

**Answers for Analisis Bertopik 2025 will be updated soon!**

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# JAWAPAN DAN ULASAN

## SAINS

### Dwibahasa

#### Bab 1

#### LANGKAH KESELAMATAN DI DALAM MAKMAL

##### KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                 |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | D | Rajah 1 menunjukkan tumpahan bahan kimia dan serpihan kaca di lantai. Alat perlindungan diri yang melindungi diri murid tersebut ialah kasut yang tertutup.<br><i>Diagram 1 shows a chemical spill and broken glass on the floor. The personal protective equipment that protects the student is covered shoes.</i>                                             |
| 2 | A | R dan S ialah bahan larut air yang tidak bahaya. P ialah bahan kimia bahaya. Q ialah sisa pepejal.<br><i>R and S are harmless water-soluble substances. P is a hazardous chemical. Q is a solid waste.</i>                                                                                                                                                      |
| 3 | B | Bahan yang boleh dibuang ke dalam singki ialah cecair atau larutan yang berkepekatan rendah dan tidak berbahaya seperti bahan neutral, asid lemah dan alkali lemah sahaja.<br><i>Materials that can be thrown into the sink are liquids or solutions of low concentration and are harmless such as neutral materials, weak acids and weak alkalis only.</i>     |
| 4 | D | Sisa biologi jenis cecair badan merupakan sisa biologi kategori D dan cara pelupusan adalah diautoklaf dan dilupus terus melalui singki makmal atau tandas.<br><i>Biological waste in the form of bodily fluids is under category D and the disposal method is autoclaved and disposed of directly through a laboratory sink or toilet.</i>                     |
| 5 | B | Alat pemadam jenis air sesuai untuk memadamkan kebakaran jenis pepejal (kecuali logam) sahaja.<br><i>Water-type extinguishers are suitable for extinguishing flammable solid (except metals) only.</i>                                                                                                                                                          |
| 6 | C | Kebakaran melibatkan logam seperti magnesium, aluminium, natrium, kalium dan sebagainya merupakan jenis kebakaran kelas D. Jenis alat pemadam kebakaran yang sesuai ialah serbuk kering.<br><i>Fires involving metals such as magnesium, aluminium, sodium, potassium and so on are class D fires. The appropriate type of fire extinguisher is dry powder.</i> |
| 7 | A | Pemadam api jenis air dan buih sesuai digunakan untuk memadam jenis kebakaran kelas A (kayu, kertas, kain dan sebarang pepejal mudah terbakar kecuali logam).<br><i>Water and foam fire extinguishers are suitable for extinguishing class A fires (wood, paper, cloth and any flammable solid except metal).</i>                                               |

##### KERTAS 2

| Soalan Questions |     |      | Jawapan Answers                                                                                                                                                                                                 | Sub markah Subs marks | Jumlah markah Total marks |
|------------------|-----|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|
| 1                | (a) | (i)  | Melindungi hidung dan mulut daripada terhidu debu, bahan kimia yang mudah meruap atau mikroorganisma.<br><i>Protects the nose and mouth from inhaling dust, volatile chemical substances or microorganisms.</i> | 1                     |                           |
|                  |     | (ii) | Dapat melindungi muka atau mata daripada terkena bahan kimia atau jangkitan.<br><i>Can protect the face or eyes from being exposed to chemicals or infections.</i>                                              | 1                     |                           |

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                  | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (b) | Pilihan/Option: Y<br>Penerangan/Description:<br>Beg plastik dapat mengelakkan cecair daripada tikus mengalir keluar.<br><i>Plastic bags can prevent liquid from rat to flow out.</i>                                                                                                                                | 1<br>1                         | 7                                  |
|                     | (c) | 1. Masukkan serbuk bikarbonat dan cuka ke dalam plastik.<br><i>Put bicarbonate powder and vinegar into the plastic.</i><br>2. Ikat plastik dengan kemas.<br><i>Tie the plastic tightly.</i><br>3. Biarkan tindak balas berlaku sehingga menghasilkan buih.<br><i>Let the reaction occur until it produces foam.</i> | 3                              |                                    |

## Bab 2

## BANTUAN KECEMASAN

### KERTAS 1

|   |   |                                                                                                                                                                                                                                                     |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | B | Kedudukan mengiring dapat membantu mangsa bernafas dengan lebih mudah<br><i>The side position can help the victim breathe more easily</i>                                                                                                           |
| 2 | C | Langkah-langkah dalam CPR selepas tekanan dada adalah bantuan pernafasan.<br><i>The steps in CPR after chest compressions are mouth to mouth resuscitation.</i>                                                                                     |
| 3 | D | Tanpa CPR, darah beroksigen tidak dapat sampai ke organ penting seperti otak dan jantung.<br><i>Without CPR, oxygenated blood cannot reach vital organs like the brain and heart.</i>                                                               |
| 4 | C | Tekanan dan sentakan ke atas yang kuat menambahkan tekanan dalam paru-paru menyebabkan bendasing tertolak keluar<br><i>Press and jerk upwards with a quick force will increase pressure in the lungs, causing the foreign object to be rejected</i> |

## Bab 3

## TEKNIK MENGUKUR PARAMETER KESIHATAN BADAN

### KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | A | Perempuan mempunyai kadar denyutan nadi yang lebih tinggi berbanding lelaki kerana saiz jantung perempuan yang lebih kecil, maka jantung perlu mengepam darah dengan lebih kerap untuk dihantar ke seluruh badan.<br><i>Female have a higher pulse rate than males because the size of females' hearts is smaller, so the heart has to pump blood more often to send it to the rest of the body.</i> |
| 2 | A | Tekanan darah bagi pesakit hipertensi peringkat 1 bermula 140/90 mmHg<br><i>Blood pressure for hypertensive patients' stage 1 started at 140/90 mmHg</i>                                                                                                                                                                                                                                             |
| 3 | C | Kategori tekanan darah berisiko apabila bacaan tekanan sistolik 130-139 mmHg dan tekanan distolik 85-89 mm Hg.<br><i>The blood pressure category is at risk when the systolic pressure reading is 130 mmHg and the diastolic pressure reading is 85-88 mm Hg</i>                                                                                                                                     |
| 4 | B | Nilai BMI yang diperolehi menggunakan formula yang diberi ialah 23.21. Oleh itu, ia berada dalam kategori jisim badan unggul.<br><i>The BMI value obtained using the given formula is 23.21. Therefore, it is in the desirable weight category.</i>                                                                                                                                                  |

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | B | Indeks Jisim Badan (BMI) yang unggul adalah antara $18.5 \text{ kgm}^{-2}$ hingga $24.9 \text{ kgm}^{-2}$ , nilai $21 \text{ kgm}^{-2}$ terletak di antara julat tersebut. Nilai yang kurang daripada julat tersebut adalah dalam kategori kurang jisim badan dan sekiranya lebih, kategori berlebihan berat badan atau obesiti.<br><i>The ideal Body Mass Index (BMI) is between <math>18.5 \text{ kgm}^{-2}</math> to <math>24.9 \text{ kgm}^{-2}</math>, the value of <math>21 \text{ kgm}^{-2}</math> lies between the range. Values that are less than the range are in the category of underweight and if more, the category of overweight or obesity.</i> |
| 6 | B | Peningkatan BMI dari $24.2 \text{ kg m}^{-2}$ (jisim badan unggul) ke $28.1 \text{ kg m}^{-2}$ (berlebihan jisim badan) menunjukkan remaja tersebut mengamalkan pengambilan kalori dengan snek yang kaya nutrien melebihi keperluannya. Ini boleh menyebabkan peningkatan berat badan, yang mungkin menyebabkan peningkatan BMI.<br><i>An increase in BMI from <math>24.2 \text{ kg m}^{-2}</math> (ideal body mass) to <math>28.1 \text{ kg m}^{-2}</math> (overweight) indicates that the teenager is consuming more calories from snacks rich with nutrient than he needs. This can lead to weight gain, which may lead to an increase in BMI.</i>            |

## KERTAS 2

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) | (i)   | Umur murid/Jenis aktiviti/Jarak larian<br><i>Student's age/Type of activity/Distance of run</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1                              | 5                                  |
|                     |     | (ii)  | Kadar denyutan nadi atlet lebih rendah kerana otot jantungnya lebih kuat.<br><i>Athletes have a lower pulse rate because their heart muscles are stronger.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1                              |                                    |
|                     |     | (iii) | Antara 91-200 / <i>Between 91-200</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                              |                                    |
|                     |     | (iv)  | Kadar denyutan nadi perempuan lebih tinggi daripada lelaki.<br><i>Female's pulse rate is higher than male's.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                              |                                    |
|                     | (b) |       | Masa mengira denyutan nadi lebih daripada 1 minit/Salah mengira denyutan nadi/Bacaan nadi diambil bukan dalam keadaan rehat.<br><i>Pulse count time more than 1 minute/Wrong pulse count/Pulse reading taken not at rest.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                              |                                    |
| 2                   | (a) | (i)   | Unit pengukuran sfigmomanometer:<br><i>Units of sphygmomanometer measurement:</i><br>Milimeter merkuri<br><i>Milimetres of mercury</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                              | 2                                  |
|                     |     | (ii)  | Masalah kesihatan yang mungkin dihadapi oleh orang dewasa tersebut:<br><i>Health problem that might be suffered by the adult:</i><br>Hipertensi // Tekanan darah tinggi<br><i>Hypertension // High blood pressure</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                              |                                    |
|                     |     | (iii) | Cara untuk mengurangkan risiko masalah kesihatan yang dinyatakan di 5(a)(ii).<br><i>Ways to decrease the risk of health problem stated in 5(a)(ii).</i><br>– Mengurangkan pengambilan garam, lemak tepu, dan gula, serta meningkatkan pengambilan buah-buahan, sayur-sayuran, dan bijirin penuh.<br><i>Reducing the intake of salt, saturated fats, and sugar, while increasing the consumption of fruits, vegetables, and whole grains.</i><br>– Melakukan aktiviti fizikal secara berkala untuk membantu menurunkan tekanan darah dan meningkatkan kesihatan jantung.<br><i>Engaging in regular physical activity to help lower blood pressure and improve heart health.</i> | 2                              |                                    |

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sub<br>markah<br>Subs<br>marks                                                                                 | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------|
|                     | (b) | (i)   | Individu P mengalami hipotensi (tekanan darah rendah) manakala individu Q mengalami hipertensi (tekanan darah tinggi)<br><i>Individual P has hypotension (low blood pressure) while individual Q has hypertension (high blood pressure)</i>                                                                                                                                                                                                                                                                                                  | 1                                                                                                              | 6                                  |
|                     |     | (ii)  | Tekanan darah apabila otot jantung<br><i>Blood pressure when hear muscle are</i><br>– mengecut / <i>contract</i> : 85 mmHg bagi individu P manakala 180 mmHg bagi individu Q.<br>85 mmHg <i>for individual P while 180 mmHg for individual Q.</i><br>– berehat / <i>relax</i> : 60 mmHg bagi individu P manakala 110 mmHg bagi individu Q.<br>60 mmHg <i>for individual P while 110 mmHg for individual Q.</i>                                                                                                                               | 1                                                                                                              |                                    |
| 3                   | (a) | (i)   | 36.51 kg m <sup>-2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                              | 6                                  |
|                     |     | (ii)  | Obesiti / <i>Obesity</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                              |                                    |
|                     |     | (iii) | Ya kerana BMI Chen berada pada skala kurang daripada 18.5 (kurang jisim badan)<br><i>Yes because Chen's BMI is on the scale of less than 18.5 (less body mass)</i>                                                                                                                                                                                                                                                                                                                                                                           | 2                                                                                                              |                                    |
|                     | (b) |       | Menu M kerana menu M merupakan Menu Pinggan Sihat Malaysia/ suku-suku separuh<br><i>Menu M because menu M is a Malaysian Healthy Plate Menu/half tribes</i>                                                                                                                                                                                                                                                                                                                                                                                  | 2                                                                                                              |                                    |
| 4                   | (a) |       | Adakah kadar denyutan nadi manusia berbeza berdasarkan aktiviti fizikal?<br><i>Does human pulse rate different based on physical activity?</i>                                                                                                                                                                                                                                                                                                                                                                                               | 1                                                                                                              |                                    |
|                     | (b) |       | Semakin lasak aktiviti fizikal yang dilakukan, semakin tinggi kadar denyutan nadi.<br><i>The more active the physical activity, the higher the pulse rate.</i>                                                                                                                                                                                                                                                                                                                                                                               | 1                                                                                                              |                                    |
|                     | (c) | (i)   | Untuk mengkaji kesan aktiviti fizikal terhadap kadar denyutan nadi manusia.<br><i>To study the effect of physical activity on human's pulse rate.</i>                                                                                                                                                                                                                                                                                                                                                                                        | 1                                                                                                              |                                    |
|                     |     | (ii)  | Dimanipulasi: Jenis aktiviti fizikal<br><i>Manipulated: Type of physical activity</i><br><br>Bergerak balas: Kadar denyutan nadi<br><i>Responding: Pulse rate</i><br><br>Dimalarkan: Tempoh masa/jantina/usia<br><i>Fixed: Time period/gender/age</i>                                                                                                                                                                                                                                                                                        | 3 betul<br>– 2<br>3 correct<br>– 2<br>2 betul<br>– 1<br>2 correct<br>– 1<br>1 betul<br>– 0<br>1 correct<br>– 0 |                                    |
|                     |     | (iii) | 1. Aktiviti dijalankan dalam kumpulan.<br><i>Activities are carried out in groups.</i><br>2. Seorang murid daripada setiap kumpulan melakukan aktiviti berehat, berjalan dan berlari dalam tempoh masa 2 minit bagi setiap aktiviti.<br><i>One pupil from each group performs the activity of resting, walking, and running in a period of 2 minutes for each activity.</i><br>3. Pastikan murid berehat selama 5 minit sebelum melakukan aktiviti seterusnya.<br><i>Make sure pupils rest for 5 minutes before doing the next activity.</i> | 4                                                                                                              |                                    |
|                     |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                |                                    |

| Soalan<br>Questions                              |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Jawapan<br>Answers                               | Sub<br>markah<br>Subs<br>marks                       | Jumlah<br>markah<br>Total<br>marks |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
|--------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------|------------------------------------|----------------------------|--|--|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------------|--|--|--|--|--|--|-------------------------|--|--|--|--|--|--|-----------------------|--|--|--|--|--|--|---|--|
|                                                  |                                                      | 4. Bacaan denyutan nadi dalam tempoh masa seminit diambil selepas setiap aktiviti dan direkodkan dalam jadual.<br><i>Pulse readings for a period of one minute are taken after each activity and recorded in the table.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                  |                                                      |                                    |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
|                                                  | (iv)                                                 | <table><tr><th rowspan="2">Jenis<br/>aktiviti<br/><i>Type of<br/>activity</i></th><th colspan="6">Kadar denyutan nadi (bpm)<br/><i>Pulse rate (bpm)</i></th></tr><tr><th>Murid<br/><i>Pupil</i><br/>1</th><th>Murid<br/><i>Pupil</i><br/>2</th><th>Murid<br/><i>Pupil</i><br/>3</th><th>Murid<br/><i>Pupil</i><br/>4</th><th>Murid<br/><i>Pupil</i><br/>5</th><th>Murid<br/><i>Pupil</i><br/>6</th></tr><tr><td>Berehat<br/><i>Rest</i></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Berjalan<br/><i>Walk</i></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Berlari<br/><i>Run</i></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> | Jenis<br>aktiviti<br><i>Type of<br/>activity</i> | Kadar denyutan nadi (bpm)<br><i>Pulse rate (bpm)</i> |                                    |                            |  |  |  | Murid<br><i>Pupil</i><br>1 | Murid<br><i>Pupil</i><br>2 | Murid<br><i>Pupil</i><br>3 | Murid<br><i>Pupil</i><br>4 | Murid<br><i>Pupil</i><br>5 | Murid<br><i>Pupil</i><br>6 | Berehat<br><i>Rest</i> |  |  |  |  |  |  | Berjalan<br><i>Walk</i> |  |  |  |  |  |  | Berlari<br><i>Run</i> |  |  |  |  |  |  | 1 |  |
| Jenis<br>aktiviti<br><i>Type of<br/>activity</i> | Kadar denyutan nadi (bpm)<br><i>Pulse rate (bpm)</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                  |                                                      |                                    |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
|                                                  | Murid<br><i>Pupil</i><br>1                           | Murid<br><i>Pupil</i><br>2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Murid<br><i>Pupil</i><br>3                       | Murid<br><i>Pupil</i><br>4                           | Murid<br><i>Pupil</i><br>5         | Murid<br><i>Pupil</i><br>6 |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
| Berehat<br><i>Rest</i>                           |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                  |                                                      |                                    |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
| Berjalan<br><i>Walk</i>                          |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                  |                                                      |                                    |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
| Berlari<br><i>Run</i>                            |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                  |                                                      |                                    |                            |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |
|                                                  |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                  |                                                      |                                    | 10                         |  |  |  |                            |                            |                            |                            |                            |                            |                        |  |  |  |  |  |  |                         |  |  |  |  |  |  |                       |  |  |  |  |  |  |   |  |

## Bab 4

## TEKNOLOGI HIJAU DALAM MELESTARIKAN ALAM

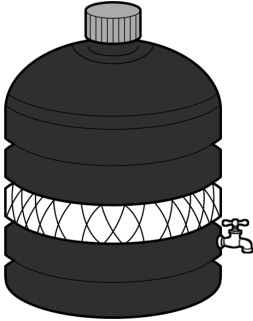
### KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                   |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | D | Malaysia mempunyai iklim tropika dengan cahaya matahari yang banyak sepanjang tahun, menjadikannya ideal untuk teknologi solar.<br><i>Malaysia has a tropical climate with abundant sunlight throughout the year, making it ideal for solar technology.</i>                                                                                                                       |
| 2 | B | Wanita tersebut mengelakkan pembaziran makanan dengan memasak mengikut jumlah ahli keluarga, yang menunjukkan tindakan pencegahan dan pengurangan sisa makanan.<br><i>The lady avoids food waste by cooking according to the number of family members, which demonstrates the action of preventing and reducing food waste.</i>                                                   |
| 3 | B | Penyahhutan bermaksud pemusnahan hutan yang boleh memberi kesan kepada kemusnahan habitat, hakisan tanah dan akhirnya berlaku banjir kilat akibat tanah yang termendap di dasar sungai.<br><i>Deforestation means the destruction of forests which can have an impact on habitat destruction, soil erosion and finally flash floods due to soil being deposited on riverbeds.</i> |
| 4 | C | Baja organik dan racun perosak biologi adalah bahan yang tidak mengandungi bahan kimia berbahaya serta tidak mencemarkan tanah.<br><i>Organic fertilisers and biological pesticides are substances that do not contain harmful chemicals and do not pollute the soil.</i>                                                                                                         |
| 5 | B | Basikal adalah pilihan pengangkutan hijau kerana ia tidak menghasilkan emisi dan menggunakan tenaga manusia untuk bergerak.<br><i>Bicycles are a green transportation option because they produce no emissions and use human power to move.</i>                                                                                                                                   |

**KERTAS 2**

| Soalan<br>Questions |     |      | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                         | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) |      | Sektor bangunan<br><i>Building sector</i>                                                                                                                                                                                                                                                                                                                                                  | 1                              | 7                                  |
|                     | (b) |      | <ul style="list-style-type: none"> <li>– Tiada pencemaran<br/><i>No pollution</i></li> <li>– Mesra alam<br/><i>Environmental friendly</i></li> <li>– Tenaga boleh diperbaharui<br/><i>Renewable energy</i></li> <li>– Percuma<br/><i>Free</i></li> </ul> (mana-mana satu jawapan)<br><i>(any one answer)</i>                                                                               | 1<br>1<br>1<br>1               |                                    |
|                     | (c) |      | <ul style="list-style-type: none"> <li>– Ya kerana sumber air yang diperolehi percuma<br/><i>Yes because the source of water is free</i></li> <li>– Tidak kerana kuantiti air yang sedikit dihasilkan<br/><i>No because less quantity of water produced</i></li> </ul> (mana-mana satu jawapan)<br><i>(any one answer)</i>                                                                 | 2                              |                                    |
|                     | (d) | (i)  | <ol style="list-style-type: none"> <li>1. Kain perca akan menyerap air<br/><i>The scrap cloth will absorb the water</i></li> <li>2. Tali diikat supaya alat itu boleh digantung<br/><i>The rope is tied so that the tool can be hung</i></li> <li>3. Bahagian atas botol dijadikan sebagai tempat meletak tanah<br/><i>The top of the bottle is used as a place to put soil</i></li> </ol> | 2                              |                                    |
|                     |     | (ii) | Kitar semula botol dan kain perca<br><i>Recycle the bottle and the scrap cloth</i>                                                                                                                                                                                                                                                                                                         | 1                              |                                    |
| 2                   | (a) |      | Sektor pengurusan sisa dan air sisa<br><i>Waste and wastewater management sector</i>                                                                                                                                                                                                                                                                                                       | 1                              | 6                                  |
|                     | (b) |      | Biojisim<br><i>Biomass</i>                                                                                                                                                                                                                                                                                                                                                                 | 1                              |                                    |
|                     | (c) |      | Bahan/Materials:<br><i>Biodiesel/Sabun/Kosmetik/Lilin/Detergen/Makanan haiwan</i><br><i>Biodiesel/Soap/Cosmetics/Wax/Detergent/Animal food</i><br><br>Kesan/Effect:<br>Mengurangkan pencemaran air/Mengurangkan pencemaran tanah/<br>Menyelamatkan hidupan akuatik.<br><i>Reduce water pollution/Reduce soil pollution/Save aquatic life.</i>                                              | 2                              |                                    |
|                     | (d) |      | Fakta/Facts:<br>Sisa lain berkurang daripada 21 000 tan.<br><i>Other waste decreased from 21 000 tons.</i><br><br>Penerangan/Description:<br>Dapat mengurangkan pencemaran alam sekitar/Mengurangkan<br>penggunaan sumber/Mengurangkan tempat pelupusan sisa.<br><i>Can reduce environmental pollution/Reduce resource use/Reduce waste disposal sites.</i>                                | 2                              |                                    |

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 3                   | (a) |       | Sektor pengurusan sisa dan air sisa<br><i>Waste and wastewater management sector</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                              | 7                                  |
|                     | (b) |       | <ul style="list-style-type: none"> <li>Gas metana ialah gas rumah hijau di mana ia memerangkap haba lebih kuat berbanding karbon dioksida (CO<sub>2</sub>).<br/><i>Methane is a greenhouse gas that traps heat in the atmosphere much more effectively than carbon dioxide (CO<sub>2</sub>).</i></li> <li>Apabila jumlah metana meningkat dalam atmosfera, ia menyebabkan suhu bumi meningkat, lalu menyumbang kepada kesan rumah hijau dan mempercepatkan pemanasan global.<br/><i>As the concentration of methane increases, the Earth's temperature rises, enhancing the greenhouse effect and accelerating global warming.</i></li> </ul>                                                                                                                                                                                                                                   | 1<br><br>1                     |                                    |
|                     | (c) |       | <ul style="list-style-type: none"> <li>Pihak berkuasa tempatan memperkasa amalan 5R kerana ia dapat mengurangkan jumlah sisa pepejal yang dihantar ke tapak pelupusan, sekali gus mengurangkan pencemaran alam sekitar seperti bau busuk, pencemaran air dan udara.<br/><i>The local authorities strengthen the 5R practice because it helps reduce the amount of solid waste sent to landfills, which in turn reduces environmental pollution such as foul smells, water, and air pollution.</i></li> <li>Amalan 5R juga dapat menjimatkan kos pelupusan sisa, mengurangkan penggunaan sumber semula jadi, dan menggalakkan kelestarian alam sekitar untuk generasi akan datang.<br/><i>Furthermore, the 5R practice helps reduce waste disposal costs, minimise the use of natural resources, and promote environmental sustainability for future generations.</i></li> </ul> | 2                              |                                    |
|                     | (d) |       | Penyediaan baja kompos:<br><i>Preparation of compost:</i> <ol style="list-style-type: none"> <li>Tambahkan gula perang dan minuman berkulat ke dalam baldi.<br/><i>Add brown sugar and cultured drink into the pail.</i></li> <li>Kacau campuran tersebut untuk memastikan semua bahan bercampur dengan baik.<br/><i>Stir the mixture to ensure all ingredients are well combined.</i></li> <li>Tutup baldi dan biarkan campuran tersebut selama beberapa minggu untuk proses penguraian.<br/><i>Cover the pail and allow the mixture to sit for several weeks for the decomposition process.</i></li> </ol>                                                                                                                                                                                                                                                                    | 3                              |                                    |
| 4                   | (a) | (i)   | Baja berlebihan/Racun berlebihan/Pestisid/Herbisid<br><i>Excess fertilisers/Excess poisons/Pesticides/Herbicides</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                              |                                    |
|                     |     | (ii)  | Mendapatkan khidmat nasihat tentang penggunaan baja dan racun dalam kuantiti yang betul/Kurangkan penggunaan baja kimia dan racun serangga/Guna kompos<br><i>Get advice on the use of fertilisers and poisons in the right quantity/Reduce the use of chemical fertilisers and pesticides/Use compost</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                              |                                    |
|                     |     | (iii) | Kemusnahan habitat/Ekosistem atau rantai makanan terganggu/Sumber air berkurang/Kemusnahan hidupan akuatik.<br><i>Habitat destruction/Ecosystem or food chain disrupted/Reduced water resources/Destruction of aquatic life.</i><br>(Terima mana-mana 2 jawapan)/(Accept any 2 answers)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2                              |                                    |

| Soalan<br>Questions |     |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (b) |     | <p>Lakaran/Sketch:</p>  <p>Penerangan/Description:</p> <ol style="list-style-type: none"> <li>1. Pili air diletakkan di bahagian bawah tong untuk membolehkan larutan diambil.<br/><i>The water tap is placed at the bottom of the barrel for allow the solution to be taken.</i></li> <li>2. Jaring dawai diletakkan di dalam untuk mengasingkan sisa pepejal dan sisa cecair.<br/><i>A wire mesh is placed inside to separate solid waste and liquid waste.</i></li> <li>3. Botol minyak terpakai dicat hitam supaya dapat menghalang sinaran cahaya.<br/><i>Used oil bottles are painted black to block light rays.</i></li> </ol> <p>(terima 2 penerangan)<br/>(accept 2 explanations)</p>                                                                                                                                                                                                                                                              | 2                              | 7                                  |
| 5                   | (a) | (i) | <p>Penerokaan hutan.<br/><i>Forest exploration.</i></p> <p>Penerokaan hutan akan mengganggu kitaran gas. Gas karbon dioksida tidak dapat digunakan untuk proses fotosintesis.<br/><i>Forest exploration will disrupt the gas cycle. Carbon dioxide gas cannot be used for the photosynthesis process.</i></p> <p style="text-align: center;"><b>atau/or</b></p> <p>Pembakaran terbuka.<br/><i>Open burning.</i></p> <p>Pembakaran hutan oleh para petani boleh menyebabkan berlakunya jerebu dan menjejaskan kualiti udara.<br/><i>Forest burning by farmers can cause haze and affect air quality.</i></p> <p style="text-align: center;"><b>atau/or</b></p> <p>Penggunaan racun serangga dan baja kimia.<br/><i>Use of insecticides and chemical fertilizers.</i></p> <p>Penggunaan secara berlebihan akan meningkatkan keasidan tanah dan tidak sesuai untuk pertanian.<br/><i>Excessive use will increase the acidity of the soil and is not suitable for agriculture.</i></p> <p>(1 isu + 1 pernyataan)<br/>(1 issue + 1 statement)</p> | 2<br><br>2<br><br>2            |                                    |

| Soalan<br>Questions |      | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (ii) | <ul style="list-style-type: none"> <li>Dapat mengurangkan kandungan gas karbon dioksida di dalam udara dengan mengurangkan penghasilan tenaga elektrik melalui pembakaran bahan api fosil.<br/><i>Can reduce the content of carbon dioxide gas in the air by reducing the production of electricity through the burning of fossil fuels.</i></li> <li>Dapat mengurangkan pencemaran udara dan memperbaiki kualiti udara yang lebih baik.<br/><i>Can reduce air pollution and improve air quality.</i></li> <li>Dapat mengurangkan pemanasan global akibat suhu Bumi yang meningkat.<br/><i>Can reduce global warming due to increased Earth's temperature.</i></li> </ul> <p>(mana-mana 2 jawapan)<br/>(any one answer)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2                              |                                    |
|                     | (b)  | <ul style="list-style-type: none"> <li>Jumlah sisa yang dibuang bertambah dari tahun 2007 hingga 2010. Pada tahun 2007, sebanyak 0.84 kg sisa dibuang dalam tempoh sehari, meningkat kepada 0.90 kg dalam tempoh sehari pada tahun 2010.<br/><i>The amount of waste thrown away increased from 2007 to 2010. In 2007, 0.84 kg of waste was thrown away in a day, increasing to 0.90 kg in a day in 2010.</i></li> <li>Pada tahun 2007, sebanyak 172493.16 kg sampah telah dibuang ke tapak pelupusan sampah. Meningkat pada tahun 2010 kepada 220752.00 kg pada tahun 2010.<br/><i>In 2007, 172493.16 kg of garbage was thrown into the landfill. Increasing in 2010 to 220752.00 kg in 2010.</i></li> <li>Pertambahan jumlah sisa yang dibuang adalah disebabkan oleh pertambahan populasi penduduk.<br/><i>The increase in the amount of waste thrown away is due to the increase in population.</i></li> <li>Penduduk juga kurang mengamalkan kitar semula dalam kehidupan.<br/><i>Residents also practice less recycling in life.</i></li> </ul>                                                                                                                           | 4                              |                                    |
|                     | (c)  | <ul style="list-style-type: none"> <li>Mengurangkan sisa pepejal yang dihantar ke tapak pelupusan sampah.<br/><i>Reduce solid waste sent to landfills.</i></li> <li>Membantu meningkatkan jangka hayat produk yang boleh dikitar semula.<br/><i>Helps increase the lifespan of recyclable products.</i></li> <li>Mengelakkan pembuangan bahan yang boleh dikitar semula.<br/><i>Avoiding the disposal of recyclable materials.</i></li> <li>Mengurangkan kos bagi proses pelupusan sisa.<br/><i>Reduce the cost of the waste disposal process.</i></li> <li>Meningkatkan kadar kitar semula.<br/><i>Increase the recycling rate.</i></li> <li>Memelihara sumber semula jadi.<br/><i>Conserving natural resources.</i></li> <li>Mengurangkan pencemaran alam sekitar dan mengekalkan kelestarian alam.<br/><i>Reduce environmental pollution and maintain environmental sustainability.</i></li> <li>Mendidik masyarakat agar menghargai sisa pepejal sebagai satu sumber ekonomi, tenaga dan artistik.<br/><i>Educating the community to appreciate solid waste as an economic, energy and artistic resource.</i></li> </ul> <p>(mana-mana 4 jawapan)<br/>(any one answer)</p> | 4                              |                                    |
|                     |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                | 12                                 |

KERTAS 1

|    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | B | Proses meiosis hanya berlaku dalam sel pembiakan dan menghasilkan sel gamet yang haploid.<br><i>The process of meiosis only occurs in reproductive cells and produces haploid gametes.</i>                                                                                                                                                                                                                                                                                                                                                        |
| 2  | C | Rajah menunjukkan proses meiosis kerana ada berlaku pindah silang. Proses meiosis hanya berlaku dalam sel pembiakan sahaja.<br><i>The diagram shows the process of meiosis due to crossing over. The process of meiosis only occurs in reproductive cells.</i>                                                                                                                                                                                                                                                                                    |
| 3  | B | Meiosis adalah proses pembelahan sel yang berlaku dalam organ pembiakan untuk menghasilkan gamet bagi pembiakan seks.<br><i>Meiosis is the cell division process that occurs in reproductive organs to produce gametes in sexual reproduction.</i>                                                                                                                                                                                                                                                                                                |
| 4  | C | 22 + X (ovum) disenyawakan dengan 22 + X (sperma) menghasilkan kromosom anak yang mengandungi 44 + XX<br><i>22 + X (ovum) fertilized with 22 + X (sperm) produces a child chromosome containing 44 + XX</i>                                                                                                                                                                                                                                                                                                                                       |
| 5  | A | Daripada kacukan induk ( $Dd \times dd$ ) akan menghasilkan 2 anak $Dd$ dan 2 anak $dd$ (2 : 2) bersamaan 1 : 1.<br><i>From the parent hybrid (<math>Dd \times dd</math>) will produce 2 children who are <math>Dd</math> and 2 children <math>dd</math> (2 : 2) equal to 1:1.</i>                                                                                                                                                                                                                                                                |
| 6  | D | Kehadiran lesung pipit adalah trait dominan. Trait dominan bersifat dominan dan akan ditonjolkan walaupun dengan kehadiran trait resesif.<br><i>The presence of dimples is a dominant trait. Dominant traits are dominant and will be highlighted even in the presence of recessive traits.</i>                                                                                                                                                                                                                                                   |
| 7  | D | Jantina individu ditentukan pada kromosom ke-23.<br><i>The individual gender is determined by the 23<sup>rd</sup> chromosome.</i>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 8  | A | Dalam persilangan monohibrid antara genotip $Tt$ (tinggi) dan $tt$ (kerdil), anak-anak yang dihasilkan akan mempunyai genotip $Tt$ (tinggi) dan $tt$ (kerdil).<br><i>In a monohybrid cross between the genotypes <math>Tt</math> (tall) and <math>tt</math> (dwarf), the offspring will have genotypes of <math>Tt</math> (tall) and <math>tt</math> (dwarf).</i>                                                                                                                                                                                 |
| 9  | D | Mutasi kromosom berlaku apabila berlaku penambahan/pengurangan bilangan kromosom dalam susunan kariotip, sindrom Turner mempunyai 45 bilangan kromosom ( $44 + X$ ) di mana kurang 1 kromosom yang sepatutnya 46.<br><i>Chromosomal mutations occur when there is an increase/decrease in the number of chromosomes in the karyotype order, Turner syndrome has 45 chromosomes (<math>44 + X</math>) which is less 1 chromosome that should be 46.</i>                                                                                            |
| 10 | B | Individu yang menghidap sindrom Turner mempunyai kurang bilangan kromosom seks. Jumlah keseluruhan kromosom hanya 45 kromosom ( $44 + XO$ ). Individu ini ialah seorang perempuan yang tidak mengalami perkembangan ciri-ciri seks sekunder seorang perempuan.<br><i>Individuals with Turner syndrome have a less number of sex chromosomes. The total number of chromosomes is only 45 chromosomes (<math>44 + XO</math>). This individual is a female who has not experienced the development of secondary sex characteristics of a female.</i> |
| 11 | B | Salah satu kebaikan dalam kejuruteraan genetik adalah menghasilkan tanaman dan ternakan yang berkualiti.<br><i>One of the benefits in genetic engineering is producing quality plants and livestock.</i>                                                                                                                                                                                                                                                                                                                                          |
| 12 | D | DNA plasmid dipotong untuk bercantum dengan DNA sel pankreas yang dipotong untuk menghasilkan DNA rekombinan.<br><i>The plasmid DNA is cut to combine with the cut pancreatic cell DNA to produce recombinant DNA.</i>                                                                                                                                                                                                                                                                                                                            |
| 13 | C | Langkah ini adalah penting untuk memastikan nyamuk yang dimodifikasi genetik dapat membunuh parasit penyebab malaria.<br><i>This step is crucial to ensure that the genetically modified mosquitoes can effectively kill the malaria-causing parasites.</i>                                                                                                                                                                                                                                                                                       |

|    |   |                                                                                                                                                                                                                                                                                                                                                   |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14 | C | Graf menunjukkan variasi tidak selangar (hanya dipengaruhi oleh faktor genetik) dan bersifat kekal, jadi hanya jenis cap jari sahaja yang dipengaruhi oleh faktor genetik.<br><i>The graph shows discontinuous variation (only influenced by genetic factors) and is permanent, so only type of fingerprint is influenced by genetic factors.</i> |
| 15 | A | Variasi selangar adalah dipengaruhi oleh faktor persekitaran (iklim) manakala variasi tak selangar adalah dipengaruhi oleh faktor genetik (pindah silang).<br><i>Continuous variation is influenced by environmental factors (climate) while discontinuous variation is influenced by genetic factors (crossover).</i>                            |

## KERTAS 2

| Soalan<br>Questions |     |      | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) | (i)  | Mitosis<br><i>Mitosis</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                              | 6                                  |
|                     |     | (ii) | Anafasa<br><i>Anaphase</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                              |                                    |
|                     | (b) |      | <ul style="list-style-type: none"> <li>Semua pokok jambu yang dihasilkan melalui pengklonan mempunyai gen yang sama<br/><i>All guava trees produced through cloning have the same gene</i></li> <li>Oleh itu, penyakit baru akan menyebabkan semua pokok berjangkit<br/><i>Therefore, a new disease will cause all trees to be infected</i></li> </ul>                                                                                                                               | 2                              |                                    |
|                     | (c) |      | Aplikasi: Terapi gen<br><i>Application: Gene therapy</i><br><br>Penerangan:<br>Teknik ini dijalankan dengan menggantikan gen yang rosak dengan memasukkan gen normal ke dalam sel badan pesakit<br><i>Explanation: This technique is carried out by replacing the damaged gene by inserting a normal gene into the cells of the patient's body</i>                                                                                                                                   | 2                              |                                    |
| 2                   | (a) |      | <ul style="list-style-type: none"> <li>Buta warna/<i>Colour blindness</i></li> <li>Anemia sel sabit/<i>Sickle cell anemia</i></li> <li>Talasemia/<i>Thalassemia</i></li> <li>Hemofilia/<i>Haemophilia</i></li> <li>Albinisme/<i>Albinism</i></li> </ul> (Terima mana-mana 2 jawapan)<br><i>(Accept any 2 answers)</i>                                                                                                                                                                | 2                              | 2                                  |
|                     | (b) |      | Bidang/ <i>Field</i> : Sains Forensik/ <i>Forensic Science</i><br>Kepentingan/ <i>Importance</i> : <ul style="list-style-type: none"> <li>Mengenal pasti kronologi kejadian<br/><i>Identify the chronology of events</i></li> <li>Mengumpul bukti fizikal secara saintifik<br/><i>Gather physical evidence scientifically</i></li> <li>Mengenal pasti DNA penjenayah<br/><i>Identify the criminal's DNA</i></li> </ul> (Terima mana-mana 1 jawapan)<br><i>(Accept any 1 answers)</i> | 2                              |                                    |

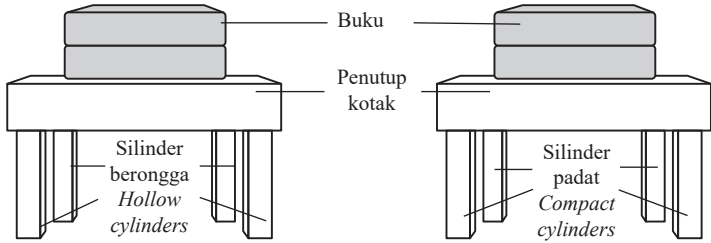
| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| (c)                 |     | <p>Persamaan/<i>Similarities</i>:<br/>Kedua-duanya mempunyai ketahanan yang tinggi terhadap perubahan cuaca.<br/><i>Both have high resistance to weather changes.</i></p> <p>Perbezaan/<i>Differences</i>:</p> <ul style="list-style-type: none"> <li>– Padi P lebih cepat matang daripada padi Q.<br/><i>Paddy P matures faster than paddy Q.</i></li> <li>– Padi P kurang tahan terhadap penyakit berbanding padi Q.<br/><i>Paddy P is less resistant to disease than paddy Q.</i></li> <li>– Jisim 1 000 biji bagi padi P lebih rendah daripada padi Q.<br/><i>The mass of 1 000 grains for paddy P is lower than paddy Q.</i></li> <li>– Batang Padi P lebih mudah patah berbanding padi Q.<br/><i>Stem of paddy P break more easily than paddy Q.</i></li> </ul> <p>(Terima mana-mana 1 jawapan)<br/>(Accept any 1 answers)</p> <p>Penjelasan pemilihan baka padi dapat meningkatkan hasil dengan memilih baka padi yang:<br/><i>Explanation of paddy breed selection can increase yield by choosing paddy breeds that:</i></p> <ul style="list-style-type: none"> <li>– Tempoh matang yang singkat.<br/><i>Short maturity period.</i></li> <li>– Tahan terhadap penyakit.<br/><i>Resistant to disease.</i></li> <li>– Hasil tuaian yang tinggi.<br/><i>High yield.</i></li> <li>– Hasil tuaian yang berkualiti.<br/><i>Quality harvest.</i></li> <li>– Batang yang tidak mudah patah.<br/><i>Stems that do not break easily.</i></li> </ul> <p>(Terima mana-mana 2 jawapan)<br/>(Accept any 2 answers)</p> | 4                              | 12                                 |
|                     | (d) | <p>Kebaikan/<i>Benefit</i>:</p> <ul style="list-style-type: none"> <li>– Masa untuk menuai lebih singkat.<br/><i>Time to harvest more shorter.</i></li> <li>– Menghasilkan hasil tuaian yang tinggi.<br/><i>Produce a high yield.</i></li> <li>– Ketahanan penyakit yang tinggi.<br/><i>High disease resistance.</i></li> </ul> <p>(Terima mana-mana 2 jawapan)<br/>(Accept any 2 answers)</p> <p>Keburukan/ <i>Disadvantages</i>:</p> <ul style="list-style-type: none"> <li>– Boleh menyebabkan mutasi pada organisma.<br/><i>Can cause mutations in organisms.</i></li> <li>– Boleh menyebabkan kesan sampingan/alahan.<br/><i>May cause side effects/allergies.</i></li> <li>– Menyebabkan tahan kepada antibiotik.<br/><i>Causes resistance to antibiotics.</i></li> <li>– Mengancam spesies asal.<br/><i>Threatening native species.</i></li> </ul> <p>(Terima mana-mana 2 jawapan)<br/>(Accept any 2 answers)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4                              |                                    |

KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                   |
|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | B | Tapak sulaiman ialah haiwan yang mempunyai sistem sokongan badan rangka hidrostatik.<br><i>Starfish is an animal that has a hydrostatic skeleton support system.</i>                                                                                                                                                                              |
| 2 | C | Turus vertebra terdiri daripada 33 ruas tulang kecil atau vertebra yang bersambung membentuk turus yang kuat dan boleh melentur. Turus vertebra melindungi saraf tunjang.<br><i>The vertebral column consists of 33 small bone or vertebrae that connect to form a strong and flexible column. The vertebral column protects the spinal cord.</i> |
| 3 | B | Kedua-dua udang dan ketam mempunyai rangka luar yang memberikan sokongan dan perlindungan kepada tubuh mereka.<br><i>Both prawns and crabs have an exoskeleton that provides support and protection to their bodies.</i>                                                                                                                          |
| 4 | A | X ialah rawan. Fungsi utama rawan ialah untuk mengurangkan geseran antara tulang.<br><i>X is cartilage. The main function of cartilage is to reduce friction between bones.</i>                                                                                                                                                                   |
| 5 | B | Pada peringkat tua di usia melebihi 65 tahun, tubuh badan manusia mula menyusut di bahagian-bahagian otot serta kulit mula mengering.<br><i>At the old stage at the age of over 65 years, the human body begins to shrink in the muscle parts and the skin begins to dry.</i>                                                                     |
| 6 | A | Otot triceps mengecut dan otot biseps mengendur semasa meluruskan tangan.<br><i>The triceps muscle contracts and the biceps muscle relaxes while straightening the arm.</i>                                                                                                                                                                       |
| 7 | B | Tumbuhan sulur paut adalah tumbuhan berlingkar dan melilit tumbuhan lain atau objek untuk sokongan.<br><i>Tendrils is a plant that coils and wraps around other plants or objects for support.</i>                                                                                                                                                |

KERTAS 2

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                      | Sub<br>markah<br>Subs<br>marks                   | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------------|
| 1                   | (a) | 60 mm                                                                                                                   | 1                                                |                                    |
|                     | (b) | <p>Ketinggian anak benih kacang hijau (mm)<br/>Height of green bean seedling (mm)</p> <p>Masa (hari)<br/>Time (day)</p> | <p>Plot – 1</p> <p>Lakar/<br/>Sketch<br/>– 1</p> |                                    |

| Soalan<br>Questions |         | Jawapan<br>Answers                                                                                                                                                                                                                                                                                | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (c)     | Pokok bunga raya (tumbuhan berkayu)<br><i>Hibiscus (woody plant)</i><br>Pokok pisang (tumbuhan tidak berkayu)<br><i>Banana tree (non-woody plant)</i>                                                                                                                                             | 1                              | 5                                  |
|                     | (d)     | Mengukur usia tumbuhan berdasarkan gelang pertumbuhan dengan menggunakan gerudi khas<br><i>Measure the age of plants based on growth rings using a special drill</i>                                                                                                                              | 1                              |                                    |
| 2                   | (a) (i) | Ketinggian anak benih/Panjang akar/Bilangan daun<br><i>The height of the seedling/The length of root/Number of leaves</i>                                                                                                                                                                         | 1                              | 5                                  |
|                     | (ii)    | Semakin bertambah hari/tempoh/masa, semakin bertambah ketinggian anak benih/panjang akar/bilangan daun<br><i>As the number of days/period/time increases, the height of seedling/length of root/number of leaves increases</i>                                                                    | 1                              |                                    |
|                     | (iii)   | Bilangan hari/Masa/Tempoh<br><i>Number of days/Time/Period</i>                                                                                                                                                                                                                                    | 1                              |                                    |
|                     | (iv)    | Jenis anak benih/Suhu/Kelembapan/Kehadiran udara/Nilai pH<br><i>Type of seedlings/Temperature/Humidity/Presence of air/pH value</i>                                                                                                                                                               | 1                              |                                    |
|                     | (b)     | Ketinggian anak benih mendatar selepas hari ke-5<br><i>The height of seedling horizontal after the 5<sup>th</sup> day</i>                                                                                                                                                                         | 1                              |                                    |
| 3                   | (a)     | Adakah meja berkaki kayu lebih kuat daripada meja berkaki buluh untuk menyokong balang air?<br><i>Is a table with wooden legs stronger than a table with bamboo legs to support a water jar?</i>                                                                                                  | 1                              |                                    |
|                     | (b)     | Meja berkaki buluh (berongga) lebih kuat menyokong balang air berbanding meja berkaki kayu (padat).<br><i>A table with bamboo legs (hollow) is stronger at supporting a jar of water than a table with wooden legs (solid).</i>                                                                   | 1                              |                                    |
|                     | (c) (i) | Jenis silinder // Silinder berongga dan silinder padat<br><i>Types of cylinders // Hollow cylinders and solid cylinders</i>                                                                                                                                                                       | 1                              |                                    |
|                     | (ii)    | Bilangan buku teks yang boleh disokong oleh silinder<br><i>The number of textbook that can be supported by cylinder</i>                                                                                                                                                                           | 1                              |                                    |
|                     | (d)     |  <p><b>Penjelasan / Explanation:</b></p> <ul style="list-style-type: none"> <li>– Rajah berfungsi<br/><i>Functional diagram</i></li> <li>– Sekurang-kurangnya 3 label<br/><i>At least 3 labels</i></li> </ul> | 1<br>1                         |                                    |

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (e) | Bilangan buku yang boleh disokong oleh silinder berongga lebih banyak (daripada silinder padat).<br><i>The number of books that can be supported by a hollow cylinder is greater (than a compact cylinder).</i>                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                              | 10                                 |
|                     | (f) | Tiga aspek yang diperlukan untuk melukis carta palang eksperimen tersebut.<br><i>Three aspects that are needed to draw the bar chart of the experiment.</i> <ul style="list-style-type: none"> <li>– Paksi-x: Jenis silinder<br/><i>X-axis: Type of cylinder</i></li> <li>– Paksi Y: Bilangan buku teks yang boleh disokong oleh silinder<br/><i>Y-axis: The number of textbook that can be supported by cylinder</i></li> <li>– Tajuk carta: Bilangan buku teks yang boleh disokong oleh silinder melawan jenis silinder.<br/><i>Title of the bar chart: The number of textbook that can be supported by cylinder against type of cylinder</i></li> </ul> | 3                              |                                    |

## Bab 7

## KOORDINASI BADAN

### KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | A | Pankreas merembeskan hormon insulin yang mengawal aras glukosa dalam darah.<br><i>The pancreas secretes the insulin hormone which controls the level of glucose in the blood.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2 | B | Dalam situasi ini, pemuda kelihatan mengalami ketakutan semasa berhadapan dengan pegawai polis yang merangsang rembesan hormon adrenalin untuk menyediakan tubuhnya menghadapi situasi cemas.<br><i>In this situation, the youngster may be experiencing fear when facing the police officer which would trigger the release of adrenaline to prepare his body for emergency.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3 | D | Pergerakan impuls dihalang oleh bahan kimia dalam alkohol menyebabkan proses penghantaran maklumat ke otak menjadi lambat.<br><i>Impulse movement is inhibited by chemicals in alcohol, causing the process of sending information to the brain to slow down.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4 | B | Hormon tiroksina berperanan dalam mengawal kadar metabolisme badan dan pertumbuhan fizikal dan mental dalam kanak-kanak. Kesan kekurangan hormon tiroksina menyebabkan kadar metabolisme rendah, tidak tahan sejuk, perkembangan fizikal dan mental terbantut serta goiter. Manakala kesan berlebihan hormon tiroksina akan menyebabkan kadar metabolisme tinggi, kuat berpeluh dan bola mata akan menonjol keluar.<br><i>The thyroxine hormone plays a role in controlling the body's metabolic rate and physical and mental growth in children. The effects of thyroxine hormone deficiency cause low metabolic rate, cold resistance, stunted physical and mental development and goiter. While the excessive effect of the thyroxine hormone will cause a high metabolic rate, heavy sweating, and protruding eyeballs.</i> |
| 5 | D | Kesan bagi dadah jenis halusinogen menyebabkan terdengar suara-suara dan terlihat objek yang tidak wujud.<br><i>The effects of hallucinogenic drugs cause hearing voices and seeing objects that are non-existent.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6 | C | Simptom seperti kadar pernafasan yang meningkat dan perasaan agresif menunjukkan bahawa jenis dadah ini adalah perangsang, yang meningkatkan aktiviti sistem saraf pusat.<br><i>Symptoms like increased breathing rate and aggressive feelings indicate that this type of drug is a stimulant, which enhances central nervous system activity.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 7 | C | Mempunyai pemikiran positif dan keyakinan diri dapat membantu Encik A mengatasi tekanan dan meningkatkan kesejahteraan mentalnya.<br><i>Having positive thinking and self-confidence can help Mr. A cope with stress and improve his mental well-being.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**KERTAS 2**

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) | Sistem endokrin<br><i>Endocrine system</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                              | 6                                  |
|                     | (b) | Menyediakan badan ketika kecemasan/Meningkatkan kadar degupan jantung/Meningkatkan kadar metabolisme/Meningkatkan aras glukosa dalam darah<br><i>Prepares the body for emergency/Increases the heart rate/Increases the metabolism rate/Increases the glucose level in the blood</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                              |                                    |
|                     | (c) | – Pemandu itu telah mengambil alkohol yang berlebihan<br><i>The driver had consumed excessive alcohol</i><br>– Alkohol mengandungi bahan kimia yang boleh melambatkan penghantaran impuls ke otak/melambatkan gerak balas terhadap rangsangan<br><i>Alcohol contains chemicals that can slow down the transmission of impulses to the brain/slow down the response to stimuli</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2                              |                                    |
|                     | (d) | – Amfetamina menyebabkan penghantaran impuls menjadi lebih cepat<br><i>Amphetamine causes the transmission of impulses to be faster</i><br>– Ketamin menyebabkan penghantaran impuls menjadi lebih perlahan<br><i>Ketamine causes the transmission of impulses to slow down</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2                              |                                    |
| 2                   | (a) | Barbiturat // Alkohol // Amfetamina // Pelarut // Ketamin<br><i>Barbiturate // Alcohol // Amphetamine // Solvent // Ketamine</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                              | 6                                  |
|                     | (b) | – Fungsi dadah halusinogen semasa pembedahan adalah sebagai ubat bius untuk mengurangkan kesakitan / <i>The function of the hallucinogen drug during surgery is to act as an anaesthetic to reduce pain and</i><br>– Menjadikan pesakit tidak sedarkan diri supaya mereka tidak merasa sakit atau sedar semasa pembedahan dijalankan. / <i>Make the patient unconscious, so they do not feel pain or become aware during the surgical procedure.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2                              |                                    |
|                     | (c) | – Bilangan penagih dadah menunjukkan penurunan dari tahun 2016 hingga 2018.<br><i>The number of drug addicts shows a decreasing trend from the year 2016 to 2018.</i><br>– Ini menunjukkan bahawa langkah-langkah pencegahan dan kesedaran mungkin telah berkesan dalam mengurangkan kadar penagihan dadah.<br><i>This suggests that preventive measures and awareness efforts might have been effective in reducing drug addiction rates.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2                              |                                    |
|                     | (d) | – Sebilangan atlet menyalahgunakan dadah dan bahan terlarang untuk meningkatkan prestasi fizikal seperti menambah kekuatan, ketahanan, atau kelajuan melebihi had semula jadi.<br><i>Some athletes misuse drugs and prohibited substances to enhance their physical performance, such as increasing strength, endurance, or speed beyond natural limits.</i><br>– Mereka juga mungkin menggunakannya untuk pulih dengan lebih cepat daripada kecederaan.<br><i>They may also use these substances to recover faster from injuries.</i><br>– Namun begitu, tindakan ini memberikan kelebihan tidak adil kepada mereka, melanggar prinsip permainan adil, dan boleh menyebabkan risiko kesihatan serius seperti kerosakan organ, ketidakseimbangan hormon, atau kesan psikologi.<br><i>However, this gives them an unfair advantage over others, violates the principles of fair play, and can cause serious health risks like organ damage, hormonal imbalance, or psychological effects.</i> | 1<br>1<br>1                    |                                    |

KERTAS 1

|    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | A | 3 jenis zarah yang membina jirim ialah atom, ion dan molekul.<br><i>The 3 types of particles that make up matter are atoms, ions and molecules.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2  | A | Air wujud dalam bentuk molekul yang terdiri daripada 2 atom hidrogen dan 1 atom oksigen.<br><i>Water exists as a molecule consisting of 2 hydrogen atoms and 1 oxygen atom.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3  | D | Unsur X mempunyai nombor proton 16, bermaksud mempunyai 16 elektron dan susunan elektron adalah 2.8.6. Ada 6 elektron di petala terluar dan terletak pada kumpulan 16 dan kala ke-3.<br><i>Element X has a proton number of 16, meaning it has 16 electrons and the electron arrangement is 2.8.6. There are 6 electrons in the outermost orbit and it is located in group 16 and the 3<sup>rd</sup> period.</i>                                                                                                                                                                                                                                                                                                                                                           |
| 4  | C | Dalam Jadual Berkala Unsur Moden, X dan Y adalah kumpulan logam. Pada suhu bilik, logam adalah dalam keadaan pepejal. Manakala Z yang berada dalam kumpulan 18 adalah gas nadir dan pada suhu bilik Z bersifat gas.<br><i>In the Modern Periodic Table of Elements, X and Y are metal groups. At room temperature, metals are in a solid state. While Z that is in group 18 is a inert gases and at room temperature Z is a gas.</i>                                                                                                                                                                                                                                                                                                                                       |
| 5  | D | Nombor elektron bagi R adalah 17(sama dengan nombor proton dihitung dari atas kiri ke kanan). Apabila menerima 1 elektron, jumlah bilangan elektron menjadi 18. Susunan elektron ialah 2.8.8.<br><i>The electron number for R is 17 (the same as the number of protons counted from top left to right). When receiving 1 electron, the total number of electrons becomes 18. The arrangement of electrons is 2.8.8.</i>                                                                                                                                                                                                                                                                                                                                                    |
| 6  | D | Unsur W (2.7) menerima satu elektron untuk mencapai susunan oktet, manakala unsur Z (2.8.8.1) boleh mendermakan satu elektron untuk mencapai susunan oktet.<br><i>Element W (2.7) accepts one electron to achieve octet order, while element Z (2.8.8.1) can donate one electron to achieve octet order.</i><br>Unsur X (2.8.2) boleh mendermakan 2 elektron dan Y (2.8.6) menerima 2 elektron untuk mencapai susunan oktet.<br><i>Element X (2.8.2) can donate 2 electrons and Y (2.8.6) accepts 2 electrons to achieve octet order.</i><br>Kedua-dua pasangan ini boleh mencapai konfigurasi oktet yang stabil melalui pemindahan elektron lalu membentuk ikatan.<br><i>These two pairs can achieve stable octet configuration by electron transfer and form a bond.</i> |
| 7  | C | Fosforus-32 digunakan untuk mengkaji kadar penyerapan baja fosforus dalam tumbuhan.<br><i>Phosphorus-32 is used to study the absorption rate of phosphorus fertilizers in plants.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 8  | A | Isotop ialah unsur yang mempunyai bilangan proton dan elektron yang sama, tetapi bilangan neutron yang berbeza. P dan Q mempunyai bilangan proton dan bilangan elektron yang sama iaitu 6, tetapi mempunyai bilangan neutron yang berbeza, 6 dan 7.<br><i>Isotopes are element that have the same number of protons and electrons, but a different number of neutrons. P and Q have the same number of protons and the same number of electrons which is 6, but have different numbers of neutrons, 6 and 7.</i>                                                                                                                                                                                                                                                           |
| 9  | D | Sinaran gama daripada kobalt-60 digunakan dalam bidang perubatan untuk membunuh sel kanser dan di dalam bidang pertanian untuk membasmi mikroorganisma pada sayur-sayuran tanpa mengubah kualiti makanan itu.<br><i>Gamma radiation from cobalt-60 is used in medicine to kill cancer cells and in agriculture to kill microorganisms on vegetables without changing the quality of the food.</i>                                                                                                                                                                                                                                                                                                                                                                          |
| 10 | A | Nombor nukleon = Bilangan neutron + Nombor proton<br><i>Nucleon number = Number of neutron + Proton number</i><br>Maka / Hence:<br>X: $12 - 6 = 6$ neutron / neutrons<br>Y: $13 - 6 = 7$ neutron / neutrons<br>Z: $14 - 6 = 8$ neutron / neutrons                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## KERTAS 2

| Soalan<br>Questions |     |  | Jawapan<br>Answers                                                                                                                                                                 | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) |  | Mengikut tertib menaik nombor proton dari kiri ke kanan dan dari atas ke bawah<br><i>In the order of increasing proton number from left to right and top to bottom</i>             | 1                              | 6                                  |
|                     | (b) |  | Q                                                                                                                                                                                  | 1                              |                                    |
|                     | (c) |  | Nombor nukleon = Nombor proton + Nombor neutron<br><i>Nucleon number = Proton number + Neutron number</i><br>$= 11 + 12$<br>$= 23$                                                 | 2                              |                                    |
|                     | (d) |  | <ul style="list-style-type: none"> <li>Sinar Z adalah sinar gama<br/><i>Ray Z is gamma rays</i></li> <li>Kuasa menembusan yang tinggi<br/><i>High penetrating power</i></li> </ul> | 2                              |                                    |

## Bab 9

## KIMIA INDUSTRI

## KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | C | Berbeza dengan aloi yang lain, piuter bersifat berkilat dan sangat sesuai untuk dijadikan bahan hiasan.<br><i>Unlike other alloys, pewter is shiny and very suitable for decoration.</i>                                                                                                                                                                                                                 |
| 2 | A | Ciri-ciri aloi yang ringan, kuat dan tahan kakisan adalah duralumin. Duralumin sesuai dijadikan badan pesawat, dan kapal terbang kerana ringan.<br><i>The characteristics of an alloy that is light, strong and resistant to corrosion is duralumin. Duralumin is suitable for making aircraft frames and airplanes because it is light.</i>                                                             |
| 3 | D | Duralumin adalah aloi yang terdiri daripada atom logam tulen utama aluminium dan atom logam asing sedikit iaitu kuprum, magnesium dan mangan.<br><i>Duralumin is an alloy consisting of the main pure metal atoms of aluminum and a small number of foreign metal atoms, namely copper, magnesium and manganese.</i>                                                                                     |
| 4 | A | Kaca plumbum adalah jenis kaca yang mempunyai indeks bias yang tinggi, menjadikannya paling sesuai untuk menghasilkan prisma kaca.<br><i>Lead crystal glass has high refractive index, making it the most suitable type for producing a glass prism.</i>                                                                                                                                                 |
| 5 | C | Pempolimeran ialah proses apabila monomer-monomer bergabung antara satu sama lain untuk membentuk satu rantai polimer.<br><i>Polymerisation is the process when monomers combine with each other to form a polymer chain.</i>                                                                                                                                                                            |
| 6 | C | Proses pemvulkanan ialah proses memanaskan getah asli bersama sulfur untuk menghasilkan getah tervulkan yang bersifat lebih kenyal dan tahan terhadap haba.<br><i>The vulcanization process is a process of heating natural rubber together with sulphur to produce vulcanized rubber that is more elastic and resistant to heat.</i>                                                                    |
| 7 | C | Bahan X ialah getah tervulkan yang bersifat tahan haba. Tayar kenderaan perlulah tahan kepada haba yang terhasil daripada geseran di jalan raya yang panas.<br><i>Substance X is a vulcanised rubber that is heat resistant. Tyres of vehicles must be resistant to the heat that resulting from friction on hot roads.</i>                                                                              |
| 8 | C | Getah tervulkan adalah lebih keras dan tahan haba. Proses pemvulkanan getah adalah pemanasan getah asli dan sulfur. Proses ini menghasilkan rangkai silang sulfur dengan polimer getah.<br><i>Vulcanised rubber is the hardest and resistant to heat. The rubber vulcanisation process is the heating of natural rubber and sulphur. This process produces sulphur cross-links with rubber polymers.</i> |

|   |   |                                                                                                                                                                                                                                                                                        |
|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9 | D | Getah sintetik digunakan untuk membuat sarung tangan, tayar kenderaan, dan tapak kasut, yang merupakan aplikasi yang sesuai bagi polimer ini.<br><i>Synthetic rubber is used to make gloves, vehicle tires, and shoe soles, which is the appropriate application for this polymer.</i> |
|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## KERTAS 2

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                  | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) |       | Gangsa/Bronze: 0.9<br>Kuprum/Copper: 1.4                                                                                                                                                                                                                                                                                                                                            | 2                              | 5                                  |
|                     | (b) | (i)   | Bongkah kuprum<br><i>Copper block</i>                                                                                                                                                                                                                                                                                                                                               | 1                              |                                    |
|                     |     | (ii)  | Bongkah gangsa lebih keras daripada bongkah kuprum/Bongkah kuprum lebih lembut daripada bongkah gangsa<br><i>Bronze block is harder than copper block/Copper block is softer than bronze block</i>                                                                                                                                                                                  | 1                              |                                    |
|                     |     | (iii) | Gangsa lebih keras/lebih kuat<br><i>Bronze is more harder/stronger</i>                                                                                                                                                                                                                                                                                                              | 1                              |                                    |
| 2                   | (a) | (i)   | Jenis logam (cincin besi dan cincin keluli)<br><i>Type of the ring (iron ring and steel ring)</i>                                                                                                                                                                                                                                                                                   | 1                              | 5                                  |
|                     |     | (ii)  | Selepas empat minggu, cincin besi dalam tabung uji P menunjukkan lapisan perang yang terbentuk di permukaan cincin besi.<br><i>After four weeks, iron ring in test tube P showed a brown layer formed on the surface of the iron ring.</i>                                                                                                                                          | 1                              |                                    |
|                     |     | (iii) | Lapisan perang// mendakan yang terbentuk di sekeliling dan permukaan cincin besi dalam tabung uji P menunjukkan bahawa proses pengoksidaan/pengaratatan telah berlaku pada cincin besi.<br><i>The brown layer and precipitate that formed around and on the surface of the iron ring in test tube P indicates that the oxidation/rusting process has occurred on the iron ring.</i> | 1                              |                                    |
|                     | (b) |       | Semakin lama cincin besi terdedah kepada air dan udara, semakin banyak mendakan perang yang terbentuk.<br><i>The longer the iron ring is exposed to water and air, the more brown precipitate is formed.</i>                                                                                                                                                                        | 1                              |                                    |
|                     |     | (c)   | Tiada perubahan yang berlaku pada cincin keluli dalam tabung uji Q selepas empat minggu, manakala cincin besi dalam tabung uji P menunjukkan lapisan perang.<br><i>No changes occurred on the steel ring in test tube Q after four weeks, while the iron ring in test tube P showed a brown layer.</i>                                                                              | 1                              |                                    |
| 3                   | (a) |       | Pengaloian<br><i>Alloying</i>                                                                                                                                                                                                                                                                                                                                                       | 1                              | 2                                  |
|                     | (b) |       | Aloi – Duralumin<br><i>Alloy – Duralumin</i><br>Ciri – Ringan/Kuat/Tahan hakisan<br><i>Features – Light/Strong/Resistant to corrosion</i>                                                                                                                                                                                                                                           | 2                              |                                    |

| Soalan<br>Questions |         | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (c) (i) | Persamaan/ <i>Similarity</i> :<br>Kedua-duanya mengandungi emas/Kedua-duanya mengandungi unsur logam asing<br><i>Both contain gold/Both contain foreign metal element</i><br><br>Perbezaan/ <i>Differences</i> :<br>Aloi P lebih lembut daripada aloi R/Aloi P mengandungi komposisi emas yang lebih banyak daripada aloi R.<br><i>Alloy P is softer than alloy R/Alloy P contains more gold composition than alloy R.</i><br>1 persamaan + 1 perbezaan<br><i>1 similarity + 1 difference</i> | 1<br><br><br>1                 | 6                                  |
|                     | (ii)    | Aloi R lebih keras daripada P dan Q.<br><i>Alloy R is harder than P and Q.</i>                                                                                                                                                                                                                                                                                                                                                                                                                | 1                              |                                    |
| 4                   | (a)     | Besi/Ferum<br><i>Iron</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                              | 6                                  |
|                     | (b)     | – Keluli keras dan kuat<br><i>Steel hard and strong</i><br>– Keluli tahan karat<br><i>Steel is rust-resistant</i>                                                                                                                                                                                                                                                                                                                                                                             | 2                              |                                    |
|                     | (c) (i) | Jenis M<br><i>Type M</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                              |                                    |
|                     | (ii)    | Lebih kenyal/Tahan terhadap haba<br><i>More elastic/More resistant to heat</i>                                                                                                                                                                                                                                                                                                                                                                                                                | 1                              |                                    |
|                     | (d)     | Tayar cepat haus<br><i>Tyre easily wears</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                              |                                    |

## Bab 10

## KIMIA DALAM PERUBATAN DAN KESIHATAN

### KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | B | Analgesik ialah ubat moden yang digunakan untuk melegakan kesakitan dengan cepat. Contoh analgesik adalah seperti aspirin, parasetamol dan kodeina.<br><i>Analgesics are modern drugs used to relieve pain quickly. Examples of analgesics are aspirin, paracetamol and codeine.</i>                                                                                                                      |
| 2 | B | Kiropraktik adalah kaedah untuk membetulkan semula kedudukan tulang menggunakan tangan. Kaedah ini berkesan untuk merawat sakit belakang dan leher, sakit sendi, sakit kepala dan kecederaan ketika bersukan.<br><i>Chiropractic is a method of realigning the position of the bones using hands. This method is effective in treating back and neck pain, joint pain, headaches and sports injuries.</i> |
| 3 | C | Perubatan komplementari seperti akupunktur tidak melibatkan pembedahan dan jahitan.<br><i>Complementary medicine such as acupuncture does not involve surgery and stitches.</i>                                                                                                                                                                                                                           |
| 4 | C | Perubatan komplementari biasanya merangkumi kaedah yang tidak invasif dan tidak melibatkan prosedur pembedahan.<br><i>Complementary medicine typically involves non-invasive methods and does not include surgical procedures.</i>                                                                                                                                                                        |
| 5 | B | Buah-buahan sitrus mengandungi banyak vitamin C. Vitamin C merupakan bahan antioksidan yang dapat melindungi sel badan daripada kerosakan (penuaan) akibat radikal bebas.<br><i>Citrus fruits contain a lot of vitamin C. Vitamin C is an antioxidant that can protect body cells from damage (aging) due to free radicals.</i>                                                                           |

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | C | <p>Faktor dalaman ialah faktor yang datang dari dalam diri sendiri seperti metabolisme dan keradangan. Manakala faktor luaran adalah faktor dari persekitaran seperti pencemaran udara, sinaran ultraungu, sinaran mengion, sisa toksik dan asap rokok.</p> <p><i>Internal factors are factors that come from within oneself such as metabolism and inflammation. While external factors are factors from the environment such as air pollution, ultraviolet radiation, ionising radiation, toxic waste and cigarette smoke.</i></p> |
|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## KERTAS 2

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                 | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
| 1                   | (a) | (i)   | <p>Warna hirisan buah pear selepas direndam dalam larutan dan dibiarkan terdedah kepada udara selama 15 minit.</p> <p><i>The color of pear slices after soaking in the solution and leaving it exposed to air for 15 minutes</i></p>                                                                                                                               | 1                              | 5                                  |
|                     |     | (ii)  | <p>Memerhatikan keadaan warna kedua-dua hirisan pear yang direndam dalam dua jenis larutan berbeza (larutan gula dan larutan limau nipis) selepas 15 minit terdedah kepada udara.</p> <p><i>Observing the color condition of both pear slices soaked in two different solutions (sugar solution and lime juice) after being exposed to air for 15 minutes.</i></p> | 1                              |                                    |
|                     |     | (iii) | <p>Proses pengoksidaan hirisan buah pear adalah proses perubahan warna hirisan buah pear dari putih kepada perang selepas direndam dalam larutan gula selama 15 minit.</p> <p><i>The process of oxidation of pear slices is the process of changing the colour of pear slices from white to brown after soaking in a sugar solution for 15 minutes.</i></p>        | 1                              |                                    |
|                     |     | (iv)  | <p>Jus limau nipis dapat menghalang pengoksidaan hirisan buah pear (larutan antioksidan), manakala larutan gula tidak menghalangnya (bukan larutan antioksidan).</p> <p><i>Lime juice can prevent the oxidation of pear slices (antioxidant solution), while sugar solution does not prevent it (not an antioxidant solution).</i></p>                             | 1                              |                                    |
|                     | (b) |       | <p>Untuk menunjukkan perubahan warna hirisan buah pear yang berlaku secara semula jadi akibat pengoksidaan tanpa sebarang larutan.</p> <p><i>To show the color change of pear slices that occurs naturally due to oxidation without any solution.</i></p>                                                                                                          | 1                              |                                    |
| 2                   | (a) |       | <p>Jawapan/Answer 1:<br/>Analgesik – Melegakan kesakitan<br/><i>Analgesic – Relieves pain</i></p>                                                                                                                                                                                                                                                                  | 2                              |                                    |
|                     |     |       | <p>Jawapan/Answer 2:<br/>Antibiotik – Membunuh atau menghalang pertumbuhan bakteria<br/><i>Antibiotics – Kill or inhibit the growth of bacteria</i></p>                                                                                                                                                                                                            | 2                              |                                    |
|                     |     |       | <p>Jawapan/Answer 3:<br/>Psikoterapeutik – Merawat pesakit psikiatrik<br/><i>Psychotherapy – Treat psychiatric patients</i><br/>(Terima salah satu jawapan)<br/>(Accept one of the answers)<br/>(1 markah untuk jenis ubat, 1 markah untuk kegunaan)<br/>(1 mark for type of drug, 1 mark for use)</p>                                                             | 2                              |                                    |

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (b) | <ul style="list-style-type: none"> <li>– Menggunakan bahan semula jadi/tumbuh-tumbuhan.<br/><i>Using natural materials/plants.</i></li> <li>– Keberkesanan rawatan lebih perlahan.<br/><i>Treatment effectiveness is slower</i></li> <li>– Kos rawatan yang rendah.<br/><i>Low cost of treatment.</i></li> <li>– Diwarisi daripada turun-temurun<br/><i>Inherited from generation to generation</i></li> <li>– Pembuktian keberkesanan secara pengalaman<br/><i>Evidence of effectiveness through experience</i></li> </ul> (Terima mana-mana 2 jawapan)<br>(Accept any 2 answers)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2                              |                                    |
|                     | (c) | Perbezaan/Differences:<br><ul style="list-style-type: none"> <li>– Umur 50 tahun mempunyai peratusan paling tinggi berjumpa lebih daripada satu doktor berbanding umur 18 – 49 tahun.<br/><i>Age of 50 has the highest percentage of seeing more than one doctor compared to age 18 – 49.</i></li> <li>– Pada umur 18 – 49 tahun, mempunyai peratusan paling tinggi untuk mendapatkan ubat daripada kawan atau keluarga berbanding 50 tahun.<br/><i>At the age of 18 – 49 years, have the highest percentage to get medicine from friends or family compared to 50 years.</i></li> <li>– Umur 18 – 49 tahun mempunyai peratusan paling tinggi untuk mendapatkan ubat daripada pembekal ubat berbanding umur 50 tahun.<br/><i>18 – 49 year olds have the highest percentage to get medicine from drug suppliers compared to 50 year olds.</i></li> </ul> (Terima mana-mana 1 perbezaan)<br>(Accept any 1 difference)<br><br>Penjelasan/Explanation:<br><ul style="list-style-type: none"> <li>– Menyebabkan kematian<br/><i>Causing death</i></li> <li>– Menyebabkan kesan sampingan yang teruk<br/><i>Causes severe side effects</i></li> <li>– Menyebabkan ketagihan<br/><i>Causes addiction</i></li> <li>– Menyebabkan ubat kurang berkesan melawan penyakit<br/><i>Causes medicine to be less effective against disease</i></li> </ul> (Terima mana-mana 3 jawapan)<br>(Accept any 3 answers) | 4                              |                                    |

| Soalan<br>Questions |     | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Sub<br>markah<br>Subs<br>marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|
|                     | (d) | <ul style="list-style-type: none"> <li>– Tidak mengandungi dadah atau bahan sintetik kimia.<br/><i>Does not contain drugs or synthetic chemicals.</i></li> <li>– Tidak melibatkan pembedahan atau jahitan pada tubuh.<br/><i>Does not involve surgery or stitches on the body.</i></li> <li>– Ubat yang diberikan menguatkan keupayaan badan.<br/><i>The medicine given strengthens the body's ability.</i></li> <li>– Rawatan secara holistik merangkumi fizikal, mental dan emosi.<br/><i>Holistic treatment includes physical, mental and emotional.</i></li> <li>– Kos rawatan yang rendah.<br/><i>Low cost of treatment.</i></li> <li>– Kurang menyakitkan.<br/><i>Less painful.</i></li> </ul> <p>(Terima mana-mana 4 jawapan)<br/>(Accept any 4 answers)</p> | 4                              | 12                                 |

## Bab 11 DAYA DAN GERAKAN

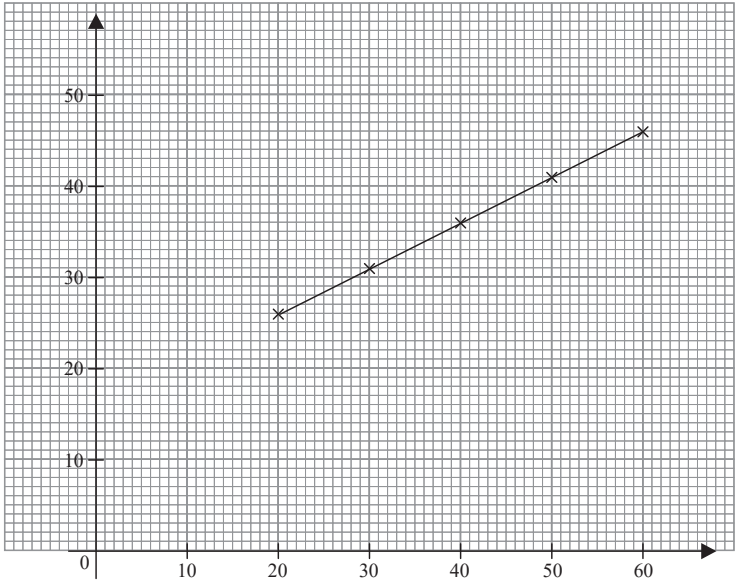
### KERTAS 1

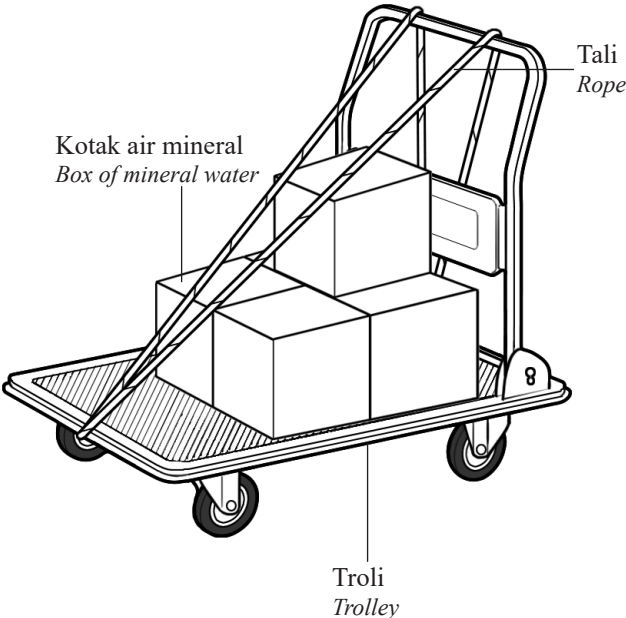
|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | B | <p>Sesaran ialah jarak lintasan terpendek yang menyambungkan dua lokasi dalam satu arah tertentu. Sesaran yang dilalui oleh kanak-kanak itu ialah 15 m.</p> <p><i>Displacement is the shortest traverse distance connecting two locations in specified direction. The displacement traveled by the child is 15 m.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2 | B | <p>Laju purata = Jumlah jarak ÷ Jumlah masa<br/><i>Average speed = Total distance ÷ Total time</i></p> <p>Jumlah masa = Jumlah jarak ÷ Laju purata<br/><i>Total time = Total distance ÷ Average speed</i></p> <p>= 700 m ÷ 2 ms<sup>-1</sup> = 350 s</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 3 | D | <p>Nilai sesaran daripada graf halaju-masa dapat diperolehi daripada menghitung luas di bawah graf.</p> <p><i>The displacement value from the velocity-time graph can be obtained from calculating the area under the graph.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4 | A | <p>Dalam graf sesaran melawan masa, jarak yang dilalui akan menghasilkan kecerunan positif (halaju), manakala tiada jarak yang dilalui menghasilkan graf yang mendatar. Apabila jarak yang dilalui adalah bertentangan maka kecerunan yang dihasilkan adalah negatif.</p> <p><i>In a displacement against time graph, distance traveled will produce a positive gradient (velocity), while no distance traveled will produce a flat graph. If the distance traveled is opposite then the gradient produced is negative</i></p>                                                                                                                                                                                                                                           |
| 5 | B | <p>Graf ini menunjukkan peningkatan halaju yang bertambah secara seragam selama 1 jam dari P ke Q, kemudian halaju adalah malar selama 2 jam dari Q ke R, seterusnya halaju bertambah secara seragam selama 2 jam dari R ke S dan dari S ke T menunjukkan halaju berkurang secara seragam selama 1 jam. Graf ini mencerminkan pergerakan yang sesuai dengan halaju yang diberikan dalam jadual.</p> <p><i>This graph shows the velocity increasing uniformly for 1 hour from P to Q, then the velocity is constant for 2 hours from Q to R, then the velocity increases uniformly for 2 hours from R to S and from S to T shows the velocity decreasing uniformly for 1 hour. This graph reflects the movement corresponding to the velocity given in the table.</i></p> |

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | D | <p>Dengan menggunakan rumus yang diberi, nilai halaju akhir ialah</p> <p><i>By using the given formula, the final velocity value is</i></p> $9.8 \text{ m}_{\text{s-2}} = \frac{\text{Halaju akhir/Final velocity} - 0}{2 \text{ s}}$ <p>Halaju akhir/Final velocity = <math>9.8 \text{ m}_{\text{s-2}} \times 2 \text{ s}</math></p> <p style="text-align: center;"><math>= 19.6 \text{ m}_{\text{s-1}}</math></p>                                                                                                                                                       |
| 7 | D | <p>Apabila kain disentak dengan laju, buku itu tidak jatuh ke lantai kerana inersia buku itu mengekalkan keadaan asal buku tersebut iaitu keadaan pegun.</p> <p><i>When the cloth is pulled quickly, the book does not fall to the floor because the inertia of the book maintains the original state of the book which is being at rest.</i></p>                                                                                                                                                                                                                         |
| 8 | A | <p>Inersia ialah sifat semula jadi sesuatu objek yang cenderung untuk mengekalkan keadaan asalnya sama ada semasa pegun/bergerak. Apabila payung dipusingkan, air terpercik ke sekeliling dan apabila tindakan itu dihentikan, air masih lagi terpercik dalam tempoh masa tertentu.</p> <p><i>Inertia is the natural property of an object that tends to maintain its original state whether at rest or in motion. When the umbrella is rotated, the water splashes around and when the action is stopped, the water is still splashing for a certain period.</i></p>     |
| 9 | B | <p>Inersia ialah sifat semula jadi sesuatu objek yang cenderung menentang perubahan keadaan asal objek itu, sama ada dalam keadaan pegun atau sedang bergerak. Inersia hanya boleh dipengaruhi oleh jisim, semakin bertambah jisim objek itu, semakin besar inersia objek tersebut.</p> <p><i>Inertia is the natural property of an object that tends to resist changes in the original state of the object, whether it is stationary or moving. Inertia can only be affected by mass, the greater the mass of the object, the greater the inertia of the object.</i></p> |

## KERTAS 2

| Soalan<br>Questions |     |       | Jawapan<br>Answers                                                                                                                                                                                                                                                         | Sub<br>markah<br>Subs marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------|
| 1                   | (a) |       | Panjang pita detik bertambah secara seragam bagi setiap 5 detik//<br>Panjang pita detik bertambah 1 cm bagi setiap 5 detik<br><i>The length of the ticker tape increases constantly every 5 seconds//The length of the stopwatch increases by 1 cm for every 5 seconds</i> | 1                           | 5                                  |
|                     | (b) |       | 6 cm                                                                                                                                                                                                                                                                       | 1                           |                                    |
|                     | (c) |       | Gerakan halaju seragam<br><i>Constant velocity motion</i>                                                                                                                                                                                                                  | 1                           |                                    |
|                     | (d) |       | Kecondongan landasan<br><i>Track inclination</i>                                                                                                                                                                                                                           | 1                           |                                    |
|                     | (e) |       | Landasan yang digunakan pada pita detik Rajah 2.2 lebih rendah<br><i>The tracks used on the timing tape of Diagram 2.2 are lower</i>                                                                                                                                       | 1                           |                                    |
| 2                   | (a) | (i)   | 60 g                                                                                                                                                                                                                                                                       | 1                           | 5                                  |
|                     |     | (ii)  | 60 g                                                                                                                                                                                                                                                                       | 1                           |                                    |
|                     |     | (iii) | 15 s                                                                                                                                                                                                                                                                       | 1                           |                                    |
|                     | (b) |       | Semakin besar jisim, semakin panjang/bertambah/besar masa yang diambil untuk 10 ayunan lengkap<br><i>The bigger the mass, the longer the time taken for 10 complete oscillations</i>                                                                                       | 1                           |                                    |
|                     | (c) |       | Jam randik<br><i>Stopwatch</i>                                                                                                                                                                                                                                             | 1                           |                                    |

| Soalan<br>Questions |     |  | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sub<br>markah<br>Subs marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------|
| 3                   | (a) |  | 41 saat / seconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                           |                                    |
|                     | (b) |  | 29 saat / seconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                           |                                    |
|                     | (c) |  | <p>Masa yang diambil untuk 5 ayunan lengkap (s)<br/>Time taken for 5 complete oscillations (s)</p>  <p>Jisim plastisin (g)<br/>Mass of plasticine (g)</p> <ol style="list-style-type: none"> <li>Semua titik dipindahkan dengan betul<br/><i>All points are correctly moved</i></li> <li>Semua titik disambungkan dan bentuk graf linear<br/><i>All points are connected and form a linear graph</i></li> </ol>                                            | 1<br>1                      |                                    |
|                     | (d) |  | <p>Jika jisim plastisin yang digunakan adalah 20 g, didapati masa yang diambil oleh plastisin untuk 5 ayunan lengkap adalah 26 saat berbanding jika jisim plastisin yang digunakan adalah 60 g, masa yang diambil plastisin untuk 5 ayunan lengkap adalah 46 s.<br/><i>If the mass of plasticine used is 20 g, it is found that the time taken by the plasticine for 5 complete oscillations is 26 seconds compared to if the mass of plasticine used is 60 g, the time taken by the plasticine for 5 complete oscillations is 46 s.</i></p> | 1                           |                                    |
|                     |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             | 5                                  |

| Soalan<br>Questions |     |  | Jawapan<br>Answers                                                                                                                                                                            | Sub<br>markah<br>Subs marks                                                     | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------|
| 4                   | (a) |  | Inersia<br><i>Inertia</i>                                                                                                                                                                     | 1                                                                               |                                    |
|                     | (b) |  | Menggoncang botol lebih kuat<br><i>Shake the bottle harder</i>                                                                                                                                | 1                                                                               |                                    |
|                     | (c) |  | Cara N kerana susunan kotak itu lebih stabil/menyebabkan kotak kasut tidak rosak<br><i>Way N because the arrangement of the shoe box is more stable/causes the shoe box not to be damaged</i> | 2                                                                               |                                    |
|                     | (d) |  |                                                                                                             | Lukisan – 1<br><i>Drawing</i><br>Label – 1<br>Susunan – 1<br><i>Arrangement</i> |                                    |
|                     |     |  |                                                                                                                                                                                               |                                                                                 | 7                                  |

KERTAS 1

|   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | D | Salah satu kelebihan tenaga nuklear adalah ia menghasilkan sedikit gas rumah hijau berbanding dengan bahan bakar fosil, menjadikannya pilihan yang lebih bersih untuk pengeluaran tenaga.<br><i>One of the advantages of nuclear energy is that it produces little greenhouse gases compared to fossil fuels, making it a cleaner option for energy production.</i>                                                                                                                                                                            |
| 2 | B | Pembelahan nukleus ialah proses pemecahan satu nukleus radioaktif yang berat kepada dua atau lebih nukleus yang lebih ringan dan lebih stabil disertai dengan pembebasan tenaga yang lebih besar.<br><i>Nuclear fission is the process of splitting a heavy radioactive nucleus into two or more lighter and more stable nuclei accompanied by the release of greater energy.</i>                                                                                                                                                              |
| 3 | A | Tindak balas berantai berlaku dalam proses pembelahan nukleus dan berlaku secara berterusan apabila satu neutron membedil dan membelah nukleus yang berjisim besar yang baharu. Kesan daripada tindak balas berantai menghasilkan tenaga nuklear yang banyak.<br><i>A chain reaction occurs in the process of nuclear fission and occurs continuously when a neutron bombards and splits a new, massive nucleus. The effect of the chain reaction produces a lot of nuclear energy.</i>                                                        |
| 4 | D | Tenaga nuklear dihasilkan melalui proses pembelahan nukleus. Pembelahan nukleus berlaku apabila satu neutron membedil satu nukleus yang berat seperti uranium-235.<br><i>Nuclear energy is produced through the process of nuclear fission. Nuclear fission occurs when a neutron bombards a heavy nucleus such as uranium-235.</i>                                                                                                                                                                                                            |
| 5 | A | Proses yang berlaku ialah pelakuran nukleus yang melibatkan penggabungan dua nukleus radioaktif ringan membentuk satu nukleus yang lebih berat disertai pembebasan tenaga nuklear yang lebih banyak beserta neutron.<br><i>The process that occurs is nuclear fusion which involves the merging of two light radioactive nuclei to form a heavier nucleus accompanied by the release of more nuclear energy along with neutrons.</i>                                                                                                           |
| 6 | D | Kesan somatik ialah kesan jangka pendek selepas terdedah dengan penyebaran radiasi contohnya katarak, leukemia, keletihan, loya dan keguguran rambut. Kesan genetik adalah kesan jangka panjang yang menjejaskan genetik seperti mutasi sel, kanser dan kecacatan kepada bayi.<br><i>Somatic effects are short-term effects after exposed to spread of radiation such as cataracts, leukaemia, fatigue, nausea and hair loss. Genetic effects are long-term effects that affect genetics such as cell mutations, cancer and birth defects.</i> |
| 7 | C | Kesan genetik akibat daripada penyebaran radiasi daripada ujian nuklear adalah kecacatan pada bayi, mutasi sel dan kanser.<br><i>Genetic effects resulting from the spread of radiation from nuclear testing are deformation of babies, cell mutations and cancer.</i>                                                                                                                                                                                                                                                                         |

| Soalan<br>Questions |     |      | Jawapan<br>Answers                                                                                                                                                                                                                                                                                                                                                              | Sub<br>markah<br>Subs marks | Jumlah<br>markah<br>Total<br>marks |
|---------------------|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------|
| 1                   | (a) | (i)  | Tenaga yang terhasil daripada tindak balas di dalam nukleus atom<br><i>Energy which is produced from the reaction in atom's nucleus</i>                                                                                                                                                                                                                                         | 1                           | 12                                 |
|                     |     | (ii) | <ul style="list-style-type: none"> <li>– Pembelahan nukleus<br/><i>Nuclear fission</i></li> <li>– Pelakuran nukleus<br/><i>Nuclear fusion</i></li> </ul> (mana-mana satu jawapan)<br><i>(any one answer)</i>                                                                                                                                                                    | 1<br><br>1                  |                                    |
|                     | (b) |      | Fungsi rod pengawal boron ialah mengawal tindak balas pembelahan nukleus dengan menyerap neutron berlebihan<br><i>The function of boron control rods is to control the rate of nuclear fission reaction by absorbing surplus neutrons</i><br><br>Fungsi moderator grafit ialah memperlahankan neutron<br><i>The function of graphite moderator is to slow down the neutrons</i> | 2                           |                                    |
|                     | (c) |      | Senjata N<br><i>Weapon N</i><br><br>Kesan/Effect:<br><ul style="list-style-type: none"> <li>– Jumlah kematian lebih besar<br/><i>Higher death rate</i></li> <li>– Kawasan dicemari lebih besar<br/><i>Large polluted areas</i></li> <li>– Sistem perhubungan musnah lebih teruk<br/><i>Worse destruction of communication system</i></li> </ul>                                 | 4                           |                                    |
|                     | (d) |      | Setuju<br><i>Agree</i><br><br>Alasan/Reason:<br><ul style="list-style-type: none"> <li>– Tidak membebaskan gas rumah hijau<br/><i>Does not release greenhouse gases</i></li> <li>– Tidak menyebabkan pemanasan global<br/><i>Does not cause global warming</i></li> <li>– Penghasilan tenaga elektrik yang lebih besar<br/><i>Greater production of electricity</i></li> </ul>  | 4                           |                                    |