

SUGGESTED ANSWER (SA) PAPER 3 SPMRSM BIOLOGY

1 (a) KB0603 – Measuring Using Numbers

Mark Scheme			Score	
<u>Sample Answer:</u>			3	
Concentration of auxin (mgL ⁻¹)	Final height of the mustard shoot after six days (cm)			
	1	2		
	0.01	4.4/4.5/4.6		4.7/4.8/4.0
	0.05	5.1/5.2/5.3		5.4/5.5/5.6
	0.07	6.7/6.8/6.9		6.5/6.6/6.7

1 (b) [KB0602 – Classifying]

Mark scheme		Score
Sample answer		3
Material	Apparatus	
Mustard shoot	Ruler	
Soil	Pot	
Auxin solution		
Water		

(c) (i) [KB0601 - Observation]

Explanation	Score
<p>Sample answer:</p> <p>1. When the concentration of auxin solution is 0.01 mgL⁻¹, the final height of mustard shoot after six days are 4.5 cm for shoot 1 and 4.8 cm for shoot 2 (respectively).</p> <p>2. When the concentration of auxin solution is 0.07 mgL⁻¹, the final height of mustard shoot after six days are 6.8 cm for shoot 1 and 6.6 cm for shoot 2 (respectively).</p>	3

1 (c) (ii) [KB0604 – Making inference]

Explanation	Score
<p>Sample answers:</p> <p>Inference from observation 1:</p> <ol style="list-style-type: none"> When the concentration of auxin solution is the lowest, the final height of mustard shoot after six days is the lowest because less auxin promote / stimulate less cell elongation, the growth rate of shoot become less / lower / lowest. When the concentration of auxin solution is highest, the final height of mustard shoot after six days is the highest because more auxin promote/stimulate more cell elongation, the growth rate of shoot become more / higher / highest. 	3

1 (d) [KB0610 – Controlling Variables]

Explanation	Score										
<p>Sample Answer :</p> <table border="1"> <thead> <tr> <th>Variables</th><th>Method to handle the variable correctly</th></tr> </thead> <tbody> <tr> <td><u>Manipulated variable:</u> Concentration of auxin solution</td><td>Use/ Spray different concentration of auxin solution which are 0.01 mgL^{-1}, 0.05 mgL^{-1} and 0.07 mgL^{-1}</td></tr> <tr> <td><u>Responding variable :</u> Final height of mustard shoot after six days // Difference in height of mustard shoot after six days // Average height // Growth rate</td><td> <p>Measure and record the final height of mustard shoot after six days by using ruler //</p> <p>Calculate and record the difference in height by using formula : Difference in height = Final height - Initial height</p> <p>Calculate and record the average height by using a formula <u>Final height 1 + Final height 2</u> //</p> <p style="text-align: center;">2</p> <p>Calculate and record growth rate of mustard shoot by using formula: Growth rate = $\frac{\text{Difference in height of mustard shoot}}{\text{Time}}$</p> </td></tr> <tr> <td><u>Constant variable:</u> Types of shoot / plant //</td><td>Use/ fix the same type of shoot / plant that is mustard //</td></tr> <tr> <td>Volume of auxin solution //</td><td>Use the same volume of auxin solution that is</td></tr> </tbody> </table>	Variables	Method to handle the variable correctly	<u>Manipulated variable:</u> Concentration of auxin solution	Use/ Spray different concentration of auxin solution which are 0.01 mgL^{-1} , 0.05 mgL^{-1} and 0.07 mgL^{-1}	<u>Responding variable :</u> Final height of mustard shoot after six days // Difference in height of mustard shoot after six days // Average height // Growth rate	<p>Measure and record the final height of mustard shoot after six days by using ruler //</p> <p>Calculate and record the difference in height by using formula : Difference in height = Final height - Initial height</p> <p>Calculate and record the average height by using a formula <u>Final height 1 + Final height 2</u> //</p> <p style="text-align: center;">2</p> <p>Calculate and record growth rate of mustard shoot by using formula: Growth rate = $\frac{\text{Difference in height of mustard shoot}}{\text{Time}}$</p>	<u>Constant variable:</u> Types of shoot / plant //	Use/ fix the same type of shoot / plant that is mustard //	Volume of auxin solution //	Use the same volume of auxin solution that is	3
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Volume of water //	2 ml. //	
Types of soil	Use the same volume of water //	
	Use the same type of soil	

1 (e) [KB0611 – Making Hypothesis]

Mark scheme	Score
<p>Sample answers :</p> <p>1. The higher/lower the concentration of auxin solution, the higher/lower the final height of mustard shoot / growth rate/ difference in height/average height</p>	3

1 (f) (i) [KB0606 – Communication]

Mark scheme						Score
Sample answers :						3
Concentration of auxin solution (mgL ⁻¹)	Final height of the mustard shoot after six days (cm)				Difference in height of the mustard shoot after six days (cm)	Growth rate (cm/day)
	Initial	Final		Average		
		1	2			
0.01	4.0	4.5	4.8	4.65	0.65	0.11
0.05	4.0	5.2	5.5	5.35	1.35	0.23
0.07	4.0	6.8	6.6	6.70	2.70	0.45
*final height must be written in 1 decimal point						
* growth rate must be written in 2 decimal point						

1 (f)(ii) [KB0608 – Space and time relationship]

Criteria	Score
<ul style="list-style-type: none"> Both axes are labelled in uniform scale All points are plotted correctly smooth / curve line and joint all the points (No extrapolation; not more than 3 small squares) 	3

(g) [KB0607 – Interpreting Data]

Criteria	Score
<p>Sample answer :</p> <p>1. When the concentration of auxin increases, the growth rate of mustard shoot increases. More auxin in solution promote/stimulate more cell elongation so that final height increases.</p>	3

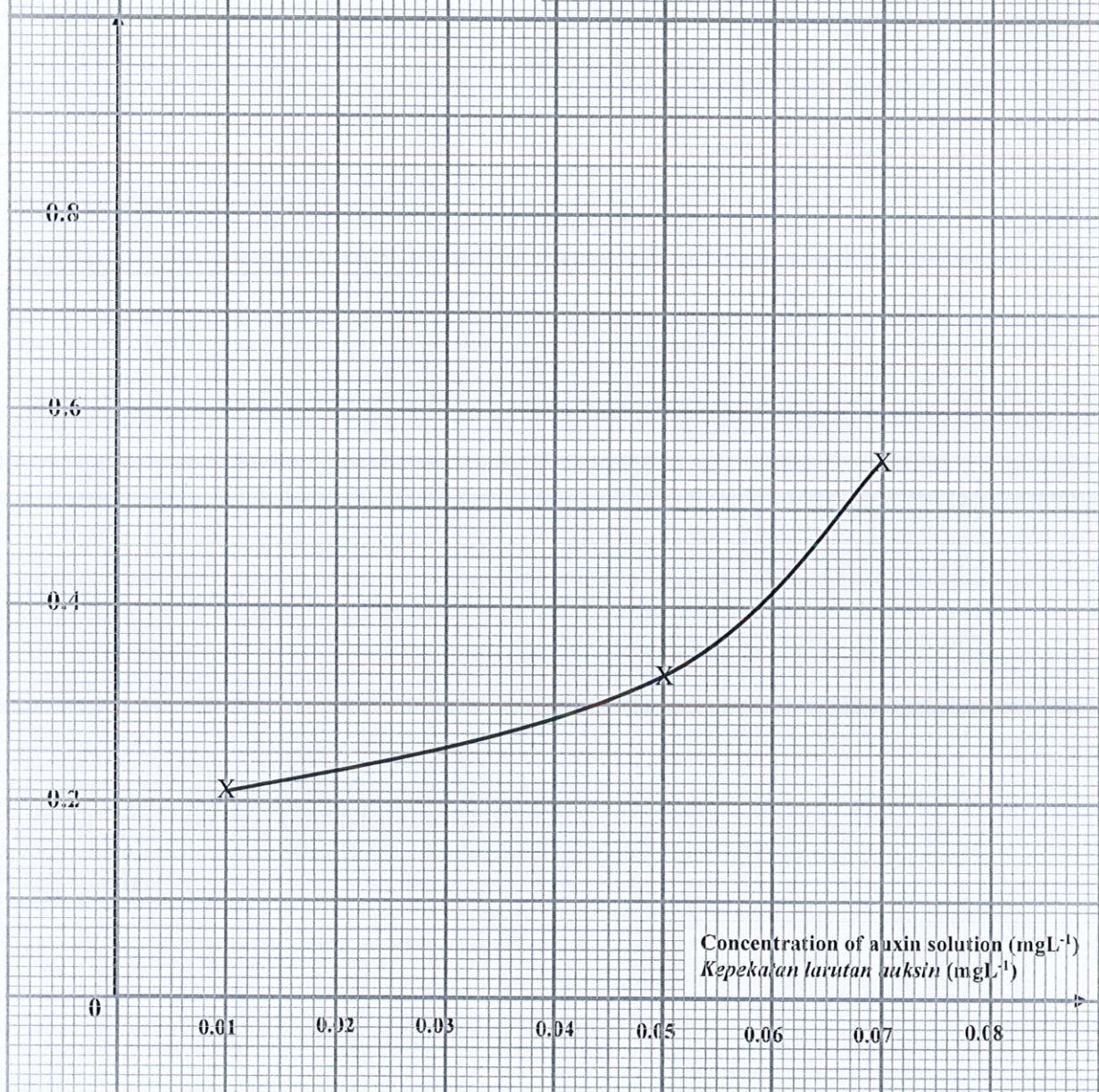
1 (h) [KB0609 – Define operationally]

Explanation	Score
<u>Sample answers:</u> 1. Growth is the process of cell elongation /increase in height of mustard shoot which is shown by the final height of mustard shoot after six days and affected by (different) concentration of auxin solution.	3

1 (i) [KB0605 –Predicting]

Mark scheme	Score
<u>Sample answer 1:</u> <ul style="list-style-type: none">• The mustard shoot remain straight, because• no cell elongation occur/ growth rate constant due to• auxin cannot diffuse to the zone of elongation through glass slip. <u>Sample answer 2:</u> <ul style="list-style-type: none">• Shoot bend towards light source/ to the right• Glass slip has no effect on the diffusion of auxin// glass slip not at cell division zone/ elongation zone/ cell differentiation zone P3• Concentration of auxin at the shaded region is higher// cell elongation at the shaded region is faster// growth rate at shaded region is higher.	3

Growth rate of mustard shoot (cm/day)
Kadar pertumbuhan pucuk sawi (cm/hari)



Question 2

No.	Mark Scheme	Score
2(i)	<u>Sample answers :</u> 1. Does different pH (value) affect the rate of trypsin reaction? 2. What is the effect of different pH on the rate of trypsin reaction?	3

No.	Mark Scheme	Score
2(ii)	<u>Sample answers :</u> 1. In pH 9/7/2, the rate of trypsin reaction is the highest/lowest. 2. In pH 2/9 the rate of trypsin reaction is lower/higher than pH 7 and pH 9/7 and pH 2. 3. The rate of trypsin reaction in (medium of) pH9/ alkaline is the highest	3

No.	Mark Scheme	Score
2(iii)	<u>Sample answers :</u> <ul style="list-style-type: none"> Manipulated Variables: pH of solution Responding variables : Rate of trypsin reaction Constant variables : Concentration of trypsin // Temperature of water bath/ surrounding // Volume of albumen suspension 	3

2(iv)	<u>Sample answers :</u> A) For Experiment Albumen Apparatus : Beakers, a tripod stand, thermometer / (water bath), test tubes, 5 ml syringe, pH paper, a wire gauze, a Bunsen burner, stopwatch, dropper, forceps Materials : * Albumen suspension, * 1 % trypsin, * 0.1 M hydrochloric acid, * 0.1 M sodium hydroxide solution, distilled water * Bunsen burner + tripod stand + wire gauze + distilled water + beaker or Waterbath = 1 Apparatus B) For Experiment cowhide leather Apparatus: Beakers, a tripod stand, thermometer / (water bath), test tubes, 5 ml syringe, pH paper, a wire gauze, a Bunsen burner, stopwatch, dropper, forceps Materials: Pieces of cowhide leather, 1% trypsin, 0.1 M vinegar, lime powder, (distilled) water *NOTE : Reject if student use hydrogen Peroxide Experiment.	3
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	Mark Scheme	K's	
2(v)	<p><u>Sample answer :</u></p> <p>A) Experiment Albumen</p> <ol style="list-style-type: none"> Prepare an albumen suspension (by mixing egg white with 500 ml of distilled water). Boil the suspension and leave it to cool. Discard large particles. Label three test tube X,Y and Z. Put 5 ml of albumen into each test tube using a syringe. Add the following solutions into each test tube. X : 1 ml of 0.1 M hydrochloric acid + 1 ml of 1 % trypsin solution Y : 1 ml of distilled water + 1 ml of 1 % trypsin solution Z : 1 ml of 0.1 M sodium hydroxide + 1 ml of 1 % trypsin solution Dip a piece of pH paper into each test tube and record the pH value Immerse all the test tube in the water bath where the temperature maintain at 37 °C. Leave the test tubes for 20 minutes. Observe the conditions/cloudiness of the mixture at the beginning of the experiment. After 20 minutes, observe and record the conditions / cloudiness of the mixture. Record all data in table / Tabulate the data. Repeat the experiment twice to get average reading. <p>B) Experiment Cowhide</p> <ol style="list-style-type: none"> Prepare a piece of cowhide. Label three beakers X,Y and Z. Put the following solutions into each beaker. X : 1 ml of 0.1 M vinegar + 1 ml of 1 % trypsin Solution + 1ml of distilled water Y: 1 ml of distilled water + 1 ml of 1 % trypsin solution Z : lime powder + 1 ml of 1 % trypsin +1ml distilled water Soak a piece of cowhide into each beaker. Dip a piece of pH paper into each beaker and record the pH value. Immerse all beakers in the water bath where the temperature is maintained at 37 °C. Leave the beakers for 20 minutes. Record all data in table / Tabulate the data. Repeat experiment twice to get average reading <p><i>* Reject K3</i></p> <p>*NOTE : Reject if student use hydrogen Peroxide Experiment.</p>	<p>K1</p> <p>K1, K5</p> <p>K5</p> <p>K1</p> <p>K1</p> <p>K1</p> <p>K4</p> <p>K1</p> <p>K1, K2</p> <p>K1</p> <p>K1</p> <p>K2, K3 (ORV)</p> <p>K1</p> <p>K5</p> <p>K1</p> <p>K1</p> <p>K1</p> <p>K4</p> <p>K1</p> <p>K1</p> <p>K1</p> <p>K2</p> <p>K1</p> <p>K5</p>	3

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PERATURAN PEMARKAHAN TAMAT