1 (a) KB0603 – Measuring Using Numbers

Mark Scheme	Score
Sample Answer:	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
Sample answer: 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). 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).	3

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

Explanation	Score
Sample answers: Inference from observation 1: 1. 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. 2. 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
Sample Answer :	

Variables	Method to handle the variable correctly
Manipulated variable: 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}
Responding variable : Final height of mustard shoot after six days //	**Measure** and **record** the final height of mustard shoot after six days by using **ruler** //
Difference in height of mustard shoot after six days //	**Calculate** and **record** the difference in height by using formula : Different in height = Final height - Initial height
Average height //	**Calculate** and **record** the average height by using a formula Final height 1+ Final height 2 // 2
Growth rate	**Calculate** and **record** growth rate of mustard shoot by using formula: Growth rate = Difference in height of mustard shoot ——————————————— Time
Constant variable: 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

Score for 1(d): 3

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
Sample answers : **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	3

1 (f) (i) [KB0606 – Communication]

Mark scheme	Score

Sample answers :

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 1	Final 2	Average		
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

Score: 3

*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
• 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
Sample answer : 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.	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> • 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> • 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
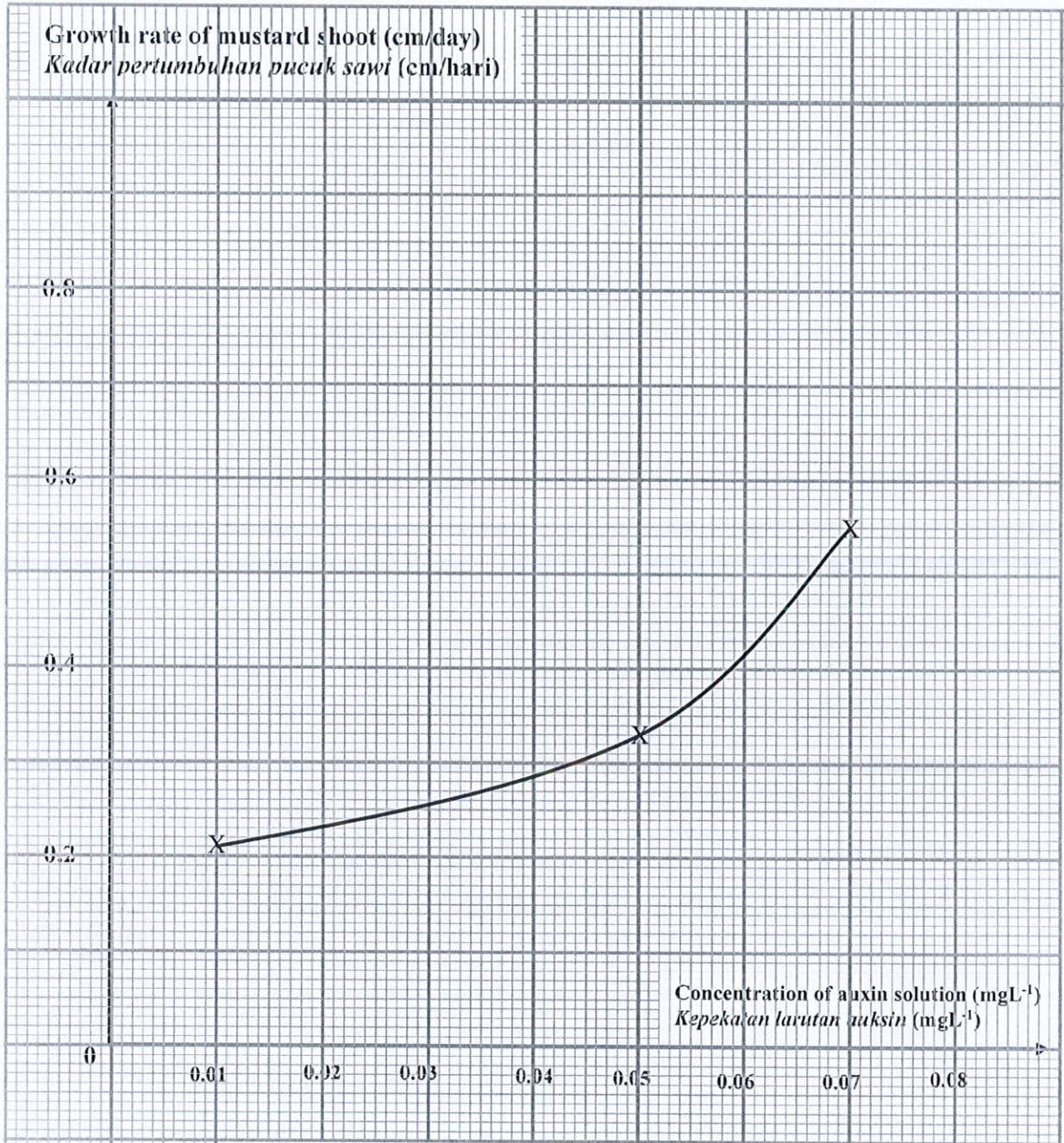
Question 2

No.	Mark Scheme	Score
2(i)	Sample answers : 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)	Sample answers : 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)	Sample answers : • 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) | Sample answers :
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 |

	Mark Scheme	K's	
2(v)	Sample answer : **A) Experiment Albumen** 1. **Prepare** an albumen suspension (by mixing egg white with 500 ml of distilled water).	K1	
	2. **Boil** the suspension and leave it to **cool**.	K1, K5	
	3. **Discard** large particles.	K5	
	4. **Label** three test tube X,Y and Z.	K1	
	5. **Put** 5 ml of albumen into each test tube using a syringe.	K1	
	6. **Add** the following solutions into each test tube.	K1	
	X : 1 ml of 0.1 M hydrochloric acid + 1 ml of 1 % trypsin solution	K4	
	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		
	7. **Dip** a piece of pH paper into each test tube and **record** the pH value	K1	
	8. **Immerse** all the test tube in the water bath where the temperature maintain at **37 ˚C.**	K1, K2	
	9. **Leave** the test tubes for 20 minutes.	K1	
	10. **Observe** the conditions/cloudiness of the mixture at the beginning of the experiment.	K1	
	11. **After 20 minutes, observe and record** the conditions / cloudiness of the mixture.	K2, K3 (ORV)	
	12. Record all data in **table / Tabulate** the data.	K1	3
	13. **Repeat the experiment twice** to get **average** reading.	K5	
	   B) Experiment Cowhide 1. **Prepare** a piece of cowhide.	K1	
	2. **Label** three beakers X,Y and Z.	K1	
	3. **Put** the following solutions into each beaker.	K1	
	X : 1 ml of 0.1 M vinegar + 1 ml of 1 % trypsin Solution + 1ml of distilled water	K4	
	Y: 1 ml of distilled water + 1 ml of 1 % trypsin solution		
	Z : lime powder + 1 ml of 1 % trypsin +1ml distilled water		
	4. **Soak** a piece of cowhide into each beaker.	K1	
	5. **Dip** a piece of pH paper into each beaker and **record** the pH value.	K1	
	6. **Immerse** all beakers in the water bath where the temperature is maintained at **37 ˚C.**	K1 K2	
	7. **Leave** the beakers for 20 minutes.		
	8. Record all data in **table / Tabulate** the data.	K1	
	9. **Repeat** experiment **twice** to get **average** reading	K5	
	  Reject K3 ***NOTE : Reject if student use hydrogen Peroxide Experiment.**		

No.	Mark Scheme	Score
2(vi)	Sample answer	2

pH value	Condition of the mixture	
	At the beginning of the experiment	After 20 minutes
2		
7		
9		

Or

pH value	Time taken for the mixture/sample to turn clear (minute)	Rate of enzyme reaction (minute^{-1})
2		
7		
9		

* **reject** pH acidic/alkaline/neutral
* pH value must include 3 different medium
* accept any pH value in 3 different medium

PERATURAN PEMARKAHAN TAMAT