4551/1
BIOLOGY
Kertas 1
2011
1 ¼ jam

MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA
CAWANGAN NEGERI SEMBILAN

==========

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2011

BIOLOGY

Paper 1

One hour and fifteen minutes

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi 45 halaman bercetak dan 1 halaman tidak bercetak

1 Which of the following structures is found in both animal and plant cells?

Manakah antara struktur berikut yang terdapat pada sel haiwan dan sel tumbuhan?

A Plasma membrane / *Membran plasma*

B Chloroplast / *Kloroplas*

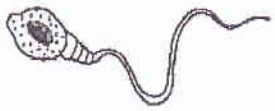
C Cell wall / Dinding sel

D Kidney / *Buah pinggang*

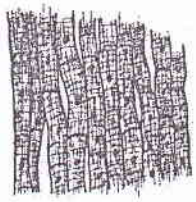
2 Which of the following is a cell?

Yang manakah di antara berikut adalah sel?

A



B



C

D

3 Diagram 1 shows the structure of plasma membrane.

Rajah 1 menunjukkan struktur membran plasma.

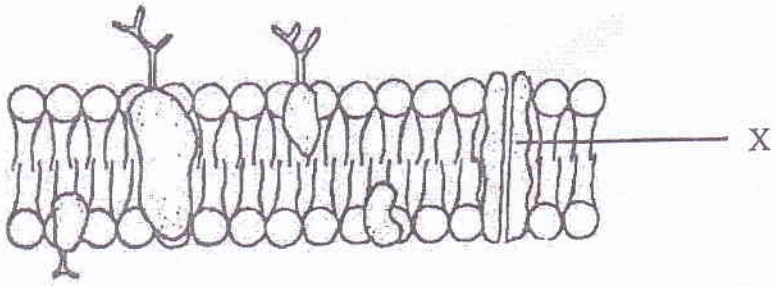


Diagram 1 / *Rajah 1*

What is the structure labelled X?

Apakah struktur berlabel X?

A Lipid / *Lipid*

B Carrier Protein / *Protein pembawa*

C Glycoprotein / *Glikoprotein*

D Pore protein / *Protein liang*

4 Which of the following best describes a semi-permeable membrane?

Yang manakah di antara berikut penjelasan terbaik mengenai membran separa telap?

A It allows only water molecules to pass through it

Ia hanya membenarkan molekul air melaluinya

B It allows water soluble molecules to pass through it

Ia hanya membenarkan molekul yang telap air melaluinya

C It allows only certain molecules to pass through it

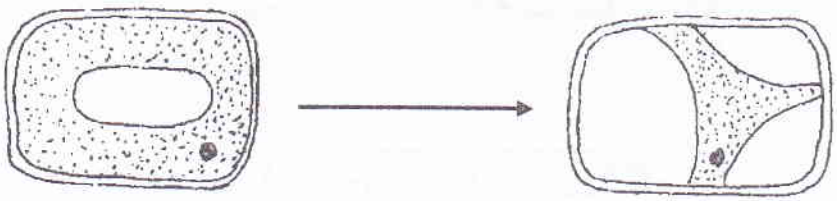
Ia hanya membenarkan molekul tertentu melaluinya

D It allows only certain molecules to pass into the cell but not out of it

Ia hanya membenarkan molekul tertentu masuk ke dalam sel tetapi tidak boleh keluar melaluinya

5 Diagram 2 shows the structure of a plant cell before and after it has been immersed in solution P.

Rajah 2 menunjukkan struktur sel tumbuhan sebelum dan selepas direndam di dalam larutan P.



Before / *Sebelum* After / *Selepas*

Diagram 2 / *Rajah 2*

What is solution P and the process that takes place in the plant cell?

Apakah larutan P dan proses yang telah berlaku dalam sel tumbuhan tersebut?

	Solution P / *Larutan P*	Process / *Proses*
A	Distilled water / *Air suling*	Plasmolysis / *Plasmolisis*
B	Distilled water / *Air suling*	Deplasmolysis / Deplasmolisis
C	10% sucrose solution / *10% larutan sukrosa*	Plasmolysis / *Plasmolisis*
D	15% sucrose solution / *15% larutan sukrosa*	Haemolysis / *Hemolisis*

6 Diagram 3 shows the structure of DNA.

Rajah 3 menunjukkan struktur DNA. .

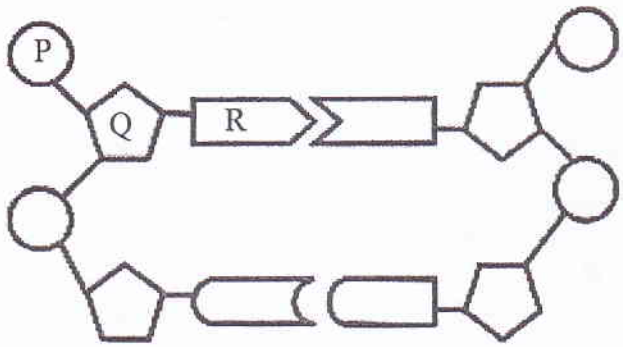


Diagram 3 / *Rajah 3*

What are P, Q and R?

Apakah P, Q dan R ?

	P	Q	R
A	Nucleotide *Nukleotida*	Phosphate group *Kumpulan fosfat*	Deoxyribose sugar *Gula deoksiribosa*
B	Phosphate group *Kumpulan fosfat*	Deoxyribose sugar *Gula deoksiribosa*	Nitrogenous base *Bes bernitrogen*
C	Phosphate group *Kumpulan fosfat*	Nucleotide *Nukleotida*	Nitrogenous base *Bes bernitrogen*
D	Nitrogenous base *Bes bernitrogen*	Phosphate group *Kumpulan fosfat*	Nucleotide *Nukleotida*

7 Diagram 4 shows the reaction of an enzyme based on 'lock and key' hyphothesis.
Rajah 4 menunjukkan tindakbalas enzim berdasarkan hipotesis 'mangga dan kunci'.

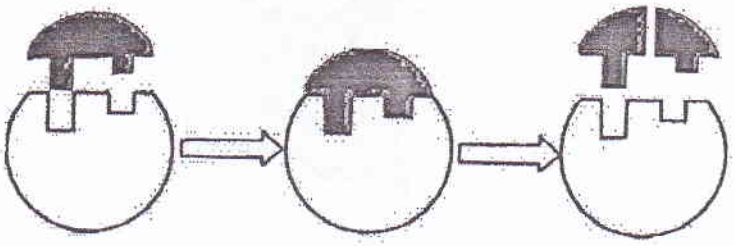


Diagram 4 / *Rajah 4*

Based on the Diagram 4, determine the properties of an enzyme.
Berdasarkan Rajah 4, kenalpasti sifat-sifat enzim.

A Enzyme action is not specific
Tindakan enzim tidak spesifik

B Enzyme remains unchanged at the end of the reaction
Enzim kekal tidak berubah di akhir tindakbalas

C Enzyme reactions are reversible
Tindakan enzim adalah berbalik

D Enzymes speed up the rates of chemical reaction
Enzim mempercepatkan kadar tindakbalas kimia

8 Diagram 5 shows a unicellular organism.

Rajah 5 menunjukkan sejenis organisma unisel.

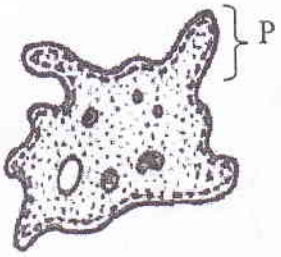


Diagram 5 / *Rajah 5*

What is the function of P?

Apakah fungsi P?

A Movement / *Pergerakan*

B Respiration / *Respirasi*

C Osmoregulation / *Pengosmokawalaturan*

D Growth / *Pertumbuhan*

9 Diagram 6 shows an animal cell during mitosis.

Rajah 6 menunjukkan sel haiwan semasa proses mitosis.

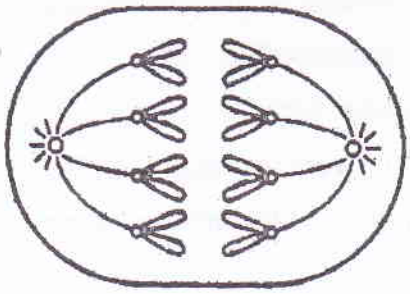


Diagram 6 / *Rajah 6*

How many chromosomes are there in the diploid cell?

Berapakah bilangan kromosom yang terdapat dalam sel diploid tersebut ?

A 2

B 4

C 6

D 8

10 Which of the following structures is a product of meiosis?

Antara struktur yang berikut yang manakah hasil meiosis?

A Ovary / *Ovari*

B Stamen / *Stamen*

C Anther / *Anter*

D Pollen grains / *Butir debunga*

11 Diagram 7(a) shows the chromosomes of a parent cell.

Diagram 7(b) shows the possible combinations of chromosomes in the daughter cells when the parent cell divides.

Rajah 7(a) menunjukkan kromosom pada sel induk.

Rajah 7(b) menunjukkan kemungkinan kombinasi kromosom dalam sel anak apabila sel induk membahagi.

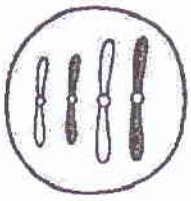


Diagram 7(a) / *Rajah 7(a)*

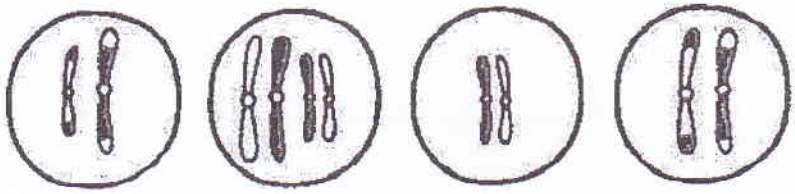


Diagram 7(b) / *Rajah 7(b)*

Which of the following statement is true?

Pernyataan yang manakah adalah benar?

A Cell T is a gamete

Sel T adalah gamet

B Cell S is a gamete

Sel S adalah gamet

C Cell S, U and V have haploid number of chromosomes

Sel S, U dan V mempunyai bilangan kromosom yang haploid

D Cell V is a product of meiosis

Sel V adalah hasil meiosis

12 The following information shows the results of the food tests carried out on a food sample.

Maklumat berikut menunjukkan keputusan ujian makanan ke atas satu sampel makanan.

Test tube *Tabung uji*	Food test *Ujian makanan*	Observation *Pemerhatian*
1	Benedict test *Ujian Benedict*	Blue solution *Larutan biru*
2	Iodine test *Ujian Iodin*	Dark blue solution *Larutan biru tua*
3	DCPIP test *Ujian DCPIP*	Colorless solution *Larutan tidak berwarna*

The food sample contains

Sampel makanan mengandungi

A starch and protein / *kanji dan protein*

B protein and reducing sugar / *protein dan gula penurun*

C starch and vitamin C / *kanji dan vitamin C*

D reducing sugar and vitamin C / *gula penurun dan vitamin C*

13 The following information shows the content of protein, fat and carbohydrate in 10 g of rice and fish eaten by a student.

Maklumat berikut menunjukkan kandungan protein, lemak dan karbohidrat dalam 10 g nasi dan ikan yang dimakan oleh seorang pelajar.

Food *Makanan*	Protein *Protein* (g)	Fat *Lemak* (g)	Carbohydrate *Karbohidrat* (g)
Rice *Nasi*	0.5	0.0	8.8
Fish *Ikan*	1.8	0.004	0.0

What would be the main end products of digestion of this meal?

Apakah hasil akhir yang utama pencernaan makanan ini?

A Amino acids and glycerol / *Asid amino dan gliserol*

B Simple sugars and glycerol / *Gula ringkas dan gliserol*

C Fatty acids and simple sugars / *Asid lemak dan gula ringkas*

D Amino acids and simple sugars / *Asid amino dan gula ringkas*

14 The following information shows the results of an experiment carried out to determine the content of vitamin C in orange juice.

Maklumat berikut menunjukkan keputusan eksperimen yang telah dijalankan untuk menentukan kandungan vitamin C dalam jus oren.

Sample *Sampel*	Volume to decolourise 1 ml of 0.1% DCPIP solution (ml) *Isipadu untuk melunturkan 1 ml larutan DCPIP 0.1% (ml)*	
	Initial / *Awal*	Final / *Akhir*
0.1% Ascorbic acid *Asid askorbik 0.1%*	5.2	4.9
Orange juice *Jus oren*	4.3	2.8

Calculate the concentration of vitamin C in the orange juice using the formula below:

$$\text{Concentration of vitamin C in orange juice} = \frac{\text{Volume of 0.1\% ascorbic acid used to decolourise 1 ml of 0.1\% DCPIP}}{\text{Volume of orange juice used to decolourise 1 ml of 0.1\% DCPIP}} \times 1.0 \text{ mg /ml}$$

Hitung kepekatan vitamin C dalam jus oren menggunakan formula berikut:

$$\textit{Kepekatan vitamin C dalam jus oren} = \frac{\textit{Isipadu asid askorbik 0.1\% untuk melunturkan 1 ml larutan DCPIP 0.1\%}}{\textit{Isipadu jus oren untuk melunturkan 1 ml larutan DCPIP 0.1\%}} \times 1.0 \text{ mg /ml}$$

A 0.2 mg/ml B 0.02 mg/ml

C 0.3 mg/ml D 0.03 mg/ml

15 Diagram 8 shows the human digestive system.

Rajah 8 menunjukkan sistem pencernaan manusia.

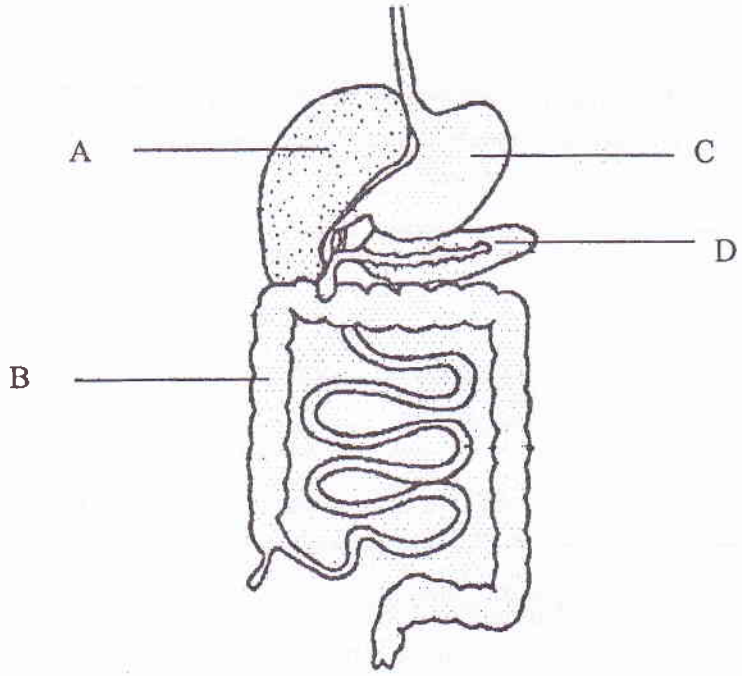


Diagram 8 / *Rajah 8*

Which one of the following organs A, B, C or D functions both as an endocrine and exocrine gland?

Antara organ A, B, C atau D, yang manakah berfungsi sebagai kelenjar endokrin dan eksokrin?

16 Diagram 9 shows a structure in the alimentary canal of a human.

Rajah 9 menunujukkan suatu struktur yang terdapat pada salur alimentari manusia.

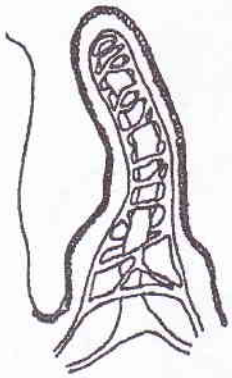


Diagram 9 / *Rajah 9*

Where is it found in the alimentary canal?

Di manakah ia didapati pada salur alimentari?

A Oesophagus / *Esofagus*

B Duodenum / *Duodenum*

C Ileum / *Ileum*

D Stomach / *Perut*

17 Diagram 10 shows the human digestive system.

Rajah menunjukkan sistem pencernaan manusia.

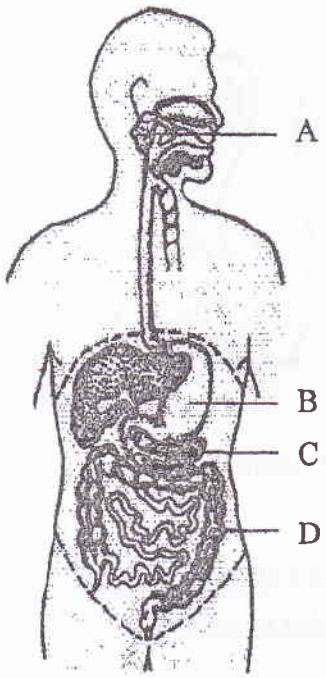


Diagram 10 / *Rajah 10*

In which part A, B, C or D does digestion of protein starts?

Antara bahagian A, B, C atau D, di manakah pencernaan protein bermula?

18 Diagram 11 shows a food guide pyramid for a balanced diet.

Rajah 11 menunjukkan suatu piramid panduan bagi sajian makanan seimbang.

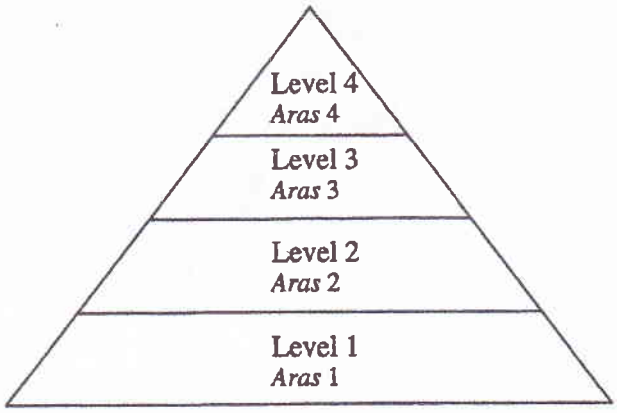


Diagram 11 / *Rajah 11*

Which food is in Level 2?

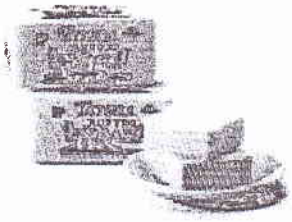
Makanan manakah yang berada pada Aras 2?

A

B

C

D



19 Diagram 12 shows two animals.

Rajah 12 menunjukkan dua jenis haiwan.

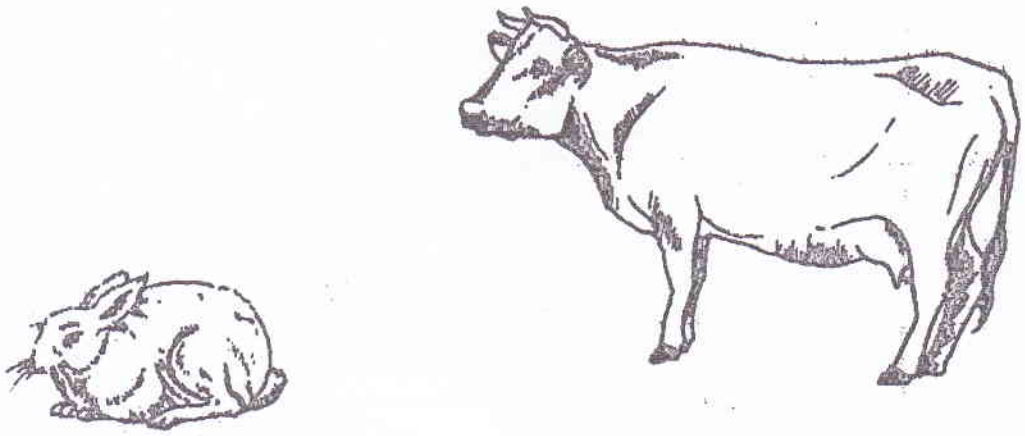


Diagram 12 / *Rajah 12*

What is the similarity of both digestive systems?

Yang manakah persamaan tentang sistem pencernaan mereka?

A Have same number of stomach chambers

Mempunyai bilangan ruangan perut yang sama

B Have the same length of caecum

Mempunyai panjang sekum yang sama

C Able to produce cellulase enzyme

Boleh menghasilkan enzim selulase

D Contains cellulose- digesting bacteria

Mengandungi bakteria pencerna-selulosa

20 Diagram13 shows the structure of a chloroplast as seen under an electron microscope.
Rajah 13 menunjukkan struktur kloroplas dilihat di bawah mikroskop elektron.

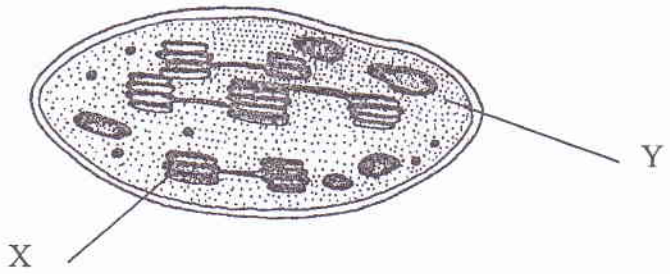


Diagram 13 / *Rajah 13*

Which of the following are required for the reactions in X and Y?
Antara berikut, yang manakah diperlukan untuk tindakbalas dalam X dan Y?

	X	Y
A	Carbon dioxide / *Karbon dioksida*	Light / *Cahaya*
B	Carbon dioxide / *Karbon dioksida*	Chloropyhll / *Klorofil*
C	Water / *Air*	Carbon dioxide / *Karbon dioksida*
D	Hydrogen ions / *Ion hidrogen*	Water / *Air*

21 The equation below shows the chemical reaction of yeast fermentation.

Persamaan di bawah menunjukkan tindakbalas kimia penapaian yis

$$C_6H_{12}O_6 \xrightarrow{X} 2C_2H_5OH + 2CO_2 + 210kJ$$

What is X? / *Apakah X?*

A Lactase / *Lactase*

B Amylase / *Amilase*

C Cellulase / *Selulase*

D Zymase / *Zimase*

22 Diagram 14 shows an alveolus.

Rajah 14 menunjukkan satu alveolus.

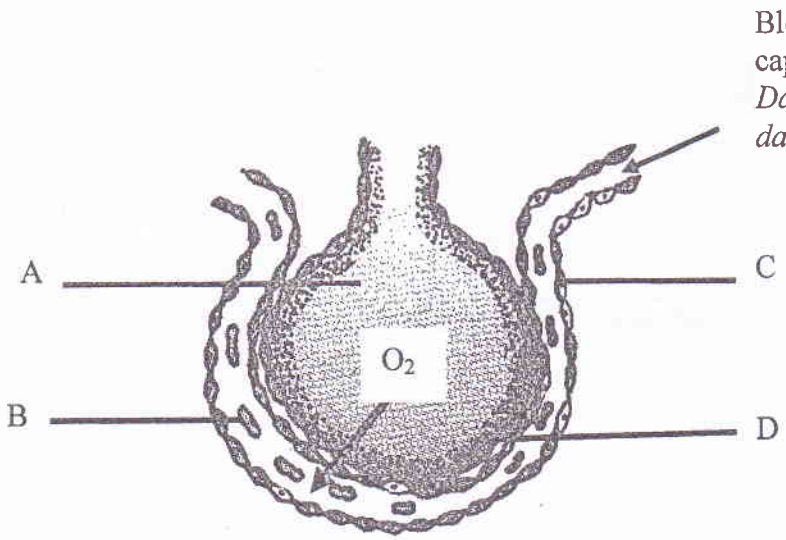


Diagram 14 / *Rajah 14*

In which part A, B, C or D is oxyhaemoglobin formed?

Antara bahagian A, B, C atau D di manakah oksihemoglobin terbentuk?

23 Diagram 15 shows the respiratory system of a grasshopper.
Rajah 15 menunjukkan sistem respirasi seekor belalang.

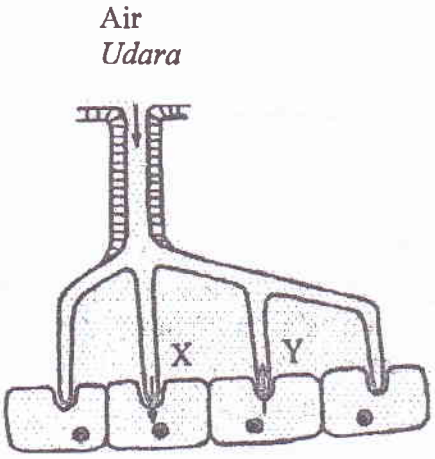


Diagram 15 / *Rajah 15*

What process occurs at X and Y during gaseous exchange?
Apakah proses yang berlaku di X dan Y semasa pertukaran gas?

A Diffusion / *Resapan*

B Osmosis / *Osmosis*

C Facilitated diffusion / *Resapan berbantu*

D Active transport / *Pengangkutan aktif*

24 Diagram 16 shows a type of interaction between two organisms.
Rajah 16 menunjukkan sejenis interaksi antara dua organisma.

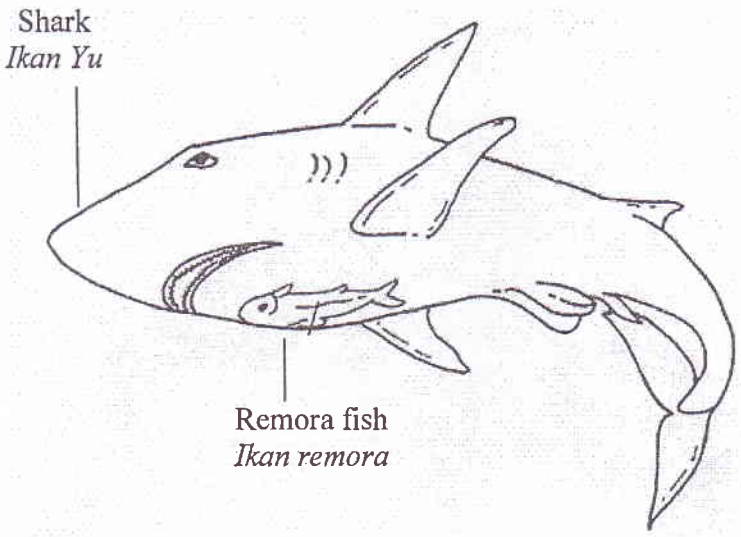
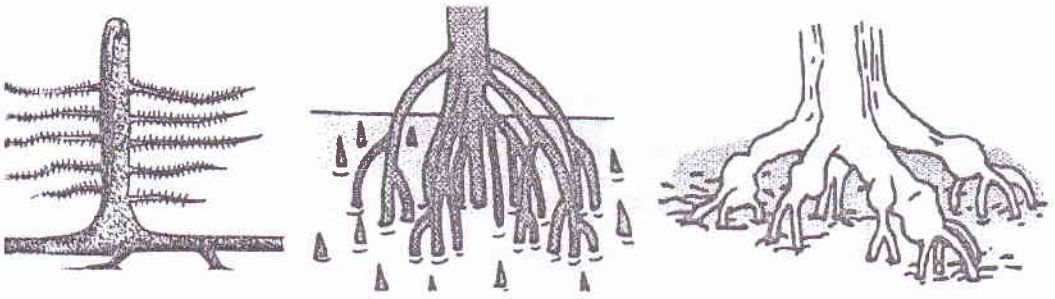


Diagram 16 / *Rajah 16*

Which of the following is the type of interaction that exists between these two organisms?
Antara yang berikut, manakah ialah jenis interaksi yang wujud di antara dua organisma tersebut?

A Parasitism / *Parasitisme*
B Commensalism / *Komensalisme*
C Mutualism / *Mutualisme*
D Saprophytism / *Saprofitisme*

25 Diagram 17 shows the roots of three types of mangrove plants U, V and W.
Rajah 17 menunjukkan sistem akar bagi tiga jenis pokok bakau U, V dan W.



U V W

Diagram 17 / *Rajah 17*

Identify the plants.
Kenalpasti tumbuhan tersebut.

	U	V	W
A	*Bruguiera* sp.	*Rhizophora* sp.	*Avicennia* sp.
B	*Rhizophora* sp.	*Bruguiera* sp.	*Avicennia* sp.
C	*Avicennia* sp.	*Rhizophora* sp.	*Bruguiera* sp.
D	*Avicennia* sp.	*Bruguiera* sp.	*Rhizophora* sp.

26 Which of the following is the correct order in the classification hierarchy beginning with the lowest group?

Antara yang berikut, manakah urutan yang betul dalam pengelasan hierarki bermula dengan kumpulan terbawah?

A Species, genus, family, order, class, phylum, kingdom
Spesies, genus, famili, order, kelas, filum, alam

B Kingdom, phylum, class, order, family, genus, species
Alam, filum, kelas, order, famili, genus, spesies

C Kingdom, order, phylum, species, class, genus, family
Alam, order, filum, spesies, kelas, genus, famili

D Species, phylum, class, order, family, genus, kingdom
Spesies, filum, kelas, order, famili, genus, alam

27 Which of the following activity causes eutrophication ?

Antara aktiviti berikut, manakah menyebabkan eutrofikasi?

A Chemical Toxins / *Toksin kimia*

B Disposal of sewage / *Pembuangan kumbahan*

C Radioactive wastes / *Bahan buangan radioaktif*

D Presence of excess acid / *Kehadiran asid yang berlebihan*

28 Diagram 18 shows the apparatus used to investigate the level of pollution in water samples by using 0.1% methylene blue solution.

Rajah 18 menunjukkan radas yang digunakan untuk mengkaji tahap pencemaran sampel air dengan menggunakan larutan metilena biru 0.1%.

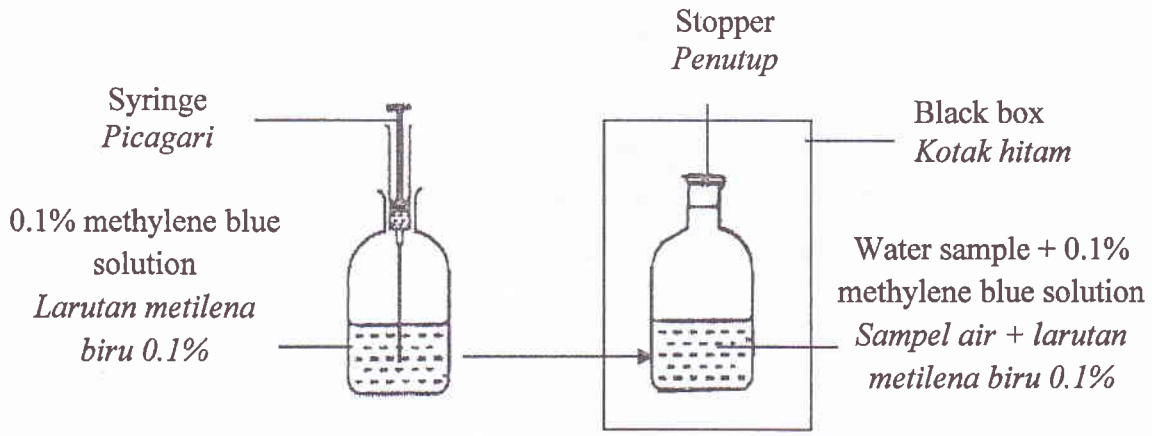


Diagram 18 / *Rajah 18*

The results are shown in Table 1.

Keputusan ditunjukkan dalam Jadual 1.

Water sample *Sampel air*	Colour of water sample after/ *Warna sampel air selepas*				
	1hour / *jam*	2 hours / *jam*	3 hours / *jam*	4 hours / *jam*	5 hours / *jam*
M	Blue / *Biru*	Blue / *Biru*	Blue / *Biru*	Blue / *Biru*	Clear /*Jernih*
N	Blue / *Biru*	Blue / *Biru*	Blue / *Biru*	Clear /*Jernih*	Clear /*Jernih*
O	Blue / *Biru*	Blue / *Biru*	Clear / *Jernih*	Clear /*Jernih*	Clear /*Jernih*
P	Blue / *Biru*	Clear / *Jernih*	Clear / *Jernih*	Clear /*Jernih*	Clear /*Jernih*

Table 1 / *Jadual 1*

Which of the following is true ?

Antara berikut, yang manakah benar?

A Sample M comes from the most polluted area

Sampel M datang dari kawasan paling tercemar

B Sample N is more polluted than sample O

Sampel N lebih tercemar daripada sampel O

C Sample P has the highest BOD value

Sampel P mempunyai nilai BOD yang paling tinggi

D Sample O has lesser microorganisms than sample M

Sampel O mempunyai mikroorganisma yang kurang daripada sampel M

29 Diagram 19 shows the concentration of antibodies in the blood after two antiserum injections.

Rajah 19 menunjukkan kepekatan antibodi dalam darah selepas dua suntikan antiserum.

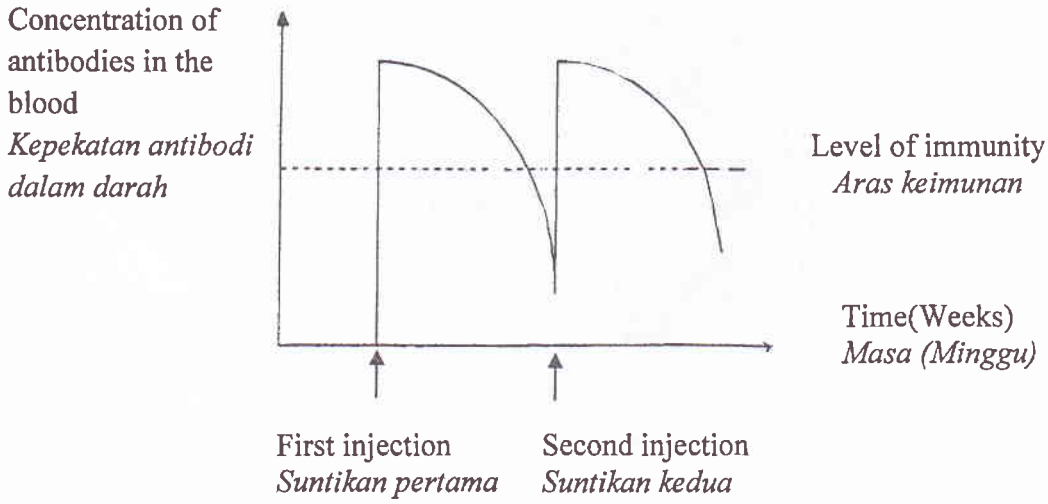


Diagram 19 / *Rajah 19*

What is the type of immunity shown ?

Apakah jenis keimunan yang ditunjukkan ?

A Artificially acquired active immunity / *Keimunan aktif buatan.*

B Artificially acquired passive immunity / *Keimunan pasif buatan.*

C Naturally acquired active immunity / *Keimunan aktif semulajadi.*

D Naturally acquired passive immunity / *Keimunan pasif semulajadi.*

30 Diagram 20 shows the cross section of a dicotyledonous root.

Rajah 20 menunjukkan keratan rentas akar tumbuhan dikotiledon.

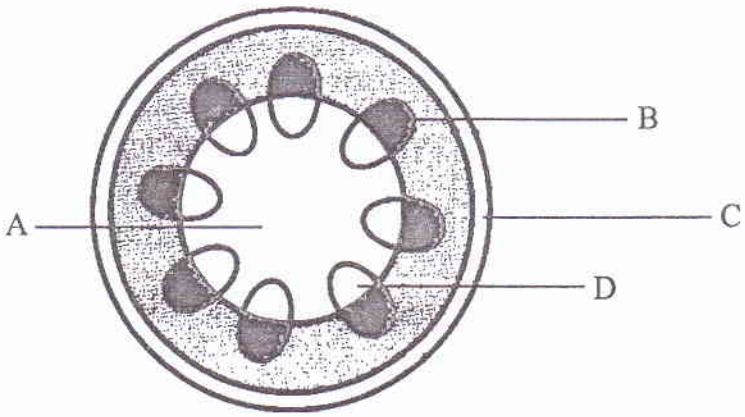


Diagram 20 / *Rajah 20*

Which of the labelled part A, B, C or D transports sucrose?

Bahagian berlabel yang manakah A, B, C atau D berfungsi mengangkut sukrosa?

31 Diagram 21 shows a type of plant tissue.
Rajah 21 menunjukkan sejenis tisu tumbuhan.

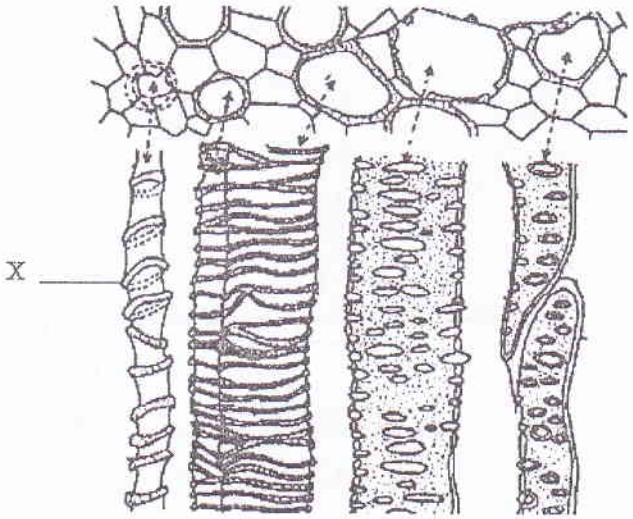


Diagram 21 / *Rajah 21*

What is the importance of the thickening of substance X to the plant tissue?
Apakah kepentingan penebalan bahan X terhadap tisu tersebut ?

A To transfer photosynthetic products
Untuk memindahkan hasil fotosintesis

B To give turgidity to the tissues
Untuk memberikan kesegahan kepada tisu

C To transfer water and mineral salts
Untuk memindahkan air dan garam mineral

D To give support and mechanical strength
Untuk memberikan sokongan dan kekuatan mekanikal

32 Diagram 22 shows an experiment to determine the rate of transpiration under a 60W light bulb.

Rajah 22 menunjukkan satu eksperimen untuk menentukan kadar tranpirasi di bawah lampu mentol 60 W.

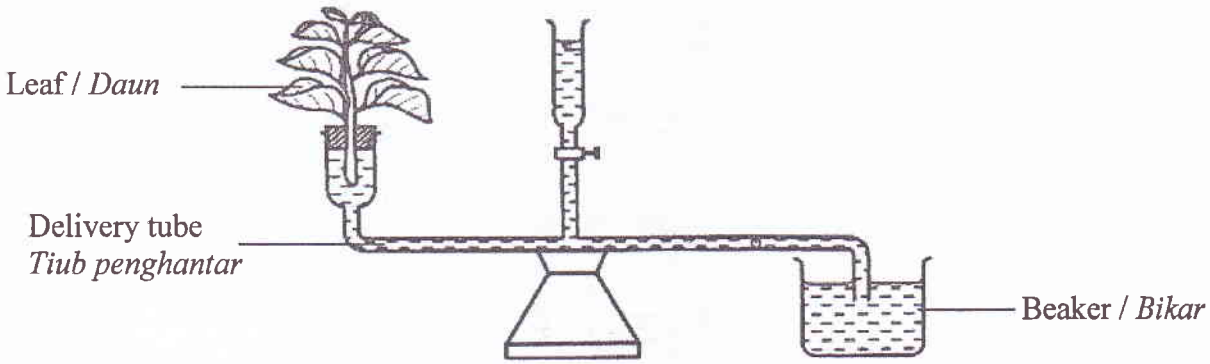


Diagram 22 / *Rajah 22*

Which of the following increases the rate of transpiration?

Antara berikut, yang manakah meningkatkan kadar transpirasi?

A Using a 40W light bulb

Gunakan lampu mentol 40 W

B Increase the diameter of the delivery tube

Tambah diameter tiub penghantar

C Increase the volume of water in the beaker

Tambah isipadu air dalam bikar

D Use another plant with more leaves

Gunakan tumbuhan lain yang banyak daun

33 Diagram 23 shows the human vertebrae.

Rajah 23 menunjukkan turus vetebra manusia.

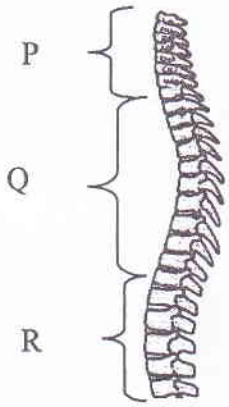
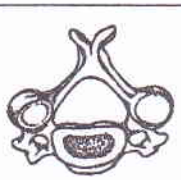
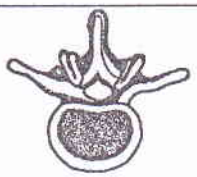
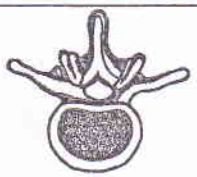
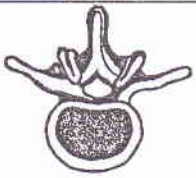


Diagram 23 / *Rajah 23*

Which are the bones at P, Q and R?

Yang manakah merupakan tulang pada P, Q dan R?

	P	Q	R
A			
B			
C			
D			

34 Diagram 24 shows the structure of a human forearm.
Rajah 24 menunjukkan struktur lengan manusia.

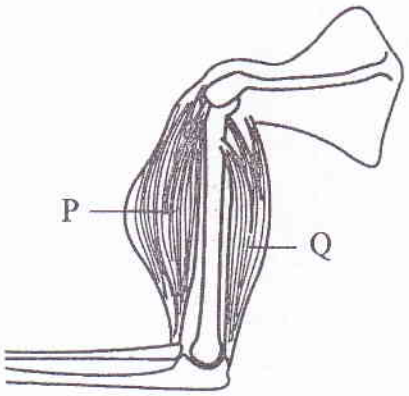


Diagram 24 / *Rajah 24*

Which of the following action of P and Q will cause the arm to bend?
Antara tindakan P dan Q yang berikut, yang manakah akan menyebabkan lengan dibengkokkan?

	P	Q
A	Contracts / *Mengecut*	Relaxes / *Mengendur*
B	Contracts / *Mengecut*	Contracts / *Mengecut*
C	Relaxes / *Mengendur*	Contracts / *Mengecut*
D	Relaxes / *Mengendur*	Relaxes / *mengendur*

35 Diagram 25 shows the fins of a fish.
Rajah 25 menunjukkan sirip pada seekor ikan

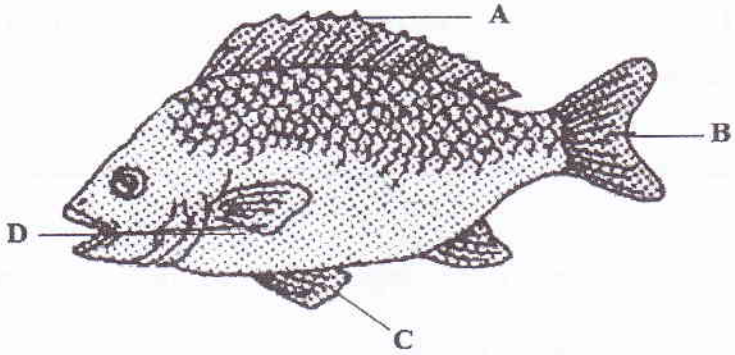


Diagram 25 / *Rajah 25*

Which one of the fins A, B, C or D helps the fish to stay on course without yawing in the water?
Di antara sirip A, B, C atau D, yang manakah membantu ikan berada pada kedudukannya tanpa merewang dalam air?

36 A hand is withdrawn when pricked by a sharp needle. The following events take place in the nervous system.

Tangan ditarik apabila tercucuk jarum tajam. Berikut adalah peristiwa yang berlaku dalam sistem saraf.

P -	Contraction of muscle / *Pengecutan otot*
Q -	Receptor is stimulated / *Reseptor dirangsangkan*
R -	Passage of impulses along efferent neuron *Laluan impuls sepanjang neuron eferen*
S -	Passage of impulses along afferent neuron *Laluan impuls sepanjang neuron aferen*

Which sequence is correct? / *Urutan manakah yang betul?*

A P → Q → R → S

B Q → S → R → P

C R → Q → S → P

D Q → R → P → S

37 Diagram 26 shows a person with a mineral deficiency.

Rajah 26 menunjukkan seorang yang mengalami kekurangan mineral.

Diagram 26 / *Rajah 26*

What is the mineral? / *Apakah mineral itu?*

A Ferum / Ferum

B Phosphorous / Fosforus

C Potassium / *Kalium*

D Iodine / *Iodin*

38 What is the effect on the production of urine if less antidiuretic hormone is secreted?

Apakah kesan ke atas penghasilan air kencing jika kurang hormon antidiuretik dirembeskan?

A Less volume but concentrated / *Isipadu rendah tetapi pekat*

B Less volume but dilute / *Isipadu rendah tetapi cair*

C More volume but concentrated / *Isipadu tinggi tetapi pekat*

D More volume but dilute / *Isipadu tinggi tetapi cair*

39

After a cross-country run, the skin is flushed.
Selepas larian merentas desa, kulit kelihatan merah.

Which of the following statement explains the condition?
Antara pernyataan berikut yang manakah menerangkan keadaan tersebut?

A Dilation of blood capillaries
Pengembangan kapilari darah

B Constriction of blood capillaries
Pencerutan kapilari darah

C Erythrocytes increase in number due to heat lost
Bilangan eritrosit bertambah disebabkan oleh kehilangan haba

D Erythrocytes dilate due to absorption of heat
Eritrosit mengembang disebabkan oleh penyerapan haba

40 Which of the following plant hormones stimulates parthenocarpy?
Antara yang berikut, hormon tumbuhan yang manakah merangsang partenokarpi?

A Abscisic acid / Asid absisik

B Cytokinin / *Sitokinin*

C Ethylene / *Etilena*

D Auxins / *Auksin*

41 Diagram 27 shows the process of sperm formation.

Rajah 27 menunjukkan proses pembentukan sperma.

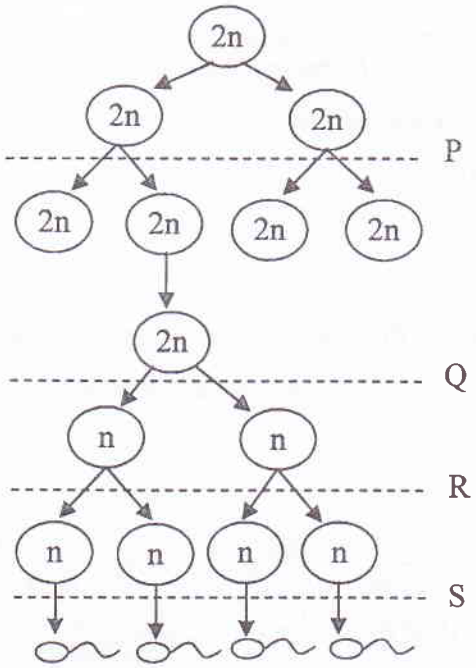


Diagram 27 / *Rajah 27*

What are the processes labelled P, Q, R and S?

Apakah proses yang berlabel P, Q, R dan S ?

	P	Q	R	S
A	Mitosis *Mitosis*	Differentiation *Pembezaan*	Meiosis I *Meiosis I*	Meiosis II *Meiosis II*
B	Growth *Pertumbuhan*	Meiosis I *Meiosis I*	Meiosis II *Meiosis II*	Differentiation *Pembezaan*
C	Meiosis I *Meiosis I*	Growth *Pertumbuhan*	Differentiation *Pembezaan*	Meiosis II *Meiosis II*
D	Mitosis *Mitosis*	Meiosis I *Meiosis I*	Meiosis II *Meiosis II*	Differentiation *Pembezaan*

42 Which hormone stimulates the development of ova in the ovaries?
Hormon manakah yang merangsang perkembangan ovum dalam ovari?

A Follicle stimulating hormone / *Hormon perangsang folikel*
B Lutenising hormone / *Hormon peluteinan*
C Progesterone / *Progesteron*
D Oestrogen / *Estrogen*

43 Diagram 28 shows the stages in the development of a human embryo.
Rajah 28 menunjukkan peringkat-peringkat perkembangan embrio manusia.

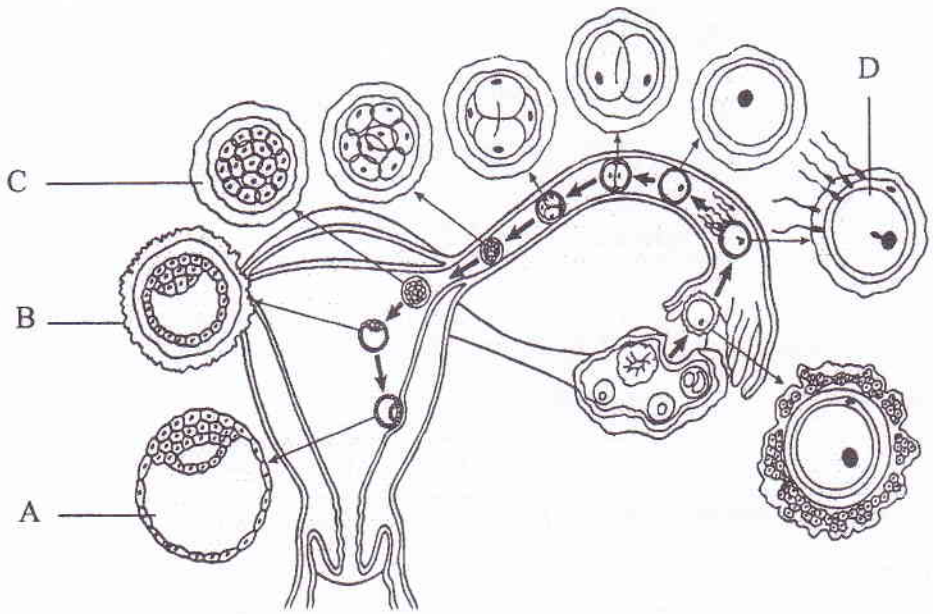


Diagram 28 / *Rajah 28*

Which of the parts labeled A, B, C or D is the blastula stage?
Manakah di antara bahagian berlabel A, B, C atau D adalah peringkat blastula?

44 Diagram 29 shows a method of birth control used by a woman

Rajah 29 menunjukkan kaedah mencegah kehamilan yang digunakan oleh seorang wanita.

Diagram 29 / *Rajah 29*

What is the consequence of using this type of birth control ?

Apakah akibat menggunakan pencegah kehamilan jenis ini?

A Ovum cannot be produced

Ovum tidak dapat dihasilkan

B The female sex hormones cannot be secreted

Hormon seks perempuan tidak dapat dirembeskan

C Sperm cells are unable to reach the ovum

Sel sperma tidak sampai ke ovum

D The zygote is unable to implant

Zigot tidak dapat menempel

45 Diagram 30 shows the formation of twins.

Rajah 30 menunjukkan pembentukan anak kembar.

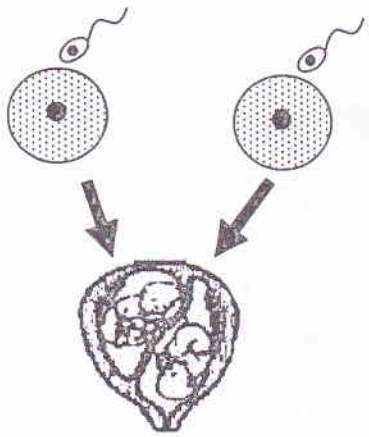


Diagram 30 / *Rajah 30*

Which of the following is a characteristic of the twins ?

Manakah di antara berikut, ciri kembar tersebut?

A They have the same characteristics

Mereka mempunyai ciri-ciri yang sama

B They have the same genetic content

Mereka mempunyai kandungan genetik yang sama

C They have different sex

Mereka berlainan jantina

D They have different placenta

Plasenta mereka berbeza

46 Diagram 31 shows the longitudinal section of an ovule

Rajah 31 menunjukkan keratan rentas ovul

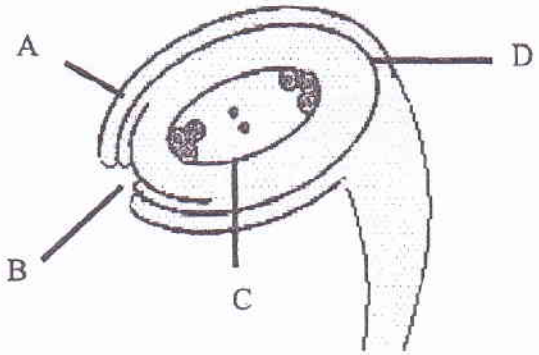


Diagram 31 / *Rajah 31*

Which part A, B, C or D is the micropyle ?

Antara b*ahagian A, B, C atau D, yang manakah mikropil ?*

47 Diagram 32 shows the growth curve of an organism.

Rajah 32 menunjukkan lengkung pertumbuhan suatu organisma

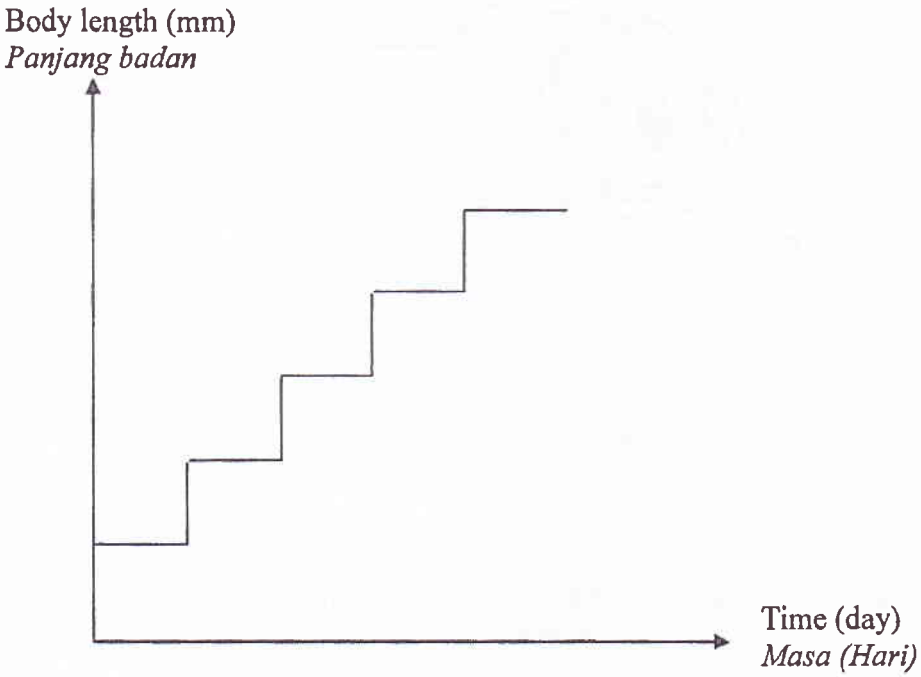


Diagram 32 / *Rajah 32*

Which of the following organisms has a growth curve as shown in Diagram 32 ?

Manakah antara organisma berikut mempunyai lengkung pertumbuhan seperti dalam Rajah 32 ?

A Frog / *Katak*

B Earthworm / *Cacing tanah*

C Cockroach / *Lipas*

D Butterfly / *Rama-rama*

48

Human blood can be classified into Rhesus positive (Rh+) or Rhesus negative (Rh-).
A married couple has different Rhesus factors. Their first child is Rhesus positive. All the subsequent pregnancies end with miscarriage.
Darah manusia boleh dikelaskan kepada Rhesus positif (Rh +) atau Rhesus negative(Rh -).
Sepasang suami-isteri mempunyai faktor Rhesus berbeza. Anak pertama mereka adalah Rhesus positif . Semua kandungan seterusnya berakhir dengan keguguran.

Determine the Rhesus factors for the parents and the miscarried foetus.
Tentukan faktor Rhesus untuk ibu bapa tersebut dan fetus yang gugur.

	Father ***Bapa***	**Mother** ***Ibu***	**Miscarried foetus** ***Fetus yang gugur***
A	Rhesus positive *Rhesus positif*	Rhesus negative *Rhesus negatif*	Rhesus positive *Rhesus positif*
B	Rhesus positive *Rhesus positif*	Rhesus negative *Rhesus negatif*	Rhesus negative *Rhesus negatif*
C	Rhesus negative *Rhesus negatif*	Rhesus positive *Rhesus positif*	Rhesus positive *Rhesus positif*
D	Rhesus negative *Rhesus negatif*	Rhesus positive *Rhesus positif*	Rhesus negative *Rhesus negatif*

49 Diagram 33 shows a karyotype of a person with a genetic abnormality.
Rajah 33 menunjukkan kariotip seorang dengan kandungan genetik yang tidak normal.

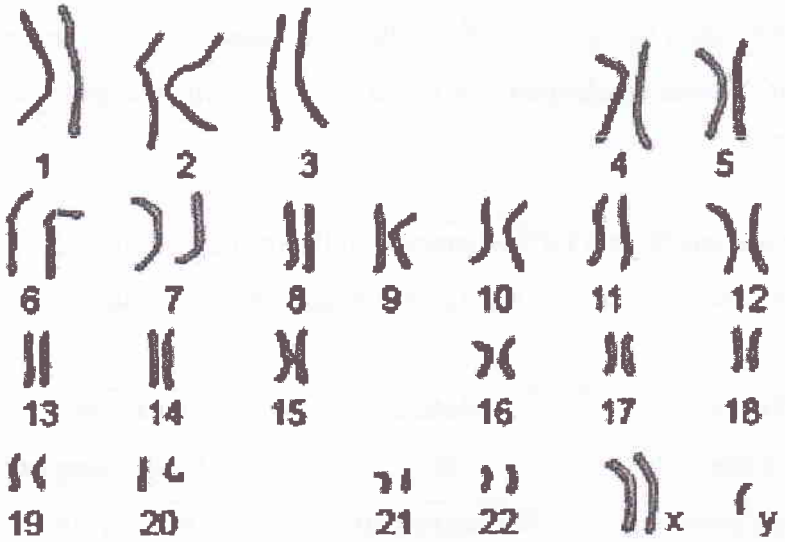


Diagram 33 / *Rajah 33*

What is the phenotype of this person ?
Apakah fenotip individu ini ?

A Down syndrome male / *Lelaki sindrom Down*
B Turner's syndrome / *Sindrom Turner*
C Klinefelter's syndrome / *Sindrom Klinefelter*
D Albino male / *Lelaki albino*

50 Diagram 34 shows a pair of homologous chromosomes. The alphabets represent the genes in the chromosomes.

Rajah 34 menunjukkan sepasang kromosom homolog. Abjad mewakili gen di dalam kromosom itu

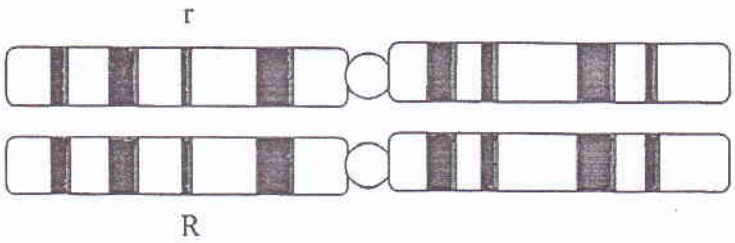


Diagram 34 / *Rajah 34*

R and r represent

R dan r mewakili

A genotype / *genotip*

B phenotype / *fenotip*

C alleles / *alel*

D traits / trait

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

SULIT
4551/2
Biology
Paper 2
2011
$2\frac{1}{2}$ hours

Name : .....

Form : .....

MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA
CAWANGAN NEGERI SEMBILAN

==========

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2011

BIOLOGY
Paper 2
Two hours and thirty minutes

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1 *Tulis* **nama** *dan* **kelas** *anda pada ruang yang disediakan.*

2 *Kertas soalan ini adalah dalam dwibahasa.*

3 *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

4 *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

5 *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

For examiner's use only			
Section	Question	Total Marks	Marks Obtained
A	1	13	
	2	12	
	3	12	
	4	11	
	5	12	
B	6	20	
	7	20	
	8	20	
	9	20	
Total			

Kertas soalan ini mengandungi 25 halaman bercetak

Section A
Bahagian A

[60 *marks*]
[60 *markah*]

Answer **all** questions in this section.
Jawab **semua** *soalan dalam bahagian ini.*

1 Diagram 1.1 and 1.2 show two different types of movement of substances across the plasma membrane.
Rajah 1.1 dan Rajah 1.2 menunjukkan dua jenis pergerakan bahan yang berbeza bagi bahan merentasi membran plasma.

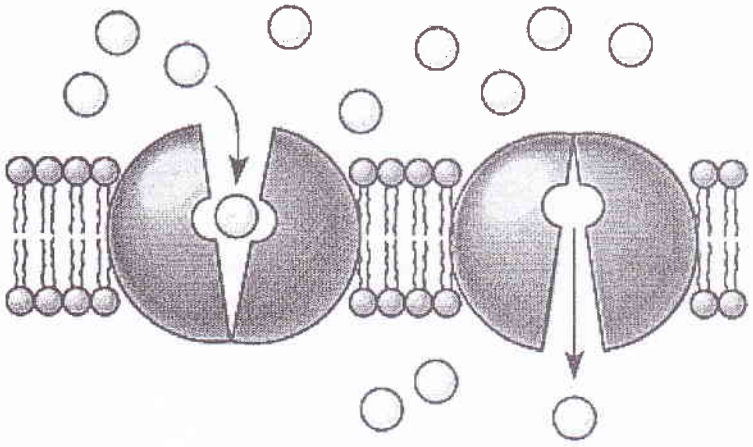


Diagram 1.1 / *Rajah 1.1*

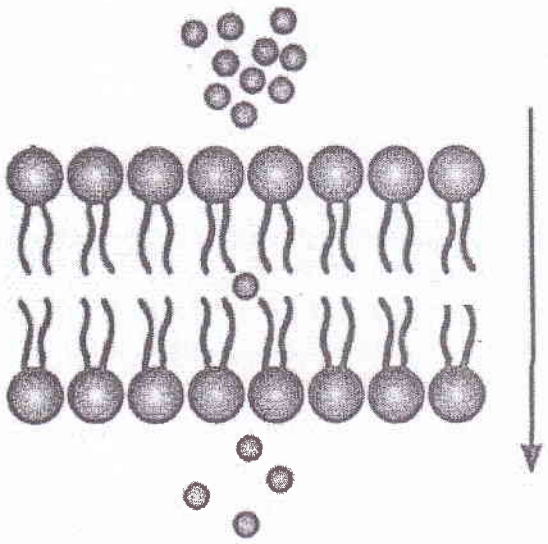


Diagram 1.2 / *Rajah 1.2*

(a) In Diagram 1.1, label the following structures:
Pada Rajah 1.1, label struktur-struktur berikut:

- Phospholipid bilayer, with letter P
  Dwilapisan fosfolipid, dengan huruf P
- Carrier protein, with letter Q
  Protein pembawa, dengan huruf Q

[2 marks / *markah*]

1(a)

(b) The plasma membrane is said to be semi-permeable. What is the meaning of semi-permeable membrane?
Membran plasma dikatakan bersifat separa telap. Apakah maksud membran separa telap ?

.....

[1 mark / *markah*]

1(b)

(c) Name the process of movement of substances across the plasma membrane as shown in Diagram 1.1 and Diagram 1.2.
Namakan proses pergerakan bahan merentasi membran plasma yang ditunjukkan pada Rajah 1.1 dan Rajah 1.2.

Process in Diagram 1.1/ *Proses pada Rajah 1.1*

.....

Process in Diagram 1.2/ *Proses pada Rajah 1.2*

.....

[2 marks / *markah*]

1(c)

(d) (i) Explain how amino acid molecules are transported across the plasma membrane by the process shown in Diagram 1.1.
Terangkan bagaimana molekul asid amino diangkut merentasi membran plasma melalui proses yang ditunjukkan pada Rajah 1.1.

.....

.....

[2 marks / *markah*]

1(d)(i)

(ii) Based on Diagram 1.2, state one example of a substance that moves across the plasma membrane. Describe the characteristics of that substance transported into the cell.

Berdasarkan Rajah 1.2, nyatakan satu contoh bahan yang bergerak merentas membran plasma. Huraikan ciri-ciri bahan tersebut.

.....

1(d)(ii) .....

.....

.....

[3 marks / *markah*]

(e) Explain the concept of osmosis in the preservation of cucumbers.
Terangkan konsep osmosis dalam pengawetan timun.

1(e) .....

.....

.....

[3 marks / *markah*]

Total

2 Diagram 2.1 shows a longitudinal section through a part of a dicotyledon leaf.
Rajah 2.1 menunjukkan keratan bujur sebahagian daun dikotiledon.

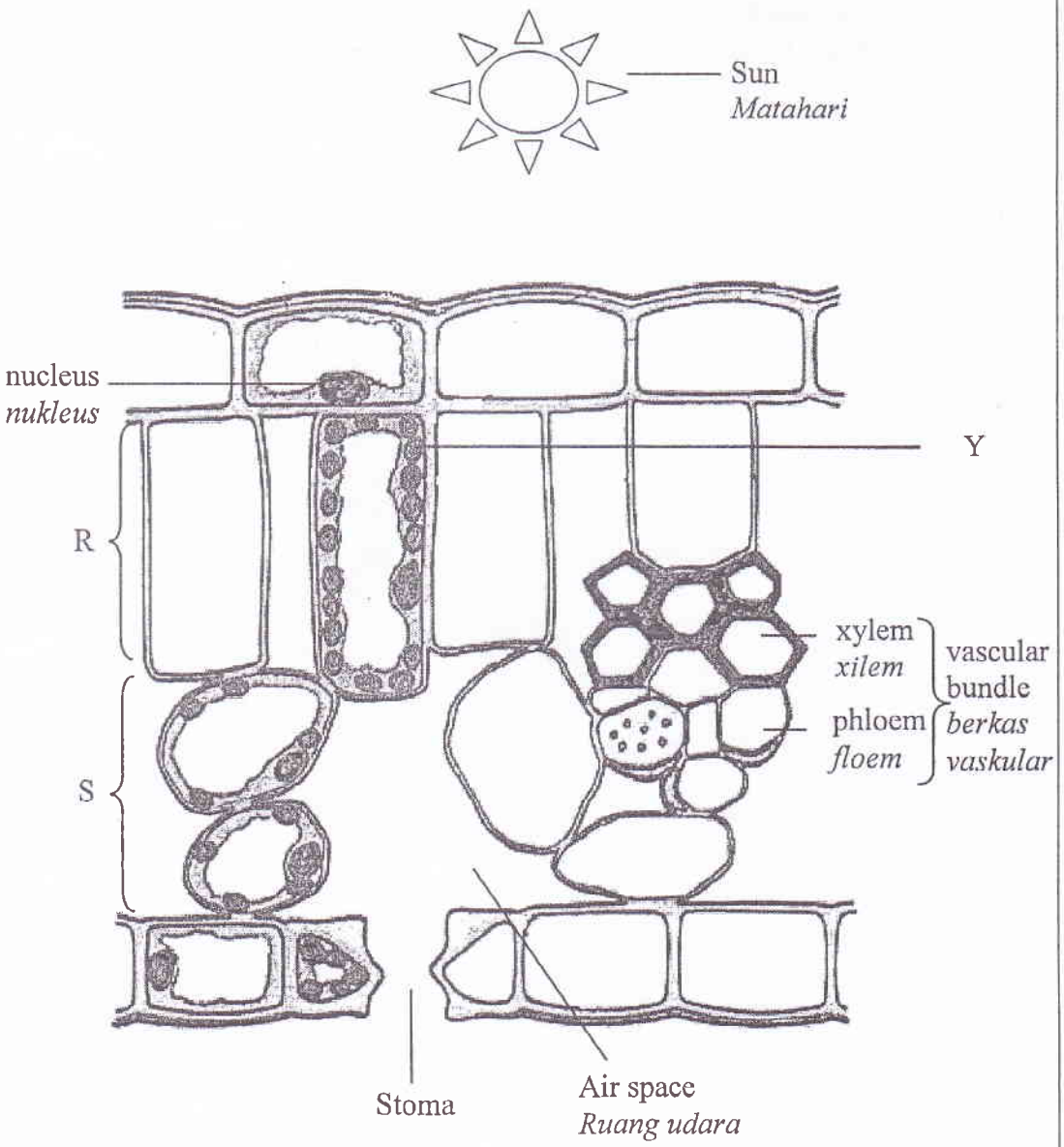


Diagram 2.1 / *Rajah 2.1*

(a) Name structures R dan Y.
Namakan struktur R dan Y.

R : .....

Y : .....

[2 marks / *markah*]

2(a)

(b) On Diagram 2.1, draw and label three arrows to show the path of raw materials into Y.

Pada Rajah 2.1, lukis dan label tiga anak panah untuk menunjukkan laluan bahan mentah ke Y.

2(b)

[3 marks / *markah*]

(c) Diagram 2.2 shows the detailed structure of Y.
Rajah 2.2 menunjukkan struktur terperinci Y.

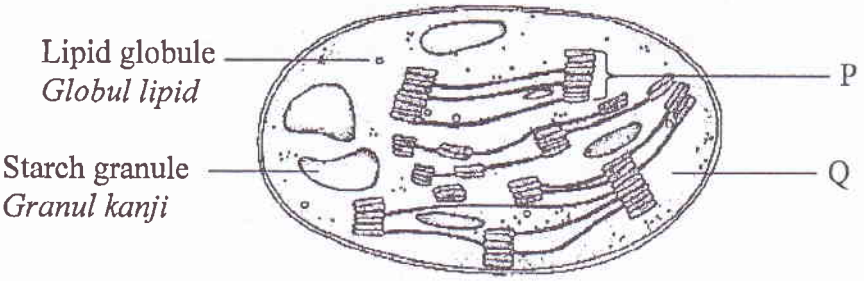


Diagram 2.2 / *Rajah 2.2*

Describe the photosynthetic reactions that occur in structures P and Q.
Huraikan tindakbalas fotosintesis yang berlaku di struktur P dan Q.

Structure P / *Struktur P* :

.....

.....

.....

Structure Q / *Struktur Q* :

2(c)

.....

.....

.....

[3 marks / *markah*]

2(d)

(d) Write down the equation for photosyntesis.
Tuliskan persamaan bagi tindakbalas fotosintesis.

.....

[1 mark / *markah*]

(e) The process of photosynthesis contributes to the balance of nature.
Proses fotosintesis menyumbang kepada keseimbangan alam.

(i) State **one** importance of photosynthesis that maintains the balance of nature.
Nyatakan satu kepentingan fotosintesis yang dapat mengekalkan keseimbangan alam.

.....

[1 mark / *markah*]

2(e)(i)

(ii) Explain how air pollution can reduce the rate of photosynthesis.
Terangkan bagaimana pencemaran udara boleh mengurangkan kadar fotosintesis.

.....

.....

.....

.....

[2 marks / *markah*]

2(e)(ii)

Total

3 Diagram 3 shows gaseous exchange in the lungs and tissues in humans.
Rajah 3 menunjukkan pertukaran gas di dalam paru-paru dan tisu manusia.

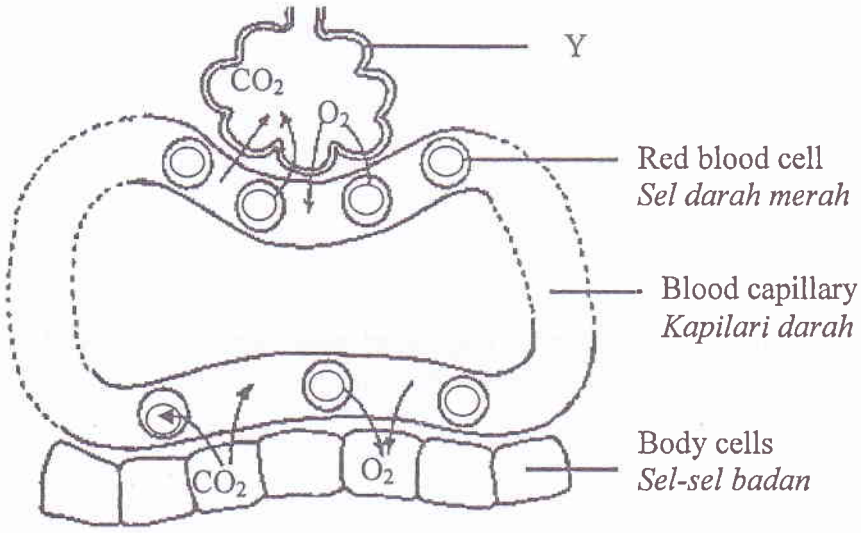


Diagram 3 / *Rajah 3*

3(a)(i)

(*a*) (i) Name structure Y .
Namakan struktur Y.

.....

[1 *mark* / *markah*]

3(a)(ii)

(ii) Gaseous exchange takes place across structure Y.
State the importance of gaseous exchange in human.
Pertukaran gas berlaku merentasi struktur Y.
Nyatakan kepentingan pertukaran gas dalam manusia.

.....

.....

[1 mark / *markah*]

[Lihat halaman sebelah

(iii) Explain two adaptations of structure Y for efficient gaseous exchange.
Terangkan dua adaptasi struktur Y untuk pertukaran gas yang efisien.

.....

.....

.....

.....

[2 marks / *markah*]

3(a)(iii)

(b) Describe the movement of respiratory gases across structure Y.
Huraikan pergerakan gas-gas respirasi merentasi struktur Y.

.....

.....

.....

.....

[2 marks / *markah*]

3(b)

(c) Explain why carbon monoxide is poisonous to the body cells.
Terangkan mengapa karbon monoksida beracun kepada sel-sel badan.

.....

.....

.....

[2 marks / *markah*]

3(c)

(d) During vigorous activities, the muscle cells undergo anaerobic respiration. State two differences between anaerobic respiration and aerobic respiration.

Semasa aktiviti lasak, sel-sel otot menjalankan respirasi anaerobik. Nyatakan dua perbezaan di antara respirasi anaerobik dan respirasi aerobik.

.....

.....

.....

.....

3(d)

[2 marks / *markah*]

(e) Explain how smoking can harm the respiratory system in human.
Terangkan bagaimana merokok merosakkan sistem respirasi manusia.

.....

.....

.....

.....

3(e)

[2 marks / *markah*]

Total

4 Diagram 4 shows a longitudinal section of a human heart.
Rajah 4 menunjukkan keratan bujur jantung manusia.

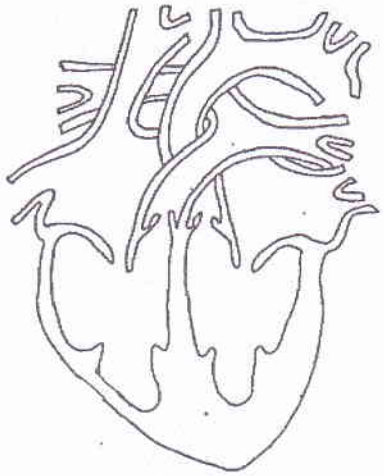


Diagram 4 / *Rajah 4*

(a) (i) On Diagram 4, label the following parts:
Pada rajah 4, label bahagian-bahagian berikut:

- left ventricle / *ventrikel kiri*
- bicuspid valve / *injap bikuspid*
- pulmonary artery / *arteri pulmonari*

[2 marks / *markah*]

4(a)(i)

(ii) Draw a series of arrows to show the flow of oxygenated blood into the heart and out of the heart.
Lukiskan satu siri anak panah untuk menunjukkan aliran darah beroksigen masuk dan keluar dari jantung.

[1 mark / *markah*]

4(a)(ii)

(b) (i) State the difference between the walls of left ventricle and right ventricle.
Nyatakan perbezaan antara dinding ventrikel kanan dan ventrikel kiri.

.....

[1 mark / *markah*]

4(b)(i)

(ii) Explain the importance of the difference in (b)(i).
Terangkan kepentingan perbezaan di (b)(i.)

.....

.....

.....

[2 marks / *markah*]

4(b)(ii)

(c)

The contractions of the cardiac muscle need not be stimulated by nerve impulses. *Pengecutan otot kardium tidak memerlukan ransangan impuls saraf.*

Explain the above statement.
Terangkan pernyataan di atas.

4(c)

.....

.....

[1 mark / *markah*]

(d) Explain what will happen to a person if the pacemaker (sinoatrial node) is impaired.
Terangkan apa akan berlaku sekiranya perentak elektronik (nodus sinoatrial) tidak berfungsi.

.....

.....

4(d)

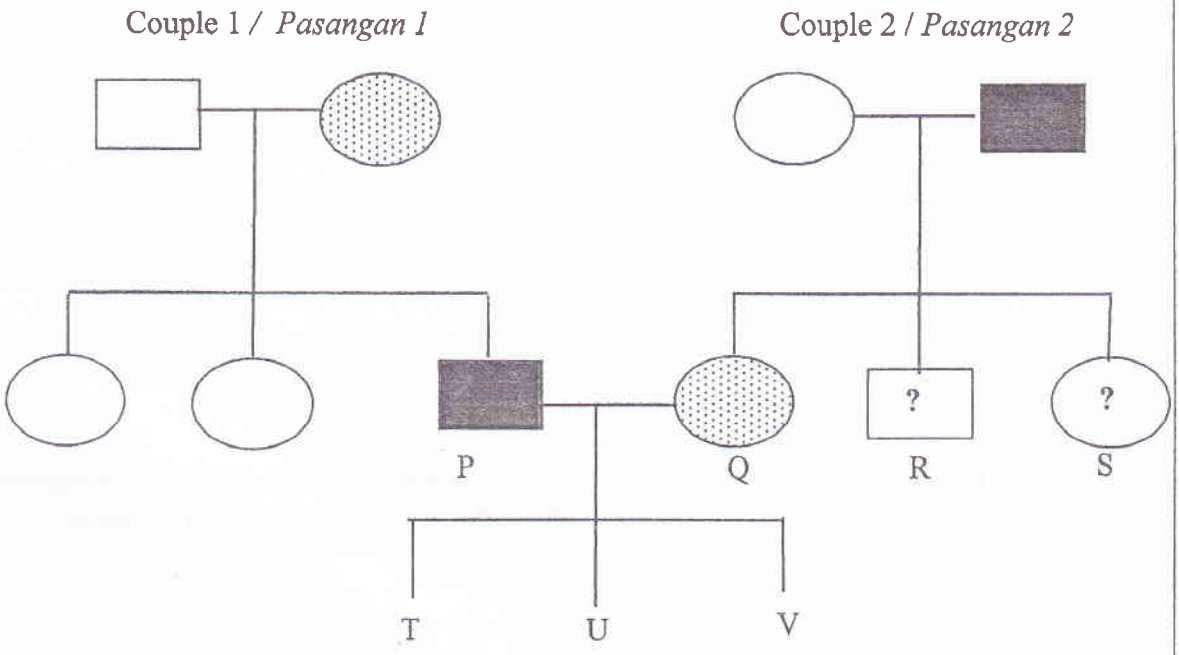
.....

.....

[4 marks / *markah*]

Total

5 Diagram 5 shows the inheritance of colour blindness in a family.
Rajah 5 menunjukkan pewarisan ciri buta warna dalam sebuah keluarga.



Key / *Kekunci*

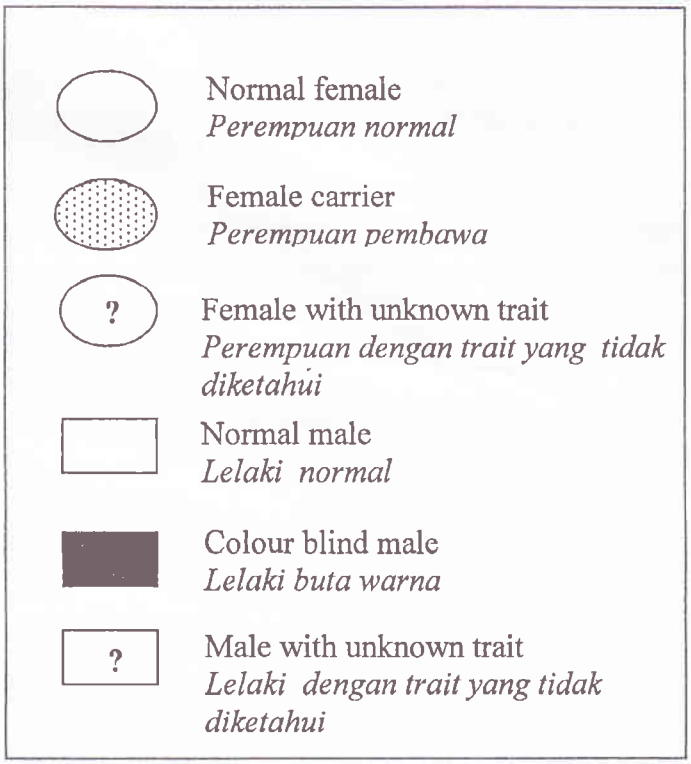


Diagram 5 / *Rajah 5*

(a) (i) What is a sex-linked gene?
Apakah gen terangkai seks?

5(a)(i)

.....

[1 mark / *markah*]

(ii) Explain how P inherits colour blindness from his parents.
Terangkan bagaimana P mewarisi buta warna daripada ibubapanya.

5(a)(ii)

.....

.....

.....

.....

[3 marks / *markah*]

(b) (i) Draw a schematic diagram to show the product of the marriage of couple 2.
Lukis rajah skema untuk menunjukkan hasil pekahwinan pasangan 2.

Parents
Induk

Gametes
Gamet

Offspring genotype
Genotip anak

Offspring phenotype
Fenotip anak

5(b)(i)

[4 marks / *markah*]

(ii) In the diagram drawn in b(i) label individuals R and S.
Dalam rajah yang dilukis dalam b(i) label individu R dan S.

[1 mark / *markah*]

5(b)(ii)

(c) What is the probability (in %) that the children of P and Q are
Apakah kebarangkalian (dalam %) anak-anak P dan Q adalah

(i) colour blind males ?
lelaki buta warna?

.....

5(c)(i)

(ii) female carriers of colour blindness?
perempuan pembawa buta warna ?

.....

[2 marks / *markah*]

5(c)(ii)

(d) The type of chromosome carrying the gene for albinism is different from the type carrying the gene for colour blindness. What is the type of chromosome carrying the gene for albinism?

Jenis kromosom yang membawa gen untuk ciri albino berbeza daripada jenis kromosom yang membawa gen untuk buta warna. Apakah jenis kromosom yang membawa gen untuk ciri albino?

.....

[1 mark / *markah*]

5(d)

Total

Section B
Bahagian B

[40 *marks*]
[40 *markah*]

Answer any **two** questions from this section.
*Jawab mana-mana **dua** soalan daripada bahagian ini.*

6 Diagram 6.1 shows the organelles involved in the synthesis and secretion of an extracellular enzyme in an animal cell.

Rajah 6.1 menunjukkan organel-organel yang terlibat dalam sintesis dan rembesan enzim luar sel di dalam sel haiwan.

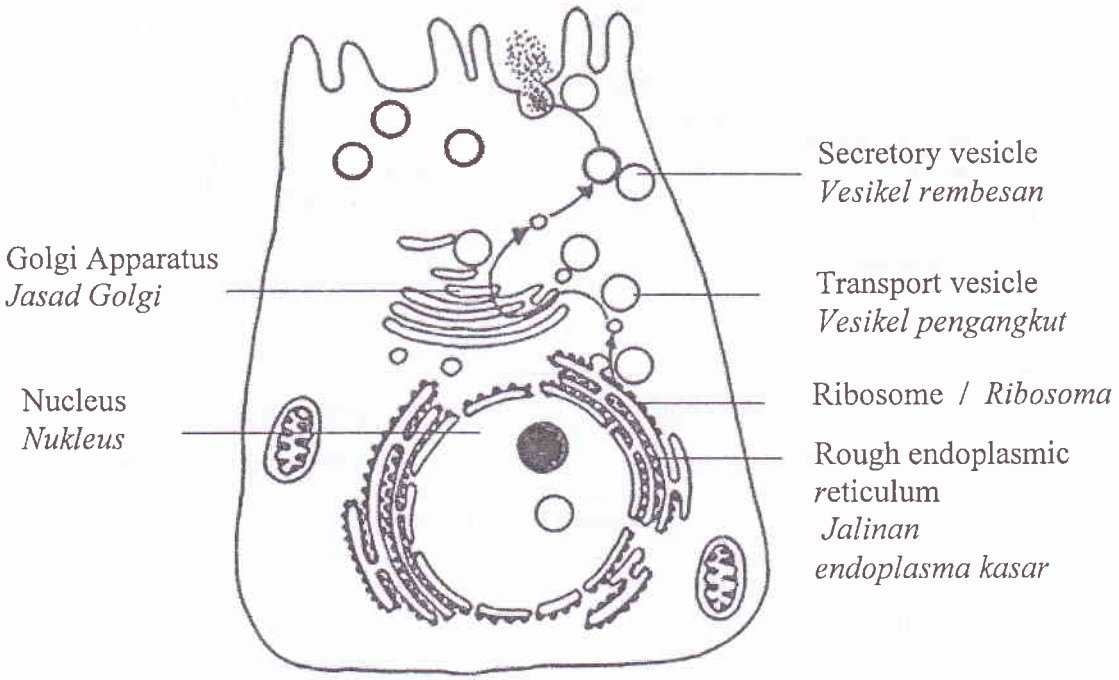


Diagram 6.1 / *Rajah 6.1*

(a) Based on Diagram 6.1, explain the processes involved in the production of extracellular enzymes.

Berdasarkan Rajah 6.1, terangkan proses-proses yang terlibat dalam penghasilan enzim luar sel.

[6 marks / *markah*]

(b) Diagram 6.2 shows two types of complex molecules.
Rajah 6.2 menunjukkan dua jenis molekul kompleks.

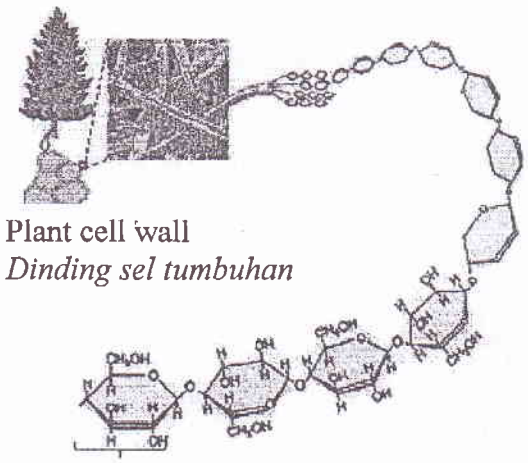
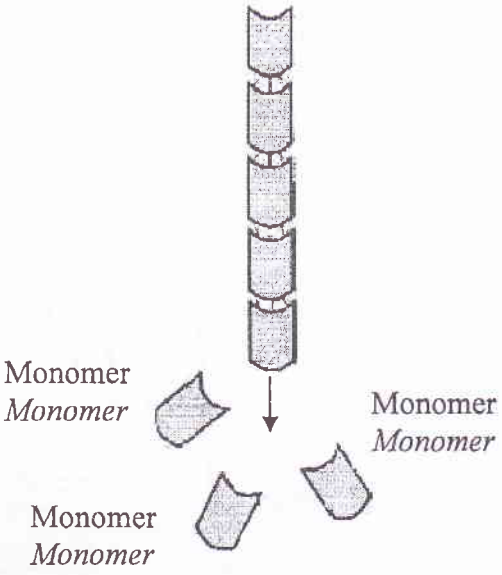
Molecule X / *Molekul X*	**Molecule Y / *Molekul Y***
 Plant cell wall *Dinding sel tumbuhan* Monosaccharide *Monosakarida*	 Monomer *Monomer* Monomer *Monomer* Monomer *Monomer*
Basic unit: monosaccharide *Unit asas: monosakarida*	Basic unit: amino acid *Unit asas: asid amino*

Diagram 6.2 / *Rajah 6.2*

Based on Diagram 6.2, explain
Berdasarkan Rajah 6.2, terangkan

(i) the formation of molecules X / *pembentukan molekul X*

(ii) the breakdown of molecule Y / *penguraian molekul Y*

[4 marks / *markah*]

(c) Starch, protein and lipid can be hydrolysed by the enzymes X, Y and Z respectively. Diagram 6.3 is a graph which shows the effect of pH on the rate of enzyme activity.

Kanji, protein dan lipid masing-masing dapat dihidrolisis oleh enzim X, Y dan Z. Rajah 6.3 ialah graf yang menunjukkan kesan pH ke atas kadar aktiviti enzim.

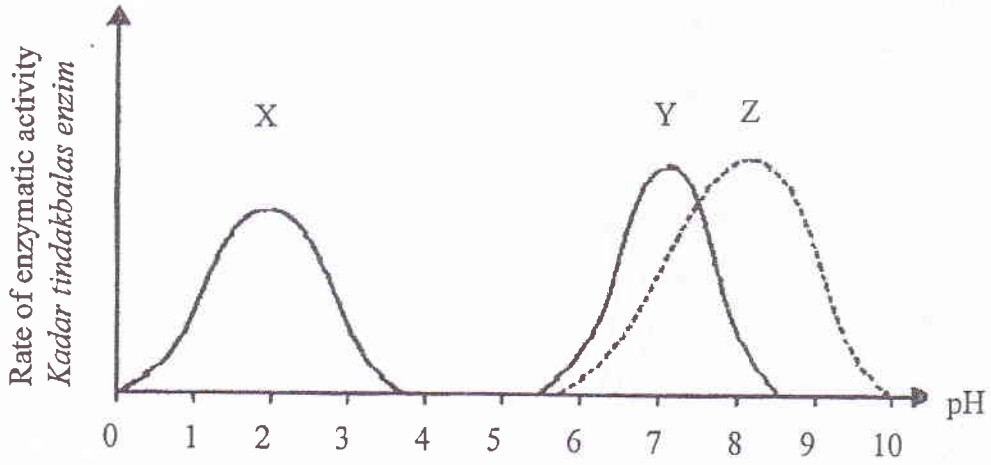


Diagram 6.3 / *Rajah 6.3*

Based on the Diagram 6.3, name X, Y, Z and explain how the changes in pH affects enzyme activity.

Berdasarkan Rajah 6.3, namakan X, Y, Z dan terangkan bagaimana perubahan pH menjejaskan aktiviti enzim.

[10 marks / *markah*]

7 Diagram 7 shows the assimilation of digested food in the liver and body cell.
Rajah 7 menunjukkan asimilasi hasil pencernaan makanan, di sel hati dan sel badan.

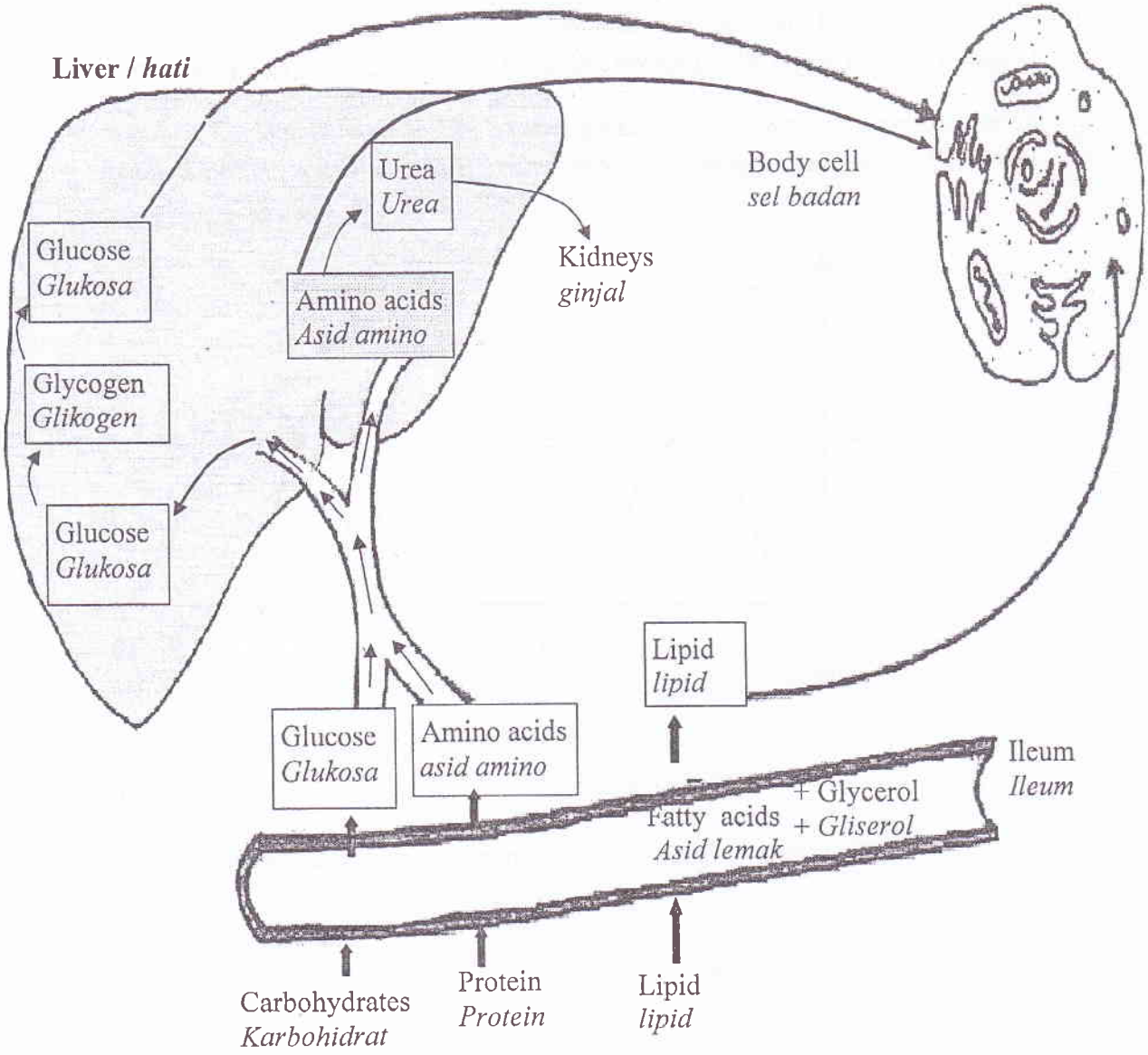


Diagram 7 / *Rajah 7*

(a) Based on Diagram 7 , explain the assimilation of the followings:
Berdasarkan Rajah 7, terangkan asimilasi bagi bahan-bahan berikut:

(i) glucose / *glukosa*
(ii) amino acids / *asid amino*
(iii) lipids / *lipid*

[10 marks / *markah*]

(b) The energy requirement for a girl aged 15 is 9000 kJ daily.
Table 1 shows the types of food, quantity and energy content of her daily menu.

Keperluan tenaga remaja perempuan berumur 15 tahun ialah 9000 kJ sehari.
Jadual 1 menunjukkan jenis-jenis makanan , kuantiti serta kandungan tenaga dalam menu hariannya.

Types of food *Jenis makanan*	**Quantity taken** *Kuantiti diambil* (g)	**Energy Content** *Kandungan tenaga* (kJ /100 g)
Rice / *Nasi*	350	1500
Chips / *Kerepek*	150	1000
Roasted Chicken / *Ayam panggang*	300	800
Grilled mutton / *Kambing panggang*	200	1200
Boiled potato / *Kentang rebus*	150	500
Chocolate / *Coklat*	100	2500
Yoghurt / *Dadih*	200	200
Egg / *Telur*	100	600

Table 1 / *Jadual* 1

(i) Calculate the daily total energy value taken by the girl .
Hitungkan jumlah nilai tenaga harian yang di ambil oleh remaja itu.

[2 marks / *markah*]

(ii) Is her daily menu a balanced diet? Explain.
Adakah menu harian gizinya seimbang? Terangkan.

[2 marks / *markah*]

(iii) If she continues to take the menu everyday for a long time, explain the consequences to her health.
Jika dia terus mengambil menu tersebut setiap hari untuk tempoh yang lama, terangkan kesan ke atas kesihatannya.

[6 marks / *markah*]

8 Diagram 8.1 shows the development of a human zygote.
Rajah 8.1 menunjukkan perkembangan zigot manusia.

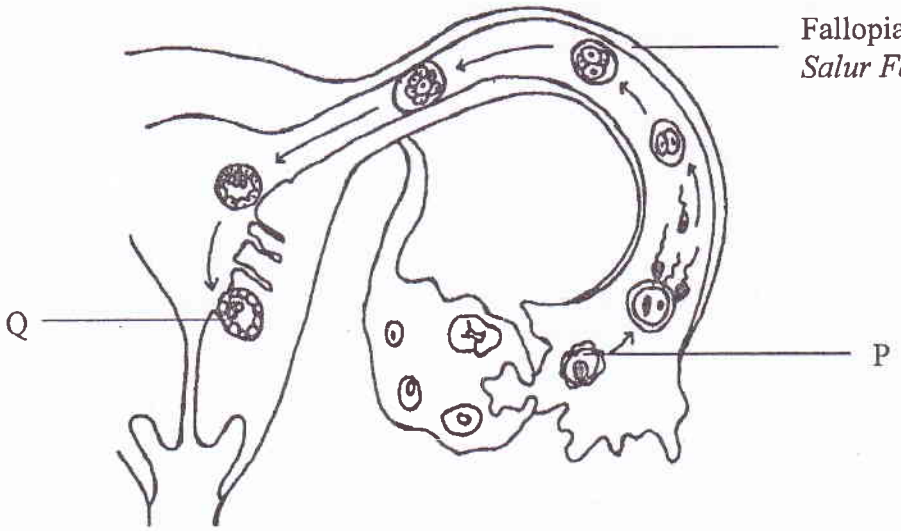


Diagram 8.1 / *Rajah 8.1*

(a) Describe the processes which occurs from P to Q.
Huraikan proses-proses yang berlaku dari P ke Q.

[6 marks / *markah*]

(b) Diagram 8.2 shows the formation of a pair of twins.
Rajah 8.2 menunjukkan pembentukan sepasang kembar.

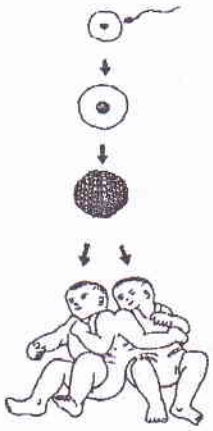


Diagram 8.2 / *Rajah 8.2*

Based on the diagram, explain the formation of this twins.
Berdasarkan rajah, terangkan pembentukan kembar ini.

[6 marks / *markah*]

(c) Mrs. A is a married woman. She has a problem getting pregnant.
Diagram 8.3 shows a laboratory method which help Mr. and Mrs. A to have their own child.

Pn. A telah berkahwin. Beliau mempunyai masalah untuk hamil.
Rajah 8.3 menunjukkan satu kaedah makmal yang telah membantu Encik A dan Puan A untuk mendapatkan anak sendiri.

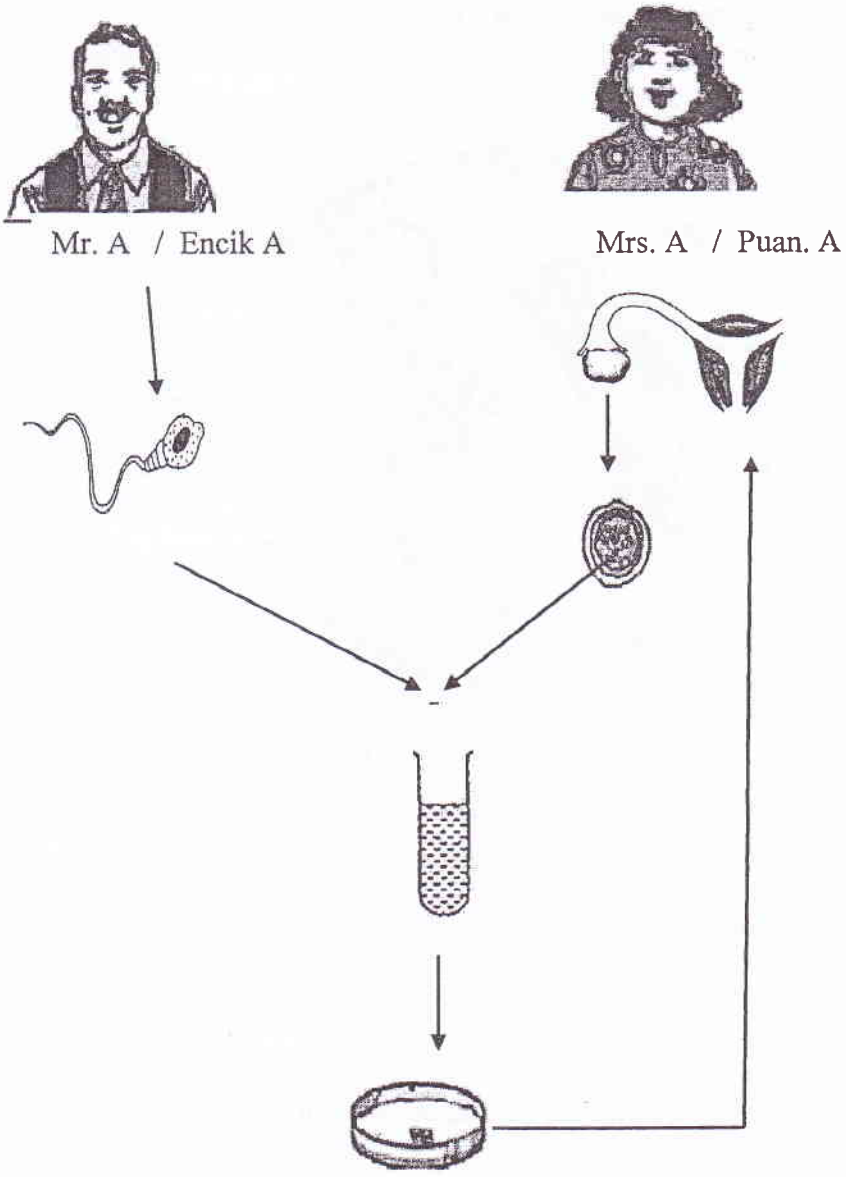


Diagram 8.3 / *Rajah 8.3*

Explain the problem faced by Mrs A and how the method shown in diagram 8.3 can be used to help the couple.

Terangkan masalah yang dihadapi oleh Pn A dan bagaimanakah kaedah yang ditunjukkan pada rajah 8.3 dapat membantu pasangan itu.

[8 marks / *markah*]

9 Diagram 9 shows a stage in meiosis in a reproductive organ.
Rajah 9 menunjukkan satu peringkat meiosis dalam organ pembiakan.

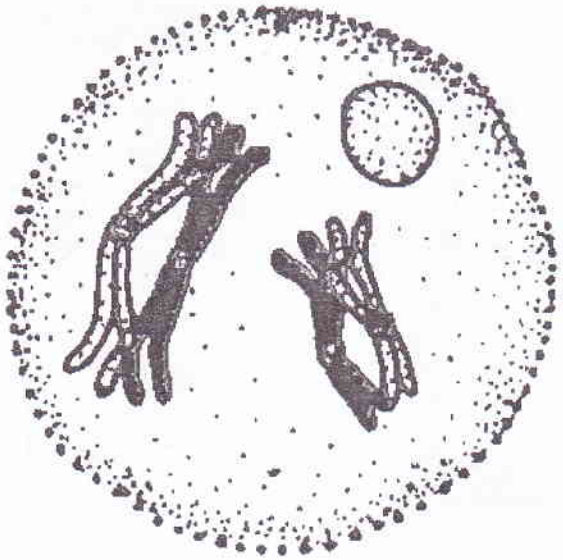


Diagram 9 / *Rajah 9*

(a) Describe the behaviour of the chromosomes during this stage that results in a new combination of genes.

Terangkan kelakuan kromosom pada peringkat ini yang menghasilkan kombinasi baru dalam gen.

[4 marks / *markah*]

(b) (i) Type of ear lobe and weight are variations seen in humans. Describe the differences between these two variations.

Jenis cuping telinga dan berat adalah variasi dalam manusia. Huraikan perbezaan antara dua variasi ini.

[4 marks / *markah*]

(ii) Explain the causes of variation in the inheritance of type of ear lobe in humans.

Jelaskan punca variasi dalam pewarisan jenis cuping telinga dalam manusia.

[6 marks */markah*]

(c)

Variation can be caused by gene or chromosomal mutation. *Variasi boleh disebabkan oleh mutasi gen atau mutasi kromosom*

Explain gene mutation.

Terangkan mutasi gen

[6 marks / *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SULIT
4551/3
Biology
Kertas 3
2011
1½ jam

Nama:.....

Kelas:.....

MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA
CAWANGAN NEGERI SEMBILAN

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2011

BIOLOGY

Paper 3

One hour thirty minutes

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis **nama** dan **kelas** anda pada ruang yang disediakan
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

Soalan	Markah Penuh	Markah Diperoleh
1	33	
2	17	
Jumlah	50	

Kertas soalan ini mengandungi 12 halaman bercetak

[Lihat halaman sebelah

Answer **all** questions.

*Jawab **semua** soalan.*

1. Diagram1 shows an experiment carried out to determine the level of pollution in water samples from different sources in a village.

Rajah 1 menunjukkan eksperimen yang dijalankan untuk menentukan tahap pencemaran sampel air dari sumber-sumber yang berbeza di sebuah kampung.

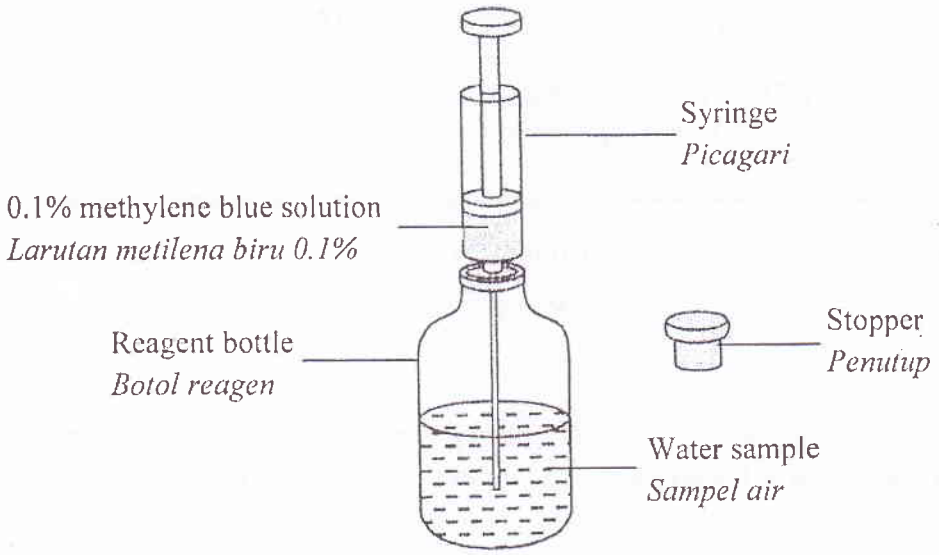


Diagram 1 / *Rajah 1*

The following steps were carried out;
Langkah-langkah berikut dijalankan;

Step 1 / *Langkah 1*

Water samples from five different sources were collected in five reagent bottles as follows;
Sampel air dari lima sumber berbeza dikumpulkan di dalam lima botol reagen seperti berikut;

Reagent bottle *Botol reagen*	Source of water sample *Sumber sampel air*
A	Well water / Air perigi
B	River water / Air sungai
C	Pond water / Air kolam
D	Drain water / Air longkang
E	Lake water / Air tasik

Step 2 / *Langkah 2*

1 ml of 0.1 % methylene blue solution was added to each water sample using a syringe.
1 ml larutan metilena biru 0.1% ditambahkan ke dalam setiap sampel air dengan menggunakan picagari.

Step 3 / *Langkah 3*

The reagent bottles were closed and kept in a dark cupboard. The time taken for methylene blue solution to decolourise was recorded.
Botol reagen ditutup dan diletakkan ke dalam almari gelap. Masa yang diambil untuk larutan metilena biru luntur direkod.

Diagram 2 shows the time at the beginning of the experiment.
Rajah 2 menunjukkan masa pada permulaan eksperimen.

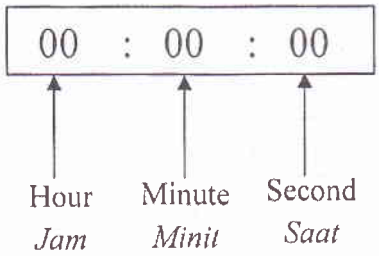


Diagram 2 / *Rajah 2*

Table 1 shows the results of this experiment.
Jadual 1 menunjukkan keputusan eksperimen ini.

Reagent bottle *Botol reagen*	Stopwatch reading *Bacaan jam randik*	Time taken for methylene blue solution to decolourise (hour) *Masa yang diambil untuk larutan metilena biru luntur (jam)*
A	04 : 00 : 00	
B	00 : 30 : 00	
C	03 : 00 : 00	
D	02 : 00 : 00	
E	01 : 00 : 00	

Table 1 / *Jadual 1*

[Lihat halaman sebelah

(a) Record the time taken for methylene blue solution to decolourise in the spaces provided in Table 1.
Rekod masa yang diambil untuk warna larutan metilena biru luntur dalam ruang yang disediakan dalam Jadual 1.

[3 marks /*markah*]

1(a) 3

(b) (i) State **two** different observations made from Table 1.
*Nyatakan **dua** pemerhatian yang berbeza yang dibuat daripada Jadual 1.*

Observation 1 / *Pemerhatian 1 :*

.....

.....

Observation 2 / *Pemerhatian 2 :*

.....

.....

[3 marks / *markah*]

1 (b)(i) 3

(ii) State the inferences from the observations in 1 (b) (i).
Nyatakan inferens daripada pemerhatian di 1(b) (i).

Inference from observation 1 / *Inferens daripada pemerhatian 1 :*

.....

.....

Inference from observation 2 / *Inferens daripada pemerhatian 2 :*

.....

.....

[3 marks / *markah*]

1(b)(ii) 3

(c) Complete Table 2 based on this experiment.
Lengkapkan Jadual 2 berdasarkan eksperimen ini.

Variable *Pembolehubah*	Method to handle the variable *Cara mengendali pembolehubah*
Manipulated variable *Pembolehubah dimanipulasikan*	....
Responding variable *Pembolehubah bergerak balas*	....
Constant variable *Pembolehubah dimalarkan*	....

1(c) 3

Table 2 / *Jadual 2*

[3 marks/ *markah*]

(d) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

1(d) 3

.....

.....

.....

[3 marks / *markah*]

(e)(i) Construct a table and record all the data collected in this experiment.
Bina satu jadual dan rekod semua data yang dikumpul dalam eksperimen ini.

Your table should have the following titles:
Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- Source of water sample
  Sumber sampel air
- Time taken for the methylene blue solution to decolourise
  Masa yang diambil untuk larutan metilena biru luntur
- Level of water pollution using the scale 1 (least polluted) to 5 (most polluted)
  Tahap pencemaran air menggunakan skala 1(paling kurang tercemar) hingga 5 (paling tercemar)

[3 marks/ *markah*]

1(e)(i) 3

(ii) Use the graph paper on page 10 to answer this question.

Using the data in 1 (e)(i), draw a bar chart to show the relationship between the level of water pollution and the source of water samples.

Guna kertas graf yang disediakan di halaman 10 untuk menjawab soalan ini.

Menggunakan data di 1(e) (i), lukis satu carta bar untuk menunjukkan hubungan antara tahap pencemaran air dengan sumber sampel air.

[3 marks/ *markah*]

1(e)(ii) 3

(f) Explain the relationship between the time taken for decolourisation of methylene blue solution with the level of pollution of the water samples.
Terangkan hubungan antara masa yang diambil untuk larutan metilena biru luntur dengan tahap pencemaran sampel air.

1 (f)

3

.....

.....

.....

[3 marks/ *markah*]

(g) State the operational definition for water pollution.
Nyatakan definisi secara operasi bagi pencemaran air.

1 (g)

3

.....

.....

.....

[3 marks / *markah*]

(h) If the experiment is repeated on a water sample near an animal farm, predict the time taken for the decolourisation of methylene blue solution. Explain your prediction.
Jika eksperimen ini diulangi ke atas sampel air berhampiran ladang ternakan haiwan, ramalkan masa yang diambil untuk warna larutan metilena biru luntur. Terangkan ramalan anda.

1 (h)

3

.....

.....

.....

[3 marks / *markah*]

i) Complete Table 3 based on the material and apparatus in Diagram 1 and Diagram 2.
Lengkapkan Jadual 3 berdasarkan bahan dan radas dalam Rajah 1 dan Rajah 2.

Materials *Bahan*	**Apparatus** *Radas*

Table 3 / *Jadual 3*

[3 marks /*markah*]

1(i)

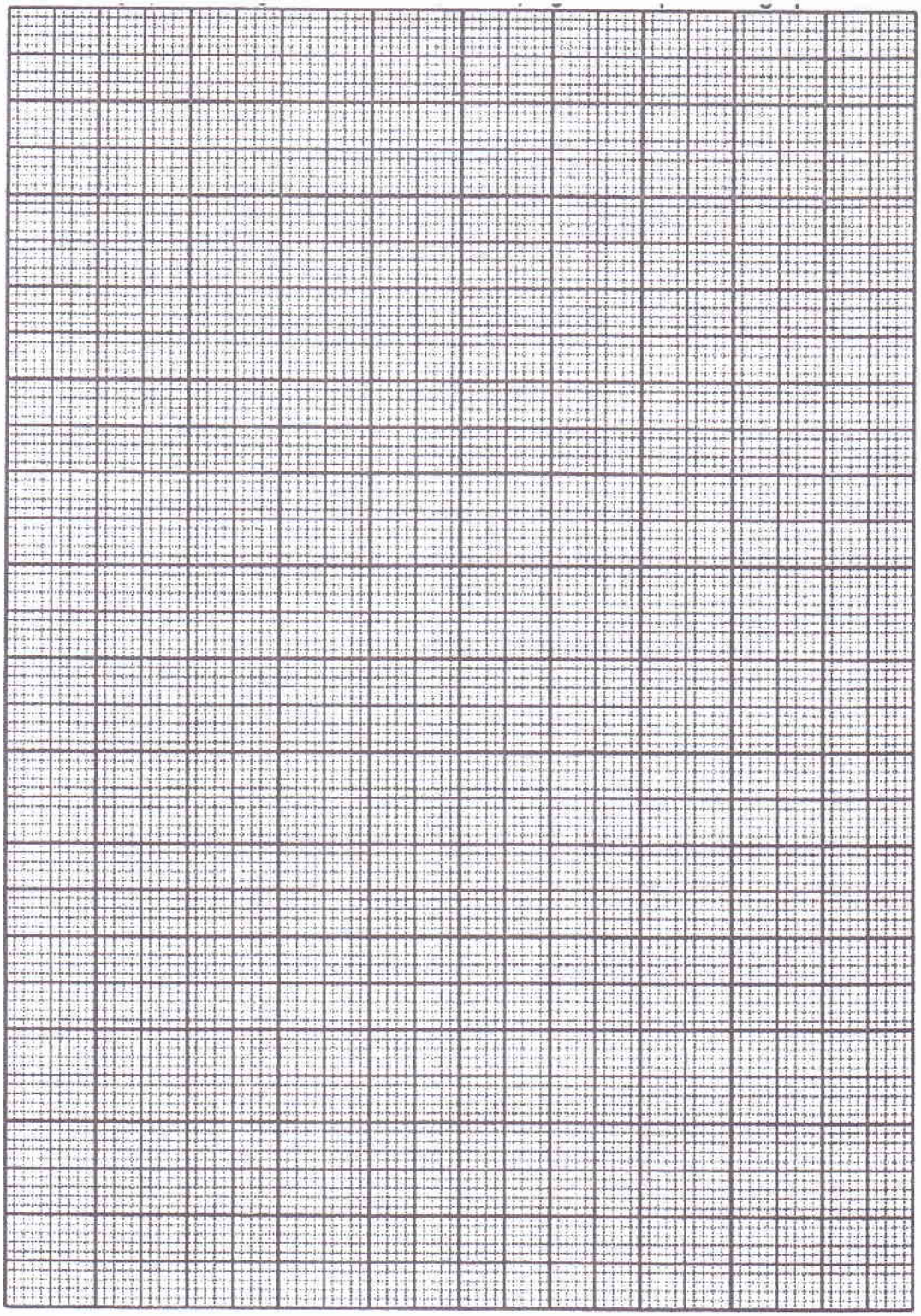
3

Total 1

33

Bar chart of level of water pollution against the source of water samples

Carta bar tahap pencemaran air melawan sumber sampel air



2.

Transpiration is the loss of water vapour from plants, especially in leaves. Transpiration occurs mostly through stomata. The amount of water lost by a plant depends on the number of leaves, light intensity, temperature, humidity and wind speed.

Transpirasi ialah kehilangan wap air dari tumbuhan, terutamanya melalui daun. Transpirasi berlaku terutamanya melalui stomata. Jumlah air yang hilang dari tumbuhan bergantung kepada bilangan daun, keamatan cahaya, suhu, kelembapan udara dan kelajuan angin.

Based on the information, plan a laboratory experiment to investigate the effect of the number of leaves on the rate of transpiration in a hibiscus plant.
Berdasarkan maklumat ini, rancang satu eksperimen dalam makmal untuk mengkaji kesan bilangan daun ke atas kadar transpirasi suatu pokok bunga raya.

The planning of your experiment must include the following aspects:
Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

- Problem statement
  Pernyataan masalah
- Hypothesis
  Hipotesis
- Variables
  Pembolehubah
- List of apparatus and materials
  Senarai radas dan bahan
- Experimental procedure
  Prosedur eksperimen
- Presentation of data
  Persembahan data

[17 marks / *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA
CAWANGAN NEGERI SEMBILAN

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2011

BIOLOGY

SKEMA PEMARKAHAN

MARKING SCHEMES BIOLOGY 2011

BIOLOGY PAPER 1

BIOLOGY PAPER 2

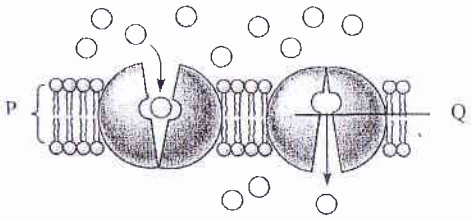
BIOLOGY PAPER 3

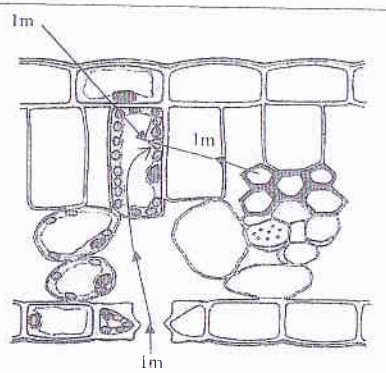
PAPER ONE

No	Answer
1	A
2	A
3	D
4	C
5	C
6	B
7	B
8	A
9	B
10	D
11	B
12	C
13	D
14	A
15	D
16	C
17	B
18	B
19	D
20	C
21	D
22	B
23	A
24	B
25	C

No	Answer
26	A
27	B
28	C
29	B
30	B
31	D
32	D
33	A
34	A
35	A
36	B
37	D
38	D
39	A
40	D
41	D
42	A
43	B
44	C
45	D
46	B
47	C
48	A
49	C
50	C

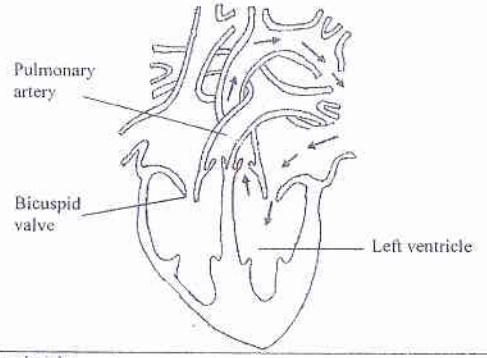
PAPER TWO

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
1(a)		1 1	2	Reject: Arrow to one layer only for P
(b)	It is a membrane that allows only certain substances to move freely across it while others cannot	1	1	
(c)	• Facilitated diffusion • Simple diffusion / osmosis	1 1	2	Reject: Passive transport
(d) (i)	S1: Amino acid binds to a specific site on the carrier protein S2: Carrier protein changes its shape and releases the amino acid on the other side S3: The movement of amino acid is down / follow the concentration gradient	1 1 1	2	Any 2
(d) (ii)	P1: Fatty acid /glycerol /vitamin A / D / E / K , steroids S1: Small, non polar E1: They are lipid soluble/can move through the phospholipid bilayer P2: Water, carbon dioxide and oxygen S2: small uncharged molecules E2: They are lipid soluble /can move through the phospholipid bilayer	1 1 1 1 1 1	3	Choose either (P1)+(S1) +(E1) or (P2) +(S2) + (E2) Each set 3 marks
(e)	P: The addition of preservatives such as concentrated salt / sugar solution makes the surrounding solution hypertonic to the cell sap of the cucumber. S1: Causing water to diffuse out from the cucumber cells by osmosis S2: The dehydrated condition of the cucumber prevent the growth of bacteria and fungi S3: Causes water to diffuse out of the bacteria / fungi S4: Bacteria / fungi dehydrates and dies	1 1 1	3	P + S1 + S2 Or P + S3 + S4
	TOTAL	13		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
2 (a)	R = palisade mesophyll Y = chloroplast	1 1	2	Do not accept : R = Mesophyll Y = chlorophyll
(b)	 • Arrow from atmosphere above upper epidermis to Y for light • Arrow from any xylem vessel to Y for water • Arrow from atmosphere through stoma to Y for carbon dioxide	 1 1 1	3	Correct arrow direction from source of raw material to Y or any chloroplast = 1m
(c)	**Structure P :** • In P (granum), light energy is absorbed /captured by chlorophyll and converted to chemical energy / ATP • Water molecules are split into ions H^+ and OH^-/ Photolysis of water occurs **Structure Q :** • In Q (stroma), hydrogen atoms combine with carbon dioxide/ fix CO_2 to form glucose (dark reaction occurs)./ reduction of CO_2 into glucose	1 1 1	3	Do not accept 'photolysis' only.
(d)	Water + carbon dioxide $\xrightarrow[\text{chlorophyll}]{\text{light}}$ glucose + oxygen OR $6H_2O + 6CO_2 \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$	1 1	1	If chemical equation, it must be balanced.
(e)(i)	E1 Provides food to human beings / animals // E2 Provides oxygen in the atmosphere / Removes CO_2 from the atmosphere // Helps maintain percentage of CO_2 / O_2 in the atmosphere	1 1	1	
(ii)	F1 Particles / dust accumulate on the leaf surface and covers the stomata E1 Reduces intake of CO_2 // Less CO_2 is absorbed from atmosphere E2 Cuts / reduces light intensity (that reaches the leaves)	1 1 1	2	F with any E
	TOTAL	12		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
3 a (i)	Alveolus / Alveoli	1	1	
a (ii)	To get oxygen for (cellular) respiration To get rid of / excrete the carbon dioxide from the cell	1	1	Any one
a(iii)	F1 The alveolus has a network of blood capillaries E1 to transport more oxygen to all part of the body F2 The alveolus has a moist surface E2 to dissolve respiratory gases / oxygen / carbon dioxide F3 has a large number of alveoli E3 to increase surface area for diffusion of oxygen /carbon dioxide / respiratory gases F4 Alveolus has a very thin / one cell thick membrane E4 to allow the diffusion of oxygen / carbon dioxide /respiratory gases faster / easily	1 1 1 1	2	F and E = 1 Choose any two F and E Reject : thin membrane only
b	P1 Partial pressure of oxygen in alveolus is higher than the partial pressure of oxygen in the blood capillaries //oxygen concentration is higher in alveolus than in the blood capillaries P2 Oxygen diffuses from alveolus into the blood capillaries OR P3 Partial pressure of carbon dioxide in alveolus is lower than the partial pressure of carbon dioxide in the blood capillaries //carbon dioxide concentration is lower in alveolus than in the blood capillaries P4 Carbon dioxide diffuses into the alveolus from the blood capillaries	1 1 1 1	2	P1 + P2 OR P3 + P4
c	P1 CO has higher affinity to bind with haemoglobin than with oxygen // CO reduce the ability of haemoglobin to combine with oxygen P2 The body cells lack oxygen // Less oxygen is transported to the body cells	1 1	2	
d	P1 Anaerobic respiration occur in the absence of oxygen whereas aerobic respiration occur in the presence of oxygen P2 Anaerobic respiration produce less energy whereas aerobic respiration produce more energy P3 The oxidation of glucose in anaerobic respiration is incomplete whereas the oxidation of glucose in aerobic respiration is complete P4 Anaerobic respiration produce lactic acid and energy whereas aerobic respiration produce carbon dioxide, water and energy	1 1 1 1	2	(Any two)
e	F1 Cigarette smoke contain tar E1 causes lung cancer F2 Cigarette smoke contain acidic gases E2 that corrode the lung			F and E = 1m (Any two F and E)

	F3 Cigarette smoke contain nicotine E3 causes addiction to smoking F4 Cigarette smoke produce heat E4 dries up the mucus /moisture in the alveolus		2	
	TOTAL	12		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
4(a) (i)		2	2	3 √ = 2 m 2 √ = 1 m 1 √ = 0 m
(a) (ii)	Showing the correct arrows	1	1	
(b)(i)	the walls of left ventricle is thicker than the right ventricle.	1	1	
(b)(ii)	(the wall of left ventricle is thicker and more muscular) ◦ to withstand the high pressure ◦ to pump blood out of the heart to all parts of the body.	1 1	2	
(c)	the cardiac muscle is myogenic./ It contracts and relaxes by themselves.	1	1	
(d)	F1- less nerve impulses are generated from SA node to the walls of the atria. E1- contraction of the atria are weakened causing less blood to enter the ventricles F2- less nerve impulses are sent to the AV node. E2- thus contraction of ventricles are weaker causing less blood to be pumped out of the heart.	1 1 1 1	4	
	TOTAL	11		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
5a(i)	- A gene carried on the X chromosome	1	1	
(ii)	- P's mother is a carrier carrying one recessive allele for colour blindness and one dominant allele for normal vision // P's mother : X^BX^b - P's father is normal carrying one dominant allele for normal vision in his X chromosome and none in his Y chromosome // P's father : X^BY - P received the X chromosome carrying the resesive allel from the mother and a Y chromosome from the father (causing him to be colour blind.) // P is X^bY	1 1 1	3	
b (i)	Mother Father Parent (X^BX^B) X (X^bY) Gamete: (X^B) (X^b) (Y) Offspring Genotype: (X^BX^b) (X^BY) Offspring phenotype: Carrier female, Normal male	1 1 1 1	4	Both parents' genotype must be correct. All gametes must be correct.
(ii)	S R Key : X^B – Normal X^b – colour blind	1	1	
c	Colour blind male : 25% Female carriers of colour blindness : 25%	1 1	2	
d	autosome	1	1	
	TOTAL	**12**		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
6(a)	• DNA in the nucleus contains genetic information to synyhesize enzymes /protein. • RNA copies the information from the DNA for use in enzyme/ protein synthesis • Ribosomes synthesise proteins / polypeptides • The synthesized proteins are transported through the spaces in the RER • Proteins are transported by transport vesicles to the Golgi apparatus • Here the proteins are modified into enzymes. • The enzymes are transported to the plasma membrane by secretory vesicles to be released outside the cell.	1 1 1 1 1 1 1	6 max	Any 6

(b)	• Molecule X is a polysaccharide /cellulose which consist of many monosaccharides /glucose • The monosaccharides /glucose are joined together by condensation to form long chains of polymers • Molecule Y is a polypeptide (which consist of many amino acids) • Molecule Y is broken down by hydrolysis.	1 1 1 1	4	Reject starch /glycogen
(c)	• X-pepsin , Y- salivary amylase , Z- Trypsin • Each enzyme functions actively at its optimum pH • The enzyme salivary amylase functions optimally at pH 7/ neutral • The optimum pH for pepsin is pH 2 / acidic • trypsin is pH 8.5 / alkaline • The changes in pH will cause changes in the concentration of hydrogen ions(H^+) and hydroxyl ions(OH^-) • The excess hydrogen ions or hydroxyl ions destabilise enzymes by changing the charges of the active site. • Charges on the substrate (surface area) are also changed • Hence the enzyme-substrate complex cannot be formed / the substrate cannot enter / fit into the active site • The effects of pH changes on enzyme activity are reversible • An enzyme which is inactive in high pH medium will become active again when it is at its optimum pH	1 1 1 1 1 1 1 1 1 1 1	max 10	
	TOTAL	**20**		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
7(a)	Able to explain the assimilation of digested food ie. glucose , amino acids and lipids **Sample answer** Glucose P1 : Excess glucose in the blood is converted to glycogen and stored in the liver P2 : When glucose level in the blood is low, glycogen is converted to glucose in the liver P3 : Excess glucose is converted to lipids by the liver P4 : In the body cells , glucose is oxidized to release energy in cellular respiration Amino acids P5 : Amino acids is used to synthesise protein in the liver. P6 : Excess amino acids undergo deamination to produce urea in the liver. P7 : Urea is then eliminated by the kidney P8 : Amino acid is used to synthesise enzymes /antibodies / hormones/new protoplasm/ repair damaged tissues in body cells Lipids P9 . Excess lipids is stored in adipose tissues P10 : Phospholipids and cholesterol make up the plasma membrane.	1 1 1 1 1 1 1 1 1 1	10	

7 (b)(i)	Able to calculate the energy value taken daily **Sample Answer** Total energy value is 5250+1500+2400+2400+750+2500+400+600=15800KJ		2	Working =1m Answer with unit = 1m
7(b)(ii)	Able to state whether the menu is a balanced diet and explain P1 : No/The menu is not a balanced diet E1: The menu does not contain the 7 classes of food in the appropriate ratio // The menu is highly rich in carbohydrates and fats // no vegetables and lack vitamins // Higher energy intake compared to energy requirement for a girl aged 15	1 1	2	
7(b)(iii)	Able to explain the consequences when taking the menu daily for a long time to her health. **Sample Answer** **F1 : Constipation** E1 : Her menu lacks fiber/roughage so her faeces moves too slowly through the colon **F2: Scurvy** E2 : lack of vitamin C //any other vitamins deficiency with explanation **F3 : Obesity** E3 : High intake of roasted chicken/ grilled mutton/chocolate / chips increase the amount of fat stored in the body . **F4 : Diabetes mellitus** E4 ; excess of carbohydrate in rice/ chips/ potatoes / chocolates increase the amount of glucose in blood when digested **F5 : Arteriosclerosis / Artherosclerosis** E5 : Roasted chicken/ grilled mutton / chips contain cholesterol which are deposited in the (lumen of) blood vessels. **F6 : Heart attack** E6 : Roasted chicken/ grilled mutton/ chips contain cholesterol which are deposited in the coronary artery //cause blockage in the coronary artery. **F7 : High blood pressure** E7 : Narrowing of the artery causes the heart to pump with higher pressure	1 1 1 1 1 1 1	6 max	F+E = 1mark (Any other suitable diseases with explanation)
	TOTAL	**20**		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
8a	P1 Ovulation releases a secondary oocyte , which enters the fallopian tube/ oviduct. P2 The nuclei of a sperm cell (n) and the ovum (n) fuse and form a diploid zygote (2n). // A sperm fertilises the ovum to form a zygote. P3 Fertilisation occurs P4 The zygote begins to divide repeatedly by mitosis (as it travels along the fallopian tube towards the uterus) to form a morula P5 The division continues to form a blastocyst / blastula P6 Implantation occur (The blastocyst attaches itself to the endometrium)	1 1 1 1 1 1	6	
8b	Able to explain the formation of Siamese twin **Sample answer** F: Siamese twins P1:One sperm fertilises one ovum P2:to produce one/single zygote P3:zygote undergoes mitosis repeatedly to form an embryo P4:the embryo divides incompletely to form two embryos P5:the embryos develop to form two individuals P6:that are joined at certain parts of the body P7 :both babies/individuals are genetically identical	1 1 1 1 1 1 1 1	6 max	Reject :Identical twins Any 6
8 (c)	P1 - Blocked Fallopian tubes P2 - sperm cannot reach the ovum for fertilisation . P3- This method is known as in-vitro fertilisation (IVF) P4 – (A laparoscope is inserted at the navel to collect) the immature ova from the ovaries are collected P5- The ova are placed in a culture medium to mature P6 – Sperms are collected and placed in the culture medium P7 – Fertilisation occurs in the culture medium // Fertilisation occur outside the body. P8- The embryos are then transferred into the uterus for implantation P9- The embryo undergo normal development in the uterus of Mrs. A (as normal pregnancy.)	1 1 1 1 1 1 1 1 1	8 max	
	TOTAL	20		

ITEM NO	SCORING CRITERIA	MARKS		REMARKS
9 (a)	Able to describe the behaviour of chromosome during prophase I. P1: Homologous chromosomes (comes together to) form pairs of **bivalent** P2: through (a process of) **synapsis** P3: Non sister chromatids of the homologous chromosomes **exchange genetic material/DNA segments** P4: through **crossing over**	1 1 1 1	4	
(b)(i)	Able to describe the differences between the variation in type of ear-lobe and weight in humans P1: It is **continuous** variation / It is a **discontinuous** variation P2: It exhibits **phenotypes with range /intermediate characteristics** / It exhibits a **few distinctive phenotypes** / with no intermediate characteristics P3: The phenotype is **influenced by the environment/** nutrition /exercise / The phenotype is **not influenced by the environment/** nutrition / exercise P4: It is controlled by **two or more genes /many pairs of alleles** / It is controlled by **one gene/ a pair of alleles.** P5: The(frequency) graph shows a **normal distribution** / The(frequency) graph shows a **discrete distribution**	1 1 1 1 1	4 Max	
(b)(ii)	Able to explain the causes of variation in ear lobe type. P1: During gametogenesis /formation of gamete P2: crossing over in prophase I E2; where exchange of genetic material/DNA segment between non-sister chromatids of the homologous chromosomes occur. P3: Independent assortment in metaphase I E3: where the random arrangement of homologous chromosomes in the metaphase plate/cell equator occur P4: (The separation of each homologous pair)results in production of gametes of different combination. E4: Random fertilisation of any male and female gamete/Any male gamete can fertilise any of the female gamete	1 1 1 1 1 1 1	6 Max	

(c)	F1: Gene mutation involves a change in: the structure of the genes / the base sequence in DNA F2 : Gene mutation may involve deletion / insertion / substitution F3 : In deletion a base in the DNA sequence is deleted / (accept diagram) E3 : causing many changes in the type of amino acids in the protein produced. F4 : In insertion, an extra base is inserted in the DNA sequence (accept diagram) E4: causing many changes in the type of amino acids in the protein produced F5 : In substitution, a base in the DNA sequence is substituted for another base (accept diagram) E5 : causing one of the amino acids in the protein sequence to change. F6 : Types of gene mutation include albinism, haemophilia and sickle cell anaemia	1 1 1 1 1 1 1	6	F+ E = 1m if E is given in scheme
	TOTAL	20		

PAPER 3

Question 1

1 (a) KB063 - Measuring and using number

Score	Criteria	Remarks
3	All data is correct. Reagent bottle: A 4.0; B 0.5; C 3.0; D 2.0; E 1.0	
2	3 – 4 data correct	
1	1-2 data correct	
0	No response// wrong response	

1 (b) (i) KB0601 – Observation

Score	Criteria	Remarks / Criteria
3	**Able to state any two observations correctly //** **Fulfill all criteria :** 1. In water sample B / river water, the time taken for the methylene blue solution to decolourise is thirty minutes/ half an hour/ 0.5 hour / the shortest 2. In water sample A / well water, the time taken For the menthylene blue to decolourise is 4 hours /the longest.	• Water sample (mv) • Time taken for metylene blue solution to decolourise (rv) • Value (time)
2	**Able to state any one observation correctly // state any two observations but inaccurate,** 1. In water sample B/ river water, the time taken for the methylene blue to decolourise is **shorter.** 2. In water sample A / well water, the time for the methylene blue to decolourise is **longer.**	Any two criteria only
1	**Able to state ideas of observation** 1. Methylene blue is decolourised in water samples. 2. In different water samples, time taken for the methylene blue to decolourise is different	Only one criteria / idea only
0	No response / wrong response	

1(b) (ii) KB0604 – Making inference

Score	Criteria	Remarks
3	**Able to state any two inferences correctly.** 1. Water sample contains the least dissolved oxygen / is the most polluted 2. Water sample contains the most dissolved oxygen / is the least polluted	
2	**Able to state any one inference correctly // state any two inferences but inaccurate.** 1. Water sample contains less dissolved oxygen / is more polluted 2. Water samples contains more dissolved oxygen / less polluted	
1	**Able to state ideas of inference.** 1. The water samples are polluted.	
0	No response / wrong response// only one idea	

1 (c) KB0610 - Controlling variables

Score	Criteria	Remarks
	Suggested answer / How to operate variables: **Manipulated variable:** Source of water sample/ Water samples — **Method of changing the manipulated variable:** Use different (sources of) water samples which are river water, well water, pond water, drain water and lake water. **Responding variable:** Time taken for the methylene blue solution to decolourise — **Determine what to observe in the responding variable:** Measure and record the time taken for the methylene blue solution to decolourise using a stopwatch **Constant variable :** Volume of methylene blue solution / concentration of methylene blue solution — **Method to fix the constant variable:** Fix / Maintain the volume of methylene blue solution at 1 ml using a syringe/ concentration of methylene blue solution at 0.1%	- verb - mv - verb - rv - apparatus - verb(fix) - cv - value
3	5-6 correct	
2	3-4 correct	
1	1-2 correct	
0	No response // wrong response	

1 (d) KB0611 – Stating the hypothesis

Score	Criteria	Remarks
3	**Able to state the hypothesis correctly.** 1) Time taken for the methylene blue solution to decolourise is the shortest for river water/ 2) River water is the most polluted of the samples of water collected/ 3) River water is the most polluted followed by lake water, drain water, pond water and well water.	Criteria • rv • mv • relationship between mv and rv
2	**Able to state the hypothesis inaccurately.** River water is more polluted .	
1	**Able to state the idea of hypothesis.** 1) If the water sample is different, the time taken for the methylene blue solution to decolourise is different / 2) The type of water samples affect the time taken for the methylene blue solution to decolourise / 3) the shorter the time taken for the methylene blue solution to decolourise the more polluted the water sample.	No mv
0	No response / wrong response	

1(e) (i) Table

Score	Able to construct a table and record the result of the experiment with the following criteria: K1 - state all titles with units correctly K2 – transfer all data for time taken for methylene blue solution to decolourise correctly K3 – state the level of pollution correctly
3	**Water sample** / **Time taken for methylene blue solution to decolourise (hour)** / **Level of water pollution** Well water / 4.0 / 1 River water / 0.5 / 5 Pond water / 3.0 / 2 Drain water / 2.0 / 3 Lake water / 1.0 / 4
2	Able to construct a table and record any two criteria
1	Able to construct a table and record any one criteria
0	No response / wrong response

1 (e) (ii) KB0606 – Communications

Score	Criteria	Remarks
3	Bar chart : refer to page 18 **Able to construct a bar chart according to all 3 criteria.** Criteria: 1. Bar chart with uniform scale and title 2. All values correctly plotted. 3. All bars have the same width and are not joined / is not a histogram	Bar chart is drawn according to students' results in e(i), even if the answer in e(i)is wrong
2	Able to construct bar chart according to 2 criteria.	
1	Able to show an idea of constructing a bar chart.	
0	No response / wrong response	

1 (f) KB0608 – Interpretation of data

Score	Criteria	Remarks
3	**Able to interpret the data correctly with explanation and by stating all 3 criteria.** • Time taken for methylene blue solution to decolourise in well water is the longest thus the level of water pollution in well water is the lowest • Well water has the highest dissolved oxygen concentration / There is very little aerobic microorganisms in well water • BOD value in well water is the lowest **(Accept any other correct relationships)**	Criteria • Relate the time taken for methylene blue solution to decolourise with the level of water pollution • Explanation using -BOD value - dissolved oxygen concentration in water / -amount of aerobic microorganisms/
2	**Able to interpret data accurately but with no explanation** The higher the water pollution the shorter the time taken for methylene blue solution to decolourise.	
1	**Able to state the idea** Different water samples affect the BOD value	
0	No response / wrong response	

1 (g) KB0609 - Operational definition

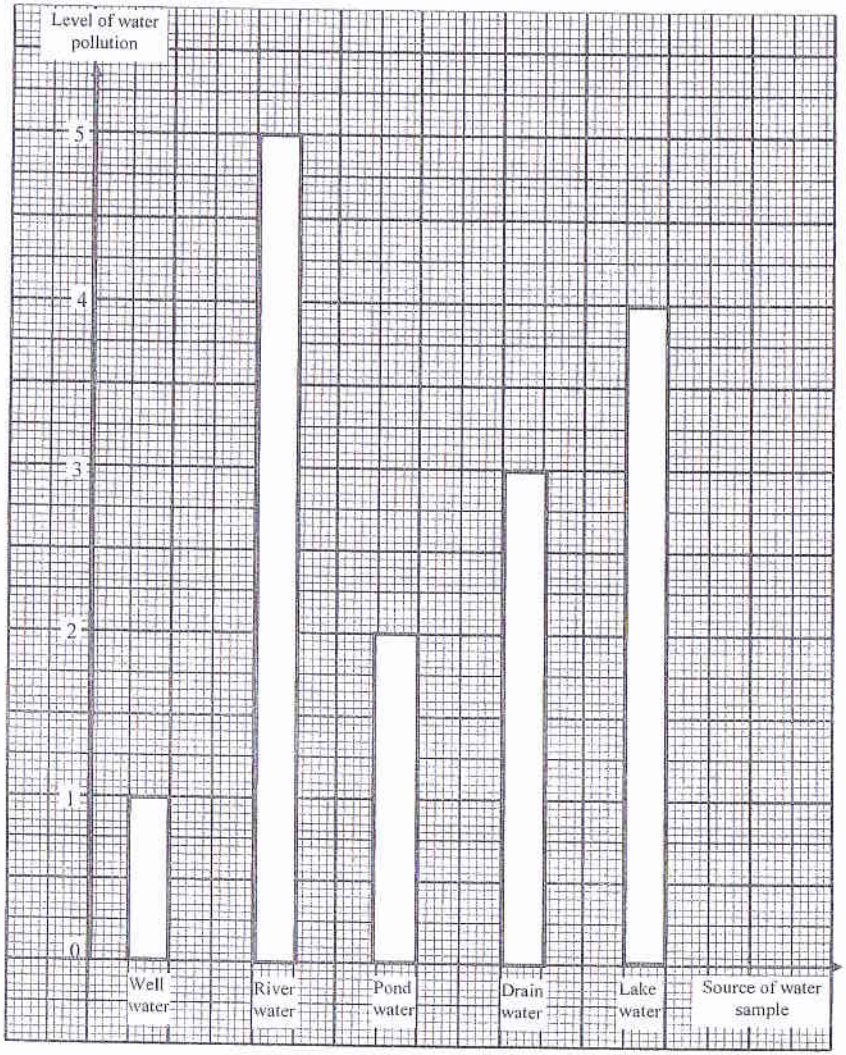
Score	Criteria	Remarks
3	**Able to state the operational definition correctly by stating all 3 criteria** • Water pollution is the change in the quality of water / the amount of dissolved oxygen / biological oxygen demand (BOD) of the water. • This is shown (in this experiment) by the time taken for the methylene blue solution to decolourise • when it is added to different water samples/ river water, well water, pond water, lake water and drain water.	• Condition of water • Measurable rv • Mv
2	**Able to state operational definition using 2 criteria.** Water pollution is the time taken for methylene blue solution to decolourise In different water samples	
1	**Able to state the idea / only one criteria** Water pollution is the change in quality of the water. Water pollution is the time taken for methylene blue solution to decolourise.	
0	No response // wrong response	

1 (h) KB0609 – Prediction

Score	Criteria	Remarks
3	**Able to predict correctly with explanation.** • The time taken for the methylene blue solution to decolourise is less than 30 minutes. • Water samples contain (high organic matter causing growth of) a lot of aerobic decomposers . • This reduces the dissolved oxygen / causes high BOD value	Prediction with value (1 mark) Explanation (2 marks)
2	**Able to state any two criteria correctly.** The time taken for the methylene blue solution to decolourise is shorter because of high levels of organic matter / a lot of aerobic bacteria/ high BOD	No value in prediction
1	**Able to state the idea** The source of water affects the time taken for the methylene blue solution to decolourise. The time taken for methylene blue solution to decolourise is less than 30 minutes	Prediction only
0	No response / wrong response	

1 (i) KB0602- Classification

Score	Criteria	Remarks
	Able to classify all materials and apparatus correctly. Materials *Bahan*: Water samples (0.1%) methylene blue solution Apparatus *Radas*: Syringe, Stopper, Reagent bottle, Stopwatch	6 √ = 3m 4-5√ = 2m 1-3√ = 1 m
0	No response // wrong response	



Question 2:

Problem Statement

Score	Criteria	Remarks
3	**Able to state the problem statement correctly with all criteria:** Sample answers: 1. Does the number of leaves affect the rate of transpiration (in hibiscus plants)? 2. What is the relationship between the number of leaves and the rate of transpiration (in a hibiscus plant) ?	Criteria • Mv • Rv • Relationship in question form with question marks
2	**Able to state the problem statement with two criteria.** Sample answers: 1. Do leaves affect the rate of transpiration (in a plant)? 2. Does the number of leaves affect the rate of transpiration. 3. What is the relationship between the number of leaves and transpiration?	
1	**Able to state the problem statement with one criteria or idea** Sample answers: 1. Do leaves affect transpiration (in a plant)? 2. Does transpiration occur through leaves (in plants)?	
0	No response / wrong response	

Hypothesis

Score	Criteria	Remarks
3	**Able to state the hypothesis correctly according to the criteria** Sample answers: 1. The more the number of leaves the higher the rate of transpiration. 2. When the number of leaves increases the rate of transpiration increases. Correct hypothesis but wrong concept based on theory: 3. The more the number of leaves the lower the rate of transpiration 4. More leaves cause the rate of transpiration to decrease.	Criteria • Mv • Rv • Relationship of mv and rv
2	**Able to state the hypothesis with two criteria** Sample answers: 1. When the number of leaves increases the transpiration increases. 2. The higher the number of leaves affect the rate of transpiration in plants. 3. The number of leaves increases the rate of transpiration in plants	1. no 'rate of' 2. No relationship for rv 3. No relationship for mv
1	**Able to state the idea of the hypothesis.** Sample answers: 1. The number of leaves affect transpiration in plants 2. The number of leaves affect the rate of transpiration in plants.	
0	No response / wrong response	

Variables:

Score	Criteria	Remarks
3	**Able to state the three variables correctly** Sample answers: Manipulated variable: Number of leaves Responding variable : Distance travelled by air bubble (in five minutes)// The rate of transpiration. Constant variable : Type of hibiscus // light intensity // surrounding temperature // wind speed // humidity/time taken for air bubble to move.	Choose any one for cv
2	Able to state any two variables correctly	
1	Able to state any one variable correctly	
0	No response / wrong response	

Materials and Apparatus

Score	Criteria	Remarks
3	Able to state all materials and apparatus Materials: ▪ Hibiscus shoot/ plant, ▪ water, ▪ plasticine, Apparatus: ○ Ruler/ weighing balance, ○ capillary tube + rubber tubing // potometer // stoppered conical flask, ○ stopwatch ○ beaker/ basin, ○ (sharp) knife, ○ string/ marker pen ○ tissue paper/ filter paper.	Functional materials are underlined
2	Able to state all functional materials (2 underlined materials and 3 underlined materials)	
1	Able to state 2 underlined materials and 2 underlined apparatus for the experiment.	
0	No response / wrong response	

Procedure:

Score	Criteria	Remarks
3	Able to state five procedures P1, P2, P3, P4 and P5 correctly. P1: How to set up the apparatus (5P1) P2: How to operate the constant variable (1P2) P3: How to operate the manipulated variable (1P3) P4: How to operate the responding variable (1P4) P5: Precaution / Accuracy (1P5)	
2	Able to state three of any procedures: 4P1 / 1P2 / 1P3 / 1P4 / 1P5 correctly	
1	Able to state two of any procedures : 4P1/ 1P2/ 1P3/ 1P4/ 1P5 correctly	
0	No response / wrong response	

Sample answer:

1.Diagram of experimental setup with at least 5 functional labels.	P1
2.Obtain a hibiscus shoot and immediately immerse in water.	P1 P5
3. By using a sharp knife, (P5) , cut (P1) off 4 cm of the hibiscus stem under water.(P1)	P1,P5
4. Fill the 'capillary tube with attached rubber tubing'/ potometer with water	P1
5.Fix the stem of the hibiscus shoot into the rubber tubing/ potometer. Make sure no air bubble is trapped.	P1 P5
6. Immerse one end of the capillary tube/ potometer in a beaker of water.	P1
7. Wipe dry the leaves with tissue paper.	P5
8. Leave the setup for 5 minutes (for the plant to adapt to the new environment).	P5
9. Lift the capillary tube from the water to trap an air bubble// Trap an air bubble in the capillary tube/ potometer.	P1
10. Tie a string on the capillary tube to mark the initial position of the air bubble.	P1
11.Start the stopwatch	P1
12.After 5 minutes(P2) tie another string to mark the final position of the air bubble and measure using a ruler	P1,P2, P4
13. Repeat step 12 to get another reading	P5
14. Calculate the average distance travelled by the air bubble in 5 minutes. Record the results in a table// Tabulate the data.	P4 P4
15. By using the same plant, repeat steps 7 to 13 by removing one leaf each time.	P2 P3
16. Calculate the rate of transpiration using the formula : $\frac{\text{distance travelled by air bubble}}{\text{5 minutes}}$	P4

Data:

Score	Criteria
2	Able to construct the correct table with titles and units based on three criteria. • Number of leaves • Distance travelled (cm)// Time taken (minute) • Rate of transpiration (cm /minute) Sample answers: Number of leaves | Distance travelled by air bubble in 5 minutes (cm): First reading, Second reading, Average | Rate of transpiration (cm/minute) Or Number of leaves | Time taken for the air bubble to travel a distance of 5 cm (minutes): First reading, Second reading, Average | Rate of transpiration (cm/minute) (First and second readings + average = 1P5 Procedure)
1	Able to construct the correct table with any two criteria.
0	No response / wrong response

Note:

1. Accept any other functional experiments.
2. Please take note that variable and data will vary according to that functional experiment.