

**Bahagian A / Section A**

[20 markah / 20 marks]

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

1. Satu eksperimen telah dijalankan untuk mengkaji kadar denyutan nadi berdasarkan jantina. Jadual 1.1 menunjukkan purata kadar denyutan nadi berdasarkan jantina. Jadual 1.1 menunjukkan purata kadar denyutan nadi bagi setiap kumpulan yang terdiri daripada seorang murid lelaki dan perempuan dari tingkatan 4 Sains selepas mereka melakukan aktiviti senaman.

*An experiment was conducted to study pulse rates based on gender. Table 1.1 shows the average pulse rate by gender. Table 1.1 shows the average pulse rate for each group consisting of one male and female students from Form 4 Science after they did an exercise activity.*

| Jantina<br>Gender | Kadar denyutan nadi (bpm)<br>Pulse rate (bpm) |                       |                       |                   |
|-------------------|-----------------------------------------------|-----------------------|-----------------------|-------------------|
|                   | Kumpulan 1<br>Group 1                         | Kumpulan 2<br>Group 2 | Kumpulan 3<br>Group 3 | Purata<br>Average |
| Lelaki<br>Boy     | 175                                           | 170                   | 165                   | 170               |
| Perempuan<br>Girl | 192                                           | 195                   | 183                   | 190               |

Jadual 1.1

Table 1.1

- (a) Nyatakan satu pemerhatian daripada eksperimen ini.

*State one observation from this experiment.*

.....

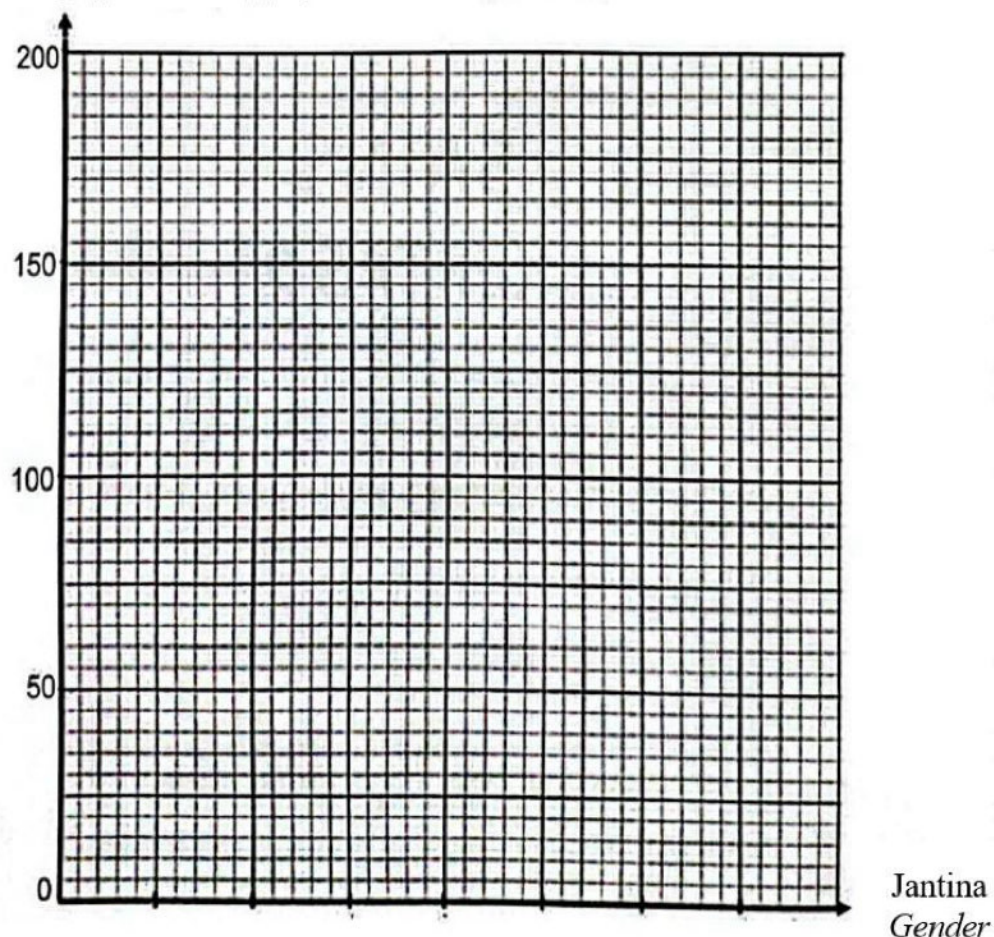
[1 markah/mark]

- (b) Berdasarkan Jadual 1.1, lukiskan graf palang bagi purata kadar denyutan nadi melawan jantina.

*Based on Table 1.1, draw a bar graph of the average pulse rate versus gender.*

Purata kadar denyutan nadi (bpm)

*Average pulse rate (bpm)*



[2 markah/marks]

- (c) Nyatakan faktor yang diperhatikan dalam eksperimen ini.

*State the factor observed in this experiment.*

.....

[1 markah/mark]

- (d) Eksperimen ini diulangi dengan melibatkan dua orang murid lain dengan melakukan aktiviti senaman yang sama. Keputusan eksperimen adalah seperti Jadual 1.2.

*This experiment was repeated by involving two other students by doing the same exercise activity. The results of the experiment are as shown in Table 1.2.*

| <b>Jantina</b><br><b>Gender</b> | <b>Kadar denyutan nadi (bpm)</b><br><b>Pulse rate (bpm)</b> |
|---------------------------------|-------------------------------------------------------------|
| Lelaki<br><i>Male</i>           | 180                                                         |
| Perempuan<br><i>Female</i>      | 150                                                         |

Jadual 1.2

Table 1.2

Mengapakah kadar denyutan nadi murid perempuan pada Jadual 1.2 berbeza daripada Jadual 1.1?

*Why is the pulse rate of female pupils in Table 1.2 different from Table 1.1?*

.....  
.....

[1 markah/mark]

2. Jadual 2 menunjukkan keputusan eksperimen yang dijalankan untuk mengkaji kesan kepekatan antibiotik (penisilin) ke atas pertumbuhan bakteria.

*Table 2 shows the result of an experiment that was conducted to study the effect of concentrated antibiotic (penicillin) on the growth of bacteria.*

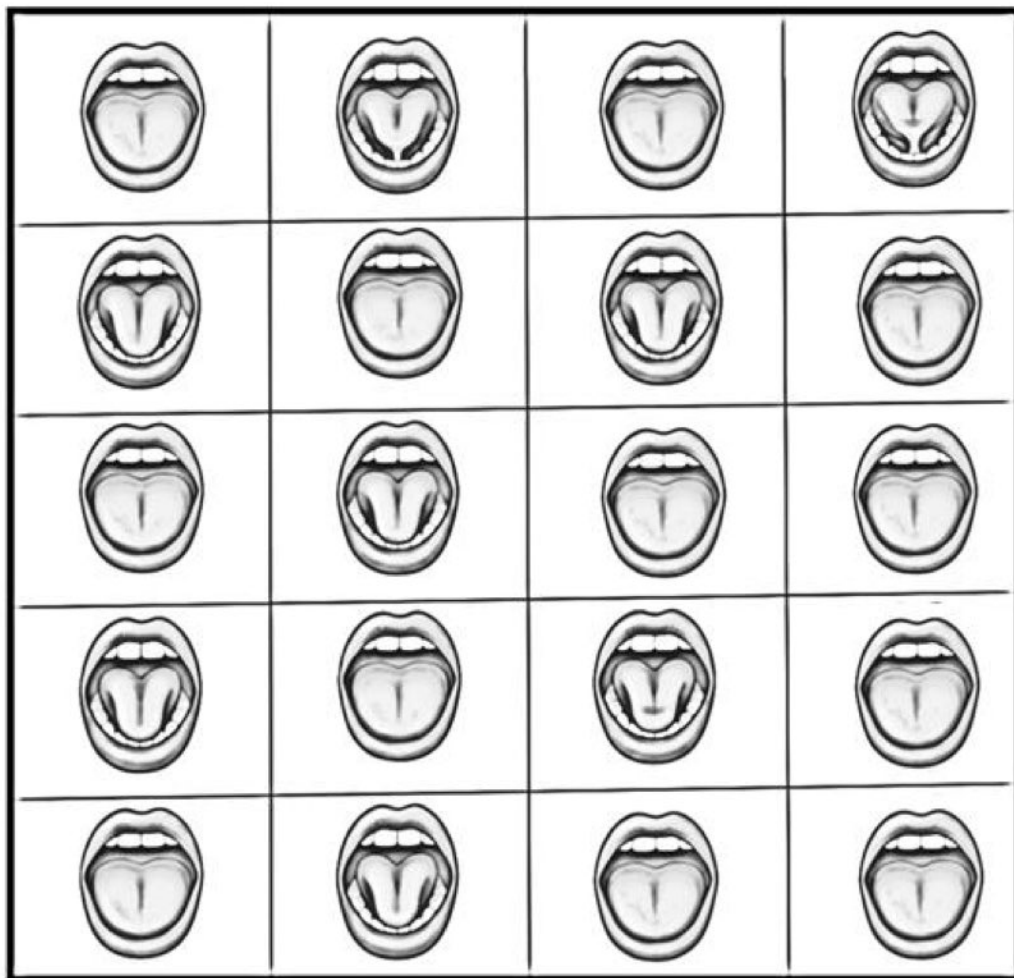
| <b>Kepekatan antibiotik</b><br><b>Concentration of antibiotic (%)</b> | <b>Luas kawasan jernih</b><br><b>Area of clear region (cm<sup>3</sup>)</b> |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------|
| 0                                                                     | Tiada<br><i>None</i>                                                       |
| 10                                                                    | Kecil<br><i>Small</i>                                                      |
| 20                                                                    | Besar<br><i>Big</i>                                                        |
| 30                                                                    | Paling besar<br><i>The biggest</i>                                         |

Jadual 2

Table 2

|                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Berdasarkan keputusan eksperimen di atas,<br><i>Based on the experiment's result above,</i> |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                           |
| (a)                                                                                         | i.                                                                                                                                                                                                                                                                                                                                                                                                                 | Nyatakan pemerhatian bagi eksperimen ini.<br><i>State the observation for this experiment.</i><br>.....<br>.....<br><div style="text-align: right;">[1 markah/mark]</div> |
|                                                                                             | ii.                                                                                                                                                                                                                                                                                                                                                                                                                | Nyatakan hipotesis bagi eksperimen ini.<br><i>State the hypothesis for this experiment.</i><br>.....<br>.....<br><div style="text-align: right;">[1 markah/mark]</div>    |
| (b)                                                                                         | Nyatakan pemboleh ubah<br><i>State the variable</i>                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                           |
|                                                                                             | i.                                                                                                                                                                                                                                                                                                                                                                                                                 | Dimanipulasikan :<br><i>Manipulated :</i><br>.....<br><div style="text-align: right;">[1 markah/mark]</div>                                                               |
|                                                                                             | ii.                                                                                                                                                                                                                                                                                                                                                                                                                | Bergerak balas :<br><i>Responding :</i><br>.....<br><div style="text-align: right;">[1 markah/mark]</div>                                                                 |
| (c)                                                                                         | Antibiotik digunakan untuk merawat penyakit yang disebabkan oleh bakteria.<br>Nyatakan definisi secara operasi bagi antibiotik berdasarkan eksperimen ini.<br><i>Antibiotics is a substance that is used to treat diseases caused by bacteria. State the operational definition of an antibiotic based on this experiment.</i><br>.....<br>.....<br>.....<br><div style="text-align: right;">[1 markah/mark]</div> |                                                                                                                                                                           |

3. Seorang murid tingkatan 5 telah menjalankan eksperimen untuk mengkaji variasi bagi suatu trait kebolehan menggulung lidah dalam kalangan rakan-rakannya di tingkatan 5 Perdana. *A Form 5 student conducted an experiment to study variations in a trait of tongue-rolling ability among his Form 5 Perdana classmates.*



Rajah 3  
Diagram 3

- (a) Berdasarkan Rajah 3, lengkapkan Jadual 3.  
*Based on Diagram 3, complete Table 3.*

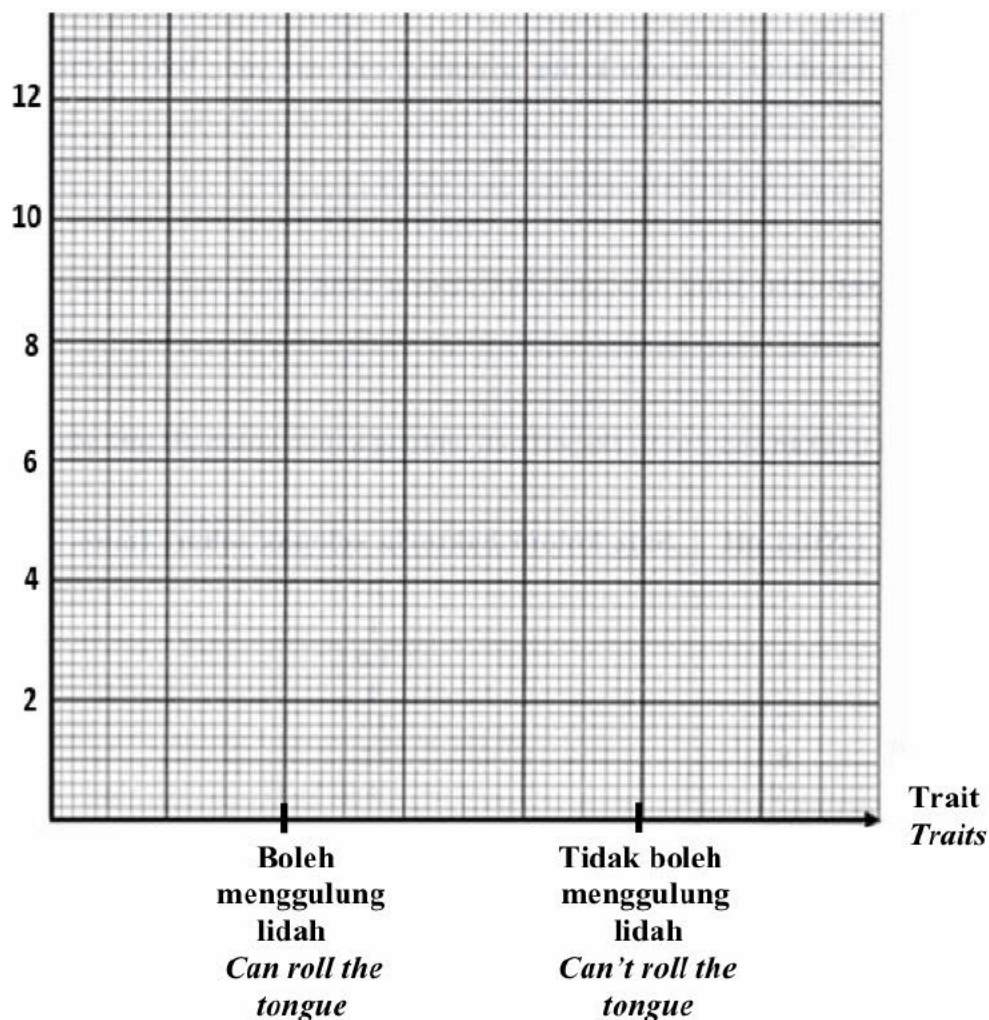
| <b>Trait</b><br><b>Traits</b>                                | <b>Bilangan murid</b><br><b>Number of students</b> |
|--------------------------------------------------------------|----------------------------------------------------|
| Boleh menggulung lidah<br><i>Can roll the tongue</i>         |                                                    |
| Tidak boleh menggulung lidah<br><i>Can't roll the tongue</i> |                                                    |

Jadual 3  
Table 3

[1 markah/mark]

- (b) Berdasarkan Jadual 3, lukiskan graf palang bagi bilangan murid melawan trait.  
*Based on Table 3, draw a bar graph of the number of students versus traits.*

**Bilangan murid**  
*Number of students*



[2 markah/marks]

- (c) Jika seorang murid lain yang tidak dapat menggulung lidah berlatih selama bertahun-tahun, adakah dia akan dapat menggulung lidah akhirnya?  
*For the students who are unable to roll the tongue, will they be able to roll the tongue after practice for years?*

Terangkan jawapan anda.

*Explain your answer.*

.....

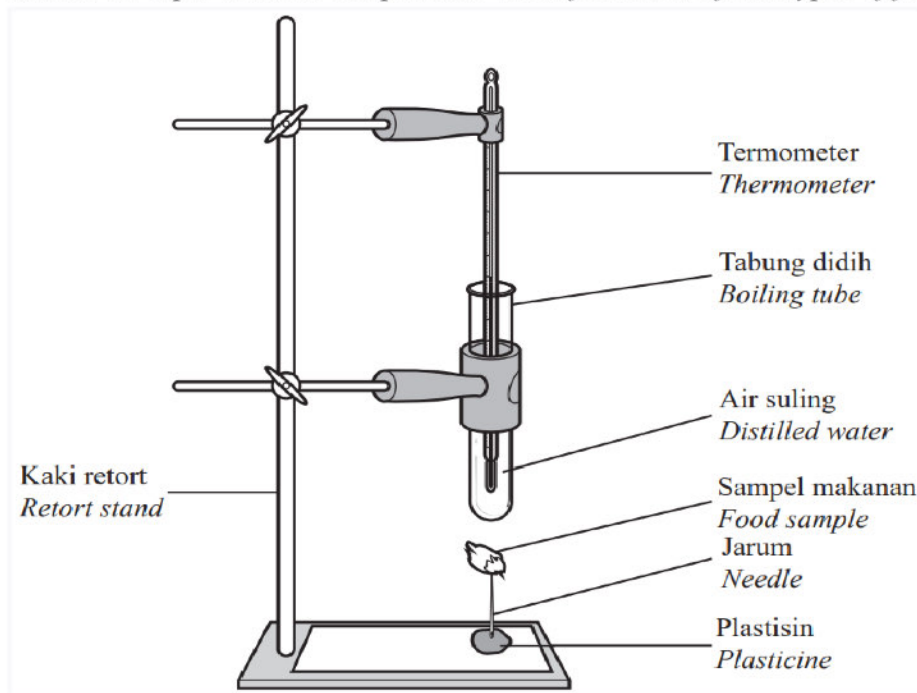
.....

.....

[2 markah/marks]

4. Rajah 4 menunjukkan eksperimen untuk membandingkan nilai kalori bagi dua jenis makanan.

*Diagram 4 shows an experiment to compare the calorific values of two types of food.*



Rajah 4  
Diagram 4

Keputusan eksperimen direkodkan dalam Jadual 4.

*The results of the experiment are recorded in Table 4.*

| Jenis makanan<br><i>Type of food</i>                                             | Kacang tanah<br><i>Groundnut</i> | Roti<br><i>Bread</i> |
|----------------------------------------------------------------------------------|----------------------------------|----------------------|
| Jisim makanan (g)<br><i>Mass of food (g)</i>                                     | 1                                | 1                    |
| Jisim air (g)<br><i>Mass of water (g)</i>                                        | 10                               | 10                   |
| Perubahan suhu (°C)<br><i>Change in water temperature (°C)</i>                   | 85                               | 27                   |
| Nilai kalori (kJ g <sup>-1</sup> )<br><i>Calorific value (kJ g<sup>-1</sup>)</i> | 3.57                             |                      |

Jadual 4  
Table 4

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) | Berdasarkan Jadual 4,<br><i>Based on Table 4,</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|     | i. Tuliskan satu pemerhatian bagi eksperimen ini.<br><i>Write one observation for this experiment.</i><br><br>.....<br><div style="text-align: right;">[1 markah/mark]</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|     | ii. Berikan satu inferens bagi jawapan anda di 4 (a)(i).<br><i>Give one inference for your answer in 4 (a)(i).</i><br><br>.....<br>.....<br><div style="text-align: right;">[1 markah/mark]</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (b) | Berdasarkan Jadual 4, hitungkan nilai kalori bagi roti dengan menggunakan formula di bawah.<br><i>Based on Table 4, calculate the calorific value of bread using the formula given below.</i><br><br>$\text{Nilai kalori (kJ g}^{-1}\text{)} = \frac{4.2 \text{ J g}^{-1}\text{°C}^{-1} \times \text{Jisim air (g)} \times \text{Perubahan suhu air (°C)}}{\text{Jisim makanan (g)} \times 1\,000}$ $\text{Calorific value (kJ g}^{-1}\text{)} = \frac{4.2 \text{ J g}^{-1}\text{°C}^{-1} \times \text{Mass of water (g)} \times \text{Change in water temperature (°C)}}{\text{Mass of food (g)} \times 1\,000}$ Nilai kalori bagi roti:<br><i>Calorific value of bread:</i><br><br><br><br><br><br><br><br><br><br><div style="text-align: right;">[2 markah/marks]</div> |
| (c) | Pada pendapat anda, apakah kesan sekiranya seseorang itu mengambil lebih kalori daripada keperluan badan?<br><i>In your opinion, what is the effect if a person consumes more calories than the body needs?</i><br><br>.....<br>.....<br><div style="text-align: right;">[1 markah/mark]</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Bahagian B / Section B**

[38 markah / 38 marks]

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

5. Rajah 5 menunjukkan situasi semasa bertugas di Jabatan Kecemasan dan Trauma Hospital Serdang, Doktor Alifah Ilyana sedang melakukan bantuan kecemasan ke atas seorang pesakit mengikut prosedur perubatan yang ditetapkan.

*Diagram 5 shows the situation while working at the Emergency and Trauma Department of Serdang Hospital, Doctor Alifah Ilyana was performing emergency help on a patient according to prescribed medical procedures.*



Rajah 5

Diagram 5

- (a) Apakah yang dimaksudkan dengan bantuan kecemasan?

*What is meant by emergency help?*

.....

.....

.....

[1 markah/mark]

- (b) Namakan bantuan kecemasan yang ditunjukkan dalam Rajah 5.

*Name the emergency help shown in Diagram 5.*

.....

[1 markah/mark]

- (c) Berikan dua situasi yang memerlukan bantuan kecemasan seperti Rajah 5.  
*Give two situations that require emergency help as shown in the Diagram 5.*

i .....  
 ii .....

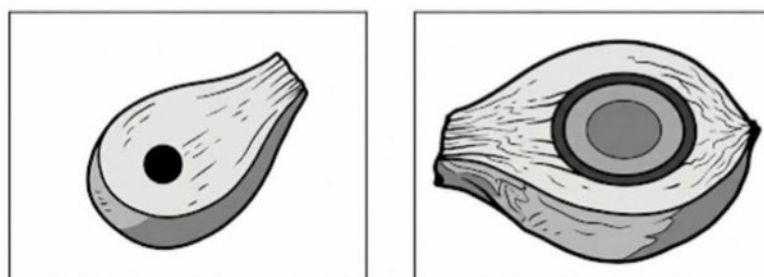
[2 markah/marks]

- (d) Nyatakan dua kepentingan bantuan kecemasan yang dinamakan di 5(b).  
*State two important aspects of emergency help mentioned in 5(b).*

i .....  
 .....  
 ii .....  
 .....

[2 markah/marks]

6.



Jenis A  
 Type A

Jenis B  
 Type B

Rajah 6  
 Diagram 6

- (a) Berdasarkan Rajah 6, buah kelapa sawit manakah yang menghasilkan minyak yang mempunyai nilai yang tinggi di pasaran? Terangkan jawapan anda.  
*Based on Diagram 6, which palm oil fruits can be used to produce oil with higher market value? Explain your answer.*

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

[2 markah/marks]

- (b) Jelaskan secara ringkas mengapa buah kelapa sawit perlu dihantar ke kilang pemprosesan dalam masa 24 jam selepas penuaian.

*Briefly explain why oil palm fruits need to be sent to the factory for processing within 24 hours after harvesting.*

.....  
 .....

[2 markah/marks]

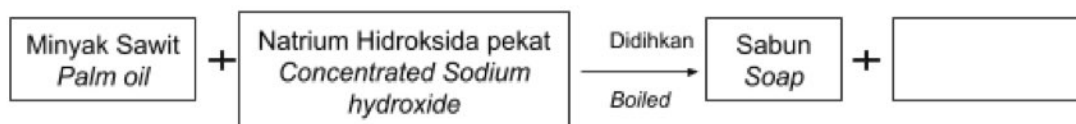
- (c) Minyak sawit boleh digunakan untuk menghasilkan sabun.  
 Persamaan bagi tindak balas yang menghasilkan sabun ditunjukkan di bawah.

*Palm oil can be used to produce soap.*

*The equation for the reaction to produce soap is shown below.*

Lengkapkan persamaan yang di tunjukkan di bawah.

*Complete the equation shown below.*



[1 markah/mark]

- (d) Apakah nama tindak balas yang ditunjukkan dalam persamaan itu?

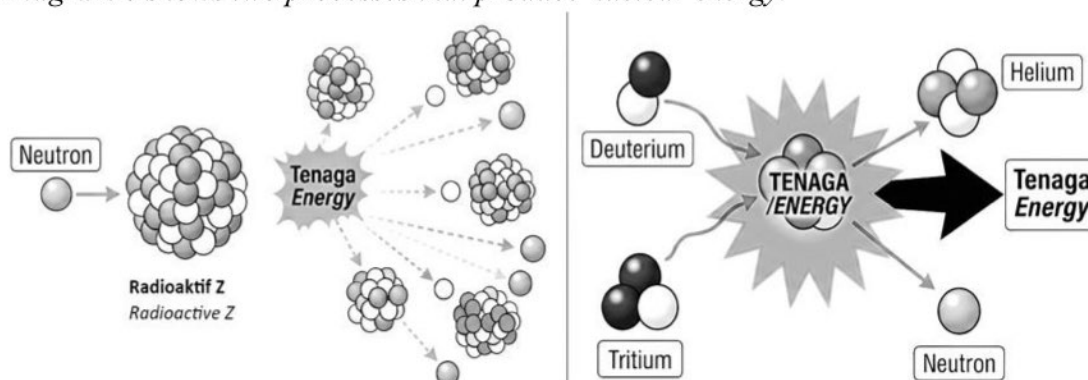
*What is the name of the reaction shown in the equation?*

.....

[1 markah/mark]

7. Rajah 7 menunjukkan dua proses yang menghasilkan tenaga nuklear.

*Diagram 7 shows two processes that produce nuclear energy.*



Proses X / Process X

Proses Y / Process Y

Rajah 7  
 Diagram 7

- (a) Proses manakah yang menghasilkan lebih banyak tenaga?

*Which process produces more energy?*

.....

[1 markah/mark]

- (b) Berikan **satu** keadaan yang diperlukan untuk proses di 7(a) berlaku.

*Give **one** condition that is necessary for the process in 7(a) to occur.*

.....

[1 markah/mark]

- (c) Namakan **satu** negara yang menggunakan tenaga nuklear sebagai sumber tenaga dan nyatakan sebabnya.

*Name **one** country that uses nuclear energy as a source of energy and state the reason.*

.....

.....

.....

[2 markah/marks]

- (d) Namakan bahan radioaktif Z yang digunakan dalam proses X. Cadangkan satu cara untuk mengendalikan bahan radioaktif dengan betul.

*Name the radioactive Z used in process X. Suggest a way to properly handle the radioactive material.*

.....

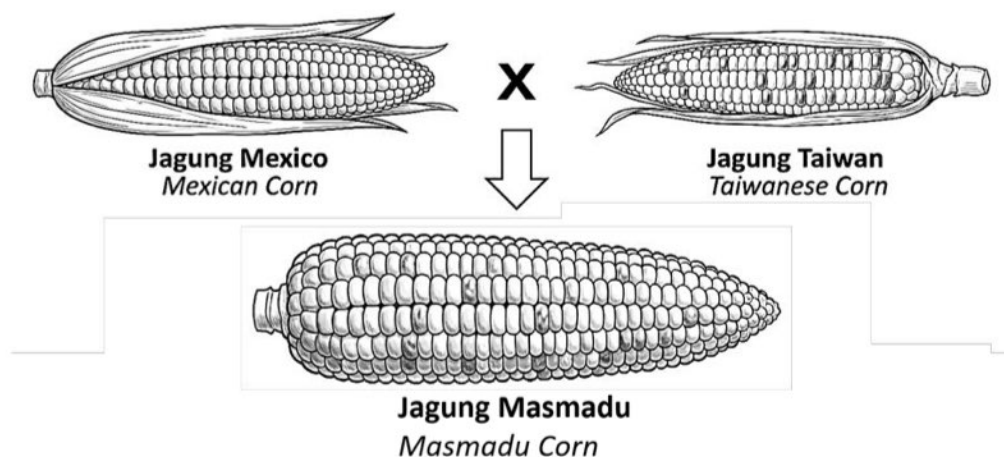
.....

.....

[2 markah/marks]

8. Organisma Termodifikasi Genetik (GMO) adalah satu kaedah teknologi kejuruteraan genetik yang digunakan untuk tujuan tertentu. Rajah 8.1 menunjukkan GMO yang dijalankan ke atas buah jagung.

*Genetically Modified Organism (GMO) is a method of genetic engineering technology used for specific purposes. Diagram 8.1 shows GMO that has been carried out on corn.*



Rajah 8.1

Diagram 8.1

- (a) i. Jagung Masmadu merupakan contoh Organisma Termodifikasi Genetik (GMO) yang dihasilkan untuk meningkatkan kualiti hasil pertanian. Ramalkan **dua** ciri fizikal atau sifat baharu yang mungkin dimiliki oleh Jagung Masmadu ini berbanding dengan pokok jagung asal bagi membantu para petani meningkatkan keuntungan mereka.

*Masmadu corn is an example of a Genetically Modified Organism (GMO) produced to improve the quality of agricultural produce. Predict **two** new physical characteristics or traits that this Masmadu corn might possess compared to the original corn plant, which would help farmers increase their profits.*

.....

.....

.....

.....

.....

[2 markah/marks]

- ii. Penggunaan teknologi GMO mampu menghasilkan tanaman jagung yang berkualiti tinggi dalam kuantiti yang banyak bagi menampung keperluan makanan penduduk dunia. Namun begitu, segelintir masyarakat enggan membeli produk GMO kerana bimbang kesan jangka panjang terhadap kesihatan dan alam sekitar. Berikan justifikasi anda dengan menilai **satu kebaikan** dan **satu risiko** pengambilannya kepada manusia.

*The use of GMO technology is able to produce high-quality corn crops in large quantities to meet the food needs of the world's population. However, some people are reluctant to buy GMO products because of concerns about the long-term effects on health and the environment. Give your justification by evaluating **one benefit** and **one risk** of consuming it to humans.*

.....

.....

.....

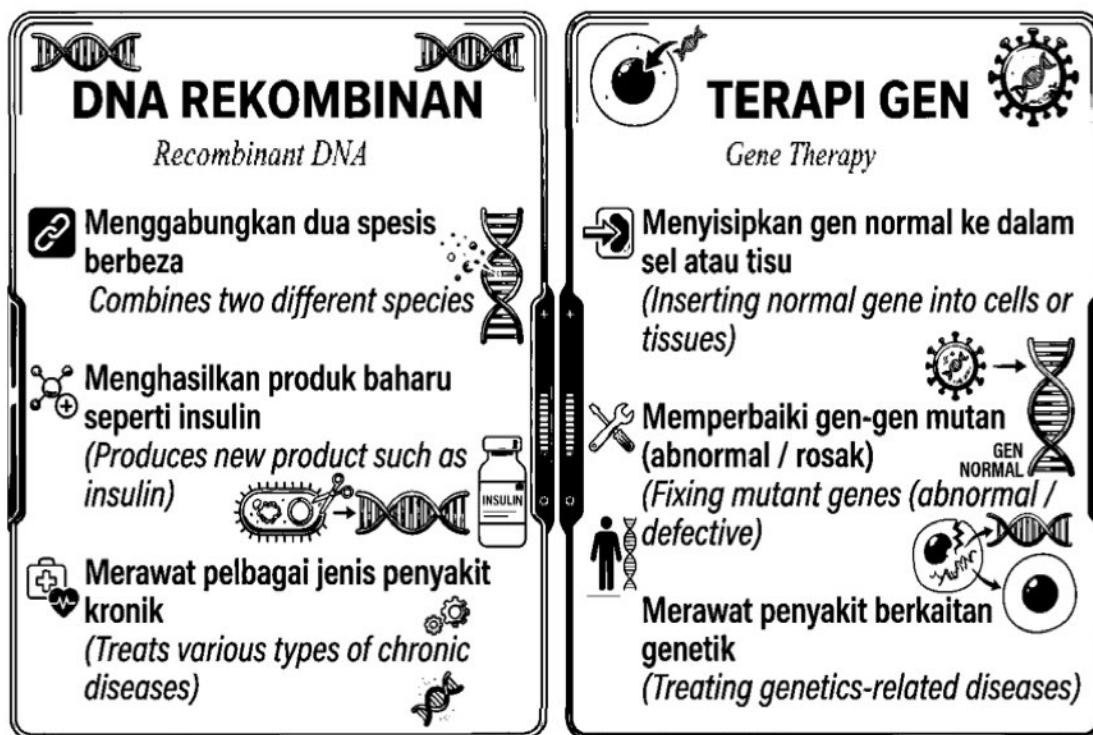
.....

.....

[2 markah/marks]

- (b) Rajah 8.2 menunjukkan maklumat bagi dua jenis kejuruteraan genetik.

*Diagram 8.2 shows information for two types of genetic engineering.*



Rajah 8.2  
Diagram 8.2

Banding beza kedua-dua jenis kejuruteraan genetik tersebut.

*Compare and contrast the two types of genetic engineering.*

.....

.....

.....

.....

[2 markah/marks]

9. Rajah 9.1 menunjukkan seorang pekerja di sebuah kilang pemprosesan getah sedang menuang asid formik ke dalam tangki penggumpalan yang mengandungi lateks cair untuk menghasilkan lateks tergumpal.

*Diagram 9.1 shows a worker in a rubber processing factory pouring formic acid into a coagulation tank containing liquid latex to produce coagulated latex.*



Rajah 9.1

Diagram 9.1

- (a) Berdasarkan pemerhatian, namakan ion bercas yang menyebabkan lateks berubah keadaan fizikalnya menjadi seperti yang ditunjukkan dalam Rajah 9.1.

*Based on the observations, name the charged ion that causes the latex to change its physical state to the one shown in Diagram 9.1.*

.....

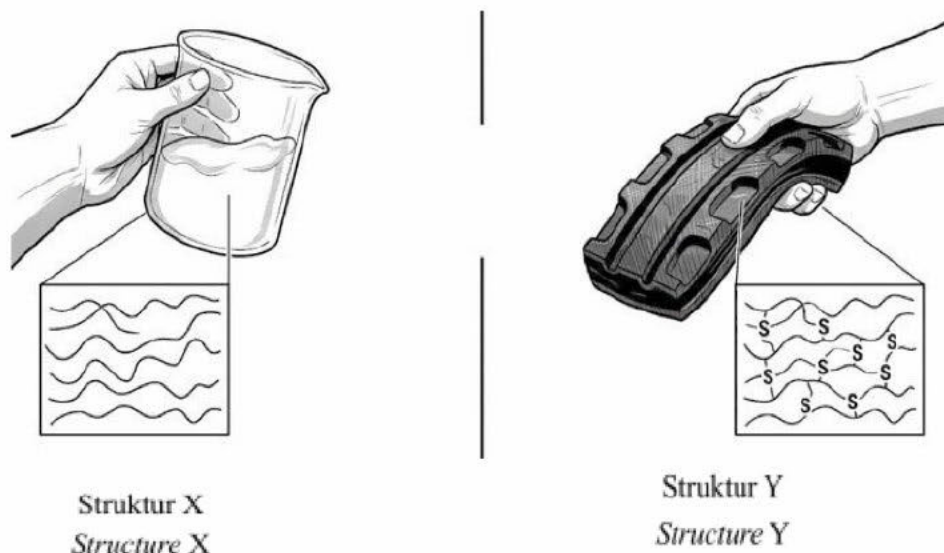
[1 markah/mark]

- (b) Seorang pengusaha ladang getah ingin menghantar susu getah segar (lateks) dalam keadaan cecair ke kilang tersebut yang terletak jauh di bandar. Cadangkan satu larutan bahan kimia yang perlu ditambah oleh pengusaha ladang tersebut bagi memastikan lateks berada dalam keadaan asal semasa diangkut ke kilang.

*A rubber plantation operator wants to send fresh latex in liquid form to the factory which is located far away from the city. Suggest a chemical solution that the plantation operator should add to ensure that the latex remains in its original state during transportation to the factory.*

[1 markah/mark]

- (c) Setelah tiba di kilang, lateks tersebut diproses melalui satu kaedah kimia bagi menghasilkan struktur getah yang berbeza seperti yang ditunjukkan dalam Rajah 9.2. *After arriving at the factory, the latex is processed through a chemical method to produce different rubber structures as shown in Diagram 9.2.*



Rajah 9.2  
Diagram 9.2

Berdasarkan Rajah 9.2, bandingkan kekuatan struktur X dan struktur Y. Wajarkan jawapan anda.

*Based on Diagram 9.2, compare the strength of structure X and structure Y. Justify your answer.*

[2 markah/ marks]

- (d) Anda dikehendaki menghasilkan satu model bola mainan kenyal dengan menggunakan bahan-bahan berikut.

*You are required to produce a model of an elastic toy ball using the following materials.*

- Susu getah segar (lateks)  
*Fresh latex*
- Cuka makan  
*Vinegar*
- Acuan plastik kecil  
*Small plastic mould*

Tuliskan langkah-langkah untuk penghasilan bola mainan kenyal tersebut.

*Write the steps to produce the elastic toy ball.*

1. ....  
.....  
.....  
.....
2. ....  
.....  
.....  
.....
3. ....  
.....  
.....  
.....
4. Bilas bola getah tersebut dengan air bersih untuk membuang sisa cuka, kemudian lap sehingga kering sebelum digunakan sebagai bola mainan kenyal.  
*Rinse the rubber ball with clean water to remove any vinegar residue, then wipe it dry before using it as an elastic toy ball.*

[3 markah/ marks]

10. Rajah 10.1 menunjukkan kaedah yang digunakan untuk meningkatkan kuantiti dan kualiti pengeluaran makanan.

*Diagram 10.1 shows the method used to increase the quantity and quality of food production.*



Rajah 10.1

*Diagram 10.1*

- (a) i. Namakan kaedah pertanian dalam Rajah 10.1.

*Named the method used in Diagram 10.1.*

.....

- ii. Terangkan bagaimana kaedah tersebut dapat meningkatkan pengeluaran makanan untuk menampung keperluan penduduk yang semakin bertambah?

*Explain how the method above could increase food production to meet the needs of a growing population?*

.....

.....

.....

.....

[2 markah/marks]

- (b) Seorang petani mendapati bahawa tanamannya kurang menghasilkan buah pada tahun ini. Rajah 10.2 menunjukkan tiga jenis baja di pasaran yang boleh membantu mengatasi masalah petani tersebut.

*A farmer found out that his crops produced less fruits this year. Diagram 10.2 shows three types of fertilizers on the market that can help overcome the farmer's problem.*



Rajah 10.2  
Diagram 10.2

Antara berikut, baja yang manakah paling sesuai digunakan untuk mengatasi masalah ini? Terangkan pilihan anda.

*Which of the following fertilizers is most suitable to be used to overcome this problem? Explain your choice.*

.....

.....

.....

.....

[2 markah/marks]

- (c) Nina tinggal di tingkat 15 sebuah pangsapuri dengan ruang balkoni yang terhad. Beliau ingin menanam sayur-sayuran hijau seperti sawi dan salad bagi menjimatkan perbelanjaan runcit.

Dengan menggunakan bahan-bahan yang diberi, anda diminta untuk membantu Nina membina sebuah model tanaman hidroponik. Terangkan model anda.

*Nina lives on the 15th floor of an apartment with limited balcony space. She wants to grow green vegetables such as mustard and lettuce, to save on groceries expenses.*

*By using the materials given, you are asked to help Nina by building a hydroponic planting model. Explain your model.*

|                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |
| Botol mineral<br><i>Mineral bottle</i>                                            | Kapas<br><i>Cotton</i>                                                            | Biji benih<br><i>Seedling</i>                                                     | Tali sumbu<br><i>Wick</i>                                                          | Pisau<br><i>Cutter</i>                                                              | Larutan baja<br><i>Fertiliser solution</i>                                          |

Penerangan :

*Description :*

.....

.....

.....

.....

.....

.....

[3 markah/marks]

**Bahagian C / Section C**

[22 markah / 22 marks]

Jawab Soalan 11 dan sama ada Soalan 12 atau Soalan 13.

Answer Question 11 and either Question 12 or Question 13.

11. Rajah 11 menunjukkan perbualan di antara dua orang murid di bilik masakan sekolah.  
*Diagram 11 shows a conversation between two students in a school kitchen room.*



Rajah 11

Diagram 11

Berdasarkan perbualan tersebut, rancang satu eksperimen dalam makmal dengan menggunakan bahan larutan natrium tiosulfat  $0.2 \text{ mol dm}^{-3}$ , asid sulfurik  $1 \text{ mol dm}^{-3}$ , kertas putih dengan tanda X, kelalang kon  $250 \text{ cm}^3$ , silinder penyukat  $50 \text{ cm}^3$ , silinder penyukat  $10 \text{ cm}^3$ , jam randik, termometer, penunu Bunsen, tungku kaki tiga dan kasa dawai untuk mengkaji satu faktor yang mempengaruhi kadar tindak balas.

Perancangan eksperimen tersebut perlu mengandungi kriteria berikut:

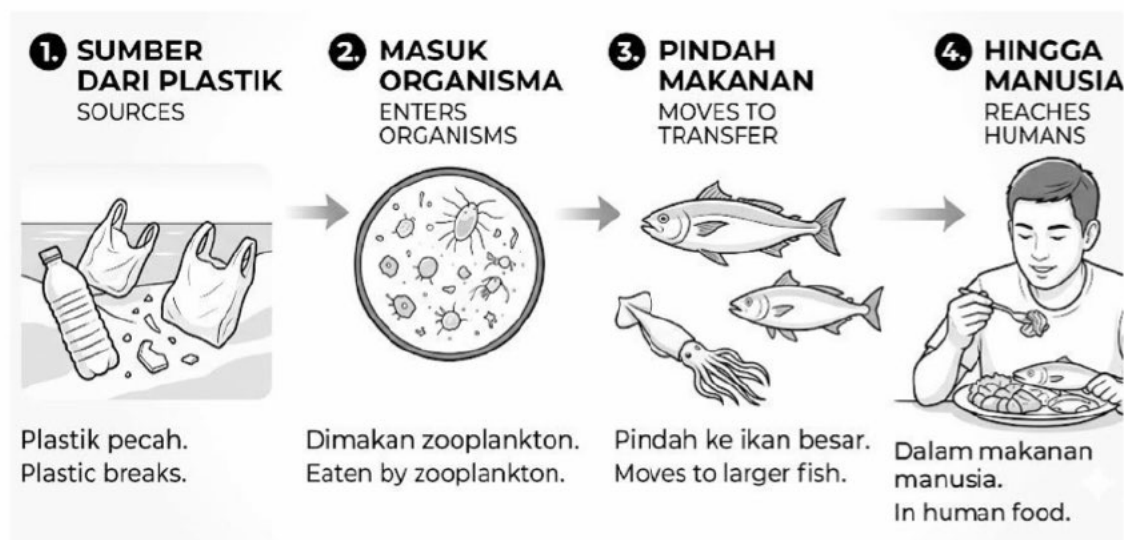
*Based on the conversation, plan an experiment in the laboratory using  $0.2 \text{ mol dm}^{-3}$  sodium thiosulphate solution,  $1 \text{ mol dm}^{-3}$  sulphuric acid, white paper with an X mark,  $250 \text{ cm}^3$  conical flask,  $50 \text{ cm}^3$  measuring cylinder,  $10 \text{ cm}^3$  measuring cylinder, stopwatch, thermometer, Bunsen burner, tripod stand and wire gauze to study a factor that affects the rate of reaction.*

*The experimental design should contain the following criteria:*

- (a) Pernyataan masalah  
*Problem statement* [1 markah/mark]
- (b) Hipotesis  
*Hypothesis* [1 markah/mark]
- (c) i. Pemboleh ubah dimanipulasi  
*Manipulated variable* [1 markah/mark]
- ii. Cara mengawal pemboleh ubah dimanipulasi  
*Way to control the manipulated variable* [1 markah/mark]
- (d) i. Pemboleh ubah bergerak balas  
*Responding variable* [1 markah/mark]
- ii. Cara mengawal pemboleh ubah bergerak balas  
*Way to control the responding variable* [1 markah/mark]
- (e) Penjadualan data  
*Tabulation of data* [2 markah/marks]
- (f) **Dua** langkah berjaga-jaga semasa menjalankan eksperimen  
***Two precautionary steps when carrying out the experiment*** [2 markah/marks]

12. (a) Rajah 12.1 menunjukkan sisa mikroplastik yang merupakan kepingan plastik yang panjangnya kurang daripada 5 mm.

*Diagram 12.1 shows microplastic waste which is plastic pieces less than 5 mm long.*



Rajah 12.1

*Diagram 12.1*

Nyatakan **dua** produk yang menyumbang kepada penghasilan mikroplastik.

*State **two** products that contribute to the production of microplastics.*

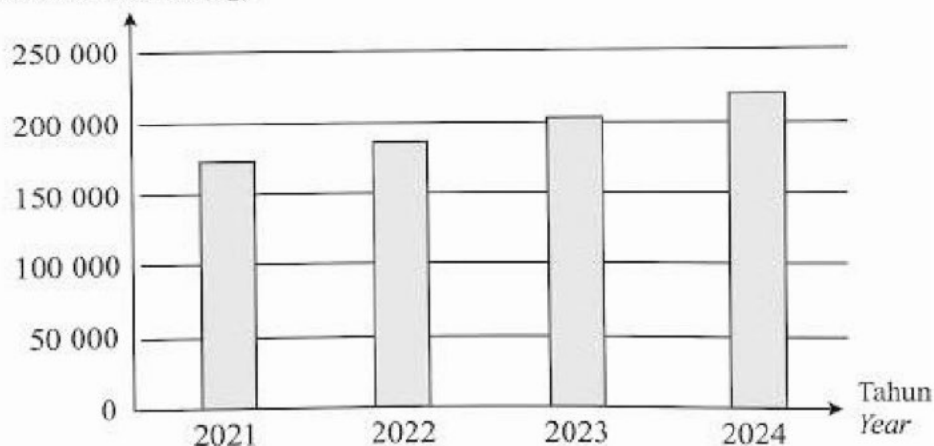
[2 markah/marks]

- (b) Berdasarkan Rajah 12.1, bagaimanakah cara mengurangkan mikroplastik dalam rantaian makanan?

*Based on Diagram 12.1, how can we reduce the microplastics in the food chain?*

[2 markah/marks]

- (c) Jumlah sisa yang dibuang (kg)  
*Total waste material (kg)*



Rajah 12.2

*Diagram 12.2*

Berdasarkan Rajah 12.2, huraikan pola jumlah sisa yang dibuang. Terangkan faktor yang mempengaruhi perubahan jumlah sisa yang dibuang.

*Based on Diagram 12.2, describe the pattern of the amount of waste thrown away.*

*Explain the factors that affect changes in the amount of waste disposed of.*

[4 markah/marks]

- (d) Teknologi Emisi Negatif merupakan kaedah yang menyingkirkan karbon dioksida dalam atmosfera. Wajarkan aplikasi kaedah ini dalam Teknologi Hijau.

*Negative Emission Technology is a method that removes excess carbon dioxide from the atmosphere. Justify the application of this method in Green Technology.*

[4 markah/marks]

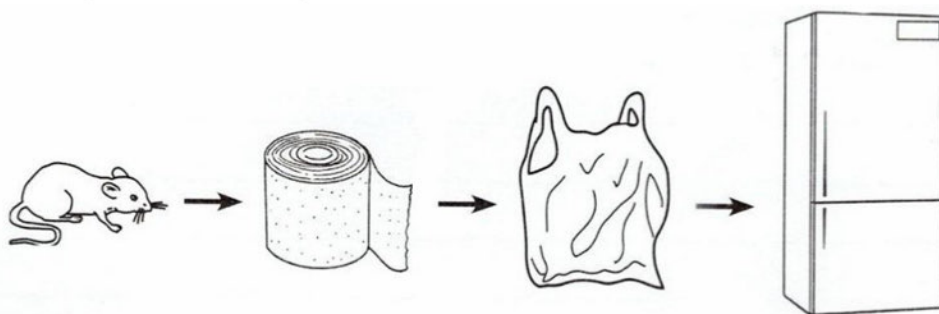
13. (a) Peralatan perlindungan diri ialah kelengkapan yang diperlukan untuk memberikan perlindungan kepada pemakainya daripada bahaya. Nyatakan satu peralatan perlindungan diri dan fungsinya.

*Personal protective equipment is needed to protect the wearer from danger. State one personal protective equipment and its function.*

[2 markah/marks]

- (b) Sekumpulan murid menjalankan satu eksperimen berkaitan sistem pencernaan seekor tikus. Pada akhir eksperimen, mereka melakukan Prosedur Operasi Standard (POS) bagi pengurusan sisa tikus tersebut seperti dalam Rajah 13.1.

*A group of students conduct an experiment related to the digestive system of a rat. At the end of the experiment, they were performing Standard of Procedure (SOP) for rat waste management as in Diagram 13.1.*



Rajah 13.1

Diagram 13.1

Terangkan proses pengurusan sisa biologi ini.

*Explain the process of this biological waste management.*

[2 markah/marks]

- (c) Puan Hidayah telah berkunjung ke satu program yang dianjurkan oleh Jabatan Bomba dan Penyelamat Malaysia.

Rajah 13.2 menunjukkan satu poster yang dipaparkan semasa program tersebut dijalankan.

*Puan Hidayah visited a programme organised by the Fire and Rescue Department of Malaysia.*

*Diagram 13.2 shows a poster displayed during the programme.*

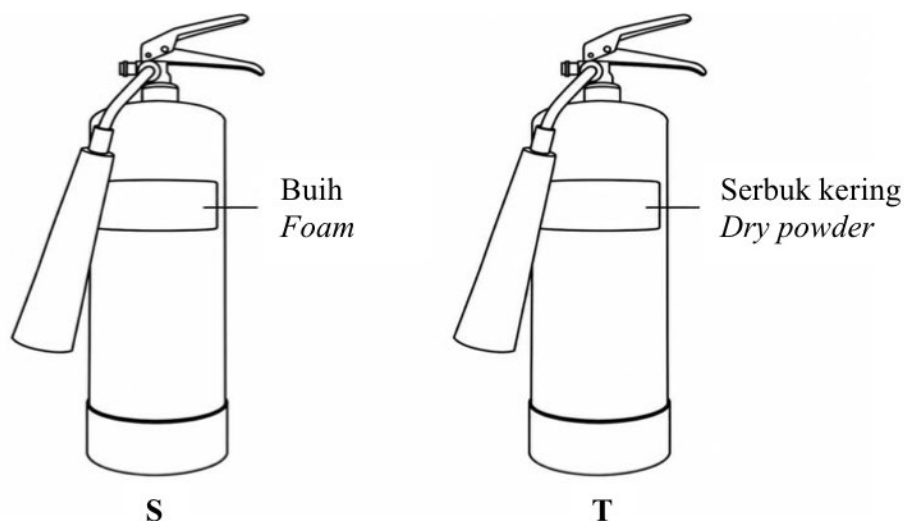


Rajah 13.2

*Diagram 13.2*

Menyedari akan kepentingan melindungi keluarganya, Puan Hidayah bercadang untuk membeli alat pemadam kebakaran untuk ditempatkan di kediamannya. Beliau diberikan dua pilihan alat pemadam kebakaran seperti Rajah 13.3.

*Realising the importance of protecting her family, Puan Hidayah intends to purchase a fire extinguisher to be placed in her home. She was given two options of fire extinguishers as in Diagram 13.3.*



Rajah 13.3  
Diagram 13.3

Banding bezakan alat pemadam kebakaran S dan T. Jelaskan kebaikan memiliki alat pemadam kebakaran di kediaman.

*Compare and contrast the fire extinguishers S and T. Explain the advantage of having a fire extinguisher at home.*

[4 markah/marks]

- (d) Kebakaran sering kali terjadi sama ada di premis perniagaan mahupun di kediaman. Kebakaran yang berlaku boleh memusnahkan harta benda mahupun mengancam nyawa. Sebagai langkah berjaga-jaga, Encik Rahman telah menyediakan alat pemadam kebakaran ABC di kediamannya. Wajarkan tindakan beliau.

*Fires often occur either at business premises or at residences. Fires can destroy property or even be life-threatening. As a precaution, Encik Rahman has provided an ABC fire extinguisher at his residence. Justify his actions.*

[4 markah/marks]

**KERTAS SOALAN TAMAT**  
**END OF QUESTION PAPER**

NO SOALAN :

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[illegible]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.