PERATURAN PEMARKAHAN BIOLOGI KERTAS 3 MODUL 2 MPSM 2015

<table>
<tr><th>No</th><th>Explanation</th><th>Score</th></tr>
<tr><td>1(a)</td><td>Able to record all 4 readings for the difference in mass of visking tubing correctly
Sample answer:

<table><tr><th>Concentration of sucrose solution (%)</th><th>Difference in mass of visking tubing after 30 minutes (g)</th></tr><tr><td>10</td><td>0.65</td></tr><tr><td>20</td><td>0.90</td></tr><tr><td>30</td><td>1.45</td></tr><tr><td>40</td><td>2.65</td></tr></table></td><td>3</td></tr>
<tr><td>2</td><td>Able to record 3 readings for the difference in mass correctly</td><td>2</td></tr>
<tr><td>1</td><td>Able to record 1- 2 readings for the difference in mass correctly</td><td>1</td></tr>
<tr><td>0</td><td>No correct response</td><td>0</td></tr>
</table>

<table>
<tr><th></th><th>Explanation</th><th></th></tr>
<tr><td>1(b)(i)</td><td>Able to state two correct observations based on the following criteria
C1 – concentration of sucrose solution
C2 – difference in mass of visking tubing

Sample answer:
Horizontal observations
1. In 10% concentration of sucrose solution, the difference in mass of the visking tubing after 30 minutes is 0.65 g.
2. In 40% sucrose solution, the difference in mass of the visking tubing after 30 minutes is 2.65 g.
Vertical observation
3. The difference in mass of visking tubing after 30 minutes in 10% concentration of sucrose solution is lower than in 40% concentration of sucrose solution.
4. The higher the concentration of sucrose solution, the larger the difference in mass of visking tubing after 30 minutes.</td><td>3</td></tr>
<tr><td></td><td>Able to state one correct observation and one inaccurate response or two inaccurate observations
Sample answer:
Inaccurate horizontal observation
1. At 10% concentration of sucrose solution, the difference in mass of visking tubing after 30 minutes is lower
2. At 40% concentration of sucrose solution, the difference in mass of visking tubing after 30 minutes is higher.</td><td>2</td></tr>
<tr><td></td><td>Able to state two observations at idea level (refer to summary of scoring)
Sample answer:
1. The final mass of visking tubing changes
2. Concentration of sucrose solution is different.</td><td>1</td></tr>
<tr><td></td><td>No correct response .</td><td>0</td></tr>
</table>

Summary of scoring for observation and inference

Score	Correct	Inaccurate	idea	wrong
3	2	-	-	-
2	1	1	-	-
	-	2		
1	1	-	1	
			2	
	1			1
		1	1	
0	-	1	-	1
0	-	-	1	1

No	Explanation	
1(b)(ii)	*Able to state all correct inferences for the observation based on the criteria:* C1: lower/higher concentration of sucrose solution C2 : less / more water molecules diffuse into the visking tubing C3 : by osmosis Sample answer: Horizontal observations 1. In lower concentration of sucrose solution// dilute solution, less water molecules diffuse into the visking tubing by osmosis 2. In higher concentration of sucrose solution// concentrated solution, more water molecules diffuse into the visking tubing by osmosis. Vertical observation 3. Less water molecules diffuse into the visking tubing in lower concentration of sucrose solution compared to higher concentration of sucrose solution by osmosis. 4. The higher the concentration of sucrose solution, the more water molecules diffuse into the visking tubing by osmosis.	3
	Able to state two correct inference and one inaccurate inference or Able to make two inaccurate inferences *Sample answer*: Inaccurate horizontal inference 1. In lower concentration of sucrose solution, less water molecules diffuse into the visking tubing Inaccurate vertical inference 2. More water molecules diffuse into the visking tubing in lower concentration of sucrose solution compared to higher concentration of sucrose solution.	2
	Able to state two inferences at idea level (refer to summary of scoring) *Sample answer*: 1. Osmosis occurs 2. Water molecules diffuse.	1
	No response or wrong response.	0

<table>
<tr><td>No</td><td>Explanation</td><td></td></tr>
<tr><td>1(c)</td><td>Able to state all the variables and the method to handle variable correctly.

<table>
<tr><td>Variable</td><td>Method to handle the variable</td></tr>
<tr><td><u>Manipulated variable</u>
Concentration of sucrose solution</td><td>Use different concentration of sucrose solutions 10%, 20%, 30% and 40% // Change the concentration of 10% into 20%, 30% and 40% of sucrose solution</td></tr>
<tr><td><u>Responding variable</u>
Difference in / final mass of visking tubing <u>after 30 minutes</u>

Rate of osmosis</td><td><u>Measure</u> and <u>record</u> the difference in / final mass of visking tubing after 30 minutes by using <u>electronic balance /weighing balance</u>

<u>Calculate</u> the rate of osmosis by using formula =
<u>Final mass – initial mass</u> (gmin $^{-1}$)
Time taken</td></tr>
<tr><td><u>Controlled variable</u>
Time taken

Volume of sucrose solution</td><td>Fix the time taken for 30 minutes

Fix the volume of sucrose solutions at 10cm^3</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>Able to get 4-5 ticks</td><td>2</td></tr>
<tr><td></td><td>Able to get 2-3 ticks</td><td>1</td></tr>
<tr><td></td><td>One tick or no response or wrong response.</td><td>0</td></tr>
</table>

No	Explanation	Score

1(d)	*Able to state the hypothesis correctly based on the following criteria:*
	R1 – concentration of sucrose solution
	R2 – difference in / final mass of visking tubing (after 30 minutes) // rate of osmosis
	H – the relationship
	Sample answer:
	1. As the concentration of sucrose solution increases, the difference in mass of visking tubing (after 30 minutes)// rate of osmosis increases.
	2. The higher the concentration of sucrose solution, the higher the difference in mass of visking tubing(after 30 minutes) // rate of osmosis
		3

	Able to state the hypothesis but less accurate Sample answer: 1. Concentration of sucrose solution affects the difference in mass of visking tubing (after 30 minutes) 2. As the sucrose solution increases, the difference in mass of visking tubing (after 30 minutes) increases	2
	Able to state the idea of the hypothesis Sample answer: 1. Difference in mass of visking tubing decrease. 2. As the difference in mass of visking tubing decrease, the concentration of sucrose solution increase. (reverse hypothesis)	1
	No correct response	0

No	Explanation	Score
1(e)(i)	*Able to construct a table and record the result of the experiment with the following criteria* C1: able to state the titles with units correctly C2: able to record all the data correctly C3: able to calculate the rate of osmosis correctly *Sample answer*:	3

Concentration of sucrose solution (%)	mass of visking tubing after 30 minutes (g)		Difference in mass of visking tubing (g)	Rate of osmosis (g min $^{-1}$)
	Initial mass (g)	Final mass (g)		
10	10.64	11.29	0.65	0.022/0.02
20	10.80	11.70	0.9	0.030/0.03
30	10.25	11.70	1.45	0.048/0.05
40	10.22	12.87	2.65	0.088/0.09

	Able to construct a table and record any two criteria	2

	Able to construct a table and record any one criterion	1
	No correct response	0

No	Explanation	Score
1(e)(ii)	*Able to draw the graph correctly with the following aspects:* Axes (A) – both axis are labeled with units and uniform scales Point (P) – all points are correctly plotted / transferred correctly Shape (S) – able to join all the points to form a smooth curve graph.(reject straight line)	3
	Graph with any two criteria	2
	Graph with any one criteria	1
	No response or wrong response	0

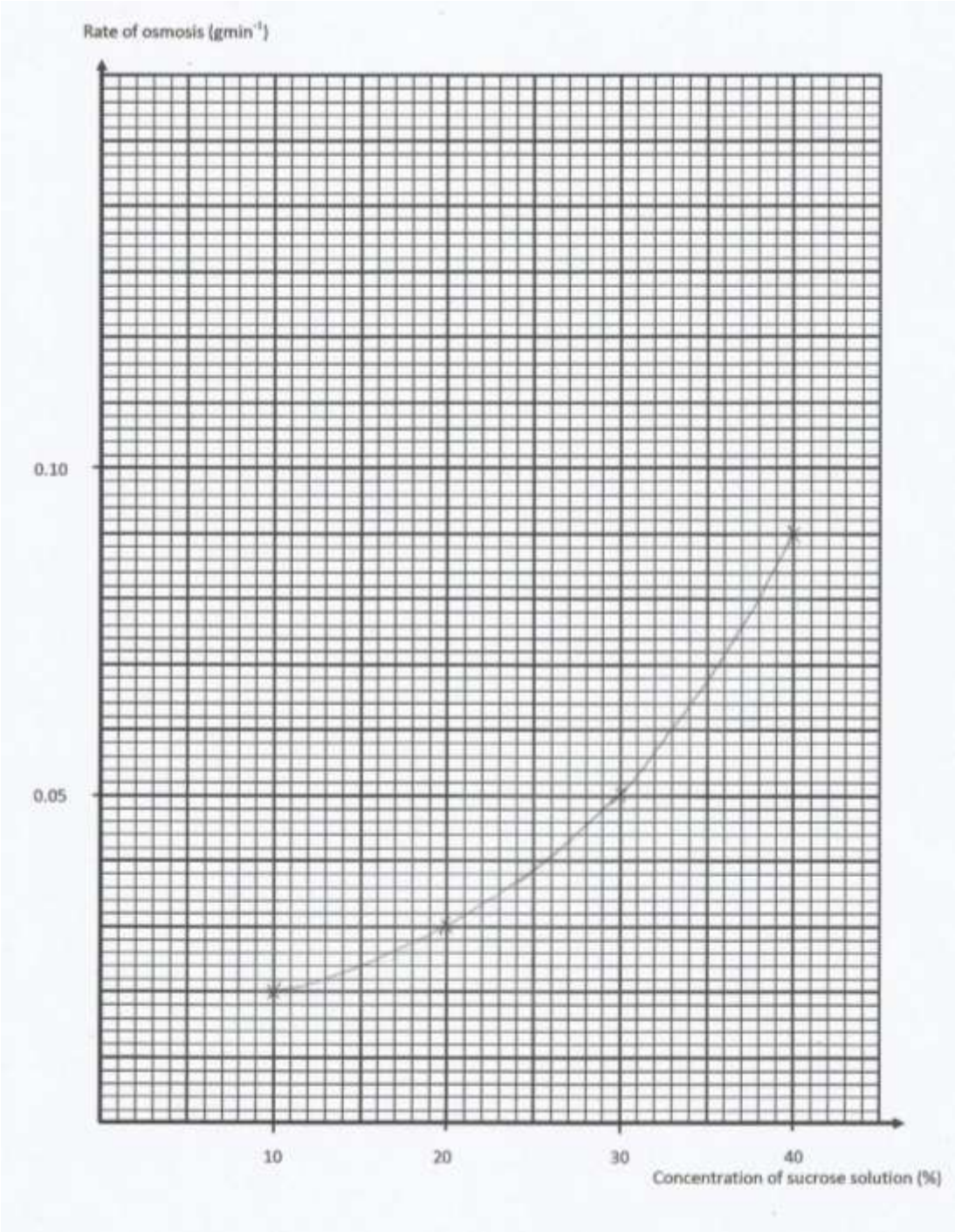
No	Explanation	Score
1(f)	*Able to interpret data correctly and explain the relationship based on the following aspects* P1 : distilled water is hypotonic to the concentration of sucrose solution(in visking tubing) // the concentration of sucrose solution is higher / hypertonic compared to distilled water // vice-versa P2 : increase the mass of visking tubing P3 : the rate of water molecules diffuse into the visking tubing is higher compared to the rate of water diffuse out of the visking tubing by osmosis Sample answer: The mass of visking tubing increases (P2) as the distilled water (in the beaker) is hypotonic to the concentration of sucrose solution (in visking tubing) (P1). So the rate of water molecules diffuse into the visking tubing is higher compared to the rate of water diffuse out of the visking tubing by osmosis (P3).	3
	Able to interpret data correctly and explain the relationship based on any two criteria.	2
	Able to interpret data correctly and explain the relationship based on any one criteria.	1
	No response or wrong response	0

No	Explanation	Score
1(g)	*Able to predict and explain the outcome of the experiment correctly based on the following item:* P1: the difference in mass of visking tubing is less than 0.9 g R1: the hypertonic solution // the higher concentration of solution in the beaker compared to the solution in the visking tubing R2: more water molecules diffuse out of the visking tubing into the beaker by osmosis	3

	Sample answer: The mass of visking tubing is less than 0.9 g because the solution in the beaker is hypertonic// the higher concentration of solution in the beaker compared to the solution in the visking tubing. So more water diffuse out of the visking tubing into the solution in the beaker by osmosis.	
	Able to state predict and explain the outcome of the experiment with two aspects	2
	Able to state predict and explain the outcome of the experiment with one aspect	1
	No response or wrong response	0

No	Explanation	Score
1(h)	*Able to define operationally based on the result of the experiment with the following aspects:* C1: movement/diffusion of water molecules in / out across the visking tubing C2 :difference in mass /final mass of visking tubing (after 30 minutes) C3: different concentration of sucrose solution Sample answer: Osmosis is the net movement / diffusion of water molecules in/ out of the visking tubing results in the difference in mass // final mass of visking tubing(after 30 minutes). It is affected by different concentration of sucrose solution .	3
	Able to define operationally on the result of the experiment with two aspects correctly	2
	Able to define operationally on the result of the experiment with one aspect correctly / theoretical definition.	1
	No response or wrong response	0

No	Explanation	Score
1(i)	*Able to classify all 3 solutions concentration and types of solution correctly* Solution concentration (%) / Types of solution compared to the osmotic concentration of cell sap 0.25% Sodium chloride solution / Hypotonic 0.80 % Sodium chloride solution / Isotonic 1.10% Sodium chloride solution / Hypertonic	3
	Able to classify two solutions concentration and types of solution correctly.	2
	Able to classify one solutions concentration and types of solution correctly.	1
	No response or wrong response	0


Rate of osmosis (gmin⁻¹)
0.10
0.05
10
20
30
40
Concentration of sucrose solution (%)

Suggested answer for Question 2

KB061201 – (Problem statement)

Question	Score	Explanation	Remarks
2 (i)	3	Able to state the problem statement correctly : P1 : Water samples Station A, B and C P2 : Time taken for decolourisation of Methylene blue Solution // BOD value // Level of water pollution H : Question form Sample answer: Which of the Station of water samples will be more polluted // give the highest BOD value ? How do water sources /samples from Station A, B and C affect the time taken for decolourisation of Methylene blue solution?	
	2	Able to state a problem statement less accurately. Sample Answer: Which station will be the most polluted water ?/ have highest BOD value? How do water at station A,B and C affect the methylene blue solution?	
	1	Able to state a problem statement at idea level Sample Answer: BOD value / water pollution is influenced by different station./ water sources	
	0	No response or wrong response	

KB061202 (KB061203 – Making Hypothesis)

Question	Score	Explanation	Remarks

2 (ii)	3	Able tostate the hypothesis based on the following aspects:
		P1 = Manipulated variable = Water sources / sample from Station A, B and C.
		P2 = Responding variable = Time taken for decolourisation of Methylene blue Solution // BOD value / Level of water pollution
		R = Relationship / Link
		
		<u>Sample answer :</u>
		Station B are the mostpollutedwater sources/ samplecompare to Station A and C//.Station B have the highest BOD value compare to Station A and C	

	2	Able to write a hypothesis statement less accurately <u>Sample answer:</u> Station B is the most polluted water / has higher BOD value. Station C is the least polluted water and low BOD Value.	
	1	Able to state a hypothesis at idea level <u>Sample answer:</u> 1. Water sources/ samples from different station affects the time taken / the decolourisation of Methylene blue solution 2.	
	0	No response or wrong response	

KB061203 (Variables)

Question	Score	Explanation	Remarks
2 (iii)	3	Able to state all the three variables correctly Sample answers : 1. Manipulated variable Water sources/ samples from Station A, B and C 2 Responding variable Time taken for decolourisation of Methylene blue Solution // BOD value /Level of water pollution 3 Constant variable 1. Volume of water sources / samples 2. Concentration of Methyleneblue 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. Sample answers: Apparatus: Reagent bottles, syringe, cupboard / black paper, stop watch, label paper / marker pen, measuring cylinder, beaker 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. 150 ml of water sources from Station A, B and C were taken and brought back to the laboratory. (K2, K1) 2. 100 ml of water sources from Station A were measured by using a measuring cylinder and then poured into the reagent bottle. (K2, K1) 3. By using a syringe, 1 ml of 0.1% methylene solution is added to the bottom of each water sources / samples. (K2/ K1) 4. The reagent bottle is closed quickly with a glass stopper and labeled as A(K5) 5. And don't shake the bottle. (K5) 6. Steps 1 to 4 were repeated by using water sources / samples from Station B and C and labeled as B and C. (K4) 7. All the reagent bottles are kept in a dark cupboard / wrap with black or sugar paper. (K1) 8. The time taken for decolourisation of ethylene blue solution is recorded using stopwatch (K3) 9. At intervals of one hour for a period of four hours, each reagent bottle is examined. (K1) 10.All data are recorded in a table. (K1) Note: K1: Steps 1,2,3,7,9,10 (Setting apparatus) K2: Step 1,2,3 (Operating fixed variable) K3: Step 8 (Operating responding variable) K4: Step 6 (Operating manipulated variable) K5: Step 4,5 (Precaution)	
	3	All the 5 K's	
	2	Any 3-4 K	
	1	Any 2 K	
	0	No response or incorrect response	

KB061206 (Presentation of Data)

<table>
<tr><th>Question</th><th>Score</th><th>Explanation</th><th>Remarks</th></tr>
<tr><td>2(vi)</td><td>2</td><td>Able to present all the data with units correctly

Sample answer:

<table>
<tr><td>Water sources / sample Station</td><td>Time taken for decolourisation of methylene blue solution / (hours)</td><td>BOD value and pollution level</td></tr>
<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>
</table>
</td><td></td></tr>
<tr><td></td><td>1</td><td>Able to present at least one data without unit or incorrect unit</td><td></td></tr>
<tr><td></td><td>0</td><td>No response or incorrect response</td><td></td></tr>
</table>