



**KEMENTERIAN
PENDIDIKAN
MALAYSIA**

**BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN**

**PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
PERCUBAAN SIJIL PELAJARAN MALAYSIA**

BIOLOGI

Peraturan Pemarkahan

Kertas 1, 2 & 3

Peraturan Pemarkahan ini mengandungi 22 halaman bercetak

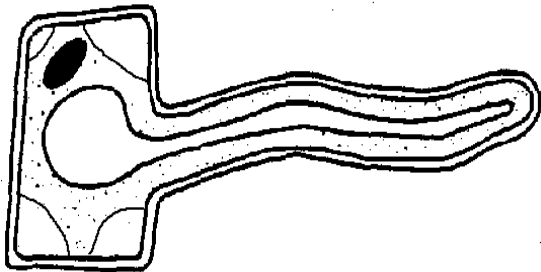
PAPER 1

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

PAPER 2

Question 1

No	Criteria	Marks	
(a) (i)	Able to name the structure of X and Y. Answers: X : Vacuole Y : Cell wall	1 1	2
(ii)	Able to name the content of X. Answers: P1 : Water / mineral salts / glucose P2 : Cell sap (Any 1)	1 1	1
(b) (i)	Able to state the condition of the leaf cell. Answers: P1 : Turgid	1	1
(ii)	Able to explain how the condition in (b) (i) is achieved. Sample answers: P1 : Water molecule diffuse into the cell // Osmosis occur P2 : (0.001% nitrate) solution is hypotonic solution P3 : Create turgor pressure P4 : Towards cell wall (Any 2)	1 1 1 1	2
(iii)	Able to state one importance of this condition to herbaceous plants. Sample answer : P1 : To give mechanical support	1	1
(c)	Able to explain the uptake of nitrate ions into root hair cell. Sample answers: P1 : (Nitrate ion is uptake by) active transport P2 : (Move) from low concentration (of nitrate ions) to high concentration (of nitrate ions) // against the concentration gradient P3 : Using energy/ATP // (aided by) carrier protein (Any 2)	1 1 1	2

(d) (i)	Able to draw the diagram of one root hair cell in plasmolysed condition Sample answer: 	1	1
	[Accept if the diagram is without the root hair]		
(ii)	Able to explain the condition of the root hair cell Sample answers: P1 : (20% nitrate) solution is a hypertonic solution to sap cell of root hair P2 : Water molecule diffuse out from root hair cell (by osmosis) P3 : Vacuole/cytoplasm shrink // plasma membrane pull away from the cell wall. (Any 2)	1 1 1	2
TOTAL			12

Question 2

No	Criteria	Marks	
(a)	Able to state the substrate and explain why. Answers: Substrate : Q Reason : Q has the shape that can fit the active site of the enzyme.	1 1	2
(b)	Able to name substrate. Answers: Sucrose	1	1
(c)	Able to explain why enzyme is needed in small quantity to act on substrate. Answers: P1 : Enzymes do not change/destroy at the end of the reaction P2 : The same enzyme molecule can react on a large number of substrate molecules. (Any 1)	1 1	1
(d)	Able to explain why most laundry detergents contain enzyme amylase Sample answers: P1 : Amylase dissolves variety of stains/dirts P2 : Breaks down starches/carbohydrate stains on clothes. P3 : by hydrolysis P4 : The clothes can be washed easily/faster P5 : (It is) effective in a small amount. (Any 3)	1 1 1 1 1	3
(e)(i)	Able to explain the graph part PQ. Sample answers: P1 : When the substrate concentration increases, the rate of (enzymatic) reaction increases. P2 : The rate of reaction depends on the substrate concentration // Substrate concentration is the limiting factor. P3 : More collision between the enzymes (molecules) and the substrates P4 : More enzyme-substrate complexes form (Any 2)	1 1 1 1	2

(ii)	Able to suggest how to increase the rate of reaction in part RS. Sample answers: P1 : There is an excess of substrate molecules. // Substrate molecules compete with one another for the active sites on enzymes. P2 : There is not enough/limited enzymes molecules to react // Enzyme concentration has become the limiting factor. P3 : To increase the rate of reaction, increase the enzyme concentration. P4 : More active sites / enzymes available for the reaction. P5 : Or increase the temperature (to optimum level) P6 : More collision between the enzymes (molecules) and the substrates // More enzyme-substrate complexes form (Any 3)	1 1 1 1 1 1	3
TOTAL			12

Question 3

No	Criteria	Marks	
(a)	Able to state the name M and N. Answers: M : Humerus N : Radius	1 1	2
(b) (i)	Able to draw the biceps muscle based on two criteria. C1 : The attachment of tendon on humerus and radius is correct. C2 : The biceps muscle is thicker than the triceps muscle.	1 1	2
(ii)	Able to state and explain one difference between the condition of biceps and triceps muscles. Sample answers: P1 : The biceps is thicker / shorter compared to the tricep. P2 : Biceps is in contraction while triceps is in relaxation.	1 1	2
(c)	Able to explain why milk is good for bone. Sample answers: P1 : Milk contains calcium P2 : for building of bones P3 : Milk contains vitamin D P4 : for the absorption of calcium (Any 2)	1 1 1 1	2
(d)	Able to name R and to explain its function. Sample answers: P1 : R is ligament P2 : Connecting bone to bone P3 : Allow movement /walking //avoid dislocation of bone (Any 2)	1 1 1	2
(e)	Able to explain the effect when the production of fluid S is decreasing. Sample answers: P1 : Less lubrication between bones P2 : Bones rub each other during movement // Prone to bone injury P3 : Pain when doing movement P4 : Hard to make movement (Any 2)	1 1 1 1	2
TOTAL			12

Question 4

No	Criteria	Marks	
(a)	Able to state the two products of photosynthesis. Answers: P1 : Glucose P2 : Oxygen	1 1	2
(b)	Able to explain the adaptation of cell T to increase the efficiency of photosynthesis process Sample answers: P1 : Cell T/ mesophyll palisade has abundance of chloroplasts P2 : The arrangement of the cell is closed / upright P3 : to absorb more light energy P4 : to split /breakdown water molecule (and to produce oxygen / H atom) (Any 2)	1 1 1 1	2
(c)	Able to explain how the light intensity affected the size of pore R. Sample answers: P1 : Guard cell / U undergoes photosynthesis process P2 : Concentration of glucose increase // Active transport of potassium ions (into the guard cells) P3 : Osmotic pressure in the guard cells increase // The guard cells become hypertonic to adjacent cells P4 : Water diffuse into the guard cell (by osmosis) P5 : The guard cells turgid, (thus stomata open widely) (Any 3)	1 1 1 1 1	3
(d)(i)	Able to give more information about point V. Sample answers: P1 : Point V is a compensation point P2 : Percentage/volume/amount of carbon dioxide release is equal to the concentration/volume/ percentage of carbon dioxide absorb by plant . P3: All carbon dioxide release from respiration is used for photosynthesis P4 : All oxygen from photosynthesis is used for respiration (Any 3)	1 1 1 1	3
(d)(ii)	Able to suggest how to increase the crop yields in greenhouses. Sample answers: P1 : Increase the light intensity P2 : More water is broken down // Photolysis of water increases P3 : More H atom produced // more oxygen is produced P4 : More carbon dioxide fixed by H atom // more glucose is produced (Any 2) OR P5 : Increase the concentration of carbon dioxide P6 : More carbon dioxide reduced by H atom // Increase the reduction of carbon dioxide P7 : More glucose produced (Any 2) OR P8 : Increase the temperature to optimum P9 : Increase the activity of (photosynthetic) enzyme P10 : More glucose is produced (Any 2)	1 1 1 1 1 1 1 1 1 1	2
TOTAL			12

Question 5

No 5	Criteria	Marks	
(a)	Able to explain role of hormone P in the development of one follicle cell in the ovary. Sample answers: P1 : Follicle Stimulating Hormone/(FSH) P2 : Stimulate the development of primary follicle into secondary follicle P3 : Stimulate primary oocyte undergoing meiosis I. (Any 2)	1 1 1	2
(b)	Able to explain the consequences of less LH. Sample answers: P1 : Less LH produced P2 : Ovulation cannot occurs P3 : Secondary oocyte are not released (into the fallopion tube) P4 : No ovum // Fertilisation could not occur. (Any 2)	1 1 1 1	2
(c)	Able to explain how strutures R and S are different. Sample answers: P1 : R is blastocyst, S is morula P2 : R has more number of cells P3 : that formed by mitosis P4 : S is solid ball, R has cavity (filled with fluid). (Any 2)	1 1 1 1	2
(d)	Able to explain the function of placenta Sample answers: P1 : Produce progesterone (after three month pregnancy) P2 : to maintain thickness of endometrium wall. P3 : The fetus attach strongly P4 : Site for the exchange of respiratory gases/nutrient / waste product P5 : Foetus gets all cellular requirement for growth // Get rid of waste to avoid toxicity P6 : Separate mothers blood circulation from fetus blood circulation P7 : Prevent mix of different blood group // Avoid agglutination P8 : Prevent mother blood pressure damage fetus blood vessel. (Any 3)	1 1 1 1 1 1 1 1 1	3
(e)	Able to suggest how the stem cell research benefit to human. Sample answers: P1 : medicinal field P2 : Stem cell undergo (repeated) mitosis P3 : (and) differentiation P4 : to form specialized tissues/bone marrow/nerve tissue/ muscle P5 : (This process takes place in culture medium) that contain hormone /nutrient P6 : Bone marrow for leukemia and chemotherapy P7 : Nerve cell for Parkinson and Alzheimer disease P8 : Heart muscle for heart disease P9 : Pancreatic islet cell for diabetes (Any 3)	1 1 1 1 1 1 1 1 1	3
TOTAL			12

Question 6

No 6	Criteria	Marks																												
(a)	<p>Able to give opinion why it is necessary for the fibrin to form.</p> <p>Sample answers:</p> <p>P1 : Yes</p> <p>P2 : Fibrin is an insoluble protein</p> <p>P3 : Fibrin need to form across the wound to stop erythrocytes from flowing out of the blood vessel.</p> <p>P4 : Prevent excessive loss of blood from a wounded person</p> <p>P5 : Prevents microorganisms such as bacteria/ foreign substances from entering wound</p> <p>P6 : Enables wound to heal faster</p> <p>P7 : Prevent the blood pressure from dropping to a dangerously low level (due to excessive blood loss)</p> <p>P8 : Maintain the circulation of blood in a closed circulatory system</p> <p style="text-align: right;">(Any 6)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	6																											
(b)	<p>Able to compare between the blood vessel P (pulmonary vein) and blood vessel Q (aorta)</p> <p>Sample answers:</p> <p>Similarities,</p> <p>S1 : Both carries oxygenated blood</p> <p>S2 : Both structure of the walls are three layers</p> <p>S3 : The walls are made up of smooth muscles</p> <p>Differences,</p> <table border="1" data-bbox="300 1029 1214 1415"> <thead> <tr> <th></th> <th>Blood vessel Q (aorta)</th> <th>Blood vessel P</th> </tr> </thead> <tbody> <tr> <td>D1</td> <td>Aorta</td> <td>Pulmonary vein</td> </tr> <tr> <td>D2</td> <td>Blood flow away from heart</td> <td>Blood flow into the heart</td> </tr> <tr> <td>D3</td> <td>Thick, muscular/elastic</td> <td>Thin, less muscular/less elastic</td> </tr> <tr> <td>D4</td> <td>to withstand high pressure</td> <td>for low blood pressure</td> </tr> <tr> <td>D5</td> <td>Lumen size/diameter is small</td> <td>Lumen size/diameter is large</td> </tr> <tr> <td>D6</td> <td>Have no valve</td> <td>Have valves</td> </tr> <tr> <td>D7</td> <td>No need to maintain the blood flow one way.</td> <td>Need to maintain the blood flow one way.</td> </tr> <tr> <td>D8</td> <td>Carries blood from the heart to all parts of the body.</td> <td>Carries blood from the lung to the heart</td> </tr> </tbody> </table> <p style="text-align: right;">(Any 8)</p>		Blood vessel Q (aorta)	Blood vessel P	D1	Aorta	Pulmonary vein	D2	Blood flow away from heart	Blood flow into the heart	D3	Thick, muscular/elastic	Thin, less muscular/less elastic	D4	to withstand high pressure	for low blood pressure	D5	Lumen size/diameter is small	Lumen size/diameter is large	D6	Have no valve	Have valves	D7	No need to maintain the blood flow one way.	Need to maintain the blood flow one way.	D8	Carries blood from the heart to all parts of the body.	Carries blood from the lung to the heart	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	8
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(c)	<p>Able to explain health problem faced by a person with defect heart as shown in Diagram 6.3</p> <p>Sample answers:</p> <p>P1 : When the heart beats, some of the blood in left ventricle flow through the hole in the septum into the right ventricle.</p> <p>P2 : Allow the mixing of oxygenated and deoxygenated blood.</p> <p>P3 : Blood flow at lower pressure in the aorta</p> <p>P4 : Less oxygen reaching the body cells</p> <p>P5 : The blood flowing through the hole creates an extra noise/ heart murmur.</p> <p>P6 : Fatigue /tiredness</p> <p>P7 : Tiring /faint easily during physical activity</p> <p>P8 : Shortness of breath</p> <p>P9 : A build up of blood and fluid in the lungs</p> <p>P10 : Swelling in the ankles/ feet/legs/ abdomen/ veins in the neck</p> <p style="text-align: right;">(Any 6)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	6																											
TOTAL			20																											

Question 7

No 7	Criteria	Marks																						
(a) (i)	<p>Able to explain how structure S and heart returns blood pressure back to normal.</p> <p>Sample answers:</p> <p>P1 : (When the blood pressure decrease), it will be detected by baroreceptor</p> <p>P2 : (which) located at the wall of aorta</p> <p>P3 : Baroreceptor produce impulse</p> <p>P4 : Impulse is transmitted to medulla oblongata / S.</p> <p>P5 : Medulla oblongata sent impulse via sympathetic nerve</p> <p>P6 : to heart/ sino artrial node (SAN)</p> <p>P7 : more impulse is initiated</p> <p>P8 : Rate of heartbeat increase// systole and diastole increase</p> <p>P9 : Size of blood vessel decrease // Blood vessel constrict</p> <p>P10 : Resulting in increase of blood pressure and back to normal</p> <p style="text-align: right;">(Any 6)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	6																					
(a)(ii)	<p>Able to explain how endocrine gland causes the physiological changes in her body during the situation</p> <p>Sample answers:</p> <p>P1 : (In panic situation), medulla oblongata detect</p> <p>P2 : stimulate adrenal gland</p> <p>P3 : (Adrenal gland) secretes adrenaline hormone</p> <p>P4 : transports by the blood stream</p> <p>P5 : Adrenaline hormone stimulate heart to increase heartbeat</p> <p>P6 : to transport more oxygen / glucose to muscle tissue// increase blood flow to muscle</p> <p>P7 : Breathing rate increase //breath fast /deeper</p> <p>P8 : to obtain more oxygen</p> <p>P9 : Convert glycogen to glucose</p> <p>P10 : level of glucose increase</p> <p>P11 : Rate of respiration in muscle increase</p> <p>P12 : more energy produce (to help fight in stressful situation)</p> <p style="text-align: right;">(Any 8)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	8																					
(c)	<p>Able to explain the similarities and differences between neuron V and neuron W.</p> <p>Sample answer:</p> <p>Similarities,</p> <p>S1 : Both neuron involve in transmission of impulse</p> <p>S2 : Axon is covered by mylien sheath</p> <p>S3 : to speed up transmission of impuls</p> <p>S4 : Both have cell body/ axon/ dendron /dendrite</p> <p>Differences</p> <table border="1" data-bbox="300 1673 1214 2052"> <thead> <tr> <th></th> <th>Neuron V</th> <th>Neuron W</th> </tr> </thead> <tbody> <tr> <td>D1</td> <td>Afferent neuron</td> <td>Efferent neuron</td> </tr> <tr> <td>D2</td> <td>Cell body at the middle of the cell</td> <td>Cell body at the terminal of cell</td> </tr> <tr> <td>D3</td> <td>Cell body located in ganglion of dorsal root</td> <td>Cell body located in grey matter of spinal cord</td> </tr> <tr> <td>D4</td> <td>Transmit impulse from receptor to spinal cord/interneuron</td> <td>Transmit impulse from spinal cord/interneuron to effector /gland/muscle</td> </tr> <tr> <td>D5</td> <td>Has long dendron</td> <td>Has short dendron</td> </tr> <tr> <td>D6</td> <td>Has short axon</td> <td>Has long axon</td> </tr> </tbody> </table>		Neuron V	Neuron W	D1	Afferent neuron	Efferent neuron	D2	Cell body at the middle of the cell	Cell body at the terminal of cell	D3	Cell body located in ganglion of dorsal root	Cell body located in grey matter of spinal cord	D4	Transmit impulse from receptor to spinal cord/interneuron	Transmit impulse from spinal cord/interneuron to effector /gland/muscle	D5	Has long dendron	Has short dendron	D6	Has short axon	Has long axon	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	6
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D5	Has long dendron	Has short dendron																						
D6	Has short axon	Has long axon																						

(Any 6)	TOTAL	20
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Question 8

No	Criteria	Marks
(a)	<p>Able to describe the changes that occur in the mangrove swamp ecosystem throughout the years that end up forming a dynamic ecosystem.</p> <p>Sample answers:</p> <p>P1 : The mangrove zone become broader towards the sea from their original position (from 1995 to 2015)</p> <p>P2 : Colonisation and Succession has occurred</p> <p><u>Pioneer species:</u></p> <p>P3 : <i>Avicennia</i> sp /Zone A colonies of open area, exposed to the sea wave and wind.</p> <p>P4 : <i>Sonneratia</i> sp/Zone A colonies at shady area , not exposed to the sea water.</p> <p>P5 : <i>Avicennia</i> sp / Zone A has cable root system to withstand in <u>the soft and muddy</u> soil and wave action.</p> <p>P6: The roots of the pioneer species trap the mud, causing the soil to become more compact / soil level increases</p> <p>P7: (as the soil increases) exposure to the tides and this makes the soil unsuitable for the pioneer species.</p> <p><u>Primary successor</u></p> <p>P8: <i>Rhizophora</i> sp / Zone B replace <i>Avicennia</i> sp / Zone A</p> <p>P9: <i>Rhizophora</i> sp / Zone B has prop root</p> <p>P10: The roots of the primary successor species trap the mud, causing the soil to become more compact / soil level increases</p> <p>P11: (as the soil increases) exposure to the tides and this makes the soil unsuitable for the primary successor species.</p> <p><u>Secondary successor</u></p> <p>P12: <i>Bruguiera</i> sp / Zone C replace <i>Rhizophora</i> sp / Zone B</p> <p>P13 : when the <u>land become higher/ firm</u></p> <p>P14: <i>Bruguiera</i> sp / Zone C is a larger species.</p> <p><u>Climmax community:</u></p> <p>P15: (As the time passed), terrestrial plants such as <i>Nypa</i> sp/ pandanus sp began to replace <i>Bruguiera</i> sp. /Zone C</p> <p>P16: Tropical rain forest develops</p> <p style="text-align: right;">(Any 10)</p>	<p>10</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
(b)	<p>Able to suggest actions should be taken to overcome the problem and <u>not damaging or destroying</u> the mangrove ecosystem.</p> <p>Sample answers:</p> <p>P1 : natural biodegradation process</p> <p>P2 : add a chemical/ oil spill dispersants to the oil spill</p> <p>P3 : increase the surface area of oil molecule</p> <p>P4 : stimulate the growth of bacteria</p> <p>P5 : bacteria digest the oil spill</p> <p>P6 : by using enzyme lipase</p> <p>P7 : the oil will be broken down into small molecule</p>	<p>10</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

P8 : by using natural fibre from plant /e.g wild lemon grass	1
P9 : as an absorbent	1
P10: absorb and coagulate the oil	1
P11: the combination of fibre and oil will not harm other organism in mangrove ecosystem.	1
P12 : physically removing the oil like using scoops	1
P13 : Law enforcement to the oil company to fully responsible for the cleaning of affected mangrove swamp.	1
(Any 10)	
TOTAL	20

Question 9

No 9	Criteria	Marks
(a)	<p>Able to draw genetic diagram to show inheritance of fur colour. <u>Answer:</u></p> <p>K Key: B- Dominant allele for black fur b- Recessive allele for white fur</p> <p><u>Parental</u></p> <p>P1: Phenotype Black White</p> <p>P2 : Genotype Bb x bb</p> <p>Meiosis</p> <p>P4 : Gametes B b b</p> <p>Random Fertilisation</p> <p><u>F1,</u></p> <p>P5: Genotype Bb bb</p> <p>P6: Phenotype Black white</p> <p>P7: Phenotype ratio 1 : 1</p> <p>P8 : Percentage of offspring black fur and white fur is 50% each</p> <p>P3 : Meiosis and random fertilisation</p> <p style="text-align: right;">(Any 6)</p>	<p>6</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
	<p>Able to explain Mendel First Law applied in the inheritance of rabbit fur colour</p> <p>Sample answers:</p> <p>P1 : Mendel First Law/ Law of segregation</p> <p>P2 : Each characteristic is controlled by two allele // BB, Bb, bb</p> <p>P3 : Characteristic black fur is controlled by Bb// characteristic of</p>	<p>4</p> <p>1</p> <p>1</p> <p>1</p>

	<p>white fur is controlled by bb</p> <p>P4 : During gamete formation/ meiosis</p> <p>P5 : Alleles (B, b) separate / segregate</p> <p>P6 : each gamete will contain one factor/gene/allele /B or b</p> <p style="text-align: right;">(Any 4)</p>	<p>1</p> <p>1</p> <p>1</p>	
(b)	<p>Able to explain how the inheritance of the Rhesus factor can be a problem to the pregnant mother.</p> <p>Sample Answer:</p> <p>P1 : (Problem will arise during pregnancy) if the mother is homozygous recessive / Rhesus negative and</p> <p>P2 : the father is heterozygous for Rhesus positive/ /homozygous for Rhesus positive</p> <p>P3 : Produce the child with 50% Rhesus positive// Produce child with 100% Rhesus positive</p> <p>P4 : (During late pregnancy or during birth) some of the foetal blood diffuse into maternal blood</p> <p>P5 : through placenta</p> <p>P6 : This triggers the mothers blood to produce anti-rhesus antibodies.</p> <p>P7 : The harmful effect do not show during the first pregnancy</p> <p>P8 : With successive pregnancies, the antibody level builds up in the maternal blood stream</p> <p>P9 : Her anti-rhesus antibodies may cross the placenta</p> <p>P10 : And cause agglutination/haemolysis of the foetal red blood cell</p> <p>P11 : known as erythroblastosis fetalis.</p> <p>P12 : resulting in newborns being born with jaundice (yellowing of the skin and eyes)</p> <p>P13 : could result in brain damage/heart failure/death</p> <p style="text-align: right;">(Any 10)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	10
TOTAL			20

PAPER 3

Question 1

1 (a) [KB0603 - Measuring Using Number]

Score	Criteria								
3	<p>Able to state all the change in volume of water in cm^3.</p> <p>Criteria: C1 Correct value with or without the correct unit C2 One decimal place</p> <p>Sample answers:</p> <table border="1"> <tbody> <tr> <td>Mass of calcium chloride (g)</td> <td>20</td> <td>40</td> <td>80</td> </tr> <tr> <td>Change in volume of water (cm^3)</td> <td>2.8</td> <td>4.6</td> <td>8.2</td> </tr> </tbody> </table>	Mass of calcium chloride (g)	20	40	80	Change in volume of water (cm^3)	2.8	4.6	8.2
Mass of calcium chloride (g)	20	40	80						
Change in volume of water (cm^3)	2.8	4.6	8.2						
2	Able to state any 2 of the change in volume of water OR 3 correct value with wrong unit.								
1	Able to state any 1 of the change in volume of water OR 2 correct value with wrong unit.								

1 (b) (i) [KB0601 - Observation]

Score	Criteria
3	<p>Able to state any two observations correctly according to the criteria: C1 Mass of calcium chloride (g) C2 Change in volume of water (cm^3)</p> <p>Sample answers:</p> <p><u>Horizontal</u></p> <ol style="list-style-type: none"> (When the) mass of calcium chloride is 20g, the change in volume of water is 2.8cm^3. (Air with) 20g calcium chloride, the water level is 2.8cm^3. <p><u>Vertical</u></p> <ol style="list-style-type: none"> When more (mass of) calcium chloride is used, the level of water decreases. <p><u>Horizontal/Vertical</u></p> <ol style="list-style-type: none"> 20g of calcium chloride, the level of water is high / higher / highest.
2	<p>Able to state any one observation correctly and one incomplete observation. <i>or</i> Able to state any two incomplete observations.</p> <p>Sample answers for incomplete observations: <u>Horizontal/Vertical</u></p> <ol style="list-style-type: none"> 20g of calcium chloride is used. The level of water decreases.
1	<p>Able to/state any one idea of observation (Any 1 criterion)</p> <p>Sample answers:</p> <ol style="list-style-type: none"> Different mass of calcium chloride is used. The level of water change.

1 (b) (ii) [KB0604 - Making inferences]

Score	Criteria
3	<p>Able to make one logical inference for each observation based on the criteria: C1 Plant / root absorbs water C2 Plant / shoot loses water // Water is transpired // Water is evaporated from plant C3 Air contains less water (vapour) // Relative humidity / air humidity is less / low // Air is drier.</p> <p>Sample answers: <u>Horizontal/Vertical</u> <u>C1+C2</u> 1. <u>Plant</u> absorbs less water because less water is lost. 2. More <u>transpiration</u> / lost by <u>plant</u> so more water is absorbed (by plant). 3. More water is lost by <u>plant</u> so more water is absorbed. <u>C1+C3</u> 4. <u>Plant</u> absorbs more water because the air drier. 5. In low <u>air</u> humidity, more water is absorbed by <u>plant</u>. <u>C2+C3</u> 6. More water is lost by <u>plant</u> because the air is drier.</p>
2	<p>Able to make one logical inference for any one observation and one inaccurate inference for the other observation. <i>or</i> Able to make two inaccurate inferences base on one criterion (C1, C2 or C3) for each observation.</p> <p>Sample answers for incomplete inferences: 1. Plant / root absorbs water 2. Plant / shoot loses water // Water is transpired // Water is evaporated from plant 3. Air contains less water (vapour) // Relative humidity / air humidity is less / low // Air is drier.</p>
1	<p>Able to make an idea of inference with one criterion.</p> <p>Sample answers: 1. Water is absorbed 2. Water is lost // Water is evaporated 3. Humidity is less / low // No water</p>

For 1(b)(i) Observation and (ii) Inference:

Score	Accurate	Inaccurate	Idea	Wrong
3	✓✓			
2	✓	✓		
		✓✓		
1	✓		✓	
	✓			✓
		✓	✓	
			✓✓	
0		✓		✓
			✓	✓
				✓✓

1 (c) [KB061001 - Controlling Variables]

Score	Criteria								
3	<p>Able to state all the variables and the method to handle the variables correctly.</p> <p>Sample answers:</p> <table border="1"> <thead> <tr> <th>Variables</th> <th>Method to handle the variables</th> </tr> </thead> <tbody> <tr> <td> Manipulated variable: <u>Mass</u> of calcium chloride // <u>Relative</u> humidity // <u>Air</u> humidity </td> <td> <u>Use different</u> mass/amount of calcium chlorida // <u>Use 20, 40, and 80g</u> of calcium chloride </td> </tr> <tr> <td> Responding variable: Water level (in the pipette) after 10 minutes // Final water level (in the pipette) // Change in water level/volume // Rate of transpiration </td> <td> (Measure and) <u>record</u> by using the <u>pipette</u> // <u>Calculate</u> (change in water level/volume) by using <u>formula</u>: Final level/volume – Initial level/volume // <u>Calculate</u> (rate of transpiration) by using <u>formula</u>: $\frac{\text{Change in water level/volume}}{\text{Time}/10}$ </td> </tr> <tr> <td> Controlled variable: Type of plant/shoot // Size of U-tube // Size/volume of glass box // Initial water level in the pipette // Time </td> <td> Fix / use <u>hibiscus</u> plant/shoot // Use <u>same</u> U-tube // Use <u>same</u> glass box // Initial water level (in the pipette) is <u>0 cm³</u> // Fix <u>10 minutes</u> </td> </tr> </tbody> </table>	Variables	Method to handle the variables	Manipulated variable: <u>Mass</u> of calcium chloride // <u>Relative</u> humidity // <u>Air</u> humidity	<u>Use different</u> mass/amount of calcium chlorida // <u>Use 20, 40, and 80g</u> of calcium chloride	Responding variable: Water level (in the pipette) after 10 minutes // Final water level (in the pipette) // Change in water level/volume // Rate of transpiration	(Measure and) <u>record</u> by using the <u>pipette</u> // <u>Calculate</u> (change in water level/volume) by using <u>formula</u> : Final level/volume – Initial level/volume // <u>Calculate</u> (rate of transpiration) by using <u>formula</u> : $\frac{\text{Change in water level/volume}}{\text{Time}/10}$	Controlled variable: Type of plant/shoot // Size of U-tube // Size/volume of glass box // Initial water level in the pipette // Time	Fix / use <u>hibiscus</u> plant/shoot // Use <u>same</u> U-tube // Use <u>same</u> glass box // Initial water level (in the pipette) is <u>0 cm³</u> // Fix <u>10 minutes</u>
Variables	Method to handle the variables								
Manipulated variable: <u>Mass</u> of calcium chloride // <u>Relative</u> humidity // <u>Air</u> humidity	<u>Use different</u> mass/amount of calcium chlorida // <u>Use 20, 40, and 80g</u> of calcium chloride								
Responding variable: Water level (in the pipette) after 10 minutes // Final water level (in the pipette) // Change in water level/volume // Rate of transpiration	(Measure and) <u>record</u> by using the <u>pipette</u> // <u>Calculate</u> (change in water level/volume) by using <u>formula</u> : Final level/volume – Initial level/volume // <u>Calculate</u> (rate of transpiration) by using <u>formula</u> : $\frac{\text{Change in water level/volume}}{\text{Time}/10}$								
Controlled variable: Type of plant/shoot // Size of U-tube // Size/volume of glass box // Initial water level in the pipette // Time	Fix / use <u>hibiscus</u> plant/shoot // Use <u>same</u> U-tube // Use <u>same</u> glass box // Initial water level (in the pipette) is <u>0 cm³</u> // Fix <u>10 minutes</u>								
2	Able to state 4 - 5 of the variables and the method to handle the variables correctly.								
1	Able to state 1 - 3 of the variables and the method to handle the variables correctly.								

1 (d) [KB0611 - Making Hypothesis]

Score	Criteria
3	<p>Able to state a hypothesis to show a relationship between the manipulated variable and responding variable and the hypothesis can be validated, base on 3 criteria:</p> <p>C1 Manipulated variable C2 Responding variable C3 Relationship (more/less) (Accept if wrong theory)</p> <p>Sample answers:</p> <ol style="list-style-type: none"> The lower/higher the air humidity, the lower/higher rate of transpiration. When less/more calcium chloride (is used), the lower/higher the final water level (in the pipette) The lower/higher the relative humidity, the less/more the change in the water level/volume (in the pipette) The lower/higher the amount of calcium chloride, the lower/higher the water level (in the pipette) after 10 minutes.

2	<p>Able to state less accurate hypothesis to show a relationship between manipulated variable and responding variable base on 2 criteria.</p> <p>Sample answers:</p> <ol style="list-style-type: none"> 1. The lower/higher the humidity, the lower/higher rate of transpiration. (No C1) 2. The lower/higher the air humidity, the lower/higher the transpiration. (No C2) 3. When less/more calcium chloride (is used), the lower/higher the water level. (No C2) 4. The lower/higher the relative humidity, the less/more the water level/volume. (No C2) 5. The amount of calcium chloride affects the water level after 10 minutes. (No C3) 6. The rate of transpiration depends on the air humidity. (No C3) 7. The air humidity depends on the rate of transpiration. (Reverse / No C3)
1	<p>Able to state idea of hypothesis to show a relationship between manipulated variable and responding variable base on 1 criterion.</p> <p>Sample answers (Idea of C1 and C2):</p> <ol style="list-style-type: none"> 1. The lower/higher the humidity, the lower/higher the transpiration. 2. When calcium chloride is used, the lower/higher the water level. 3. Transpiration occurs based on humidity. 4. The water level affects the calcium chloride.

1 (e) (i) [KB0606 - Communicating]

Score	Criteria												
3	<p>Able to tabulate a table and fill in data accurately base on three criteria:</p> <p>C1: Titles with correct units C2: Recording data, for Mass of calcium chloride <u>and</u> Change in volume of water C3: Calculation, for Rate of transpiration</p> <p>Sample answer:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Mass of calcium chloride (g) // (gram)</th> <th style="text-align: center;">Change in volume of water (cm³)</th> <th style="text-align: center;">Rate of transpiration (cm³ minute⁻¹) // cm³ per minute</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">2.8</td> <td style="text-align: center;">0.28</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">4.6</td> <td style="text-align: center;">0.46</td> </tr> <tr> <td style="text-align: center;">80</td> <td style="text-align: center;">8.2</td> <td style="text-align: center;">0.82</td> </tr> </tbody> </table>	Mass of calcium chloride (g) // (gram)	Change in volume of water (cm ³)	Rate of transpiration (cm ³ minute ⁻¹) // cm ³ per minute	20	2.8	0.28	40	4.6	0.46	80	8.2	0.82
Mass of calcium chloride (g) // (gram)	Change in volume of water (cm ³)	Rate of transpiration (cm ³ minute ⁻¹) // cm ³ per minute											
20	2.8	0.28											
40	4.6	0.46											
80	8.2	0.82											
2	Able to tabulate a table base on two criteria.												
1	Able to tabulate a table base on one criterion.												

1 (e) (ii) [KB0608 - Space and Time Relationship]

Score	Criteria
3	<p>Able to draw a line-graph based on three criteria:</p> <p>C1: The x-axis and the y-axis are marked with appropriate values and constant scale. C2: All points are transferred correctly C3: Smooth/straight line touching all points (No extrapolation; not more than 3 small squares)</p>
2	Any two criteria
1	Any one criterion

1 (e) (iii) [KB0607 - Interpreting Data]

Score	Criteria
3	<p>Able to state and explain the relationship between the rate of transpiration and the mass of calcium chloride and any two explanations.</p> <p>C1: Relationship Sample 1 – The <u>more/higher</u> the mass of calcium chloride, the <u>more/higher</u> the rate of transpiration. (If reverse – <u>idea</u> only) Sample 2 – The rate of transpiration <u>increase linearly with the increase</u> in the mass of calcium chloride. (If reverse – <u>idea</u> only) (Reject: Proportional)</p> <p>C2: Two Explanations: Sample 1 – Plant / root absorbs <u>more</u> water Sample 2 – Plant / shoot loses <u>more</u> water // <u>More</u> water is transpired // <u>More</u> water is evaporated from plant Sample 3 – Air contains <u>less</u> water (vapour) // <u>Low</u> relative humidity / air humidity is <u>low</u> // Air is <u>drier</u>.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> The higher the mass of calcium chloride, the higher the rate of transpiration, because the plant absorbs more water and more water is transpired. The more the mass of calcium chloride, the more the rate of transpiration, because the air is drier and more water is evaporated from the plant.
2	Able to state the relationship and any one explanation , or idea of relationship and two explanations .
1	Able to state the relationship , or idea of relationship and one explanation .

1 (f) [KB0609 - Define Operationally]

Score	Criteria
3	<p>Able to state the meaning of transpiration operationally, based on the experiment.</p> <p>Criteria: C1 Transpiration is the evaporation of water from <u>hibiscus</u> plants / shoot. C2 Determined by the change in <u>volume of water in 10 minutes</u> / change in <u>water level in the pipette after 10 minutes</u> C3 Depends on <u>air humidity</u> / amount of <u>water vapour in the air</u></p> <p>Sample answer:</p> <ol style="list-style-type: none"> Transpiration is the evaporation of water from hibiscus shoot. The rate of transpiration is determined by the change in the volume of water in 10 minutes and is affected by the amount of water vapour in the air.
2	<p>Able to state any two criteria</p> <p>Sample answers:</p> <ol style="list-style-type: none"> Transpiration is the evaporation of water from shoot. The rate of transpiration is determined by the change in the volume of water in 10 minutes and is affected by the amount of water vapour in the air. Transpiration is the evaporation of water from hibiscus shoot. The rate of transpiration is determined by the change in the volume of and is affected by the amount of water vapour in the air.
1	<p>Able to state any one criterion or at idea level only.</p> <p>Sample answers:</p>

	<ol style="list-style-type: none"> 1. Transpiration is the lost of water in the form of water vapour from plants // Theory 2. Transpiration is the evaporation of water from shoot. 3. The rate of transpiration is determined by the change in the volume of water. 4. Transpiration is affected by the amount of water vapour.
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1 (g) [KB0605 - Predicting]

Score	Criteria
3	<p>Able to predict the rate of transpiration when another hibiscus shoot with six number of leaves is used and the air is treated with 40g of calcium chloride, and explain the prediction based on three criteria.</p> <p>C1 Prediction: Any value more than $0.46 \text{ cm}^3 \text{ minute}^{-1}$ // Higher than $0.46 \text{ cm}^3 \text{ minute}^{-1}$. (Higher / without unit – idea level, no marks, can consider C2 and C3)</p> <p>C2 Explanation 1: Larger surface area of leaves // More number of stomata C3 Explanation 2: More water evaporated from leaves</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. (The rate of transpiration is) $0.50 \text{ cm}^3 \text{ minute}^{-1}$ because larger surface area of leaves and more water is evaporated from the leaves. 2. More than $0.46 \text{ cm}^3 \text{ minute}^{-1}$ because more stomata so more water is transpired out from the plant.
2	<p>Able to predict less accurately (Prediction+1explanation//Prediction (idea)+ 2 Explanations)</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. The rate of transpiration is more because more stomata so more water is transpired out from the plant. 2. 0.50 cm^3, because larger surface area of leaves and more water is evaporated from the leaves.
1	<p>Able to give idea of prediction. (Prediction // Prediction (idea) + 1 Explanation)</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 3. 0.50 cm^3, because more water is evaporated from the leaves. 4. More because more stomata on the leaves.

1 (h) [KB0602 - Classifying]

Score	Criteria										
3	<p>Able to classify each character to the correct category of factor.</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Biotic factor</th> <th>Abiotic factor</th> </tr> </thead> <tbody> <tr> <td>Surface area of leave</td> <td>Relative humidity</td> </tr> <tr> <td>Number of stomata</td> <td>Topography</td> </tr> <tr> <td>-</td> <td>Temperature</td> </tr> <tr> <td>-</td> <td>Light intensity</td> </tr> </tbody> </table>	Biotic factor	Abiotic factor	Surface area of leave	Relative humidity	Number of stomata	Topography	-	Temperature	-	Light intensity
Biotic factor	Abiotic factor										
Surface area of leave	Relative humidity										
Number of stomata	Topography										
-	Temperature										
-	Light intensity										
2	Able to classify any 4 correctly.										
1	Able to classify any 2 correctly.										

Question 2

Problem Statement

Score	Criteria
3	<p>Able to state the problem statement of the experiment correctly that include criteria: C1 Manipulate variables : pH (value/medium) // Acidic, alkali and neutral medium C2 Responding variables : Rate of respiration in yeast C3 Relation in question form and question symbol [?]</p> <p>Sample answers: 1. What is the effect of (different) pH on the (rate of) respiration in yeast? 2. Does pH affect the respiration in yeast? 3. How acidic, alkali and neutral medium affecting the respiration in yeast?</p>
2	<p>Able to state the problem statement of the experiment with two criteria.</p> <p>Sample answers: 1. What is the effect of pH on the respiration? 2. Does acidic medium affect the respiration in yeast? 3. How pH affecting the rate of respiration in yeast.</p>
1	<p>Able to state the of problem statement with one criteria or at idea level.</p> <p>Sample answers: 1. What is the effect of HCl on the respiration? 2. Does acidic medium affect the yeast?</p>

Variables

Score	Criteria
3	<p>Able to state the three variables correctly</p> <p>Sample answers: Manipulate variables : pH (value/medium) // Acidic, alkali and neutral medium // Type of solution Responding variables : Rate of respiration in yeast // Time taken for lime water turn cloudy // Change in height of water level // Time taken for diameter of dough / balloon to double Controlled variable: Temperature // Concentration of yeast suspension / glucose solution // Duration / time (of activity)</p>
2	Able to state any two variables correctly
1	Able to state any two variable correctly

Hypothesis

Score	Criteria
3	<p>Able to state the hypothesis correctly according to the criteria.</p> <p>C1 Manipulate variables C2 Responding variables C3 Relationship of the variables</p> <p>Sample answers:</p> <ol style="list-style-type: none"> In (medium of) pH 7 the rate of respiration in yeast is highest compared to other pH (mediums) / pH 2 and pH 9. [Accept pH value neutral, acidic and alkali] In neutral medium the rate of respiration in yeast is highest compared to other pH mediums / acidic and alkali mediums.
2	<p>Able to state the hypothesis with two criteria.</p> <p>Sample answers:</p> <ol style="list-style-type: none"> Different pH give different rate of respiration in yeast. pH affects the rate of respiration in yeast. The rate of respiration in yeast in (medium of) pH 7 / neutral medium is highest. In neutral medium the respiration is highest compared to other pH mediums / acidic and alkali mediums.
1	<p>Able to state the hypothesis with one criterion.</p> <p>Sample answers:</p> <ol style="list-style-type: none"> Different pH affect respiration. pH change the activity of yeast.

Materials and Apparatus

Score	Criteria			
	Using Lime Water	Using U-tube	Using Dough	Using Balloon
3	<p>Able to state all functional materials / 4*materials + 1 other material 2*apparatus + 3 other apparatus for the experiment. Materials: *<u>Yeast // Yeast solution /suspension (1%)</u>, *<u>Glucose // Glucose solution (1%) // Any sugar/starch/flour</u> *<u>Hydrochloric acid, // Sodium hydroxide // Buffer solution of pH 2, 7 and 9 (any 2)</u> *<u>Distilled water</u>, Lime water Apparatus: *<u>Test tube/boiling tube, *delivery tube, beaker, measuring cylinder, retort stand, stopwatch and water bath (beaker water and Bunsen burner).</u> [Accept if not separately] [Reject if in wrong category]</p>	<p>Able to state all functional materials / 4*materials + 1 other material 2*apparatus + 3 other apparatus for the experiment. Materials: *<u>Yeast // Yeast solution /suspension (1%)</u>, *<u>Glucose // Glucose solution (1%) // Any sugar/starch/flour</u> *<u>Hydrochloric acid, // Sodium hydroxide // Buffer solution of pH 2, 7 and 9 (any 2)</u> *<u>Distilled water</u>, Coloured water Apparatus: *<u>Test tube/boiling tube, *U-tube, beaker, measuring cylinder, retort stand, stopwatch and water bath (beaker water and Bunsen burner).</u> [Accept if not separately] [Reject if in wrong category]</p>	<p>Able to state all functional materials / 4*materials + 1 other material 2*apparatus + 3 other apparatus for the experiment. Materials: *<u>Yeast // Yeast solution /suspension (1%)</u>, Glucose // Glucose solution (1%) // Any sugar *<u>Hydrochloric acid, // Sodium hydroxide // Buffer solution of pH 2, 7 and 9 (any 2)</u> *<u>Distilled water</u>, *<u>Flour</u> Apparatus: *<u>Beaker/basin, *Measuring cylinder // Ruler, finger/ mixer/spoon/ladle, stopwatch and water bath (beaker water and Bunsen burner).</u> [Accept if not separately] [Reject if in wrong category]</p>	<p>Able to state all functional materials / 4*materials + 1 other material 2*apparatus + 3 other apparatus for the experiment. Materials: *<u>Yeast // Yeast solution /suspension (1%)</u>, *<u>Glucose // Glucose solution (1%) // Any sugar/starch/flour</u> *<u>Hydrochloric acid, // Sodium hydroxide, // Buffer solution of pH 2, 7 and 9 (any 2)</u> *<u>Distilled water</u>, Apparatus: *<u>(Rubber) balloon, *Ruler, conical flask, measuring cylinder, stopwatch and water bath (beaker water and Bunsen burner).</u> [Accept if not separately] [Reject if in wrong category]</p>
2	Able to state all functional materials and apparatus; 4*materials + 2*apparatus and 2 other materials or apparatus for the experiment.			
1	Able to state all functional materials and apparatus; 4*materials + 2*apparatus.			

Procedure

Score	Criteria
3	<p>Able to state five procedures P1, P2, P3, P4 and P5 correctly. P1 : How to Set Up The Apparatus (4P1) P2 : How to Make Constant The Control Variable (1P2) P3 : How to Manipulate The Manipulated Variable (1P3) P4: How to Record The Responding Variable (2P4) P5 : Precaution (1P5)</p>
2	Able to state three or four of any procedures P1, P2, P3, P4 and P5 completely.
1	Able to state two of any procedures P1, P2, P3, P4 and P5 completely.

Example of Procedure:

P	Using Lime Water	Using U-tube	Using Dough	Using Balloon
P1	<ul style="list-style-type: none"> ▪ Label 3 test tubes / boiling tubes (as A, B and C). ▪ Pour yeast suspension into a test tube ▪ Mix with glucose solution ▪ Connect delivery tube ▪ Pour lime water into another test tube ▪ Start stop watch 	<ul style="list-style-type: none"> ▪ Label 3 test tubes / boiling tubes. ▪ Pour yeast suspension into a test tube ▪ Mix with glucose solution ▪ Connect delivery tube ▪ Connect to U-tube ▪ Fill the U-tube with coloured water ▪ Start stop watch ▪ Mark initial/final coloured water level 	<ul style="list-style-type: none"> ▪ Label 3 basin / trough ▪ Pour yeast suspension into the basin ▪ Mix with glucose solution ▪ Mix with flour ▪ Knead into a dough ▪ Leave the dough aside ▪ Start stop watch 	<ul style="list-style-type: none"> ▪ Label 3 conical flask ▪ Pour yeast suspension into the basin ▪ Mix with glucose solution ▪ Cover the mouth of conical flask with a rubber balloon ▪ Leave the set-up aside ▪ Start stop watch
P2	<ul style="list-style-type: none"> ▪ 2ml // 1% yeast suspension ▪ 2ml // 1% glucose solution ▪ 2ml HCl / NaOH / distilled water ▪ 2ml lime water ▪ Water bath temperature 30°C 	<ul style="list-style-type: none"> ▪ 2ml // 1% yeast suspension ▪ 2ml // 1% glucose solution ▪ 2ml HCl / NaOH / distilled water ▪ Time 10 minutes ▪ Water bath temperature 30°C 	<ul style="list-style-type: none"> ▪ 2ml // 1% yeast suspension ▪ 2ml // 1% glucose solution ▪ 2ml HCl / NaOH / distilled water ▪ 100g flour ▪ Water bath temperature 30°C 	<ul style="list-style-type: none"> ▪ 2ml // 1% yeast suspension ▪ 2ml // 1% glucose solution ▪ 2ml HCl / NaOH / distilled water ▪ Water bath temperature 30°C ▪ Type of balloon
P3	<ul style="list-style-type: none"> ▪ Pour/mix with HCl, NaOH, distilled water (all three) // acidic, alkali and neutral solutions // Buffer solution of pH 2, 7 and 9 	<ul style="list-style-type: none"> ▪ Pour/mix with HCl, NaOH, distilled water (all three) // acidic, alkali and neutral solutions // Buffer solution of pH 2, 7 and 9 	<ul style="list-style-type: none"> ▪ Pour/mix with HCl, NaOH, distilled water (all three) // acidic, alkali and neutral solutions // Buffer solution of pH 2, 7 and 9 	<ul style="list-style-type: none"> ▪ Pour/mix with HCl, NaOH, distilled water (all three) // acidic, alkali and neutral solutions // Buffer solution of pH 2, 7 and 9
P4	<ul style="list-style-type: none"> ▪ Record the time taken for the lime water turns cloudy ▪ In a table // Tabulate the data ▪ Calculate the rate of respiration using formula; 1/time. 	<ul style="list-style-type: none"> ▪ Record the change in the height of water level ▪ In a table // Tabulate the data ▪ Calculate the rate of respiration using formula; change in height/time. 	<ul style="list-style-type: none"> ▪ Record the time taken for the diameter of the dough to double ▪ In a table // Tabulate the data ▪ Calculate the rate of respiration using formula; 1/time. 	<ul style="list-style-type: none"> ▪ Record the time taken for the diameter of the balloon to double ▪ In a table // Tabulate the data ▪ Calculate the rate of respiration using formula; 1/time.
P5	<ul style="list-style-type: none"> ▪ The test tubes containing yeast and glucose are closed <u>tightly</u> with rubber stopper (with delivery tube). ▪ The end of delivery tube is immersed in the lime water. ▪ The experiment is repeated twice to get <u>average</u> result. 	<ul style="list-style-type: none"> ▪ The test tubes containing yeast and glucose are closed <u>tightly</u> with rubber stopper (with delivery tube). ▪ The experiment is repeated twice to get <u>average</u> result. 	<ul style="list-style-type: none"> ▪ <u>Do not use your palm</u> during kneading the dough ▪ The experiment is repeated twice to get <u>average</u> result. 	<ul style="list-style-type: none"> ▪ The mouth of the conical flask is covered <u>tightly</u> with the rubber balloon. ▪ The experiment is repeated twice to get <u>average</u> result.

Data

Score	Criteria																																				
2	<p>Able to construct a correct table for the data tabulation. C1 Titles with correct units (1 mark) C2 Manipulated variables (at least 3 pH values/medium) (1 mark)</p> <p>Sample answers:</p> <p>[Using lime water]</p> <table border="1"> <thead> <tr> <th>pH</th> <th>Time taken (for lime water turns cloudy) (minute)</th> <th>Rate of respiration (minute⁻¹)</th> </tr> </thead> <tbody> <tr> <td>2</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td></td> <td></td> </tr> <tr> <td>9</td> <td></td> <td></td> </tr> </tbody> </table> <p>[Using U-tube]</p> <table border="1"> <thead> <tr> <th>Medium</th> <th>Change in (coloured) water level (cm)</th> <th>Rate of respiration (cm min⁻¹)</th> </tr> </thead> <tbody> <tr> <td>Acidic</td> <td></td> <td></td> </tr> <tr> <td>Neutral</td> <td></td> <td></td> </tr> <tr> <td>Alkali</td> <td></td> <td></td> </tr> </tbody> </table> <p>[Using dough] / [Using baloon]</p> <table border="1"> <thead> <tr> <th>Solution</th> <th>Change in diameter (cm)</th> <th>Rate of respiration (cm min⁻¹)</th> </tr> </thead> <tbody> <tr> <td>HCl</td> <td></td> <td></td> </tr> <tr> <td>Distilled water</td> <td></td> <td></td> </tr> <tr> <td>NaOH</td> <td></td> <td></td> </tr> </tbody> </table>	pH	Time taken (for lime water turns cloudy) (minute)	Rate of respiration (minute ⁻¹)	2			7			9			Medium	Change in (coloured) water level (cm)	Rate of respiration (cm min ⁻¹)	Acidic			Neutral			Alkali			Solution	Change in diameter (cm)	Rate of respiration (cm min ⁻¹)	HCl			Distilled water			NaOH		
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END OF MARKING SCHEME