Nama: .................................................................................... Kelas: ......................

4
5
5
1
2

**SULIT** 4551/2

**4551/2**
**BIOLOGI**
**Kertas 2**
**Ogos**
2 ½ jam

**MAKTAB RENDAH SAINS MARA**

# PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2019

## BIOLOGI

**Kertas 2**

Dua jam tiga puluh minit

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tulis nama, kelas dan nombor maktab 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 bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

| *Untuk Kegunaan Pemeriksa* | | | |
|---|---|---|---|
| Kod Pemeriksa : | | | |
| Bahagian | Soalan | Markah Penuh | Markah Diperoleh |
| 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 halaman 32 bercetak

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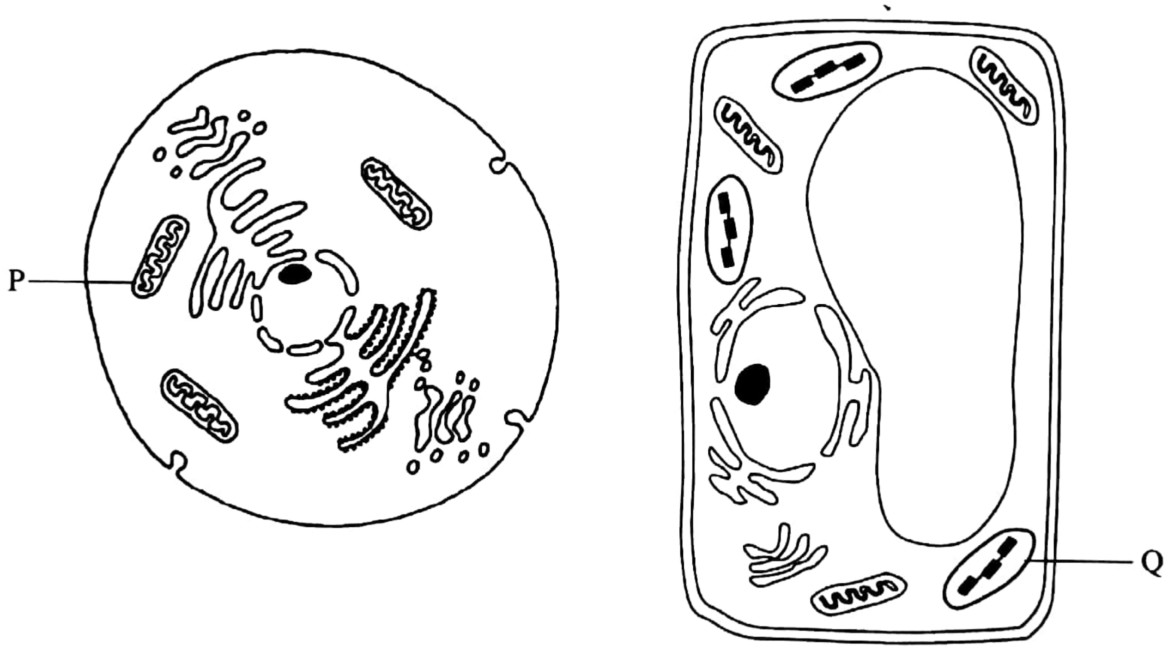
**Section A**
*Bahagian* A

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

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

1. Diagram 1.1 shows structure of cell X and Y

*Rajah* 1.1 *menunjukkan struktur sel X dan Y.*




Cell X
*Sel* X

Cell Y
*Sel* Y

Diagram 1.1
*Rajah* 1.1

(a) Based on Diagram 1.1

*Berdasarkan Rajah* 1.1

(i) Name the type of cell X.

*Namakan jenis sel* X.

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

[1 *mark*]
[1 *markah*]



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(ii) Explain the function of organelle Q.

*Terangkan fungsi organel* Q.

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

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

[2 *marks*]
[2 *markah*]

(iii) Flight muscle cell has a large number of organelle P. Explain why.
*Sel otot penerbangan mempunyai banyak organel* P. *Terangkan mengapa.*

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

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

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

[2 *marks*]
[2 *markah*]

(iv) State **one** similarity and **one** difference between cell X and cell Y.

*Nyatakan* ***satu*** *persamaan dan* ***satu*** *perbezaan antara sel* X *dan sel* Y.

Similarity/ *Persamaan*:

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

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

Difference/ *Perbezaan*:

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

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

[2 *marks*]
[2 *markah*]

*[Lihat halaman sebelah]*

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(b) Diagram 1.2 shows the stages involved in the synthesis of extracellular enzyme.

*Rajah* 1.2 *menunjukkan peringkat-peringkat yang terlibat dalam penghasilan enzim luar sel.*

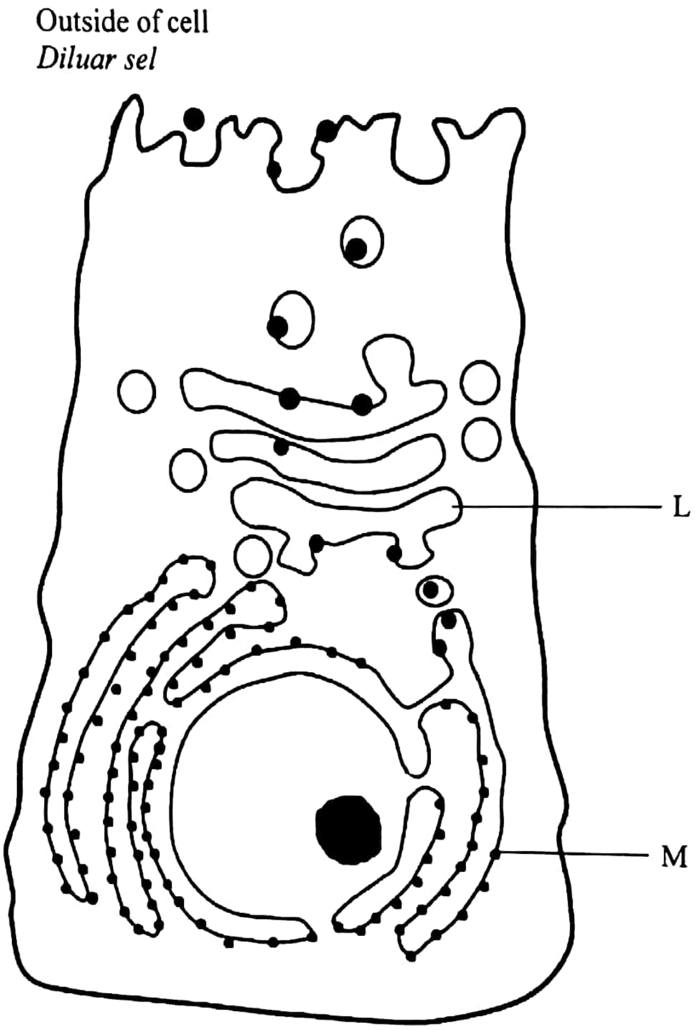


Diagram 1.2
*Rajah* 1.2

(i) Name the organelles L and M.

*Namakan organel* L *dan* M.

Organelle / *Organel* L: ..............................................................................................

Organelle / *Organel* M: ..............................................................................................

[2 *marks*]
[2 *markah*]



Scanned by CamScanner

(ii) Explain the role of M during the synthesis of extracellular enzyme.

*Terangkan peranan* M *semasa enzim luar sel dihasilkan.*

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

[3 *marks*]
[3 *markah*]

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2. (a) Diagram 2.1 shows phase W of mitosis in an animal cell.
*Rajah* 2.1 *menunjukkan fasa* W *mitosis dalam sel haiwan.*

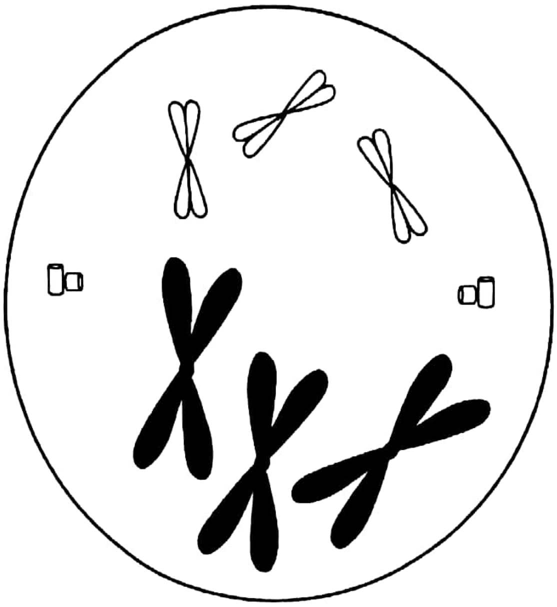

Diagram 2.1
*Rajah* 2.1

(i) Name phase W.
*Namakan fasa* W.

Phase / *Fasa* W: ..........................................................................

[1 *mark*]
[1 *markah*]

(ii) Explain one chromosomal behaviour during phase W.
*Terangkan satu kelakuan kromosom semasa fasa* W.

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

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

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

[2 *marks*]
[2 *markah*]



Scanned by CamScanner

(iii) Draw the chromosomes of daughter cell in the circle provided in Diagram 2.2.

*Lukis kromosom bagi satu sel anak dalam bulatan yang disediakan dalam Rajah* 2.2.

[2 *marks*]
[2 *markah*]

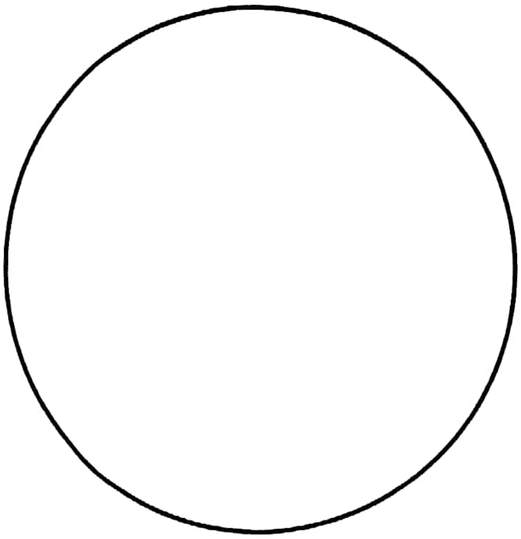

Diagram 2.2
*Rajah* 2.2

*[Lihat halaman sebelah]*


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(b) An agricultural officer wants to produce a large number of banana plants by using the technique shown in Diagram 2.2.

*Seorang pegawai agrikultur ingin menghasilkan sejumlah besar pokok pisang dengan menggunakan teknik seperti ditunjukkan dalam Rajah* 2.2.

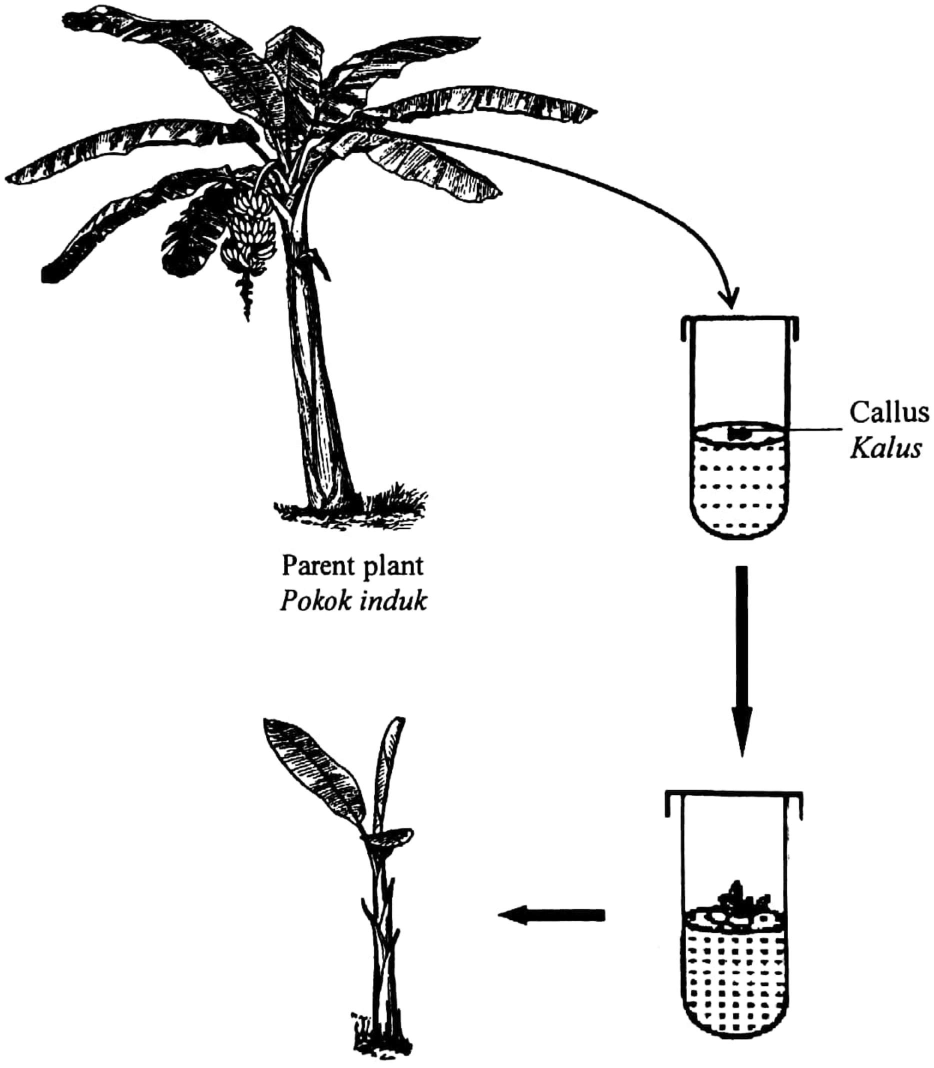


Diagram 2.2
*Rajah* 2.2

(i) Name the technique used.

*Namakan teknik yang digunakan.*

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

[1 *mark*]
[1 *markah*]

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(ii) Explain how callus is formed.

*Terangkan bagaimana kalus terbentuk.*

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

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

[2 *marks*]
[2 *markah*]

(iii) State **two** advantages of the technique in 2 (a)(i) in production of banana plants in agriculture.

*Nyatakan* ***dua*** *kelebihan teknik di* 2(a)(i) *terhadap pengeluaran pokok pisang dalam bidang pertanian.*

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

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

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

[2 *marks*]
[2 *markah*]

(iv) Explain **one** characteristic of the plantlet produced if tissue is taken from root tips of banana plant

*Terangkan* ***satu*** *ciri anak pokok yang dihasilkan jika tisu diambil dari hujung akar pokok pisang tersebut*

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

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

[2 *marks*]
[2 *markah*]



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3. Diagram 3.1 shows a modern farmer was observing the damaged at his paddy field. He noticed that the decrease of crop yield is caused by mice in that area.

*Rajah 3.1 menunjukkan seorang petani moden sedang meninjau kerosakan di sawah padi beliau. Dia mendapati hasil tanaman padi berkurangan disebabkan oleh tikus-tikus di kawasan tersebut.*

Diagram 3.1
*Rajah 3.1*

(a) The farmer carried out an activity to estimate the size of mice population in his paddy field. The result is shown in Table 1.

*Petani tersebut telah menjalankan satu aktiviti untuk menentukan saiz populasi tikus di sawah padi beliau. Keputusan kajian ditunjukkan di dalam Jadual 1.*

| | |
|---|---|
| Number of mice during first capture<br>*Bilangan tikus pada tangkapan pertama* | 62 |
| Number of mice during second capture<br>*Bilangan tikus pada tangkapan kedua* | 78 |
| Number of marked mice during second capture<br>*Bilangan tikus yang bertanda pada tangkapan kedua* | 37 |

Table 1
*Jadual 1*

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(i) Name the technique used by the farmer.

*Namakan teknik yang digunakan oleh petani tersebut.*

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

[1 *mark*]
[1 *markah*]

(ii) Based on Table 2, estimate the size of the mice population.

*Berdasarkan Jadual 2, anggarkan saiz populasi tikus tersebut.*

[2 *marks*]
[2 *markah*]

(iii) State **one** assumption made when the farmer uses this technique.

*Nyatakan **satu** andaian yang dibuat apabila petani menggunakan teknik tersebut.*

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

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

[1 *mark*]
[1 *markah*]



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(iv) After a month, the crop yield has increased.

*Selepas sebulan, hasil tanaman telah meningkat.*

Predict what will happen to the population size of mice. Explain your answer.

*Ramalkan apakah yang berlaku kepada saiz populasi tikus tersebut. Terangkan jawapan anda.*

Prediction:..........................................................................................
*Ramalan*

Explanation: .........................................................................................
*Penerangan*

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

[2 *marks*]
[2 *markah*]

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(b) Diagram 3.2 shows a hierarchy in the classification of organisms.

*Rajah* 3.2 *menunjukkan satu hierarki dalam pengelasan organisma.*

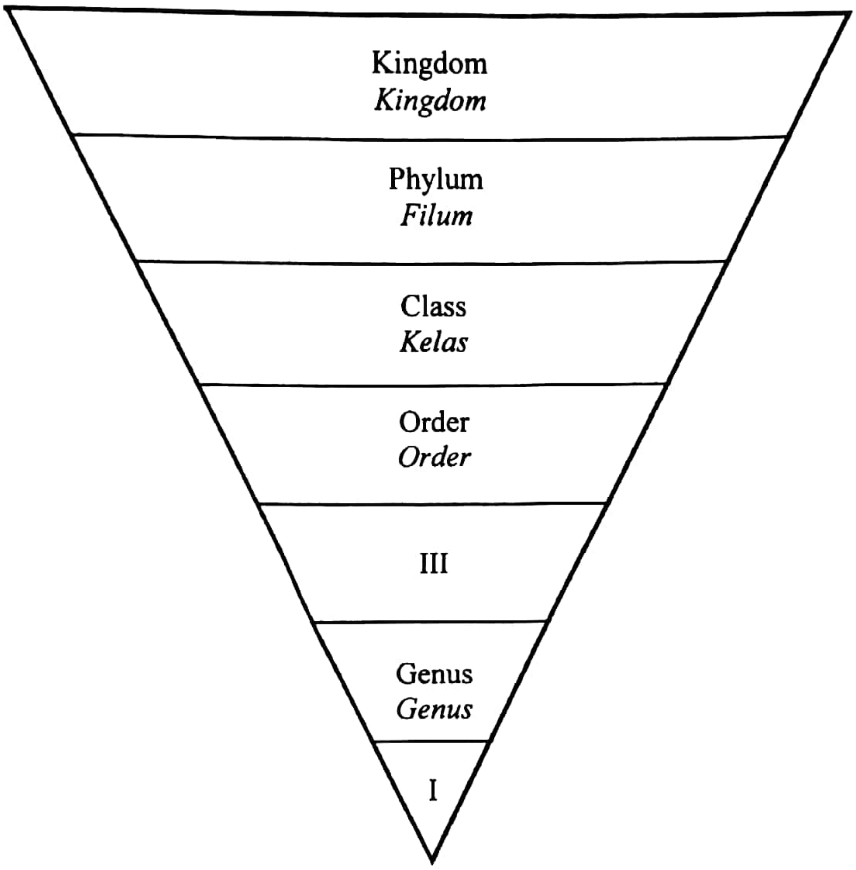


Diagram 3.2
*Rajah* 3.2

(i) Name hierarchical level I and III.

*Namakan peringkat hieararki* I *dan* III.

Level I: ..........................................................................................................
*Peringkat*

Level III: ..........................................................................................................
*Peringkat*

[2 *marks*]
[2 *markah*]



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(ii) Kingdoms is classified into 5 major groups. State **two** of the groups.

*Alam dibahagikan kepada 5 kumpulan utama. Nyatakan **dua** daripada kumpulan tersebut.*

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

[2 *marks*]
[2 *markah*]

(c) Statement below was taken from a scientific publication.
*Pernyataan di bawah diambil daripada satu terbitan saintifik.*

> Rice is the seed of the grass named *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population, especially in Asia.
>
> *Beras adalah benih rumput Oryza sativa (beras Asia) atau Oryza glaberrima (beras Afrika). Sebagai bijirin, ia merupakan makanan ruji yang paling banyak diambil oleh sebahagian besar populasi manusia di dunia, terutamanya di Asia.*

(i) State the hierarchy of classification for *Oryza*.

*Nyatakan hirarki pengelasan bagi Oryza.*

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

[1 *mark*]
[1 *markah*]

(ii) The name of *Oryza sativa* is given based on the rules of the Linnaeus Binomial System. Explain **one** of the rules.

*Nama Oryza sativa diberikan berdasarkan peraturan Sistem Binomial Lineus. Terangkan **satu** peraturan tersebut.*

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

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

[1 *mark*]
[1 *markah*]



Scanned by CamScanner

4. Diagram 4.1 shows a growth curve of germinating seedlings.
Diagram 4.2 shows a growth curve of grasshopper.

*Rajah 4.1 menunjukkan lengkung pertumbuhan biji benih yang sedang bercambah.*
*Rajah 4.2 menunjukkan lengkung pertumbuhan belalang.*

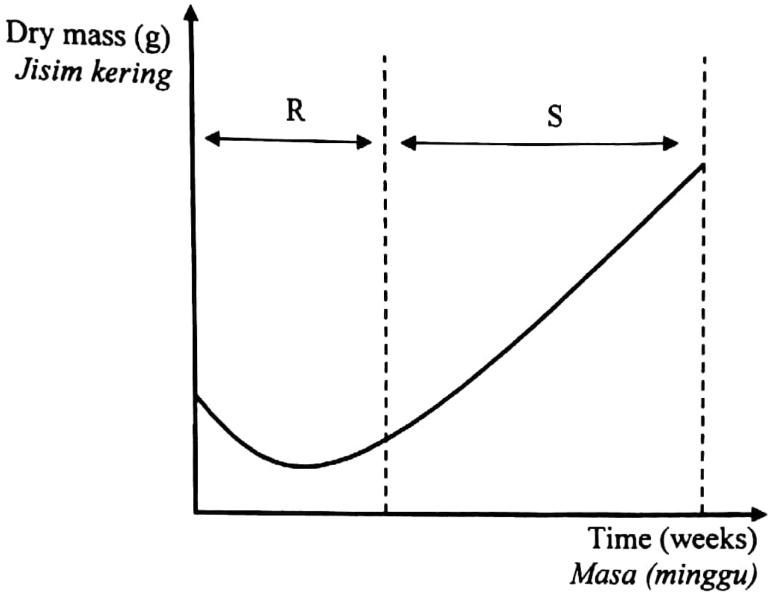


Diagram 4.1
*Rajah 4.1*

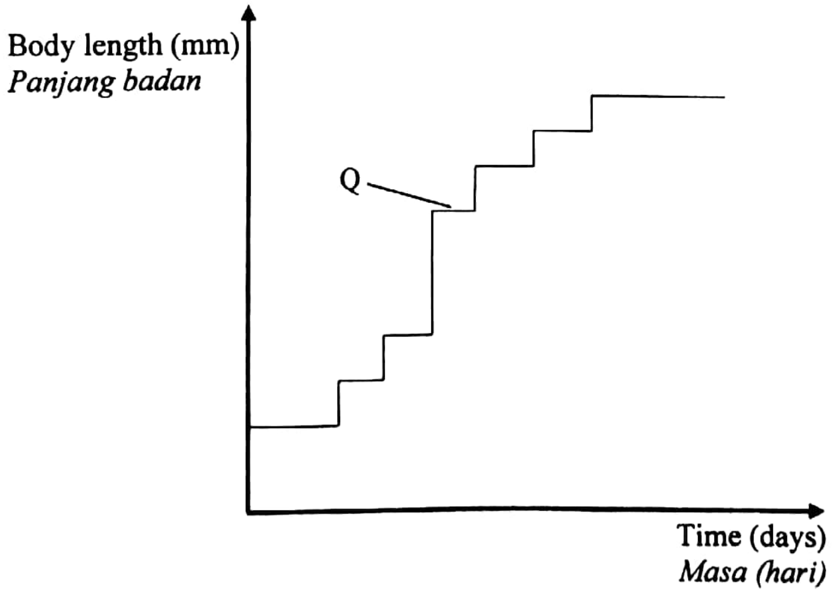


Diagram 4.2
*Rajah 4.2*

*[Lihat halaman sebelah]*

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(a) (i) Name phase S.

*Namakan fasa* S.

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

[1 *mark*]
[1 *markah*]

(ii) Explain the growth curve in stage R.

*Terangkan lengkung pertumbuhan pada peringkat* R.

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

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

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

[2 *marks*]
[2 *markah*]

(iii) State **two** differences between growth curve in Diagram 4.1 and Diagram 4.2.

*Nyatakan* ***dua*** *perbezaan antara lengkung pertumbuhan di Rajah* 4.1 *dan Rajah* 4.2.

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

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

[2 *marks*]
[2 *markah*]

(iv) Explain what happens during process Q.

*Terangkan apa yang berlaku semasa proses* Q.

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

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

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

[2 *marks*]
[2 *markah*]

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(b) Diagram 4.3 shows the stages of growth in dicotyledonous stem.

*Rajah 4.3 menunjukkan peringkat-peringkat pertumbuhan dalam batang pokok dikotiledon.*

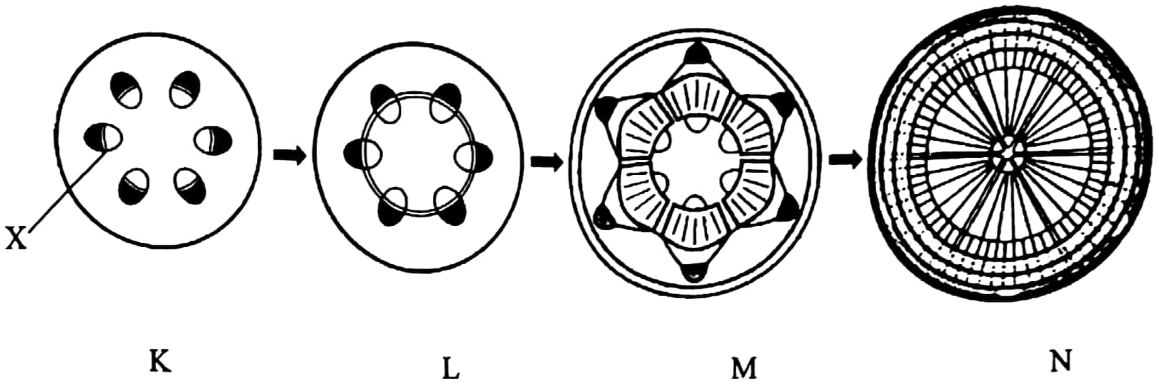


Diagram 4.3
*Rajah 4.3*

(i) Name tissue X.

*Namakan tisu X.*

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

[1 *mark*]
[1 *markah*]

(ii) Explain the development of tissue X from stage K to L.

*Terangkan perkembangan tisu X dari peringkat K hingga L.*

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

[2 *marks*]
[2 *markah*]

(iii) Explain what will happen to the plant if tissue X fails to form.

*Terangkan apa yang akan berlaku kepada tumbuhan tersebut jika tisu X gagal terbentuk.*

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

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

[2 *marks*]
[2 *markah*]

*[Lihat halaman sebelah]*



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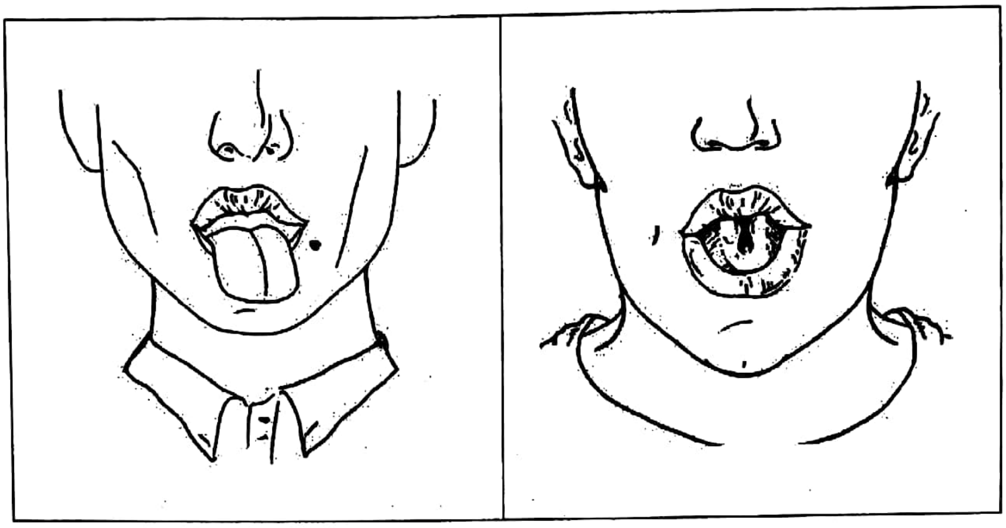
5. (a) Diagram 5.1 shows a trait of ability to roll the tongue between two individuals.
*Rajah* 5.1 *menunjukkan trait kebolehan menggulung lidah antara dua individu.*



Individual P
*Individu* P

Individual Q
*Individu* Q

Diagram 5.1
*Rajah* 5.1

(i) Name the type of variation of individual P and individual Q.
*Namakan jenis variasi bagi individu* P *dan individu* Q.

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

[1 *mark*]
[1 *markah*]

(ii) State **two** factors causing the variation.
*Nyatakan **dua** faktor yang menyebabkan variasi tersebut.*

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

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

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

[2 *marks*]
[2 *markah*]



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(iii) A student is unable to roll his tongue. He practices to roll his tongue every day but fails. Explain why.

*Seorang pelajar tidak berkebolehan menggulung lidah. Dia cuba untuk menggulung lidah setiap hari tetapi gagal. Terangkan mengapa.*

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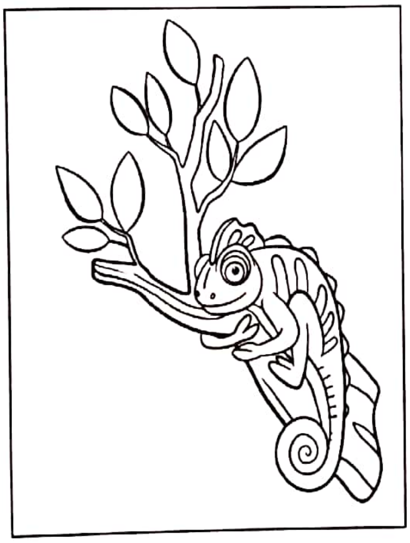
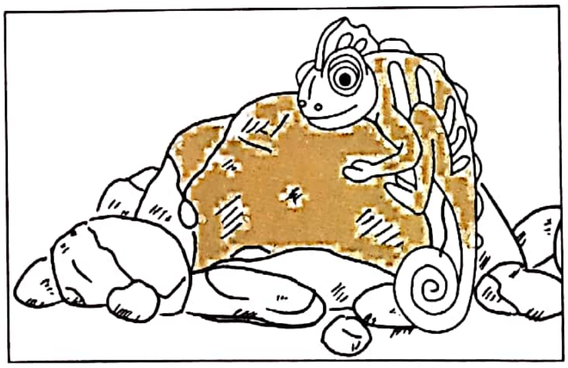
[3 *marks*]
[3 *markah*]

(b) Diagram 5.2 shows a chameleon with a change in habitat from A to B.

*Rajah* 5.2 *menunjukkan seekor sesumpah berpindah dari habitat* A *ke habitat* B.



Habitat A
*Habitat* A



Habitat B
*Habitat* B

Diagram 5.2
*Rajah* 5.2



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(i) Based on Diagram 5.2, explain how chameleon's ability to change colour help its survival.

*Berdasarkan Rajah 5.2, terangkan bagaimana perubahan warna membantu sesumpah untuk terus hidup.*

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[3 *marks*]
[3 *markah*]

(ii) Compare the variation shown in Diagram 5.1 and Diagram 5.2.

*Bandingkan variasi yang ditunjukkan dalam Rajah* 5.1 *dan Rajah* 5.2.

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

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

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

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

[3 *marks*]
[3 *markah*]



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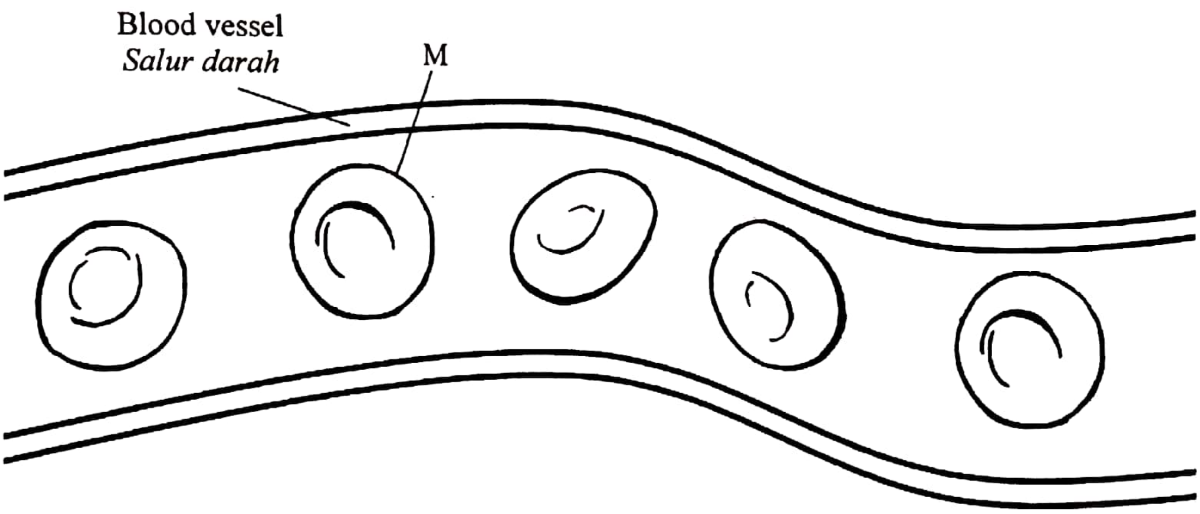
## Section B
## *Bahagian* B

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

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

6. Diagram 6.1 shows a part of human blood component.

*Rajah* 6.1 *menunjukkan sebahagian komponen sel darah manusia.*




*Rajah* 6.1

(a) Explain the function of structure M.

*Terangkan fungsi struktur* M.

[4 *marks*]
[4 *markah*]



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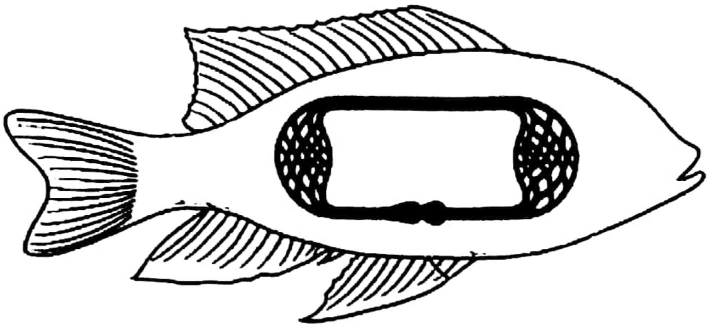
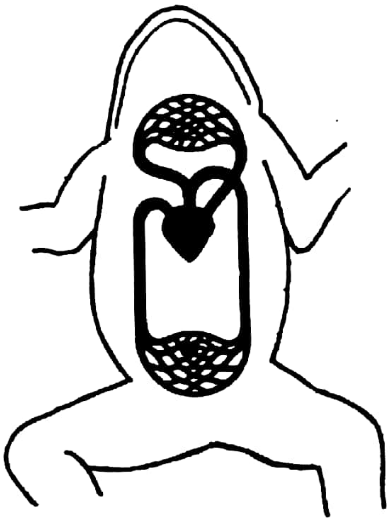
(b) Diagram 6.2 shows a blood circulatory system of two organisms P and Q.
*Rajah* 6.2 *menunjukkan sistem peredaran darah bagi dua organisma* P *dan* Q.



Organism P
*Organisma* P



Organism Q
*Organisma* Q

Diagram 6.2
*Rajah* 6.2

Compare the blood circulatory system in P and Q.
*Bandingkan sistem peredaran darah* P *dan* Q.

[10 *marks*]
[10 *markah*]



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c) Diagram 6.3 shows a dialog between a doctor and a woman about the importance of vaccinations for her child.

*Rajah 6.3 menunjukkan dialog antara seorang doktor dengan seorang wanita berkaitan kepentingan vaksinasi kepada anaknya.*

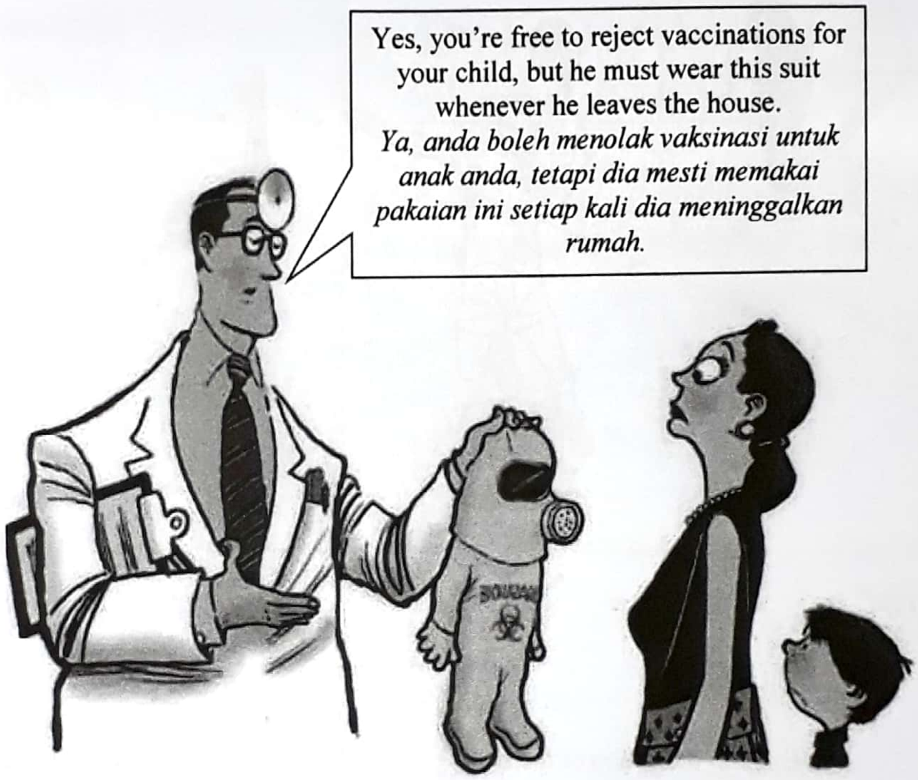


Diagram 6.3
*Rajah 6.3*

Explain the effect to the child if their parents refuse to take vaccination.

*Terangkan kesan kepada kanak–kanak jika ibu bapa mereka menolak pengambilan vaksin.*

[6 *marks*]
[6 *markah*]



Scanned by CamScanner

7. (a) Diagram 7.1 shows two students playing badminton in a tournament.

*Rajah 7.1 menunjukkan dua orang pelajar sedang bermain badminton dalam satu kejohanan.*

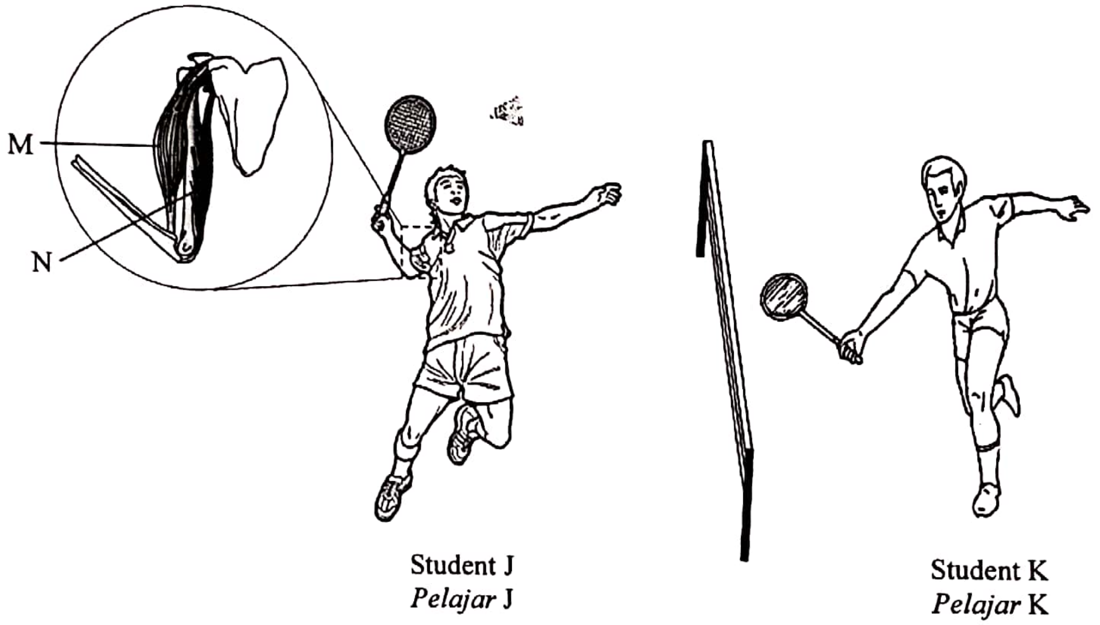


Diagram 7.1
*Rajah 7.1*

(i) Explain the action of the muscle M and N to bend the forearm in student J.

*Terangkan pergerakan otot* M *dan* N *untuk membengkokkan lengan pelajar* J

[4 *marks*]
[4 *markah*]

(ii) Student K immediately responses to return the shuttlecock that was smashed by student J.

*Pelajar* K *segera bertindakbalas menghantar kembali bulu tangkis yang dipukul oleh pelajar* J.

Explain the transmission of impulses in that situation.

*Terangkan penghantaran impuls dalam situasi tersebut.*

[6 *marks*]
[6 *markah*]

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(b) Diagram 7.2 shows a graph of bone mass against age in women suffering from osteoporosis.

*Rajah 7.2 menunjukkan graf jisim tulang melawan umur bagi wanita penghidap osteoporosis.*

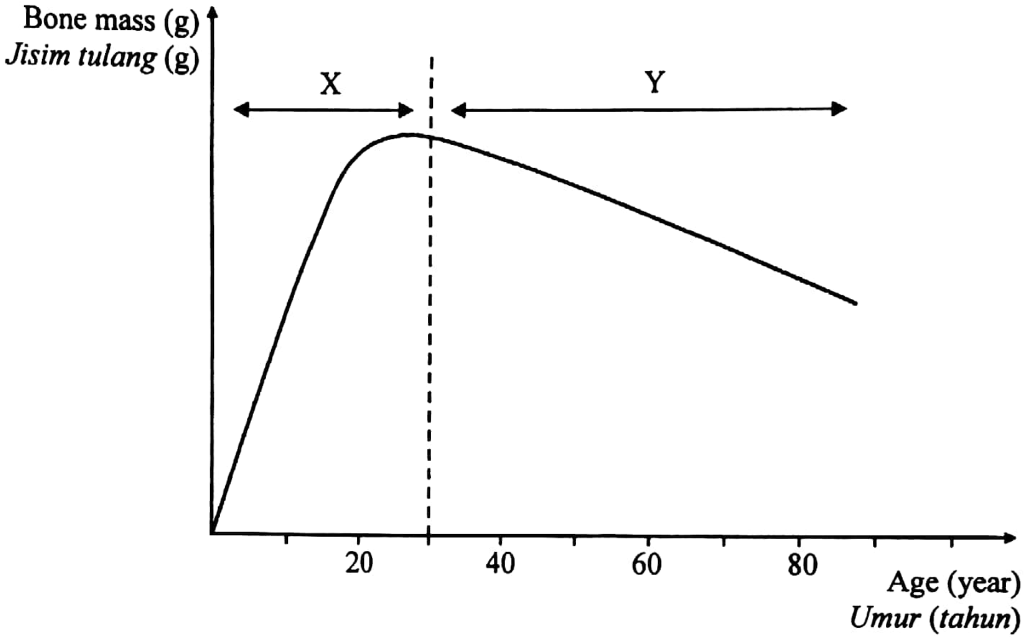


Diagram 7.2
*Rajah* 7.2

(i) Explain the graph at phase X and Y.

*Terangkan graf tersebut pada fasa* X *dan* Y.

[4 *marks*]
[4 *markah*]

(ii) Suggest and explain what should be taken to prevent the disease.

*Cadangkan dan terangkan langkah–langkah yang perlu diambil untuk mengelakkan penyakit tersebut.*

[6 *marks*]
[6 *markah*]

*[Lihat halaman sebelah]*
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8. Diagram 8.1 shows a stomach in a human.
Diagram 8.2 shows longitudinal section of the stomach wall.

*Rajah* 8.1 *menunjukkan perut manusia*
*Rajah* 8.2 *menunjukkan keratan memanjang dinding perut.*

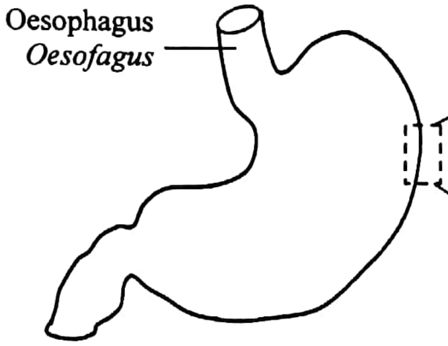


Diagram 8.1
*Rajah* 8.1

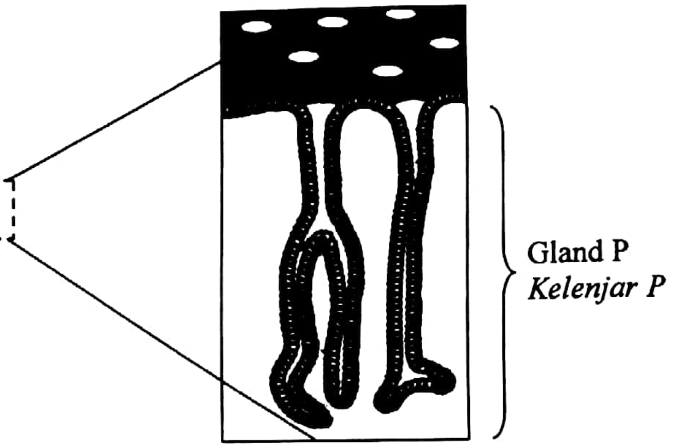


Diagram 8.2
*Rajah* 8.2

(a) Explain what happens to the digestion process if gland P fails to function.

*Terangkan apakah yang berlaku kepada proses pencernaan sekiranya kelenjar* P *gagal berfungsi.*

[6 *marks*]
[6 *markah*]



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(b) The balanced diet of different people vary according to their life style, health condition and specific nutrition need.

*Gizi seimbang setiap individu adalah berlainan, bergantung kepada gaya hidup, keadaan kesihatan dan nutrisi khas yang diperlukan.*

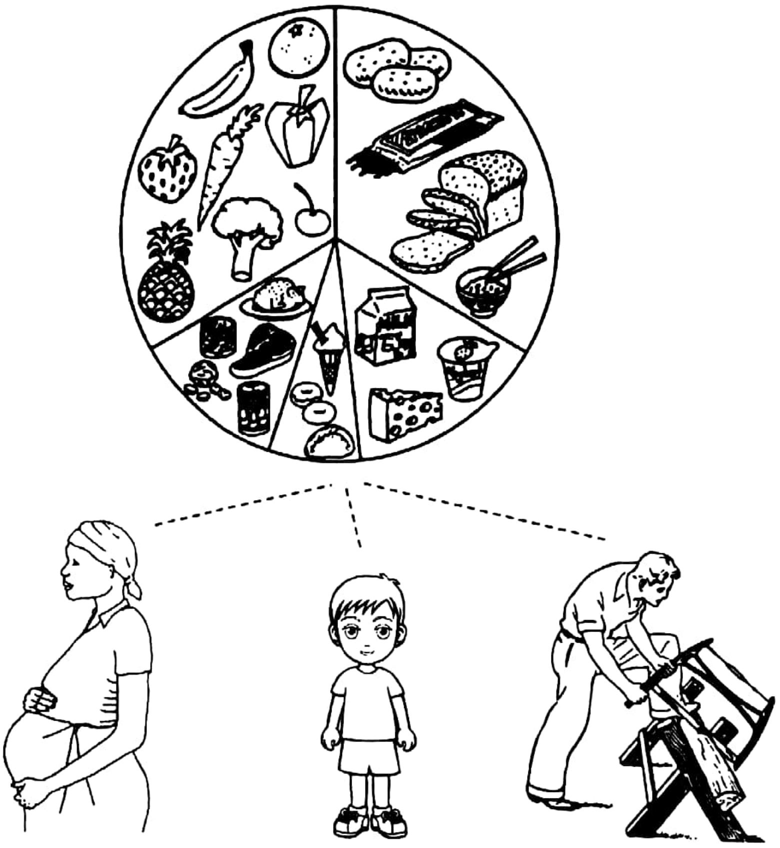

Diagram 8.3
*Rajah* 8.3

Discuss the importance of appropriate balanced diet for three individuals in Diagram 8.3.

*Bincangkan kepentingan gizi seimbang yang sesuai untuk ketiga – tiga individu dalam Rajah* 8.3.

[10 *marks*]
[10 *markah*]

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(c) Diagram 8.2 shows the relationship between photosynthesis and respiration in a plant.

*Rajah 8.2 menunjukkan hubungan antara fotosintesis dan respirasi dalam tumbuhan.*

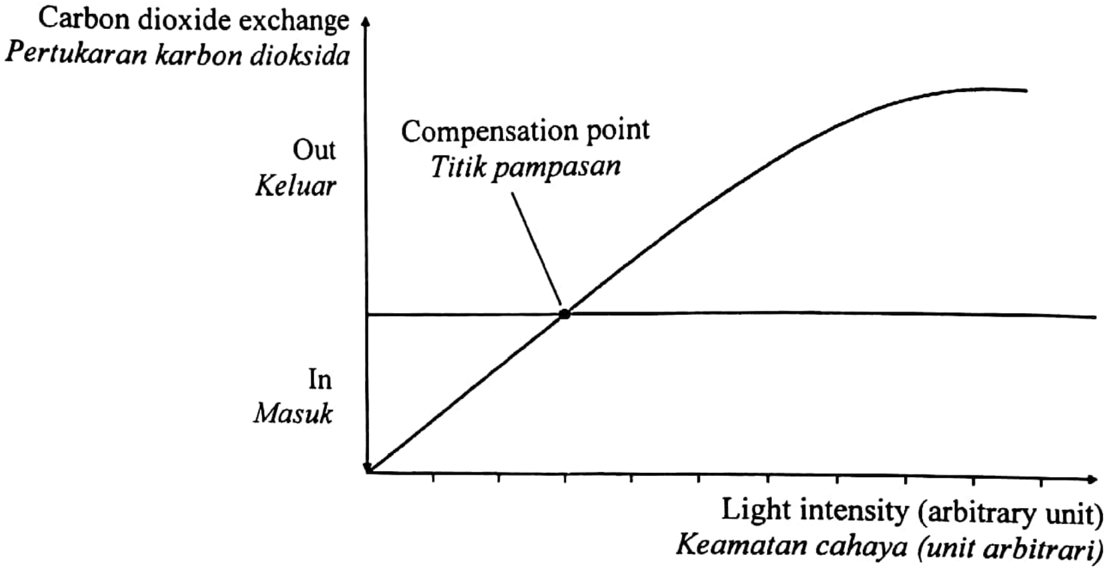


Diagram 8.2
*Rajah* 8.2

Predict what will happen to the plant that constantly remain at the compensation point.

*Ramalkan apakah yang akan terjadi kepada tumbuhan yang kekal berada di titik pampasan.*

[4 *marks*]
[*4 markah*]



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9. (a) Diagram 9.1 shows the emergency personnel in protective suits prepared to clean up the Sungai Kim - Kim in Pasir Gudang, Johor. Sungai Kim-Kim is located nearby the chemical processing industrial area.

*Rajah 9.1 menunjukkan kakitangan kecemasan dalam sut perlindungan bersedia untuk membersihkan Sungai Kim-Kim di Pasir Gudang. Sungai Kim-Kim terletak berhampiran kawasan industri pemprosesan bahan kimia.*

Diagram 9.1
*Rajah* 9.1

(a) Explain the bad effects by the presence of factories to Sungai Kim-Kim.

*Terangkan kesan buruk kewujudan kilang-kilang terhadap Sungai Kim-Kim.*

[4 *marks*]
[4 *markah*]

(b) Describe ways to improve the water quality of the river for better survival of aquatic organisms.

*Huraikan cara-cara penambahbaikan kualiti air sungai untuk kemandirian organisma akuatik.*

[6 *marks*]
[6 *markah*]

*[Lihat halaman sebelah]*

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(c) Diagram 9.2 shows an industrial area that contributes to the changes of the air quality.

*Rajah 9.2 menunjukkan satu kawasan industri yang menyumbang kepada perubahan kualiti udara.*

Diagram 9.2
*Rajah 9.2*

Explain how the activity in Diagram 9.2 changes the pH value of the rainwater.
*Terangkan bagaimana aktiviti dalam Rajah 9.2 mengubah nilai pH air hujan.*

[6 *marks*]
[6 *markah*]



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(d)

Wangari Maathai is the first environmentalist to win the Nobel Peace Prize Prestigious Award. She founded the Green Belt Movement, the largest tree planting project in Africa aimed at promoting biodiversity. To date, her organization has planted more than 30 million trees. She was also honored for her contribution towards sustainable development in her country.

*Wangari Maathai ialah pencinta alam pertama memenangi anugerah berprestij Hadiah Nobel Keamanan. Beliau mengasaskan Pergerakan Tali Pinggang Hijau, projek penanaman pokok terbesar di Afrika bertujuan mempromosi kepelbagaian bio. Terkini, organisasi beliau telah menanam lebih daripada 30 juta pokok. Beliau juga mendapat pengiktirafan atas sumbangan terhadap pembangunan lestari negaranya.*

Based on the above statement, explain the importance of conserving tropical rain forest for human.

*Berdasarkan pernyataan di atas, terangkan kepentingan memelihara hutan hujan tropika kepada manusia.*

[4 *marks*]
[4 *markah*]



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