solution to incomplete Knop's solution // the presence to absence of phosphate in Knop's solution							
<u>Responding variable:</u> The length of maize plant root 1 and root 2 // The change in length of maize plant root 1 and 2//	Record the length of maize plant roots 1 and roots 2 by using ruler. Calculate the change in length of maize plant roots 1 and 2 by using formula							

		<p>The average change in length of maize plant roots //</p> <p>The growth rate of maize plant roots</p>	<p>= Final – initial length in maize plant roots</p> <p>or</p> <p>Calculate the average change in length of maize plant roots by using formula</p> $= \frac{\text{change in length of maize plant roots 1} + \text{change in length of maize plant roots 2}}{2}$ <p>or</p> <p>Calculate the growth rate of maize plant roots by using formula</p> $= \frac{\text{average change in length of maize plant roots}}{3 \text{ days}}$
		<p><u>Constant variable:</u></p> <p>Type of plants // the size of seedlings // the amount of solutions</p>	<p>Use the same types of plants which is maize plants //</p> <p>Use the same size of seedlings//</p> <p>The same amount of solutions</p>
2		Able to state any 4-5 items correctly	
1		Able to state any 1-3 items correctly	
0		Not able to response or wrong response	

(d) [KB0611 – Making hypothesis]

Score	Item	Criteria
3	1(d)	<p>Able to state all three criterias correctly based on :</p> <p>P1 : state the manipulated variable.</p> <p>P2 : state the responding variable</p> <p>R : relationship between P1 and P2</p> <p>Sample answer:</p> <p>1. In complete Knop's solution,/ solution A/ in presence of phosphate , the growth rate of maize plant roots is higher compared to incomplete Knop's solution / solution B/ absence of phosphate</p>
2		Able to state any two criterias correctly or any two criterias inaccurately.
1		Able to state any one criteria correctly or at idea level.
0		Not able to response or wrong response

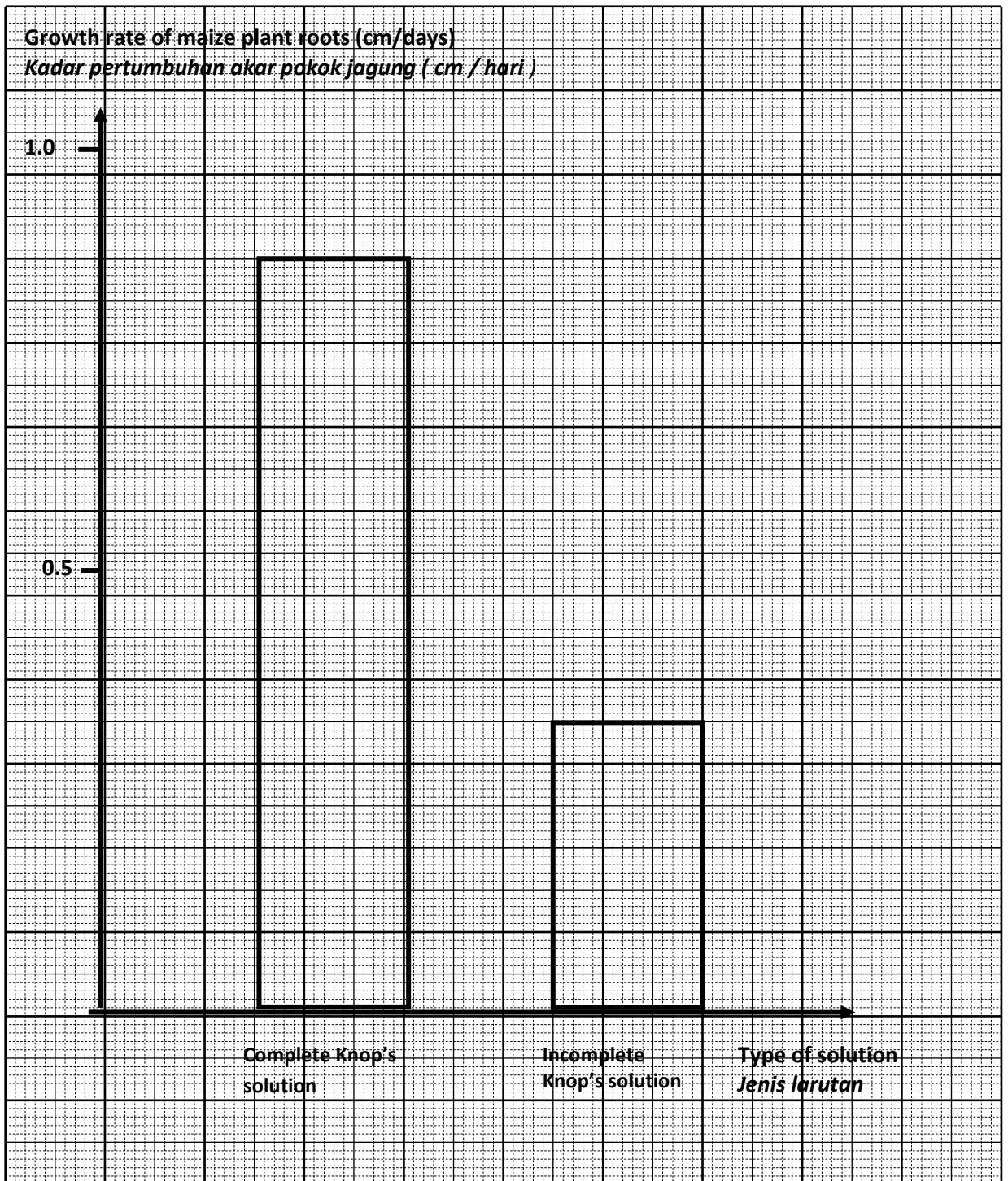
(e)(i) [KB 0606 – Communicating skill]

Score	Item	Criteria																									
3		<p>Able to construct a table and record all the data correctly based on :</p> <p>T: Title with correct units D: Correct data (final length of maize plant roots) S: Correct calculations of change in length , average change in length and growth rate of maize plant roots</p> <p>Sample answer:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Solutions</th> <th colspan="2">The final length of maize plant roots (cm)</th> <th colspan="2">Change in length of maize plant roots (cm)</th> <th rowspan="2">Average change in length of maize plants roots (cm)</th> <th rowspan="2">Growth rate of maize plants roots (cm / days)</th> </tr> <tr> <th>Maize plant roots 1</th> <th>Maize plant roots 2</th> <th>Maize plant roots 1</th> <th>Maize plant roots 2</th> </tr> </thead> <tbody> <tr> <td>A Complete Knop's</td> <td>3.2</td> <td>4.4</td> <td>2.2</td> <td>3.4</td> <td>2.8</td> <td>0.93 / 0.9</td> </tr> <tr> <td>B Incomplete Knop's</td> <td>1.2</td> <td>1.6</td> <td>0.2</td> <td>0.6</td> <td>0.4</td> <td>0.13 / 0.1</td> </tr> </tbody> </table>	Solutions	The final length of maize plant roots (cm)		Change in length of maize plant roots (cm)		Average change in length of maize plants roots (cm)	Growth rate of maize plants roots (cm / days)	Maize plant roots 1	Maize plant roots 2	Maize plant roots 1	Maize plant roots 2	A Complete Knop's	3.2	4.4	2.2	3.4	2.8	0.93 / 0.9	B Incomplete Knop's	1.2	1.6	0.2	0.6	0.4	0.13 / 0.1
Solutions	The final length of maize plant roots (cm)			Change in length of maize plant roots (cm)		Average change in length of maize plants roots (cm)	Growth rate of maize plants roots (cm / days)																				
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A Complete Knop's	3.2	4.4	2.2	3.4	2.8	0.93 / 0.9																					
B Incomplete Knop's	1.2	1.6	0.2	0.6	0.4	0.13 / 0.1																					
2		Able to state any two criterias correctly																									
1		Able to state any one criteria correctly																									
0		Not able to response or wrong response																									

(e) (ii) [KB0607 – Using spatial and time relationship]

Score	Item	Criteria
3		<p>Able to draw a bar chart graph based on the following criteria :</p> <p>P :Correct axis label with unit/ uniform scale. T : all points are plotted correctly. B: Correct shape of graph</p>
2		Any two criterias
1		Any one criteria
0		Not able to response or wrong response

Bar chart of the growth rate of maize plant roots against the type of solution
Carta bar kadar pertumbuhan akar pokok jagung melawan jenis larutan



(e)(iii) [KB0608- Interpreting data]

Score	Item	Criteria
3		<p>Able to explain the relationship between the growth rate of maize against the type of solution (R + any 2P)</p> <p>R: correct conclusion The growth rate of maize plant roots higher in solution A // complete Knop's solution compared to solution B // incomplete Knop's solution</p> <p>P1: all mineral // phosphate presence / incomplete minerals //absence of phosphate</p> <p>P2:stimulate/ suitable (for the growth of roots) //</p> <p>P3 : cells divide by mitosis causes the length of maize plants roots increases</p> <p>PSample answer: The growth rate of maize plant roots is higher in complete Knop's solution compared to in incomplete Knop's solution because phosphate is presence which stimulate /suitable for the growth of roots causes the length of maize plant roots increases.</p>
2		Able to state R + P2 / P1 + P3
1		Able to state P1 only
0		Not able to response or wrong response

(h) [KB060902 - Operational definition]

Score	Item	Criteria
3		<p>Able to define operationally based on :</p> <p>P1: process of changes in length of maize plantroots</p> <p>P2: shown by the final length of maize plant roots 1 and maize plant roots 2</p> <p>P3: affected by the type of solution // complete Knops solution // the presence of phosphate</p> <p>Sample answer: Growth is the changes in length of maize plant roots which is shown by the final length of maize plant roots 1 and maize plant roots 2. Growth is affected by the type of solution / complete Knop's solution / the presence of phosphate</p>
2		Able to predict any 2 criterias
1		Able to predict any one criteria
0		Not able to response or wrong response

(g) [KB0605 – Predicting]

Score	Item	Criteria
3		Able to predict the growth maize plant roots correctly based on : P1: more than 0.3 cm/days P2: more minerals / phosphate presence // required by roots P3: stimulate increases the changes in length of maize plant root // suitable for growth // cells divide by mitosis rapidly Sample answer: The growth rate of maize plant roots is more than 0.3 cm/days because more phosphate is presence which stimulate the increases changes in length of maize plant roots
2		Able to predict any P1 and P2 / P1 and P3
1		Able to predict P1 only
0		Not able to response or wrong response

(i) [KB0602 - Classifying]

Score	Item	Criteria										
3		Able to classify macronutrient and micronutrients correctly (8 correct ticks): Sample answer: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Macronutrients</th> <th>Micronutrients</th> </tr> </thead> <tbody> <tr> <td>Pottasium</td> <td>Boron</td> </tr> <tr> <td>Calcium</td> <td>Molibdenum</td> </tr> <tr> <td>Sulphur</td> <td>Copper</td> </tr> <tr> <td>Magnesium</td> <td>Ferum</td> </tr> </tbody> </table>	Macronutrients	Micronutrients	Pottasium	Boron	Calcium	Molibdenum	Sulphur	Copper	Magnesium	Ferum
Macronutrients	Micronutrients											
Pottasium	Boron											
Calcium	Molibdenum											
Sulphur	Copper											
Magnesium	Ferum											
2		Any 4 - 7 ticks										
1		Any 1 - 3 ticks										
0		Not able to response or wrong response										

QUESTION 2

Question	Mark scheme	Marks
2(i)	<p>Able to state a problem statement relating the MV to RV correctly.</p> <p>P1 : the concentration of enzyme</p> <p>P2: the rate of enzyme reaction//the time taken for the hydrolysis of starch to be completed</p> <p>P3: relationship with question form</p> <p><u>Sample answers:</u></p> <p>1. What is the effects of enzyme concentration on the activity of salivary amylase on starch//the time taken for the hydrolysis of starch to be completed ?</p> <p>2. How does the enzyme concentration affects the activity of the salivary amylase//the time taken for the hydrolysis of starch to be completed?</p>	3
	<p>Able to state a problem statement less accurately / less one criteria.</p> <p><u>Sample answers:</u></p> <p>1. Enzyme concentration affects the activity of salivary amylase</p> <p>2. What is the effect of enzyme on the activity of salivary amylase?</p>	2
	<p>Able to state a problem statement at idea level / less two criteria.</p> <p>Sample answer:</p> <p>1. Enzyme affects the activity of salivary amylase</p>	1
	No response or incorrect response	0
2(ii)	<p>Able to state a hypothesis based on the following criteria correctly.</p> <p>P1 : the concentration of enzyme (Manipulated Variable)</p> <p>P2: the rate of enzyme reaction//activity of salivary amylase// the time taken for the hydrolysis of starch to be completed</p> <p>P3 : relationship</p>	3

	<p><u>Sample answers:</u></p> <ol style="list-style-type: none"> 1. The higher the enzyme concentration, the higher the rate of enzyme reaction 2. When the enzyme concentration increase, the rate of enzyme reaction increase 	
	<p>Able to state a hypothesis less accurately / less one criteria.</p> <p><u>Sample answers:</u></p> <ol style="list-style-type: none"> 1. The enzyme concentration affects the rate of enzyme reaction 	2
	<p>Able to state a hypothesis at idea level / less two criteria.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Enzyme affects the time taken for hydrolysis of starch to be completed 	1
	<p>No response or incorrect response</p>	0
2(iii)	<p>Able to state all 3 variables correctly.</p> <p><u>Sample answers:</u></p> <ol style="list-style-type: none"> 1. <u>Manipulated variable:</u> Enzyme concentration 2. <u>Responding variable :</u> The rate of enzyme reaction//the time taken for hydrolysis of starch 3. <u>Constant variable :</u> Temperature // volume of enzyme//concentration of substrate/starch 	3
	<p>Any 2 variables correct</p>	2
	<p>Any 1 variable correct</p>	1
	<p>No response or incorrect response</p>	0

Question	Mark scheme	Marks
2(iv)	<p>Able to list all the important apparatus and materials correctly</p> <p>- 6 apparatus and 4 materials = 6A + 4 M</p> <p><u>Sample answers:</u> <u>Apparatus: (A)</u> 1. Water bath // (Beakers +distilled water+ thermometer) 2. Tile with grooves 3. Test tube 4. Thermometer 5. Syringe 6. Stopwatch</p> <p>Note: the use of water bath is equal to(beaker + water + thermometer)</p> <p><u>Materials: (M)</u> 1. starch suspension 2. saliva 3. distilled water 4. iodine solution</p>	3
	Able to state any 4 A + 3M	2
	Able to state any 2A + 2M	1
	No response / wrong response	0
	<p><u>Sample answer:</u></p> <p>Any 3/2/1 A only</p>	

2(v)	<p>Able to describe the steps of the experiment correctly.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Prepare three test tubes and label with A- C.(K1) 2. Fill test tube A with 10% amylase enzyme concentration solution (K1) 3. Immerse the test tube in water bath set at 37C throughout the experiment (K1,K5) 4. Meanwhile , add few drops of iodine solution onto the grooves of white tile. (K1) 5. Add 4 ml of 1% starch suspension to the test tube by using a syringe.(K1,K2) 6. Immediately, start the stopwatch (K1) 7. Stir the mixture in the test tube by using a glass rod (K1,K5) 8. Remove a small amount of the mixture and test with iodine solution on the tile(K1) 9. Repeat iodine test at 30-second intervals until the mixture does not turn blue-black when tested with iodine solution(K1,K2) 10. Record the time taken for the hydrolysis of starch to be completed (K3). 11. Calculate the rate of enzyme reaction by using formula $= \frac{1}{\text{time}} (\text{min}^{-1}) \text{ (K3)}$ 12. Repeat step 2 to 11 with 15% and 20% of amylase enzyme concentration.(K1,K4) 13. Record the results in a table. (K3) <p>K1 : Steps 1, 2, 3,4,5,6, 7,8,9 and 12 (any 4 K1)</p> <p>K2 : Steps 5,9 (any one step)</p> <p>K3 : Steps 10,11 (any one step)</p> <p>K4 : Steps 12</p> <p>K5 : Steps 3,7 (any one step)</p>	
	5 K	3
	3- 4 K	2
	1-2 K	1
		0

Question	Mark scheme	Marks												
2(vi)	<p>Able to construct a table to present data with the following criteria:</p> <p>T : Title with correct units</p> <p>M: Manipulated variable</p> <p><u>Sample answers:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Concentration of amylase (%)</th> <th>Time taken for the hydrolysis of starch to be completed (min)</th> <th>Rate of enzyme reaction (1/ t) (min⁻¹)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td></td> <td></td> </tr> <tr> <td>15</td> <td></td> <td></td> </tr> <tr> <td>20</td> <td></td> <td></td> </tr> </tbody> </table>	Concentration of amylase (%)	Time taken for the hydrolysis of starch to be completed (min)	Rate of enzyme reaction (1/ t) (min ⁻¹)	10			15			20			2
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10														
15														
20														
	No response or incorrect response	0												

END OF MARKING SCHEME

PERATURAN PEMARKAHAN TAMAT