



KEMENTERIAN PENDIDIKAN  
JABATAN PENDIDIKAN NEGERI TERENGGANU

# MPP 3

## SPM 2025

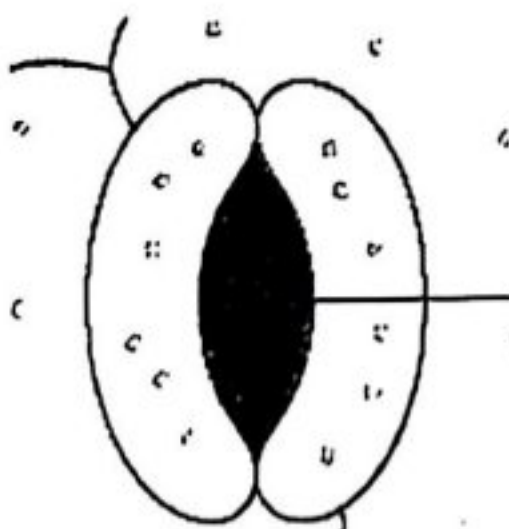
**PERATURAN  
PEMARKAHAN**

### BIOLOGI

## PERATURAN PEMARKAHAN Kertas 2

| Item          | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Markah                       |          |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------|
| 1(a)          | <p><b>Dapat mengenalpasti struktur U dan V dengan betul.</b></p> <p><i>Jawapan:</i></p> <p>U: Lengkung insang<br/><i>Gill arch</i></p> <p>V: Filamen (insang)<br/><i>(Gill) filaments</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1<br><br>1                   | 2        |
| 1(b)(i)       | <p><b>Dapat menamakan struktur W dengan betul.</b></p> <p><i>Jawapan:</i> (Otot) miotom<br/><i>Myotome (muscle)</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                            | 1        |
| 1(b)(ii)      | <p><b>Dapat menerangkan fungsi struktur W untuk melakukan pergerakan dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: bertindak secara antagonis<br/><i>acts as antagonistic pair</i></p> <p>P2: Otot miotom di sebelah kanan mengecut, otot miotom di sebelah kiri mengendur // Otot miotom di sebelah kiri mengecut, otot miotom di sebelah kanan mengendur<br/><i>the myotome on the right contracts, the myotome on the left relaxes // the myotome on the left contracts, the myotome on the right relaxes</i></p> <p>P3: menyebabkan ekor melibas ke kanan // menyebabkan ekor melibas ke kiri<br/><i>tail will be whipped to the right // tail will be whipped to the left</i></p> <p>P4: Badan bergerak dari sisi ke sisi // menolak air ke belakang dan ke sisi // badan digerakkan ke hadapan<br/><i>Body moves from side to side // pushing water backwards and sideway // fish moving forward</i></p> | 1<br><br>1<br><br>1<br><br>1 | 2        |
| 1(c)          | <p><b>Dapat menyatakan bagaimana sirip S mengatasi masalah tersebut semasa berenang dengan betul.</b></p> <p><i>Jawapan:</i> sirip S / ekor membengkok / mengibas <u>lebih</u> kerap<br/><i>fin S / tail bend / whips <u>more</u> often</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                            | 1        |
| <b>JUMLAH</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              | <b>6</b> |



| Item     | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Markah                                    |   |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---|
| 3(a)(i)  | <p><b>Dapat menyatakan nama C dan D dengan betul.</b></p> <p><i>Jawapan;</i></p> <p>C: Lamina<br/><i>Lamina</i></p> <p>D: Petiol<br/><i>Petiole</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1<br><br>1                                | 2 |
| 3(a)(ii) | <p><b>Dapat menerangkan ciri penyesuaian bagi struktur C untuk meningkatkan kadar fotosintesis dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>F1: ( bahagian daun yang) leper / rata<br/><i>( part of the leaf) flat</i></p> <p>P1: untuk menambahkan luas permukaan<br/><i>To increase surface area</i></p> <p>P2: supaya ( kloroplas di dalamnya) terdedah kepada cahaya matahari secara maksimum<br/><i>So that (the chloroplast inside) are exposed to maximum sunlight</i></p> <p>ATAU/ OR</p> <p>F2: berbentuk nipis<br/><i>Thin shape</i></p> <p>P3: memudahkan gas-gas (yang terlibat dalam fotosintesis) meresap dengan cekap ke bahagian dalam daun.<br/><i>Ease the gases (involved in photosynthesis) to diffuse efficiently to the inside of the leaf</i></p> <p><b>note: F1 + P1/P2 Atau F2 + P3</b></p> | 1<br><br>1<br><br>1<br><br><br>1<br><br>1 | 2 |
| 3(b)(i)  | <p><b>Dapat melukiskan keadaan sel pengawal dan liang stoma tumbuhan tersebut dengan betul.</b></p> <p><i>Jawapan:</i></p>  <p><b>Nota:</b></p> <p>Terima jika komponen struktur dalam sel pengawal tidak lengkap-yang penting ,menunjukkan liang stoma terbuka</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                                         | 1 |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |          |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|
| 3(b)(ii)      | <p><b>Dapat menerangkan keadaan liang stoma yang anda lukis di (b)(i) berdasarkan kepekatan sukrosa dalam sel pengawal dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: Kepekatan sukrosa meningkat (kerana berlaku fotosintesis)<br/> <i>Concentration of sucrose increase (because photosynthesis occur)</i></p> <p>P2: Keupayaan air dalam sel pengawal berkurang<br/> <i>Water potential in guard cell decreases</i></p> <p>P3: Molekul air dari sel epidermis meresap ke dalam sel pengawal secara osmosis<br/> <i>Water molecules from epidermal cell diffuse into guard cell by osmosis</i></p> <p>P4: Stoma terbuka // sel pengawal segah / melengkung keluar<br/> <i>Stomata open // guard cell turgid / curve outward</i></p> | 1<br>1<br>1<br>1 | 2        |
| <b>JUMLAH</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  | <b>7</b> |

| Item | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Markah |   |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|
| 4(a) | <p><b>Dapat menyatakan nama neuron P dan Q dengan betul.</b></p> <p><i>Jawapan:</i></p> <p>P: Neuron deria<br/> <i>Sensory neurone</i></p> <p>Q: Efektor<br/> <i>Effector</i></p>                                                                                                                                                                                                                                                                                         | 1<br>1 | 2 |
| 4(b) | <p><b>Dapat menerangkan apa akan berlaku jika neuron P rosak dengan betul.</b></p> <p><i>Jawapan:</i></p> <p>P1: Impuls tidak boleh dihantar dari reseptor ke sistem saraf pusat / otak &amp; saraf tunjang<br/> <i>Impulse cannot transmit from receptor to central nervous system / brain &amp; spinal cord</i></p> <p>P2: Otak tidak boleh mentafsir / mengintegrasikan impuls / maklumat<br/> <i>Brain cannot interpret / integrate the impulse / information</i></p> | 1<br>1 | 1 |
| 4(c) | <p><b>Dapat menerangkan pemindahan maklumat dari M ke L</b></p> <p><i>Jawapan:</i></p> <p>P1: M / Reseptor mengesan rangsangan / mencetuskan impuls saraf<br/> <i>M / Receptors detect stimulus / triggers nerve impulse</i></p> <p>P2: Neuron deria menghantar impuls saraf ke L / saraf tunjang<br/> <i>Sensory neurones transmit nerve impulse to L / spinal cord</i></p>                                                                                              | 1<br>1 | 2 |

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |          |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------|
| 4(d) | <p><b>Dapat meramalkan apa akan berlaku kepada individu dalam situasi dalam Rajah 4.2 jika L cedera</b></p> <p><i>Jawapan:</i></p> <p>P1: Impuls saraf tidak akan dihantar dari neuron deria ke efektor.<br/><i>The nerve impulse will not be sent from sensory neurone to the effector.</i></p> <p>P2: Efektor / otot tidak akan mengecut.<br/><i>The effector / muscle will not contracts.</i></p> <p>P3: Jari / tangan tidak dapat dialihkan serta merta daripada jarum.<br/><i>The finger / hand will not be removed immediately from the needle.</i></p> | 1<br>1<br>1 | 2        |
|      | <b>JUMLAH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             | <b>7</b> |

| Item | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Markah           |   |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---|
| 5(a) | <p><b>Dapat menyatakan nama kelenjar P dan organ Q dengan betul.</b></p> <p><i>Jawapan:</i></p> <p>P: Kelenjar air liur<br/><i>Salivary gland</i></p> <p>Q: Perut<br/><i>Stomach</i></p>                                                                                                                                                                                                                                                                                                                                                      | 1<br>1           | 2 |
| 5(b) | <p><b>Dapat menyatakan satu fungsi sel epitelium pada permukaan dinding organ Q dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1 : Sel utama merembeskan pepsinogen<br/><i>Chief cells secrete pepsinogen</i></p> <p>P2 : Sel pariental merembeskan asid hikroklorik<br/><i>Pariental cells secrete hydrochloric acid</i></p> <p>P3 : Sel mukus merembeskan mukus<br/><i>Mucous cell secretes mucous</i></p>                                                                                                                         | 1<br>1<br>1      | 1 |
| 5(c) | <p><b>Dapat menerangkan bagaimana pembedahan pintasan gastrik dapat mengurangkan berat badan Encik S dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: Saiz perut menjadi kecil<br/><i>Stomach size becomes smaller</i></p> <p>P2: Cepat berasa kenyang / Makan sedikit / Kurang berasa lapar<br/><i>Feel full quickly / Eat less/ Feel less hungry</i></p> <p>P3: Kurang pengambilan kalori<br/><i>Less calorie intake</i></p> <p>P4: Kurang pembentukan lemak / tisu adipos<br/><i>Less formation of fats / adipose tissue</i></p> | 1<br>1<br>1<br>1 | 3 |

| 5(d)                                                                                                                          | <p>Dapat menyatakan perbezaan antara pencernaan fizikal dan pencernaan kimia dengan betul.</p> <p>Contoh jawapan:</p> <table><tr><th>Pencernaan fizikal<br/><i>Physical digestion</i></th><th>Pencernaan kimia<br/><i>Chemical digestion</i></th></tr><tr><td>Pemecahan makanan secara mekanikal (membentuk butiran kecil)<br/><i>Mechanical breakdown of food (to form small particles)</i></td><td>Proses penguraian molekul kompleks menjadi molekul ringkas<br/><i>Process breakdown of complex molecules into simple molecules</i></td></tr><tr><td>Melibatkan pengunyahan dan peristalsis<br/><i>Involves chewing and peristalsis.</i></td><td>Melibatkan tindakan enzim<br/><i>Involves enzyme reaction</i></td></tr></table> | Pencernaan fizikal<br><i>Physical digestion</i> | Pencernaan kimia<br><i>Chemical digestion</i> | Pemecahan makanan secara mekanikal (membentuk butiran kecil)<br><i>Mechanical breakdown of food (to form small particles)</i> | Proses penguraian molekul kompleks menjadi molekul ringkas<br><i>Process breakdown of complex molecules into simple molecules</i> | Melibatkan pengunyahan dan peristalsis<br><i>Involves chewing and peristalsis.</i> | Melibatkan tindakan enzim<br><i>Involves enzyme reaction</i> | 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| Pencernaan fizikal<br><i>Physical digestion</i>                                                                               | Pencernaan kimia<br><i>Chemical digestion</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                 |                                               |                                                               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| Pemecahan makanan secara mekanikal (membentuk butiran kecil)<br><i>Mechanical breakdown of food (to form small particles)</i> | Proses penguraian molekul kompleks menjadi molekul ringkas<br><i>Process breakdown of complex molecules into simple molecules</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                 |                                               |                                                               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| Melibatkan pengunyahan dan peristalsis<br><i>Involves chewing and peristalsis.</i>                                            | Melibatkan tindakan enzim<br><i>Involves enzyme reaction</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                 |                                               |                                                               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| Item     | Peraturan Pemarkahan                                                                                   | Markah |   |
|----------|--------------------------------------------------------------------------------------------------------|--------|---|
| 6(a)(i)  | Dapat menyatakan Zon P dan Q dengan betul.                                                             |        | 2 |
|          | Jawapan:                                                                                               |        |   |
|          | Zon P: Zon pembezaan sel<br>Zone of cell differentiation                                               | 1      |   |
|          | Zon Q: Zon pemanjangan sel<br>Zone of cell elongation                                                  | 1      |   |
| 6(a)(ii) | Dapat menyatakan fungsi struktur R dengan betul.                                                       |        | 1 |
|          | Jawapan:                                                                                               |        |   |
|          | P1: Meningkatkan luas permukaan akar<br>Increase surface area of the root                              | 1      |   |
|          | P2: Meningkatkan penyerapan air dan garam mineral<br>Increase absorption of water and mineral salts    | 1      |   |
| 6(b)     | Dapat membezakan pertumbuhan dalam Rajah 6.1 dan Rajah 6.2 berdasarkan aspek yang diberi dengan betul. |        | 2 |
|          | Jawapan:                                                                                               |        |   |
|          |                                                                                                        |        |   |
|          |                                                                                                        |        |   |
|          |                                                                                                        |        |   |
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| 6(c) | <p><b>Dapat menjelaskan ciri batang pokok balak seperti <i>Shorea sp</i> mempunyai nilai ekonomi yang tinggi dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>F1: Berlaku penebalan lignin pada dinding sel<br/><i>Lignin thickening occurs in the cell walls</i></p> <p>P1: Batang pokok menjadi kuat / keras<br/><i>Become strong / hard stem</i></p> <p>P2: Digunakan sebagai struktur rumah / bangunan / perabot<br/><i>Use as the structure of houses / buildings / furniture</i><br/>atau</p> <p>F2: Kehadiran gelang tahunan<br/><i>The presence of annual rings</i></p> <p>P3: Menghasilkan corak / kelihatan menarik<br/><i>creates patterns / appears interesting</i></p> <p>P4: sebagai barang perhiasan.<br/><i>as decorative items</i></p> <p style="text-align: right;"><b>F + P yang sepadan</b></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> | 3 |
|      | <b>JUMLAH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                       | 8 |

| Item     | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Markah |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 7(a)(i)  | <p><b>Dapat menyatakan nama agen pencuci Y dengan betul</b></p> <p><i>Jawapan: Ekoenzim</i><br/><i>Ecoenzyme</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1      |
| 7(a)(ii) | <p><b>Dapat menyatakan dua kepentingan penghasilan agen pencuci Y dengan betul</b></p> <p><i>Contoh Jawapan:</i></p> <p>P1: Mengurangkan sisa sampah organik // mengurangkan tapak pelupusan sampah // mengurangkan pencemaran air / udara<br/><i>Reduce organic waste // reduce landfill // reduce water / air pollution</i></p> <p>P2: Menjimatkan kos<br/><i>Cost saving</i></p> <p>P3: Lebih selamat digunakan oleh manusia // tidak mempunyai bahan kimia berbahaya // mesra alam<br/><i>Safer for human's use // do not contain harmful chemical // eco-friendly</i></p> <p>P4: Digunakan untuk mencuci longkang / air sisa<br/><i>Used to clean drain / wastewater</i></p> | 2      |
| 7(b)     | <p><b>Dapat menerangkan kesan aktiviti pembuangan sisa plastik ke atas biodiversiti di Malaysia dengan betul</b></p> <p><i>Contoh jawapan:</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3      |

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|      | <p>P1: Kehilangan habitat semulajadi<br/><i>Loss of natural habitat</i></p> <p>P2: menyebabkan kepupusan spesies terancam (seperti penyu belimbing) // mengurangkan biodiversiti<br/><i>Cause the extinction of endangered species (such as leatherback turtle) // reduce biodiversity</i></p> <p>P3: (Berlaku pencemaran air yang) mengganggu ekosistem akuatik / merosakkan kehidupan marin / ekosistem tidak seimbang // mengganggu rantai makanan<br/><i>(Water pollution occur that) disrupting aquatic ecosystems / harming marine life / ecosystem imbalance / disrupts food chain</i></p> <p>P4: Pengumpulan mikroplastik / Organisma laut menelan mikroplastik<br/><i>Microplastic accumulation / Marine organisms ingest microplastics</i></p> <p>P5: menyebabkan masalah kesihatan (serius seperti kanser).<br/><i>leads to (serious) health issues (such as cancer).</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1<br>1<br>1<br>1<br>1 |   |
| 7(c) | <p><b>Dapat mewajarkan saranan penerapan kempen 5S di sekolah dengan betul.</b></p> <p><i>Contoh Jawapan:</i></p> <p><b>Sisih (Seiri) : Pengurangan Sisa dan Penggunaan Sumber</b><br/><b>Sort (Seiri) : Waste Reduction and Resource</b></p> <p>P1: Mengurangkan penggunaan bahan yang tidak perlu seperti kertas / plastik / alat tulis yang berlebihan // mengurangkan pembaziran sumber / sisa buangan // mengurangkan jejak karbon<br/><i>Minimised usage of unnecessary materials such as paper/ plastic / excess stationery // helps reduce resource / waste reduce carbon footprint</i></p> <p><b>Susun (Seiton) : Mengoptimum Penggunaan Sumber</b><br/><b>Set in Order (Seiton): Optimal Resource Utilization</b></p> <p>P2: Susunan bahan secara sistematik memastikan peralatan pembelajaran digunakan dengan maksimum // mengurangkan keperluan untuk pembelian baru // menggalakkan penggunaan semula.<br/><i>Systematic arrangement ensures learning tools are used efficiently // reducing the need for new purchases // encouraging reuse.</i></p> <p><b>Sapu (Seiso) : Udara Bersih dan Persekitaran Hijau</b><br/><b>Shine (Seiso) : Clean Air and Green Environment</b></p> <p>P3: Mengekalkan kebersihan kelas membantu mengurangkan pencemaran udara dalam kelas // selain menggalakkan penggunaan produk mesra alam seperti pembersih organik / tumbuhan dalam kelas.<br/><i>Maintaining classroom cleanliness helps reduce indoor air pollution while encouraging the use of eco-friendly products like organic cleaners and indoor plants.</i></p> | 1<br><br>1<br><br>1   | 3 |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |  |
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|               | <b>Seragam (Seiketsu) : Pemantapan Budaya Hijau</b><br><b>Standardise (Seiketsu) : Strengthening Green Culture</b><br>P4: Memantapkan amalan mesra alam seperti kitar semula // penggunaan tenaga / air secara cekap // menggalakkan kesedaran teknologi hijau dalam kalangan pelajar.<br><i>Standardising eco-friendly practices such as recycling // energy efficiency / water conservation // promotes an awareness of green technology among students.</i>                                                       | 1        |  |
|               | <b>Sentiasa Amalkan (Shitsuke) : Mengamalkan Pendidikan Kelestarian Alam</b><br><b>Sustain (Shitsuke) : Practices of Environmental Sustainable Education</b><br>P5: Melatih pelajar untuk mengamalkan konsep teknologi hijau melalui aktiviti pembelajaran dalam kelas //menerapkan nilai kelestarian / sayangi alam dalam kehidupan mereka.<br><i>Train students to practice green technology principles in their daily classroom routine // integrates sustainability values / love of nature into their lives</i> | 1        |  |
| <b>JUMLAH</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>9</b> |  |

| Item | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Markah                |   |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|
| 8(a) | <b>Dapat menerangkan mengapa bacaan seperti Rajah 8.3 diperoleh.</b><br><br><i>Contoh jawapan:</i><br>P1: Aras glukosa dalam darah tinggi melebihi aras normal<br><i>Blood glucose levels increase exceed the normal level.</i><br>P2: Glukosa berlebihan tidak ditukarkan kepada glikogen<br><i>Excess glucose is not converted into glycogen</i><br>P3: Sel beta / pankreas tidak merembeskan hormon insulin ke dalam darah.<br><i>Beta cells / pancreas did not secrete insulin in blood.</i><br>P4: (Insulin) tidak merangsang sel hati dan sel otot untuk menggunakan glukosa dalam proses respirasi sel.<br><i>(insulin) not stimulate liver cells and muscle cells to use glucose in the process of cellular respiration.</i><br>P5: Menyebabkan diabetes melitus<br><i>Cause Diabetes mellitus</i> | 1<br>1<br>1<br>1<br>1 | 3 |
| 8(b) | <b>Dapat menerangkan perbezaan kandungan bahan yang terdapat dalam struktur M dan air kencing.</b><br><br><i>Contoh jawapan:</i><br><br>P1: Struktur M mengandungi asid amino / glukosa, manakala dalam air kencing tidak mengandungi asid amino / glukosa.<br><i>Structure M contains amino acids / glucose, while in urine does not contain amino acids / glucose.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                     | 3 |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |          |
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|               | <p>P2: Semua / 100% asid amino / glukosa telah diserap semula (ke dalam kapilari darah).<br/><i>All / 100% amino acids / glucose had been reabsorbed (into blood capillaries)</i></p> <p>P3: secara pengangkutan aktif<br/><i>By active transport</i></p> <p>P4: pada tubul berlingkar proksimal / Struktur M<br/><i>At the proximal convoluted tubule / structure M</i></p>                                                                                                                                                                                                                                                                                                                                                 | 1<br>1<br>1      |          |
| 8(c)          | <p><b>Dapat mencadangkan bagaimana pesakit ini dapat mengurangkan masalah batu karang tanpa menjalani pembedahan.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: Minum banyak air setiap hari<br/><i>Drink a lot of water daily</i></p> <p>P2: Kurangkan pengambilan daging merah / makanan tinggi protein<br/><i>Reduce intake of red meat / high-protein food</i></p> <p>P3: Kurangkan pengambilan garam / makanan proses / jeruk<br/><i>Reduce intake of salts / processed food / pickled food</i></p> <p>P4: Kurangkan makanan tinggi oksalat / contoh makanan seperti bayam / kekacang / coklat / keledaik<br/><i>Reduce food high oxalate / example of food such as spinach / peanuts / chocolate / sweet potato</i></p> | 1<br>1<br>1<br>1 | 3        |
| <b>JUMLAH</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  | <b>9</b> |

| Item    | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Markah |   |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|
| 9(a)    | <p><b>Dapat menerangkan peranan R dan S dalam perkembangan fetus dengan betul</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: R / vena tali pusat mengangkut darah beroksigen / yang kaya dengan oksigen / nutrien (dari plasenta ke fetus)<br/><i>R / umbilical vein carries oxygenated blood / rich in oxygen / nutrients (from placenta to the foetus)</i></p> <p>P2: S / arteri tali pusat mengangkut darah terdeoksigen / yang kaya dengan karbon dioksida / bahan buangan nitrogen / urea / bahan kumuh (dari fetus ke plasenta)<br/><i>S / umbilical arteries carry deoxygenated blood / rich in carbon dioxide / nitrogenous waste / urea / waste products (from foetus to the placenta)</i></p> | 1<br>1 | 2 |
| 9(b)(i) | <p><b>Dapat menerangkan mengapa oosit sekunder P mempunyai bilangan kromosom yang berbeza daripada oosit sekunder yang normal dengan betul</b></p> <p><i>Contoh jawapan:</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        | 5 |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                       |    |
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|          | <p>P1: Tak disjungsi kromosom<br/><i>Non-disjunction of chromosome</i></p> <p>P2: Semasa anafasa I / anafasa II<br/><i>During anaphase I / anaphase II</i></p> <p>P3: Gentian gelendong tidak terbentuk / mengecut<br/><i>Spindle fibre are not formed / contract</i></p> <p>P4: Kromosom homolog / kromatid kembar tidak terpisah (semasa anafasa I / anafasa II)<br/><i>Homologous chromosomes / sister chromatid does not separate (during anaphase I / anaphase II)</i></p> <p>P5: Membentuk oosit sekunder yang abnormal<br/><i>Forming abnormal secondary oocyte</i></p> <p>P6: Oosit sekunder P lebih satu kromosom<br/><i>Secondary oocyte P extra one chromosome</i></p>                                                                                                                                                        | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> |    |
| 9(b)(ii) | <p><b>Dapat menerangkan kesan apabila oosit sekunder P disenyawakan oleh sperma yang normal dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: Zigot / embryo / fetus / bayi yang tidak normal terhasil<br/><i>Abnormal zygote / embryo / foetus / baby is produced</i></p> <p>P2: Mempunyai 47 kromosom / lebih satu kromosom<br/><i>Have 47 chromosomes / extra one chromosome</i></p> <p>P3: Menyebabkan sindrom Down / Klinefelter<br/><i>Causes to Down / Klinefelter syndrome</i></p> <p>P4: Mengalami mutasi kromosom<br/><i>Experience chromosomal mutation</i></p>                                                                                                                                                                                                                                                      | <p>1</p> <p>1</p> <p>1</p> <p>1</p>                   | 3  |
| 9(c)     | <p><b>Dapat menerangkan perkaitan antara aras hormon P, Q, R dan S dengan urutan peristiwa yang berlaku dalam ovari dengan betul</b></p> <p><i>Contoh jawapan:</i></p> <p>P1: Hormon P / FSH dirembeskan oleh kelenjar pituitari<br/><i>Hormone P / FSH secreted by pituitary gland</i></p> <p>P2: FSH merangsang perkembangan folikel primer<br/><i>FSH stimulate the development of primary follicle</i></p> <p>P3: Folikel / Oosit primer berkembang menjadi folikel sekunder / Graaf / oosit sekunder<br/><i>Primary follicle / oocyte develops into secondary / Graafian follicle / secondary oocyte</i></p> <p>P4: Sel folikel (yang berkembang) merembeskan estrogen / R<br/><i>(Growing) follicle cells secrete oestrogen / R</i></p> <p>P5: Untuk membaiki / memulihkan endometrium<br/><i>To repair / heal endometrium</i></p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>          | 10 |

|               |                                                                                                                                                                                                        |           |  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| P6:           | Estrogen tinggi merencat rembesan FSH / merangsang rembesan hormon peluteinan / LH / Q<br><i>Higher oestrogen inhibits the secretion FSH / stimulate the secretion of luteinising hormone / LH / Q</i> | 1         |  |
| P7:           | LH / Q (yang tinggi) merangsang pengovulan pada hari ke-14<br><i>(High) LH / Q stimulate ovulation at day-14</i>                                                                                       | 1         |  |
| P8:           | Oosit sekunder dibebaskan<br><i>Secondary oocyte is released</i>                                                                                                                                       | 1         |  |
| P9:           | (Folikel Graaf) membentuk korpus luteum<br><i>(Graafian follicle) forming corpus luteum</i>                                                                                                            | 1         |  |
| P10:          | Korpus luteum merembeskan progesteron / S<br><i>Corpus luteum secrete progesterone / S</i>                                                                                                             | 1         |  |
| P11:          | Untuk menebalkan endometrium<br><i>To thicken the endometrium</i>                                                                                                                                      | 1         |  |
| P12:          | Korpus luteum akan terurai jika tiada persenyawaan<br><i>Corpus luteum degenerate if no fertilisation</i>                                                                                              | 1         |  |
| P13:          | Aras hormon progesteron / S akan menurun<br><i>Level of progesterone hormone / S become decreases</i>                                                                                                  | 1         |  |
| <b>JUMLAH</b> |                                                                                                                                                                                                        | <b>20</b> |  |

| Item  | Peraturan Pemarkahan                                                                                                                                                                                                                                                                                                                                                                                                                            | Markah |   |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|
| 10(a) | <p><b>Dapat penyesuaian sel rakan dengan betul</b></p> <p><i>Contoh Jawapan:</i></p> <p>P1: Mempunyai (banyak) mitokondria<br/><i>Has (many) mitochondria</i></p> <p>P2: untuk menghasilkan / membekalkan (banyak) tenaga<br/><i>to produce / provide (a lot of) energy</i></p> <p>P3: bagi pengangkutan <u>sukrosa</u><br/><i>for transportation of <u>sucrose</u></i></p> <p>P4: secara pengangkutan aktif<br/><i>by active transport</i></p> |        | 2 |
| 10(b) | <p><b>Dapat menerangkan kesan kerosakan yang berlaku dalam tisu P ke atas proses pengangkutan yang dijalankan oleh tisu Q dengan betul</b></p> <p><i>Contoh jawapan:</i></p>                                                                                                                                                                                                                                                                    |        | 5 |

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|       | <p>P1 Pengangkutan air dari akar ke pucuk / daun tidak berlaku<br/><i>Water transport from roots to shoots / leaves does not occur</i></p> <p>P2 Air tidak meresap masuk (dari tisu P) ke dalam tisu Q / tiub tapis secara osmosis<br/><i>Water does not diffuse (from tissue P) into tissue Q / sieve tube by osmosis</i></p> <p>P3 Keupayaan air dalam tisu Q / tiub tapis kekal rendah<br/><i>Water potential in tissue Q / sieve tube remain low</i></p> <p>P4 Tekanan hidrostatik dalam tisu Q / tiub tapis rendah / tidak meningkat<br/><i>Hydrostatic pressure in tissue Q / sieve tube low / does not increase</i></p> <p>P5 Sukrosa / kandungan floem tidak ditolak sepanjang tisu Q / tiub tapis<br/><i>Sucrose/ phloem content cannot be pushed along tissue Q / sieve tube</i></p> <p>P6 Sukrosa / kandungan floem tidak diangkut ke bahagian batang / akar / pucuk / buah / umbisi<br/><i>Sucrose / phloem content is not transported to the stem / roots / shoots / fruit / tubers</i></p> <p>P7 Proses translokasi tidak berlaku<br/><i>Translocation process does not occur</i></p> | 1<br>1<br>1<br>1<br>1<br>1<br>1 |   |
| 10(c) | <p><b>Dapat menerangkan mengapa kangkung yang tumbuh di tebing kolam dalam Rajah 10.2 tidak sesuai dimakan.</b></p> <p><i>Contoh Jawapan:</i></p> <p>P1 Air kolam / tanah dicemari / mengandungi logam berat<br/><i>Pond water / soil is polluted / contain heavy metal</i></p> <p>P2 Akar pokok kangkung menyerap logam berat (dari tanah dan air)<br/><i>Water spinach root absorbs heavy metal (from soil and water)</i></p> <p>P3 Logam berat terkumpul dalam pokok kangkung<br/><i>Heavy metal accumulates in water spinach</i></p> <p>P4 (Logam berat) diserap / dipindahkan ke manusia <u>apabila dimakan</u><br/><i>(Heavy metal) being absorbed / transferred to human <u>when eaten</u></i></p> <p>P5 Menyebabkan masalah kesihatan / kanser / kerosakan ginjal<br/><i>Cause health problem/ cancer/ kidney failure</i></p>                                                                                                                                                                                                                                                               | 1<br>1<br>1<br>1<br>1           | 3 |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                         |                                                                                        |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
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| 10(d) | <p><b>Dapat menyatakan perbezaan antara proses P dan proses Q dengan betul</b></p> <p><i>Contoh Jawapan:</i></p> <table><tr><td></td><td><b>Proses P</b><br/><i>Process P</i></td><td><b>Proses Q</b><br/><i>Process Q</i></td><td></td></tr><tr><td>P1</td><td>Proses gutasi<br/><i>Gutiation process</i></td><td>Proses transpirasi<br/><i>Transpiration process</i></td><td>1</td></tr><tr><td>P2</td><td>Berlaku pada waktu malam / awal pagi<br/><i>Occur at night / early morning</i></td><td>Berlaku pada waktu siang (yang panas dan berangin)<br/><i>Occur at daytime (hot and windy)</i></td><td>1</td></tr><tr><td>P3</td><td>Berlaku hanya dalam tumbuhan herba<br/><i>Only occur in herbaceous plant</i></td><td>Berlaku dalam semua tumbuhan<br/><i>Occur in all plants</i></td><td>1</td></tr><tr><td>P4</td><td>Air terbebas dalam bentuk titisan air<br/><i>Water released in the form of droplets</i></td><td>Air terbebas dalam bentuk wap air<br/><i>Water released in the form of water vapour</i></td><td>1</td></tr><tr><td>P5</td><td>Air terbebas melalui struktur khas di bahagian urat daun / hidatod<br/><i>Water released from specialised structure in the leaf vein / hydathode</i></td><td>Air terbebas melalui stoma<br/><i>Water released from stomata</i></td><td>1</td></tr><tr><td>P6</td><td>Berlaku apabila tekanan akar tinggi<br/><i>Occur when high root pressure</i></td><td>Dikawal oleh pembukaan dan penutupan liang stoma<br/><i>Controlled by opening and closing of stomata</i></td><td>1</td></tr><tr><td>P7</td><td>Air yang mengandungi / kaya dengan mineral<br/><i>Water contain / rich in mineral</i></td><td>Air tulen dibebaskan<br/><i>Pure water is released</i></td><td>1</td></tr></table> |                                                                                                         | <b>Proses P</b><br><i>Process P</i>                                                    | <b>Proses Q</b><br><i>Process Q</i> |    | P1                                             | Proses gutasi<br><i>Gutiation process</i> | Proses transpirasi<br><i>Transpiration process</i> | 1                                                                                                            | P2 | Berlaku pada waktu malam / awal pagi<br><i>Occur at night / early morning</i> | Berlaku pada waktu siang (yang panas dan berangin)<br><i>Occur at daytime (hot and windy)</i> | 1 | P3 | Berlaku hanya dalam tumbuhan herba<br><i>Only occur in herbaceous plant</i> | Berlaku dalam semua tumbuhan<br><i>Occur in all plants</i> | 1 | P4 | Air terbebas dalam bentuk titisan air<br><i>Water released in the form of droplets</i> | Air terbebas dalam bentuk wap air<br><i>Water released in the form of water vapour</i> | 1 | P5 | Air terbebas melalui struktur khas di bahagian urat daun / hidatod<br><i>Water released from specialised structure in the leaf vein / hydathode</i> | Air terbebas melalui stoma<br><i>Water released from stomata</i> | 1 | P6 | Berlaku apabila tekanan akar tinggi<br><i>Occur when high root pressure</i> | Dikawal oleh pembukaan dan penutupan liang stoma<br><i>Controlled by opening and closing of stomata</i> | 1 | P7 | Air yang mengandungi / kaya dengan mineral<br><i>Water contain / rich in mineral</i> | Air tulen dibebaskan<br><i>Pure water is released</i> | 1 | 5 |
|       | <b>Proses P</b><br><i>Process P</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Proses Q</b><br><i>Process Q</i>                                                                     |                                                                                        |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P1    | Proses gutasi<br><i>Gutiation process</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Proses transpirasi<br><i>Transpiration process</i>                                                      | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P2    | Berlaku pada waktu malam / awal pagi<br><i>Occur at night / early morning</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Berlaku pada waktu siang (yang panas dan berangin)<br><i>Occur at daytime (hot and windy)</i>           | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P3    | Berlaku hanya dalam tumbuhan herba<br><i>Only occur in herbaceous plant</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Berlaku dalam semua tumbuhan<br><i>Occur in all plants</i>                                              | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P4    | Air terbebas dalam bentuk titisan air<br><i>Water released in the form of droplets</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Air terbebas dalam bentuk wap air<br><i>Water released in the form of water vapour</i>                  | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P5    | Air terbebas melalui struktur khas di bahagian urat daun / hidatod<br><i>Water released from specialised structure in the leaf vein / hydathode</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Air terbebas melalui stoma<br><i>Water released from stomata</i>                                        | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P6    | Berlaku apabila tekanan akar tinggi<br><i>Occur when high root pressure</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Dikawal oleh pembukaan dan penutupan liang stoma<br><i>Controlled by opening and closing of stomata</i> | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P7    | Air yang mengandungi / kaya dengan mineral<br><i>Water contain / rich in mineral</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Air tulen dibebaskan<br><i>Pure water is released</i>                                                   | 1                                                                                      |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| 10(e) | <p><b>Dapat menerangkan bagaimana proses biokimia di daun dan pengangkutan di batang pokok menyebabkan keadaan batang pokok yang ditunjukkan oleh hasil eksperimen dengan betul.</b></p> <p><i>Contoh jawapan:</i></p> <table><tr><td>P1</td><td>Sel daun menjalankan proses fotosintesis<br/><i>Leaf cells carry out photosynthesis</i></td><td>1</td></tr><tr><td>P2</td><td>menghasilkan glukosa<br/><i>produce glucose</i></td><td>1</td></tr><tr><td>P3</td><td>Glukosa bergabung dengan fruktosa membentuk sukrosa<br/><i>Glucose combines with fructose to form sucrose</i></td><td>1</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | P1                                                                                                      | Sel daun menjalankan proses fotosintesis<br><i>Leaf cells carry out photosynthesis</i> | 1                                   | P2 | menghasilkan glukosa<br><i>produce glucose</i> | 1                                         | P3                                                 | Glukosa bergabung dengan fruktosa membentuk sukrosa<br><i>Glucose combines with fructose to form sucrose</i> | 1  | 5                                                                             |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P1    | Sel daun menjalankan proses fotosintesis<br><i>Leaf cells carry out photosynthesis</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                                                                                       |                                                                                        |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P2    | menghasilkan glukosa<br><i>produce glucose</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                                                       |                                                                                        |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |
| P3    | Glukosa bergabung dengan fruktosa membentuk sukrosa<br><i>Glucose combines with fructose to form sucrose</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                                                                                                       |                                                                                        |                                     |    |                                                |                                           |                                                    |                                                                                                              |    |                                                                               |                                                                                               |   |    |                                                                             |                                                            |   |    |                                                                                        |                                                                                        |   |    |                                                                                                                                                     |                                                                  |   |    |                                                                             |                                                                                                         |   |    |                                                                                      |                                                       |   |   |

|               |                                                                                                                                                                                       |           |  |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| P4            | Sukrosa / hasil fotosintesis diangkut ke dalam tiub tapis (secara pengangkutan aktif)<br><i>Sucrose / photosynthetic product is transported into sieve tube (by active transport)</i> | 1         |  |
| P5            | Sukrosa / hasil fotosintesis diangkut / ditolak dari bahagian pucuk ke akar<br><i>Sucrose / photosynthetic product is transported / pushed from shoot to the root</i>                 | 1         |  |
| P6            | Pengangkutan sukrosa / hasil fotosintesis terhenti di <u>atas</u> bahagian X / gelang<br><i>Transportation of sucrose / photosynthetic product stop <u>above</u> part X / ring</i>    | 1         |  |
| P7            | kerana tisu floem telah dibuang<br><i>because phloem tissue is removed</i>                                                                                                            | 1         |  |
| P8            | Sukrosa / hasil fotosintesis berkumpul di <u>atas</u> bahagian X / gelang<br><i>Sucrose / photosynthetic products accumulate <u>above</u> part X / ring</i>                           | 1         |  |
| P9            | Batang di <u>atas</u> bahagian X / gelang membengkak<br><i>Stem <u>above</u> part X / ring swollen</i>                                                                                | 1         |  |
| <b>JUMLAH</b> |                                                                                                                                                                                       | <b>20</b> |  |

| Item  | Peraturan Pemarkahan                                                                                                                                                                                                                                            | Markah |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|
| 11(a) | <b>Dapat menerangkan jenis variasi berdasarkan ciri yang ditunjukkan dalam Rajah 11.1 dengan betul</b><br><br><i>Contoh jawapan:</i>                                                                                                                            |        | 3 |
| F1    | Variasi tak selanjat<br><i>Discontinuous variation</i>                                                                                                                                                                                                          | 1      |   |
| P1    | Ciri boleh dibezakan dengan jelas / ketara<br><i>Characteristics is clearly defined / distinct</i>                                                                                                                                                              | 1      |   |
| P2    | Kualitatif // tidak boleh diukur<br><i>Qualitative // cannot be measured</i>                                                                                                                                                                                    | 1      |   |
| P3    | Dipengaruhi oleh faktor genetik sahaja // dikawal oleh satu gen / sepasang alel // tidak dipengaruhi oleh faktor persekitaran<br><i>Influenced by genetic factor // controlled by a single gene / a pair of alleles // not affected by environmental factor</i> | 1      |   |
| P4    | Tiada ciri perantaraan<br><i>No intermediate characteristics</i>                                                                                                                                                                                                | 1      |   |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |   |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---|
| 11(b) | <p><b>Dapat membina rajah skema untuk menentukan kebarangkalian kumpulan darah anak lelaki mereka dengan betul</b></p> <p><i>Jawapan:</i></p> <div style="text-align: center;"> <p>Encik K                  Puan L<br/>Mr. K                    Mrs. L</p> <p>P1 Genotip Induk : <math>I^O I^O</math> X <math>I^A I^B</math><br/><i>Parent's genotype</i></p> <p>P2 Meiosis :<br/><i>Meiosis</i></p> <p>P3 Gamet : <math>I^O</math> <math>I^O</math> <math>I^A</math> <math>I^B</math><br/><i>Gametes</i></p> <p>P4 Persenyawaan :<br/><i>Fertilisation</i></p> <p>P5 Genotip anak : <math>I^A I^O</math> <math>I^B I^O</math> <math>I^A I^O</math> <math>I^B I^O</math><br/><i>Offspring genotype</i></p> <p>P6 Fenotip anak : A B A B<br/><i>Offspring phenotype</i></p> <p>P7 Nisbah fenotip : 1:1 //<br/><i>Phenotype ratio</i>      50% kumpulan darah A, 50% kumpulan darah B<br/>1:1 //<br/>50% blood group A, 50% blood group B</p> </div> | 1<br>1<br>1<br>1<br>1<br>1<br>1 | 7 |
| 11(c) | <p><b>Dapat mencadangkan cara-cara untuk merawat penyakit tersebut dengan betul</b></p> <p><i>Cadangan jawapan:</i><br/><b>C1: Albinism (Minimum 1)</b></p> <p>P1 Elakkan kulit dari terdedah secara langsung dengan sinaran matahari<br/><i>Avoid skin from exposure to direct sunlight</i></p> <p>P2 Menggunakan krim perlindungan matahari / memakai baju berlengan panjang / memakai topi / payung<br/><i>Use sunscreen protection / wear long sleeve shirt / wearing hat / cap / umbrella</i></p> <p>P3 Memakai cermin mata hitam<br/><i>Wearing sunglasses</i></p> <p>P4 bagi melindungi mata dari sinaran UV<br/><i>to protect the eyes from UV ray</i></p>                                                                                                                                                                                                                                                                                 | 1<br>1<br>1<br>1                | 4 |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                |   |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---|
|       | <b>C2: Talasemia (Minimum 1)</b><br>P5 Mendapatkan suntikan vaksin<br><i>Get vaccine injection</i><br>P6 Mengamalkan diet yang mengandungi kalsium / vitamin D yang tinggi / contoh makanan yang sesuai / susu / keju<br><i>Practise a diet contain high calcium / vitamin D / example of suitable food / milk / cheese</i><br>P7 Bersenam (untuk mengurangkan kesan sampingan penyakit)<br><i>Exercise (to reduce side effect of disease)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1<br><br>1<br><br>1                            |   |
| 11(d) | <b>Dapat mewajarkan kebaikan ujian saringan talasemia yang menyumbang kepada kesejahteraan masa hadapan dengan betul</b><br><br><i>Cadangan jawapan:</i><br>P1 Mengenal pasti pembawa gen / penghidap talasemia (lebih awal)<br><i>Identify thalassemia gene carrier / thalassaemic (early)</i><br>P2 Mencegah penyakit talasemia<br><i>Prevent thalassemia</i><br>P3 Mengurangkan bilangan pesakit talasemia<br><i>Reduce the number of thalassemia patient</i><br>P4 Mengurangkan kos bagi rawatan penyakit talasemia<br><i>Reduce cost for thalassemia treatment</i><br>P5 Pembawa / penghidap boleh merancang untuk memilih pasangan hidup<br><i>A carrier / thalassemia patient can plan a marriage to choose a spouse</i><br>P6 Mengelakkan keturunan daripada penyakit genetik<br><i>Avoid offspring from genetic disease</i><br>P7 Pesakit yang di kesan awal boleh menerima rawatan yang lebih baik (untuk meningkatkan kualiti hidup)<br><i>Patients who are detected early can get a better treatment (to improve quality of life)</i> | 1<br><br>1<br><br>1<br><br>1<br><br>1<br><br>1 | 6 |
|       | <b>JUMLAH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>20</b>                                      |   |

<https://t.me/cikgufazliebiosensei>