

SULIT
4551/1
Biologi
Kertas 1
Ogos 2015
1 1/4 jam



JABATAN PELAJARAN TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2015 SIJIL PELAJARAN MALAYSIA

BIOLOGI

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini mengandungi 50 soalan.*
2. *Kertas soalan ini disediakan dalam dwibahasa.*
3. *Jawab semua soalan.*
4. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan yang disediakan.*
5. *Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*
6. *Rajah yang mengiringi soalan dimaksudkan untuk memberi maklumat yang berguna bagi menjawab soalan. Rajah tidak dilukis mengikut skala kecuali dinyatakan.*
7. *Anda dibenarkan menggunakan kalkulatur saintifik yang tidak boleh diprogram.*

Kertas soalan ini mengandungi 25 halaman bercetak

Disediakan oleh:
Guru Akram Terengganu

Dibiayai oleh:
Kerajaan Negeri Terengganu

- 1 Diagram 1 shows an organelle of a cell.
Rajah 1 menunjukkan organel yang terdapat di dalam suatu sel.

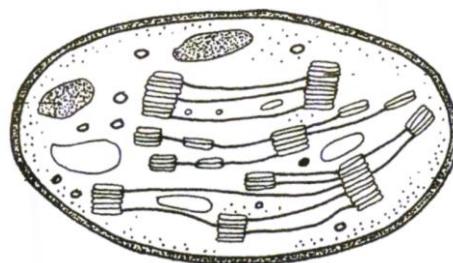


Diagram 1/ *Rajah 1*

Which of the following processes occurs in this organelle ?
Antara proses berikut, yang manakah berlaku dalam sel ini?

- | | |
|---|---|
| A Photosynthesis
<i>Fotosintesis</i> | C Synthesis of enzyme
<i>Sintesis enzim</i> |
| B Synthesis of protein
<i>Sintesis protein</i> | D Generation of energy
<i>Penjanaan tenaga</i> |
- 2 The following information refers to organelle M.
Maklumat berikut merujuk kepada organel M

- Contain hydrolytic enzymes
Mengandungi enzim hidrolitik
- Digest complex organic molecule and eliminate worn out organelle
Mencernakan molekul organik kompleks dan menyingkirkan organel yang tidak digunakan lagi

What is organelle M ?
Apakah organel M ?

- | | |
|------------------------------|--|
| A Lysosome
<i>Lisosom</i> | C Golgi apparatus
<i>Jasad Golgi</i> |
| B Nucleus
<i>Nukleus</i> | D Endoplasmic reticulum
<i>Retikulum endoplasma</i> |

- 3 Diagram 2 shows organelle R in a cell which is involved in producing extracellular enzymes.

Rajah 2 menunjukkan organel R yang terdapat dalam suatu sel yang terlibat dalam penghasilan enzim luar sel.

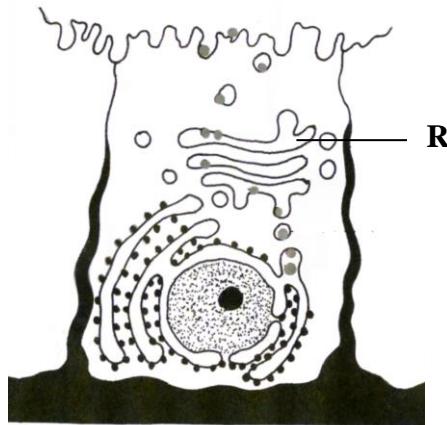


Diagram 2/ Rajah 2

What will happen if organelle R is absent?
Apakah yang akan berlaku jika tiada organel R?

- A Protein are not synthesised
Protein tidak disintesis

- B Protein are not modified
Protein tidak diubahsuai

- C Protein are denatured
Protein dinyahaslikan

- D Protein are hydrolysed
Protein dihidrolisiskan

- 4 Distilled water diffuses into a potato strip and cause it to increases in mass.

What is the process involved?

Air suling meresap masuk kedalam jalur ubi kentang dan menyebabkan pertambahan jisim. Apakah proses yang terlibat?

- A Facilitated diffusion / *Resapan berbantu*

- B Simple diffusion / *Resapan ringkas*

- C Active transport / *Pengangkutan pasif*

- D Osmosis / *Osmosis*

- 5 Diagram 3 shows a substance moves across the phospholipid bilayer of a plasma membrane.

Rajah 3 menunjukkan satu bahan bergerak merentasi dwilapisan fosfolipid membran plasma

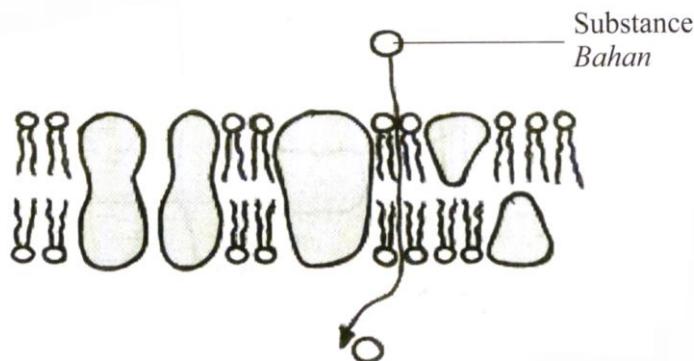


Diagram 3/ Rajah 3

What is the substances?

Apakah bahan ini ?

- A Oxygen / Oksigen
- B Glucose / Glukosa
- C Sodium Ion / Ion sodium
- D Amino acid / Asid amino

- 6 Diagram 4 shows the condition of spinach cell after being immersed in a solution.

Rajah 4 menunjukkan keadaan satu sel bayam yang direndam dalam suatu larutan.

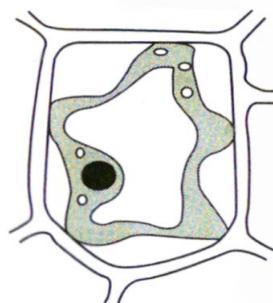


Diagram 4 / Rajah 4

What is the phenomenon shown by the spinach cell ?

Apakah fenomena yang ditunjukkan oleh sel bayam?

- A Turgid / Segah
- B Crenation / Krenasi
- C Plasmolysis/ Plasmolisis
- D Deplasmolysis / Deplasmolisis

7 Potato strips were placed in 5%, 15% and 30% sucrose solution respectively. The initial mass of the potato strips is 1.40g.

Which of the following should be the final mass of the potato strips in 30% sucrose solution?

Jalur kentang masing-masing diletakkan didalam larutan sukrosa 5%, 15% dan 30%.

Jisim awal jalur-jalur kentang ialah 1.40g.

Antara berikut, yang manakah kemungkinan jisim akhir jalur-jalur kentang didalam larutan sukrosa 30%?

A 1.14g / 1.14g

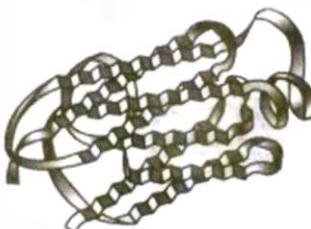
C 1.40g / 1.40g

B 1.58g / 1.58g

D 1.79g / 1.70g

8 Diagram 5 shows the structure of protein molecule.

Rajah 5 menunjukkan struktur molekul protein.



Rajah 5/ Rajah 5

What is the type of the level of organization of this protein?

Apakah aras organisasi protein ini

A Primary structure / *Struktur primer*

B Secondary structure / *Strukur Sekunder*

C Tertiary structure / *Struktur tertier*

D Quartenary structure / *Struktur kuarterner*

9 Diagram 6 shows the optimum pH of enzyme P in its reaction.

Rajah 6 menunjukkan pH optimum bagi enzim P dalam tindak balasnya.

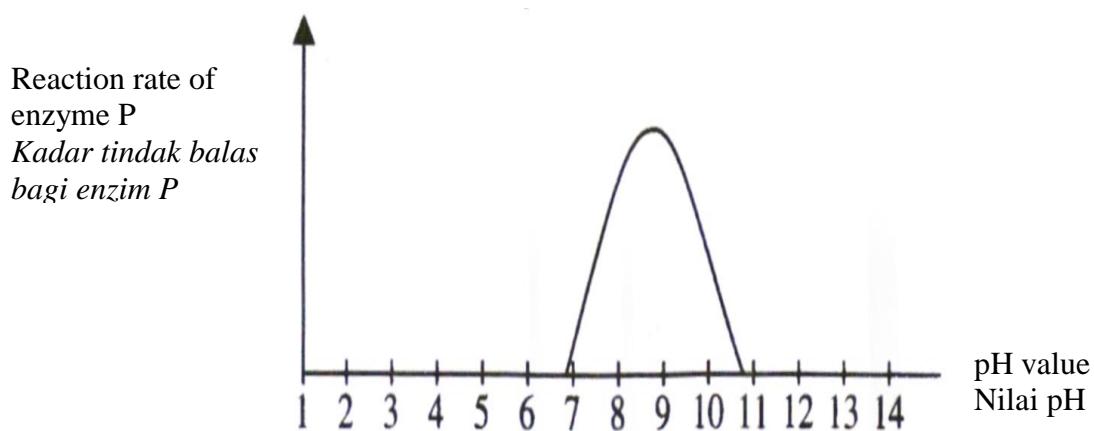


Diagram 6/ Rajah 6

What is enzyme P?

Apakah enzim P ?

- A Erepsin / Erepsin
 B Rennin / Renin
 C Pepsin / Pepsin
 D Trypsin / Tripsin
- 10 Diagram 7 shows the cell cycle.
Rajah 7 menunjukkan kitar sel.

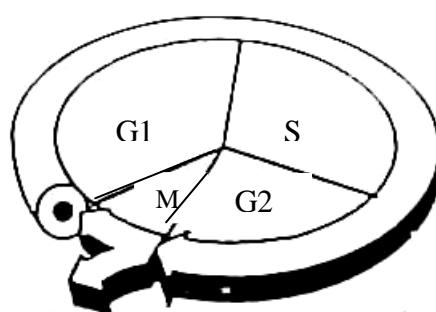


Diagram 7 / Rajah 7

At which stage undergoes accumulation of energy?

Pada peringkat manakah berlaku pengumpulan tenaga?

- A G1 / G1
 B G2 / G2
 C S / S
 D M / M

- 11 Which of the following human cells is produced through meiosis?
Antara berikut, sel-sel badan manusia yang manakah dihasilkan melalui meiosis?
- | | |
|---------------------------|------------------------------------|
| A Muscle cell / Sel otot | C Ovum cell / Sel ovum |
| B Nerves cell / Sel saraf | D Epithelial cell / Sel epithelium |
- 12 Diagram 8 shows a phase of mitosis in a cell.
Rajah 8 menunjukkan satu fasa mitosis dalam sel.

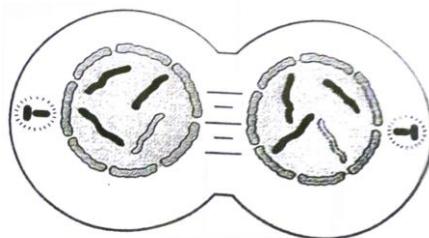


Diagram 8 / Rajah 8

- What is the stage before this phase?
Apakah peringkat sebelum fasa itu?
- | |
|------------------------|
| A Prophase / Profasa |
| B Metaphase / Metafasa |
| C Anaphase / Anafasa |
| D Telophase / Telofasa |
- 13 Diagram 9 shows telophase in a somatic cell.
Rajah 9 menunjukkan peringkat telofasa dalam sel soma.

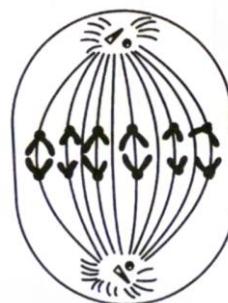


Diagram 9 / Rajah 9

- What is the number of chromosome in a gamete after the cell completes its division?
Berapakah bilangan kromosom dalam gamet selepas sel membahagi dengan lengkap?
- | | | | |
|-----|-----|------|------|
| A 3 | B 6 | C 12 | D 24 |
|-----|-----|------|------|

14 Diagram 10 shows a pitcher plant traps and digest insect.

Rajah 10 menunjukkan tumbuhan periuk kera memerangkap dan mencernakan serangga.

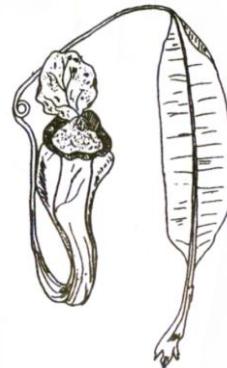


Diagram 10 / Rajah 10

What is the type of nutrition shown?

Apakah jenis nutrisi yang ditunjukkan ?

- A Fotoautotrophs/ *Fotoautotrof*
- B Kemoautotrophs/ *Kemoautotrof*
- C Heterotrophs saprophytes/ *Heterotrof Saprofitisme*
- D Heterotrophs holozoik / *Heterotrof holozoik*

15 Diagram 11 shows the human digestive organs.

Rajah 11 menunjukkan organ-organ pencernaan manusia.

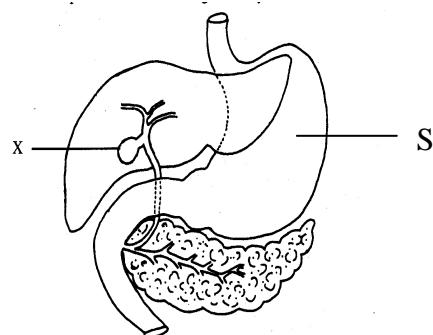


Diagram 11 / Rajah 11

Which of the following enzymes is secreted by organ S?

Antara enzim berikut, yang manakah dirembeskan oleh organ S?

- | | |
|----------------------------|----------------------------|
| A Erepsin / <i>Erepsin</i> | C Amylase / <i>Amilase</i> |
| B Rennin / <i>Renin</i> | D Trypsin / <i>Tripsin</i> |

16

A boy's diet is deficient in iron.
Seorang budak lelaki kekurangan zat besi dalam pemakanannya.

What is the condition that might be suffer from, if this diet is prolonged?

Apakah keadaan yang akan dialami sekiranya diet ini berpanjangan?

- A Ricket / Riket
- B Scurvy / Skurvi
- C Anaemia / Anaemia
- D Beri-beri / Beri-beri

17 Diagram 12 shows a longitudinal section of a vilus.

Rajah 12 menunjukkan keratan memanjang bagi vilus

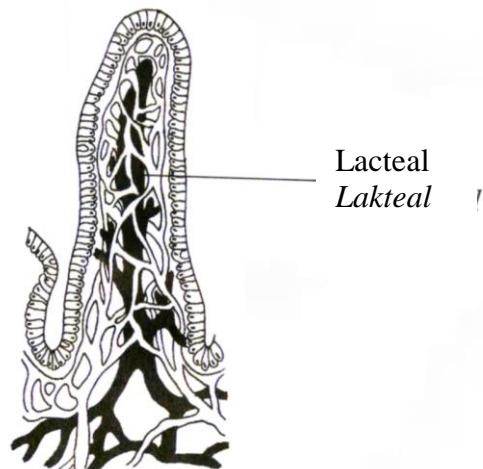


Diagram 12 / Rajah 12

Which substances diffuses into lacteal?

Bahan manakah yang meresap kedalam lakteal?

- A Water / Air
- B Glucose / Glukosa
- C Fatty acid / Asid lemak
- D Amino acid / Asid amino

18

Temperature, light intensity and concentration of carbon dioxide is the factors that affect the rate of photosynthesis.

Suhu, keamatan cahaya dan kepekatan gas karbon dioksida adalah faktor-faktor yang mempengaruhi kadar fotosintesis.

What will happen to the process of photosynthesis if the light intensity is low?

Apakah yang akan berlaku kepada proses fotosintesis jika keamatan cahaya rendah?

- A More oxygen is released / *Lebih banyak oksigen dibebaskan*
- B Less glucose is produced / *Kurang glukosa dihasilkan*
- C Rate of photolysis of water increases / *Kadar fotolisis air bertambah*
- D Rate of starch production increases / *Kadar penghasilan kanji bertambah*

19 Diagram 13 shows the method used to improve the quality and quantity of food production.

Rajah 13 menunjukkan satu kaedah yang digunakan untuk meningkatkan kualiti dan kuantiti penghasilan makanan.

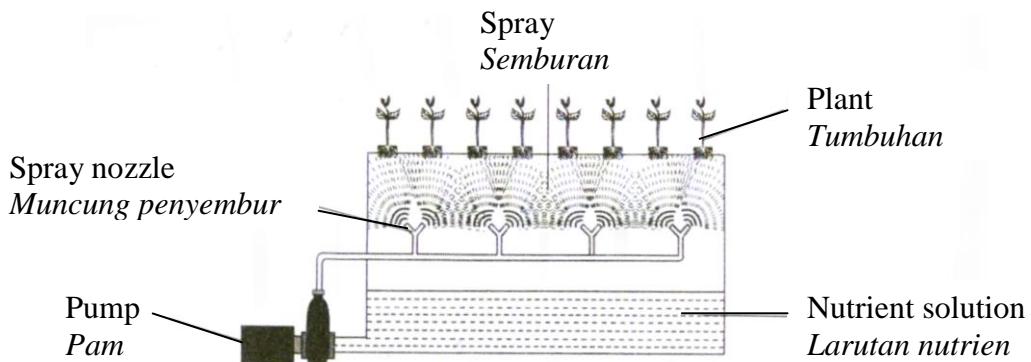


Diagram 13 / Rajah 13

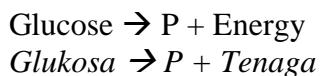
What is the method used ?

Apakah kaedah yang digunakan ?

- A Aerophonics / *Aerofonik*
- B Hydroponics / *Hidrofonik*
- C Tissue culture / *Kultur tisu*
- D Plant breeding / *Pembibakan tumbuhan*

- 20 The following equation shows the process that take place in the muscle cell of an athlete while doing a vigorous activity.

Persamaan berikut menunjukkan proses yang berlaku dalam sel otot seorang atlit semasa melakukan aktiviti cergas.



What is P / Apakah P?

- A Carbon dioxide / Karbon dioksida
- B Lactic acid / Asid laktik
- C Ethanol / Etanol
- D Water / Air

- 21 Diagram 14 shows a model of a lungs.

Rajah 14 menunjukkan model pepuru.

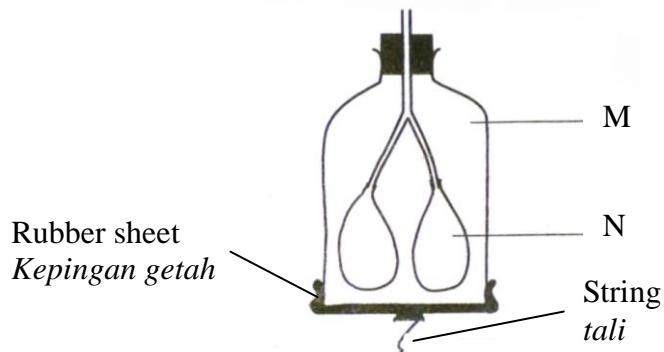


Diagram 14 / Rajah 14

What will happen in M and N when the string is pulled downwards?
Apakah yang berlaku di M dan N semasa tali ditarik ke bawah?

	M	N
A	Volume increases <i>Isipadu bertambah</i>	Expand <i>Mengembang</i>
B	Volume decreases <i>Isipadu berkurang</i>	Contract <i>Mengecut</i>
C	Pressure increases <i>Isipadu bertambah</i>	Expand <i>Mengembang</i>
D	Pressure decreases <i>Isipadu berkurang</i>	Contract <i>Mengecut</i>

- 22 Diagram 15 shows the respiratory structure of an insect.
Rajah 15 menunjukkan struktur respirasi bagi seekor serangga.

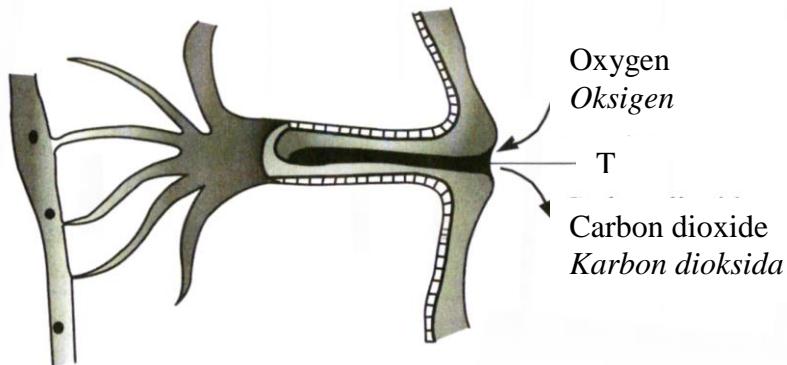


Diagram 15 / Rajah 15

- What is T? / Apakah T?
- | | |
|-----------------------|-----------------------|
| A Trachea / Trakea | C Muscle / Otot |
| B Spiracle / Spirakel | D Tracheole / Trakeol |
- 23 How does fish maximize the efficiency of gaseous exchange?
Bagaimakah ikan memaksimakan kecekapan pertukaran gas?
- A The closing of mouth and operculum
Penutupan mulut dan operkulum
 - B The opening of mouth and operculum
Pembukaan mulut dan operkulum
 - C The opposite direction of water and blood flow through the gills
Arah pengaliran air dan darah yang bertentangan melalui insang
 - D The same direction of water and blood flow through the gills
Arah pengaliran air dan darah yang sama melalui insang

- 24 The oxygen level in the blood of a mountain climber drops from its normal level during mountain climbing. Which process occur in his respiratory system to return the oxygen level to normal.

Aras oksigen dalam darah seorang pendaki gunung jatuh dibawah aras normal semasa mendaki gunung. Proses manakah yang berlaku dalam sistem respirasinya untuk mengembalikan aras oksigen ke normal?

- I pH of blood decrease
pH darah menurun
 - II Breathing and ventilation rate increase
Kadar pernafasan dan ventilasi meningkat
 - III Respiratory muscles contract and relax faster
Otot respirasi mengecut dan mengendur dengan lebih cepat
 - IV Intercostal muscles contract and relax slower
Otot interkosta mengecut dan mengendur dengan lebih lambat
- | | |
|----------------------------|----------------------------|
| A I and II
I dan II | C I and IV
I dan IV |
| B II and III
II dan III | D III and IV
III dan IV |

- 25 The following information shows the results of an experiment to determine the carbon dioxide content in exhaled air using J-tube.

Maklumat berikut menunjukkan keputusan eksperimen untuk menentukan kandungan karbon dioksida didalam udara hembusan dengan menggunakan tiub J.

Length of exhaled air column = 10.0 cm
Panjang turus udara hembusan = 10.0 cm

Length of exhaled air column after treatment with potassium hydroxide = 9.6 cm
Panjang turus udara hembusan yang dirawat dengan kalium hidroksida = 9.6 cm

Length of exhaled air column after treatment with potassium pyrogallate = 8.5 cm
Panjang turus udara hembusan selepas dirawat dengan kalium pirogalat = 8.5 cm

The percentage of carbon dioxide content in the exhaled air is?
Peratusan kandungan karbon dioksida dalam udara hembusan ialah ?

- | | |
|---------|--------|
| A 4 % | C 11 % |
| B 8.5 % | D 21% |

26 Diagram 15 shows a crab with barnacles on its shell.

Rajah 15 menunjukkan seekor ketam yang mempunyai teritip pada kulitnya.

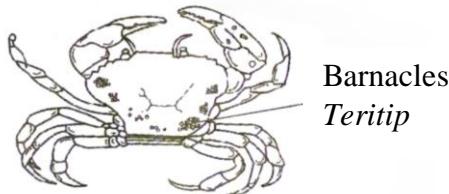


Diagram 15 / Rajah 15

What is the interaction between the crab and the barnacles?

Apakah jenis interaksi antara ketam dan teritip?

- A Parasitism / Parasitisme
B Mutualism / Mutualisme

- C Saprophytism / Saprofitisme
D Comensalism / Komensalisme

27 The following information is related to a process occur in an ecosystem.

Maklumat berikut adalah berkaitan dengan proses yang berlaku dalam suatu ekosistem.

- The pioneer species is replaced by a new species which is more adapted to the habitat
Spesies perintis diganti oleh spesies baru yang lebih beradaptasi dengan habitat
- The process occur gradually over a long period of time
Proses berlaku beransur-ansur pada jangka masa yang panjang
- The process end with a climax community
Proses berakhir dengan komuniti klimaks

The process is?

Proses tersebut ialah?

- A Colonization / Pengkolonian
B Competition / Persaingan
C Succession / Sesaran
D Evolution / Evolusi

- 28 Diagram 16 shows the root structure of a mangrove plant.
Rajah 16 menunjukkan struktur akar tumbuhan bakau.



Diagram 16 / Rajah 16

What is structure Y ?
Apakah struktur Y?

- A Knee root / Akar lutut
- B Butress root / Akar banir
- C Pneumatophore / Pneumatofor
- D Prop root / Akar jangkang

- 29 Diagram 17 shows pond ecosystem.
Rajah 17 menunjukkan ekosistem kolam.

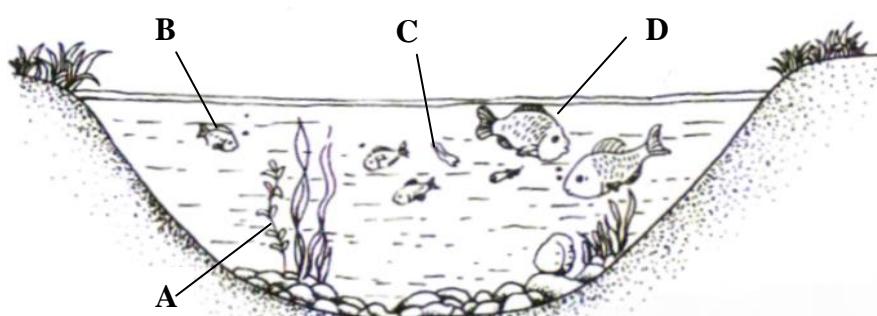


Diagram 17 / Rajah 17

Which of the organisms labelled **A**, **B**, **C** or **D** is at the highest trophic level?
*Antara organisma yang berlabel **A**, **B**, **C** or **D**, yang manakah berada pada aras trof yang tertinggi?*

- 30 The following information is about habitat.
Maklumat berikut adalah berkaitan sebuah habitat..

Habitat / Habitat	:	School Field / Padang sekolah
Size / saiz	:	50 m X 100 m
Type of plants	:	<i>Mimosa pudica</i>
Jenis tumbuhan	:	<i>Mimosa pudica</i>

Which of the following is the most suitable method is use to estimate the population of woody plants in the habitat?

Antara kaedah berikut, yang manakah paling sesuai digunakan untuk menganggarkan populasi tumbuhan berkayu dihabitat tersebut?

- A Line transect / transek garisan
 - B Belt transect / transek jalur
 - C Quadrat size 1m x 1m / kuadrat bersaiz 1m x 1m
 - D Quadrat size 5m x 5m / kuadrat bersaiz 5m x 5m
- 31 Why full cream milk turns sour faster if not keep refrigerated after opened?
Kenapakah susu penuh krim menjadi cepat masam jika tidak disimpan dalam peti sejuk selepas dibuka?

- A Low temperature kills the bacteria
Suhu rendah membunuh bakteria
- B There are no bacteria in a refrigerator
Tiada bakteria terdapat dalam peti sejuk
- C Low temperature prevents bacterial growth
Suhu rendah mencegah pertumbuhan bakteria
- D Enzymes in the milk are active at room temperature
Enzim di dalam susu adalah aktif pada suhu bilik

32 The information below shows the impacts of phenomenon S.
Maklumat berikut menunjukkan kesan daripada fenomena S.

- Increase in the earth's temperature
Meningkatkan suhu bumi
- Change in climate zone
Perubahan dalam zon-zon iklim
- Decline in the yield of crops
Penurunan pengeluaran hasil tanaman
- Melting of polar ice and glaciers causing a rise in sea level
Pencairan glasier di kutub dan menyebabkan peningkatan aras lautan

What is phenomenon S? / Apakah fenomena S?

- A Greenhouse effect / *Kesan rumah hijau*
 B Ozone depletion / *Penipisan lapisan ozon*
 C Thermal pollution / *Pencemaran terma*
 D Global warming / *Pemanasan global*
- 33 Diagram 18 shows logging activity.
Rajah 18 menunjukkan aktiviti pembalakan.



Diagram 18 / Rajah 18

Which of the following is the effect of the activity?
Antara berikut, yang manakah kesan daripada aktiviti tersebut?

- A Eutrophication / *Eutrofikasi*
 B Increase of biodiversity / *Peningkatan biodiversiti*
 C Air pollution / *Pencemaran udara*
 D Soil erosion / *Hakisan tanah*

- 34 Diagram 19 shows the blood circulatory system of an organism.
Rajah 19 menunjukkan sistem peredaran darah sejenis organisma.

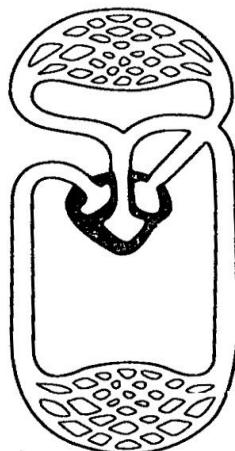


Diagram 19 / Rajah 19

Which of the following organism has the similar circulatory system as shown in the diagram ?

Antara organisma berikut, yang manakah mempunyai sistem peredaran yang sama seperti yang ditunjukkan dalam rajah?

- | | |
|-------------------|------------------|
| A A fish / ikan | C A frog / katak |
| B A bird / burung | D A snake / ular |

- 35 Diagram 20 shows the longitudinal section of human heart.
Rajah 20 menunjukkan keratan membujur jantung manusia.

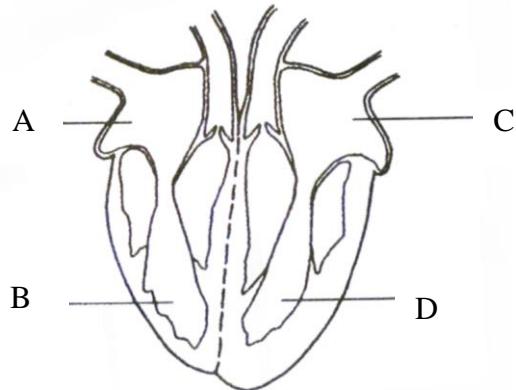


Diagram 20 / Rajah 20

Which of the labelled parts A, B, C or D pumps blood to the lungs?
Antara bahagian berlabel A,B, C atau D yang manakah mengepam darah ke peparu?

- 36 Diagram 21 shows the part of a stem of a tree where the ring of bark has been removed. The tree is watered everyday.

Rajah 21 menunjukkan bahagian batang pokok yang gelang kulitnya telah dibuang. Pokok tersebut disiram dengan air setiap hari.

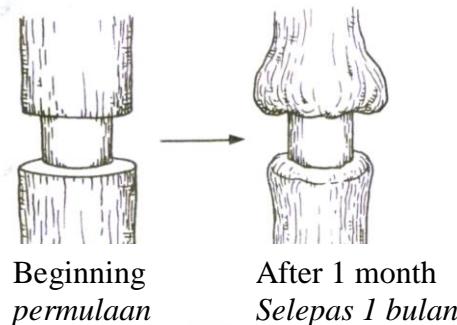


Diagram 21 / Rajah 21

Which statement explain the observation.?

Pernyataan yang manakah menerangkan pemerhatian itu?

- A Fungus infection at the part of the bark
Serangan kulat pada tempat yang digelang
- B Water diffuse out from the part of the bark
Air meresap keluar dari tempat yang digelang
- C Glucose cannot be transport to the root
Glukosa tidak dapat diangkut ke akar
- D Glucose and water cannot be transported to the leaves
Glukosa dan air tidak dapat diangkut ke daun

- 37 Which bones make up the pectoral girdle?

Tulang-tulang manakah yang membentuk lengkungan pektoral?

- A Ulna and radius / *Ulna dan radius*
- B Humerus and scapula / *Humerus dan skapula*
- C Clavicle and humerus / *Klavikel dan humerus*
- D Clavicle and scapula / *Klavikel dan skapula*

- 38 Diagram 22 shows the knee joint.
Rajah 22 menunjukkan sendi lutut

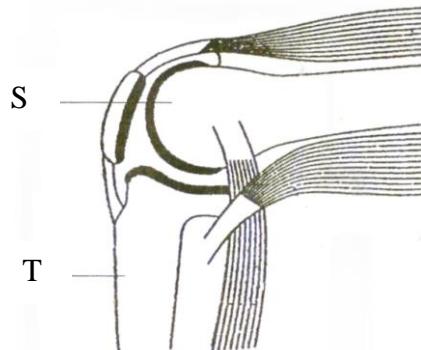


Diagram 22 / Rajah 22

- Which of the following tissues joins S to T?
Antara berikut, yang manakah menghubungkan S kepada T?
- Ligament / Ligamen
 - Tendon / Tendon
 - Adipose / Adipos
 - Cartilage / Rawan

- 39 A man had an accident. The accident caused injury to the brain and affect his reading ability.
 Which part of the brain is affected?
Seorang lelaki mengalami kemalangan. Kemalangan itu menyebabkan kecederaan pada otak dan menjelaskan kebolehan membaca.
Bahagian otak manakah yang terjejas?
- Cerebrum / Serebrum
 - Cerebelum / Serebelum
 - Hypothalamus / Hipotalamus
 - Medulla oblongata / Medula oblongata

- 40 Diagram 23 shows a type of neuron.
Rajah 23 menunjukkan sejenis neuron

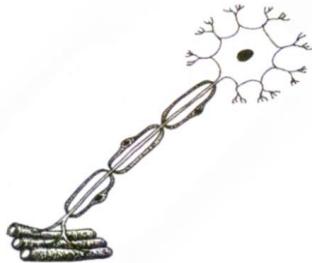


Diagram 23 / Rajah 23

What is the type of this neuron?
Apakah jenis neuron ini?

- A Afferent neurone / Neuron aferen
 - B Efferent neurone / Neuron eferen
 - C Interneuron / Interneuron
 - D Neurotransmitter / Neurotransmitter
- 41 A boy runs very fast when chase by a fierce dog.
Seorang budak lelaki berlari pantas apabila dikejar oleh seekor anjing garang.

Which of the following reactions occurs in the boy's body?
Antara tindak balas berikut, yang manakah berlaku dalam badannya?

- I Blood glucose level increase / Aras glukosa darah meningkat
- II Metabolic rate increase / Kadar metabolisme meningkat
- III Body temperature decrease / Suhu badan menurun
- IV Rate of heart beat increases / Kadar denyutan jantung meningkat

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

- 42 Diagram 24 shows a method used by a housewife to keep unripe chiku to speed up the ripening of chiku fruits.

Rajah 24 menunjukkan kaedah yang digunakan oleh seorang surirumah untuk menyimpan buah ciku muda bagi mempercepatkan buah ciku menjadi masak.

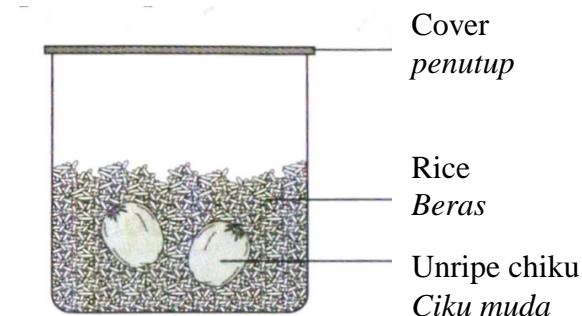


Diagram 24 / Rajah 24

What is the purpose of keeping the chiku in the rice container?

Apakah tujuan menyimpan buah ciku dalam bekas beras?

- A To trap heat / *Untuk memerangkap haba*
- B To trap ethylene / *Untuk memerangkap etilena*
- C To trap humidity / *Untuk memerangkap kelembapan*
- D To trap carbon dioxide / *Untuk memerangkap karbon dioksida*

- 43 Which of the following is the formation of male gametes?

Antara yang berikut, yang manakah pembentukan gamet jantan?

- A Meiosis / *Meiosis*
- B Oogenesis / *Oogenesis*
- C Gametogenesis / *Gametogenesis*
- D Spermatogenesis / *Spermatogenesis*

- 44 Diagram 25 shows the development of follicle in an ovary.
Rajah 25 menunjukkan perkembangan satu folikel dalam ovarи.

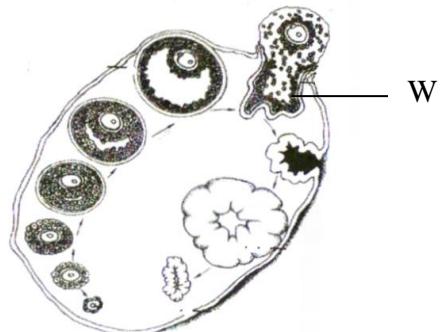


Diagram 25 / Rajah 25

What could happen to structure W after ovulation?
Apakah yang akan terjadi kepada struktur W selepas pengovulan?

- A Degenerates
Merosot
 - B Initiates the production of follicle stimulating hormone (FSH)
Merangsang penghasilan hormon perangsang folikel
 - C Develops into corpus luteum
Berkembang menjadi korpus luteum
 - D Develops into a secondary follicle
Berkembang menjadi folikel sekunder
- 45 Diagram 26 shows a longitudinal section of a flower.
Rajah 26 menunjukkan keratan membujur bagi sekuntum bunga.

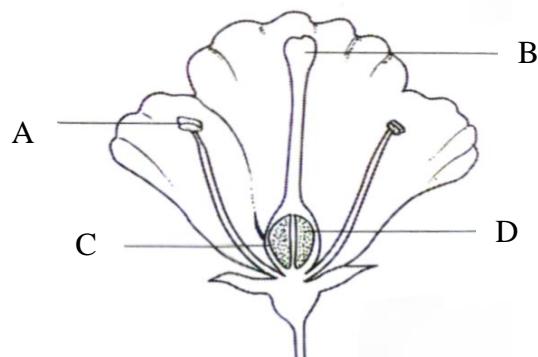


Diagram 26 / Rajah 26

At which part A, B, C or D the development of pollen grain take place?
Antara bahagian A, B, C atau D, dimanakah perkembangan debunga berlaku?

- 46 What is the genotype of the offsprings in F1 generation in a monohybrid cross between RR x rr?
Apakah genotip anak dalam generasi F1 hasil kacukan monohibrid RR x rr?

- A 100% are Rr / 100% adalah Rr
- B 100% are RR / 100% adalah RR
- C 100% are rr / 100% adalah rr
- D 75% are Rr and 25% are rr / 75% adalah Rr dan 25% adalah rr

- 47 Diagram 27 shows a type of chromosomal mutation.
Rajah 27 menunjukkan mutasi kromosom.

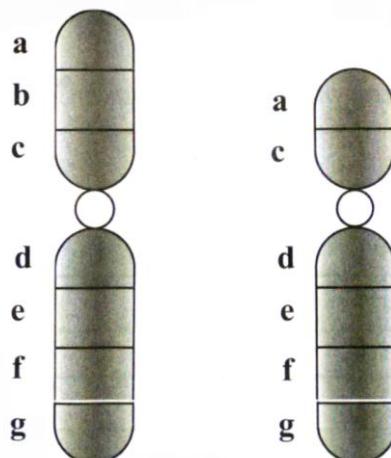


Diagram 27 / Rajah 27

What type of this mutation?
Apakah jenis mutasi ini?

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

- 48 The genotype of a person blood group is $I^A I^O$
What is his blood group?

Genotip kumpulan darah individu ialah $I^A I^O$
Apakah kumpulan darah orang itu?

- A O / O
- B A / A
- C B / B
- D AB / AB

- 49 Which of the following explain why colour blindness occur among a male compare to female?
Antara berikut yang manakah menerangkan sebab buta warna lebih banyak berlaku kepada lelaki berbanding perempuan?

- A Allele for colour blindness present in chromosome X
Alel untuk buta warna terdapat pada kromosom X
- B Allele for colour blindness present in chromosome Y
Alel bagi buta warna terdapat pada kromosom Y
- C Female is only carrier for colour blindness
Perempuan hanya bertindak sebagai pembawa gen buta warna
- D Male have only one X chromosome and colour blindness occur when there is recessive alleles.
Lelaki mempunyai hanya satu kromosom X dan buta warna berlaku apabila terdapat alel resesif

- 50 Which of the following is example of discontinuous variation?
Antara berikut yang manakah contoh bagi variasi tak selanjar?

- A Height / *Ketinggian*
- B Body weight / *Berat badan*
- C Skin colour / *Warna kulit*
- D Shape of ear lobe / *Bentuk cuping telinga*

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SKEMA JAWAPAN BK 9

PEPERIKSAAN PERCUBAAN SPM 2015

BIOLOGI 4551/1

KERTAS 1

1	A	11	C	21	A	31	C	41	C
2	A	12	C	22	B	32	D	42	B
3	B	13	A	23	C	33	D	43	D
4	D	14	D	24	B	34	C	44	C
5	A	15	B	25	A	35	B	45	A
6	C	16	C	26	D	36	C	46	A
7	A	17	C	27	C	37	B	47	A
8	C	18	B	28	D	38	A	48	B
9	D	19	A	29	B	39	C	49	D
10	B	20	B	30	C	40	B	50	D

NAMA : TINGKATAN :

SULIT
4551/2
Biologi
KERTAS 2
Ogos/ Sept 2015

2 ½ jam

PEPERIKSAAN PERCUBAAN SPM
SIJIL PELAJARAN MALAYSIA

BIOLOGI

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIBERITAHU

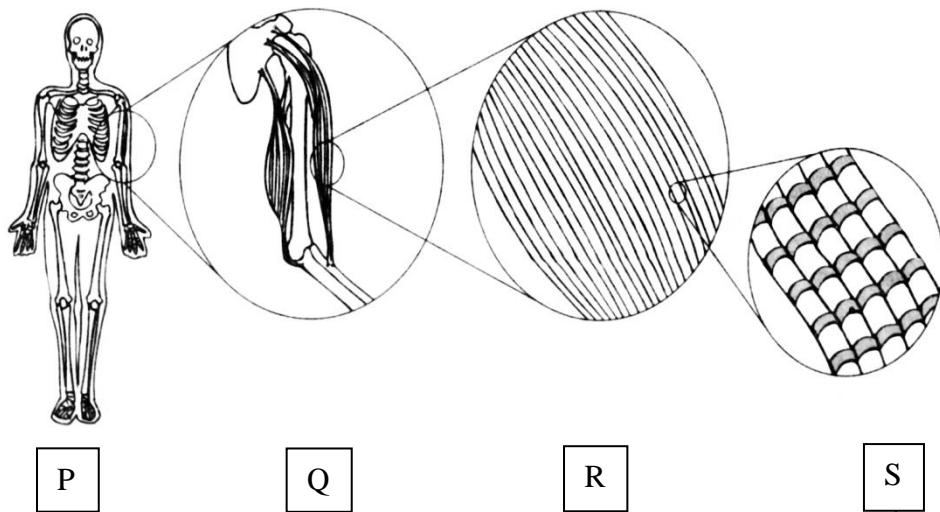
1. *Kertas soalan ini mengandungi dua bahagian : Bahagian A dan Bahagian B.*
2. *Jawab semua soalan dalam Bahagian A. Jawapan kepada Bahagian A hendaklah ditulis dalam ruang jawapanyang disediakan*
3. *Jawab dua soalan dari Bahagian B dan jawapan kepada Bahagian B hendaklah ditulis dalam ruang bergaris yang disediakan dibahagian akhir kertas soalan. Anda diminta menjawab dengan lebih terperinci untuk Bahagian B. Jawapan mestilah jelas dan logik. Dalam jawapan anda,persamaan,gambar rajah, jadual , graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*
4. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
5. *Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.*
6. *Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram. Walau bagaimanapun, langkah mengira perlu ditunjukkan*
8. *Masa yang dicadangkan untuk menjawab Bahagian A ialah 90 minit, Bahagian B 60 minit.*
9. *Semua kertas jawapan hendaklah diserahkan di akhir peperiksaan.*

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

Kertas soalan ini mengandungi 21 halaman bercetak.

SECTION A
Answer all the questions
Jawab semua soalan

1. Diagram 1 shows an example of an organizational level for human cells.
- Rajah 1 menunjukkan contoh peringkat organisasi sel bagi manusia.



A group of similar cells with common structure and function <i>Sekumpulan sel yang mempunyai struktur dan fungsi yang sama</i>	A basic unit of all living things <i>Unit asas bagi semua benda hidup</i>	Consist of several organ that work together to carry out of living process <i>Terdiri daripada beberapa organ yang bekerjasama untuk menjalankan proses hidup</i>	Two or more types of tissues working together to perform a specific function <i>Dua atau lebih jenis tisu yang berperanan bersama-sama untuk melaksanakan fungsi tertentu</i>
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Diagram 1.1 // Rajah 1.1

1(a)

3

- (a) Based on Diagram 1.1, match the structures in level P, Q and R to the meaning as an example shown for S.
- Berdasarkan Rajah 1.1, padangkan struktur dalam peringkat P, Q dan R terhadap definisi seperti contoh bagi S.

[3 marks]

- (b) Give two types of muscle shown in level R

Berikan dua jenis otot yang ditunjukkan pada peringkat R.

.....
.....

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Use
1(b)

2

[2 marks]

- (c) Diagram 1.2 shows an organelle found abundantly in level S.

Rajah 1.2 menunjukkan satu organel yang banyak terdapat dalam peringkat S.



Diagram 1.2 / Rajah 1.2

Based on Diagram 1.2, explain how this organelle structured to enable structure in level S to carry out its function efficiently.

Berdasarkan Rajah 1.2, terangkan bagaimana organel tersebut distrukturkan untuk membolehkan struktur dalam peringkat S berfungsi dengan cekap.

.....
.....

1(c)

2

[2 marks]

- (d) Explain the importance of the system shown in Diagram 1.1

Terangkan kepentingan sistem yang ditunjukkan dalam Rajah 1.1.

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

1(d)

3

[3 marks]

- (e) Based on the Diagram 1.1 , predict the function of structure in level Q if R is deformed during its formation.

Berdasarkan Rajah 1.1, ramalkan fungsi struktur dalam peringkat Q jika R mengalami kecacatan semasa pembentukannya.

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

1(e)

2

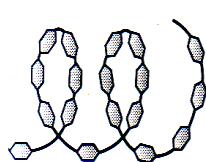
Total

[2 marks]

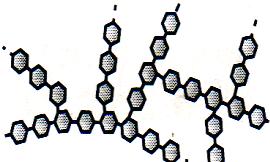
12

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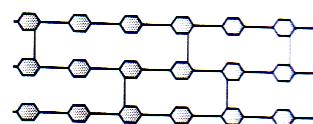
2. Diagram 2 shows types of polysaccharide found in a living organisms
Rajah 2 menunjukkan jenis polisakarida yang ditemui dalam organisma hidup



P



Q



R

Diagram 2 // Rajah 2

2(a)

1

- (a) Name the elements that made up the compound above.
Namakan unsur-unsur yang membentuk sebatian di atas

[1 mark]

2(b)

1

- (b) State the basic unit which form a compound P, Q and R
Nyatakan unit asas yang membentuk sebatian P, Q dan R

[1 mark]

2(c)

2

- (c) Name compound P, Q and R.
Namakan sebatian P, Q dan R.

P:

Q:

R:

[2 marks]

2(d)

3

- (d) Suspension P in Diagram 2 is added with saliva. Explain how P can be broken down into disaccharides.

Ampaian P dalam Rajah 2 ditambahkan dengan air liur. Terangkan bagaimana P boleh diuraikan kepada disakarida.

.....

[3 marks]

- (e) A group of student carried out a Benedict test to determine type of carbohydrates. A result obtained as follow:
Sekumpulan pelajar menjalankan Ujian Benedict untuk mengenalpasti jenis karbohidrat. Hasil ujian adalah seperti berikut :

Food samples // <i>Sampel makanan</i>	Observation // Pemerhatian
 A	Brick red precipitate is formed <i>Mendakan merah bata terbentuk</i>
 B	Brick red precipitate is formed <i>Mendakan merah bata terbentuk</i>
 C	No change <i>Tiada perubahan</i>

- (i) Explain why there is a different observation between food sample A and food sample C.
Terangkan mengapa terdapat perbezaan pemerhatian antara sampel makanan A dan sampel makanan C.

.....

2(e)(i)

2

[2 marks]

- (ii) Describe how the student able to obtain a positive observation for food sample C.
Huraikan bagaimana pelajar itu dapat memperoleh pemerhatian yang positif bagi sampel makanan C

.....

2(e)(ii)

3

Total

[3 marks]

12

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3. Diagram 3.1 below shows role of hormone X in the response on tip of shoot and tip of root in plant.

Rajah 3.1 di bawah menunjukkan peranan hormon X dalam gerakbalas pertumbuhan di hujung pucuk dan di hujung akar tumbuhan.

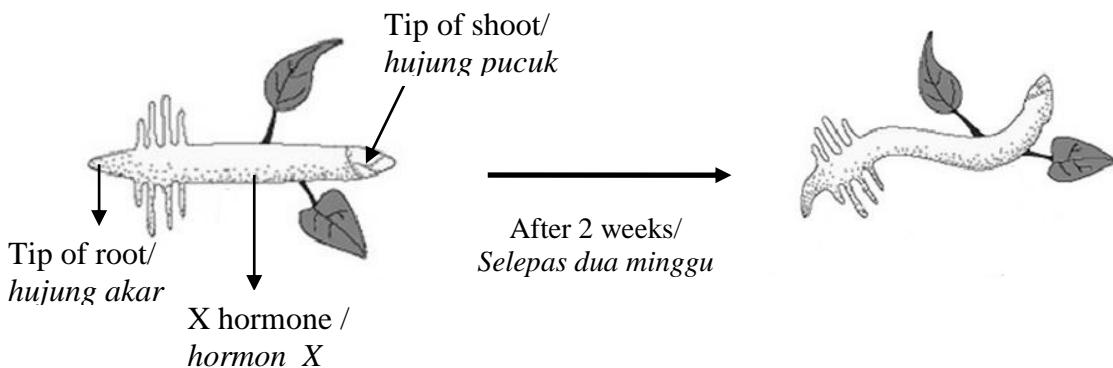


Diagram 3.1 / Rajah 3.1

3(a)(i)

1

- a) (i) Name hormone X.
Namakan hormon X

[1 mark]

- (ii) Based on Diagram 3.1 , what is the type of response shown in the :
Berdasarkan Rajah 3.1, apakah jenis gerakbalas yang ditunjukkan pada:

3(a)(ii)

2

tip of shoot :
hujung pucuk

tip of root :
hujung akar

[2 marks]

- b) State the effect of hormone X on the growth of tip of root. Give your reason
Nyatakan kesan hormon X ke atas pertumbuhan di hujung akar. Berikan sebab.

3(b)

2

.....

.....

.....

[2 marks]

- c) Diagram 3.2(a) above shows fruit produced naturally and Diagram 3.2(b) shows fruit produced from one technique used commercially in agriculture.

Rajah 3.2 (a) di atas menunjukkan buah yang dihasilkan secara semulajadi dan Rajah 3.2(b) menunjukkan buah yang terhasil daripada satu teknik yang digunakan secara komersial dalam pertanian



Diagram 3.2(a)
Rajah 3.2(a)



Diagram 3.2(b)
Rajah 3.2(b)

- (i) Name the technique used.

Namakan kaedah yang digunakan.

3(c)(i)

	1
--	---

[1 mark]

- (ii) Explain the differences how the fruit produced in Diagram 3.2(a) and the fruits produced in Diagram 3.2(b)

Terangkan perbezaan bagaimana buah yang dihasilkan pada Rajah 3.2(a) berbanding dengan buah yang dihasilkan dalam Rajah 3.2 (b) diperolehi.

3(c)(ii)

	3
--	---

[3 marks]

- (iii) After 55 years,a fruits produced using the technique state in (c)(i) found abundantly in the countries. Predict what will happen to the fruits species continuity.

Selepas 55 tahun berlalu, semua buah yang diperolehi dengan menggunakan teknik yang dinyatakan dalam (c)(i) dijumpai dengan meluas dalam negara. Ramalkan apakah yang akan berlaku kepada kesinambungan spesies buah tersebut.

3(c)(iii)

	3
--	---

Total

	12
--	----

[3 marks]

For
Examiner's
Use

4. Two individuals X and Y were injected to acquire immunity. The level of antibody in the blood of individual X and Y is shown in Diagram 4.1(a) and 4.1(b).

Dua individu X dan Y telah disuntik bagi mendapatkan imunisasi. Aras antibodi dalam darah individu X dan Y adalah seperti yang ditunjukkan dalam Rajah 4.1(a) dan 4.1(b).

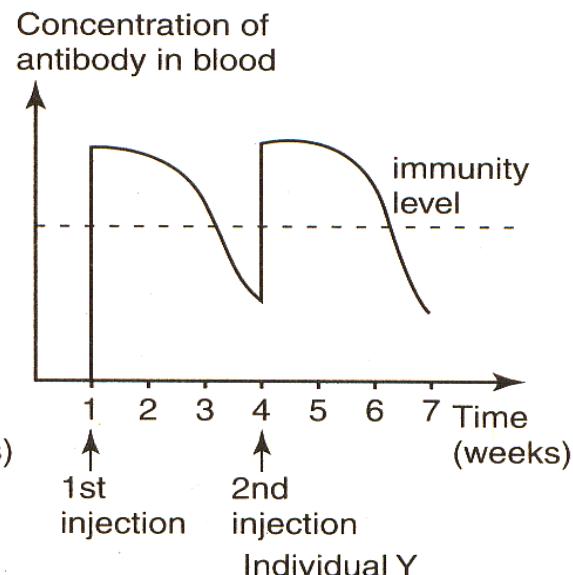
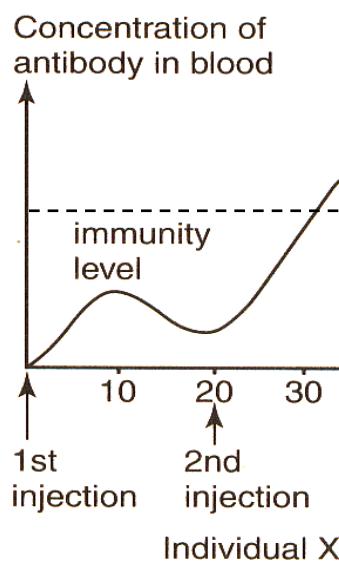


Diagram 4.1(a)
Rajah 4.1(a)

Diagram 4.1(b)
Rajah 4.1(b)

- 4(a) (a) Name the type of immunity obtained by individual X and individual Y.
Namakan jenis imunisasi yang diterima oleh individu X dan individu Y.

X :

Y :

[1 mark]

- 4(b) (b) State the importance of the second injection for individual X and individual Y.
Nyatakan kepentingan suntikan kedua pada individu X dan individu Y.

X:

Y:

[1 mark]

- (c) Describe **two** differences between the type of immunity obtained by individual X and individual Y based on Diagram 4.1(a) and 4.1(b).

Huraikan dua perbezaan di antara jenis imunisasi yang diterima oleh individu X dan individu Y berdasarkan Rajah 4.1(a) dan 4.1(b)

.....

4(c)

2

[2 marks]

- (d) Diagram 4.2 shows a type of white blood cell which is important in the body defence mechanism.

Rajah 4.2 menunjukkan sejenis sel darah putih yang penting dalam mekanisme pertahanan badan.

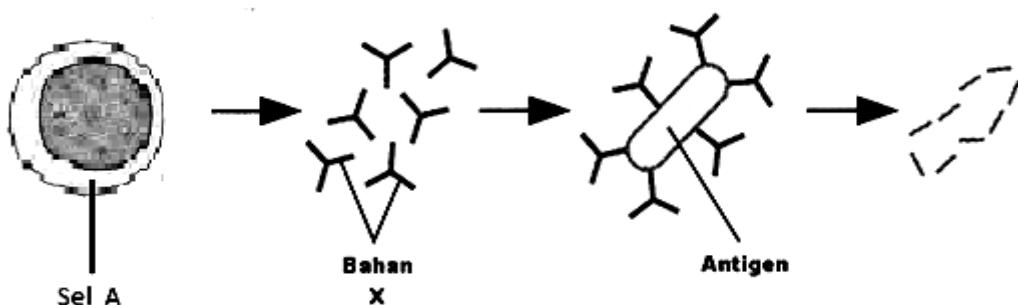


Diagram 4.2 / Rajah 4.2

Name the structures labelled A and X

Namakan struktur berlabel A dan X:

Cell A / Sel A :

Material X / Bahan X :

[2 marks]

4(d)

2

- (e) Explain the mechanism of body defence shown in Diagram 4.2

Terangkan mekanisme pertahanan badan yang ditunjukkan dalam Rajah 4.2

.....

4(e)

3

[3 marks]

*For
Examiner's
Use*

- (f) Table 1 shows a schedule of immunisation given for every new born until 2 years old in Malaysia.

Jadual 1 menunjukkan satu Rancangan Pengimunan yang diberikan kepada bayi yang baru lahir sehingga berusia 2 tahun di Malaysia.

Age / Umur	Types of Immunity / Jenis Pengimunan
New born <i>Bayi baru lahir</i>	Tuberculosis (B.C.G) / Batuk kering (First dose) Hepatitis B / Hepatitis B (Dos pertama)
1 month <i>1 bulan</i>	Hepatitis B / Hepatitis B (Second dose) (Dos kedua)
3 month <i>3 bulan</i>	Triple Antigen / Antigen Tigaan (First dose) Polio / Lumpuh (Dos pertama)
4 month <i>4 bulan</i>	Triple Antigen / Antigen Tigaan (Second dose) Polio / Lumpuh (Dos ke dua)
5 month <i>5 bulan</i>	Triple Antigen / Antigen Tigaan (Second dose) Polio / Lumpuh (Dos kedua) Hepatitis B / Hepatitis B (Third dose) (Dos ketiga)
9 – 24 month <i>9- 24 bulan</i>	Germans measles / Campak German
1 ½ - 2 year <i>1 ½ - 2 tahun</i>	Triple Antigen / Antigen Tigaan (Third dose) Polio / Lumpuh (Dos ketiga)

Table 1 / Jadual 1

In your opinion, justify do parents should follow the Immunisation Programs. Explain why.

Pada pendapat anda, wajarkah setiap ibu bapa mematuhi Rancangan Pengimunan tersebut. Terangkan mengapa.

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

4(f)

	3
--	---

Total

	12
--	----

[3 marks]

5. Angiosperm plants like *Hibiscus rosasinensis* sp. can reproduce by sexual reproduction and asexual reproduction.

Tumbuhan angiosperm seperti Hibiscus rosasinensis sp. boleh membiak secara pembiakan seks dan aseks.

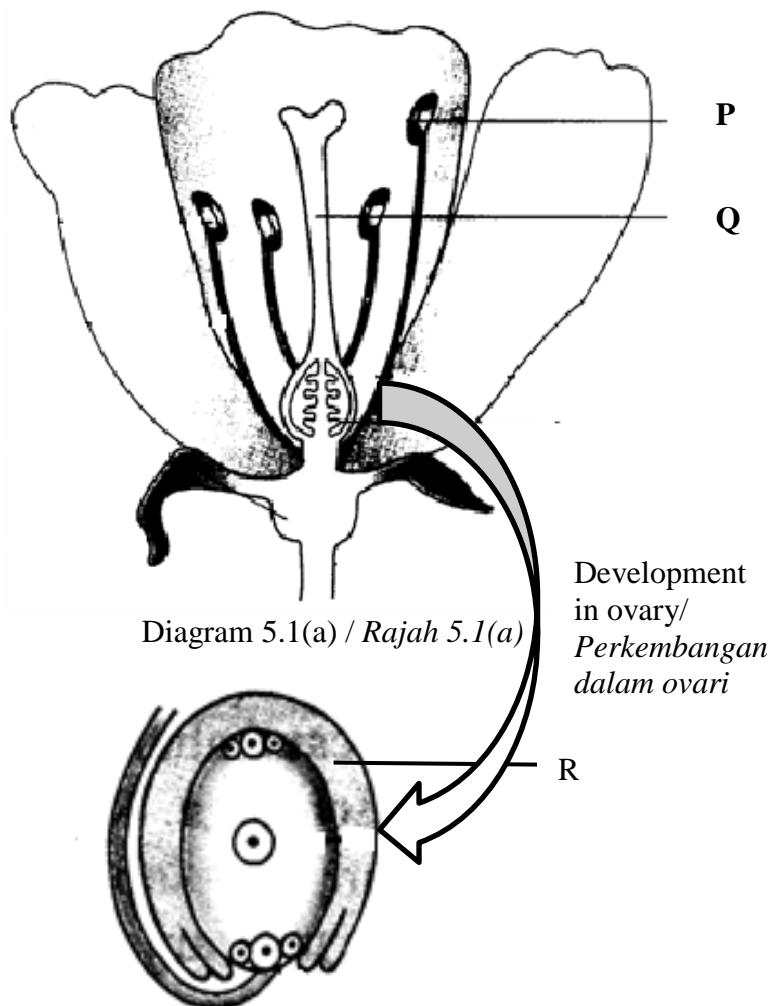


Diagram 5.1(b) / Rajah 5.1(b)

Diagram 5.1(a) show the structure of flower which involve in plant reproduction process
Rajah 5.1(a) menunjukkan struktur bunga yang terlibat dalam proses pembiakan tumbuhan.

5(a)(i)

- (a) (i) Name the organization level of flower in multicellular organism.

Namakan aras organisasi bunga dalam organisma multisel

1

..... [1 mark]

For
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Use

5(a)(ii)

- (ii) State a difference between sexual reproduction and asexual reproduction in plants.

Nyatakan satu perbezaan proses pembiakan seks dan aseks dalam tumbuhan

.....
.....

[1 mark]

5(b)(i)

- (b)(i) Diploid cells in P in Diagram 5.1(a) undergoes cell division to produce haploid cells of the pollen. Explain the process.

Sel-sel diploid dalam P dalam Rajah 5.1(a) menjalani proses pembahagian sel untuk menghasilkan sel-sel debunga yang haploid. Terangkan proses yang berlaku.

.....
.....

[2 marks]

- (ii) After the mature pollen formed in P, the butterfly perch the flower for sucking the honey and alight the other flower at the same tree.

Based on Diagram 5.1(a), explain the possibility which occur in Q structure of the other flower

Selepas debunga matang terbentuk pada P, rama-rama telah hinggap pada bunga itu untuk menghisap madu dan kemudian menghinggapi pula bunga lain pada pokok yang sama.

Berdasarkan Rajah 5.1(a), terangkan kemungkinan yang berlaku dalam struktur Q bunga yang lain.

5(b)(ii)

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

[3 marks]

5(c)

- (c) Based on Diagram 5.1(b), the fertilization which occurs in R differ with in human. Explain why.

Berdasarkan Rajah 5.1(b), persenyawaan yang berlaku dalam R berbeza dengan manusia. Terangkan mengapa.

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

[3 marks]

For
Examiner's
Use

(d) During the development of ovule and seed in the flower, ovary develop to form fruit.

Explain the important of the fruit.

Semasa perkembangan ovul dan biji benih dalam bunga, ovarii berkembang menjadi buah. Terangkan kepentingan buah.

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

[2 marks]

5(d)

2

Total

12

SECTION B

[40 marks]

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

- 6(a) Mr Ali celebrate his son excellent achievement in SPM with steak barbecue party.
Encik Ali meraikan kejayaan anaknya dalam peperiksaan SPM dengan mengadakan jamuan barbecue daging

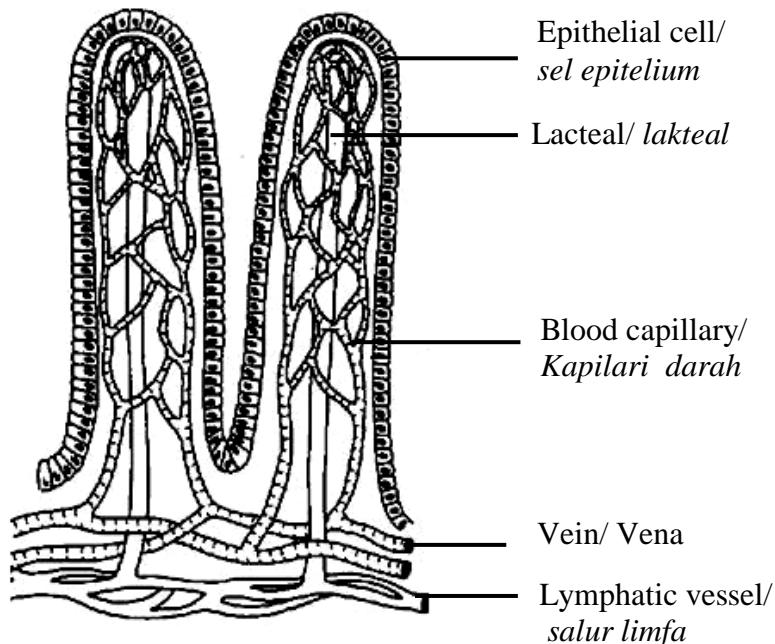


Diagram 6.1 // Rajah 6.1

Based on the above statement, explain the process in the structure in Diagram 6.1.
Berdasarkan pernyataan di atas, terangkan proses yang berlaku dalam struktur dalam Rajah 6.1.

[5 marks]

- (b) Diagram 6.2 shows the transport of nutrients from the intestine to the body cells.
Rajah 6.2 menunjukkan pengangkutan nutrien daripada usus ke sel-sel badan.

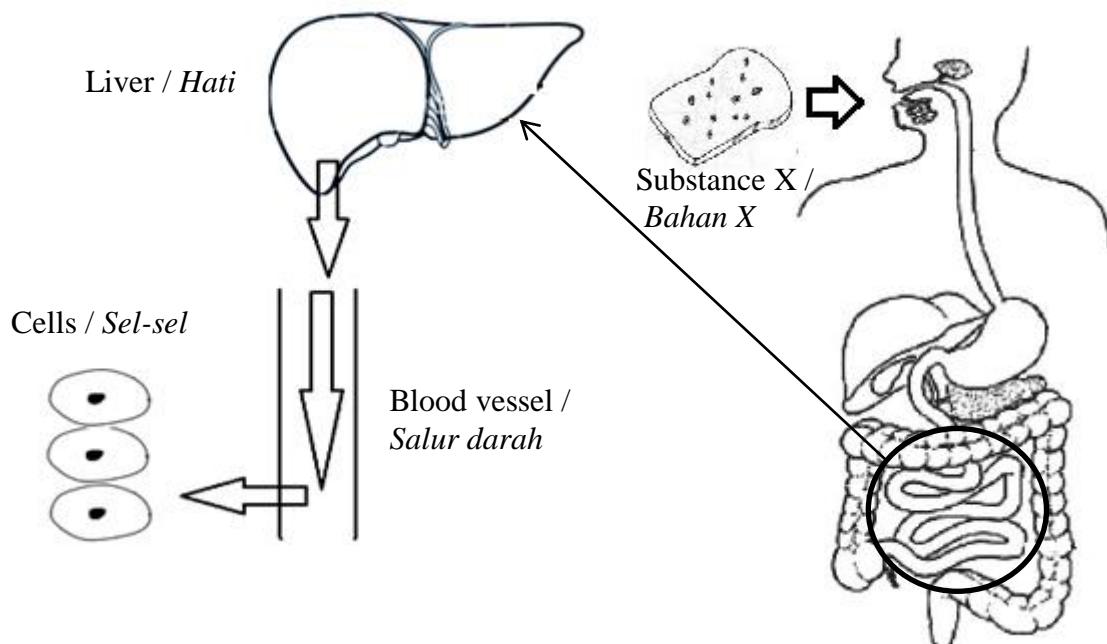


Diagram 6.2 / Rajah 6.2

Describe the transport of nutrients in substance X by the system in Diagram 6.2 until reaches body cells

Huraikan pengangkutan nutrient dalam bahan X oleh sistem dalam Rajah 6.2 sehingga ke sel-sel badan.

[5 marks]

- (c) Diagram 6.3(a) shows a healthy colon and Diagram 6.3(b) shows colon of unhealthy colon.
Rajah 6.3(a) menunjukkan kolon yang sihat dan Rajah 6.3(b) menunjukkan kolon yang tidak sihat.

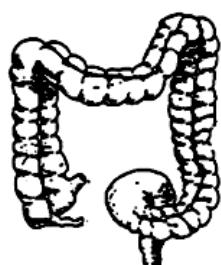


Diagram 6.3(a)
Rajah 6.3(a)



Diagram 6.3(b)
Rajah 6.3(b)

Explain the effects in Diagram 6.3(b) on:
Terangkan kesan dalam Rajah 6.3(b) terhadap:

- (i) Structure and function of colon
Struktur dan fungsi kolon

[5 marks]

- (ii) Defaecation
Penyahtinjaan

[5 marks]

- 7(a) *Pleurococcus_sp.* is a unicellular green algae found on the bark of tree.
A group students carried out an experiment to estimate the population size of *Pleurococcus sp* within school compound.
Pleurococcus sp ialah alga hijau unisel yang terdapat pada kulit batang pokok. Sekumpulan murid menjalankan satu eksperimen untuk menganggarkan saiz populasi *Pleurococcus sp* dalam kawasan sekolah.

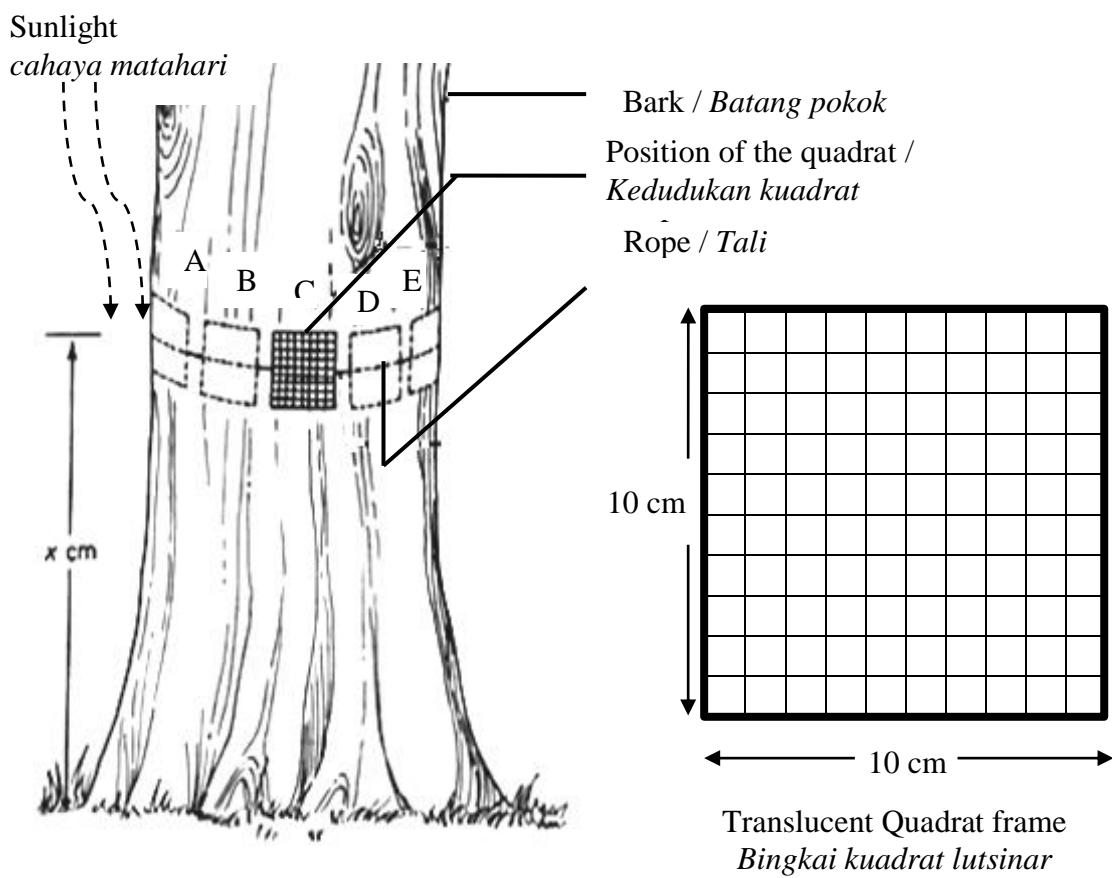


Diagram 7.1 // Rajah 7.1

- (i) Based on the Diagram 7.1, describe the technique used to estimate the percentage coverage of *Pleurococcus sp* on the bark of tree.
*Berdasarkan Rajah 7.1,uraikan teknik yang digunakan untuk menganggarkan peratus litupan *Pleurococcus sp* pada kulit batang pokok.*

[6 marks]

- (ii) Table 1 shows the results of activity to estimate population size of *Pleurococcus sp* in the Diagram 7.1.
*Jadual 1 menunjukkan keputusan daripada satu aktiviti untuk menganggarkan saiz populasi *Pleurococcus sp* dalam Rajah 7.1*

Aspect/Aspek	A	B	C	D	E
Percentage coverage of <i>Pleurococcus sp</i> (cm ²)	53	86	70	63	54
Peratus litupan (cm ²)					

Table 1 // Jadual 1

Based on the result in Table 1, explain how the light intensity influence the population size of the *Pleurococcus sp*
*Berdasarkan keputusan dalam Jadual 1, terangkan bagaimakah faktor keamatan cahaya mempengaruhi populasi *Pleurococcus sp*.*

[4 marks]

(b)(i)

Dengue fever is a viral infection caused by the female mosquito. Dengue fever occurs in tropical and sub-tropical regions and usually increases in the hot and humid months. In recent years, dengue fever has become a major international public health concern.

Demam denggi adalah jangkitan virus yang disebabkan oleh nyamuk betina . Demam denggi berlaku di kawasan-kawasan tropika dan sub - tropika dan biasanya meningkat pada bulan-bulan yang panas dan lembap . Dalam tahun-tahun kebelakangan ini, demam denggi telah menjadi satu kebimbangan kesihatan awam antarabangsa .



Diagram 7.2 // Rajah 7.2

Diagram 7.2 shows the vector of dengue fever. Based on the statement above describe how the vectors cause dengue fever to human
Rajah 7.2, menunjukkan vektor demam denggi. Berdasarkan penyataan di atas uraikan bagaimana vektor tersebut menyebabkan demam denggi pada manusia

[5 marks]

- (ii) Explain the role of individual, community and government that can control the disease.

Terangkan peranan individu, komuniti dan kerajaan yang boleh dilakukan untuk mengawal penyakit ini.

[5 marks]

8. Diagram 8.1 shows the lymphatic system and blood circulatory system.
Rajah 8.1 menunjukkan sistem limfa dan sistem peredaran darah

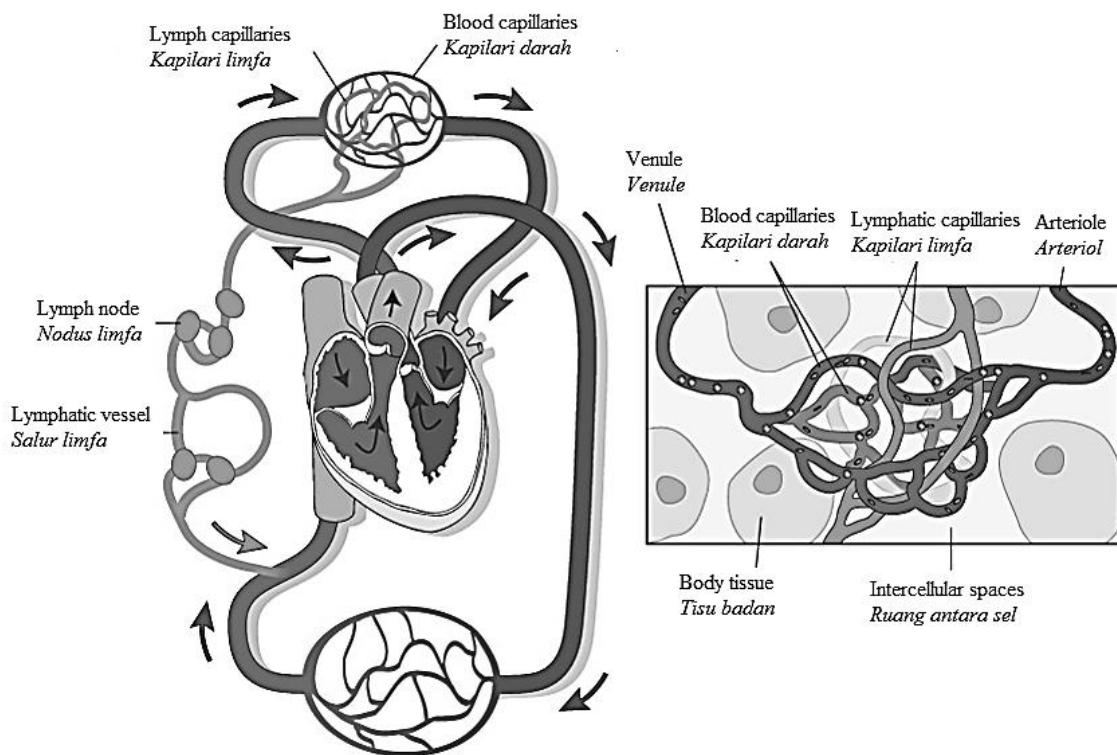


Diagram 8.1 // Rajah 8.1

- (a)(i) Explain the formation of the fluid in the intercellular spaces
Terangkan pembentukan bendalir dalam ruang antara sel

[4 marks]

- (ii) Explain how lymphatic system complements the blood circulatory system
Terangkan bagaimana sistem limfa melengkapi sistem peredaran darah

[8 marks]

- (b) Jusoh is a poor farmer who lives in a rural area. There are many mosquitoes that act as vectors of parasitic worms. He does not wear any shoes while doing his daily work. After one year, his leg become swollen as in Diagram 8.2

Jusoh seorang petani miskin yang tinggal di kawasan pedalaman. Kawasan tersebut mempunyai banyak nyamuk yang menjadi vektor kepada cacing parasit. Beliau tidak memakai sebarang alas kaki semasa menjalankan kerja-kerja harian. Selepas setahun, kakinya membengkak seperti dalam Rajah 8.2

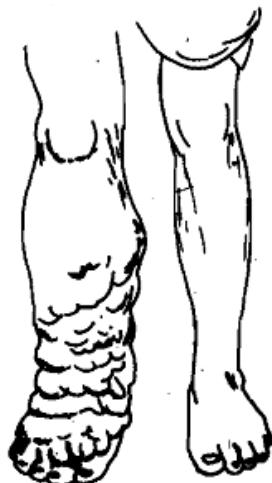


Diagram 8.2 / Rajah 8.2

Based on the above statement, explain how the condition happen and suggest ways that can help to prevent the disease.

Berdasarkan pernyataan di atas, terangkan bagaimana keadaan ini berlaku dan cadangkan langkah-langkah yang dapat membantu mengelakkan penyakit tersebut.

[8 marks]

9 (a) Diagram 9.1(a) shows a human activity on the environment in area X. That area is developed such as Diagram 9.1(b).

Rajah 9.1(a) menunjukkan satu aktiviti manusia keatas alam sekitar di kawasan X. Kawasan tersebut telah dibangunkan seperti dalam Rajah 9.1(b).



Diagram 9.1(a)
Rajah 9.1(a)

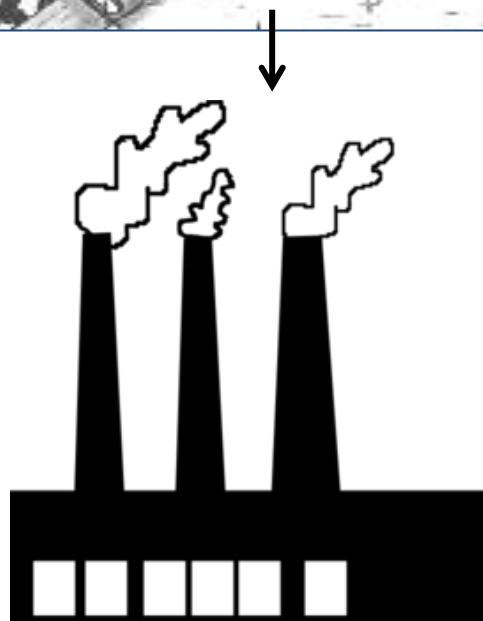


Diagram 9.1(b)
Rajah 9.1(b)

Based on your opinion, justify the effect of the development to the ecosystem in area X.

Berdasarkan pendapat anda, justifikasikan apa yang berlaku ke atas ekosistem di kawasan X tersebut.

[10 marks]

- (b) Diagram 9.2(a) shows a scientist has been conducting research on a type of radioactive material which is mutagenic agents in the laboratory. During the research, scientists have been exposed to radiation from the radioactive materials. Based on her reading, a person who is exposed to radiation is probably to inherit the disease inherited as shown in Diagram 9.2(b).

Rajah 9.2(a) menunjukkan seorang saintis telah menjalankan kajian keatas sejenis bahan radioaktif yang merupakan agen mutagen di makmal. Semasa kajiannya, saintis itu telah terdedah kepada sinaran yang terhasil daripada bahan radioaktif tersebut. Berdasarkan bacaannya, seseorang yang terdedah kepada sinaran tersebut berkemungkinan akan mendapat penyakit genetik seperti dalam Rajah 9.2(b).

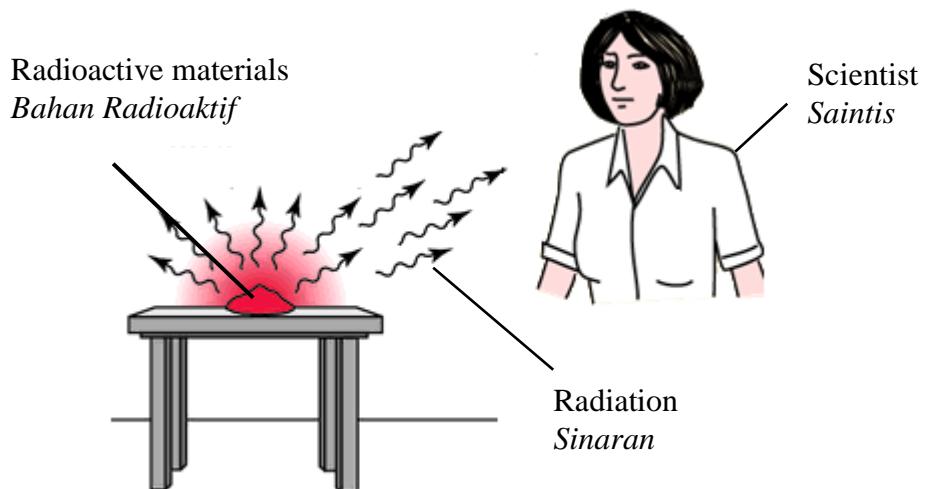


Diagram 9.2(a) // Rajah 9.2(a)

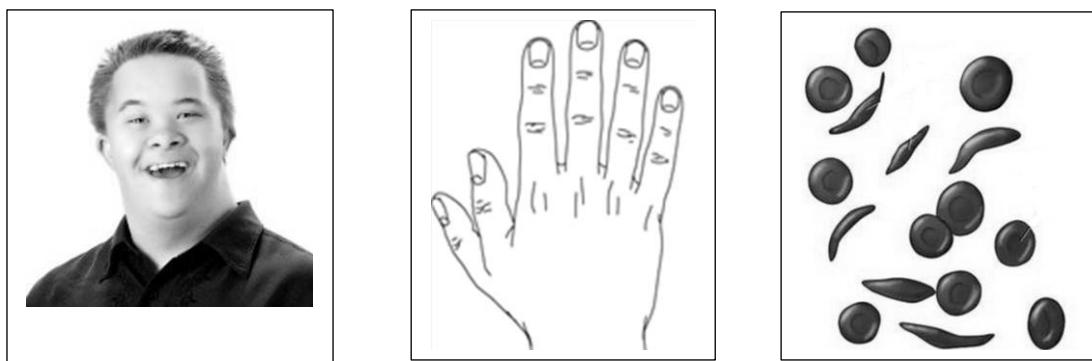


Diagram 9.2(b) // Rajah 9.2(b)

Write a report on how the radiation of radioactive substances can cause genetic diseases such as in Diagram 9.2(b). The report should include the certain examples of the disease.

Tuliskan satu laporan bagaimana sinaran bahan radioaktif tersebut boleh menyebabkan penyakit genetik seperti dalam Rajah 9.2(b).

[10 marks]

END OF THE QUESTIONS

PERATURAN PEMARKAHAN

Num.	Scoring Criteria	Marks	
1(a)	<p><i>Able to match PQRS with meaning</i></p> <p>Answer: All 3 correct matching</p>	3	3m
1(b)	<p><i>Able to give the types same as</i></p> <p>Answer:</p> <p>P1: smooth muscle (tissues) P2: cardiac muscle (tissues) P3: skeletal muscle (tissues)</p>	1 1 1	2m
1(c)	<p><i>Able to explain the adaptation of S</i></p> <p><i>Suggested answer:</i></p> <p>F: Organelle is mitochondria P1: folded inner membrane to form crystae to increase TSA/V P2: to produce / generate more energy P3: for muscle contraction (and relaxation)</p>	1 1 1 1	2m
1(d)	<p><i>Able to explain organisms have a specific level of organization</i></p> <p><i>Suggested answer:</i></p> <p>F: Skeletal system E1: provide support / shape for organism E2: enable the movement to happen E3: cause by contraction of the muscle / structure in level R E4: help by ligament / tendon / joint</p>	1 1 1 1	3m
1(e)	<p><i>Able to predict the structure function Q,</i></p> <p><i>Suggested answer:</i></p> <p>P1- Q unable to bent and straighten // move the arm P2- formation of myofibril incomplete // contain less / no mitochondria P3- less / no ATP energy produced P4- cause R cannot contract and relax</p>	1 1 1 1	2m
	<i>Any 2E</i>	TOTAL	12

Num	Scoring Criteria	Marks	
2(a)	<p><i>Able to name the elements that made up the compound</i></p> <p><i>Answer : Carbon / C, Hydrogen / H, Oxygen / O</i></p>	1	1
2(b)	<p><i>Able to state the basic unit which form a compound P, Q and R</i></p> <p><i>Answer : Glucose</i></p>	1	1
2(c)	<p><i>Able to name compound P, Q and R</i></p> <p><i>Answer :</i></p> <p>P : Starch Q : Glycogen R : Cellulose</p> <p><i>Notes :all correct = 2 marks, 1&2 correct = 1 mark</i></p>	2	2
2(d)	<p><i>Able to explain how P can be broken down into disaccharides using saliva.</i></p> <p><i>Suggested answer :</i></p> <p>F : Saliva contain (salivary) amylase. P1 : Salivary amylase hydrolysed starch/ P into maltose P2 : By hydrolysis process</p>	1 1 1	3
2(e)(i)	<p><i>Able to explain the different observation between food sample A and food sample C.</i></p> <p><i>Suggested answer :</i></p> <p>P1: Food sample A have reducing sugar while food sample C not have reducing sugar. P2: Food sample A contain maltose but C contain sucrose P3: Maltose reduce CuSO₄ in the Benedict solution into Cu₂O Any 2</p>	1 1 1	2
2(e)(ii)	<p><i>Able to discuss how to obtain a positive observation for food sample C.</i></p> <p><i>Suggested Answer :</i></p> <p>P1 : (Food sample C) need to boil with dilute HCl / acid P2 : Sucrose then is hydrolysed P3: into glucose <u>and</u> fructose. Or P1: (Food sample C) added with sucrase P2: sucrose hydrolysed P3: into glucose <u>and</u> fructose</p>	1 1 1 1 1 1	3
	TOTAL	12	

NUM	SCORING CRITERIA	MARKS											
3(a)(i)	<p><i>Able to name hormone X</i></p> <p><i>Answer:</i> Auxin</p>	1	1										
3(a)(ii)	<p><i>Able to state type of tropism shows in the tip of root and tip of shoot</i></p> <p><i>Answer:</i></p> <table border="1"> <tr> <td>Tip of shoot</td><td>Negative geotropism</td></tr> <tr> <td>Tip of root</td><td>Positive geotropism</td></tr> </table>	Tip of shoot	Negative geotropism	Tip of root	Positive geotropism	1 1	2						
Tip of shoot	Negative geotropism												
Tip of root	Positive geotropism												
3(b)	<p><i>Able to explain the response of auxin on the tip of root in the growth of plant</i></p> <p><i>Suggested answer:</i></p> <p>P1: hormone X accumulate at lower side P2: because of the gravity forces P3: a high concentration of auxins inhibit the elongation of cell in the root P4: the upper side of the root grows faster than the lower side. P5: the young root curves and grows downward</p> <p style="text-align: right;">Any 2</p>	1 1 1 1 1	2										
3(c)(i)	<p><i>Able to name the technique used</i></p> <p><i>Answer:</i> Parthenocarpy</p>	1	1										
3(c)(ii)	<p><i>Able to explain the differences how the fruit produced in diagram 3.1(a) and the fruits produced in diagram 3.1 (b)</i></p> <p><i>Suggested answer:</i></p> <table border="1"> <thead> <tr> <th>Diagram 3.1 (a)</th><th>Diagram 3.1 (b)</th></tr> </thead> <tbody> <tr> <td>F1: do not use hormone</td><td>Using hormones</td></tr> <tr> <td>P2: Pollination occur</td><td>Sprayed with auxins on stigma and ovary to form fruit</td></tr> <tr> <td>F2: double fertilization</td><td>Without fertilization</td></tr> <tr> <td>P3: Involved pollen grain and egg cells</td><td>Do not involved pollen grain</td></tr> </tbody> </table> <p style="text-align: right;">Any 3</p>	Diagram 3.1 (a)	Diagram 3.1 (b)	F1: do not use hormone	Using hormones	P2: Pollination occur	Sprayed with auxins on stigma and ovary to form fruit	F2: double fertilization	Without fertilization	P3: Involved pollen grain and egg cells	Do not involved pollen grain	1 1 1 1	3
Diagram 3.1 (a)	Diagram 3.1 (b)												
F1: do not use hormone	Using hormones												
P2: Pollination occur	Sprayed with auxins on stigma and ovary to form fruit												
F2: double fertilization	Without fertilization												
P3: Involved pollen grain and egg cells	Do not involved pollen grain												
3(c)(iii)	<p><i>Able to predict what will happen to the fruits species continuity</i></p> <p><i>Suggested answer:</i></p> <p>P1: reduce biodiversity P2: less variation P3: no natural selection // not involve male gamete and female gamete by randomly P4: become extinct.</p> <p style="text-align: right;">Any 3</p>	1 1 1 1	3										
	TOTAL	12											

Num	Scoring Criteria	Marks										
4(a)	<p>Able to name type of immunity <i>Answer:</i> X: Artificial active immunity Y: Artificial passive immunity <i>Both must correct</i></p>	1										
4(b)	<p>Able to name the substance used <i>Answer:</i> To increase the concentration of antibodies exceed immunity level</p>	1										
4(c)	<p>Able to explain two differences between immunity in individual P and Q <i>Suggested answer:</i></p> <table border="1" data-bbox="319 642 1208 866"> <tr> <td data-bbox="319 642 732 686">P</td><td data-bbox="732 642 1208 686">Q</td></tr> <tr> <td data-bbox="319 686 732 754">P1: Produced its own antibodies</td><td data-bbox="732 686 1208 754">Receive ready-made antibodies from other sources</td></tr> <tr> <td data-bbox="319 754 732 799">P2: permanent / long-lasting</td><td data-bbox="732 754 1208 799">Temporary / short-lasting</td></tr> <tr> <td data-bbox="319 799 732 844">P3: injection of vaccine</td><td data-bbox="732 799 1208 844">Injection of anti-serum</td></tr> <tr> <td data-bbox="319 844 732 889">P4: slow response</td><td data-bbox="732 844 1208 889">Fast / immediate response</td></tr> </table> <p><i>Any two</i></p>	P	Q	P1: Produced its own antibodies	Receive ready-made antibodies from other sources	P2: permanent / long-lasting	Temporary / short-lasting	P3: injection of vaccine	Injection of anti-serum	P4: slow response	Fast / immediate response	2
P	Q											
P1: Produced its own antibodies	Receive ready-made antibodies from other sources											
P2: permanent / long-lasting	Temporary / short-lasting											
P3: injection of vaccine	Injection of anti-serum											
P4: slow response	Fast / immediate response											
4(d)	<p>Able to name cell A and material X <i>Answer:</i> Cell A: Lymphocyte Material X: Antibody</p>	1 1 2										
4(e)	<p>Able to explain the mechanism of body defense shown in Diagram 4.2 <i>Suggested answer:</i> P1: Lymphocytes / cell A identify / recognize the antigen P2: and produce (specific) antibodies P3: antibodies bind with antigen to form antigen-antibodies complex P4: antibodies destroy the antigen / pathogen</p>	1 1 1 1 3										
4(f)	<p>Able to explain why every parent must obey that schedule to ensure that their baby are safe from certain diseases <i>Suggested answer:</i> P1: to stimulate the lymphocytes to produce antibodies P2: to increase the concentration of antibodies produced exceed the immunity level P3: enable the lymphocytes to have memories for the same type of pathogen P4: enable body to provide immediate response towards the pathogen Notes: If students answer "No" P1: inaccurate preparation of vaccine P2: cause death / diseases P3: Preparation of vaccine need high cost P4: risks for children / babies with low / weak immunity</p>	1 1 1 1 3										
	TOTAL	12										

Num	Scoring Criteria	Marks							
5(a)(i)	<p>Able to name the organization level of flower in multicellular organism Answer: Organ</p>	1	1						
5(a)(ii)	<p>Able to state a difference between sexual reproduction and asexual reproduction in plants Suggested answer:</p> <table border="1" data-bbox="314 525 1240 646"> <thead> <tr> <th data-bbox="314 525 774 563">Sexual reproduction</th><th data-bbox="774 525 1240 563">Asexual reproduction</th></tr> </thead> <tbody> <tr> <td data-bbox="314 563 774 601">Fertilisation occur</td><td data-bbox="774 563 1240 601">No fertilisation occur</td></tr> <tr> <td data-bbox="314 601 774 646">Involves gamete</td><td data-bbox="774 601 1240 646">Not involves gamete</td></tr> </tbody> </table>	Sexual reproduction	Asexual reproduction	Fertilisation occur	No fertilisation occur	Involves gamete	Not involves gamete	1 1	1
Sexual reproduction	Asexual reproduction								
Fertilisation occur	No fertilisation occur								
Involves gamete	Not involves gamete								
5(b)(i)	<p>Able to explain the process where the diploid cells in P in Diagram 5.1(a) undergoes cell division to produce haploid cells of the pollen. Suggested answer: F: By meiosis P1: P contain pollen mother cell / diploid microsporocyte cell P2: to produce four haploid cells</p>	1 1 1	2						
5(b)(ii)	<p>Able to explain the possibility which occur in Q Suggested answer: F: Pollination occur P1: mature pollen contain tube nucleus and generative nucleus P2: germinate and form pollen tube (at Q) P3: generative nucleus divides by mitosis to form two male gametes P4: When pollen tube reaches the embryo sac, pollen tube will enter ovule through micropyle P5: tube nucleus degenerate and the end of the pollen tube burst</p>	1 1 1 1 1 1	3						
5(c)	<p>Able to explain why n the fertilization which occur in R differ with in human. Suggested answer: F1: R contain ovum and two polar nuclei while in ovary of human contain ovum and only P1: one male gamete fertilise with ovum (to form diploid zygote) P2: the other male gamete fertilise with two polar nuclei (to form triploid nucleus) P3: while in human male gamete / sperm only fertilise with ovum F2: Fertilisation in R produce diploid zygote and triploid nucleus while in human produce diploid zygote only</p>	1 1 1 1 1 1	3						

5(d)	<p><i>Able to explain the important of the fruit</i></p> <p><i>Suggested answer:</i></p> <p>P1: Fruit cover seeds P2: and help to disperse the seeds apart from the tree P3: to avoid intraspecific competition P4: and ensure the successfulness of plant survival in new habitat</p>	1 1 1 1	2
		<i>Any 2</i>	Total 12

Num	Scoring Criteria	Marks
6 (a)	<p><i>Able to explain the process of absorption in the villus, if the person eat meat.</i></p> <p><i>Suggested answer</i></p> <p>F The end product of meat digestion is amino acid P1 Amino acids diffused into the epithelial cells of ileum P2 by facilitated diffusion P3 because the concentration of amino acid in small intestine is higher compare to concentration of amino acid in villus P4 The remaining amino acid across the epithelial lining involves active transport</p>	1 1 1 1 1
6(b)	<p><i>Able to describe the transport of glucose by the circulatory system for assimilation</i></p> <p><i>Suggested answer</i></p> <p>P1 (Glucose absorb into villus) and transport to liver through hepatic portal vein P2 Excess glucose is converted to glycogen and stored in the liver P3 The liver converts the glycogen back to the glucose when the blood glucose level low P4 If the glycogen store in the liver is full, excess glucose is converted into lipids by the liver P5 Glucose is transport to the cell through blood vessel P6 Glucose are used by cells to produce energy in cell respiration</p>	1 1 1 1 1 1
6(c)(i)	<p><i>Able to explain the effects of unhealthy colon to the human health</i></p> <p><i>Suggested answer</i></p> <p>F Part of the colon become enlarge// some part of the colon become thin P1 because internal wastes accumulate P2 colon become stagnant pockets// saku yg tidak bergerak P3 becomes the breeding ground for harmful bacteria / parasites P4 inhibits normal bowel contraction thus leading to a slower transit time P5 internal wastes product also undergo fermentation P6 produce large amount of gases</p>	1 1 1 1 1 1

6(c)(ii)	<p><i>Able to describe the <u>one</u> problems related to defecation in human</i></p> <p><i>Suggested answer</i></p> <p>P1 Constipation P2 cause by less taking roughage P3 the symptoms is faeces becomes hard/dry P4 because to much water absorbed by colon P5 faeces moving too slowly through the colon P6the rectum is unable to expel faeces</p> <p style="text-align: right;"><i>Any 5</i></p> <p>or</p> <p>P1 Colon cancer P2 a type of cancer that develops in the tissues of the colon P3 caused by carcinogens produced by colon bacteria P4 and eating a high fat/ low fibre diet P5 the symptoms is include <u>blood in the stool</u>/ a change in bowel movements/<u>weight loss</u>/ feeling tired</p> <p style="text-align: right;"><i>Any 5</i></p> <p>or</p> <p>P1 Haemorrhoids P2 a condition in which the vein around the anus or lower rectum are swollen and inflamed P3 caused by prolonged constipation P4 because the person do not drinking a lot of water P5 do ot eatting a high fibre diet P6 do not empty your bowels (defecate) P7 do not exercise regularly</p> <p style="text-align: right;"><i>Any 5</i></p>	
	Total	20

Num	Scoring Criteria	Marks
7(a)(i)	<p><i>Able to describe the technique used to estimate the percentage coverage of <i>Pleurococcus</i> sp on the bark of tree.</i></p> <p><i>Suggested answer:</i></p> <p>P1: The Quadrat Sampling Technique 1</p> <p>P2: Percentage coverage is an indication of how much area of the quadrat is occupied by a species./Percentage coverage is useful when it is not possible to identify separate individuals. 1</p> <p>P3: A clear trunk, without any boughs and has a lot of <i>Pleurococcus</i> sp colonies on the bark is selected. 1</p> <p>P4: The rope is tied around the trunk at the level with a lot of colony of <i>Pleurococcus</i> sp . 1</p> <p>P5: The distance of the rope from the ground is measured (x m) 1</p> <p>P6: A translucent Quadrat frame of 10 cm x 10cm in size is used for sampling. 1</p>	

	<p>P7: The quadrat is placed on the bark at different aspects A,B,C,D and E (to determine the percentage coverage)</p> <p>P8: Each small quadrat is 1% or 1cm². Only squares that are covered by half or more than half of the species are counted</p> <p>P9: The squares that are covered by less than half are omitted.</p> <p>P10: Percentage coverage for all quadrats is estimated by using :</p> <p style="text-align: center;">Percentage coverage</p> $= \frac{\text{aerial coverage of all quadrats (m2)}}{\text{number of quadrats} \times \text{quadrat area}} \times 100\%$	1	1	6
	<i>Any 6</i>			
7(a)(ii)	<p><i>Able to explain how the light intensity influence the population size of the Pleurococcus sp</i></p> <p><i>Suggested answer:</i></p> <p>P1: At B population size/percentage coverage of <i>Pleurococcus</i> sp is high //at A and E Percentage coverage of <i>Pleurococcus</i> sp is lower.</p> <p>P2: At B Light intensity is optimum for <i>Pleurococcus</i> sp to carry out photosynthesis at maximum rate.</p> <p>P3: At B the growth rate of <i>Pleurococcus</i> sp is higher</p> <p>P4: At A, Light intensity is very high , dehydrate the cells of the <i>Pleurococcus</i> sp /less moist</p> <p>P5: At A, not suitable for the growth of <i>Pleurococcus</i> sp/the growth rate of <i>Pleurococcus</i> sp is low</p> <p>P6: At E, light intensity is low, the rate of photosynthesis is low</p> <p>P7: At E, the growth rate of <i>Pleurococcus</i> sp is low</p>	1	1	4
	<i>Any 4</i>			
7(b)	<p><i>Able to describe the vectors, pathogen , symptoms and methods of transmission of the disease.</i></p> <p><i>Suggested answer:</i></p> <p>P1: Vector that transmit pathogen disease is <i>Aedes</i> (aegypti betina) /<i>Aedes</i> sp mosquito</p> <p>P2: Pathogen that cause dengue fever is virus,</p> <p>P3: Dengue viruses are transmitted to humans (host) through the bites of the (female striped) <i>Aedes</i> (aegypti) mosquito (vector).</p> <p>P4: These mosquito breeds easily during the rainy seasons / fresh water / any suitable example / e.g. water that is stored in plastic bags / cans / flowerpots / old tires.</p> <p>P5: causes / able to state any symptom:</p> <ul style="list-style-type: none"> - High fever (104 F, 40°C) with severe body pain and rashes over parts of the body// deep muscle and joint pains (during first hours of illness) and Chills - Severe headache and vomiting /nausea - Red eyes, pain in the eyes - Enlarged lymph nodes 	1	1	5

	<ul style="list-style-type: none"> - Loss of appetite - Low blood pressure and heartbeat rate - Extreme fatigue <p>[Any 3 symptoms]</p>		
		<i>Any 5P</i>	
7(c)	<p><i>Able to discuss the role of individual, community and government to control the disease:</i></p> <p><i>Suggested answer:</i></p> <p>F1: keep environment clean P1: by carrying out ‘gotong-royong’ (in local community) P2: bury cans / bottles / old tyres / any example in the ground to avoid water retention</p> <p>F2: control the population of <i>Aedes</i> mosquitoes larvae P3: put medication to kill the larvae / abate / spray insecticides (reject: mention the brand / Ridsect)</p> <p>F3: Awareness campaign P4: carry out poster / colouring competition / talks / educate people about the importance of health / any suitable example</p> <p>F4: Restrict laws / Laws enforcement P5: compound / jail / any reasonable punishment</p>	1 1 1 1 1 1 1 1 1 1 1	
		<i>Any 5</i>	Total 20

Num	Scoring Criteria	Marks
8(a)(i)	<p><i>Able to explain the formation of interstitial fluid</i></p> <p><i>Suggested answer:</i></p> <p>P1: diameter of arteriole is bigger / larger than diameter of capillaries P2: cause higher hydrostatic pressure in capillaries P3: some of the blood plasma (such as nutrients, oxygen, any suitable example) is filtered into the intercellular spaces P4: form interstitial fluid / tissue fluid</p>	1 1 1 1
(a)(ii)	<p><i>Able to give your opinion, how lymphatic system complement the blood circulatory system</i></p> <p><i>Suggested answer:</i></p> <p>P1: The fluid must be returned to the circulatory system to maintain normal blood volume. P2: lymphatic fluid from right arm / shoulder area / right side of the head and neck P3: flow into right lymphatic duct</p>	4 1 1 1

Num	Scoring Criteria	Marks
9(a)	<i>Able to discuss the effect of the development to the ecosystem in area X</i>	
	<i>Sample answer:</i>	
	<u>Good Effect</u>	
	G1: Build / Develop residence to accommodate the increase in population.	1
	G2: Industrial / factory to increase job opportunities / increase the income/ economic.	1
	G3: Develop road system to shorten travelling time / reduce traffic jam.	1
	G4: Restructuring of infrastructure facilities / upgrade the Infrastructure / example	1 2
		<i>Any 2 Good</i>
	<u>Bad Effect</u>	
	F1: causes soil erosion / landslides / flash flood	1
	P1: forest floor stripped of it vegetation / absence of plant root system make the soil structure unstable	1
	P2: when it rains heavily, top layer of the soil removal and thinning / crumble and lead to soil erosion / landslides	1
	P3: eroded soil then carried and deposited at the bottom of river / flash flood	1

P7 : caused by x-rays / gamma rays / ultraviolet rays / carcinogenic substances / asbestos / nirosamine / benzene / formaldehyde / chochicine / caffeine / food preservative / pesticides /example	1
P8 : gene mutation is a change in the structure of genes	1
P9 : alters the sequence of the DNA	1
P10 : causes a change in the sequence of amino acids (in the polypeptide chain) // protein formed is different	1
Example of disease causes by gene mutation	
P11 : sickle cell anaemia caused by abnormal haemoglobin / sickle-shaped red blood cell // change in the gene produce haemoglobin	1
P13 : Polydactylism form of the Heningway mutant / mutations in a gene itself	1
P14 : chromosome mutation is a change in the structure / number of chromosome	1
P15 : (change in the structure of chromosome) include deletion / inversion / duplication / translocation	1
P16 : (changes in the number of chromosome) through loss / addition (one or more) of chromosome	1
Example of disease caused by chromosomal mutation	
P17 : down's syndrome caused by an extra chromosome 21 // 47 chromosome	1 Max 10 Any 10
TOTAL	20

MAKLUMAT UNTUK CALON

1. Jawab semua soalan.
2. Jawapan anda hendaklah ditulis dalam ruang yang disediakan dalam kertas soalan.
3. Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tuliskan jawapan yang baru.
4. Rajah yang mengiringi soalan dimaksudkan untuk memberi maklumat yang berguna bagi menjawab soalan. Rajah tidak dilukis mengikut skala kecuali dinyatakan.
5. Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.
6. Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
7. Kertas soalan ini hendaklah diserahkan di akhir peperiksaan.

Pemberian markah:

Markah	Penerangan
3	Cemerlang : Respons yang paling baik
2	Memuaskan : Respons yang sederhana
1	Lemah : Respons yang kurang tepat.
0	Tiada respons atau respons salah

Answer **all** questions

Jawab semua soalan

Question 1 / Soalan 1

Energy value or calorific value is the quantity of heat produced when one gram of food is completely oxidized or burnt down. This heat energy is then absorbed by the water in the boiling tube. Hence, the energy content in food varies among food samples according to their classes of food.

Nilai tenaga atau nilai kalori adalah kuantiti haba yang dihasilkan apabila satu gram makanan dioksidakan dengan lengkap atau dibakar. Tenaga haba ini seterusnya diserap oleh air di dalam tabung didih. Justeru itu, kandungan tenaga dalam pelbagai sampel makanan adalah berbeza-beza berdasarkan kelas-kelas makanan.

A group of form 4 students carried out an experiment to determine the energy value for the following food samples in Diagram 1.

Sekumpulan pelajar tingkatan 4 telah menjalankan satu eksperimen untuk menentukan nilai tenaga untuk sampel-sampel makanan berikut dalam Rajah 1.



Diagram 1 / Rajah 1

Diagram 2 shows the apparatus set- up used in this experiment showing the initial water temperature of 29°C .

Rajah 2 menunjukkan suatu set radas dan bahan yang digunakan dalam eksperimen ini yang menunjukkan suhu awal air adalah 29°C .

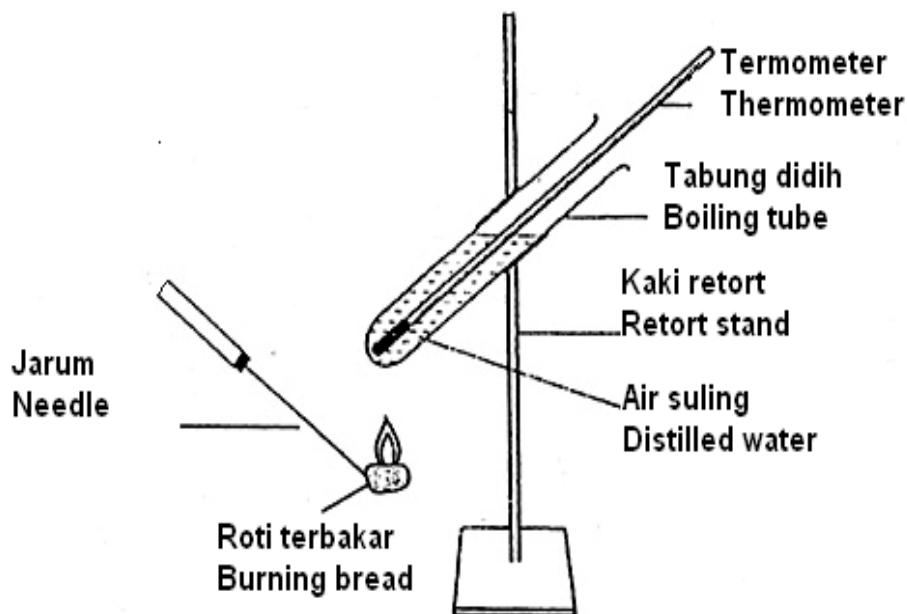


Diagram 2 / Rajah 2

The following steps were carried out:

Langkah-langkah berikut telah dijalankan:

- Step 1: Small pieces of bread (P) is cut off and the mass is weight and recorded using a balance.
Sebahagian kecil roti (P) telah dicerat dan jisimnya ditimbang serta direkodkan menggunakan penimbang.
- Step 2: 20 ml of distilled water was placed into a clean boiling tube by using a measuring cylinder.
20 ml air suling dimasukkan ke dalam tabung didih yang bersih menggunakan silinder penyukat.
- Step 3: The boiling tube is clamped to a retort stand with thermometer placed in it.
Tabung didih diapit pada kaki retort dengan termometer diletakkan ke dalamnya.
- Step 4: The initial temperature of water in the boiling tube were measured and recorded by using a thermometer.
Jisim awal air di dalam tabung didih diukur dan direkodkan menggunakan termometer.

- Step 5: The bread (P) is attached to a pin and burnt in a labour gas flame.
Roti (P) dilekatkan pada pin dan dibakar di dalam api gas labor.
- Step 6: When completely burnt, the burnt bread is placed below the boiling tube.
Apabila pembakaran lengkap, roti yang dibakar diletakkan di bawah tabung didih.
- Step 7: The water is stirred gently with the thermometer.
Air dikacau secara perlahan menggunakan termometer.
- Step 8: The final temperature of water is recorded using the thermometer
Suhu akhir air direkodkan menggunakan termometer.
- Step 9: The energy value of bread is calculated using the following formula:

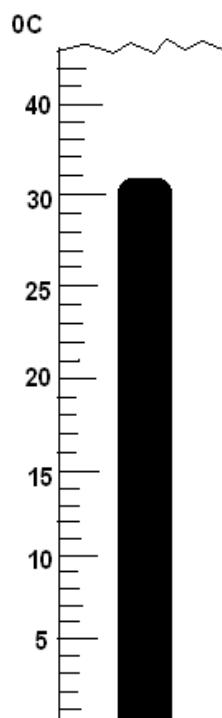
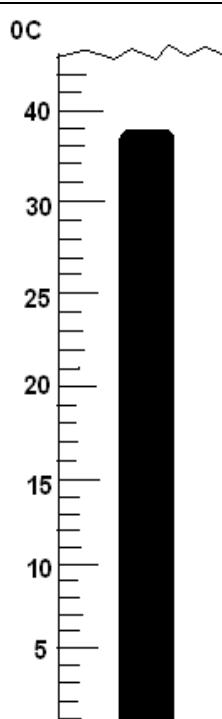
$$\text{Energy value} = \frac{4.2 (\text{Jg}^{-1} \text{C}) \times \text{mass of water (g)} \times \text{temperature increase} (\text{ }^{\circ}\text{C})}{\text{Mass of food sample (g)}}$$

Nilai tenaga roti dihitung menggunakan formula berikut:

$$\text{Nilai tenaga} = \frac{4.2 (\text{Jg}^{-1} \text{C}) \times \text{jisim air (g)} \times \text{kenaikan suhu (}^{\circ}\text{C)}}{\text{Jisim sampel makanan (g)}}$$

- Step 10: Step 1 until 9 are repeated using anchovy (Q) and cashew nut (R)
Langkah 1 hingga 9 diulangi menggunakan ikan bilis (Q) dan kacang gajus (R)

Table 1 shows the highest water temperature after the food sample is completely burnt down.
Jadual 1 menunjukkan suhu tertinggi selepas sampel makanan dibakar dengan lengkap.

Type of food sample <i>Jenis sampel makanan</i>	Mass of food sample <i>Jisim sampel makanan (g)</i>	Final temperature of water <i>Suhu akhir air (°C)</i>	Increase in water temperature <i>Pertambahan suhu air (°C)</i>
P Bread <i>Roti</i>	0.6	 <p>0C 40 35 30 25 20 15 10 5 0</p>	<input type="text"/>
Q Anchovy <i>Ikan Bilis</i>	0.8	 <p>0C 40 35 30 25 20 15 10 5 0</p>	<input type="text"/>

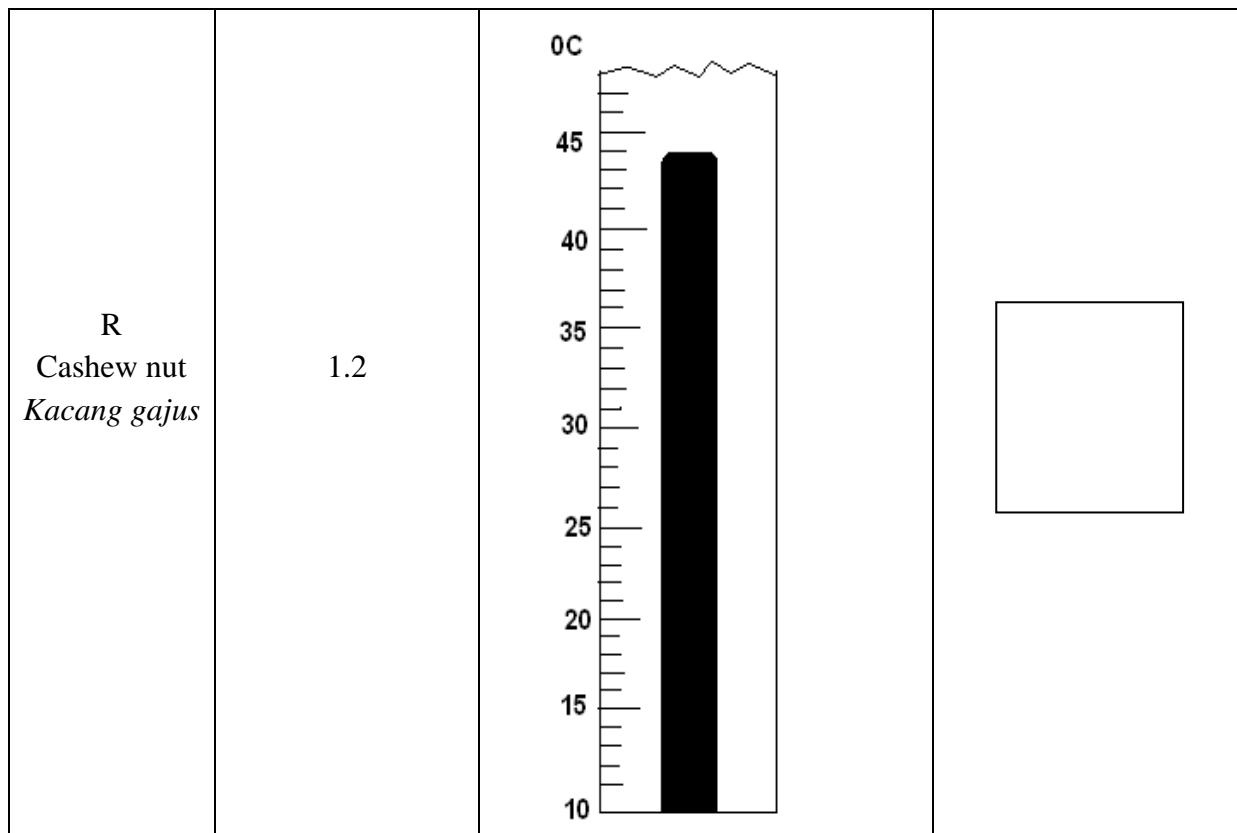


Table 1

Jadual 1

1(a)

- (a) Record the increase in water temperature in Table 1.
Rekod kenaikan suhu air di dalam Jadual 1.

[3 marks]

[3 markah]

- (b)(i) State two different observations that can be made from Table I.
Nyatakan dua pemerhatian yang berbeza yang boleh dibuat daripada Jadual 1.

Observation 1 / *Pemerhatian 1:*

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

Observation 2 / *Pemerhatian 2*

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

1(b)(i)

[3 marks]
[3 markah]

- (b)(ii) State two inferences related to the above observations.

Nyatakan dua inferens berkaitan dengan pemerhatian di atas.

Inference from observation 1 / *Inferens dari pemerhatian 1*

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

1(b)(ii)

Inference from observation 2 / *Inferens dari pemerhatian 2*

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

[3 marks]
[3 markah]

- (c) From Diagram 2, list out all the apparatus and materials used in this experiment.

Dari Rajah 2, senaraikan semua radas dan bahan yang digunakan dalam eksperimen ini.

Apparatus <i>Radas</i>	Materials <i>Bahan-bahan</i>

Table 2 / Jadual 2

[3 marks]
[3 markah]

- (d) Complete the variables in Table 3 based on this experiment.

Lengkapkan pembolehubah-pembolehuabah dalam Jadual 3 berdasarkan eksperimen ini.

Variables <i>Pembolehubah</i>	Method to handle the variables <i>Cara mengendalikan pembolehubah.</i>
Manipulated Variable: <i>Pembolehubah dimanipulasikan:</i>
Responding Variable: <i>Pembolehubah bergerak balas:</i>
Fixed Variable: <i>Pembolehubah Malar:</i>

Table 3 / Jadual 3

[3 marks]

[3 markah]

- (e) State the hypothesis for this experiment.
Nyatakan hipotesis untuk eksperimen ini,

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

1(e)

[3 marks]

[3 markah]

- (f) Construct a Table and record all the data collected in this experiment.
Bina satu jadual dan rekodkan semua data yang terkumpul dalam eksperimen ini.

Your Table should have the following :

Jadual anda hendaklah mengandungi yang berikut:

- Type of food sample / *Jenis sampel makanan*
- Mass of food sample / *Jisim sampel makanan.*
- Increase in water temperature / *Kenaikan suhu air*
- Energy value for each food sample. / *Nilai tenaga setiap sampel makanan.*

1(f)

[3 marks]

[3 markah]

1(g)(i)

- (g)(i) Used the graph paper provided on page 13 to answer this question.
By using the Table in 1(f), draw a bar chart graph on the energy value against the type of food sample.

Gunakan kertas graf yang disediakan pada halaman 13 untuk menjawab soalan ini. Dengan menggunakan Jadual di 1(f), lukiskan satu graf carta bar ke atas nilai tenaga melawan jenis sampel makanan,

[3 marks]

[3 markah]

- (g)(ii) Based on the graph in 1(g)(i), state the relationship between the energy value and the type of food sample.

Explain.

Berdasarkan graf dalam 1(g)(i), nyatakan hubungan di antara nilai tenaga dan jenis sampel makanan.

Terangkan.

1(g)(ii)

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

.....

[3 marks]

[3 markah]

- (h) If the food sample is replaced by S, **predict** the outcome of the experiment.

Explain your prediction.

*Sekiranya sampel makanan digantikan oleh S, ramalkan hasil eksperimen,
Terangkan ramalan anda*



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

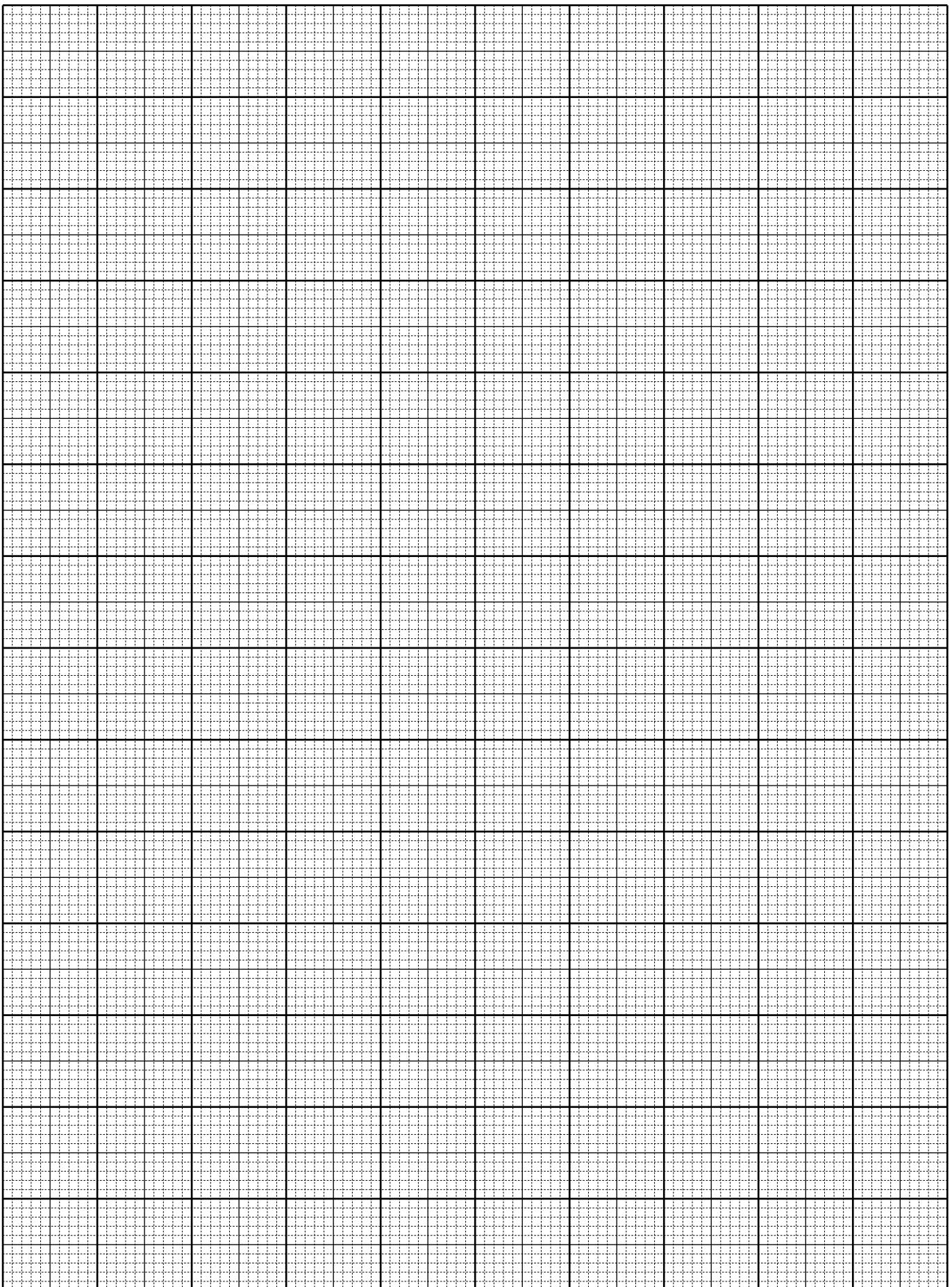
1(h)

[3 marks]
[3 markah]

- (i) Define operationally the Energy Value.
Definisikan secara operasi Nilai Tenaga.
-
.....
.....
.....

1(i)

[3 marks]
[3 markah]



Question 2

Soalan 2

When an individual does vigorous exercise such as running or playing sports, blood osmotic pressure will increase. One of the effects is reduced in urine output. This occurs due to the negative feedback mechanism.

Apabila seseorang individu melakukan aktiviti cergas seperti berlari atau bersukan, tekanan osmosis darah akan meningkat. Salah satu daripada kesannya ialah pengurangan pengeluaran air kencing . Keadaan ini berlaku disebabkan oleh mekanisme suap balik negatif.

By using biological knowledge, a group of student carried out an experiment in the laboratory to investigate the effect of different volume of water intake on the urine produced.

Dengan menggunakan pengetahuan biologi, sekumpulan pelajar telah menjalankan eksperimen di dalam makmal untuk mengkaji kesan pengambilan isipadu air yang berbeza ke atas penghasilan air kencing.

The planning of your experiment should include the following aspect:

Rancangan eksperimen anda hendaklah mengandungi aspek berikut:

- Problem statement
Pernyataan Masalah
- Hypothesis
Hipotesis
- Variables
Pembolehubah
- List of apparatus and materials
Senarai radas dan bahan
- Experimental procedure
Prosedur Eksperimen
- Presentation of Data
Penyampaian Data

[17 marks]

**END OF THE QUESTION PAPER
SOALAN TAMAT**

SPACE FOR THE ANSWER

Part Question Number

SPACE FOR THE ANSWER

Part Question Number

SPACE FOR THE ANSWER

Part **Question Number**

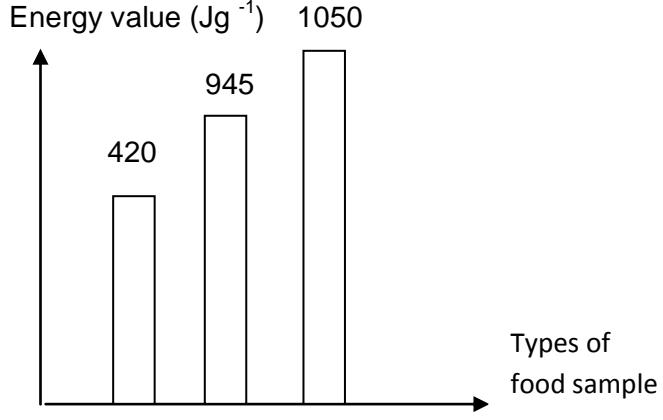
TENTATIVE ANSWERS: SOALAN 1 TRIAL SPM (Paper 3)

ITEM NO	SCORE	EXPLANATION	REMARKS												
		[KB0603 : Measuring using Numbers]													
1(a)	3	<p>Able to record the increase in water temperature correctly.'</p> <p><u>Sample answer:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Type of food sample</td> <td></td> <td>Increase in water temperature ($^{\circ}\text{C}$)</td> </tr> <tr> <td>P / Bread</td> <td>32- 29</td> <td>03</td> </tr> <tr> <td>Q / Anchovy</td> <td>38- 29</td> <td>09</td> </tr> <tr> <td>R / Cashew nut</td> <td>44- 29</td> <td>15</td> </tr> </table>	Type of food sample		Increase in water temperature ($^{\circ}\text{C}$)	P / Bread	32- 29	03	Q / Anchovy	38- 29	09	R / Cashew nut	44- 29	15	
Type of food sample		Increase in water temperature ($^{\circ}\text{C}$)													
P / Bread	32- 29	03													
Q / Anchovy	38- 29	09													
R / Cashew nut	44- 29	15													
	2	<p>Able to record the increase in water temperature based on any 2 correct aspects OR Able to record the final water temperature for each food samples</p> <p><u>Sample answer:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Type of food sample</td> <td>Final water temperature ($^{\circ}\text{C}$)</td> </tr> <tr> <td>P / Bread</td> <td>32</td> </tr> <tr> <td>Q / Anchovy</td> <td>38</td> </tr> <tr> <td>R / Cashew nut</td> <td>44</td> </tr> </table>	Type of food sample	Final water temperature ($^{\circ}\text{C}$)	P / Bread	32	Q / Anchovy	38	R / Cashew nut	44					
Type of food sample	Final water temperature ($^{\circ}\text{C}$)														
P / Bread	32														
Q / Anchovy	38														
R / Cashew nut	44														
	1	Able to record any one correct aspect OR Any 2 correct final water temperature													
	0	Wrong answer or no response // one correct final water temperature,													
		[KB0601 : Observation]													
1(b)(i)	3	<p>Able to state correct observations based on the manipulated and responding variables:</p> <p>Observation 1:</p> <p>1. For P or Bread, the increase in water temperature is 3°C</p>													

		<p>2. For P or Bread, the final water temperature is 32°C 3. For Q or Anchovy, the increase in water temperature is 9°C. 4. For Q / Anchovy , the final water temperature is 38°C</p> <p>Observation 2:</p> <ol style="list-style-type: none"> 1. For R / Cashew nut, the increase in water temperature is 15°C. 2. For R / Cashew nut , the final water temperature is 44°C. 	
	2	Able to state any 2 inaccurate observations OR Any one correct answers.	
	1	Able to state observations at idea level	
	0	Wrong answer or no response	
		[KB0604 : Inference]	
1(b)(ii)	3	<p>Able to state correct inferences which corresponds to the observation .</p> <p>Sample answer:</p> <p>Inference 1:</p> <ol style="list-style-type: none"> 1. P / Bread is carbohydrate classes of food which has lowest energy value 2. P / Bread released the least /lowest heat energy which is absorbed by water / has lowest energy value. <ol style="list-style-type: none"> 3. Q/ Anchovy is protein classes of food which has low energy value. 4. Q / Anchovy release lower / less heat energy which is absorbed by water / has low energy value. <p>Inference 2;</p> <ol style="list-style-type: none"> 1. Q/ Cashew nut is protein classes of food which has highest energy value. 2. Q/ Cashew nut released more /most heat energy which is absorbed by water./ has highest energy value 	
	2	Able to state any 2 inaccurate inferences OR any one correct inference.	
	1	Able to state any inferences at idea level	
	0	Wrong answer or no response	

KB0602 : Classifying											
1(c)	3	<p>Able to classify the apparatus and materials correctly based on Diagram 2 OR Any 6 correct ticks</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Apparatus</th><th>Materials</th></tr> </thead> <tbody> <tr> <td>Needle Retort stand Boiling tube Thermometer</td><td>Burning bread Distilled water</td></tr> </tbody> </table>	Apparatus	Materials	Needle Retort stand Boiling tube Thermometer	Burning bread Distilled water					
Apparatus	Materials										
Needle Retort stand Boiling tube Thermometer	Burning bread Distilled water										
	2	Able to classify correctly based on any 4-5 ticks									
	1	Able to classify correctly based on any 1-3 ticks									
	0	Wrong answer or no response									
[KB0610 : Variables]											
1(d)	3	<p>Able to find correct variable and method to handle OR Any 6 ticks.</p> <table border="1"> <thead> <tr> <th>Variables</th><th>Method to handle the variable</th></tr> </thead> <tbody> <tr> <td>Manipulated: Type of food sample// P,Q and R // Bread, anchovy and cashew nut</td><td>Used different types of food sample // Change bread to anchovy and cashew nut</td></tr> <tr> <td>Responding variable: Energy Value // Increase in water temperature</td><td>Calculate the energy value using formula <u>4.2X water massX temperature increase</u> Mass of food //Record the increase in water temperature using thermometer</td></tr> <tr> <td>Constant variable: Initial water temperature</td><td>Used 29° C water temperature.</td></tr> </tbody> </table>	Variables	Method to handle the variable	Manipulated: Type of food sample// P,Q and R // Bread, anchovy and cashew nut	Used different types of food sample // Change bread to anchovy and cashew nut	Responding variable: Energy Value // Increase in water temperature	Calculate the energy value using formula <u>4.2X water massX temperature increase</u> Mass of food //Record the increase in water temperature using thermometer	Constant variable: Initial water temperature	Used 29° C water temperature.	
Variables	Method to handle the variable										
Manipulated: Type of food sample// P,Q and R // Bread, anchovy and cashew nut	Used different types of food sample // Change bread to anchovy and cashew nut										
Responding variable: Energy Value // Increase in water temperature	Calculate the energy value using formula <u>4.2X water massX temperature increase</u> Mass of food //Record the increase in water temperature using thermometer										
Constant variable: Initial water temperature	Used 29° C water temperature.										
	2	Any 4-5 ticks									
	1	Any 1-3 ticks									
	0	Wrong answer or no response									
[KB0611 : Hypothesis]											
1(e)	3	Able to state correct hypothesis relating the manipulated	P1: food								

		<p>and responding variable.</p> <p>Bread /P has the lowest energy value / increase in water temperature compare to Anchovy(Q) and Cashew nut (R)// vice versa</p>	<p>samples P2: energy value / increase in water temperature H: relationship</p>																
	2	Able to state the hypothesis based on any two aspects	P1 & P2 //P1 & H // P2 & H																
	1	Able to state the hypothesis based on any one aspect	P1 / P2																
	0	Wrong answer or no response																	
[KBO606 : Communicating]																			
1(f)	3	<p>Able to record all the data correctly in a Table based on</p> <p>T= Correct title and Units D= Correct data E = Correct energy value</p> <p>Sample answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type of food sample</th> <th>Mass of food sample (g)</th> <th>Increase in water temperature ($^{\circ}$ C)</th> <th>Energy Value (Jg$^{-1}$)</th> </tr> </thead> <tbody> <tr> <td>P/ Bread</td> <td>0.6</td> <td>03</td> <td>420</td> </tr> <tr> <td>Q/ Anchovy</td> <td>0.8</td> <td>09</td> <td>945</td> </tr> <tr> <td>R/ Cashew nut</td> <td>1.2</td> <td>15</td> <td>1,050</td> </tr> </tbody> </table>	Type of food sample	Mass of food sample (g)	Increase in water temperature ($^{\circ}$ C)	Energy Value (Jg $^{-1}$)	P/ Bread	0.6	03	420	Q/ Anchovy	0.8	09	945	R/ Cashew nut	1.2	15	1,050	
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P/ Bread	0.6	03	420																
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R/ Cashew nut	1.2	15	1,050																
	2	Able to record any 2 correct Data																	
	1	Able to record any 1 correct Data																	
	0	Wrong answer or no response																	

		[KB0607 : Using spatial time and Space Relationship]									
1(g)(i)	3	<p>Able to plot a graph with the following aspect s:</p> <p>P – all axis with uniform scale and correct units T – all point is transferred correctly B – correct Bar chart</p> <p>Sample answer:</p>  <table border="1"> <thead> <tr> <th>Types of food sample</th> <th>Energy value (Jg⁻¹)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>420</td> </tr> <tr> <td>2</td> <td>945</td> </tr> <tr> <td>3</td> <td>1050</td> </tr> </tbody> </table>	Types of food sample	Energy value (Jg⁻¹)	1	420	2	945	3	1050	
Types of food sample	Energy value (Jg⁻¹)										
1	420										
2	945										
3	1050										
	2	Able to plot a graph based on any 2 aspects									
	1	Able to plot a graph based on any 1 aspect									
	0	Wrong answer or no response									
		[KB0608 : Interpret Data]									
1(g)(ii)	3	<p>Able to explain the relationship between energy value and the type of food sample based on:</p> <p>P1: Hypothesis statement P2: Classes of food P3: Heat energy absorbed by water to increased the temperature</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Bread /P has the lowest energy value compare to anchovy and cashew nut 2. because it is carbohydrate classes of food 3. least heat energy is absorbed by water to increased the temperature / 03° C of water <p>OR</p> <ol style="list-style-type: none"> 1. Cashew nut / R has the highest energy value 									

		compare to anchovy and bread 2. because it is protein and lipid classes of food 3. most/ highest heat energy is absorbed by water to increase the temperature / 19°C of water.	
	2	Able to explain the relationship based on any 2 aspects	
	1	Able to explain the relationship based on any 1 aspect	
	0	Wrong answer or no response	
[KB0605: Prediction]			
1(h)	3	<p>Able to explain prediction of the outcome correctly based on:</p> <p>P1. Name & classes of food P2: Energy value P3: Highest heat energy released / absorbed by water</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. S is cobra which has more lipid 2. Its energy value is more than cashew nut // More than 1050 J g^{-1} 3. Heat energy released is the highest / absorbed by water 	
	2	Able to explain prediction of outcome based on any 2 aspects	
	1	Able to explain prediction of outcome based on any 1 aspect	
	0	Wrong answer or no response	
[KB0609: Defining by Operation]			
1(i)	3	<p>Able to define operationally based on:</p> <p>P1: What is energy value P2: How it is determine P3: What factor cause them.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Energy value is the quantity of heat (energy) produce by bread / anchovy / cashew nut / food sample. 2. which is absorbed by water to increase them to 03°C / 09°C / 15°C. or determine / shown by the increase in water temperature. 3. The energy value is affected by the type of food sample. 	

	2	Able to define correctly based on any 2 aspects.	
	1	Able to define correctly based on any 1 aspect	
	0	Wrong answer or no response	

Suggested answer for Question 2

KB061201 – (Problem statement)

Question	Score	Explanation	Remarks
2 (i)	3	Able to state the problem statement correctly : P1 : <u>volume/amount/quantity</u> of water drank/drunk/intake P2 : <u>volume /amount/quantity</u> of urine produced/output H : Question form Sample answer: 1. What is the effect of amount/volume of water intake on the amount / volume of urine produced (by our kidneys)? 2. How does / does different amount/volume of water intake affect the volume of urine produce / output?	
	2	Able to state a problem statement less accurately. Sample Answer: 1. Does amount of water intake affects the urine output? 2. What is the effect of water intake in the volume of urine produce?	
	1	Able to state a problem statement at idea level Sample Answer: 1. Urine produced is affected by volume of water intake	
	0	No response or wrong response	

KB061202 (KB061203 – Making Hypothesis)

Question	Score	Explanation	Remarks
2 (ii)	3	Able to state the hypothesis based on the following aspects: P1 = Manipulated variable = <u>volume/amount/quantity</u> of water drank/drunk/intake P2 = Responding variable = <u>volume /amount/quantity</u> of urine produced/output R = Relationship / Link <u>Sample answer :</u> 1. The higher/lower the amount / volume/quantity of water drank/intake, the higher/lower the amount / volume of urine produced. 2.	
	2	Able to write a hypothesis statement less accurately <u>Sample answer:</u> 1. Volume /amount/quantity of urine produced/output is influenced by volume/amount/quantity of water drank/drunk/intake	

		2. Different amount/volume of water drank, produces different amount /volume of urine.	
	1	Able to state a hypothesis at idea level <u>Sample answer:</u> 1. Higher/lower water intake, higher/lower urine produced 2. The kidney produces urine.	
	0	No response or wrong response	

KB061203 (Variables)

Question	Score	Explanation	Remarks
2 (iii)	3	Able to state all the three variables correctly <u>Sample answers :</u> 1. <u>Manipulated variable</u> volume/amount/quantity of water drank/drunk/intake 2 <u>Responding variable</u> volume /amount/quantity of urine produced/output 3 <u>Constant variable</u> student/age/temperature/activities/gender/body size/health condition/time/type of water	
	2	Able to state any two variables correctly	
	1	Able to state any one variable correctly	
	0	No response or incorrect response	

KB061204 - (Apparatus and materials)

Question	Score	Explanation	Remarks
2(iv)	3	Able to list out all the important apparatus and materials correctly. <u>Sample answers:</u> Apparatus: Measuring cylinder, beaker, cup/container/bottle, stopwatch, /clock Materials: Student,drinking water/mineral water	
	2	Able to list 2 apparatus and 2 materials correctly	
	1	Able to list 1 apparatus and 1 materials correctly	
	0	No response or incorrect response	

KB061205 (Experimental Procedure)

Question	Score	Explanation	Remarks
2(v)	3	Able to describe all the steps of the experiment correctly <u>Sample answers:</u>	

		<p>1. The night before the experiment, three students are requested to stop eating and drinking after 10.00pm /They were asked to empty their bladder before experiment. (K1,K5)</p> <p>2. A student/three student/student must <u>same size/age/weight/gender</u>(K2)</p> <p>3. On the morning of the experiment, (at 8.00am), each student <u>drink</u> 500ml of distilled water. (K1)</p> <p>4. A student/three student are asked to <u>rest/has same activity</u>/ not to do vigorous activity.(K2)</p> <p>5. After <u>an hour</u>, (at 9.00am) each student <u>collected</u> their urine using a beaker/measuring cylinder/cup (K2, K1)</p> <p>6. <u>Record</u> the volume of urine by using a measuring cylinder.(K3)</p> <p>7. The experiment is repeated by drinking different volume of distilled water : 1000ml and 1500ml (K4)</p> <p>8. The average urine produced by the three student is calculated/taken (K5)</p> <p>9. All data is recorded in a table/tabulate the data (K1)</p> <p>Note:</p> <p>K1: Steps 1,3,5,8 (any three) (Setting apparatus)</p> <p>K2: Step 2,4,5 (any one)(Operating fixed variable)</p> <p>K3: Step 6(Operating responding variable)</p> <p>K4: Step 7(Operating manipulated variable)</p> <p>K5: Step 1,8 (any one) (Precaution)</p>	Reject same height
	3	All the 5 K's	
	2	Any 3-4 K	
	1	Any 1-2 K	
	0	No response or incorrect response	

KB061206 (Presentation of Data)

Question	Score	Explanation	Remarks																														
2(v)	2	<p>Able to present all the data with units correctly</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Student/group of student//volume of water</th> <th colspan="4">Volume of urine collected by each student/volume of urine (ml)</th> <th>Average volume of urine collected per student (ml)</th> </tr> </thead> <tbody> <tr> <td>P/group A//500</td> <td>1</td><td>2</td><td>3</td><td>4</td> <td></td> </tr> <tr> <td>Q/group B//1000</td> <td></td><td></td><td></td><td></td> <td></td> </tr> <tr> <td>R/group C//1500</td> <td></td><td></td><td></td><td></td> <td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td> <td></td> </tr> </tbody> </table>	Student/group of student//volume of water	Volume of urine collected by each student/volume of urine (ml)				Average volume of urine collected per student (ml)	P/group A//500	1	2	3	4		Q/group B//1000						R/group C//1500												Can choose either <u>volume</u> or <u>average</u>
Student/group of student//volume of water	Volume of urine collected by each student/volume of urine (ml)				Average volume of urine collected per student (ml)																												
P/group A//500	1	2	3	4																													
Q/group B//1000																																	
R/group C//1500																																	
	1	Able to present at least one data without unit or incorrect unit																															
	0	No response or incorrect response																															