4551/3 **SULIT**
Biologi
Kertas 1
Peraturan
Pemarkahan
2009
$1\frac{1}{4}$ jam

JABATAN PELAJARAN MELAKA

PEPERIKSAAN AKHIR TAHUN
TINGKATAN EMPAT
2009

BIOLOGI

KERTAS 1

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 2 halaman bercetak

Answer Sheets (Paper 1) 2009

No. Ques	Ans	No. Ques	Ans	No. Ques	Ans
1	A	**21**	D	**41**	C
2	C	**22**	A	**42**	B
3	B	**23**	B	**43**	D
4	D	**24**	A	**44**	B
5	D	**25**	D	**45**	C
6	A	**26**	B	**46**	C
7	D	**27**	B	**47**	A
8	C	**28**	C	**48**	C
9	A	**29**	B	**49**	C
10	B	**30**	C	**50**	D
11	C	**31**	C		
12	A	**32**	C		
13	C	**33**	B		
14	B	**34**	B		
15	A	**35**	D		
16	C	**36**	B		
17	C	**37**	C		
18	C	**38**	B		
19	A	**39**	A		
20	B	**40**	B		

4551/2
Biologi
Kertas 2
Peraturan
Pemarkahan
2009
$1\frac{1}{2}$ jam

JABATAN PELAJARAN MELAKA

PEPERIKSAAN AKHIR TAHUN
TINGKATAN EMPAT
2009

BIOLOGI

KERTAS 2

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 12 halaman bercetak

[Lihat Sebelah

SULIT
4551/2
Biologi
Nov 2009
2 ½ jam

JABATAN PELAJARAN NEGERI MELAKA

MARK SCHEME
BIOLOGY PAPER 2
PEPERIKSAAN AKHIR TAHUN
TINGKATAN EMPAT
2009

SKEMA JAWAPAN

BIOLOGI
4551/2

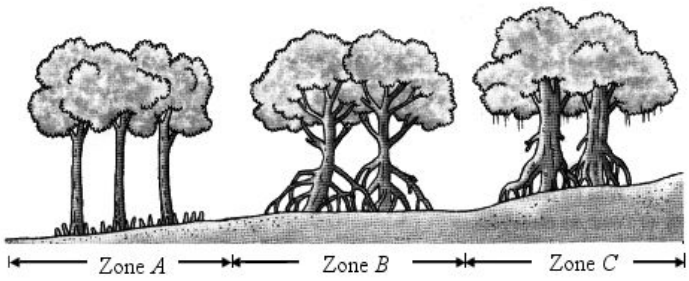
Dua jam tiga puluh minit

Kertas jawapan ini mengandungi 16 halaman bercetak

SECTION A

Item No.	Scoring Criteria	Marks	Remark
1(a)(i)	A: Plasma membrane B: Chloroplast C: Mitocondrion	1 1 1	3m
(ii)	B: contain chlorophyll to traps sunlight/ convert light energy to chemical energy during photosynthesis. C: involved in cellular respiration/ help the glucose break down.	1 1	2m
(b)	X Because has cell wall// has chloroplast.	1 1	2m
(c)	1.Animal cell has centriol but plant cell don't has. 2. Animal cell didn't has cell wall but plant cell has.	1 1	2m
(d)(i)	Does not have energy To perform cell activity	1 1	2m
(ii)	Glucose + Oxygen $\longrightarrow$ Carbon dioxide + Water + Energy	1	
			12m
2 (a)	Photosynthesis is the process by which green plants synthesis organic compounds from carbon dioxide and water in the presence of sunlight.	1 1	2m
(b)	*P* : Chlorophyll *Q* : Electron *R* : Electron *S* : Oxygen *T* : Hydrogen ion *U* : Hydrogen atom		6√ - 4m 4-5√ -3m 2-3√ -2m 1√-1m
(c)	Electron *Q* is released when chlorophyll is activated from the absorption of light energy. Electron *R* is released from photolysis of water and used to replace the activated electron *Q* released from chlorophyll molecules.	1 1	2m

(d)	Hydrogen atoms and ATP produced during light reaction are used to reduce carbon dioxide to produce glucose. The glucose produced can then be converted to starch for temporary storage.	1 1	2m
(e)	Oxygen. It is used for aerobic respiration	1 1	2m
			12m
3 (i)	P- Lipase Q- Fat molecule/Fat R- Enzyme-substrate complex S- Fatty acid and glycerol	1 1 1 1	4m
(ii)	1. P works on specific substrates molecules 2. P remains unchanged at the end of the reaction	1 1	2m
(b)(i)	"Lock and key" hypothesis	1	
(ii)	In "Lock and key" hypothesis on enzyme reaction - The substrate fits into the active site of the enzyme/Various types of bonds hold the substrate in the active site to form an enzyme-substrate complex. - The enzyme then converts the substrate to products. (The products leave the enzyme)	1 1	2m
(c)	Used in ripening of cheese//To break down fat in meat	1	
(d)	No products are produced - For most enzyme, denaturation occurs at about 60° C - The high temperature breaks the bonds that forms the protein structure. - The active site loses its shape and fails to fit the substrate. (any 1 answer)	1 1	2m
			12m
4(a)(i)	Animal cells	1	
(ii)	• Animal cells have centrioles. • They do not have cell wall.	1 1	
(b)	M : Centrioles	1	

	N : Spindle fibre	1	
	O : Homologous chromosomes	1	
(c)(i)	*M*: produce spindle threads	1	
(ii)	*N*: pull chromosomes to the equator during nuclear division	1	
(d)(i) (ii)	Mitosis Meiosis	1 1	2m
(e)(i)	Metaphase	1	
(ii)	Metaphase I	1	
			12m
5 (a)	 Diagram *A*	1	
(b)	*Avicennia sp*. so *Sonneratia sp.*	1	
(c)(i)	Pneumatophore	1	
(ii)	Gaseous exchange through the lenticels	1	
(d)(i)	Vivaparity seeds	1	
(ii)	1- Lack of oxygen in the water-logged soil. The seeds can still obtain the oxygen directly from the atmosphere. 2 – The high salinity sea water in the mangrove swamp. The seeds are protected from dehydration through this reproduction	1 1	2m
(e)	1 - Thick cuticle to reduce lose of water by transpiration. 2 - hydathodes on the leaves to secrete the excess salts from the tree/ sunken stomata	1 1	2m

(f)(i)	*Rhizophora sp.* / *Bruguiera sp.*	1	
(ii)	Succession occurs and causes more mud or silt to be deposited. Hence, the banks are raised higher, become drier and harder. The soil is then more suitable for another species of mangrove tree.	1 1	2m
			12m

Section B

Item no	Scoring Criteria	Mark	
6(a) (i)	• The process shown in diagram 6.1 is simple diffusion. • At the beginning of the experiment the base of the beaker has a high concentration of potassium permanganate(VII) whereas in the distilled water, the concentration of potassium permanganate(VII) is low. • There is concentration gradient between the potassium permanganate(VII) at the base of the beaker with the distilled water at the top. • The diffusion of potassium permanganate(VII) molecules will occur from the region of high concentration to low concentration, which is in accordance to the concentration gradient to achieve equilibrium of concentration. • Hence, at the end of the experiment, the purple colour of potassium permanganate(VII) can be seen throughout the water in the beaker because the potassium permanganate molecules have moved by simple diffusion to a region of low concentration of potassium permanganate(VII).	1 1 1 1 1	Max = 4
6 (a) (ii)	<u>Fresh milk</u> • Pasteurisation is a method of preservation of milk. • Fresh milk is heated to 63°C for 30 minutes and then cooled instantly. • Or milk is heated to 72°C for 15 seconds and then cooled instantly. • The method of preservation will destroy the microorganisms but will not change the nutrient value and colour of milk. <u>Fish</u> • The process of dehydration is a method of preserving fish. • The fish is dried with the use of fire, smoke or is left in the hot sun. • Food that is dried will have very low content of water and also is covered with carbon. • The water content which is low will cause the microorganisms which are present to be destroyed or change into spores which are not active.	 1 1 1 1 1 1 1 1	Max = 6
6 (b) (i)	• When the plant cell is put into 5% of sucrose solution, the solution is isotonic to the plant cell sap. • Hence, there is no concentration gradient between the osmotic pressure of the cell sap of the plants with the	1 1	

	environment. • So the rate of water molecules moving into the plant cell is equal with the rate of water moving out from the cell to the surrounding. • Hence, there is no change in the structure or the size of the vacuole observed. • Then, the cell is put into 30% of sucrose solution which is a hypertonic solution compared to the cell sap of the plants. • There is an osmotic concentration gradient between the cell sap of the plants with the surroundings. • The water molecules will move out of the vacuole in the plant cytoplasm to the surrounding to achieve an osmotic equilibrium. • This will cause the volume of water in the vacuole in the cytoplasm to decrease, hence the cell membrane will be detached from the cell wall and the vacuole will contract. • The cell undergoes plasmolysis. • When the cell is put back into 0.1% of the sucrose solution, the solution is hypotonic to the plant cell sap. • There exists an osmotic concentration gradient between the plant cell sap with the surrounding solution. • This situation will cause a lot of water molecules from the surrounding move into the plant cell compared with water that moves out from the plant cell to the surrounding. • The volume of the water in the cell increase, the vacuole enlarges, and the cytoplasm and the cell membrane will be pushed towards the cell wall. • The cell becomes turgid.	1 1 1 1 1 1 1 1 1 1 1	Max = 10
7 (a) (i)	• Organism *P* shows autotrophic nutrition whereby it is able to synthesis complex organic substances, for example, carbohydrates from inorganic substances such as carbon dioxide and water. • Organism *Q* shows heterotrophic nutrition, whereby it is unable to synthesis its own food and has to feed on food substances previously synthesised by other organisms.	2 2	Max = 4
7 (a) (ii)	<u>Similarity</u> • Both have alimentary canals which are unable to secrete enzyme cellulose to digest cellulose. <u>Differences</u> • *R* is a rodent with a one-chamber stomach whereas Q is a ruminant with a four-chamber stomach. • *R* has a large caecum compared to Q. • In *R*, food is digested twice through the alimentary canal whereas in Q, food is digested only once.	1 2 1 2	

	• In *R*, there is no regurgitation of food. In Q, the partially masticated food is regurgidated to the mouth for further mastication. • Bacteria and protozoa in the caecum of organism R secrete cellulase to digest cellulose. Bacteria and protozoa in the rumen and reticulum of organism *Q* secrete cellulose to digest cellulose.	2 2	Max = 10
7 (b)	<u>Obesity</u> • Obesity is often caused by consumption of excess carbohydrates and fats and lack of exercise. • People who are obese should reduce intake of fats and carbohydrates and carry out more exercise. <u>Anaemia</u> • Anaemia may be due to insufficient red blood cells or the available red blood cells do not contain sufficient haemoglobin to transport oxygen. • Anaemia often results from a deficiency of nutritional factors (e.g. iron, vitamin B_{12}) required to synthesis haemoglobin or red blood cells. It may also be caused by excessive loss of blood or destruction of the cells by endoparasites. • There should be an increase in the intake of ion and vitamin B_{12} if anaemia is caused by the deficiency of these factors. <u>Constipation</u> • Constipation is the difficulty or infrequent elimination of faeces from the body. • Eating more food high in dietary fibres and drink more fluid to prevent constipation.	 1 1 1 1 1 1 1	Max = 6
8 (a) (i)	• *Amoeba* does not have special structure to carry out respiration. • Gaseous exchange is carried out through diffusion across the plasma membrane. • The concentration of oxygen is higher in the outside environment compared to inside the cell. • The oxygen diffuses into the cell by diffusion across the plasma membrane. • The concentration of carbon dioxide is higher in the *amoeba* compared to the outside environment. • Carbon dioxide diffuses out through the plasma membrane by diffusion.	1 1 1 1 1 1	Max = 4
8 (b) (i)	<u>Organism *X*</u> • Has branching fine tracheoles to increase the total surface area to volume ratio • Tracheoles have a moist wall to facilitate dissolving of the	 1 1	

<table>
<tr><td></td><td>gas.
• The wall of tracheole is thin to speed up the process of gaseous exchange.
• The number of tracheoles is numerous to provide a large surface area.
<u>Organism Y</u>
• The gill filaments have numerous projections to increase the surface area.
• The thin membrane of the filament facilitates diffusion of respiratory gases into and out.
• There are numerous blood capillaries in the gill filament to absorb oxygen and eliminate carbon dioxide.</td><td>1

1

1

1

1</td><td>Max = 6</td></tr>
<tr><td>8 (c) (i)</td><td><table><tr><th>Inhalation</th><th>Exhalation</th></tr><tr><td>External intercostal muscles contract</td><td>External intercostal muscles relax</td></tr><tr><td>Internal intercostal muscles relax</td><td>Internal intercostal muscles contract</td></tr><tr><td>Diaphragm muscles contract, diaphragm flattens</td><td>Diaphragm muscles relax, diaphragm curves upwards</td></tr><tr><td>The rig cage moves upwards and outwards</td><td>The rig cage moves inwards and downwards</td></tr><tr><td>The volume of the thoracic cavity increases</td><td>The volume of the thoracic cavity decreases</td></tr><tr><td>Air pressure decreases</td><td>Air pressure increases</td></tr><tr><td>The air from the atmosphere rushes</td><td>The air from the atmosphere is forced out</td></tr></table></td><td>2

2

2

2

2

2

2
2</td><td>Max = 10</td></tr>
<tr><td>9 (a) (i)</td><td>• This phenomena is called greenhouse effect
• Cause combustion of fossils fuels, deforestation and open burning
• Energy from the Sun reaches the earth through radiation
• Some of this radiation is absorbed by the earth
• Greenhouse effect happens as carbon dioxide that are released to the atmosphere will form a layer of gas
• Increase in CO_2 concentration become traps heat
• CO_2 absorbs the infrared radiation
• The layer of CO_2 will be denser than air hence preventing heat that is reflected to the earth to be released
• The reflected heat will continue to increase the temperatureof the earth /global warming
• Melting the polar ice causing raise the sea level</td><td>1
1

1
1
1

1
1
1

1

1</td><td>Max = 10</td></tr>
</table>

9 (b) (i)	The good a social, economic and environmental effects 1) Provides job opportunity 2) Its can improve economic status 3) Provides infrastructure basic needs 4) Such as built up schools to upgrade quality 5) Provides better living condition for settlement 6) Such as electric supply and hygienic water supply 7) Convenient transport system 8) Easy to move from one place to another	 1 1 1 1 1 1 1 1	
		Max = 5	
	The bad a social, economic and environmental effects 1) Area exposed to land reclaimation 2) During heavy rain, soil particles are washed away to the river leads to muddy flood. 3) Habitat for flora and fauna are destroyed 4) Extinction of flora and fauna 5) Pollution air/ water / thermal / sound 6) Leads to decrease in health quality 7) Increase population , leads to social problem.	 1 1 1 1 1 1 1 1	
		Max = 5	Max = 10

4551/3
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Kertas 3
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BIOLOGI

KERTAS 3

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 13 halaman bercetak

MARKING SCHEME

Question 1

(a) (i) 1. When the concentration of sucrose is 0, the length of the potato strips is 5.8cm..

2. When the concentration of sucrose is 1.0, the length of the potato strips is 4.3 cm.

(ii) 1. The concentration of sucrose solution is hypotonic to cell sap of the potato strip and water diffuse into the cell sap
2. The concentration of sucrose solution is hypertonic to cell sap of the potato strip and water diffuse out from cell sap

(b) 5.8 cm, 5.5 cm, 5.1 cm, 4.7 cm, 4.5 cm, 4.3 cm

(c) Manipulated variable : The concentration of sucrose solution
Use different concentration of sucrose solution

Responding variable : The lengths of potato strips
Measure and record the length of potato strips using a Ruler

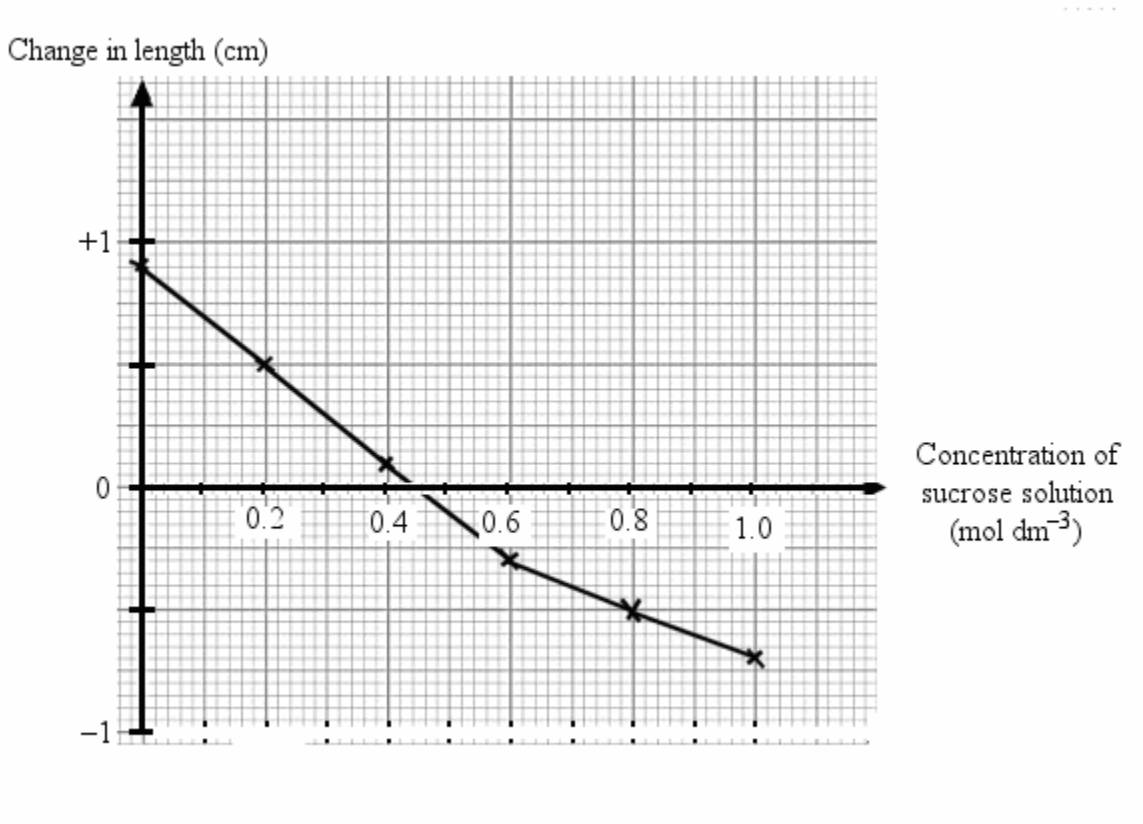
Fixed variables : Temperature, volume of sucrose solution used
Fixed the temperature/ volume of sucrose solution used.

(d) The higher the concentration of sucrose solution, the shorter length of potato strip.

(e) (i)

Test tube	Concentration of sucrose solution (mol dm^{-3})	Length of potato strip (cm)		Difference in length (cm)
		Initial length	Final length	
A	0	5.00	5.80	+0.80
B	0.2	5.00	5.50	+0.50
C	0.4	5.00	5.10	+0.10
D	0.6	5.00	4.70	–0.30
E	0.8	5.00	4.50	–0.50
F	1.0	5.00	4.30	–0.70

(ii)



(f) 0.45 mol dm^{-3}

(g)
- The solutions in test tubes *A*, *B* and *C* are hypotonic to the potato cell sap. Water diffuses into the cells by osmosis and the potato strips becomes longer.
- The sucrose solution in test tubes *D*, *E* and *F* are hypertonic to the potato cell sap. This causes water to diffuse out of the potato cell sap by osmosis. The potato strips become shorter and shorter as the concentration of the sucrose solution increases.
- If the concentration of the sucrose solution is isotonic to the potato cell sap, there is no change in length in the potato strips. This is because in an isotonic solution, there is no net movement of water into the cell and out of the cell.

(h) **Apparatus:**
Six test tubes, cork borer, scalpel, forceps, beaker, ruler, glass rod and white tile
Materials:
A potato, sucrose solutions of 0.2 mol dm^{-3}, 0.4 mol dm^{-3}, 0.6 mol dm^{-3}, 0.8 mol dm^{-3}, 1.0 mol dm^{-3}, distilled water and filter paper

(i) The plants will wilt because the excess fertilisers in the soil cause the water in the soil to become hypertonic, and water diffuses out of the plant cells.

Question 2

Construct	Criteria And Sample answer	Notes on scoring
Aim	To investigate the effect of temperature on the rate of anaerobic respiration in yeast	√ only Reject if no "yeast"
Problem statement	Able to state the problem statement of the experiment **correctly** that include criteria: • Manipulate variables: **temperature** • Responding variables : **anaerobic respiration** • Relation in question form and question symbol [**?**] Sample answers: **1.** What is the effect of **temperature** on the rate of **anaerobic respiration** in yeast**?** **2.** Does **temperature** affect the rate of anaerobic respiration in yeast?	3 marks and √
	Able to state the problem statement of the experiment with **two** criteria. Sample answers: **1.** What is the effect of **temperature** on yeast**?** **2.** Does **temperature** affect the activity of yeast?	2 marks and √
	Able to state the problem statement with **one** criteria. Sample answers: **1.** Yeast is affected by **temperature.** **2.** **Temperatures affect** the activity of yeast. **3.** **Temperature** is a factor in anaerobic respiration.	1 mark and √
Hypothesis	Able to state the hypothesis **correctly** according to the criteria: • Manipulate variables • Responding variables • Relationship of the variables Sample answers: **1.** As the **temperature** increases, the rate of **anaerobic respiration** in yeast increases. **2.** The higher the **temperature** , the higher rate of **anaerobic respiration.**	3 marks and √

<table>
<tr><td></td><td>Able to state the hypothesis with two criteria
1. The temperature affects the rate of anaerobic respiration in yeast.
2. The temperature affects the time taken for lime water to turn chalky.</td><td>2 marks and

√</td></tr>
<tr><td></td><td>Able to state the idea of the hypothesis.
1. The temperature affects the respiration of yeast.
2. The optimum temperature in respiration in yeast is 35^{o}C.</td><td>1 mark and

√</td></tr>
<tr><td>Variables</td><td>Able to state the three variables correctly

<table><tr><td>Manipulated</td><td>Temperature</td></tr><tr><td>Responding</td><td>Time taken (lime water turns chalky) // Rate of anaerobic respiration</td></tr><tr><td>fixed</td><td>Volume / concentration of yeast suspension</td></tr></table></td><td>√ only</td></tr>
<tr><td>Apparatus & materials</td><td>Able to state all functional materials and apparatus <u>Yeast and Glucose</u> should be in the material listed

<u>Apparatus:</u>
1. boiling tube
2. water bath
3. stopwatch
4. rubber stopper
5. delivery tube
6. retort stand
7. measuring cylinder

<u>Materials :</u>
Yeast suspension
Glucose solution
lime water/ bicarbonate indicator
Paraffin/oil</td><td>3 marks and

√

<u>Yeast and Glucose</u> should be in the material listed</td></tr>
<tr><td></td><td>Able to state 4-5 apparatus and 2 materials for the experiment.
<u>Yeast and Glucose</u> should be in the material listed</td><td>2 marks and

√</td></tr>
<tr><td></td><td>Able to state 3 apparatus and 2 materials for the experiment.

<u>Yeast and Glucose</u> should be in the material listed</td><td>1 mark and

√</td></tr>
</table>

	1-2 apparatus and 1 material	0
Technique	Able to state the operating responding variable correctly, using suitable apparatus / formula. Sample answers: 1. Using a ruler, measure and record the change in height of the coloured liquid 2. Using stopwatch, measure and record the number of bubbles released / volume of gas collected after 10 minutes. 3. using stopwatch, measure and record time taken for lime water turn chalky 4. Calculating the rate of anaerobic respiration by using the formula: $\frac{1}{\text{Time taken for lime water to turn chalky}}$	B1 = 1 mark and √
Procedure	Able to state **five** procedures P1, P2, P3, P4 and P5 correctly. P1 : How to Set Up The Apparatus (Any 3) P2 : Operating fixed variable (any 1) P3 : How to Manipulate The Manipulated Variable (1P3) P4: How to Record The Responding Variable (1P4) P5 : Precaution (1P5)	
	P1: any 3 • Yeast suspension in boiling tube • Add glucose solution in boiling tube • First manipulated temperature, 20^{o}C • Record initial temperature • Record in a table • Plot graph P2: any 1 • Volume of yeast suspension • Volume of glucose suspension P3: • Record the time for the lime water to turn chalky P4: • Repeat experiment in different temperature such as 30 ^{o} C, 40 ^{o} C and 50 ^{o} C (Suitable set of experiment)	All 5 P = 3marks and √ 3-4P only = 2 marks and √ 2P only = 1 mark and √ 1P only = 0 (√)

<table>
<tr><td></td><td>P5: Any 1
• Make sure all joints are air-tight
• Repeat experiment to get average readings
• Add paraffin / oil</td><td></td></tr>
<tr><td>Recording data/ result</td><td>Able to construct a table to record all data with the following aspects:
• Titles with correct units
• No data is required

<table><tr><td>Temperature / ^{o}C</td><td>20</td><td>30</td><td>40</td><td>50</td></tr><tr><td>Time taken for lime water to turn chalky (minute)</td><td></td><td></td><td></td><td></td></tr><tr><td>Rate of respiration in yeast (min $^{-1}$)</td><td></td><td></td><td></td><td></td></tr></table></td><td>B2= 1 and √</td></tr>
<tr><td>Conclusion</td><td>Able to rewrite the hypothesis correctly.</td><td>√ only</td></tr>
<tr><td>Planning experiment</td><td>Able to plan the experiment based on 7 – 9 (√) of the following criteria:
• Statement of identified problem
• Objective of study
• Variables
• Statement of hypothesis
• List of materials and apparatus
• Technique used
• Experimental procedures
• Presentation of data
• Conclusion</td><td>3 marks</td></tr>
<tr><td></td><td>Able to plan the experiment based on 4 – 6 (√) of the criteria.</td><td>2 marks</td></tr>
<tr><td></td><td>Able to plan the experiment based on 1 – 3 (√) of the criteria.</td><td>1 mark</td></tr>
</table>

Sample answer for procedure

1. Boil 100ml of water in a beaker, cool it and use it to prepare a 5% glucose and a 5% yeast .
2. Label 4 boiling tubes as A, B, C, and D.
3. Pour 15 ml of the 5% glucose solution to boiling tube A. Then, add 5 ml of yeast suspension.
4. Add sufficient paraffin, to form a layer covering the content.
5. Connect the boiling tube with stopper that has attached U-shaped delivery tube and a thermometer. Make sure all the joints are air-tight.
6. Dip the other free end of the U-shaped delivery tube into a test tube containing limewater.
7. Then place boiling tube A into water bath with temperature, 20^{o} C and start the stopwatch.
8. The time when the lime water turns chalky is recorded using the stopwatch.
9. Repeat step 3 until step 8, for boiling tubes B, C and D, using different temperature of the water bath that is such as 30^{o} C, 40^{o} C and 50^{o} C.
10. Record all data in a table and calculate the rate of respiration using this formula:

$$\frac{1}{\text{Time taken for lime water to turn chalky}}$$

11. Plot a graph of rate of respiration against temperature.