SULIT

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA **4551/1**
EXCEL II
BIOLOGY
Kertas 1
Sept 2009

1 Jam 15 minit Satu jam lima belas minit

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1. Kertas soalan ini adalah dalam dwibahasa.
2. Soalan dalam Bahasa Inggeris mendahulu soalan yang sepadan dalam Bahasa Malaysia.
3. Calon dikehendaki membaca dengan teliti arahan di dalam kertas soalan ini.

DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED
(JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU)

1. This question paper consists of **50** questions. (*Kertas soalan ini mengandungi **50** soalan)*
2. Answer **all** questions. (*Jawab **semua** soalan)*
3. Answer each question by **blackening** the correct space on the objective sheet. *(Jawab setiap soalan dengan **menghitamkan** ruangan yang betul pada kertas jawapan).*
4. **Blacken** only one space for each question. *(**Hitamkan** satu ruangan sahaja bagi setiap soalan).*
5. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer. *(Sekiranya anda hendak menukarkan jawapan, padamkan tanda yang telah dibuat dan hitamkan jawapan yang baru)*
6. The diagram in the question provided are not drawn to scale unless stated. *(Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan).*
7. You may use a non-programmable scientific calculator. *(Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram)*

Kertas soalan ini mengandungi 30 halaman bercetak.

  [Lihat sebelah

1. Diagram 1 shows the structure of a cell.
Rajah 1 menunjukkan struktur suatu sel.

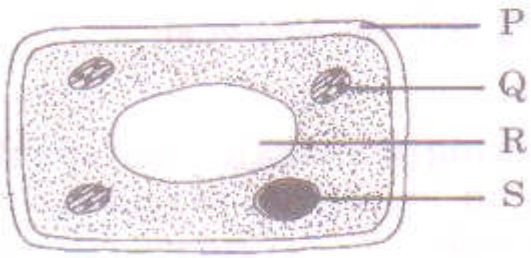


Diagram 1

Which of the organelle contains chromosomes?
Antara organel berikut yang manakah mengandungi kromosom?

A. P
B. Q
C. R
D. S

2. The following information refers to organelle Y.
Maklumat berikut berkenaan organel Y.

- Found in large number in flight muscle cells of insects and birds.
- *Terdapat dengan banyak pada sel otot serangga dan burung.*
- Functions as a site to generate energy(ATP)
- *Berfungsi sebagai tapak penjanaan tenaga (ATP)*

What is organelle Y?
Apakah organel Y?

A. Mitochondrion
M*itokondrion*
B. Golgi apparatus
Jasad Golgi
C. Ribosome
Ribosom
D. Lysosome
Lisosom

3. Holozoic nutrition is the type of nutrition in which an organism
Pemakanan holozoik adalah jenis pemakanan di mana sesuatu organisma

A. absorbs nutrients from another living organism
menyerap nutrien daripada organisma hidup yang lain
B. ingests food and digests it within the body
mengambil makanan dan mencernanya dalam badannya sendiri
C. absorbs nutrients from dead organic material
menyerap nutrien daripada bahan organik yang sudah mati
D. synthesis organic compounds using light energy
mensisntesis sebatian organik dengan mengguna tenaga cahaya

4. During vigorous exercise, what are the end products of anaerobic respiration in human muscle tissues?
Semasa senaman cergas, apakah hasilan akhir pernafasan anaerobic dalam tisu otot manusia?

A. Carbon dioxide and water
Karbon dioksida dan air
B. Ethanol and carbon dioxide
Etanol dan karbon dioksida
C. Lactic acid and energy
Asid laktik dan tenaga
D. Lactic acid and carbon dioxide
Asid laktik dan karbon dioksida

5, What are the characteristics of a climax community?
Apakah ciri-ciri suatu komuniti klimaks?

I. It takes a long time to be formed
Pembentukannya mengambil masa yang lama
II. It is stable
Ia adalah stabil
III. A drastic change in an abiotic factor can disturb its dynamic equilibrium
Perubahan drastik pada suatu faktor abiotik akan menggangu keseimbangan dinamiknya
IV. The biotic and abiotic components interact with one another in a climax community
Komponen biotik dan abiotik berinteraksi di antara satu sama lain dalam suatu komuniti klimaks

A. I, II and III only
I,II dan III sahaja
B. I,II and IV only
I, II dan IV sahaja
C. II, III and IV only
II, III dan IV sahaja
D. I, II, III and IV
I, II, III dan IV

6. Which of the following abiotic components affect the activity of microorganisms?
Manakah di antara komponen abiotik berikut akan mempengaruhi aktiviti mikroorganisma?

I. pH
pH
II. Light intensity
Keamatan cahaya
III Temperature
Suhu
IV. Availability of nutrients
Kebolehdapatan nutrien

A. II and III only
II dan III sahaja
B. I, II and IV only
I, II dan IV sahaja
C. I, III and IV only
I, III dan IV sahaja
D. I, II, III and IV
I, II, III dan IV

7. What are the effects of ultraviolet radiation?
Apakah kesan sinar ultraungu?

I. It can cause an increase in earth's temperature
Boleh menyebabkan suhu bumi meningkat
II. It leads to global warming
Bolehmenyebabkan pemanasan global
III. It can damage chlorophyll
Boleh merosakkan klorofil

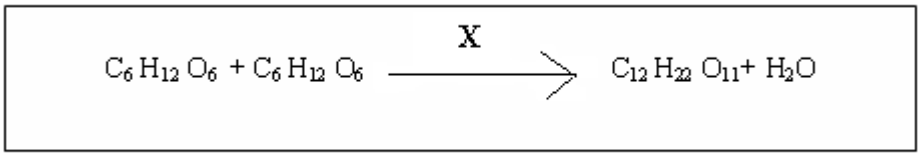
IV. It kills phytoplankton
Boleh membunuh fitoplankton

A I and II only
I dan II sahaja
B. III and IV only
III dan IV sahaja
C. I, II and III only
I,II dan III sahaja
D. II, III and IV only
II, III dan IV sahaja

8. What are the contents of carbohydrates?
Apakah kandungan karbohidrat?

A. Carbon, hydrogen, oxygen and nitrogen.
Karbon, hidrogen, oksigen dan nitrogen
B. Carbon, hydrogen and oxygen.
Karbon, hidrogen dan oksigen
C. Carbon and hydrogen.
Karbon dan hidrogen
D. Carbon and oxygen.
Karbon dan oksigen

9. The equation below shows the formation of disaccharides through the process X.
Persamaan di bawah menunjukkan pembentukkan disakarida melalui proses X..



What is the name of process X?
Apakah nama bagi proses X?

A. Hydrolysis and condensation
Hidrolisis dan kondensasi
B. Condensation
Kondensasi
C. Hydrolysis
Hidrolisis
D. Photolysis
Fotolisis

10. Which of the statement is **true** about the necessity of producing new cells in living organisms?
Antara pernyataan berikut yang manakah benar tentang kepentingan penghasilan sel baru bagi organisma hidup?

A. To replace dead and damaged cells.
Untuk menggantikan sel mati dan rosak.
B. To produce male and female gametes.
Untuk menghasilkan gamet lelaki dan perempuan.
C. To build new nerve cells in the brain.
Untuk membina sel saraf baru di dalam otak.
D. To decrease the number of cells for the growth of the organism.
Untuk mengurangkan bilangan sel bagi pertumbuhan organisma.

11. Diagram 2 shows a cross section of a part of a plant .
Rajah 2 menunjukkan keratan rentas satu bahagian pada tumbuhan .

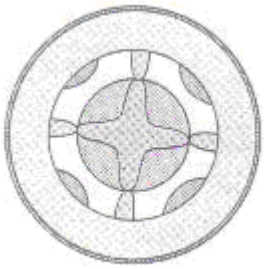


Diagram 2

This is a cross-section of a
Ini adalah keratan rentas

A. Monocotyledonous root
Akar monokotiledon
B. Monocotyledonous stem
Batang monokotiledon
C. Dicotyledonous stem
Batang dikotiledon
D. Dicotyledonous root
Akar dikotiledon

12. What is the function of pulmonary circulation?
Apakah fungsi peredaran pulmonari?

A. To deliver blood to body cells
Untuk menghantar darah ke sel-sel badan
B. To deliver blood to the lungs
Untuk menghantar darah ke peparu
C. To deliver blood to all parts of the body
Untuk menghantar darah ke semua bahagian badan
D. To deliver blood to all parts of the body except the lungs
Untuk menghantar darah ke semua bahagian badan kecuali peparu

13. What is the function of the axon of a sensory neuron?
Apakah fungsi akson neuron deria?

A. To release neurotransmitter in the synaptic cleft
Membebaskan neurotransmitter ke dalam celah sinaps
B. To carry impulse away from the cell body
Membawa impuls keluar dari badan sel
C. To speed up the conduction of impulse
Mempercepatkan penghantaran impuls
D. To carry impulse towards the cell body
Menghantar impuls ke badan sel

14. Where does spermatogenesis occur?
Di *manakah spermatogensis berlaku?*

A. Epididymis
Epididimis
B. Prostate gland
Kelenjar Prostat
C. Seminal gland
Kelenjar semen
D. Seminiferous tubules
Tubul seminiferus

15. Which of the following **cannot** be inherited?
Antara berikut yang manakah tidak akan diwarisi?

A. Colour blindness
Buta warna
B. Blood group
Kumpulan darah

C. Birth mark
Tanda lahir
D. Height.
Ketinggian

16. Diagram 3 shows the structure of a plant cell.
Rajah 3 menunjukkan struktur bagi sel tumbuhan.

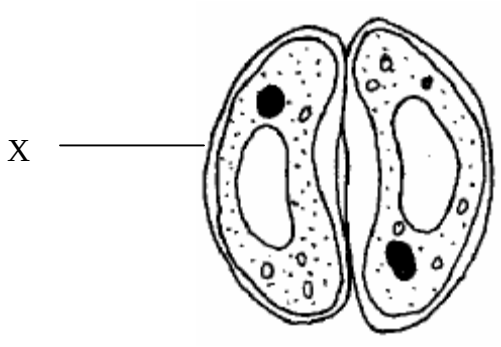


Diagram 3

What is the characteristic of structure X?
Apakah sifat bagi struktur X?

A. Fully permeable
Telap
B. Semi permeable
Separa telap
C. Elastic
Kenyal
D. Tough
Teguh

17. Which of the following is **not true** about enzymes?
Antara berikut yang manakah benar tentang enzim?

A. Enzymes are highly specific
Enzim adalah sangat specifik
B. Enzymes cannot be destroyed
Enzim tidak dapat dimusnahkan
C. Enzymes are needed in big quantities
Enzim diperlukan dalam kuantiti yang banyak.
D. Enzymes are synthesized in the ribosomes.
Enzim disintesis di dalam ribosom.

18. Diagram 4 shows a phase of mitotic division.
Rajah 4 menunjukkan satu fasa pembahagian mitosis.

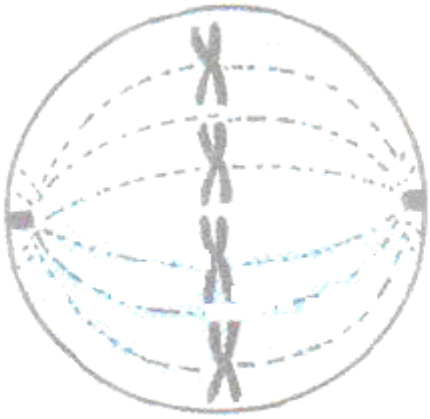


Diagram 4

What is the next stage after this phase?
Apakah peringkat seterusnya selepas fasa ini?

A. Metaphase
Metafasa
B. Telophase
Telofasa
C. Anaphase
Anafasa
D. Prophase
Profasa

19. The following incomplete equation shows the process of photosynthesis
Berikut adalah persamaan tidak lengkap yang menunjukkan proses fotosintesis

$$\text{x + water} \xrightarrow[\text{chlorophyll}]{\text{y}} \text{glucose + z}$$

x + air *klorofil* *glukosa + z*

What do x, y and z represents?
Apakah yang diwakili oleh x, y dan z?

	x	y	z
A.	Carbon dioxide *Karbon dioksida*	Oxygen *Oksigen*	Sunlight *Cahaya matahari*

B.	Carbon dioxide *Karbon dioksida*	Sunlight *Cahaya matahari*	Oxygen *Oksigen*
C.	Oxygen *Oksigen*	Carbon dioxide *Karbon dioksida*	Sunlight *Cahaya matahari*
D.	Oxygen *Oksigen*	Sunlight *Cahaya matahari*	Carbon dioxide *Karbon dioxide*

20. A plant can possibly reach the compensation point
Suatu tumbuhan mungkin mencapai takat tepu

I. When light intensity is high
Apabila keamatan cahaya adalah tinggi
II. When light intensity is low
Apabila keamatan cahaya adalah rendah
III. At night
Sewaktu malam
IV. At dusk
Sewaktu senja

A. I only
I sahaja
B. II only
II sahaja
C. II and IV only
II dan IV sahaja
D. III and IV only
III dan IV sahaja

21.

- Green in colour
Berwarna hijau
- Grow on other plants for support
Tumbuh pada tumbuhan-tumbuhan lain untuk mendapatkan sokongan
- Have roots systems with many ants and organic matter
Mempunyai sistem akar yang mempunyai bahan organik serta didiami oleh semut

The above information refers to
Maklumat di atas merujuk kepada

I. Epiphytes
Epifit

II Producers
Pengeluar

III Saprophytes
Saprofit

IV Autotrophs
Autotrof

A. I and II only
I dan II sahaja

B. II and IV only
II dan IV sahaja

C. I, II and IV only
I, II dan IV sahaja

D. II, III and IV only
II, III dan IV sahaja

22. Diagram 5 shows a natural phenomenon
Rajah5 menunjukkan suatu fenomena semula jadi

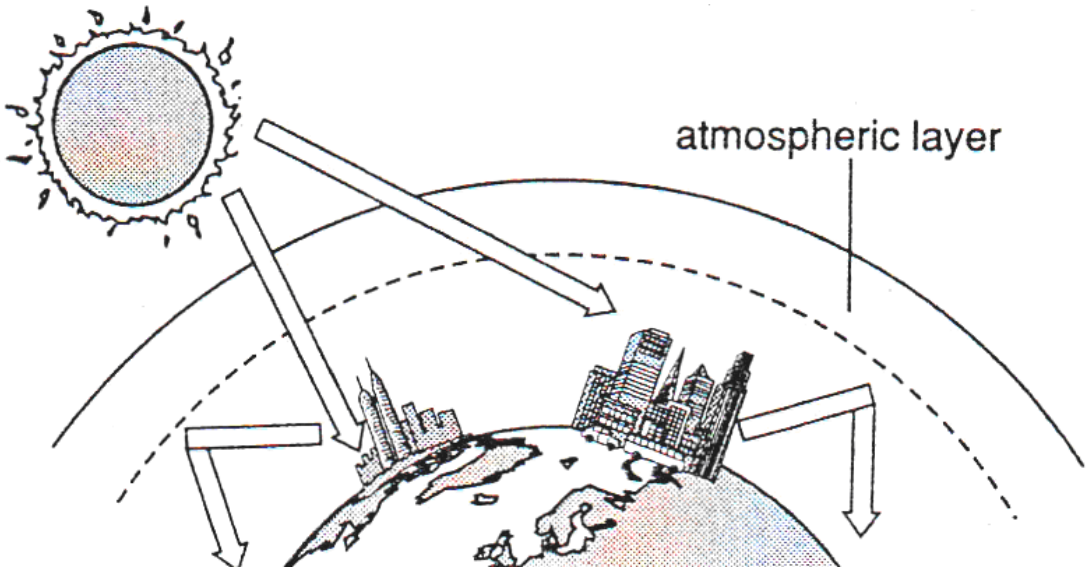


Diagram 5

Which of the following will cause the same effect as the phenomenon shown in the diagram?
Manakah di antara berikut akan menyebabkan kesan yang sama seperti fenomena yang ditunjukkan dalam rajah itu?

A. Soil erosion
Hakisan tanah
B. Oil spill in the area
Tumpahan minyak di kawasan itu
C. Excessive use of chemical fertilizer
Penggunaan baja kimia berlebihan
D. Increased use of motor vehicles on the road
Peningkatan dalam penggunaan kenderaan bermotor di jalan raya

23. Diagram 6 shows the female reproductive system.
Rajah 6 menunjukkan sistem pembiakan perempuan.

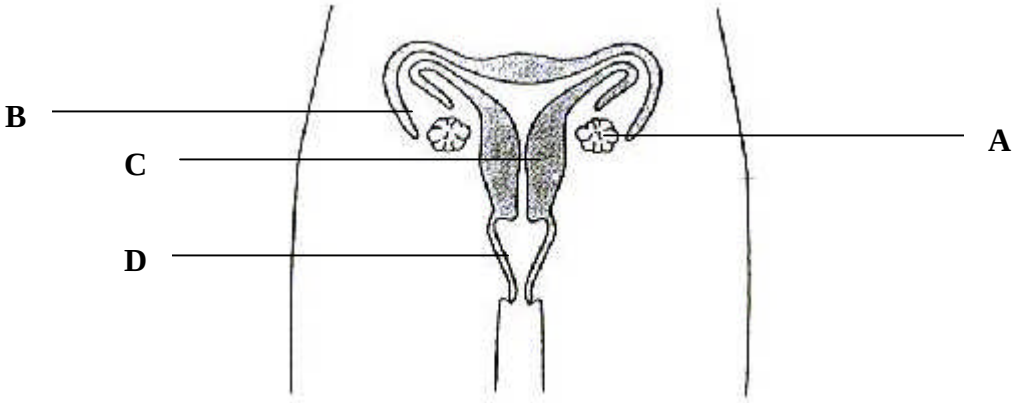


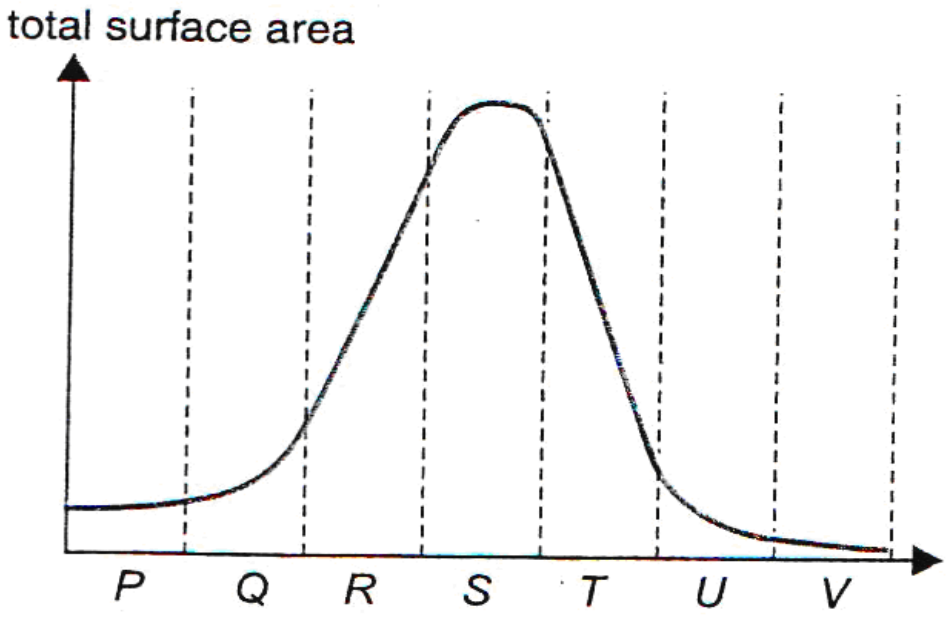
Diagram 6

From the diagram, where does implantation occurs?
Daripada rajah, di manakah penempelan berlaku?

24. Which of the following is found in an ovum?
Manakah antara berikut terdapat di dalam ovum?

A. 23 autosomes only
23 autosom sahaja
B. 22 autosomes and 1 X chromosomes
22 autosom dan 1 *kromosom X*
C. 23 autosomes and 1 Y chromosomes
23 autosom dan 1 kromosom Y
D. 22 autosomes and XY chromosomes
22 autosom dan kromsom XY

25. The graph shows the total surface area of different types of blood vessels in the human circulatory system
Graf menunjukkan jumlah luas permukaan pelbagai jenis salur darah dalam sistem peredaran manusia



What is blood vessel S and the importance of having a large surface area?
Apakah salur darah S dan kepentingan mempunyai jumlah luas permukaan yang besar?

Blood Vessel *(Salur darah)*	Importance (Kepentingan)
A. Arteriole *Arteriol*	Control blood flow *Mengawal aliran darah*
B. Vein *Vena*	To return blood to the heart *Untuk mengembalikan darah ke jantung*
C. Aorta *Aorta*	Carries the blood under high pressure *Mengangkut darah di bawah tekanan tinggi*
D. Blood capillary *Kapilari darah*	Increases the absorption rate of substances *Meningkatkan kadar penyerapan bahan-bahan*

26. Diagram 7 shows the shape of the red blood cell after being immersed into a solution for 15 minutes.
Rajah 7 menunjukkan bentuk bagi sel darah merah selepas direndam di dalam larutan selama 15 minit.

Diagram 7

What is the type of solution?
Apakah jenis larutan?

A. Hypotonic solution
Larutan hipotonik
B. Hypertonic solution
Larutan hipertonik
C. Haemolysis
Hemolisis
D. Plasmolysis
Plasmolisis

27. Diagram 8 shows the condition of a plant after being given some fertilizer.
Rajah 8 menunjukkan keadaan pokok selepas diberi baja.

Diagram 8

Which of the following, explain the phenomena.?
Antara berikut yang manakah menerangkan tentang fenomena tersebut.?

A. Water diffuses from the soil into the cell sap by osmosis.
Air meresap daripada tanah ke dalam sap sel melalui osmosis.

B. The plant loses water and this causes the cells to become deplasmolysed
Tumbuhan tersebut kehilangan air dan mengakibatkan sel mengalami deplasmolisis.

C. Fertilisers dissolved in the soil water and causes it to become more concentrated and hypertonic to the cell sap of the roots.
Baja melarut ke dalam air tanah dan menyebabkannya lebih pekat dan hipertonik terhadap sap sel akar.

D. Fertilisers dissolved in the soil water and causes it to become less concentrated and hypotonic to the cell sap of the roots.
Baja melarut ke dalam air tanah dan menyebabkannya kurang pekat dan hipotonik terhadap sap sel akar.

28. The following results were obtained in an experiment to determine the concentration of vitamin C in a type of fruit juice.

Keputusan berikut diperolehi dalam suatu eksperimen untuk menentukan kepekatan kandungan vitamin C dalam sejenis jus buah

Volume of 0.1% ascorbic acid needed to decolourise 1ml of DCPIP solution
= 1.5ml
Isipadu 0.1% asid askorbik yang perlu untuk melunturkan warna 1ml larutan DCPIP = 1.5ml

Volume of fruit juice needed to decolourise 1ml of DCPIP solution
= 0.6ml
Isipadu jus buah yang perlu untuk melunturkan warna 1ml larutan DCPIP = 0.6ml

[0.1% of pure ascorbic acid contains 1mg ascorbic acid/cm^3]
[0.1% asid askorbik tulen mengandungi 1mg asid askorbik/sm^3]

What is the concentration of vitamin C in the fruit juice?
Apakah kepekatan vitamin C dalam jus buah itu?

A. 2.5mg/cm^3
2.5mg/sm^3

B. 25mg/cm^3
25mg/sm^3

C. 1.5mg/cm³
1.5mg/sm³

D. 0.6mg/cm³
0.6mg/sm³

29. Diagram 9 shows an event during meiosis.
Rajah 9 menunjukkan kejadian yang berlaku dalam meiosis.

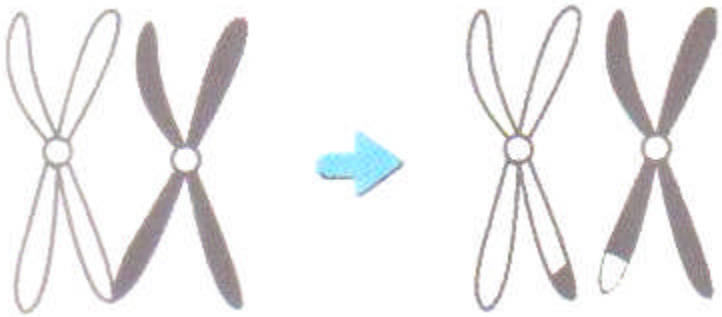


Diagram 9

Which of the statement is **not true** about the event?
Antara pernyataan berikut yang manakah tidak benar?

A. Crossing over occurs.
Pindah silang berlaku

B. It happens in Prophase I.
Berlaku pada Profasa I

C. Chromosomes replication takes place.
Penggandaan kromosom berlaku

D. Change of genetic material occurs.
Pertukaran maklumat genetik berlaku.

30. Diagram 10 shows the relationship between the lymphatic vessel, blood capillary and body cells
Rajah 10 menunjukkan perhubungan di antara salur limfa, kapilari darah dan sel-sel badan

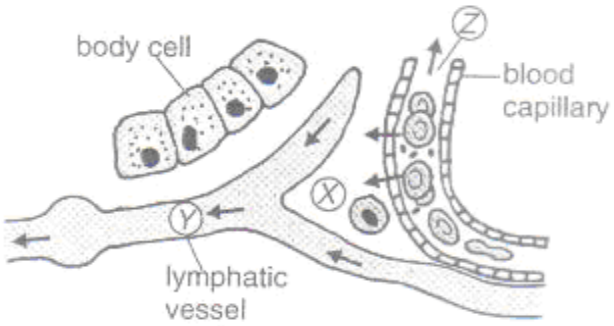


Diagram 10

Which statements are **true**?
Manakah di antara pernyataan berikut adalah benar?

I. Fluid X contain leucocytes
Bendalir X mengandungi leukosit
II. Fluid Y does not contain platelets
Bendalir Y tidak mengandungi platlet
III. Z does not contain erythrocytes
Z tidak mengandungi eritrosit
IV Fluid Y has a higher content of lymphocyte compared to fluid X
Bendalir Y mempunyai kandungan leukosit lebih tinggi berbanding bendalir X

A. I and II only
I dan II sahaja
B. II and IV only
II dan IV sahaja
C. I, II and III only
I, II dan III sahaja
D. I, II and IV only
I, II dan IV sahaja

31. Diagram 11 shows a potometer that is used to investigate the effect of air movements on the rate of transpiration in a plant.
Rajah 11 menunjukkan sebuah potometer yang digunakan untuk mengkaji kesan pergerakan udara ke atas kadar transpirasi dalam tumbuhan.

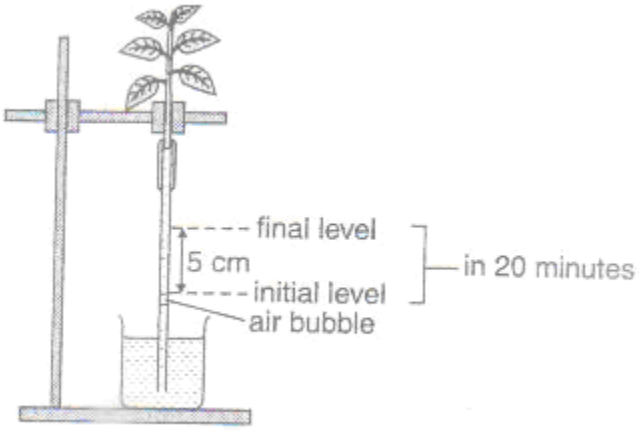


Diagram 11

If the distance travelled by the air bubble is 5.0cm after 20 minutes when a fan is switched on, predict the distance travelled by the air bubble when the fan is not switched on.
Jika jarak yang dilalui oleh gelembung udara ialah 5.0sm selepas 20 minit kipas dipasangkan, ramalkan jarak yang dilalui gelembung udara itu jika kipas tidak dipasangkan.

A. 3.8cm
B. 5.1cm
C. 5.5cm
D. 6.0cm

32.

P: Must work in pairs
Mesti bekerja secara berpasangan
Q:Produce movements by pulling on the tendons
Menghasilkan pergerakan dengan menarik pada tendon
R:Decrease in length when they contract
Memendek apabila mengecut
S:Act on bones which functions as levers
Bertindak ke atas tulang-tulang yang berfungsi sebagai tuas-tuas

From the table above, which statements are **true** about skeletal muscles?
Daripada jadual di atas, manakah ayat yang benar mengenai otot-otot rangka?

A. Q and S only
Q dan S sahaja
B. P and Q only
P dan Q sahaja
C. P, Q and R only
P, Q dan R sahaja
D. P, Q, R and S
P, Q, R dan S

33. Diagram 12 shows how glucose changes to glycogen in the human body.
Rajah 12 menunjukkan bagaimana glukosa ditukarkan kepada glikogen dalam badan manusia

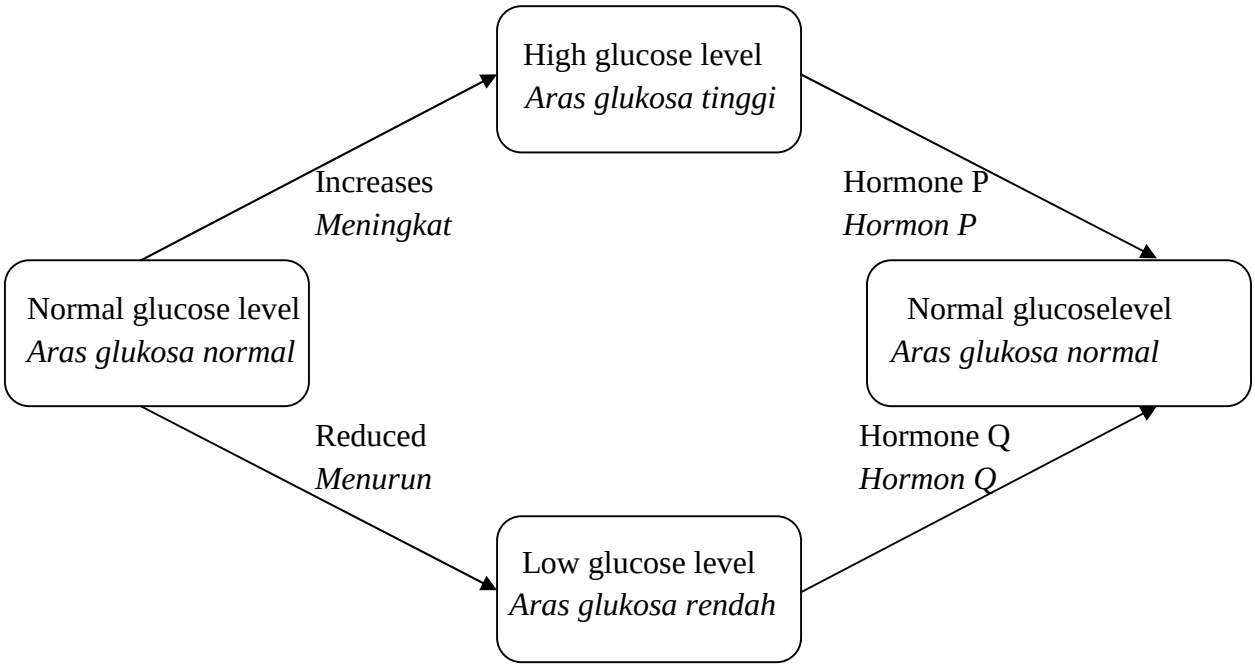


Diagram 12

Which of the followings represents hormones P and Q?
Antara yang berikut, yang manakah mewakili hormon P dan Q?

Hormone P *Hormon P*	Hormone Q *Hormon Q*
A. Insulin *Insulin*	Glucagon *Glukagon*
B. Glucagon *Glukagon*	Insulin *Insulin*
C. Adrenaline *Adrenalina*	Insulin *Insulin*
D. Thyroxine *Tiroksina*	Adrenaline *Adrenalina*

34. Gaseous exchange take place in an alveolus of the human respiratory system.
Pertukaran gas berlaku di dalam alveolus dalam sistem respirasi manusia.

What is name of the process involved?
Apakah nama proses yang terlibat?

A. Osmosis
Osmosis

B. Active transport
Pengangkutan aktif
C. Simple diffusion
Resapan ringkas
D. Facililated diffusion
Resapan berbantu

35. How can infertility in a female be overcome?
Bagaimanakah cara untuk mengatasi kemandulan pada perempuan?

I. *In vitro* fertilization
Persenyawaan In vitro
II. Artificial insemination .
Permanian Beradas
III. Using a surrogate mother
Ibu tumpang.
IV Vasectomy
Vasektomi

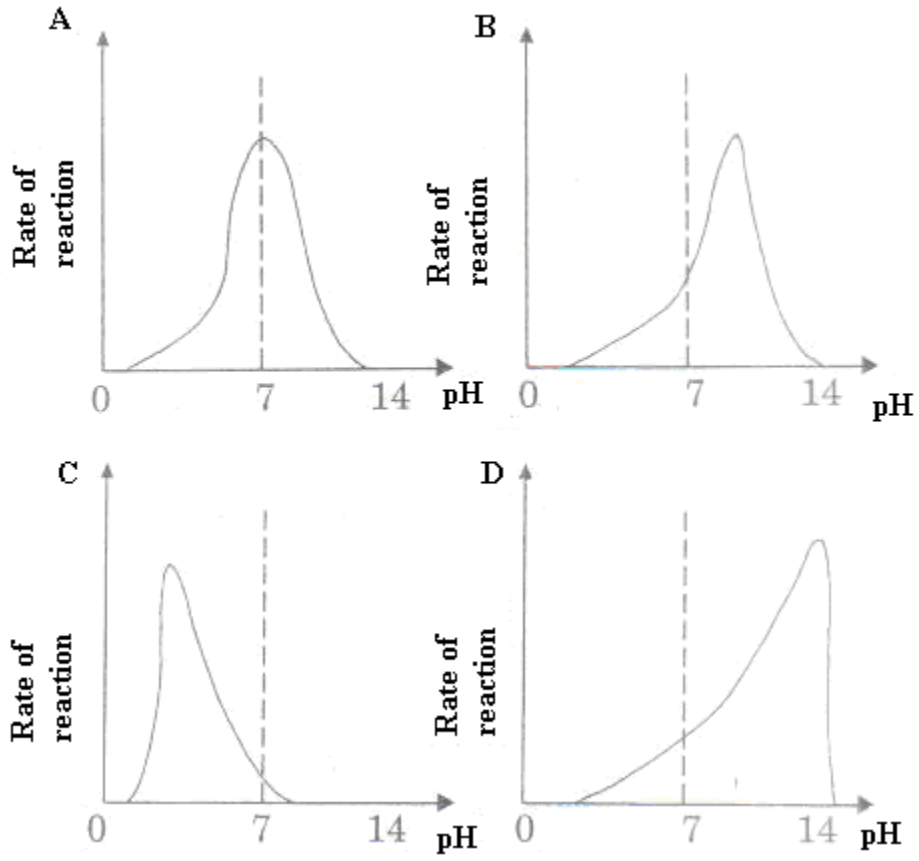
A. I and II only
I dan II sahaja
B. II and III only
II dan III sahaja
C. I , II and III only
I, III dan III sahaja
D. I, II, III and IV
I,II ,III dan IV

36. Mary has blood group AB.
Jenis darah Mary ialah AB.

What would be the possible blood group of her parents?
Apakah jenis darah yang mungkin bagi kedua-dua ibubapanya?

A. Mary's father has blood group A and Mary's mother has blood group B.
Kumpulan darah bapa Mary ialah A dan kumpulan darah ibu Mary ialah B
B. Mary's father has blood group A and Mary's mother has blood group O.
Kumpulan darah bapa Mary ialah A dan kumpulan darah ibu Mary ialah O.
C. Mary's parents are both of blood group O
Kedua-dua ibu bapa Mary mempunyai kumpulan darah O
D. Mary's parents are both of blood group B.
Kedua-dua ibu bapa Mary mempunyai kumpulan darah B.

37. Which of the following graph best represents the effect of pH on the rate of reaction of enzymes secreted by the pancreas?
Antara graf berikut, yang manakah paling sesuai untuk menunjukkan kesan pH ke atas kadar tindak balas enzim yang dirembeskan oleh pankreas?



38. Which of the following **does not** cause water pollution?
Antara berikut, yang manakah tidak akan menyebabkan pencemaran air?

A. Excess nitrates
Nitrat berlebihan
B. Carbon monoxide
Karbon monoksida
C. Sewage
Bahan kumbahan
D. Industrial waste
Sisa buangan industri

39.

- P is a tree that produces fruits
  P ialah pokok yang berbuah
- Q is a green plant that lives on the branches of P
  Q ialah tumbuhan hijau yang tinggal pada dahan pokok P

- R lives on the bark of P but it does not have green leaves nor visible roots. R feeds on the cell sap of the phloem tissue in P
  R tinggal pada kulit pokok P tetapi tidak mempunyai daun hijau mahupun akar. R mendapat makanan daripada sap sel pada tisu floem pokok P
- S lives in the soil near the roots of P and feeds on dead leaves
  S tinggal dalam tanah berhampiran akar pokok P dan mendapat makanan daripada daun-daun mati

What types of nutrition are practiced by organisms P, Q, R and S?
Apakah jenis pemakanan yang diamalkan oleh organisma P, Q, R dan S?

I. P is an autotroph
P ialah autotrof
II. Q is a parasite
Q ialah parasit
III. R is an epiphyte
R ialah epifit
IV S is a saprophyte
S ialah saprofit

A. I and III only
I dan III sahaja
B. I and IV only
I dan IV sahaja
C. II, III and IV only
II, III dan IV sahaja
D. I, II, III, IV
I, II, III, IV

40. Diagram 13 shows the structure of a nephron
Rajah 13 berikut menunjukkan suatu nefron

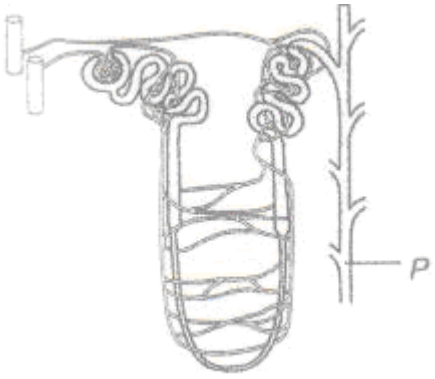


Diagram 13

Which activities cause P to become more permeable?
Aktiviti-aktiviti manakah yang akan menyebabkan P untuk menjadi lebih telap air?

I. Eating salty potato chips
Memakan kerepek kentang yang masin
II. Playing a vigorous game
Bermain permainan cergas
III. Drinking plenty of water
Meminum banyak air
IV. Sitting down to watch television
Duduk untuk menonton televisyen

A. I and II only
I dan II sahaja
B. I and III only
I dan III sahaja
C. II and III only
II dan III sahaja
D. II and IV only
II dan IVsahaja

41. Diagram 14 shows schematic hybrid of a pea plant.
Rajah 14 menunjukkan skema kacukan tumbuhan kekacang.

Parents	Tall	X	Short
Induk	*Tinggi*		*Rendah*
	↓		
F1	All tall		
	Semua tinggi		

Diagram14

The results of F1 generation is self pollinated to produce the F2 generation. Which cross would give a phenotype ratio of 3:1?
Keputusan generasi F1 telah dikacukan sesama sendiri untuk menghasilkan generasi F2. Kacukan yang manakah akan menghasilkan nisbah fenotip 3:1?

A. TT X tt
B. Tt X tt
C. TT X Tt
D. Tt X Tt

42. Diagram 15 shows a type of chromosome mutation.
Rajah 15 menunjukkan sejenis mutasi kromosom.

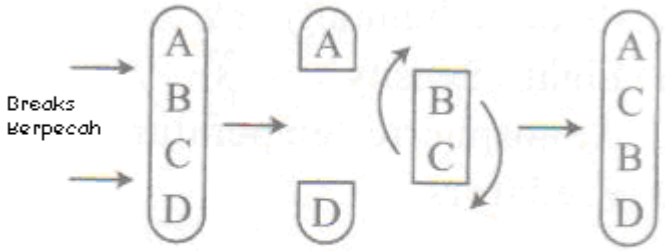


DIAGRAM 15

What is the type of chromosome mutation shown ?
Apakah jenis mutasi kromosom yang ditunjukkan ?

A. Translocation
Translokasi
B. Duplication
Penggandaan
C. Inversion
Penyongsangan
D. Deletion
Pelenyapan

43. Diagram 16 shows a plant that was left in the sun for 10 hours.
Rajah 16 menunjukkan suatu tumbuhan yang didedahkan kepada cahaya matahari selama 10 jam

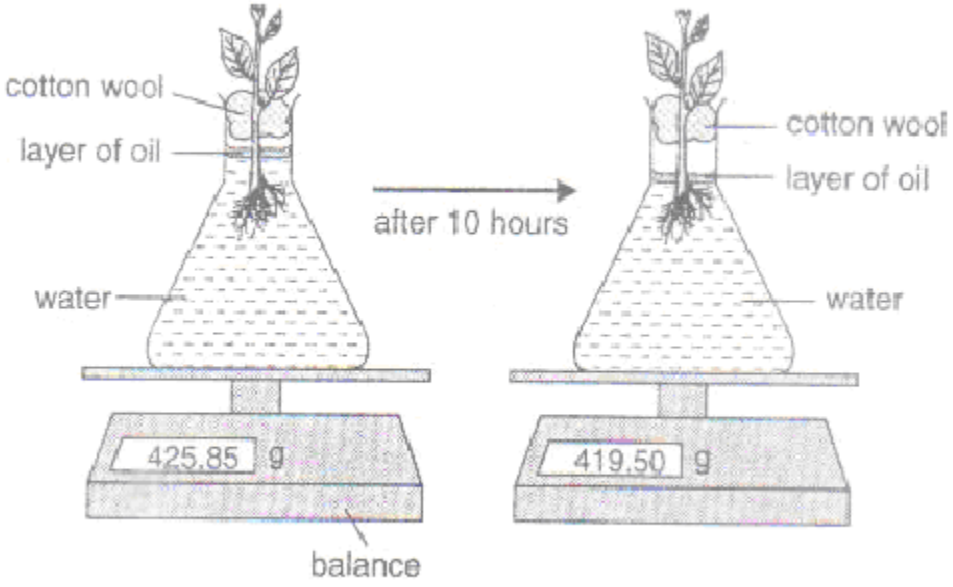


Diagram 16

Which process explains the result shown in the diagram?
Manakah proses yang menerangkan keputusan yang ditunjukkan dalam rajah itu?

A. Evaporation of water from the flask
Penyejatan air dari kelalang
B. Transpiration by the leaves of the plant
Transpirasi oleh daun tumbuhan
C. Photosynthesis by the leaves of the plant
Fotosintesis oleh daun tumbuhan
D. Absorption of water by the roots of the plants
Penyerapan air oleh akar tumbuhan

44. A teenage girl likes to eat fried food, chocolates, cakes and desserts which are high in sugar. She dislikes eating vegetables and fruits. Which of the following are the most likely effects of her diet over a long period of time?
Seorang remaja perempuan gemar memakan makanan yang digoreng, coklat, kek serta pembasuh mulut yang tinggi dalam kandungan gula. Dia tidak gemar memakan sayur-sayuran dan buah-buahan. Manakah antara berikut merupakan

kesan yang paling mungkin berlaku setelah dia mengamalkan cara pemakanan itu untuk jangka masa yang lama?

I. Diabetes
Kencing manis
II. Obesity
Kegendutan
III. Rickets
Riket
IV. Constipation
Sembelit

A. I, II and III only
I, II dan III sahaja
B. I and II only
I dan II sahaja
C. II and IV only
II dan IV sahaja
D. I, II and IV only
I, II dan IV sahaja

45. Diagram 17 shows the formation of pollen grains.
Rajah 17 menunujukkan pembentukan debunga.

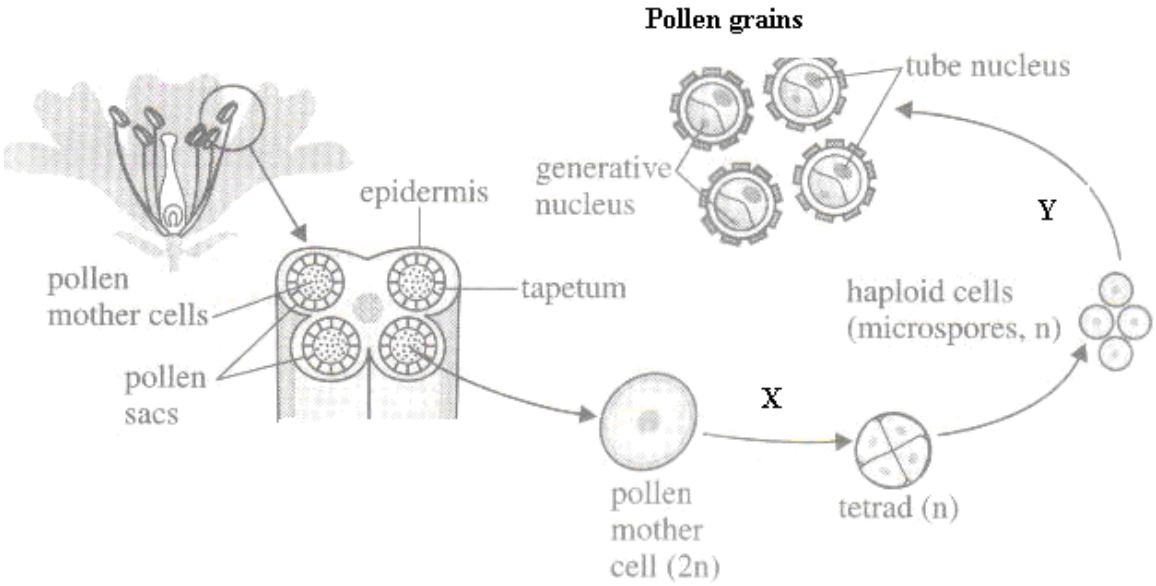


Diagram 17

What is the name of the process X and Y?
Apakah nama proses X dan Y?

	X	Y
A	Mitosis	Meiosis
B	Meiosis	Mitosis
C	Meiosis	Mitosis
D	Mitosis	Mitosis

46. Diagram 18 shows the changes in the level of hormones involved in the menstrual cycle.
Rajah 18 menunjukkan perubahan aras hormon yang terlibat dalam kitar haid.

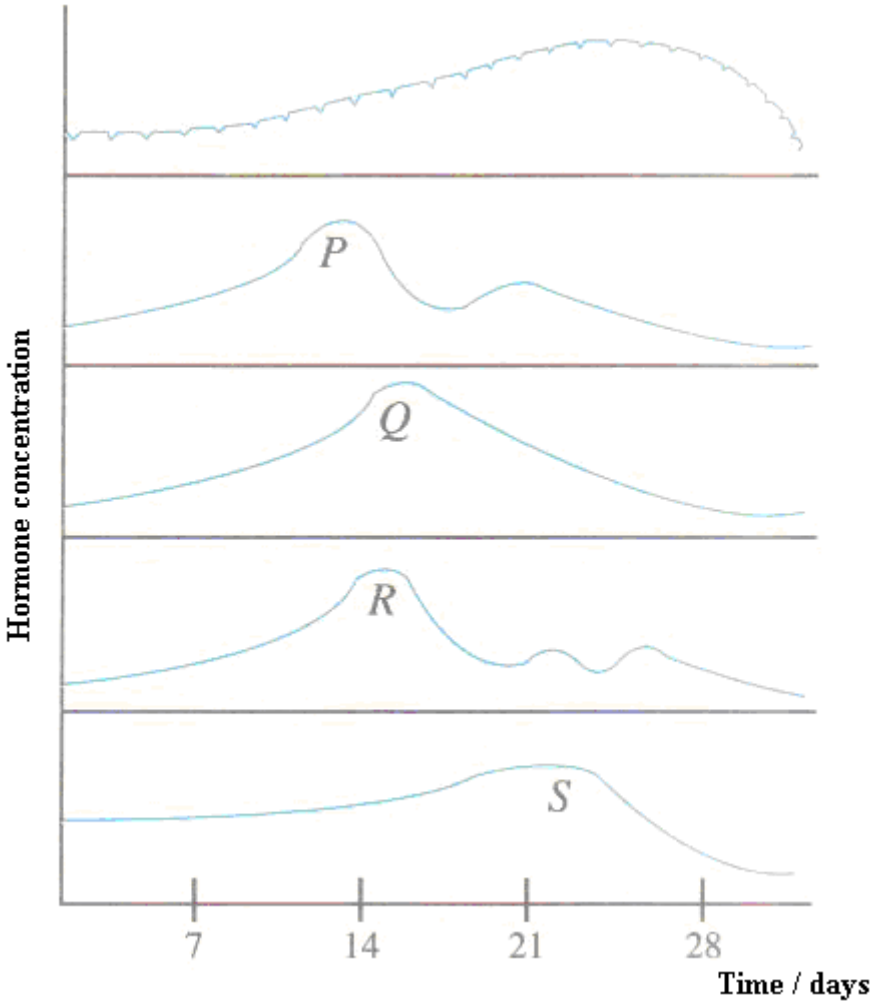


Diagram 18

Which of the following represents P, Q, R and S?
Manakah di antara berikut mewakili P, Q, P dan S?

	P	Q	R	S
A	FSH *FSH*	Progesterone *Progesteron*	Oestrogen *Estrogen*	LH *LH*
B	FSH *FSH*	LH *LH*	Progesterone *Progesteron*	Oestrogen *Estrogen*
C	Progesterone *Progesteron*	FSH *FSH*	LH *LH*	Oestrogen *Estrogen*
D	Oestrogen *Estrogen*	Progesterone *Progesteron*	LH *LH*	FSH *FSH*

47. Diagram 19 shows a setup of an experiment by a student.
Rajah 19 menunjukkan ujikaji yang djalankan oleh seorang pelajar.

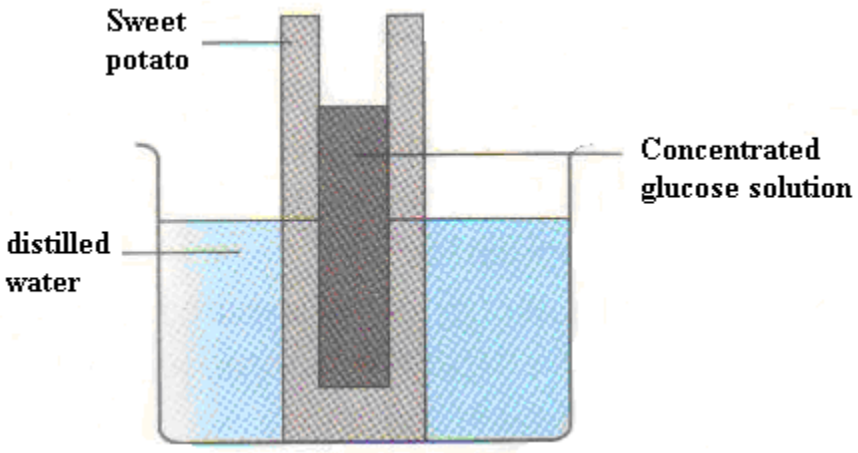


Diagram 19

After 40 minutes, the liquid level in the cavity rise. What is the best conclusion of the experiment?
Selepas 40 minit, aras cecair di dalam rongga itu meningkat. Apakah kesimpulan bagi ujikaji tersebut?

A. The cell sap of the cells in the sweet potato moved into the cavity.
Sap sel bagi ubi kentang telah bergerak ke dalam rongga
B. All the contents of the sweet potato cells moved into the cavity.
Semua kandungan sel ubi kentang telah bergerak ke dalam rongga.
C. The distilled water molecules moved out from the cavity.
Molekul air suling telah bergerak keluar daripada rongga.
D. The distilled water molecules moved into the cavity.
Molekul air suling telah bergerak ke dalam rongga .

48. How can muscle cramps be prevented?
Bagaimanakah kekejangan otot boleh dicegah?

I. By exercising regularly
Dengan sentiasa melakukan senaman
II. By warming up before performing vigorous exercise
Dengan melakukan senaman pemanasan badan sebelum melakukan senaman cergas
III. By doing muscle stretching exercise before performing vigorous exercise
Dengan melakukan senaman meregangkan otot sebelum melakukan senaman cergas
IV. By making sure the body is adequately hydrated
Dengan memastikan badan mempunyai kandungan air yang mencukupi

A. II and III only
II dan III sahaja
B. I, III and IV only
I, III dan IV sahaja
C. II, III and IV only
II, III dan IV sahaja
D. I, II, III, IV
I, II, III, IV

49. What causes the shoot of a plant to grow towards light?
Apakah yang menyebabkan pucuk tumbuhan itu tumbuh ke arah cahaya?

A. The shoot needs light to carry out photosynthesis
Pucuk memerlukan cahaya untuk menjalankan fotosintesis.
B. The shoot needs to grow longer to compete for light.
Pucuk perlu lebih panjang untuk bersaing mendapatkan cahaya.
C. The accumulation of auxin on the side of the shoot exposed to the light.
Pengumpulan auksin di sisi pucuk yang terdedah kepada cahaya.
D. The cells on the side of the shoot in the shade elongate faster than the cell on the exposed side.
Sel di sisi pucuk yang terlindung memanjang dengan lebih cepat daripada sel di sisi yang terdedah.

50. Which of the following statement is **true** about the differences between continuous variation and discontinuous variation?
Antara pernyataan berikut, yang manakah benar tentang perbezaan di antara variasi selanjar dan variasi tak selanjar?

	Continuous variation *Variasi selanjar*	Discontinuous variation *Variasi tak selanjar*
A	Influenced by environmental factors *Dipengaruhi oleh faktor persekitaran*	Not influenced by environmental factors *Tidak dipengaruhi oleh faktor persekitaran*
B	Has distinct differences *Mempunyai perbezaan ketara*	No distinct differences *Tidak mempunyai perbezaan ketara*
C	No intermediate in phenotype *Tidak mempunyai fenotip perantaraan*	Have intermediate in phenotype *Mempunyai fenotip perantaraan*
D	Can be inherited *Boleh diwarisi*	Cannot be inherited *Tidak boleh diwarisi*

SKEMA JAWAPAN Biologi Kertas 1

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

4551/2
EXCEL 2
Biology
Sept 2009
Paper 2
2½ hours

NAME :_____

CLASS :_____

BIOLOGI
Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan **No. Kad Pengenalan dan Angka Giliran** anda pada ruangan yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa*
3. *Soalan dalam B. Inggeris mendahului soalan yang sepadan dalam B. Melayu*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan samada dalam B. Inggeris atau B. Melayu*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini*

Untuk Kegunaan Pemeriksa			
Kod Pemeriksa :			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	12	
	2	12	
	3	12	
	4	12	
	5	12	
B	6	20	
	7	20	
	8	20	
	9	20	
Jumlah			

Kertas soalan ini mengandungi 19 halaman bercetak

Section A
[60 marks]

*Answer **all** questions.*

For Examiner's use

1. Diagram 1.1 shows a plant cell as seen under an electron microscope.
Rajah 1.1 menunjukkan satu sel tumbuhan yang dilihat di bawah mikroskop elektron.

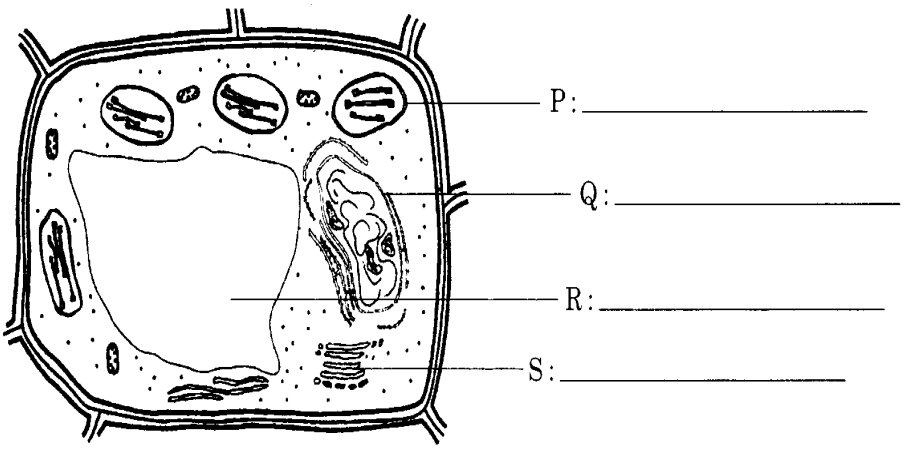


Diagram 1.1
Rajah 1.1

(a) On Diagram 1.1, label the structures P. Q, R and S.
Pada Rajah 1.1, labelkan struktur P, Q, R dan S.

P: ……

Q: ……

R: ……

S: ……

[4 marks]

1(a)

(b) State the process that occurs in organelle P.
Nyatakan process yang berlaku di dalam organel P.

……

[1 mark]

1(b)

For Examiner's use

(c) If the cell is actively involved in transporting ions and molecules, predict which organelle that can be found abundantly.
Sekiranya cell tersebut terlibat secara aktif dalam pengangkutan ion dan molekul, ramalkan organel mana yang didapati dengan banyaknya.

1(c)

……

[1 mark]

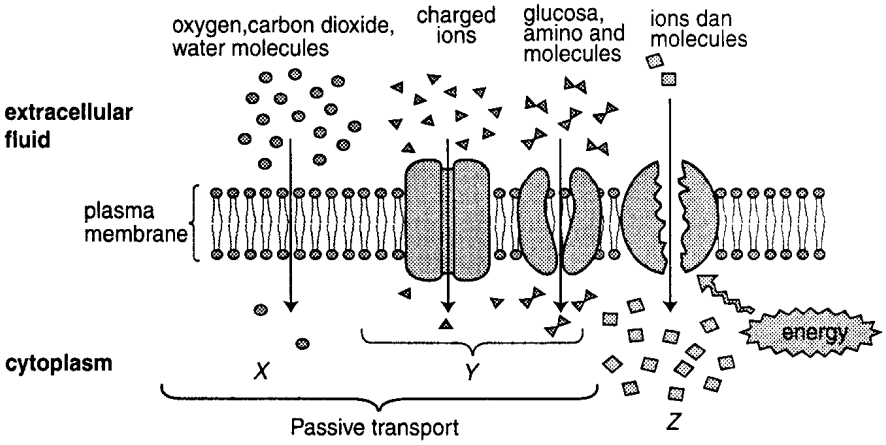


Diagram 1.2
Rajah 1.2

(d) (i) Based on Diagram 1.2, name the processes X, Y, Z that occur when the substances move across the plasma membrane.
Berdasarkan Rajah 1.2 namakan proses X, Y, Z yang berlaku apabila bahan-bahan bergerak merentasi membran plasma.

X: ……

Y: ……

Z: ……

1(d)(i)

[3 marks]

(ii) Give **ONE** similarity between process X and Y.
Berikan dua persamaan di antara process X and Y.

……

……

……

1(d)(ii)

[1 mark]

For Examiner's use

(iii) State TWO differences between process Y and Z.
Nyatakan dua perbezaan di antara proses Y dan Z.

1. ……

……

2. ……

……

[2 marks]

1(d)(iii)

For Examiner's use

2. Diagram 2.1 shows various types of polypeptides.
Rajah 2.1 menunjukkan pelbagai jenis polypeptida.

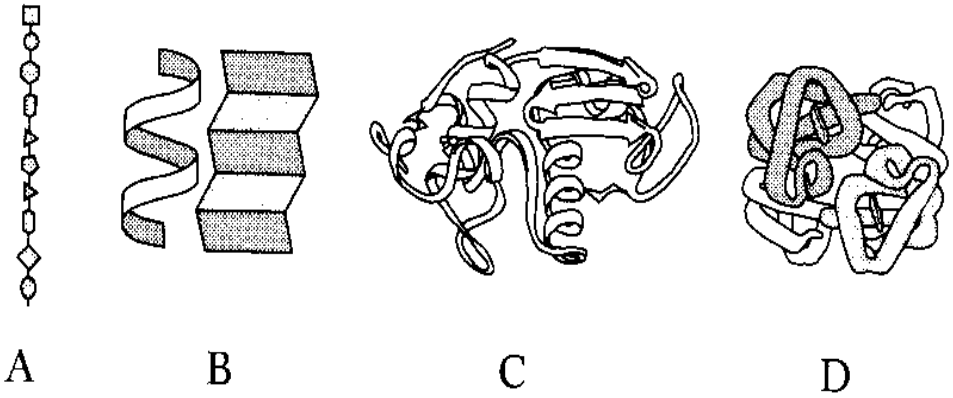


Diagram 2.1
Rajah 2.1

(a) (i) Based on Diagram 2.1, which protein structure is an enzyme?
Berdasarkan Rajah 2.1, struktur protein manakah merupakan enzim?

2(a)(i)

.....

[1 mark]

(ii) Explain how the structure of polypeptide mentioned in (a)(i) is formed.
Terangkan bagaimana struktur polipeptida yang dinyatakan dalam (a)(i) dibentuk.

……...……

2(a)(ii)

……...……

……...……

[2 marks]

(iii) State two factors that affect the rate of enzyme activity.
Nyatakan dua faktor yang mempengaruhi kadar tindakbalas enzim.

2(a)(iii)

…….

[2 marks]

For Examiner's use

(b) Diagram 2.2 shows a metabolic pathway in a human cell in which substrate A is converted to the end product D with the aid of three different enzymes. Substrate B and substrate C are intermediate products.

Rajah 2.2 menunjukkan laluan metabolik di dalam sel manusia yang mana substrat A diubah menjadi hasilan akhir D dengan bantuan tiga enzim yang berbeza. Substrat B dan substrate C merupakan substrat–substrat perantaraan.

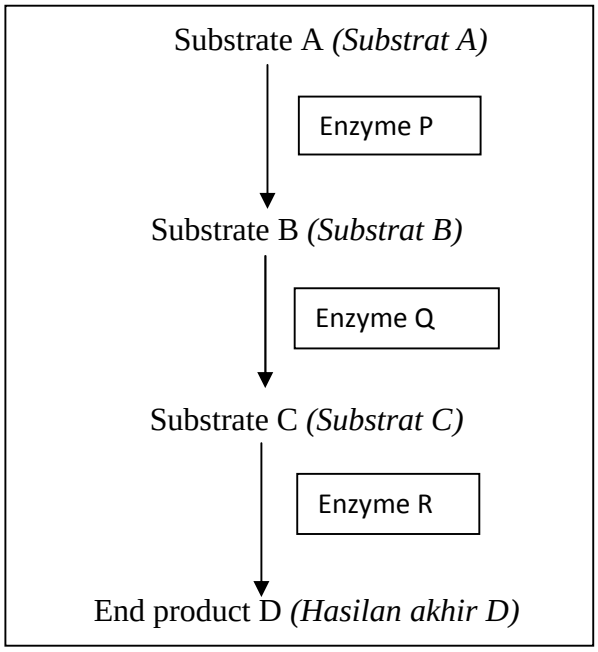


Diagram 2.2 (*Rajah 2.2)*

Explain what happens to the rate of production of the end product D if
Terangkan apa yang berlaku kepada kadar penghasilan hasilan akhir D sekiranya

(i) the concentration of substrate A increases
kepekatan substrat A meningkat

……...

……...

……...

……...

[2 marks]

2(b)(i)

For Examiner's use

(ii) the concentration of enzyme P increases, while the concentrations of enzymes Q and R remain the same
kepekatan enzim P meningkat manakala kepekatan enzim Q dan R dikekalkan sama
……..
……..

2(b)(ii)

[2 marks]

(c) Enzymes are widely used in our daily life and industries. Explain how enzymes act in helping to cook meat.
Enzim digunakan secara meluas dalam aktiviti harian dan perindustrian. Terangkan bagaimana enzim bertindak membantu semasa memasak daging.
……
……
……

2(c)

[2 marks]

(d) Amino acids can be divided into essential and non-essential amino acids. State the main difference between essential and non-essential amino acids.
Asid Amino boleh dibahgiakan kepada asid amino perlu dan asid amino tak perlu. Nyatakan perbezaan utama di antara asid amino perlu dan asid amino tak perlu.
……
……

2(d)

[1 mark]

For Examiner's use

3. Green plants synthesize their food through the process of photosynthesis. Diagram 3.1 is a schematic diagram summarising the light reaction and dark reaction in the process of photosynthesis.

Tumbuhan hijau membina makanan melalui proses fotosintesis. Rajah 3.1 menunjukkan rajah skema ringkasan tindakbalas cahaya dan tindakbalas gelap dalam proses fotosintesis.

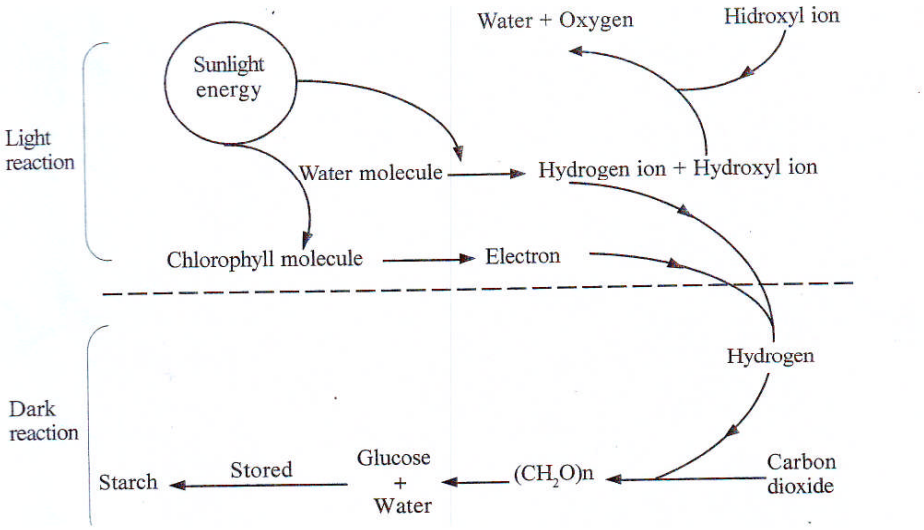


Diagram 3.1

Rajah 3.1

(a) (i) Name the organ where the reactions take place in a plant.
Namakan organ di mana tindakbalas tersebut berlaku dalam tumbuhan.

3(a)(i)

.....

[1 mark]

(ii) Where does light reaction occur in the chloroplast?
Di manakah tindakbalas cahaya berlaku di dalam kloroplas?

3(a)(ii)

.....

[1 mark]

For Examiner's use

(b) Based on the schematic diagram in Diagram 3.1, explain the function of light energy.
Berdasarkan rajah alir dalam rajah 1, terangkan fungsi tenaga cahaya.

.....
.....
.....

[2 marks]

3(b)

(c) (i) What is the end product of light reaction?
Apakah hasil akhir tindakbalas cahaya ?

.....

[1 mark]

3(c)(i)

(ii) State the importance of the substance you named in (c).
Nyatakan kepentingan bahan yang dinamakan di (c).

.....

[1 mark]

3(c)(ii)

(d) What is the role of hydrogen in dark reaction?
Apakah peranan hidrogen dalam tindakbalas gelap ?

……
……

[1 mark]

3(d)

(e) State how starch is formed from glucose?
Nyatakan bagaimanakah kanji dibentuk daripada glukosa?

…… .

[1 mark]

3(e)

(f) Write an overall equation for photosynthesis.
Tuliskan persamaan untuk proses fotosintesis.

.....
.....

[1 mark]

3 (f)

For Examiner's use

(g) Where does gaseous exchange occur in a plant ?
Di manakah pertukaran gas berlaku dalam tumbuhan ?

3 (g)

.....

[1 mark]

(h) State TWO leaf adaptations to optimise photosynthesis.
Nyatakan DUA penyesuaian daun untuk mengoptimumkan fotosintesis.

3 (h)

1. ……..
2. ……..

[2 marks]

For Examiner's use

4. Diagram 4.1 and 4.2 show TWO different types of immunity.
Rajah 2.1 dan 2.2 menunjukkan DUA jenis keimunan

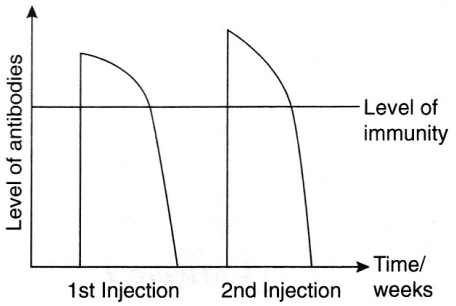


Diagram 4.1
Rajah 4.1

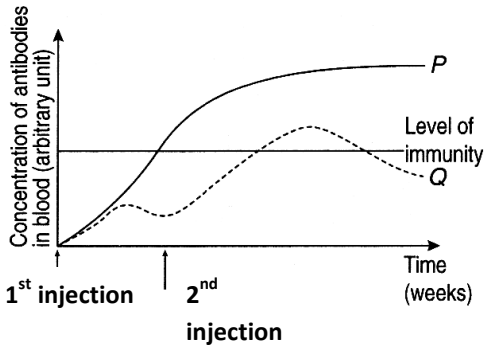


Diagram 4.2
Rajah 4.2

(a) (i) State the type of body defence mechanism involved in immunity.
Nyatakan jenis mekanisme pertahanan badan yang terlibat dalam keimunan.

4 (a) (i)

……

[1 mark]

(ii) State the substance produced by the body which can be relate to immunity.
Nyatakan bahan yang dihasilkan oleh badan yang berkaitan dengan keimunan.

4 (a) (ii)

……

[1 mark]

(b) State the type of immunity in diagram 4.1 and 4.2.
Nyatakan jenis imunity dalam rajah 4.1 dan 4.2.

4 (b)

Diagram 4.1: …….

Diagram 4.2: ……

[2 marks]

For Examiner's use

(c) (i) State the substance injected to each person ***P*** and ***Q*** based on diagram 4.2.
Nyatakan bahan yang disuntik kepada individu P dan Q dalam rajah 4.2.

4 (c) (i)

……

[1 mark]

(ii) Explain the role of the substance named in c(i).
Jelaskan peranan bahan yang dinamakan di c(i).

4 (c) (ii)

.....

.....

[2 marks]

(iii) Explain why ***Q*** had to be given the second injection of the same substance.
Terangkan mengapa individu Q harus diberi suntikan kedua bagi bahan yang sama.

……

……

……

4 (c)(iii)

[2 marks]

(d) (i) Based on diagram 4.1, state an example of substance injected to the person.
Berdasarkan rajah 4.1, nyatakan satu contoh bahan yang disuntik kepada individu tersebut.

4 (d) (i)

……

[1 mark]

(ii) Explain why the person needed to be injected with the substance named in d(i).
Terangkan mengapa individu tersebut perlu disuntik dengan bahan yang dinamakan dalam d(i).

……

……

……

4 (d) (ii)

[2 marks]

For Examiner's use

5. Diagram 5.1 shows the human female reproduction system.
Rajah 5.1 menunjukkan sistem pembiakan perempuan.

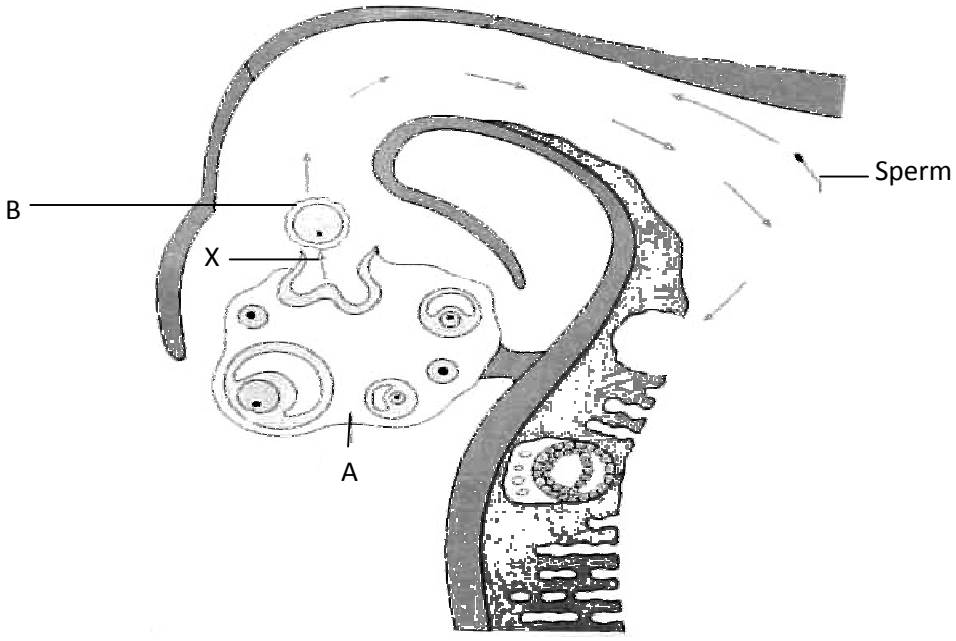


Diagram 5.1
Rajah 5.1

(a) Name structures A, B and process X
Namakan struktur A, B dan proses X.

A: …….

B: …….

X: ……....

[3 marks]

5 (a)

(b) (i) Nucleus of structure B and sperm fuse together to form structure C which will divide repeatedly. Name structure C and the type of division involved.
Nukleus struktur B dan sperma berpadu membentuk struktur C yang kemudiannya membahagi berulang kali. Namakan struktur C dan jenis pembahagian yang terlibat.

C : ……
Type of division:
Jenis pembahagian: ……..

[2 marks]

5 (b) (i)

For Examiner's use

(ii) Circle the location where fertilization occur in the diagram above.
Bulatkan kawasan di mana persenyawaan berlaku dalam gambarajah di atas

[1 mark]

5 (b) (ii)

(c) Diagram 5.2 shows the prenatal development of a human embryo after fertilization.
Rajah 5.2 menunjukkan perkembangan prenatal bagi embrio manusia selepas persenyawaan

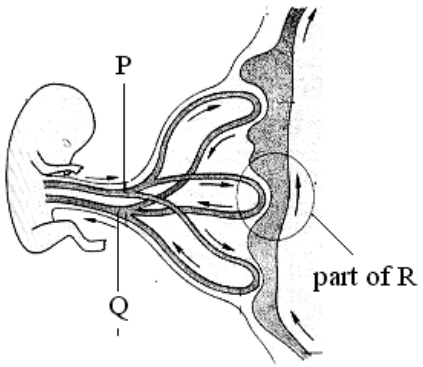


Diagram 5.2
Rajah 5.2

(i) State the functions of P and Q.
Nyatakan fungsi P dan Q.

P: ……

……

Q: ……

……

[2 marks]

5 (c) (i)

(ii) Explain the significance of the structure R in the growth of the embryo.
Jelaskan kepentingan struktur R dalam pertumbuhan embrio.

……

……

……

[2 marks]

5 (c) (ii)

For Examiner's use

(d) A mother who recently gave birth to a baby intends to space her next pregnancy. She and her husband had agreed to start family planning. Suggest two methods that they can choose.
Seorang ibu yang baru melahirkan anak ingin menjarakkan kehamilan yang seterusnya. Dia dan suaminya telah bersetuju untuk merancang keluarga. Cadangkan dua kaedah yang mereka boleh pilih.

……

……

[2 marks]

5 (d)

Section B
[40 marks]

Answer any TWO questions.

6 (a) Diagram 6.1 below shows a stage in meiosis in reproductive organ.
Rajah 6.1 di bawah menunjukkan satu peringkat meiosis dalam organ pembiakan.

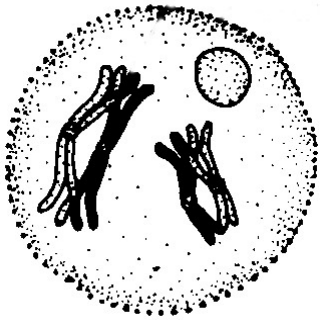


Diagram 6.1
Rajah 6.1

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]

(b) (i) Blood group and height are variations seen in human. Describe the differences between these two variations.
Kumpulan darah dan ketinggian adalah variasi dalam manusia. Huraikan perbezaan antara dua variasi ini.

[4 marks]

(ii) Explain the causes of variation in the inheritance of blood group in human.
Jelaskan punca variasi dalam pewarisan kumpulan darah manusia.

[6 marks]

(c)

A man who has blood group A and his wife who has blood group B gives birth to a child with blood group O. *Seorang lelaki dengan kumpulan darah A dan isterinya dengan kumpulan darah B melahirkan anak yang mempunyai kumpulan darah O.*

By using a schematic diagram, show how the above situation is possible.

Dengan menggunakan gambar rajah skematik, tunjukkan bagaimana situasi di atas boleh berlaku.

[6 marks]

7. (a) With the aid of a labelled diagram, explain how gaseous exchange occurs in a leaf.
Dengan bantuan gambarajah berlabel, terangkan bagaimana pertukaran gas berlaku di dalam daun.

[10 marks]

(b) Explain the human respiratory response and rate of respiration in different situations as named below.
Terangkan gerakbalas repirasi manusia dan kadar respirasi dalam situasi yang berlainan seperti dinamakan dibawah:

(i) Relaxing
Semasa berehat

(ii) At high altitudes
Semasa berada di aras yang tinggi

(iii) In fear
Semasa ketakutan

(iv) During vigorous activities.
Semasa melakukan aktiviti berat

[10 marks]

8 (a) The diagram below shows the relationship between the population of organism X and organism Y.
Rajah di bawah menunjukkan hubungan antara populasi organisma X dan Y.

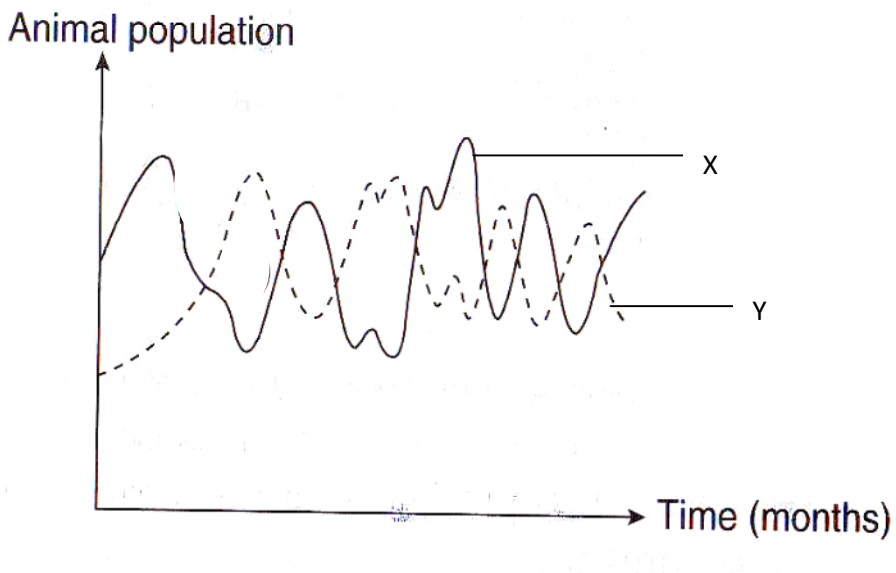


Diagram 8.1
Rajah 8.1

(i) By using a suitable example for X and Y, explain how the relationship shown above can maintain the size of a population.
Dengan menggunakan contoh yang sesuai bagi X dan Y, terangkan bagaimana hubungan di atas boleh mengekalkan saiz populasi.

[6 marks]

(ii) The relationship between X and Y can be manipulated as a biological control. State two advantages of the biological control in an ecosystem.
Perhubungan di antara X dan Y boleh dimanipulasi sebagai kawalan biologi. Nyatakan dua kelebihan menggunakan kawalan biologi di dalam suatu ekosistem.

[2 marks]

(b)

Eutrophication is a process whereby an aquatic ecosystem is enriched with nutrients.

Eutrofikasi ialah process di mana ekosistem akuatik diperkayakan dengan nutrient.

Diagram 8.2 shows the eutrophication process that occurs to a lake due to human activities.

Rajah 8.2 menunjukkan proses eutrofikasi yang berlaku di sebuah kolam akibat aktiviti manusia.

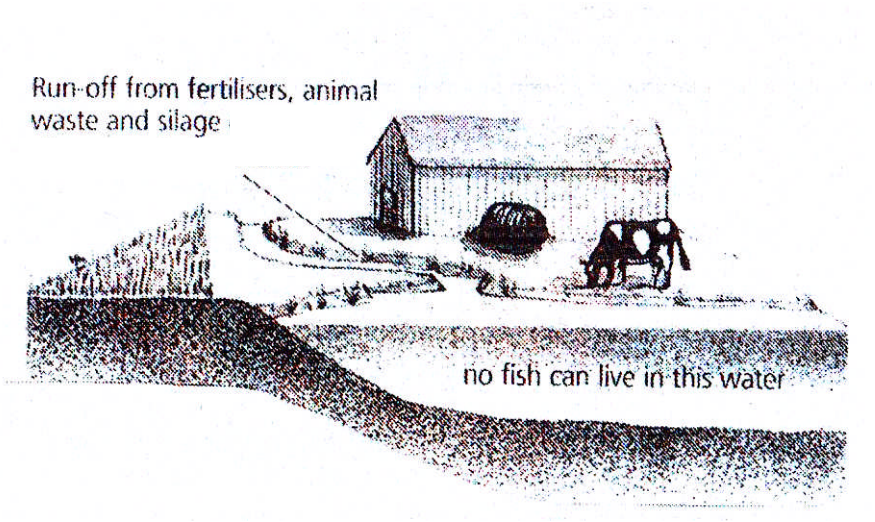


Diagram 8.2
Rajah 8.2

(i) Based on the diagram, explain how does eutrophication happen and its effect to the ecosystem.
Berdasarkan gambarajah di atas, jelaskan bagaimana eutrofikasi berlaku dan kesannya kepada ekosistem.

[9 marks]

(ii) Explain how sewage treatment and the usage of organic fertilizers instead of inorganic fertilizers can reduce water pollution.
Jelaskan bagaimana rawatan air kumbahan dan penggunaan baja organik menggantikan baja inorganik dapat mengurangkan pencemaran air.

[3 marks]

9. Diagram 9.1 shows a structure of a unit of a nephron.
Rajah 9.1menunjukkan struktur satu unit nefron.

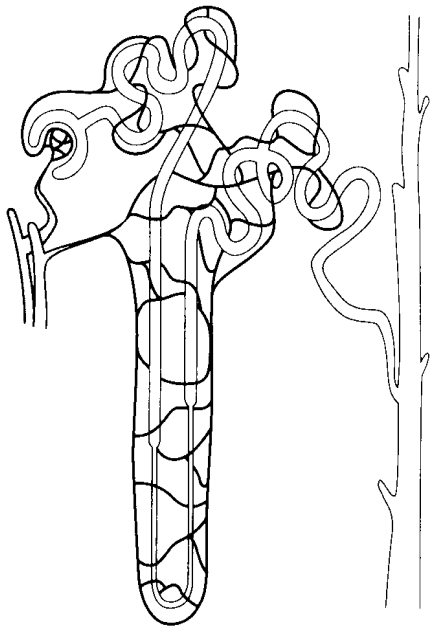


Diagram 9.1
Rajah 9.1

(a) Explain the structure and the role of the nephron.
Terangkan struktur dan peranan nefron.

[6 marks]

(b) Describe how urine is produced.
Terangkan bagaimana air kencing dibentuk.

[10 marks]

(c) Explain the consequences of kidney failure.
Jelaskan kesan kegagalan ginjal.

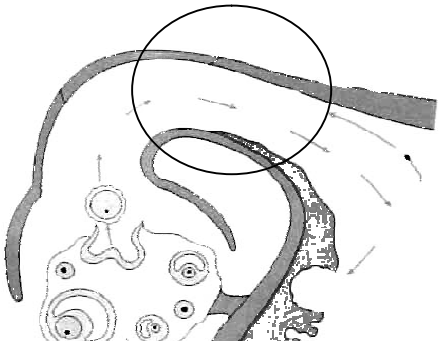
[4 marks]

		Answer		**Notes on scoring**
1.	(a)	P: Chloroplast Q: nucleus R: vacuole S: Golgi apparatus		1 1 1 1
	(b)	Photosynthesis		1
	(c)	Mitochondria		1
	(d)	(i)	X: Simple diffusion Y: Facilitated diffusion Z: Active transport	1 1 1
		(ii)	P1-Both process do not involve usage of energy (passive transport) P2-In both process, substances move down the concentration gradient until equilibrium is reached. (Any one)	 1
		(iii)	P1-Process Y does not need energy while process Z need metabolic energy P2-Substances in process Y move across the membrane down the concentration gradient until equilibrium is reached while in process Z substances move across the membrane against the concentration gradient.	1 1
			TOTAL MARKS	**12 marks**

No			**Answer**	**Notes on scoring**
2	(a)	(i)	C – Tertiary structure	1
		(ii)	P1-The tertiary structure is formed when the helix chains or the beta pleated sheets are folded or coiled into a three-dimensional shape of a polypeptide. P2-The tertiary structure is held in place by ionic bonds, disulphide bonds and hydrogen bonds that are formed between the amino acids of the polypeptide chains or sheets	2
		(iii)	Temperature/pH/ substrate concentration/enzyme concentration Any two	2
	(b)	(i)	P1-Increasing the concentration of substrate A would lead to more collisions between the molecules of substrate A dan enzyme P. P2-more molecules of substrates B and C are produced and, subsequently, the rate of production of end product D will be higher.	2
		(ii)	P1-If the concentration of enzyme P increases, more molecules of substrate A will be converted into substrate B. P2-However, since the concentrations of enzymes Q and R remain the same (the concentration of the enzymes is the limiting factor), the excess substrate B cannot be metabolised, and the rate of production of end product D remains the same	2
	(c)		P1-Protease enzyme is used for digestion of protein P2-and to soften it.	2
	(d)		Essential amino acids are amino acids that cannot be synthesised by the body while non-essential amino acids are amino acids that can be synthesised by the body.	1
			TOTAL MARKS	**12**

		No.	Answer	Notes on scoring
3	(a)	(i)	Leaf	1
		(ii)	Grana	1
	(b)		F1: Light energy excites the electron of chlorophyll molecules to higher energy levels F2: Light energy is used to split the water molecules into hydrogen ions (H^+) and hydroxyl ions (OH^-)	1 1
	(c)	(i)	Oxygen	1
		(ii)	Oxygen is used for cellular respiration	1
	(d)		Hydrogen atoms are used to reduce carbon dioxide in a series of reactions to form glucose.	1
	(e)		The glucose (monomers) undergoes condensation to form starch.	1
	(f)		$6H_2O + 6CO_2 \xrightarrow{\text{light, chlorophyll}} C_6H_{12}O_6 + 6O_2$ (water) (carbon dioxide) (glucose) (oxygen)	1
	(g)		Through the stomata and lentisels	1
	(h)		F1: the upper epidermis is thin and transparent to allow light to penetrate and reach the chloroplasts in the palisade cells. F2: palisade cells are packed tightly together in an upright arrangement to receive the maximum amount of light	1 1
			TOTAL MARKS	**12**

No			Answer	Notes on scoring
4	(a)	(i)	The third line of defense	1
		(ii)	Antibody	1
	(b)	Diagram 4.1 : Artificial Passive immunity Diagram 4.2 : Artificial Active immunity		2
	(c)	(i)	Vaccine	1
		(ii)	F – vaccine is a preparation of weakened or dead forms of pathogen. E – it stimulates the immune system in the body to reach the level of Immunity	2
		(iii)	F – The first dose results the production of low level of antibody E – Second dose is needed to increase the production of antibody until it reaches the immunity level.	2
	(d)	(i)	Antibiotic// Serum // anti-serum	1
		(ii)	F- The body cannot produce its own antibody E - To have an immediate treatment to fight the infection.	2
			TOTAL MARKS	**12 marks**

			Answer	**Notes on scoring**
5	(a)	A: Ovary B: Secondary oocyte X: Ovulation		3
	(b)	(i)	C: Zygote Type of division: Mitosis/mitotic division	2
		(ii)	Able to circle the location where fertilization occur in the diagram 	1
5	(c)	(i)	P: Transport waste/excretory substances/urea, CO_2 from foetus to mother's blood Q: Transport nutrients, oxygen from mother's blood to foetus	2
		(ii)	P1: Provide a medium of exchange of materials/substances between foetal blood and mother's blood. P2: as an endocrine organ / producing oestrogen and /progesterone (to sustain /maintain the thickness of uterine wall. P3: Transport antibodies from the mother's blood to the foetus Any two	2
	(d)	Sample answers: Oral contraceptive pills/condom/Intra-uterine device (IUD)/Implants/diaphragm/ other examples. Any two		2
			TOTAL MARKS	**12 marks**

Section B
[40 marks]

ANSWER ANY TWO QUESTIONS

<table>
<tr><td colspan="4"></td><td>marks</td></tr>
<tr><td>6</td><td>(a)</td><td></td><td>Able to describe the behaviour of chromosome during prophase 1.
P1: Homologous chromosomes (comes together to) form pairs of bivalent
P2: through (a process of) synapsis
P3: Non sister chromatids of the homologous exchange genetic material/DNA segments
P4: through crossing over</td><td>
1

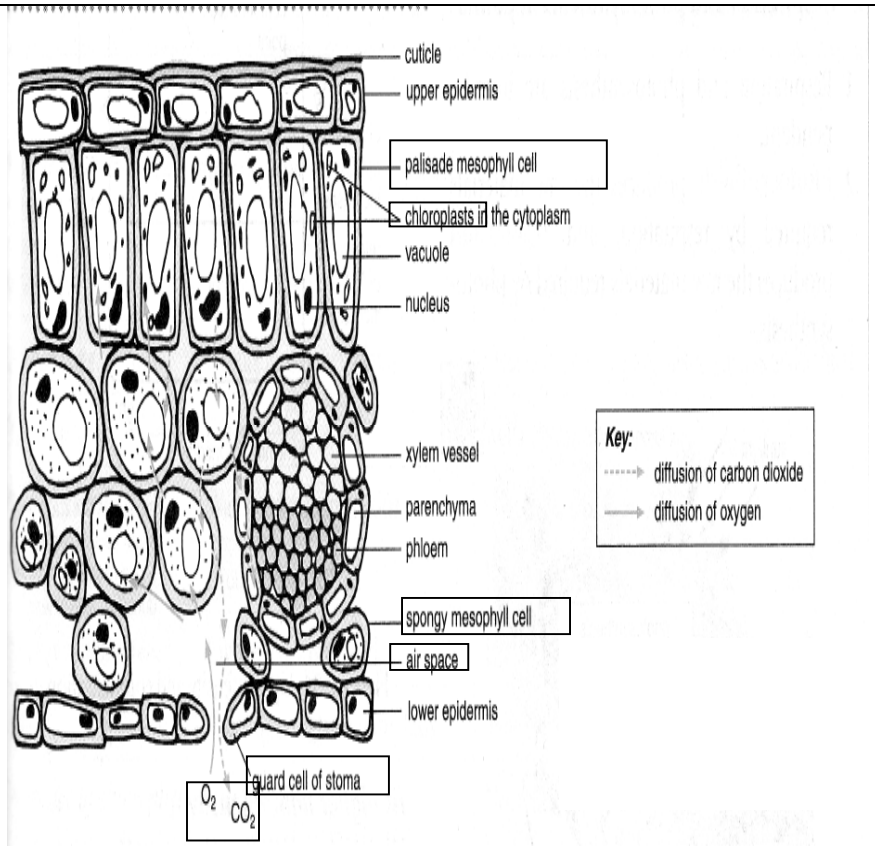
1
1
1
4 marks</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Able to describe the differences between the variation in blood group and height in human
<table>
<tr><td></td><td>Height</td><td>Blood Group</td></tr>
<tr><td>P1</td><td>It is continous variation</td><td>It is a discontinous variation</td></tr>
<tr><td>P2</td><td>It exhibits phenotypes with range/intermediate characters</td><td>It exhibits a few distinctive phenotypes (with no intermediate characters)</td></tr>
<tr><td>P3</td><td>The phenotype is influenced by environment/ nutrition/exercise</td><td>The phenotype is not influenced by environment/ nutrition/exercise</td></tr>
<tr><td>P4</td><td>It is controlled by two or more genes/many pairs of alleles</td><td>It is controlled by one gene/ a pair of alleles.</td></tr>
<tr><td>P5</td><td>The frequency graph shows a normal distribution</td><td>The frequency graph shows a discrete distribution</td></tr>
</table>
Any 4</td><td>Max 4</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Able to explain the causes of variation in blood group.
P1: During gametogenesis/formation of gamete
P2: crossing over in prophase 1/meiosis I
P3; where exchange of genetic material/DNA segment between non-sister chromatids of the homologous chromosomes occur.
P4: Independent assortment in metaphase I/meosis I
P5: where the random arrangement of homologous chromosomes in the metaphase plate/cell equator occur
P6: (The separation of each homologous pair)results in production of gametes of different combination.
P7: Random fertilization of any male and female gamete/Any male gamete can fertilise any of the female gamete (which results</td><td>

1
1

1
1
1

1
1
Max 6</td></tr>
</table>

			in a unique zygote).	
	(c)		Able to draw a schematic diagram on the inheritance <u>Parents</u> Phenotype: Blood Group A x Blood group B Genotype: I^oI^A x I^oI^B Meiosis Gamete: I^o I^A I^o I^B Fertilisation <u>Offspring</u> Genotype I^oI^o I^oI^B I^oI^A I^AI^B Blood Group Phenotype O B A AB Ratio: 1: 1: 1: 1 Keys: I^o : Recessive allele for blood type O I^A : Dominant/codominant allele for blood type A I^B : Dominant/codominant allele for blood type B All Labels/titles	1 1 1 1 1 1 1 Max 6
7	(a)		P1-Gaseous exchange between plant cells and the environment occurs by **diffusion** mainly through the stomata and lenticels. (A stoma consists of a pore surrounded by a pair of guard cells. Respiratory gases enter and leave plants via the stomata in the epidermis of the leaves and the stems of herbaceous plants.) P2-Photosynthesis takes place in the guard cells(contains a large number of chloroplast)and produce glucose as end product. The concentration of glucose in guard cell increases and causes osmotic pressure increase too. P3-More water molecule from adjacent cell move into guard cell and it become turgid. P4-So, stomata opens when there is light and close at night. P5&P6-The pathway of gaseous exchange in a leaf during respiration is shown in the diagram below.	1 1 1 1 2m (1m-diagram 1m- at

			 P7-When the stomata are open, they connect the air spaces within the leaves with the atmosphere. P8-Oxygen from the atmosphere diffuses into the air spaces and then dissolves in the film of water around the mesophyll cells. P9-Oxygen is then used in aerobic respiration. The concentration of oxygen in the cells becomes lower than the concentration of oxygen in the air spaces P10-The difference in concentration gradient allows oxygen to diffuse continuously from the air spaces into the cells. P11-During the day, the carbon dioxide which is produced during aerobic respiration is used in photosynthesis. P12-The excess carbon dioxide diffuses into the air spaces and then through the stomata into the atmosphere. Any 10	least 5 label) 1 1 1 1 1 1 Max 10
7	(b)	(i)	The human respiratory response and rate of respiration in different situation: Relaxing P1-The breathing rate at rest is normally 18 to 20 breaths per minute P2-the heartbeat rate is between **60 to 70** beats per minute.	2
		(ii)	At high altitudes P1-At high altitudes, the atmospheric pressure is low and this may lead to **difficulty in breathing**. P2-Above 10 000 feet, **the decreased partial pressure of**	

			oxygen causes a drop in the oxygen level of blood. P3-Initially, a person will experience **headaches, nausea and dizziness**. P4-However, after a few days, the body will acclimatise to the condition as the affinity of haemoglobin for oxygen is reduced and more oxygen is released to the body tissue. (Any 3)	Max 3
		(iii)	In fear P1-When a person is in fear, **the breathing and the heartbeat rates increase** to meet the demand of a higher respiration rate in the cells. P2-**A higher respiration rate is needed to generate more energy** to enable the person in distress or in fear to cope better. P3-At the same time, **the adrenal glands secrete the adrenaline hormone**. This hormone increases the heartbeat and breathing rates so that more glucose and oxygen are supplied to the muscles. This prepares the person for a response to the dangerous situation.	3
		(iv)	During vigorous activities P1-During vigorous activities such as swimming, running, aerobic exercise and outdoor games, **the breathing rate increases** to 30 breaths per minute P2-**while the heartbeat rate increases** to 120 beats per minute. P3-The increase in heartbeat rate **helps the blood to deliver more oxygen and glucose to the respiring cells**. P4-At the same time, **carbon dioxide is removed from the cells at a faster time.** (Any 2)	Max 2 Total 10
8	(a)	(i)	Able to give examples for organism X and Y. Able to describe the interaction between X and Y P1: X is prey//rat//other examples and Y is predator //snake//other examples P2: An increase of rat population is followed by an increase in the snake's population P3: This will lead to the reduction/decrease of rat's population P4: because snakes feed on/eat the rats P5: When the rat population is reduced, there will be less food for the snake. P6: This cause the decrease/reduction of snake's population. P7: There will be less predation P8: causing the increase of the rat's population P9: The cycle continues and keep the population in dynamic	1 1 1 1 1 1 1 1 1

			equilibrium Note: P1 and any 5P	 Max 6
		(ii)	P1: Cheap compared to chemical control P2: The predator attack only the prey//other organisms are not affected P3: No side effect to environment (Any 2)	1 1 1 Max 2
	(b)	(i)	Able to explain how eutrophication occurs and its effect P1 – Fertilisers/animal wastes/silage contain nitrate/phosphate P2 – washed out in water when it rains//leach/run into the lake and enrich it with nutrients P3 – algae/green plants grow rapidly //algal bloom. P4 – This will (cover the surface of the water and) block the sunlight (for the plants growing in the lake) P5 – This reduce the rate of photosynthesis P6 – and reduce the dissolved oxygen in the lake. P7 – The aquatic plants and algae (eventually) die P8 – decomposed by bacteria P9 - which further reduce the dissolved oxygen/use up the dissolved oxygen P10 – increase the lake BOD and cause the death/reduction of aquatic animals (Any 9)	 1 1 1 1 1 1 1 1 1 1 Max 9
		(ii)	P1: Treating sewage will remove harmful microorganisms/bacteria and nutrients (which cause eutrophication) P2: Then the water can be reused/recycle/release into the rivers/sea P3: Organic fertilizers (such as manure) does not contain much nitrates/phosphate (which can leach out from the soil) P4: They release their nutrients gradually (over a long period of time) giving crops time to absorb them efficiently. Any 3	 1 1 1 1 Max 3
9	(a)		Able to explain the structure and the role of the nephron : P1 - Nephron is the functional unit of a kidney. P2 - A nephron consists of 3 major parts : - Glomerulus and its associated vessels P3 - the Bowman"s capsule P4 - a long narrow tube called the renal tubule, which is made up of the proximal convoluted tubule, loop of Henle and distal convoluted tubule.	 1 1 1 1

			P5 - the distal convoluted tubules of several nephrons join to a common collecting duct. P6 – the loop of Henle is a long hairpin-shaped region of the nephron that descends into the medulla and then returns to the cortex.	1 1 Total 6m
		(b)	Able to describe the formation of urine. **F1 - Able to state three processes in urine formation** E1 - Ultrafiltration, reabsorption and secretion. **F2 - Able to explain the ultrafiltration process** P1 - Blood is under relatively high pressure when it reaches the nephron. P2 The high blood pressure in the glomerulus, forces fluid to filter through the filtration membrane into the lumen of Bowman's capsule P3 - forming glomerular filtrate; P4 - contains water, glucose, amino acids, urea, mineral salts and other small molecules (Any 3) **F3 - Able to explain the reabsorption process** P5 - The glomerular filtrate will flow into proximal convoluted tubule P6- selective reabsorption occurs; all the glucose, amino acids, vitamins and many inorganic ions are reabsorbed back into the blood P7- by active and passive transport P8- forming a relatively high solute concentration in the peritubular capillaries P9 - thus a large volume of water is reabsorbed into the blood by osmosis and P10- increase the concentration of urea in the convoluted Tubule P11- glomerular filtrate then flow into loop of henle and distal convoluted tubule P12- more water and minerals being reabsorbed back into the blood (Any 4) **F4 - Able to explain the secretion process** P13 -takes place in the distal convoluted tubule P14 -urea/toxins/certain drugs / hydrogen ions/potassium ions/ammonia being secreted by passive diffusion and active transport from the blood capillary into the distal convoluted tubule P15- the filtrate reaches the collecting duct ; now	 1 1 1 1 Max 3 1 1 1 1 1 1 1 Max 4 1 1

			called urine P16 -flows down the ureter, the bladder and the urethra and is finally excreted. (Any 2)	1 1 Max 2 Total 10
	(c)		Able to explain the consequences of kidney failure : P1 – if both kidneys stop functioning, the blood osmotic pressure and blood volume cannot be maintained. P2 – the built up of toxic wastes in the body can result in life-threatening conditions. P3 – they have to undergo haemodialysis P4 – another threatment for impaired kidney functions is the transplant of a healthy kidney from a donor to the patient.	**1** **1** **1** **1** **Total 4**
			TOTAL MARKS	20

NAMA: _____

SULIT KELAS: _____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2009 **4531/3**
EXCEL SPM
BIOLOGI
Kertas 3
2009

1 Jam 30 minit Satu jam tiga puluh minit

DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED
(JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU)

1. *Tulis nama dan kelas anda pada ruangan 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 dalam bahasa Melayu.*

SOALAN	MARKAH PENUH	MARKAH DIPEROLEHI
1	33	
2	17	
JUMLAH	50	

Kertas soalan ini mengandungi 15 halaman bercetak.

[Lihat sebelah]

*Answer **all** questions.*

Jawab semua soalan

1. Diagram 1 shows an experiment that was carried out to investigate the effect of air movement on transpiration rate of hibiscus plant by using a potometer.Time is taken for an air bubble to move from X to Y (10 cm distance) by using stopwatch.

Rajah 1 menunjukkan satu eksperimen yang dijalankan untuk mengkaji kesan pergerakan udara terhadap kadar transpirasi pokok bunga raya dengan menggunakan satu potometer. Masa pergerakan gelembung udara dari X ke Y (jarak 10 cm) diambil dengan menggunakan jam randik.

Fan [*Kipas Angin*]

Stopwatch [*Jam Randik*]

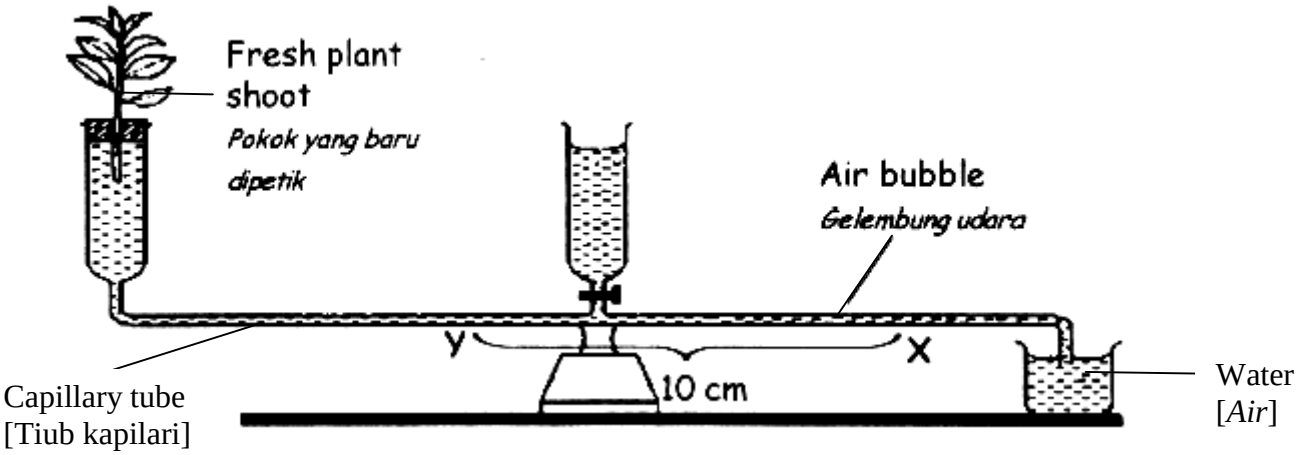


Diagram 1

The potometer is placed near a fan with air speed adjusted at different velocity as shown in the Table 1.

Potometer ini diletakkan berhampiran dengan kipas di mana kelajuan angin diubah pada aras yang berbeza seperti dalam jadual 1.

1 (a) Record the time taken by air bubble to move from X to Y in table 1.

Rekodkan masa yang telah diambil untuk gelembung udara bergerak dari X ke Y dalam jadual 1.

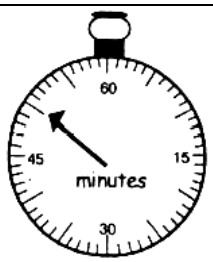
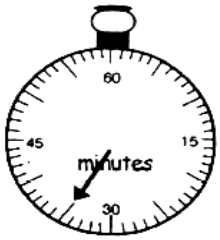
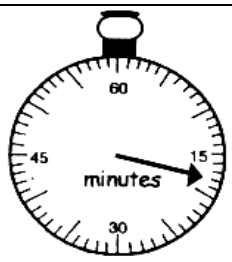
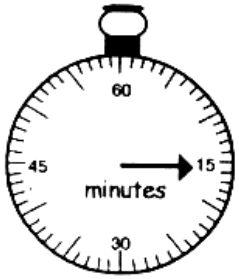
Fan speed *Kelajuan kipas*	Stop watch reading *Bacaan jam randik*	Time taken by air bubble to move from X to Y (minute) *Masa yang diambil oleh gelembung udara bergerak dari X ke Y (minit)*
0		
1		
2		
3		
4		

Table 1 [Jadual 1]

(a). Record the time taken by air bubble to move from X to Y in the spaces provided in Table 1. [3 marks]
Catatkan masa yang telah diambil oleh gelembung udara bergerak dari X ke Y di dalam jadual 1 diruang yang disediakan.
[3 markah]

For examiner use

(b).i) State **two** different observations on the time of air bubble moves.Refer table 1.
[Nyatakan dua pemerhatian ke atas masa yang diambil oleh gelembung udara itu untuk bergerak.Rujuk jadual 1]

Observation 1
Pemerhatian 1

……

……

Observation 2
[*Pemerhatian 2]*

……

……
[3 marks]
[3 markah]

(ii) State **one** inference for each observation made in (b) (i).
[Nyatakan satu inferen bagi setiap pemerhatian yang dibuat pada 1(b)(i)]

Inference for observation 1 *[Inferen daripada pemerhatian 1]*

……

……

Inference for observation 2 *[Inferen daripada pemerhatian 2]*

……

……
[3 marks]
[3 markah]

(c).iii Based on the bar chart in c (ii) ,explain the relationship between the rate of transpiration and the fan speed.
Berdasarkan carta bar di c (ii),terangkan hubungan antara kadar transpirasi melawan kelajuan kipas.

……

……

……

……

[3 marks]
[3 markah]

d) 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 dimanipulasi]* .....……..…….. ……..……	…….. ……
Responding variable [*Pembolehubah bergerakbalas*] ……....…… ……..……..	…….. …….
Fixed variables [*Pembolehubah dimalarkan*] ……....…… ……..……..	…….. ……

Table 2 [Jadual 2]

[3 marks]
[3 markah]

(e) State the hypothesis for this experiment.
[Nyatakan hipotesis bagi eksperimen ini]

……

……

……

[3 marks]
[3 markah]

(f) Based on the experiment, define transpiration operationally

Berdasarkan eksperimen, beri definisi transpirasi secara operasi

……

……

……

[3 marks]
[3 markah]

(g) The experiment is repeated using fan speed 3, but by placing the set-up in the dark. Predict transpiration rate of the plant shoot under this condition.

Explain your predication.

Ekperimen ini diulang dengan menggunakan kipas pada kelajuan 3, tetapi radas di letakkan dalam gelap. Ramalkan kadar transpirasi pucuk tumbuhan pada keadaan ini.Terangkan ramalan anda.

……

……

……

[3 marks]
[3 markah]

(h) The following list is part of apparatus and material used in this experiment.
Senarai berikut adalah sebahagian daripada radas dan bahan yang digunakan dalam eksperimen ini.

Fan ,photometer,stopwatch,fresh plant shoot,water,capillary tube *Kipas Angin,potometer,jam randik,pokok yang baru dipetik,air,tiub kapilari*

Complete Table 3 by matching the apparatus and material used in this experiment.
Lengkapkan Jadual 3 dengan radas dan bahan yang digunakan dalam eksperimen ini.

Material *Bahan*	*Apparatus* *Radas*

Table 3
Jadual 3

[3 marks]

[33 marks]

2 Industrial, domestic and agricultural activities produce waste which pollutes water. The level of water pollution can be tested by determining the Biochemical Oxygen Demand (BOD) value. Methylene blue solution is used as an indicator to test for the presence of oxygen in the water samples. It is blue when oxygen is present and colourless when there is no oxygen.
Aktiviti industri, domestik dan pertanian menghasilkan bahan buangan yang mencemarkan air. Tahap pencemaran air boleh diuji dengan menentukan nilai Keperluan Oksigen Biokimia.
Larutan Metilena biru digunakan sebagai penunjuk untuk menguji kehadiran oksigen dalam sampel air. Larutan ini kekal biru apabila terdapat oksigen dalam sampel air dan warna biru luntur apabila tidak terdapat oksigen.

Based on the above information, design a laboratory experiment to investigate the level of pollution in several different sources of water.
Berdasarkan maklumat di atas reka bentuk satu eksperimen makmal untuk mengkaji tahap pencemaran air dari sumber yang berbeza.

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

- Problem statement
  Pernyataan masalah

- Aim of investigation
  Objektif kajian

- Hypothesis
  Hipotesis

- Variables
  Pembolehubah

- List of apparatus and materials
  Senarai radas dan bahan

- Technique used
  Teknik yang digunakan

- Experimental procedure or method
  Kaedah atau prosedur eksperimen

- Presentation of data
  Cara data dipersembahkan

- Conclusion
  Kesimpulan

(*17 marks*)

1(c) (i) Construct a table and record all the data collected in this experiment.Your table should have the following aspects :

Bina satu jadual dan rekodkan semua data yang dikumpulkan dalam eksperimen ini.Jadual anda hendaklah mengandungi aspek-aspek berikut :

- Fan speed *[Kelajuan kipas]*
- Time taken *[Masa yang diambil]*
- Transpiration rate *[Kadar transpirasi:]*

The formula of the transpiration is:

$$\text{Transpiration rate} = \frac{\text{Distance}}{\text{Time}}$$

[Hitung dan rekodkan kadar transpirasi dalam jadual anda.

Formula untuk kadar transpirasi adalah:

$$\textit{Kadar transpirasi} = \frac{\textit{Jarak}}{\textit{Masa}}$$

[3marks]

[3markah]

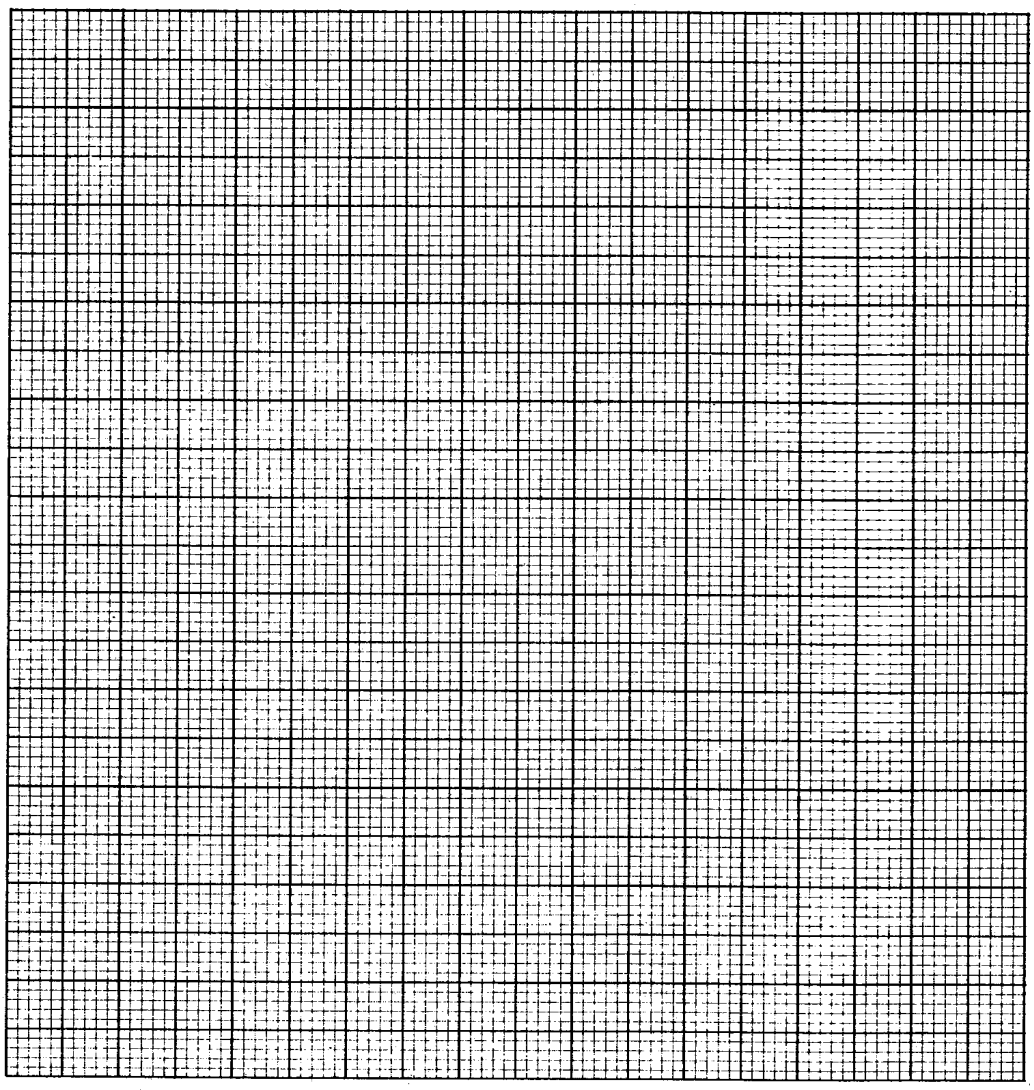
1.c (ii) Use the graph paper provided to answer this question.

Using the data 1 C (i) ,draw a bar chart to show the relationship between the rate of transpiration against the fan speed.

Gunakan kertas graf yang disediakan untuk menjawab soalan ini.Menggunakan data di 1 c(ii) ,lukis satu carta bar untuk menunjukkan hubungan antara kadar transpirasi dengan kelajuan kipas.

[3 marks]

[3 markah]



<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td rowspan="4">1 (a)</td><td>Able to record the data correctly

<table><tr><td>Fan speed</td><td>Time taken by air bubble to move from X to Y (minute)</td></tr><tr><td>0</td><td>50</td></tr><tr><td>1</td><td>35</td></tr><tr><td>2</td><td>28</td></tr><tr><td>3</td><td>18</td></tr><tr><td>4</td><td>15</td></tr></table></td><td>3</td></tr>
<tr><td>Able to record 4 data correctly</td><td>2</td></tr>
<tr><td>Able to record 3 data correctly</td><td>1</td></tr>
<tr><td>No response or incorrectly data or only 2 correct data</td><td>0</td></tr>
</table>

No.	Mark Scheme	Score
1 (b) (i)	Able to state two different correct observations C1: MV – Fan speed C2: RV - time taken by air bubble to move from X to Y <u>Sample answers</u> <u>Vertical observation</u> 1 At fan speed 0,the time taken for air bubble to move from X to Y is 50 minutes. 2 At fan speed 4,the time taken for air bubble to move from X to Y is 15 minutes. <u>Horizontal observation</u> 1. The time taken by air bubble to move from X to Y at fan speed 0 is longer then at fan speed 4.	3
	Able to state one correct observation and one inaccurate observation <u>Or</u> Able to state two inaccurate observations <u>Sample answers</u> 1 At fan speed 0,the time taken for air bubble to move is long. 2 The time taken by air bubble to move from X to Y is affected by fan speed.	2
	Able to state only one correct observation <u>Or</u> Able to state two observations at idea level <u>Sample answer</u> (idea level) 1. Different speed of fan cause different time taken for air bubble move. 2. The higher speed of the fan ,the shortest time taken for air bubble move. 3. Air movement cause air bubble to move	1
	No response <u>or</u> incorrect response <u>or</u> one idea only	0

No.	Mark Scheme	Score
1 (b) (ii)	Able to make two correct inferences Note : Inference must match observations <u>Sample answers</u> 1. At fan speed 0,the time taken for air bubble to move from X to Y is 50 minutes because the air movement is slow. 2. At fan speed 4,the time taken for air bubble to move from X to Y is 15 minutes because the air movement is fast.	3
	Able to state one correct inference and one inaccurate inference Or Able to state two inaccurate inferences <u>Sample answers</u> 1. Different speed of air movement will causes different time taken for the air bubble move. 2. Different speed of air movement causes different transpiration rate.	2
	Able to state only one correct inference <u>Or</u> Able to state two inferences at idea level <u>Sample answer</u> (idea level) 1. Air movement affect transpiration rate. 2. Transpiration rate vary at different speed of air movement.	1
	No response <u>or</u> incorrect response <u>or</u> one idea only	0

<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td>1. (c) (i)</td><td>Able to construct a table with the following aspects :
T : title with correct unit
D: data transferred
C: calculation
<table><tr><th>Fan speed</th><th>Time (minute)</th><th>Transpiration rate (cm/min)</th></tr><tr><td>0</td><td>50</td><td>0.20</td></tr><tr><td>1</td><td>35</td><td>0.29</td></tr><tr><td>2</td><td>28</td><td>0.36</td></tr><tr><td>3</td><td>18</td><td>0.56</td></tr><tr><td>4</td><td>15</td><td>0.67</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to construct a table with two aspects correctly</td><td>2</td></tr>
<tr><td></td><td>Able to construct a table with one aspect only correctly</td><td>1</td></tr>
<tr><td></td><td>No response or incorrect answer</td><td>0</td></tr>
</table>

No.	**Mark Scheme**	**Score**
1 (c) (ii)	Able to draw the bar chart graph correctly which include the following aspects : X : Title of x-axis and y-axis with correct unit - 1 mark Y : Five points are plotted correctly - 1 mark Z : The bar chart is smoothly drawn - 1 mark	3
	Any two aspects correctly	2
	Any one aspects correctly	1
	No response or incorrect aspect	0

No.	Mark Scheme	Score
1 (c) (iii)	Able to explain the relationship between the rate of transpiration and the fan speed based on the following criteria : 1. Rate of transpiration 2 Fan speed 3 reason <u>Sample answer</u> 1. When the speed of fan increases,the transpiration rate will also increase,this is because more water molecules will be evaporated into atmosphere. 2. When the fan speed decrease ,the transpiration rate also decreases due to less water evaporate.	3
	Able to explain the relationship using any two criteria. Sample answer : 1. Slow air movement causes less water evaporated by the plant.	2
	Able to explain the relationship using any one criteria. 1. Air movement will affect the rate of transpiration /water loss from the plant.	1
	No response or incorrect response	0

<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td rowspan="4">1 (d) (i)</td><td>Able to state all 3 variables and methods to handle each variable

<u>Sample answers</u>

<table>
<tr><th>Variable</th><th>Method to handle the variable</th></tr>
<tr><td><u>Manipulated variable</u>
Air movement // fan speed</td><td>Fan is switched on at different speed.</td></tr>
<tr><td><u>Responding variable</u>
Time taken for air bubble to move from X to Y.

Rate of transpiration</td><td>Measure and record the time taken for air bubble to move from X to Y by using stopwatch.
Using formula to calculate the rate of transpiration.</td></tr>
<tr><td><u>Constant variable</u>
Light intensity
Type of plant

Distance between X and Y</td><td>The light intersity is fixed.
Use/fix the same spesies of plant.
The distance between X and Y is fixed (10 cm)</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>Able to state 4 – 5 answers correctly</td><td>2</td></tr>
<tr><td>Able to state 2 - 3 answers correctly</td><td>1</td></tr>
<tr><td>No response <u>or</u> incorrect response <u>or</u> one correct answer only</td><td>0</td></tr>
</table>

No.	Mark Scheme	Score
1 (e)	Able to state a hypothesis **relating** the **manipulated variable** and the **responding variable** correctly <u>Sample answers</u> 1 The higher the speed of the fan ,the less time is taken by the air bubble to move from X to Y 2 The higher the speed of the fan,the higher the rate of transpiration.	3
	Able to state a hypothesis relating the manipulated variable and the responding variable inaccurately <u>Sample answers</u> 1. Different speed of air movement causes different rate of transpiration. 2. Different speed of air movement causes different amount of water lost/time taken for air bubble to move from X to Y.	2
	Able to state one idea of a hypothesis <u>Sample answers</u> 1 Air movement causes different rate of transpiration 2 Air movement causes different amount of water loss/time taken for air bubble move.	1
	No response <u>or</u> incorrect response	0

No.	Mark Scheme	Score
1 (f)	Able to define transpiration operationally <u>Sample answer</u> 1. Transpiration is the process water loss from the plant shoot (through leaves) and affected by air movement /fan speed that shown by time taken for water to move in a certain distance/ from X to Y.	3
	Any two criteria <u>Sample answer</u> 1. Transpiration is the loss of water from the plant shoot affected by air movement.	2
	Any one criteria <u>Sample answer</u> 1. Transpiration is the loss of water from the plant shoot.	1
	No response or incorrect response	0

No.	Mark Scheme	Score
1 (g)	Able to predict the outcome of the experiment based on the following criteria: C1: Expected transpiration C2: Comparison C3: The reason of the answer <u>Sample answer</u> 1. Time taken for transpiration rate at fan speed 3,in the dark is more then 18 minutes because the stomata are closed in the dark,hence less water evaporate from the plant shoot. 2. Less than 0.56cm/min because stomata in leaves/plant are closed in the dark,less water evaporated from the leaves/plant.	3
	Any two criteria <u>Sample answer</u> 1. Transpiration rate at fan speed 3, in the dark less than 0.56 cm/min.	2
	Any one criteria <u>Sample answer</u> 1. Transpiration rate is low.	1
	No response or incorrect response	0

<table>
<tr><th>No.</th><th>Mark Scheme</th><th>Score</th></tr>
<tr><td rowspan="4">1 (h)</td><td>Able to classify the apparatus and materials according to their functions in the experiment

<table><tr><th>Apparatus</th><th>Materials</th></tr><tr><td>Fan</td><td>Fresh plant shoot</td></tr><tr><td>Stop watch</td><td>water</td></tr><tr><td>Beaker</td><td></td></tr><tr><td>Capillary tube</td><td></td></tr></table></td><td>3</td></tr>
<tr><td>Any 5 answers correctly</td><td>2</td></tr>
<tr><td>Any 3 to 4 answers correctly</td><td>1</td></tr>
<tr><td>No response or only two correct answer</td><td>0</td></tr>
</table>

PERATURAN PEMARKAHAN SOALAN NO. 2 BIOLOGI KERTAS 3 EXCEL FORM 5 2009

No	Mark Scheme	Score	Remark
2(i)	Able to state the problem statement relating the manipulated variable with the responding variable correctly based on the following criteria: P1 : different sources of water P2 : the level of (water) pollution P3 : ? (question mark) Sample answer : What is the level of (water) pollution in different sources of water ?	3	Tick (√)
	Able to state the problem statement based on two criteria. Sample answer : What is the level of water pollution ?	2	Tick (√)
	Able to state a problem statement based on one citeria.	1	Tick (√)
	No response or incorrect response	0	

No	Mark Scheme	Score	Remark
2(ii)	Able to state the aim of the investigation correctly Sample answer: To investigate the level of water pollution in different sources of water.		Tick (√)

No	Marking Scheme	Score	Remark
2(iii)	Able to state the hypothesis relating the manipulated variable with the responding variable correctly based on the following criteria: MV: source of water RV : the level of (water) pollution // time for the methylene blue solution to turn colourless H : Relationship Sample answer : 1. The methylene blue solution took the shortest time to decolorize in …..water. 2. …..water is the most polluted samples of water collected	3	Tick (√)
	Able to state the hypothesis based on two criteria. Sample answer : 1. Different sources of water affect the time taken for the methylene blue to turn colourless	2	Tick (√)
	Able to state the hypothesis based on one criteria. Sample answer : 1. The …… water is polluted.	1	Tick (√)
	No response or incorrect response	0	

No	Marking Scheme	Score	Remark
2(iv)	Able to state the three variables correctly. Sample answer: Manipulate Variable: source of water Responding Variable : the level of (water) pollution // time for the methylene blue to turn colourless Constant Variable : Volume of water samples // volume of methylene blue		All variables correct (Tick) √

No	Marking Scheme	Score	Remark
2(iv)	Able to list all important apparatus and materials correctly Sample answer Apparatus : Reagent bottles (250 ml) with stoppers Beakers Syringes Stopwatch Materials : Methylene blue solutions Water samples - (at least 4)	3	Tick (√)
	Able to list at least 3 apparatus and at least 4 materials	2	Tick (√)
	Able to list at least 2 apparatus and at least 3 materials	1	Tick (√)
	No response or incorrect response	0	

No	Marking Scheme	Score	Remark
2(vi)	Able to state a suitable technique used for the experiment Sample anwer : The time taken for the methylene blue solution in all the samples of water to decolourise is taken by using the stopwatch . Results are recorded in a table.	B = 1	Tick (√)

No	Mark Scheme	Score	Remark
2(vii)	Able to describe the steps of the experiment correctly based on the following criteria. K1 – set up K2 – handling the manipulated variable K3 – handling the responding variable K4 – handling the constant variable K5 – Precaution taken Sample answer : Steps : 1. Water samples are collected from (four) different water sources. 2. The reagent bottles are labelled (P,Q,R,S,). 3. Each reagent bottles are filled with 100 ml of the water samples respectively. 4. A syringe is used to add 1 ml of methylene blue solution to the base of each of the water samples. 5. The reagent bottles are quickly close. 6. All the bottles are placed inside a cupboard and the stopwatch is started. 7. The bottles are examined from time to time. 8. The time taken for the methylene blue solution in all the samples of water to decolourise are recorded. 9. The results are recorded in a table. *Indicator:* *K1 – step 1,2,5,6,7,8 (any four steps)* *K2 – step 3* *K3 – step 8, 9* *K4 – step 3, 4*	3	Tick (√)

	K5 – step 4,5,6,7 (any three steps)		
	Able to state any four criteria (4K).	2	Tick (√)
	Able to state any three criteria (3K).	1	Tick (√)
	No response or incorrect response	0	

<table>
<tr><th>No</th><th>Mark Scheme</th><th>Score</th><th>Remark</th></tr>
<tr><td>2(vii)</td><td>Able to construct a table to record data

Sample answer :

<table>
<tr><th>Reagent Bottle</th><th>Sources of water</th><th>Time Taken For The Methylene Blue To Decolorize (Hour)</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td><td>Bonus = 1</td><td>Tick (√)</td></tr>
</table>

No	Mark scheme	Score	Remark
2(x)	Able to make the right conclusion Sample answer : Less time is taken for the methylene blue to decolourise / turn colourless in (river) water compare to (drain) water. Hypothesis is accepted. * Answer in the ( ) depends on the student's answer.		Tick (√)

		Score	Remark
01	Problem Statement	3	
02	Hypothesis	3	
03	Planning	3	8-9 tick = 3 6-7 tick = 2 4-5 tick = 1
04	Experimental Procedure	3	5K = 3 4K = 2 3K = 1
05	List of apparatus and materials	3	
B1	Technique	1	
B2	Data Presentation	1	
	TOTAL	17	