SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2010

BIOLOGI

Kertas 1

1 Jam 15 Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa; iaitu dalam Bahasa Inggeris dan diikuti dalam Bahasa Melayu yang sepadan.

2. Calon dikehendaki membaca maklumat berikut.

INFORMATION FOR CANDIDATES

1. This question paper consists of **50** questions.
2. Answer **all** questions.
3. Answer each question by blackening the correct space on the answer sheet.
4. Blacken only **one** space for each question.
5. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.
6. The diagrams in the questions provided are not drawn to scale unless stated.
7. You may use a non-programmable scientific calculator.

Kertas soalan ini mengandungi 27 halaman bercetak.

1 Diagram 1 shows the structure of an animal cell.
Rajah 1 menunjukkan struktur satu sel haiwan.

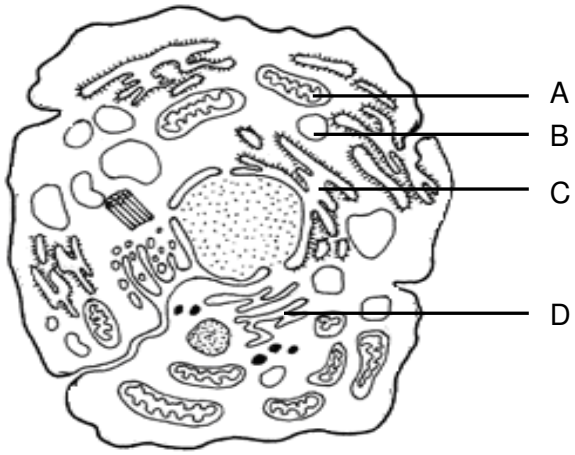


Diagram 1
Rajah 1

Which of the parts labelled **A**, **B**, **C** and **D** is a mitochondrion?
*Yang manakah antara bahagian berlabel **A**, **B**, **C** dan **D** ialah satu mitokondrion?*

2 Diagram 2 shows the organisation and specialisation of plant cells forming tissue X.
Rajah 2 menunjukkan organisasi dan pengkhususan sel-sel tumbuhan membentuk tisu X.

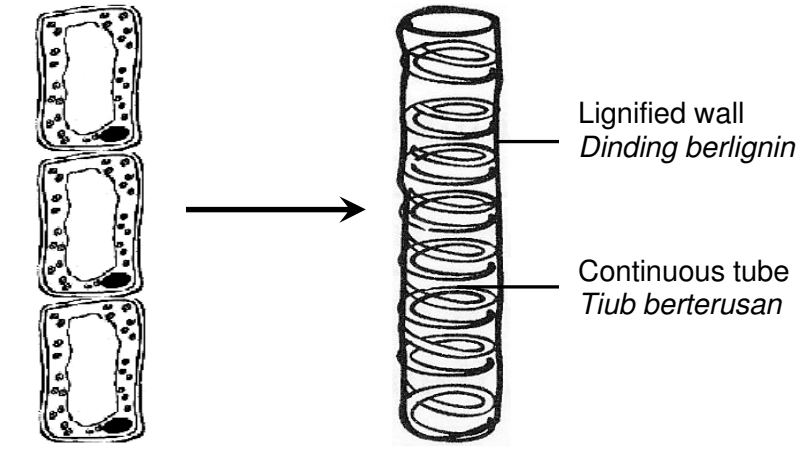


Diagram 2
Rajah 2

What is tissue X?
Apakah tisu X?

A Epidermis
Epidermis

B Palisade mesophyll
Mesofil palisad

C Xylem
Xilem

D Phloem
Floem

3 Diagram 3 shows the structure of a plasma membrane.
Rajah 3 menunjukkan struktur satu membran plasma.

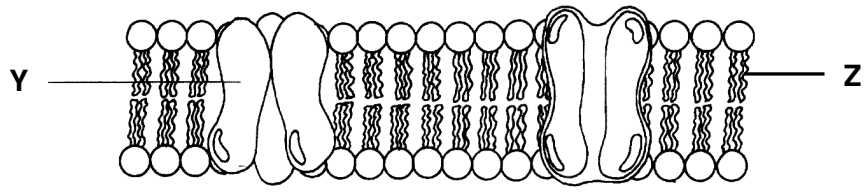


Diagram 3
Rajah 3

What is Y and Z?
Apakah Y dan Z?

	Y	Z
A	Pore Protein *Protein liang*	Phospholipid *Fosfolipid*
B	Carrier Protein *Protein pembawa*	Phospholipid *Fosfolipid*
C	Carier Protein *Protein pembawa*	Glycolipid *Glikolipid*
D	Pore Protein *Protein liang*	Glycolipid *Glikolipid*

4 Diagram 4 shows the condition of an onion cell after being immersed in a solution.
Rajah 4 menunjukkan keadaan satu sel bawang setelah direndam di dalam suatu larutan.

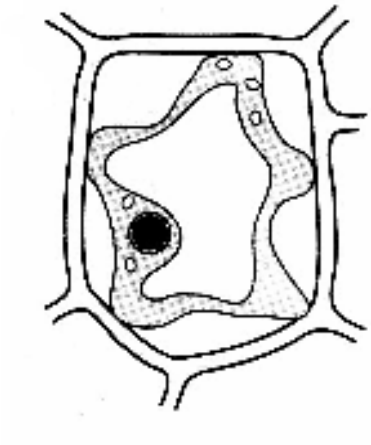


Diagram 4
Rajah 4

What is the phenomenon?
Apakah fenomena ini?

A Turgid
Segah

B Crenation
Krenasi

C Plasmolysis
Plasmolisis

D Deplasmolysis
Deplasmolisis

5 Diagram 5 shows the initial and final stages of an experiment.
Rajah 5 menunjukkan peringkat awal dan akhir suatu eksperimen.

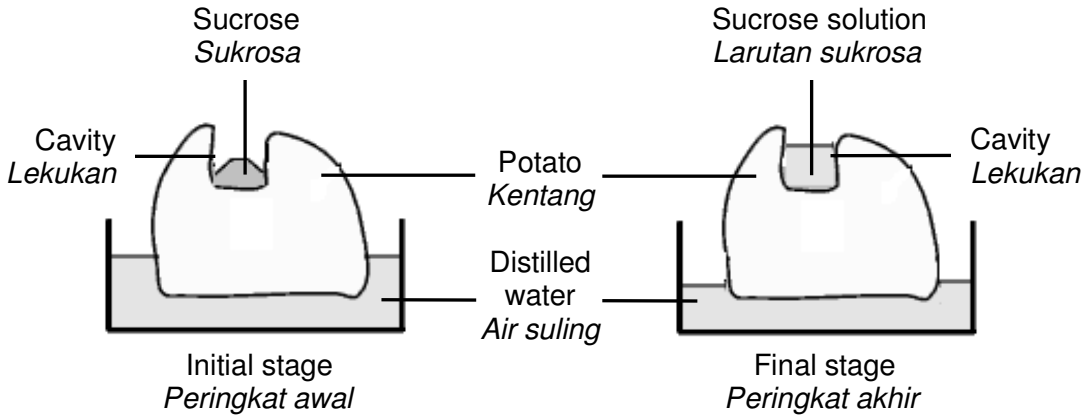


Diagram 5
Rajah 5

What causes the formation of sucrose solution in the cavity of the potato?
Apakah yang menyebabkan pembentukan larutan sukrosa di dalam lekukan pada kentang?

A Sucrose molecules from the cavity moved into the potato by diffusion
Molekul sukrosa bergerak dari lekukan ke dalam kentang secara resapan

B Sucrose solution from the potato moved into the cavity by diffusion
Larutan sukrosa bergerak dari kentang ke dalam lekukan secara resapan

C Water molecules from the distilled water moved into the potato by osmosis
Molekul air bergerak dari air suling ke dalam kentang secara osmosis

D Water molecules from the distilled water moved into the cavity by osmosis
Molekul air bergerak dari air suling ke dalam lekukan secara osmosis

6 Diagram 6 shows the movement of substances from blood capillary into a body cell.
Rajah 6 menunjukkan pergerakan bahan dari kapilari darah ke dalam satu sel badan.

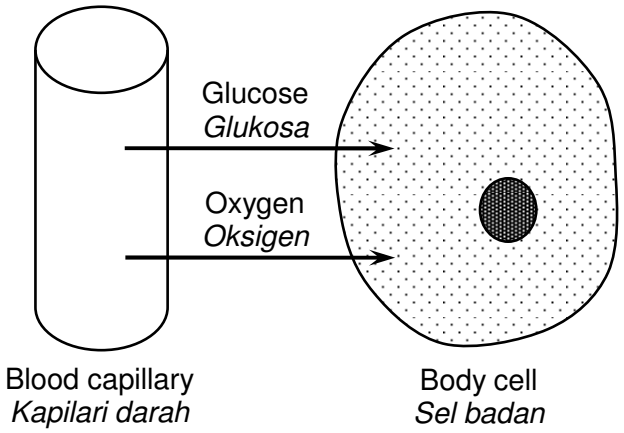


Diagram 6
Rajah 6

Which factor causes the substances to move into the body cells?
Manakah faktor yang menyebabkan bahan-bahan bergerak ke dalam sel badan?

A Metabolic energy
Tenaga metabolisma

B Concentration gradient
Kecerunan kepekatan

C The presence of a cell membrane
Kehadiran membran sel

D The presence of a permeable membrane
Kehadiran membran telap

7 The following shows the formation of a sucrose molecule.
Yang berikut menunjukkan pembentukan molekul sukrosa.

Glucose / *Glukosa* + Molecule R / *Molekul R* ⟶ Sucrose / *Sukrosa* + Water / *Air*

What is molecule R?
Apakah molekul R?

A Glucose
Glukosa

B Lactose
Laktosa

C Fruktose
Fruktosa

D Galactose
Galaktosa

8 Which of the following are true about saturated fats?
Yang manakah antara berikut benar tentang lemak tepu?

I Low content of cholesterol
Kandungan kolesterol rendah

II Solid form at room temperature
Berbentuk pepejal pada suhu bilik

III Maximum content of hydrogen atoms
Kandungan atom hidrogen maksimum

IV At least one double bond between the carbon atoms
Sekurang-kurangnya satu ikatan ganda-dua di antara atom-atom karbon

A I and IV only
I dan IV sahaja

B I, II and III only
I, II dan III sahaja

C II and III only
II dan III sahaja

D II, III and IV only
II, III dan IV sahaja

9 Diagram 7 shows the action of an enzyme.
Rajah 7 menunjukkan tindakan suatu enzim.

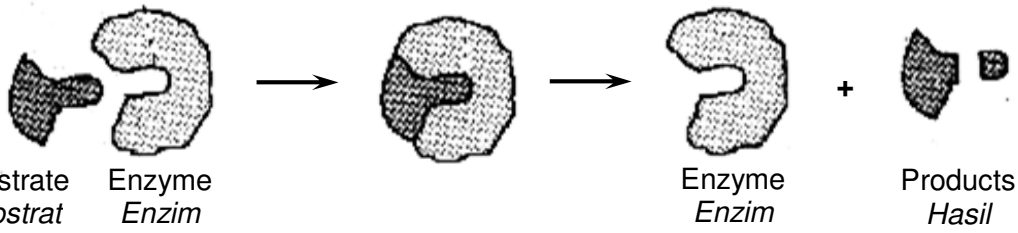


Diagram 7
Rajah 7

What is shown by the diagram?
Apakah yang ditunjukkan melalui rajah ini?

A Enzyme is a protein
Enzim ialah satu protein

B Enzyme and substrate are specific
Enzim dan substrat adalah spesifik

C Enzyme is denatured by temperature
Enzim ternyahasli oleh suhu

D Enzyme speeds up the biochemical reaction
Enzim mempercepatkan tindak balas biokimia

10 Diagram 8 shows a cell cycle.
Rajah 8 menunjukkan satu kitar sel.

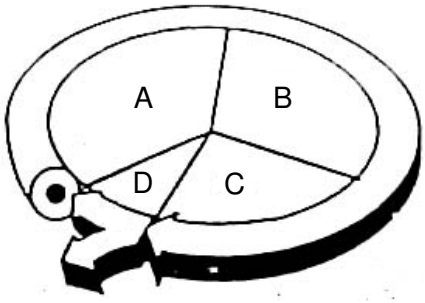


Diagram 8
Rajah 8

Which of the phases labelled **A**, **B**, **C** and **D** does the replication of DNA occur?
*Yang manakah antara fasa-fasa berlabel **A**, **B**, **C** dan **D** berlakunya replikasi DNA?*

11 The following information is about a stage in mitosis.
Maklumat berikut adalah mengenai satu peringkat mitosis.

> Sister chromatids are pulled by spindle fibres to form daughter chromosomes.
> *Kromatid beradik ditarik oleh gentian gelendung membentuk anak kromosom.*

Which of the following is the phase of mitosis?
Yang manakah antara berikut fasa mitosis itu?

A Telophase
Telofasa

B Metaphase
Metafasa

C Prophase
Profasa

D Anaphase
Anafasa

12 Diagram 9 shows a stage of meiosis in a cell of an animal.
Rajah 9 menunjukkan satu peringkat meoisis dalam satu sel sejenis haiwan.

Diagram 9
Rajah 9

What is the diploid number of chromosomes in each somatic cell of the animal?
Apakah nombor diploid bagi kromosom di dalam setiap sel somatik haiwan itu?

A 2

B 4

C 4

D 16

13 Diagram 10 shows a unicellular organism.
Rajah 10 menunjukkan satu organisma unisel.

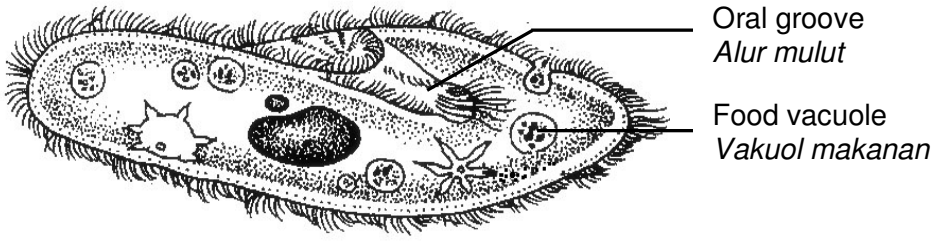


Diagram 10
Rajah 10

What type of nutrition is conducted by the organism?
Apakah jenis nutrisi yang dilakukan oleh organisma ini ?

A Autotroph nutrition
Nutrisi autotrof

B Holozoic nutrition
Nutrisi holozoik

C Parasitic nutrition
Nutrisi parasit

D Saprophytic nutrition
Nutrisi saprofit

14 Which is a correct match of vitamin and its function?
Yang manakah padanan yang betul bagi vitamin dan fungsinya?

A Vitamin A – to prevent scurvy
Vitamin A – untuk mencegah skurvi

B Vitamin C – to prevent pellagra
Vitamin C – untuk mencegah pellagra

C vitamin D – for formation of pigment in the retina
vitamin D – untuk pembentukan pigmen dalam retina

D vitamin B_1 – for formation of coenzyme needed in cellular respiration
vitamin B_1 – untuk pembentukan koenzim yang diperlukan dalam respirasi sel

15 Diagram 11 shows a longitudinal section of a villus in human.
Rajah 11 menunjukkan keratan rentas satu vilus pada manusia.

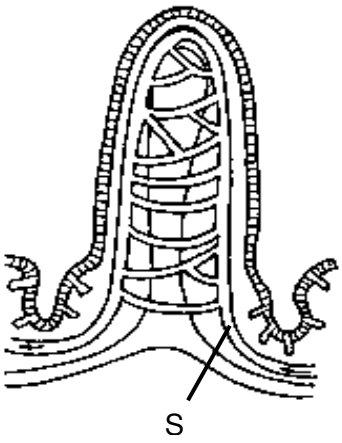


Diagram 11
Rajah 11

Which of these compounds can be found in S?
Sebatian yang manakah boleh dijumpai dalam S?

A Vitamin A
Vitamin A

B Vitamin E
Vitamin E

C Amino Acids
Asid amino

D Droplets of lipids
Titisan lipid

16 Table 1 shows the content of protein, fat and carbohydrate in 10g of rice and fish.
Jadual 1 menunjukkan kandungan protein, lemak dan karbohidrat dalam 10g nasi dan ikan.

Nutrient *Nutrien*	Food *Makanan*	
	Rice *Nasi*	Fish *Ikan*
Protein (g) *Protein (g)*	0.6	1.6
Fat (g) *Lemak (g)*	0.01	0.004
Carbohydrate (g) *Karbohidrat (g)*	8.7	0

Table 1
Jadual 1

What are the main digestive products from this meal?
Apakah hasil pencernaan utama dari hidangan ini?

A Amino acids and glycerol
Asid amino dan gliserol

B Simple sugar and glycerol
Gula ringkas dan gliserol

C Fatty acids and simple sugar
Asid lemak dan gula ringkas

D Amino acid and simple sugar
Asid amino dan gula ringkas

17 Diagram 12 shows a part of the human digestive system.
Rajah 12 menunjukkan sebahagian daripada sistem pencernaan manusia.

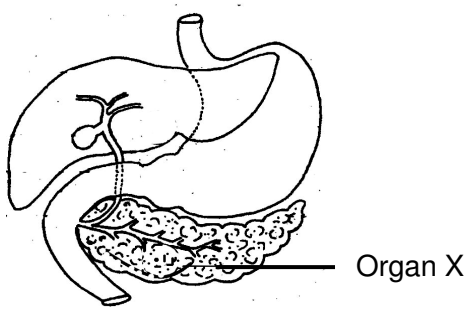


Diagram 12
Rajah 12

Which process is affected when organ X fails to function?
Proses yang manakah akan terjejas apabila organ X gagal berfungsi?

A Digestion of sucrose
Pencernaan sukrosa

B Emulsification of lipids
Pengemulsian lipid

C Secretion of enzyme pepsin
Perembesan enzim pepsin

D Conversion of glycogen to glucose
Penukaran glikogen kepada glukosa

18 Diagram 13 shows the structure of a chloroplast.
Rajah 13 menunjukkan struktur satu kloroplas.

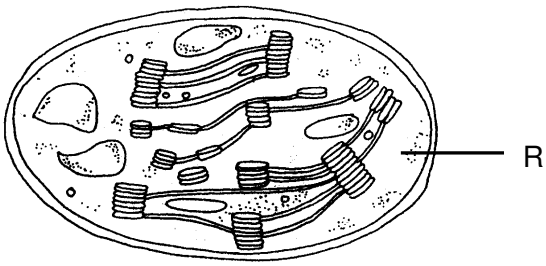


Diagram 13
Rajah 13

Which of the following reactions occurs in R?
Proses yang manakah akan terjejas apabila organ X gagal berfungsi?

A	Carbon dioxide + Hydrogen → Glucose *Karbon dioksida + Hidrogen → Glukosa*
B	Hydrogen ion + Electron → Hydrogen atom *Ion hidrogen + Elektron → Atom hidrogen*
C	Hydroxyl ion → Hydroxyl group + Electron *Ion hidroksil → Kumpulan hidroksil + Elektron*
D	Water molecule → Hydrogen ion + Hydroxyl ion *Molekul air → Ion hidrogen + Ion hidroksil*

19 Which of the following are the products of anaerobic respiration in yeast?
Yang manakah antara berikut merupakan produk respirasi anaerob dalam yis?

A Lactic acid and water
Asid laktik dan air

B Ethanol and carbon dioxide
Etanol dan karbon dioksida

C Glucose and carbon dioxide
Glukosa dan karbon dioksida

D Lactic acid and carbon dioxide
Asid laktik dan karbon dioksida

20 Diagram 14 shows a respiratory structure of an organism.
Rajah 14 menunjukkan struktur respirasi satu organisma

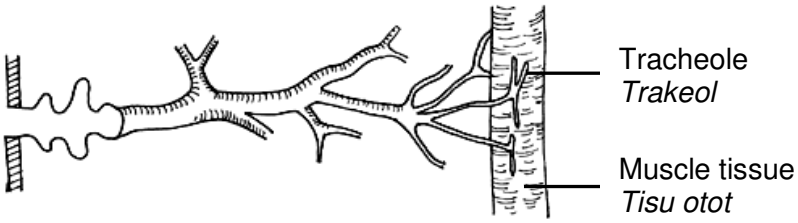


Diagram 14
Rajah 14

Which organism has this respiratory structure?
Organisma yang manakah mempunyai struktur respirasi ini?

A Frog
Katak

B Fish
Ikan

C Lizard
Cicak

D Grasshopper
Belalang

21 Which are correct about aerobic respiration as compared to anaerobic respiration?
Yang manakah betul bagi respirasi aerobik berbanding respirasi anaerobik?

I Occurs in cytoplasm
Berlaku dalam sitoplasma

II Complete oxidation of glucose
Pengoksidaan glukosa lengkap

III High energy released per glucose molecule
Tenaga yang dihasilkan per molekul glukosa tinggi

IV Products of respiration are lactic acids and energy
Hasil respirasi ialah asid laktik dan tenaga

A I and II only
I dan II sahaja

B II and III only
II dan III sahaja

C I and IV only
I dan IV sahaja

D III and IV only
III dan IV sahaja

22 Diagram 15 shows human respiratory system.
Rajah 15 menunjukkan sistem repirasi manusia.

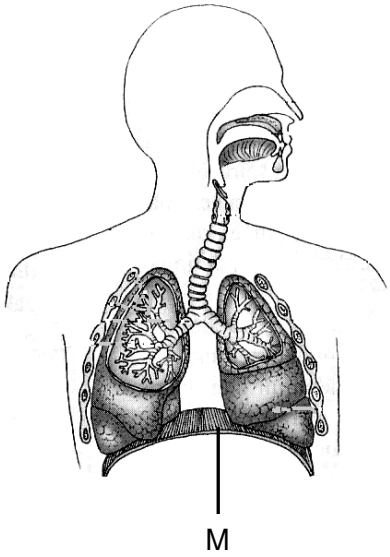


Diagram 15
Rajah 15

Which of the following is the effect when muscle M fails to contract?
Yang manakah antara berikut merupakan kesan apabila otot M gagal mengecut?

A High air pressure in the lungs
Tekanan udara di dalam peparu tinggi

B Large volume of thoracic cavity
Isipadu rongga toraks besar

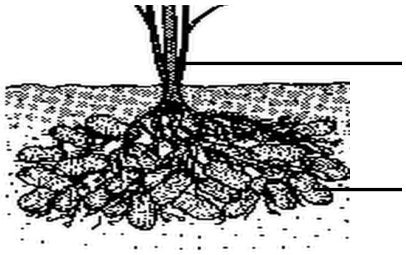
C Internal intercostals muscles contract
Otot interkosta luar mengecut

D Rib cage remains extended upwards and outwards
Sangkar rusuk kekal mengembang ke atas dan ke luar

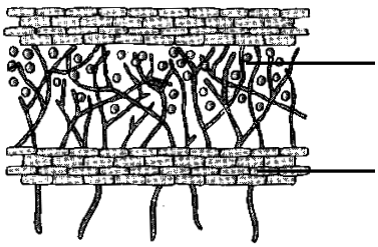
23 Which of the following shows the commensalism relationship?
Yang manakah antara berikut menunjukkan perhubungan komensalisma?

A

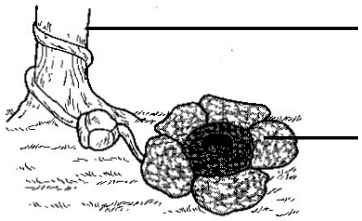
B



C



D



24 Which of the following is the effect of eutrophication in a river?
Yang manakah antara berikut kesan eutrofikasi di sebatang sungai?

A The dissolves oxygen level increases.
Aras oksigen terlarut meningkat.

B The dissolved oxygen level decreases.
Aras oksigen terlarut menurun.

C The dissolved carbon dioxide level decreases.
Aras karbon dioksida terlarut menurun.

D The dissolved carbon dioxide level does not change.
Aras karbon dioksida terlarut tidak berubah.

25 Diagram 16 shows a food web in grassland.
Rajah 16 menunjukkan siratan makanan di padang rumput.

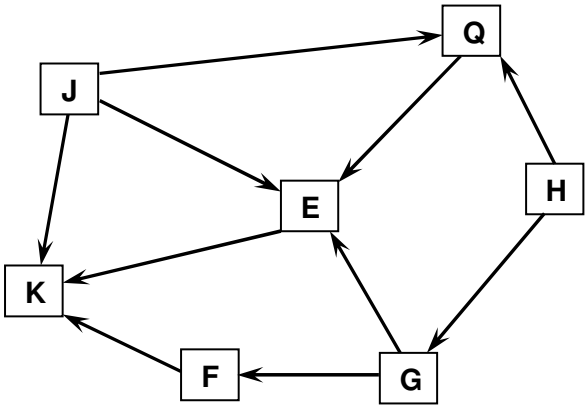


Diagram 16
Rajah 16

Which of the following statements is true about the food web?
Antara pernyataan berikut, yang manakah benar tentang siratan makanan tersebut?

A K is a decomposer
K ialah pengurai

B E is a tertiary consumer
E ialah pengguna tertier

C F may be grasshopper
F mungkin ialah belalang

D Q is a carnivorous animal
Q ialah haiwan karnivor

26 Diagram 17 shows the energy flow in an ecosystem.
Rajah 17 menunjukkan aliran tenaga dalam suatu ekosistem.

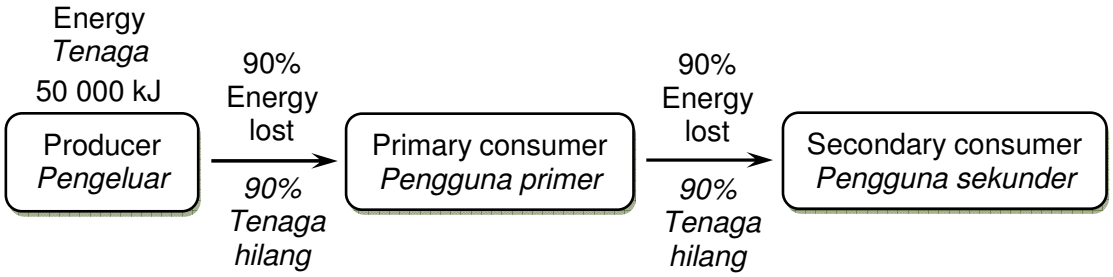


Diagram 17
Rajah 17

What is the amount of energy received by the secondary consumer?
Berapakah jumlah tenaga yang diterima oleh pengguna sekunder?

A 50 kJ

B 500 kJ

C 5 000 kJ

D 50 000 kJ

27 The following information is on the impact of a phenomenon.
Maklumat berikut ialah berkenaan impak satu fenomena.

> Excessive ultraviolet rays cause skin cancer in humans, reducing the rate of photosynthesis in plants and disrupt the food chain.
>
> *Sinar ultraungu berlebihan mengakibatkan kanser kulit pada manusia, merendahkan kadar fotosintesis tumbuhan serta menggangu rantai makanan.*

Which of the following is the phenomenon ?
Yang manakah antara berikut fenomena tersebut?

A Thermal pollution
Pencemaran termal

B Global warming
Kepanasan global

C Greenhouse effect
Kesan rumah hijau

D Thinning of the ozone layer
Penipisan lapisan ozon

28 Diagram 18 shows a step to ensure a balance nature.
Rajah 18 menunjukkan satu langkah memastikan alam semulajadi seimbang.

Diagram 18
Rajah 18

What is the name of this method?
Apakah nama kaedah ini?

A Recycle
Kitar semula

B Replanting
Tanam semula

C Reprocess
Proses semula

D Reduce paper usage
Kurangkan penggunaan kertas

29 In an experiment, a sample of lake water was found to have a high B.O.D. value.
Dalam suatu eksperimen, satu sampel air tasik didapati mempunyai nilai B.O.D yang tinggi.

Which of the following is the conclusion for the experiment?
Yang manakah antara berikut merupakan kesimpulan eksperimen ini?

A Low pollution level of the lake water
Kadar pencemaran air tasik rendah

B Photosynthesis process has occurred rapidly
Proses fotosintesis berlaku dengan pantas

C The lake water has a high oxygen content
Air tasik mempunyai kandungan oksigen yang tinggi

D Abundant of microorganisms are present in the lake water
Terdapat banyak mikroorganisma di dalam air tasik tersebut

30 Diagram 19 shows a human activity.
Rajah 19 menunjukkan satu aktiviti manusia.

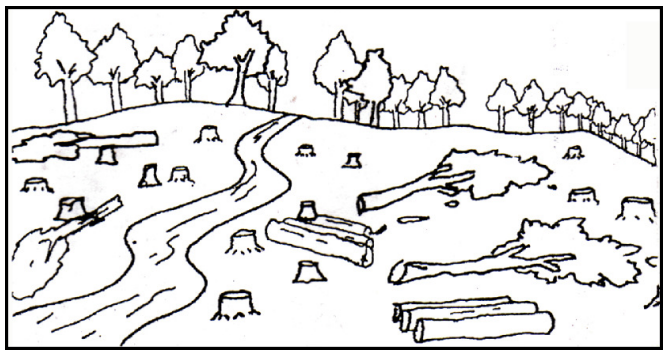


Diagram 19
Rajah 19

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

A Decrease in B.O.D. value
Penurunan nilai B.O.D.

B Increase the habitat of the fauna
Peningkatan habitat untuk fauna

C Decrease the temperature in north pole
Penurunan suhu di kawasan kutub utara

D Increase the carbon dioxide level in the atmosphere
Peningkatan paras karbon dioksida dalam atmosfera

31 Diagram 20 shows a blood circulatory system.
Rajah 20 menunjukkan satu sistem peredaran darah.

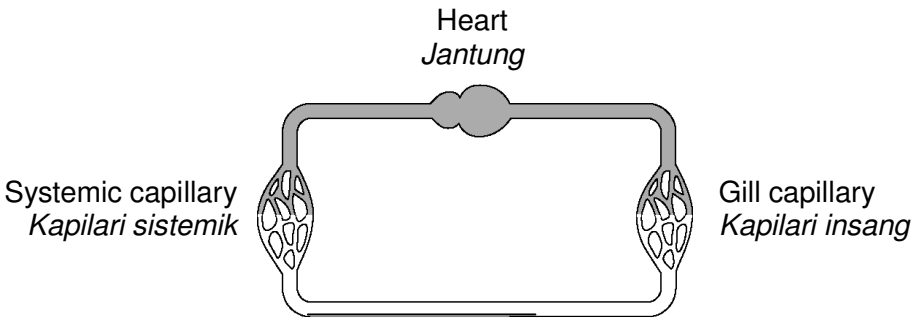


Diagram 20
Rajah 20

What is the type of the blood circulatory system?
Apakah jenis sistem peredaran darah ini?

A Open circulatory system
Sistem peredaran terbuka

B Double circulatory system
Sistem peredaran darah ganda-dua

C Single, closed and complete circulatory system
Sistem peredaran tunggal, tertutup dan lengkap

D Single, closed and incomplete circulatory system
Sistem peredaran tunggal, tertutup dan tak lengkap

32 Diagram 21 shows a type of plant tissue.
Rajah 21 menunjukkan sejenis tisu tumbuhan.

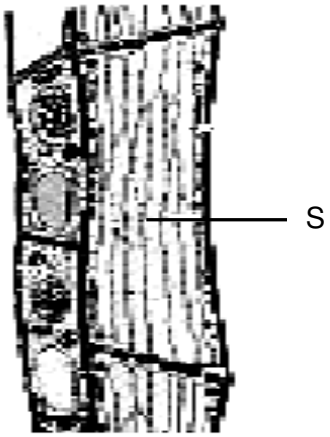


Diagram 21
Rajah 21

What is the importance of S?
Apakah kepentingan S?

A To transport photosynthetic products
Untuk mengangkut hasil fotosintesis

B To transport water and mineral salts
Untuk mengangkut air dan garam mineral

C To give turgidity to the tissue
Untuk memberikan kesegahan kepada tisu tumbuhan

D To give strength and mechanical support
Untuk memberikan kekuatan dan sokongan mekanikal

33 Table 2 shows the characteristics of blood in blood vessel X of human.
Jadual 2 menunjukkan ciri-ciri darah dalam salur darah X pada manusia.

Pressure *Tekanan*	Oxygen concentration *Kepekatan oksigen*	Carbon dioxide concentration *Kepekatan karbon dioksida*
High *Tinggi*	Low *Rendah*	High *Tinggi*

Table 2
Jadual 2

What is blood vessel X?
Apakah salur darah X?

A Aorta
Aorta

B Vena cava
Vena kava

C Pulmonary vein
Vena pulmonari

D Pulmonary artery
Arteri pulmonari

34 Diagram 22 shows capillaries, tissues and vessel X.
Rajah 22 menunjukkan kapilari darah, tisu dan vessel X.

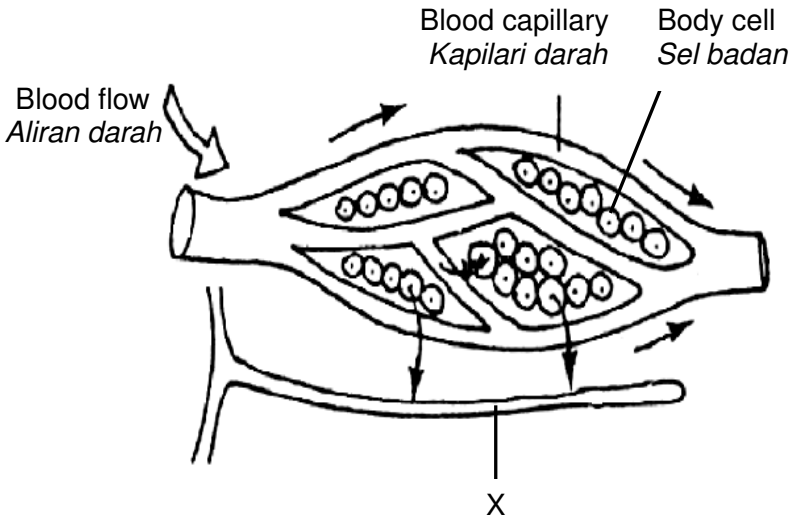


Diagram 22
Rajah 22

What is the fluid that flows into X?
Apakah bendalir yang memasuki X?

A Blood
Darah

B Plasma
Plasma

C Lymph
Bendalir limfa

D Interstitial fluid
Cecair interstis

35 Diagram 23 shows a human vertebra.
Rajah 23 menunjukkan satu tulang vertebra manusia.

Diagram 23
Rajah 23

What is structure Y?
Apakah struktur Y?

A Centrum
Sentrum

B Spinous process
Cuaran spina

C Transverse process
Cuaran melintang

D Transverse foramen
Foramen melintang

36 Diagram 24 shows human elbow joint.
Rajah 24 menunjukkan sendi siku manusia.

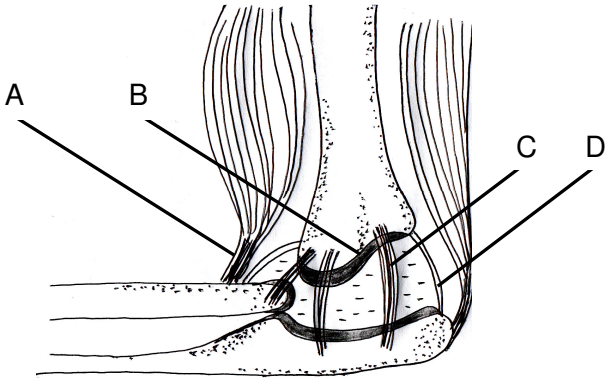


Diagram 24
Rajah 24

Which of the parts labelled **A**, **B**, **C** and **D** absorbs shock during a movement?
*Yang manakah antara bahagian berlabel **A**, **B**, **C** dan **D** menyerap hentakan semasa bergerak?*

37 Diagram 25 shows the flight muscles in a bird.
Rajah 25 menunjukkan otot penerbangan seekor burung.

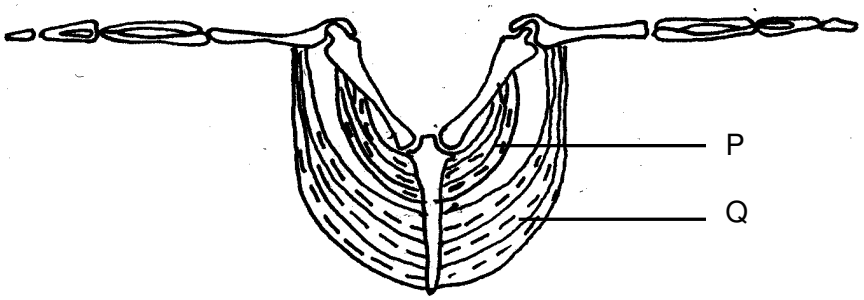


Diagram 25
Rajah 25

What are the actions of muscles P and Q in a downstroke movement of the wings*?*
Apakah tindakan otot-otot P dan Q dalam pergerakan libasan sayap ke bawah?

	P	Q
A	Relax *Relaks*	Relax *Relaks*
B	Relax *Relaks*	Contract *Mengecut*
C	Contract *Mengecut*	Relax *Relaks*
D	Contract *Mengecut*	Contract *Mengecut*

38 Diagram 26 shows the structure of human brain.
Rajah 26 menunjukkan struktur otak manusia.

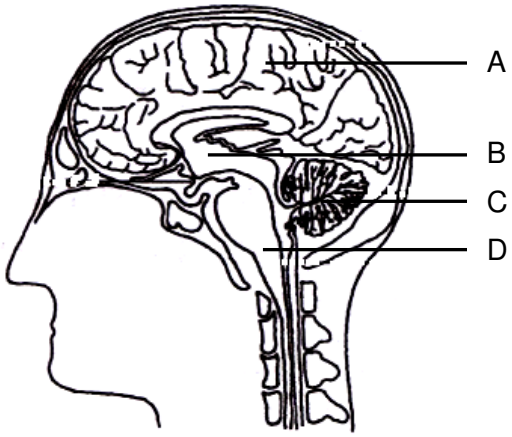


Diagram 26
Rajah 26

Which of the parts labelled **A**, **B**, **C** and **D** functions in controlling body balance?
*Yang manakah antara bahagian berlabel **A**, **B**, **C** dan **D** berfungsi dalam pengawalan keseimbangan badan?*

39 Diagram 27 shows a method producing seedless fruits in flowering plants.
Rajah 27 menunjukkan satu kaedah menghasilkan buah tanpa biji dalam tumbuhan berbunga.

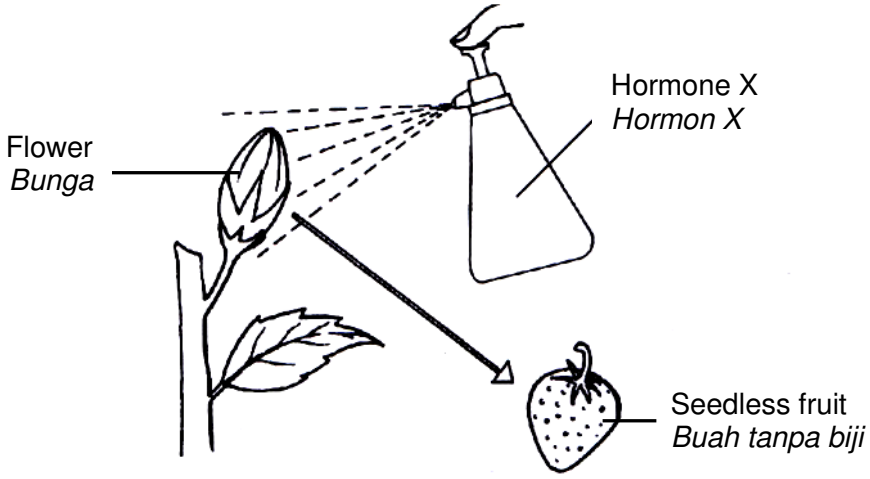


Diagram 27
Rajah 27

What is hormone X?
Apakah hormone X?

A Auxin
Auksin

B Ethylene
Etilena

C Cytokinin
Sitokinin

D Abcicic acid
Asid absisik

40 Diagram 28 shows a reflex arc.
Rajah 28 menunjukkan satu arka refleks.

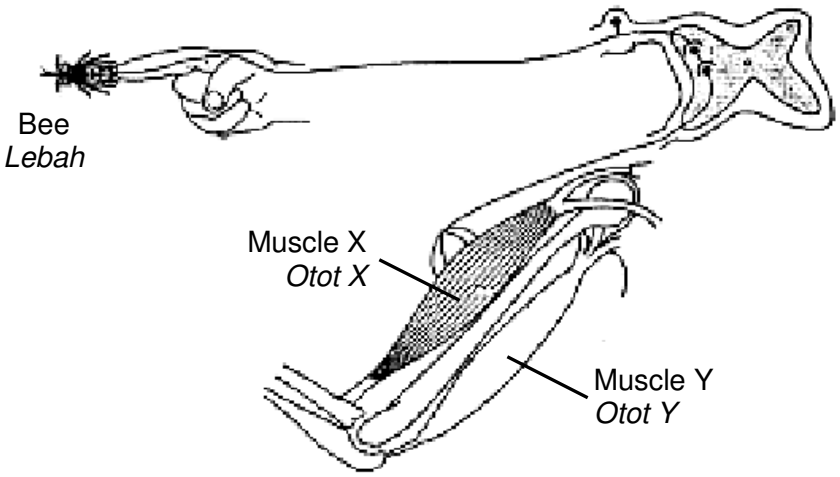


Diagram 28
Rajah 28

Which of the following is true about the reflec arc?
Yang manakah antara berikut benar tentang arka refleks itu?

A The reflex arc involves two types of neurone
Arka reflek ini melibatkan dua jenis neuron

B The coordination centre is medulla oblongata
Pusat kawalan ialah medula oblongata

C Muscle X contracts while muscle Y relaxes
Otot X mengecut manakala otot Y mengendur.

D The pain is felt before the hand is pulled away from the bee
Kesakitan dirasa sebelum tangan ditarik daripada lebah

41 The following information is about a coordination and response.
Maklumat berikut ialah berkenaan satu penyelarasan dan gerak balas.

A boy ran very fast when chased by a fierce dog.
Seorang budak lelaki berlari dengan pantas selepas dikejar oleh seekor anjing.

Which of the following occurs in the boy's body?
Manakah antara berikut berlaku dalam badan budak lelaki tersebut?

A Metabolic rate decreases
Kadar metabolisme menurun

B Rate of digestion increases
Kadar pencernaan meningkat

C Concentration of blood glucose increases
Kepekatan glukosa darah meningkat

D Amount of glucagon secreted decreases
Jumlah glukagon yang dirembeskan menurun

42 Diagram 29 shows the process of spermatogenesis.
Rajah 29 menunjukkan proses spermatogenesis.

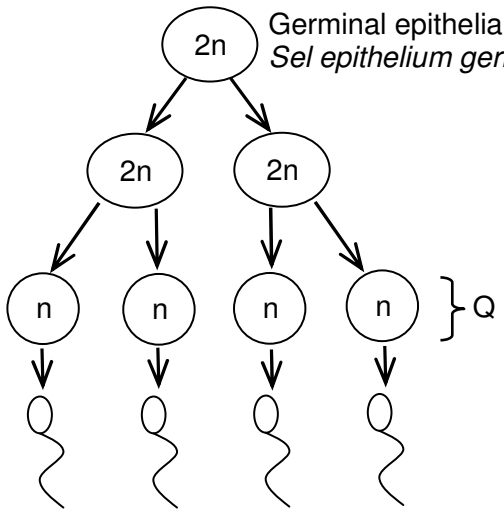


Diagram 29
Rajah 29

What is Q?
Apakah Q?

A Spermatid
Spermatid

B Spermatozoa
Spermatozoa

C Spermatogonium
Spermatogonium

D Primary spermatocyte
Spermatosit primer

43 Which is the characteristic of the cells in the elongation zone of a root tip?
Yang manakah adalah ciri sel-sel di zon pemanjangan pada hujung akar?

A The cells have a big nucleus
Sel-sel mempunyai nukleus yang besar

B The cells have big vacuoles
Sel-sel mempunyai vakuol yang besar

C The cells differentiate into tissues
Sel-sel membeza menjadi tisu

D The cells are small and tightly packed
Sel-sel kecil dan tersusun padat

44 Diagram 30 shows the cross section of a stem of wood.
Rajah 30 menunjukkan keratan rentas batang satu pokok berkayu.

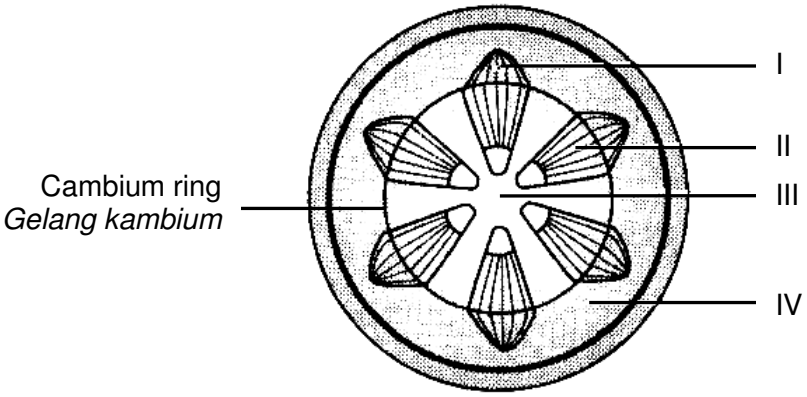


Diagram 30
Rajah 30

Which of the parts labeled I, II, III and IV is the result of secondary growth?
Yang manakah antara bahagian berlabel I, II, III dan IV ialah hasil pertumbuhan sekunder?

A I and II only
I dan II sahaja

B II and IV only
II dan IV sahaja

C III and IV only
III dan IV sahaja

D I, II, and IV
I, II, dan IV

45 Diagram 31 shows the structure of female reproductive organ in a flowering plant.
Rajah 31 menunjukkan struktur organ pembiakan betina satu tumbuhan berbunga.

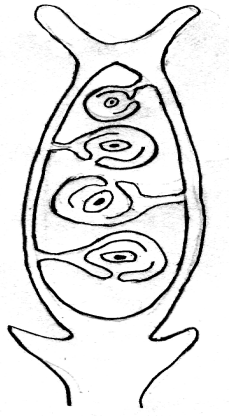


Diagram 31
Rajah 31

How many seeds in the fruit formed by this female organ?
Berapakah bilangan biji di dalam buah yang dihasilkan oleh organ betina ini?

A 1

B 2

C 3

D 4

46 Table 3 shows the information of the blood of a student.
Jadual 3 menunjukkan maklumat tentang darah seorang pelajar.

Type of antigen on the surface of erythrocyte *Jenis antigen di permukaan eritrosit*	A and B *A dan B*
Type of antibodies in plasma *Jenis antibodi dalam plasma*	None *Tiada*

Table 3
Jadual 3

What is the blood group of the student?
Apakah kumpulan darah pelajar ini?

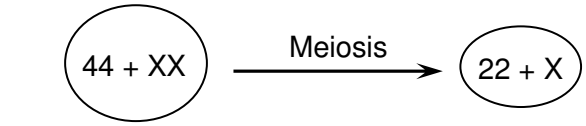
A Group A
Kumpulan A

B Group B
Kumpulan B

C Group AB
Kumpulan AB

D Group O
Kumpulan O

47 Diagram 32 shows the formation of an ovum in human.
Rajah 32 menunjukkan pembentukan satu ovum dalam manusia.



Female somatic cell
Sel soma betina

Ovum

Diagram 32
Rajah 32

Male somatic cell with 44 + XY chromosomes forms two types of sperms, one with sex chromosome X and the other one with sex chromosome Y.
The sperm with sex chromosome Y fertilises an ovum.
What is the combination of chromosomes in the zygote formed?

Sel soma jantan dengan 44 + XY kromosom membentuk dua jenis sperma, satu dengan kromosom seks X dan satu lagi dengan kromosom seks Y.
Sperma dengan kromosom seks Y mensenyawakan satu ovum.
Apakah kombinasi kromosom dalam zygot yang terbentuk?

A 22 + XX

B 22 + XY

C 44 + XX

D 44 + XY

48 The following key is used in illustrating the inheritance of albinism in human.
Petunjuk berikut digunakan dalam menunjukkan pewarisan albinisma pada manusia.

Key:
Petunjuk:

A - Dominant allele for normal skin
Alel dominan untuk kulit nomal

a - Recessive allele for albino
Alel resesif untuk albino

Which cross will produce 50% albino offsprings?
Kacukan yang manakah akan menghasilkan 50% anak albino?

	Male parent *Induk lelaki*	Female Parent *Induk perempuan*
A	Aa	Aa
B	Aa	aa
C	AA	aa
D	aa	aa

49 Which of the following is a continuous variation?
Yang manakah antara berikut merupakan variasi selanjar?

A Skin colour
Warna kulit

B Types of finger print
Jenis cap ibu jari

C Attachment of earlobe
Lekapan cuping telinga

D The position of flower in plants
Kedudukan bunga pada tumbuhan

50 Diagram 33 shows the changes in a chromosome before and after experiencing a mutation.
Rajah 33 menunjukkan perubahan pada satu kromosom sebelum dan selepas mengalami mutasi.

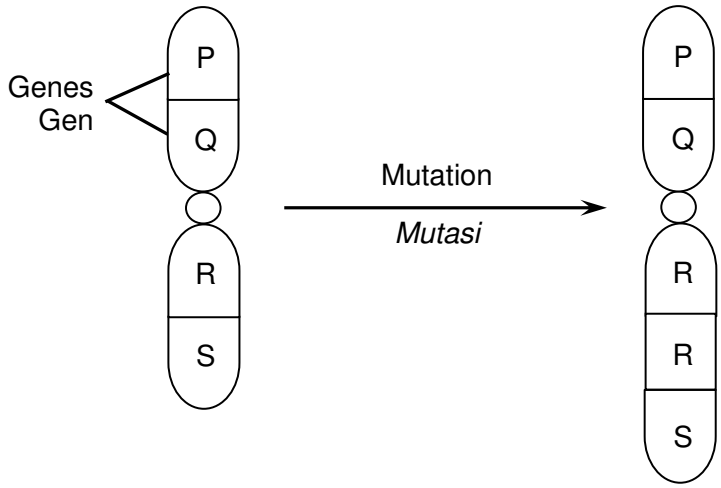


Diagram 33
Rajah 33

Which of the following is about the mutation?
Yang manakah antara berikut mengenai mutasi ini?

	Type of mutation *Jenis mutasi*	Type of change *Jenis perubahan*
A	Gene mutation *Mutasi gen*	Deletion *Pelenyapan*
B	Gene mutation *Mutasi gen*	Duplication *Penggandaan*
C	Chromosomal mutation *Mutasi kromosom*	Deletion *Pelenyapan*
D	Chromosomal mutation *Mutasi kromosom*	Duplication *Penggandaan*

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

4551/2
Biologi
Kertas 2
Ogos
2010
2½ jam

SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2010

BIOLOGI
Kertas 2
2 Jam 30 Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa; iaitu dalam Bahasa Inggeris dan diikuti dalam Bahasa Melayu yang sepadan.
2. Calon dikehendaki membaca maklumat berikut.

INFORMATION FOR CANDIDATES

1. This question paper consists of two sections : **Section A** and **Section B**.
2. Answer all questions in **Section A.** Write your answers for Section A clearly in the spaces provided in the question paper.
3. Answer any two questions from **Section B**. Write your answer for Section B on the lined paper in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
4. Show your working, it may help you to get marks.
5. If you wish to cancel any answer, neatly cross out the answer.
6. The diagrams in the questions are not drawn to scale unless stated.
7. The mark allocated for each question or part of question is shown in brackets.
8. The time suggested to complete Section A is 90 minutes, and Section B is 60 minutes.
9. You may use a non-programmable scientific calculator
10. Hand in this question paper at the end of the examination.

Untuk Kegunaan 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 17 halaman bercetak.

Section A
Bahagian A

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

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

1 Diagram 1 shows the levels of cell organisation in human.
Rajah 1 menunjukkan peringkat organisasi sel pada manusia.

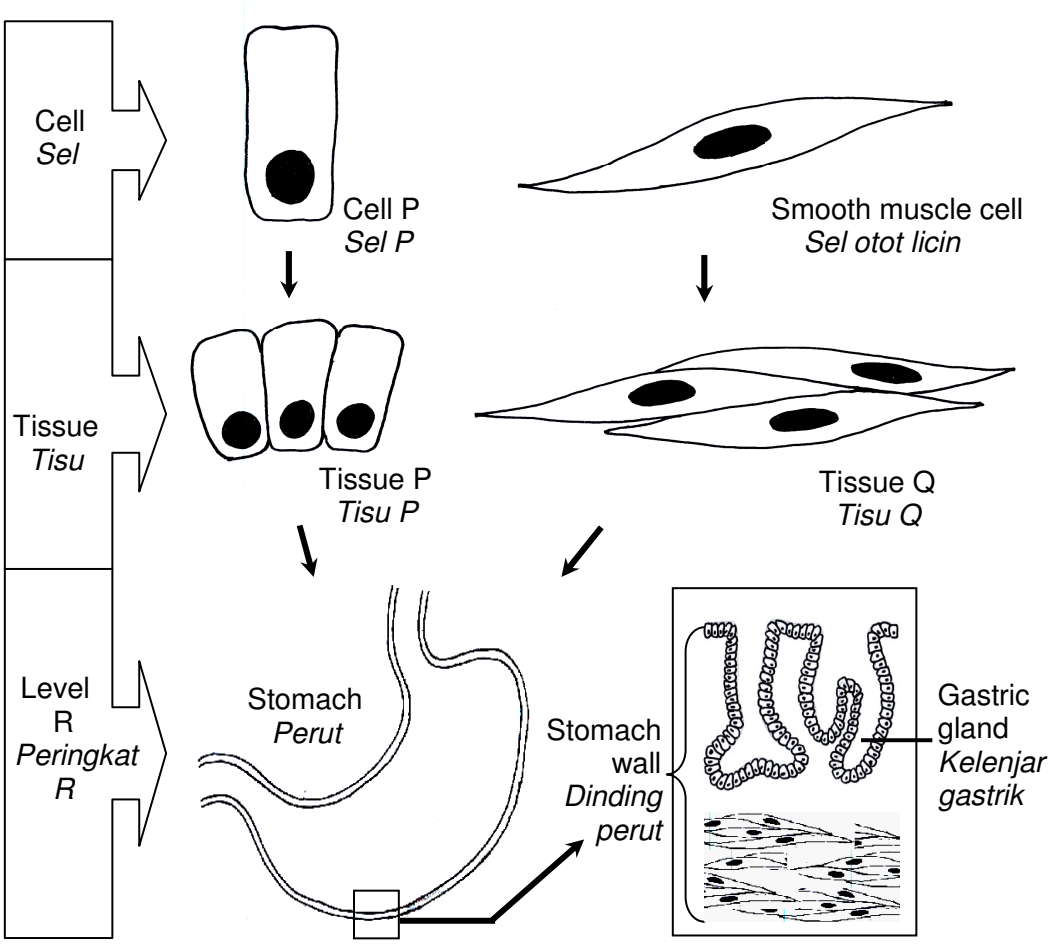


Diagram 1
Rajah 1

1(a)

(a) State what a cell is.
Nyatakan apakah satu sel.

……

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

1(b)

(b) Name Cell P and Tissue Q.
Namakan Sel P dan Tisu Q.

Cel P / *Sel P* : ……

Tissue Q / *Tisu Q* : …… [2 *marks*]
[2 *markah*]

[Lihat halaman sebelah

For Examiner's Use

(c) Based on Diagram 1, explain the organisation and function of Tissue Q and stomach.
Berdasarkan Rajah 1, terangkan organisasi dan fungsi Tisu Q dan perut.

Tissue Q / *Tisu Q* :

……

……

……
[2 *marks*]
[2 *markah*]

1(c) 2

Stomach / *Perut* :

……

……

……
[2 *marks*]
[2 *markah*]

1(c) 2

(d) State the Level P of the cell organisation.
Nyatakan Peringkat P dalam organisasi sel.

Level P / *Peringkat P* : …… [1 *mark*]
[1 *markah*]

1(d) 1

(e) (i) Name the food molecules that are digested in the stomach and the enzyme for this reaction.
Namakan molekul makanan yang dicerna di dalam perut serta enzim bagi tindak balas ini

Food molecules / *Molekul makanan* : .....

Enzyme / *Enzim* : .....
[2 *marks*]
[2 *markah*]

1(e)(i) 2

(ii) Describe how the hydrochloric acid produced by the gastric glands help in the digestion of food molecules in the stomach.
Huraikan bagaimana asid hidroklorik yang dihasilkan oleh kelenjar gaster membantu dalam pencernaan molekul makanan di dalam perut.

……..

……..

……..
[2 *marks*]
[2 *markah*]

1(e)(ii) 2

Total A1 12

2 Diagram 2.1 shows the action of enzyme maltase on substrate P.
Rajah 2.1 menunjukkan tindakan enzim maltase ke atas substrat P.

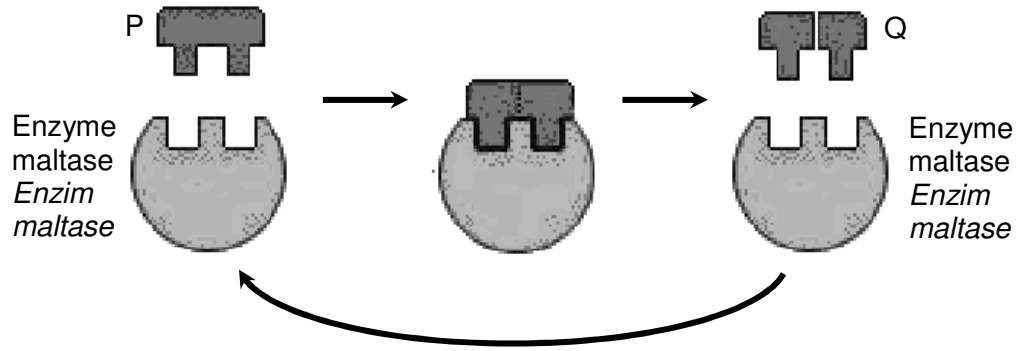


Diagram 2.1
Rajah 2.1

2(a)

(a) Name molecules P and Q.
Namakan molekul P dan Q.

P : …… Q : ……

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

2(b)(i)

(b) (i) The action of enzyme maltase on substrate P is specific. Explain this statement.
Tindakan enzim maltase ke atas substrat P adalah spesifik. Terangkan pernyataan ini.

……

……

……

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

2(b)(ii)

(ii) Based on Diagram 2.1, state two other characteristics of enzyme maltase.
Berdasarkan Rajah 2.1, nyatakan dua ciri enzim maltase yang lain.

1. ……

2. ……

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

For Examiner's Use

(c) When a sliced apple is exposed to air, an enzyme in the apple starts a chemical reaction which cause the apple turning brown.
Diagram 2.2 shows the observation made on a sliced apple before and after a treatment as follows:
Part R: Soaked in an alkali
Part S: Soaked in a distilled water

Apabila sepotong epal didedahkan ke udara, sejenis enzim dalam epal akan memulakan tindak balas kimia yang menyebabkan epal bertukar perang.
Rajah 2.2 menunjukkan pemerhatian yang dibuat ke atas potongan epal sebelum dan selepas satu rawatan seperti berikut:
Bahagian R: Direndam di dalam alkali
Bahagian S: Direndam di dalam air suling

Diagram 2.2
Rajah 2.2

(i) Based on Diagram 2.2, explain your observation.
Berdasarkan Rajah 2.2, terangkan pemerhatian anda.

.....

.....

.....

.....

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

2(c)(i) 3

(ii) Explain another treatment to avoid sliced apples from turning brown.
Terangkan satu rawatan lain untuk mengelakkan potongan epal bertukar perang.

.....

.....

.....

.....

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

2(c)(ii) 3

Total A2 12

3 Diagram 3.1 shows the cross section of leaf of a plant, which lives at a sandy beach facing the sea.

Rajah 3.1 menunjukkan keratan rentas daun sepohon pokok yang tumbuh di pantai berpasir menghala ke laut.

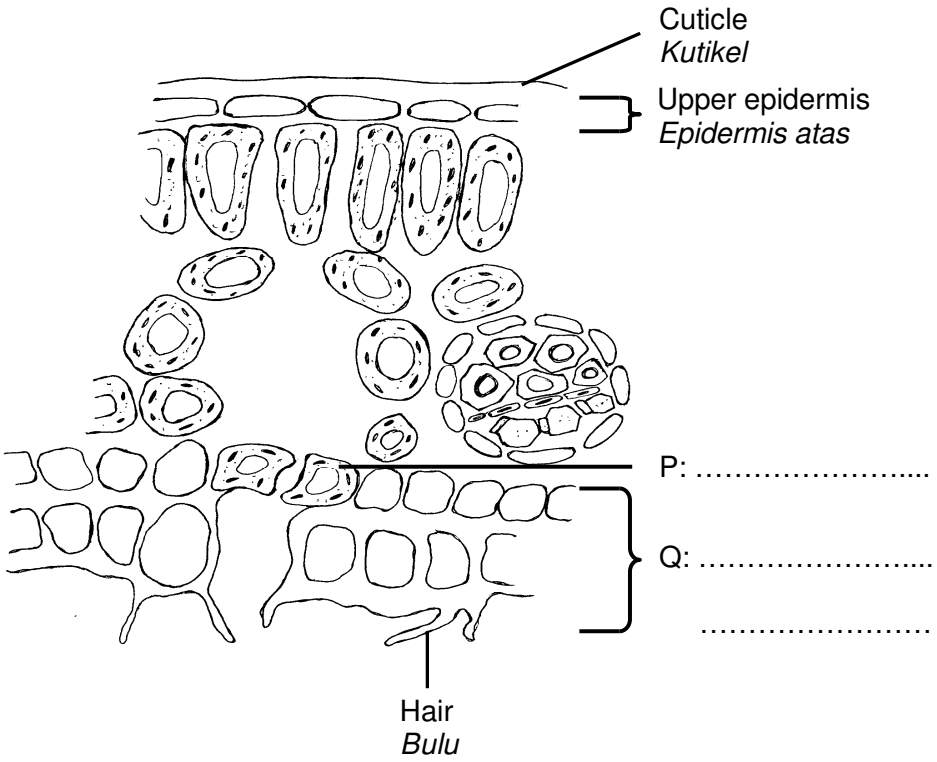


Diagram 3.1
Rajah 3.1

3(a)

(a) Label cell P and layer Q in the spaces provided in Diagram 3.1.
Labelkan sel P dan lapisan Q pada ruangan yang disediakan pada Rajah 3.1.
[2 *marks*]
[2 *markah*]

(b) The petiole of the leaf is immersed in an eosin solution, a red colouring.
Tangkai daun direndam dalam larutan eosin, iaitu satu pewarna merah.

(i) In Diagram 3.1, label the tissue which is coloured red with an arrow and a letter 'R'.
Pada Rajah 3.1, labelkan tisu yang akan diwarnakan merah dengan mengunakan satu anak panah dan huruf 'R'.

(ii) Explain why the tissue is coloured red.
Terangkan mengapa tisu ini diwarnakan merah.

3(b)

……

……
[2 *marks*]
[2 *markah*]

For Examiner's Use

(c) Based on Diagram 3.1, state **two** adaptations on the structure of the leaf in reducing the loss of water efficiently.

*Berdasarkan Rajah 3.1, nyatakan **dua** penyesuaian pada struktur daun dalam mengurangkan kehilangan air dengan cekap.*

1. .....

2. .....

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

3(c) 2

(d) High tide and muddy ground pose a problem for the root to obtain oxygen. Explain how this plant overcomes the problem.

Air pasang dan tanah berlumpur menyukarkan akar memperoleh oksigen. Terangkan bagaiman tumbuhan ini mengatasi masalah tersebut.

.....

.....

.....

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

3(d) 2

(e) Diagram 3.2 shows a cycle of two major processes that occurs in organelles S and T in a plant cell.

Rajah 3.2 menunjukkah kitaran bagi dua proses utama yang berlaku dalam organel S dan T dalam sel tumbuhan.

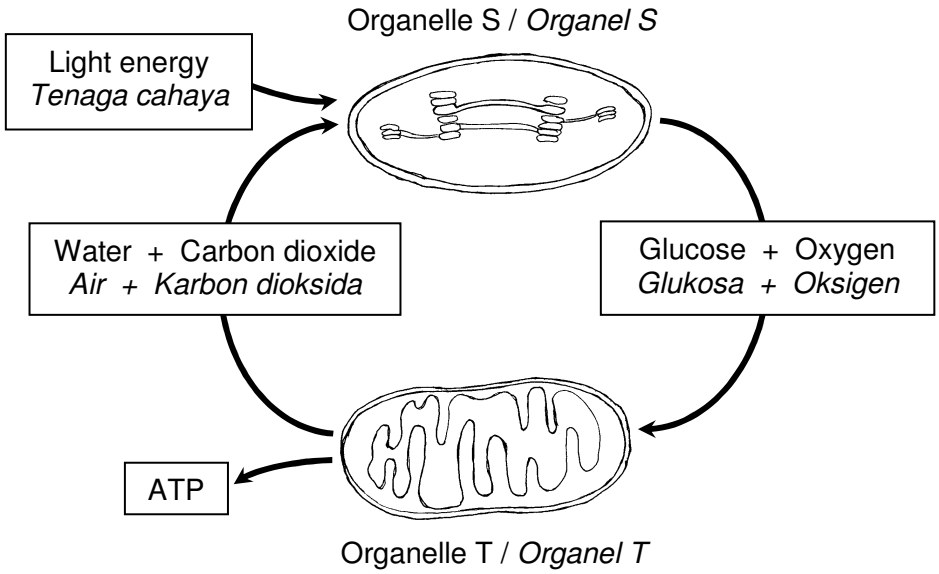


Diagram 3.2
Rajah 3.2

(i) State **two** differences between the processes that occur in organelle S and organelle T.

*Nyatakan **dua** perbezaan antara proses yang berlaku dalam organel S dan organel T.*

1. .....

.....

2. .....

.....

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

3(e)(i) 2

(ii) If the rate of activity in organelle T exceeds that in organelle S for a long period of time, state the effect to the plant and to the environment.

Jika kadar aktiviti dalam organel T melebihi yang berlaku dalam organel S dalam satu jangka masa yang lama, nyatakan kesannya ke atas tumbuhan tersebut dan alam sekitar.

Effect to the plant / *Kesan ke atas tumbuhan* : .....

.....

Effect to the environment / *Kesan ke atas alam sekitar* : .....

.....

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

3(e)(ii) 2

Total A3 12

4 Diagram 4.1 shows the action of node P on human heart.

Rajah 4.1 menunjukkan tindakan nodus P ke atas jantung manusia.

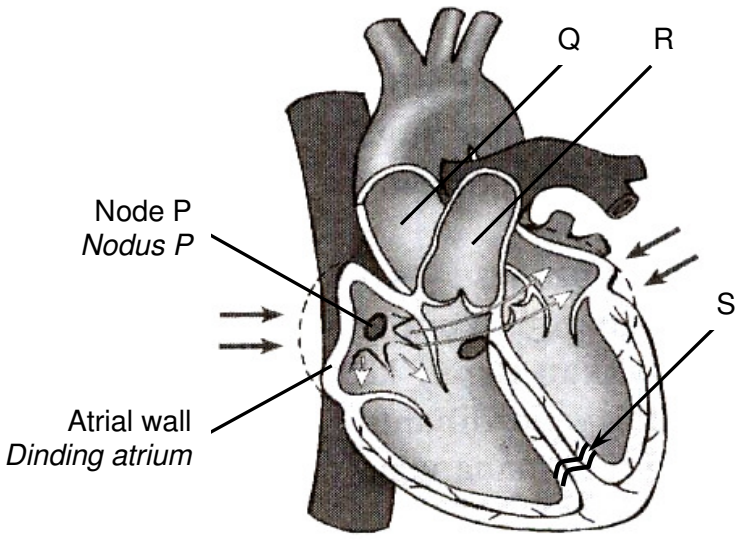


Diagram 4.1
Rajah 4.1

For Examiner's Use

(a) (i) Name node P.
Namakan nodus P.

4(a)(i) 1

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

(ii) Based on Diagram 4.1, explain the function of node P.
Berdasarkan Rajah 4.1, terangkan fungsi nodus P.

.....

.....

.....

.....

4(a)(ii) 3

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

(b) (i) State the direction of blood that flows in blood vessel Q and in blood vessel R.
Nyatakan arah darah yang mengalir dalam salur darah Q dan dalam salur darah R.

4(b)(i) 1

.....

.....

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

(ii) A child with heart problem has a hole in the septum at S.
Explain how the defect affects the blood pressure in blood vessel Q.
Seorang kanak-kanak dengan masalah jantung mempunyai satu lubang pada septum di S.
Terangkan bagaimana kecacatan ini mempengaruhi tekanan darah dalam salur darah Q.

.....

.....

.....

4(b)(ii) 2

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

(c) Diagram 4.2(a) shows a healthy coronary artery.
Diagram 4.2(b) shows the coronary artery of a person with cardiovascular disease. The coronary arteries supply blood to heart muscles.

Rajah 4.2(a) menunjukkan satu arteri koronari yang sihat.
Rajah 4.2(b) menunjukkan arteri koronari seorang pesakit kardiovaskular. Arteri koronari membekalkan darah ke otot-otot jantung.

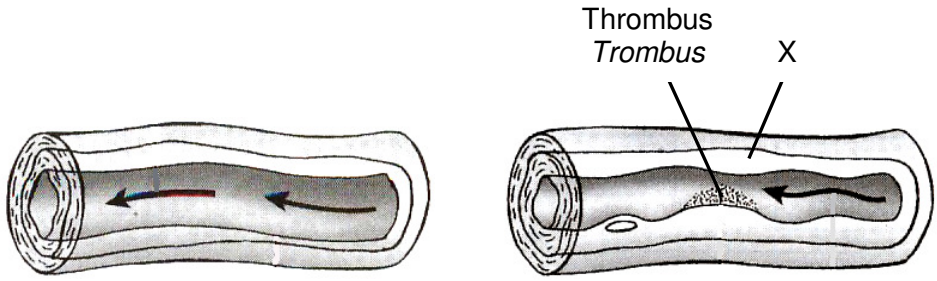


Diagram 4.2(a)
Rajah 4.2(a)

Diagram 4.2(b)
Rajah 4.2(b)

4(c)(i) 1

(i) Name deposit X.
Namakan enapan X.

……..…….. 1 *mark*]
[1 *markah*]

4(c)(ii) 2

(ii) Explain how the deposit X and thrombus lead to cardiovascular disease.
Terangkan bagaimana enapan X dan trombus mengakibatkan penyakit kardiovaskular.

……..……..

……..……..

……..……..
[2 *marks*]
[2 *markah*]

4(c)(iii) 2

(iii) Suggest **two** ways to maintain a healthy heart.
*Cadangkan **dua** cara mengekalkan kesihatan jantung.*

1. .....……..……

……..……..

2. ...……..……..

..……..……
[2 *marks*]
[2 *markah*]

Total A4 12

For Examiner's Use

5 Diagram 5.1 shows the structure of a nephrone in human.
Rajah 5.1 menunjukkan satu struktur nefron pada manusia.

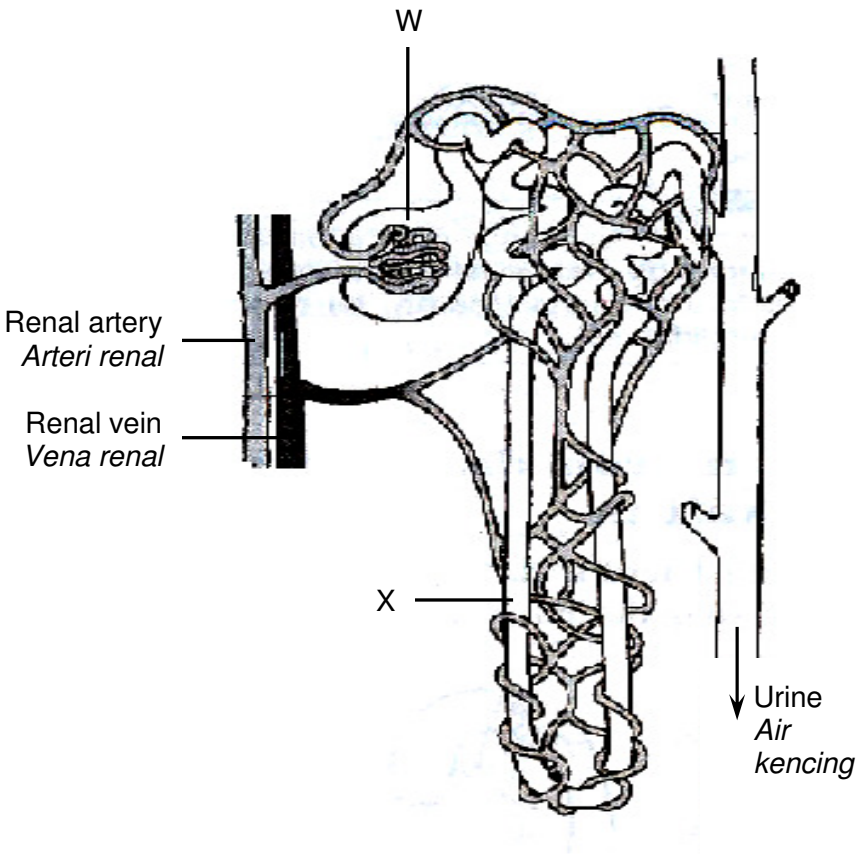


Diagram 5.1
Rajah 5.1

(a) (i) Explain the formation of fluid in W.
Terangkan pembentukan cecair dalam W.

.....

.....

.....

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

5(a)(i) 2

(ii) Explain **one** difference between the content in W and in X.
*Terangkan **satu** perbezaan kandungan dalam W dan X.*

.....

.....

.....

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

5(a)(ii) 2

(b) A person who suffers diabetes insipidus produces a large amount of urine. Explain how this problem is related to the imbalance of hormone in his body.

Seseorang yang menghidapi diabetes insipidus menghasilkan air kencing yang banyak.
Terangkan bagaimana masalah ini berkaitan dengan ketidakseimbangan hormon dalam badannya.

……

……

……

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

5(b) 2

(c) Diagram 5.2 shows a treatment undergone by a patient.
Rajah 5.2 menunjukkan satu rawatan yang dilalui oleh seorang pesakit.

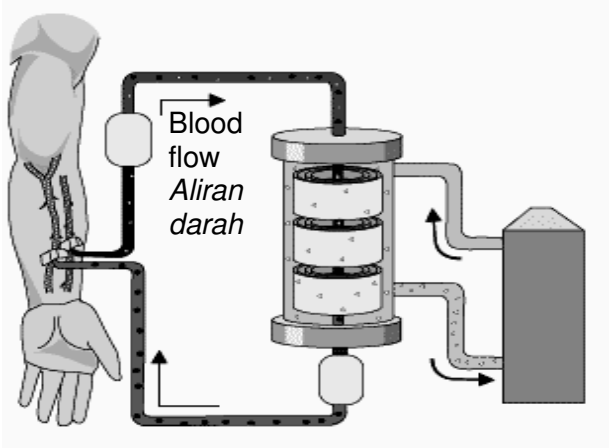


Diagram 5.1
Rajah 5.1

Explain the condition of the patient before undergoing this treatment.
Terangkan keadaan pesakit itu sebelun menjalani rawatan ini.

……

……

……

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

5(c) 3

(d) Explain the importance of kidney in maintaining human health.
Terangkan kepentingan ginjal dalam mengekalkan kesihatan manusia.

……

……

……

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

5(d) 3

Total A5 12

Section B
Bahagian B

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

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

6 (a) Diagram 6.1 shows three processes involved before the food substances taken in are able to be incorporated into the body cells of humans.

Rajah 6.1 menunjukkan tiga proses yang terlibat sebelum bahan makanan yang diambil dapat disepadukan ke dalam sel-sel badan manusia.

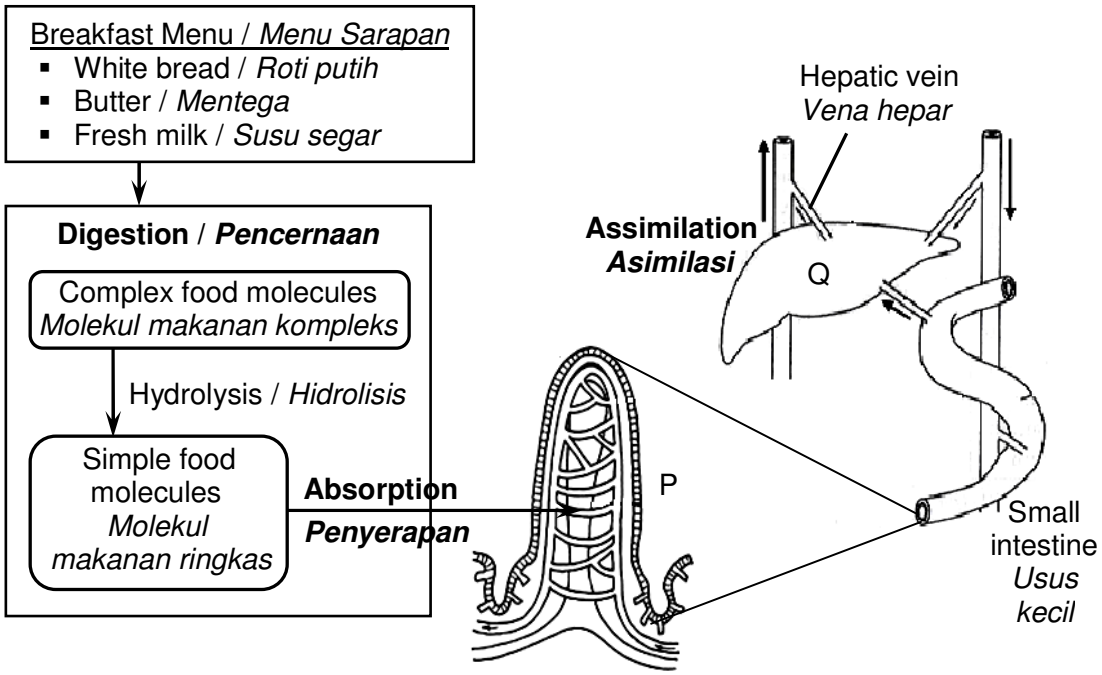


Diagram 6.1
Rajah 6.1

Explain the digestion of butter before it is absorbed by P. [4 *marks*]
Terangkan pencernaan mentega sebelum diserap oleh P. [4 *markah*]

(b) Describe the absorption and assimilation of the food taken in during breakfast. [10 *marks*]

Huraikan proses penyerapan dan asimilasi bahan makanan yang diambil semasa sarapan pagi. [10 *markah*]

(c) About 50% of the small intestine of a man is cut and removed due to cancer.
Explain the effect to the function of structure P and to the amount of stored carbohydrates in his organ Q. [6 *marks*]

Hampir 50% usus kecil seorang lelaki telah dipotong dan dikeluarkan akibat kanser.
Terangkan kesan ke atas fungsi struktur P dan ke atas jumlah karbohidrat simpanan dalam organ Q beliau. [6 *markah*]

[Lihat halaman sebelah

7 (a) Diagram 7.1 shows a body defence mechanism.
Rajah 7.1 menunjukkan satu mekanisme pertahanan badan.

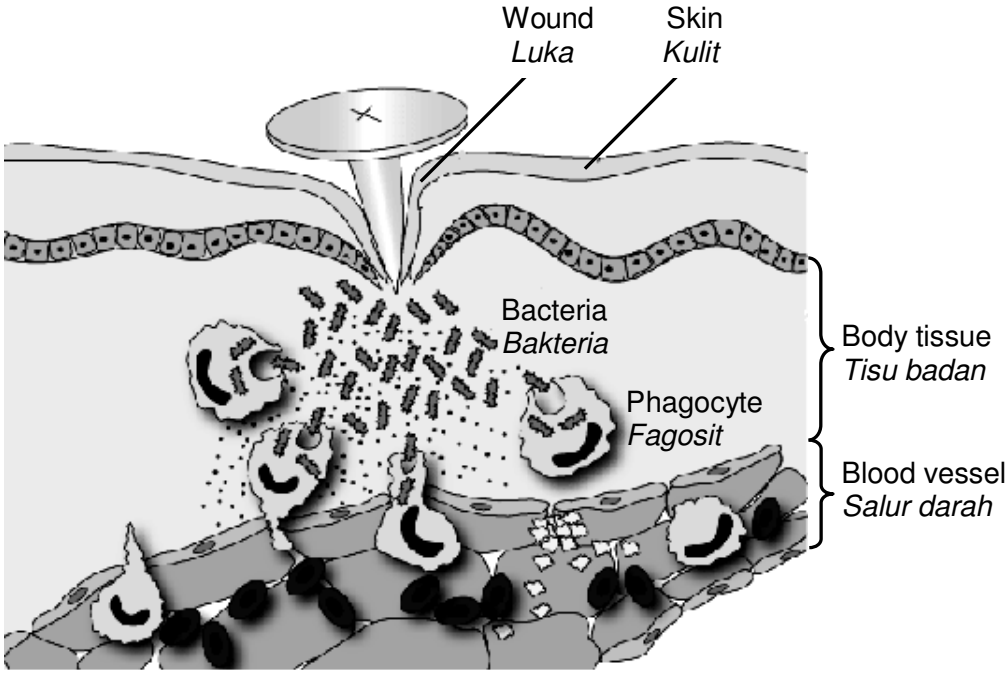


Diagram 7.1
Rajah 7.1

Explain the body's response towards the entry of bacteria into the body.
Terangkan gerak balas badan terhadap kemasukan bakteria ke dalam badan.

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

(b) Microorganisms are very useful in medicinal field. They are widely used in biotechnology in producing substances to fight against diseases.
Explain this statement by using two examples of the application.

Mikroorganisma adalah sangat berguna dalam bidang perubatan. Mikroorganisma digunakan dengan meluas dalam bioteknologi bagi menghasilkan bahan untuk melawan penyakit.
Terangkan pernyataan ini dengan menggunakan dua contoh aplikasi.

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

(c) The graphs in Diagram 7.2 show the concentration of antibodies in the blood of two individuals, X and Y, after given two injections of different substances.

Graf-graf dalam Rajah 7.2 menunjukkan kepekatan antibodi dalam darah bagi dua orang individu, X dan Y, selepas menerima dua suntikan bahan-bahan yang berbeza.

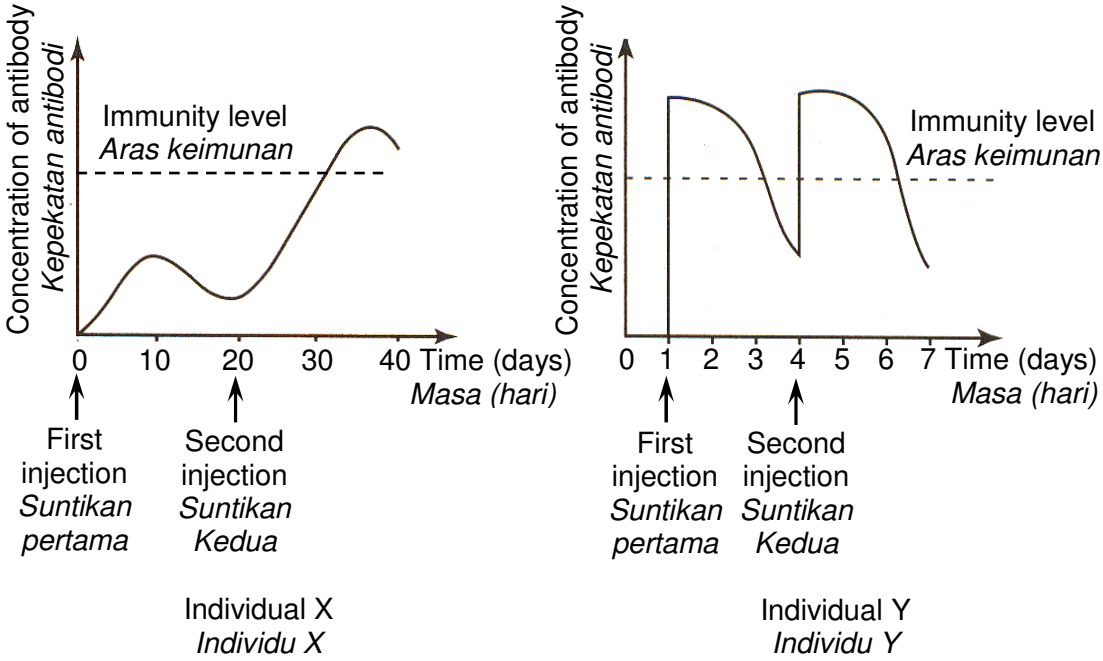


Diagram 7.1
Rajah 7.1

(i) Explain with examples why both individuals are immuned to specific antigens.

Terangkan dengan contoh mengapa kedua-dua individu adalah imun terhadap antigen-antigen tertentu.

[5 *marks*]
[5 *markah*]

(ii) Describe the differences between the immunity obtained by the individuals.

Huraikan perbezaan bagi keimunan yang diperoleh oleh individu-individu itu.

[5 *marks*]
[5 *markah*]

8 (a) Diagram 8 shows the level of four hormones and the sequence of events that occur during a menstrual cycle of a healthy woman.

Rajah 8 menunjukkan aras empat hormon dan turutan peristiwa yang berlaku semasa satu kitar haid seorang wanita yang sihat.

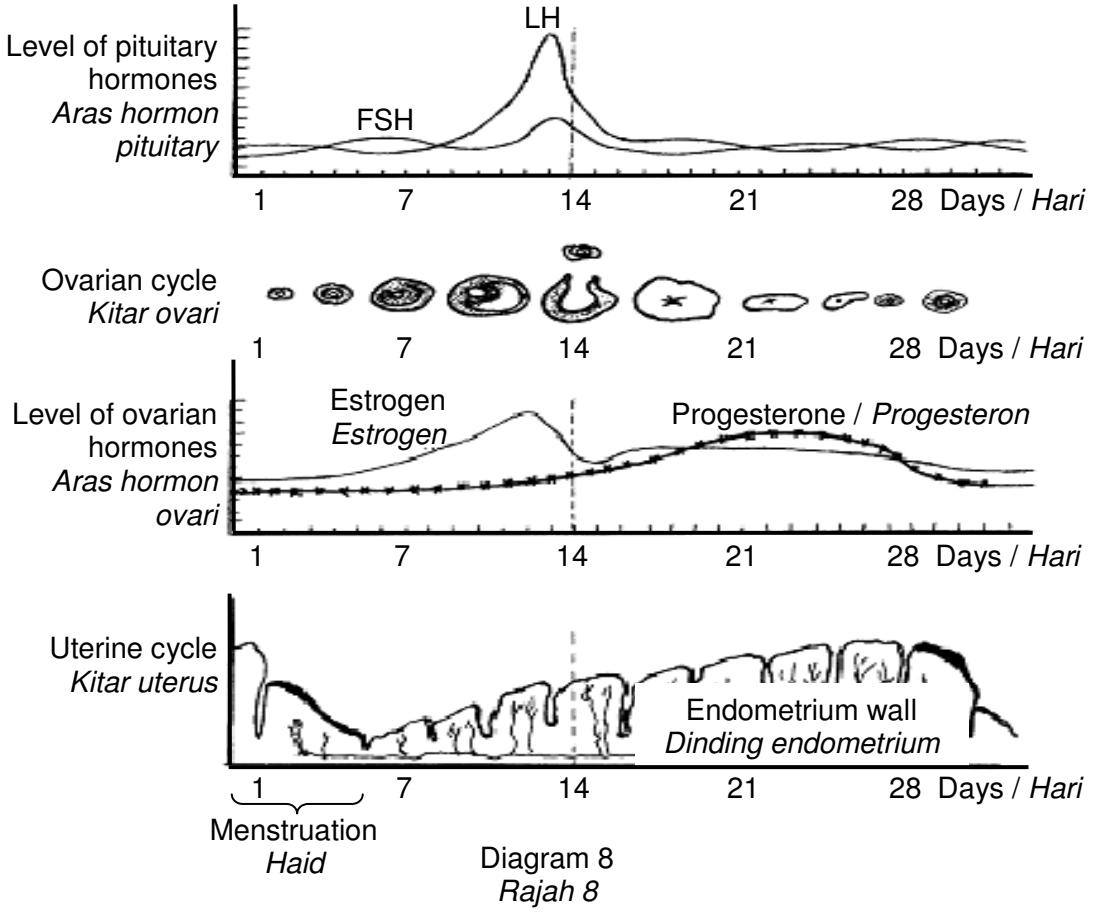


Diagram 8
Rajah 8

Describe how the menstrual cycle is affected if the pituitary hormones peak up seven days later.

Huraikan bagaimana kitar haid ini akan dipengaruhi sekiranya aras hormon pituitari memuncak lewat tujuh hari kemudian.

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

(b)

> "In Malaysia, it is estimated that one baby is abandoned every 10 days in the Klang Valley, and 100 babies abandoned every year nationwide."
>
> The Star Online, September 27, 2008
>
> *"Di Malaysia, dianggarkan seorang bayi dibuang setiap 10 hari di Lembah Klang, dan 100 bayi dibuang setiap tahun di seluruh negara."*
>
> *The Star Atas Talian, September 27, 2008*

Discuss the advantages and the disadvantages in the application of science and technology in human reproduction in handling the issue.

Bincangkan kebaikan dan keburukan aplikasi sains dan teknologi dalam pembiakan manusia dalam menangani isu tersebut.

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

[Lihat halaman sebelah

9 (a) Diagram 9.1 shows a newly developed area.
Rajah 9.1 menunjukkan satu kawasan yang baru dibangunkan.

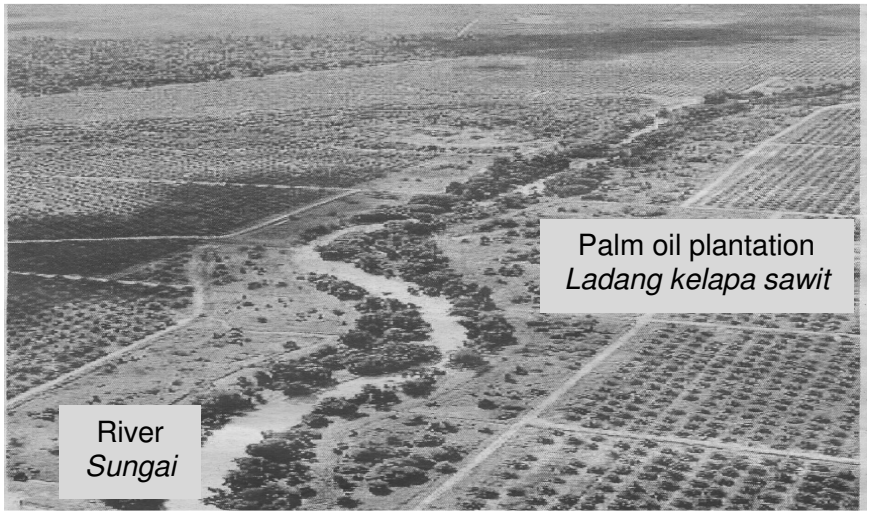


Diagram 9.1
Rajah 9.1

Explain how the human activity affects the river aquatic ecosystem.
Terangkan bagaimana aktiviti manusia ini mempengaruhi ekosistem akuatik sungai.
[10 *marks*]
[10 *markah*]

(b) Diagram 9.2 shows an environmental phenomenon.
Rajah 9.2 menunjukkan satu fenomena alam sekitar.

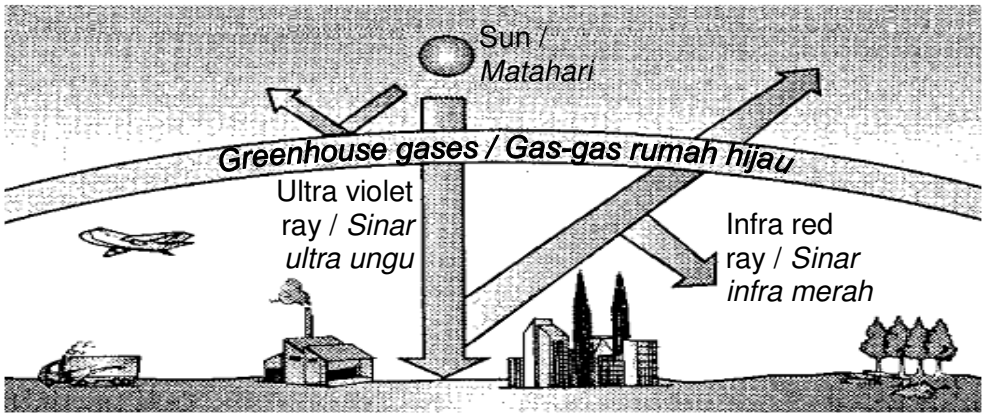


Diagram 9.2
Rajah 9.2

(i) Discuss the good and bad effects in the formation of a layer of greenhouse gases in the atmosphere.
Bincangkan kesan baik dan kesan buruk pembentukan satu lapisan gas-gas rumah hijau di atmosfera.
[5 *marks*]
[5 *markah*]

(ii) Can we save the world from the impact of the phenomenon? Justify your opinion.
Bolehkah kita menyelamatkan dunia daripada impak fenomena ini? Bahaskan pendapat anda.
[5 *marks*]
[5 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Nama ..... Tingkatan **4551/3**

SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2010

BIOLOGI

Kertas 3

1 Jam 30 Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa; iaitu dalam Bahasa Inggeris dan diikuti dalam Bahasa Melayu yang sepadan.
2. Calon dikehendaki membaca maklumat di bawah.

INFORMATION FOR CANDIDATES

1. This question paper consists of two questions. Answer ***all*** the questions.
2. Write your answers for ***Question 1*** in the spaces provided in the question paper
3. Write your answers for ***Question 2*** on the lined pages at the end of the question paper in detail. You may use equations, diagrams, tables, graph and other suitable methods to explain your answer.
4. Show your working, it may help you to get marks.
5. If you wish to cancel any answer, neatly cross out the answer.
6. The diagrams in the questions are not drawn to scale unless stated.
7. Marks allocated for each question or part question are shown in brackets
8. The time suggested to complete ***Question 1*** is 45 minutes and ***Question 2*** is 45 minutes
9. You may use a non-programmable scientific calculator
10. Hand in this question paper at the end of the examination.

Marks awarded:

Score	Description
3	**Excellent:** The best response
2	**Satisfactory:** An average response
1	**Week:** An inaccurate response
0	No response or wrong response

Untuk Kegunaan Pemeriksa		
Soalan	**Markah penuh**	**Markah**
1	33	
2	Respons 15	
	Laporan 2	
JUMLAH		

Kertas soalan ini mengandungi 10 halaman bercetak.

Answer **all** questions.
Jawab **semua** *soalan.*

Question 1
Soalan 1

An experiment was carried out to investigate the effect of different concentrations of sucrose solutions on potato tissues.
Satu eksperimen telah dijalankan untuk mengkaji kesan kepekatan larutan sukrosa yang berbeza ke atas tisu kentang.

The following steps were carried out:
Langkah-langkah berikut telah dijalankan:

Step 1: *Langkah 1:*	Four pieces of potato disc with thickness of 2 mm each were obtained from a potato. The initial diameter of each disc was 1.5 cm. *Empat keping cakera kentang dengan ketebalan 2 mm setiap satu telah diperoleh daripada sebiji kentang.* *Diameter setiap cakera ialah 1.5 cm.*
Step 2: *Langkah 2:*	Each disc was immersed in a petri dish containing different concentration of sucrose solution. *Setiap cakera telah direndam di dalam piring petri yang mengandungi larutan sukrosa yang berbeza-beza kepekatan.*
Step 3: *Langkah 3*:	After 20 minutes, the potato discs were removed and wiped dry with a filter paper. *Selepas 20 minit, cakera kentang telah dikeluarkan dan dilap kering menggunakan kertas turas.*
Step 4: *Langkah 4:*	The final diameter of each potato disc was measured and recorded. *Diameter akhir setiap cakera kentang itu telah diukur dan direkodkan.*

Diagram 1 shows the initial diameter for each potato disc.
Rajah 1 menunjukkan diameter awal bagi setiap cakera kentang.

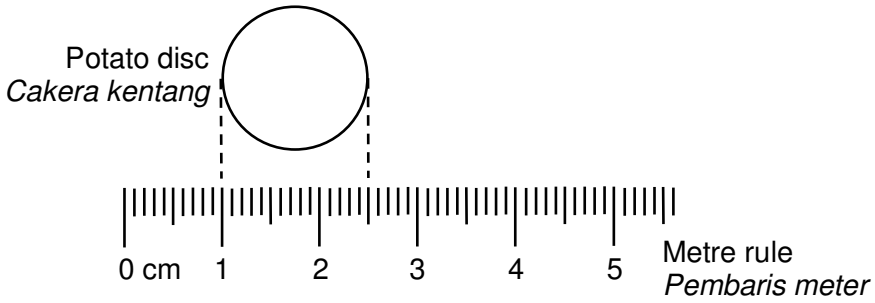


Diagram 1
Rajah 1

Table 1 shows the results of the experiment.
Jadual 1 menunjukkan keputusan eksperimen ini.

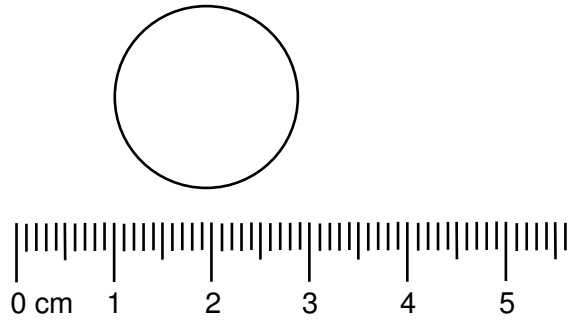
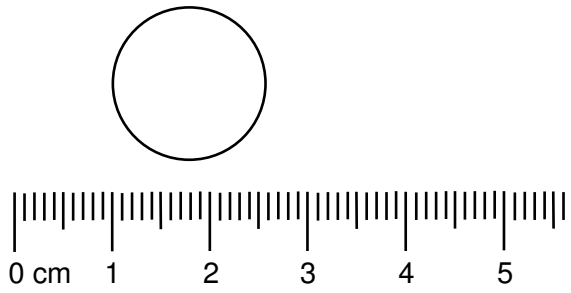
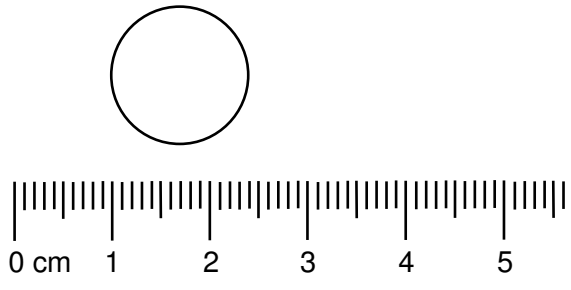
Concentration of sucrose solution, M *Kepekatan larutan sukrosa, M*	Final diameter of potato disc after 20 minutes, cm *Diameter akhir cakera kentang selepas 20 minit, cm*	
0.2		……
0.4		……
0.6		……

Table 1
Jadual 1

For Examiner's Use

(a) Record the final diameter of each potato disc in the spaces provided in Table 1.

Rekodkan diameter akhir setiap cakera kentang di dalam ruangan yang disediakan di dalam Jadual 1.

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

1(a)

(b) (i) State **two** different observations based on Table 1.

Nyatakan dua pemerhatian yang berbeza berdasarkan Jadual 1.

Observation 1:
Pemerhatian 1:

……

……

Observation 2:
Pemerhatian 1:

……

……

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

1(b)(i)

(ii) State the inference which corresponds to each observation in 1(b)(i).

Nyatakan inferens yang sepadan dengan setiap pemerhatian di 1(b)(i).

Inference for observation 1:
Inferens untuk pemerhatian 1:

……

……

Inference for observation 2:
Inferens untuk pemerhatian 2:

……

……

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

1(b)(ii)

(c) Complete Table 2 based on the experiment.
Lengkapkan Jadual 2 berdasarkan eksperimen ini.

For Examiner's Use

Variables *Pemboleh ubah*	Method to handle the variables *Cara mengendali pemboleh ubah*
Manipulated variable *Pemboleh ubah dimanipulasi* …… ……	…… …… ……
Responding variable *Pemboleh ubah bergerak balas* …… ……	…… …… ……
Controlled variable *Pemboleh ubah dimalarkan* …… ……	…… …… ……

Table 2
Jadual 2

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

1(c)

(d) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

……

……

……

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

1(d)

(e) (i) Construct a table and record all the data collected in this experiment.
Your table should have the following titles:

Bina satu jadual dan rekod semua data yang dikumpul dalam eksperimen ini.
Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- Concentration of sucrose solution
  Kepekatan larutan sukrosa
- Initial diameter of the potato disc
  Diameter awal cakera kentang
- Final diameter of potato disc
  Diameter akhir cakera kentang
- Percentage change in diameter of potato disc
  Peratus perubahan diameter cakera kentang

For Examiner's Use

1(e)(i)

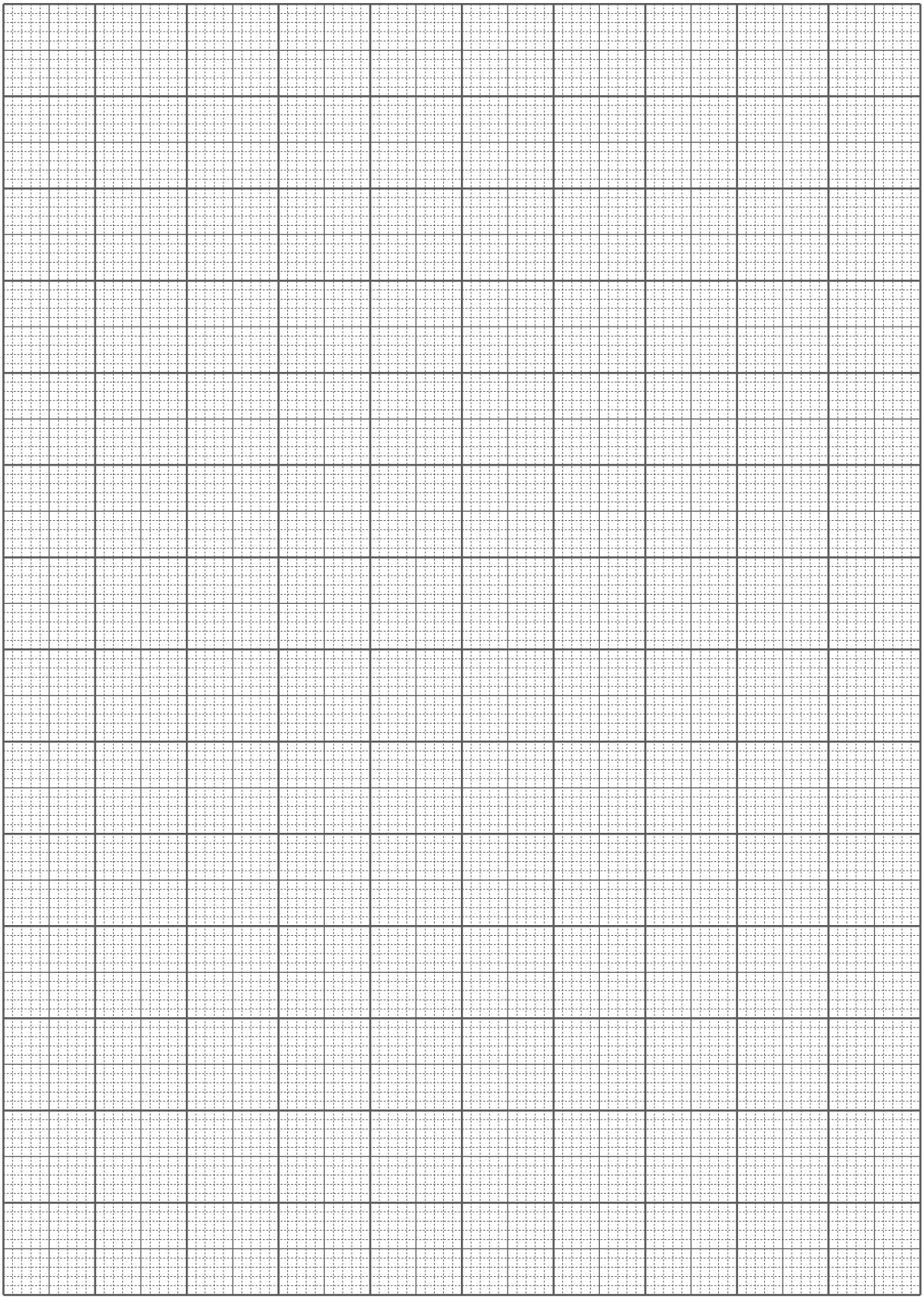
[3 *marks*]
[3 *markah*]

(ii) Use the graph paper provided on page 7 to answer this question.
Using the data in 1(e)(i), draw a graph to show the relationship between the percentage change in diameter of potato disc and the concentration of the sucrose solutions.

Gunakan kertas graf yang disediakan di halaman 7 untuk menjawab soalan ini.
Dengan menggunakan data dalam 1(e)(i), lukiskan graf untuk menunjukkan hubungan antara peratus perubahan diameter cakera kentang dan kepekatan larutan sukrosa.

1(e)(ii)

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



(f) Based on the graph in 1(e)(ii), state the concentration of sucrose solution which is isotonic to the concentration of the cell sap of the potato.
Explain your answer.

Berdasarkan graf dalam 1(e)(ii), nyatakan kepekatan larutan sukrosa yang isotonik kepada kepekatan sap sel kentang tersebut.
Terangkan jawapan anda.

……

……

……

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

For Examiner's Use

1(f)

(g) The experiment is repeated by using another potato disc of the same initial size. The disc is immersed in distilled water for 20 minutes.
Predict the result of this experiment.
Explain your prediction.

Eksperimen ini diulang dengan menggunakan satu cakera kentang lain yang mempunyai saiz awal yang sama. Cakera ini direndam di dalam air suling selama 20 minit.
Ramalkan keputusan eksperimen ini.
Terangkan ramalan anda.

……

……

……

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

1(g)

(h) Based on this experiment, define osmosis.
Berdasarkan eksperimen ini, takrifkan osmosis.

……

……

……

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

1(h)

(i) Another experiment is carried out to study the effect of different concentrations of sucrose solutions on the tissue of spinach strips.
The observation of the experiment is shown in Diagram 2.

Satu lagi eksperimen telah dijalankan untuk mengkaji kesan kepekatan larutan sukrosa yang berlainan terhadap tisu jalur bayam.
Pemerhatian eksperimen ditunjukkan dalam Rajah 2.

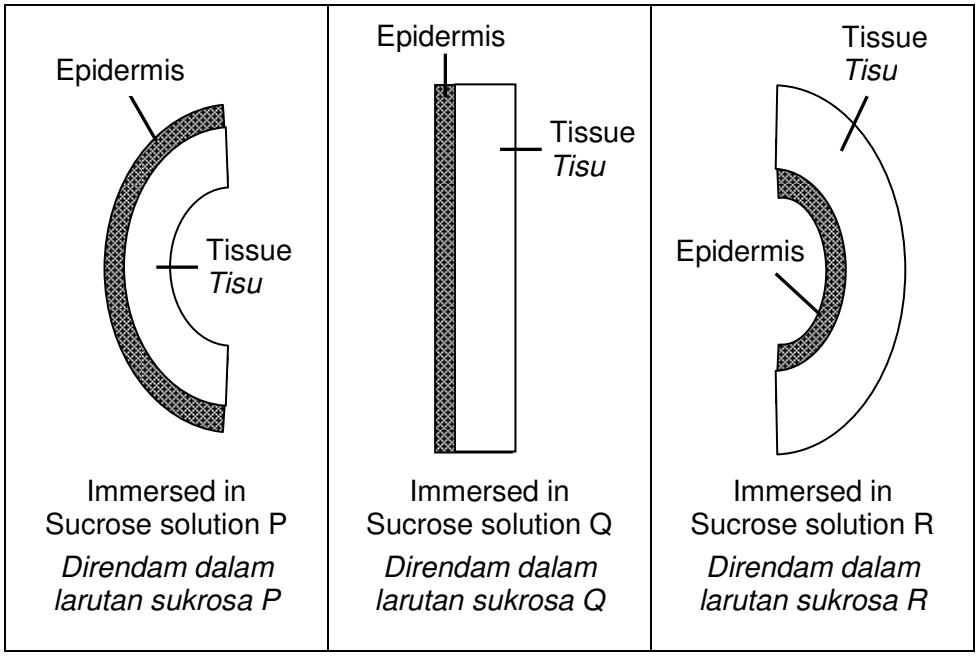


Diagram 2
Rajah 2

Classify the sucrose solutions P, Q and R.
Kelaskan larutan-larutan sukrosa P, Q dan R.

Concentration of sucrose solution, M *Kepekatan larutan sukrosa, M*	Type of solution compared to the concentration of cell sap of spinach *Jenis larutan berbanding dengan kepekatan sap sel bayam*

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

1(i)

Total 1

Question 2
Soalan 2

Transpiration is the loss of water vapour from plants, especially in leaves. Transpiration occurs mostly through the stomata. The amount of water lost by a plant depends on its size, surrounding light intensity, temperature, humidity and wind speed.
Diagram 3 shows the movement of water in a terrestrial plant.

Transpirasi ialah kehilangan wap air dari tumbuhan, terutamanya pada daun. Transpirasi berlaku terutamanya melalui stomata. Jumlah air yang hilang dari tumbuhan bergantung kepada saiz tumbuhan, keamatan cahaya, suhu, kelembapan dan kelajuan angin sekitar.
Rajah 3 menunjukkan pergerakan air dalam satu tumbuhan darat.

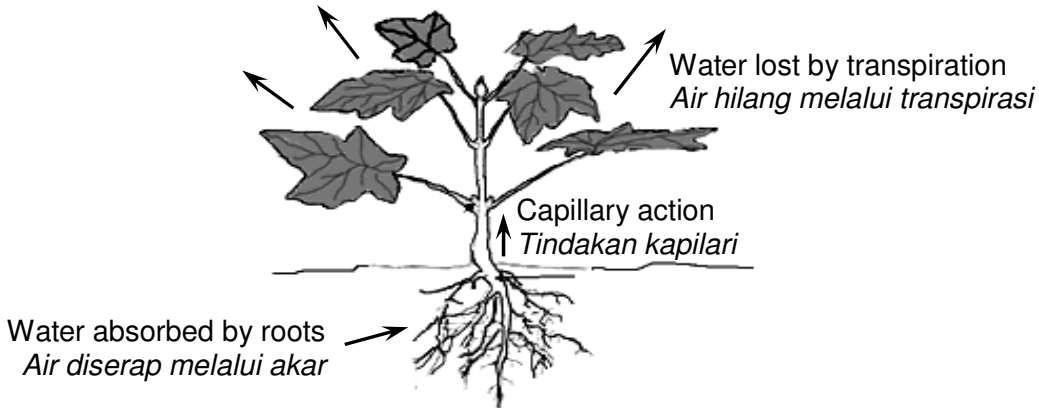


Diagram 3
Rajah 3

Based on the information, design an experiment to be conducted in the laboratory to investigate the effect of the number of leaves on the rate of transpiration in a hibiscus plant.

Berdasarkan maklumat ini, rancang satu ekperimen untuk dilaksanakan di dalam makmal untuk mengkaji kesan bilangan daun ke atas kadar transpirasi satu pokok bunga raya.

The planning of your experiment must include the following aspects:
Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

- Problem statement
  Pernyataan masalah
- Objective of investigation
  Objektif kajian
- Hypothesis
  Hipotesis
- Variables
  Pembolehubah
- List of materials and apparatus
  Senarai bahan dan radas
- Technique used
  Teknik yang digunakan
- Experimental procedures
  Kaedah eksperimen
- Presentation of data
  Persembahan data
- Conclusion
  Kesimpulan

[17 *marks*]
[17 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2010

BIOLOGI
PERATURAN PEMARKAHAN
KERTAS 1, 2 & 3

Peraturan pemarkahan ini adalah

dalam Bahasa Inggeris sahaja.

Peraturan pemarkahan ini mengandungi 24 halaman bercetak.

PAPER 1

No	Answer	No	Answer	No	Answer	No	Answer	No	Answer
1	A	11	D	21	B	31	C	41	C
2	C	12	B	22	A	32	A	42	A
3	B	13	B	23	C	33	D	43	B
4	C	14	B	24	B	34	D	44	A
5	D	15	C	25	A	35	B	45	D
6	B	16	D	26	B	36	B	46	C
7	C	17	D	27	D	37	B	47	D
8	C	18	A	28	A	38	C	48	B
9	B	19	B	29	D	39	A	49	A
10	B	20	D	30	D	40	C	50	D

PAPER 2

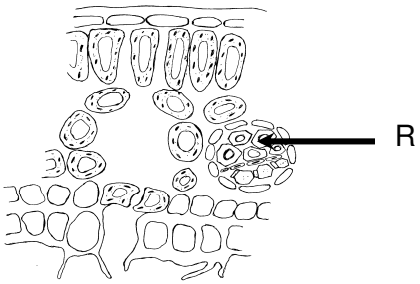
Question 1

No	Criteria	Marks	
(a)	Able to state what a cell is. Sample answer: ▪ The basic unit of life / living organism.	 1	1
(b)	Able to name Cell P and Tissue Q. Answers: ▪ Cell P: Epithelial (cell) ▪ Tissue Q: Smooth muscle (tissue)	 1 1	2
(c)	Able to explain the organisation and function of Tissue Q and stomach based on Diagram 1. Sample answers: Tissue Q: ▪ Made up of (many) smooth muscle cells. ▪ Perform / carry out (specific function) muscle contraction / contraction of stomach wall Stomach: ▪ Made up of (many) tissues Q / epithelial tissues and smooth muscle tissues. ▪ Perform / carry out (specific function) the digestion of food / protein	 1 1 1 1	4
(d)	Able to state the Level P of the cell organisation. Sample answers: ▪ Organ	 1	1
(e) (i)	Able to name the food molecules that are digested in the stomach and the enzyme for this reaction. Sample answers: ▪ Food molecules: proteins ▪ Enzyme: pepsin	 1 1	2
(ii)	Able to describe how the hydrochloric acid produced by the gastric glands help in the digestion of food molecules in the stomach. Sample answers: ▪ Provide acidic medium ▪ For the (optimal) reaction of the enzyme pepsin	 1 1	2
TOTAL			**12**

Question 2

No	Criteria	Marks	
(a)	Able to name molecules P and Q. Answer: ▪ P: maltose ▪ Q: glucose	 1 1	2
(b) (i)	Able to explain the statement; The action of enzyme maltase on substrate P is specific. Sample answers: ▪ Enzyme maltase only acts on (substrate) P // One enzyme only acts on one substrate only. ▪ The active site (of the enzyme) is specific to certain substrate.	 1 1	2
(ii)	Able to state two other characteristics of enzyme maltase. Sample answers: ▪ Enzyme molecule is not destroyed by the reaction. ▪ Enzyme is needed in small quantity ▪ Enzyme can catalyse a reversed reaction. Any 2	 1 1 1 2	2
(c) (i)	Able to explain the observation based on Diagram 2.2. Sample answers: ▪ The apple Part R remains the same but Part S turns brown / black. ▪ Alkali (medium / condition) is not suitable for the enzyme. ▪ Neutral (medium / condition) is suitable for the enzyme. ▪ Enzyme is denatured / destroyed by the alkali // The alkali neutralises / change the charges on the active sites of the enzyme // The enzyme cannot catalyse / start the chemical reaction / oxidation process / no oxidation in Part R. Any 3	 1 1 1 1 3	3
(ii)	Able to explain another treatment to avoid sliced apples from turning brown. Sample answers: ▪ Soak the apple in warm / hot water ▪ Enzymes are destroyed / denatured by heat ▪ No chemical reaction / oxidation process OR ▪ Soak in hydrochloric acid / pineapple juice ▪ Enzymes are destroyed / denatured by low pH ▪ No chemical reaction / oxidation process OR ▪ Coat the sliced apple in sugar / oil ▪ Enzymes are not exposed to air / oxygen ▪ No chemical reaction / oxidation process	 1 1 1 OR 1 1 1 OR 1 1 1	3
TOTAL			**12**

Question 3

No	Criteria	Marks	
(a)	Able to label cell P and layer Q Answer: ▪ P: Guard cell ▪ Q: Lower epidermis	 1 1	2
(b) (i)	Able to label the xylem tissue with an arrow and a letter 'R'. Sample answer:  	 1	1
(ii)	Able to explain why the xylem tissue is coloured red. Sample answer: ▪ (The xylem / tissue) transports water (and dissolved substances)	 1	1
(c)	Able to state **two** adaptations on the structure of the leaf in reduce the loss of water efficiently. Sample answer: ▪ Sunken stoma ▪ Thick lower epidermis / cuticle ▪ Presence of hairs / hairy leaves Any 2	 1 1 1 2	2
(d)	Able to explain how plant overcomes the problem in obtaining oxygen during high tide and in muddy ground. Sample answer: ▪ Root / stem have lenticels // Pneumatophore // Aerial roots ▪ that jutted up / emerged out from the ground / above the water.	 1 1	2
(e) (i)	Able to state two differences between the processes that occur in chloroplast and mitochondrion. Sample answer: ▪ Process in (organelle) S occur in the presence of (sun)light / daytime while in (organelle) T occurs all the time. ▪ Process in (organelle) S is an anabolism / produce glucose while in (organelle) T is a catabolism / break down glucose ▪ Process in (organelle) S is photosynthesis while in (organelle) T is respiration. Any 2	 1 1 1 2	2
(ii)	Able to state the effect of higher activities of organelle T to the plant and environment Sample answer: ▪ To the plant; growth is retarded (not enough food is built new cells) ▪ To the environment; more carbon dioxide is released // more oxygen is taken out of the environment // less oxygen is produced	 1 1	2
TOTAL			**12**

Question 4

No	Criteria	Marks	
(a) (i)	Able to name node P. Answer: ▪ Sinoatrial (node)	 1	1
(ii)	Able to explain the function of node P. Sample answers: ▪ As a pacemaker / controls heartbeats. ▪ It generates / produces impulses / signals / information (to both atria) // It initiates impulses (to the atria). ▪ Causing atria to contract (simultaneously). ▪ Blood is forced into / enters ventricles. Any 3	 1 1 1 1 3	3
(b) (i)	Able to state the direction of blood that flows in blood vessel Q and in blood vessel R. Sample answers: ▪ Q: to all parts of body, and R: to the lungs.	 1	1
(ii)	Able to explain how a hole in the septum affects the blood pressure in blood vessel Q. Sample answers: ▪ (Blood pressure) decreases. ▪ Mixing of blood in ventricles // (Some of the) blood in the left ventricle enters the right ventricle.	 1 1	2
(c) (i)	Able to name deposit X. Answer: ▪ Cholesterols / fats / calcium	 1	1
(ii)	Able to explain how deposit X and thrombus lead to cardiovascular disease. Sample answers: ▪ (Lumen of) arteries are narrowed / blocked. ▪ No / less oxygen / nutrients supplied to the heart (tissues) // No / less energy produced (by respiration). Any 1 ▪ Heart tissues damage / died ▪ Heart stop beating // (Causing) angina / heart attack Any 1	 1 1 1 1 1 1	2
(iii)	Able to suggest **two** ways to maintain a healthy heart. Sample answers: ▪ Taking food low in cholesterols / (saturated) fats // Balance diet. ▪ Practice a healthy lifestyle / (regular) exercise / reduce stress.	 1 1	2
TOTAL			**12**

Question 5

No	Criteria	Marks	
(a) (i)	Able to explain the formation of fluid in Bowman's capsule. Answer: ▪ (By) ultrafiltration ▪ (Due to) high hydrostatic pressure / force ▪ (Some) blood (components) except erythrocyte, platelets and plasma proteins enter W / Bowman's capsule. Any 2	 1 1 1 2	2
(ii)	Able to explain **one** difference between the content in Bowman's capsule and in loop of Henle. Sample answers: ▪ In W more glucose / amino acid / vitamins / minerals / water // In X less ... ▪ Reabsorption occurs at the proximal convoluted tubule.	 1 1	2
(b)	Able to explain diabetes insipidus related to the imbalance of hormone in the body. Sample answers: ▪ Lacking in ADH / antidiuretic hormone. ▪ Less reabsorption of water in the distal convoluted tubule / collecting duct // Distal convoluted tubule / collecting duct less permeable to water.	 1 1	2
(c)	Able to explain why a patient needs to undergo haemodialysis regularly. Sample answers: ▪ Dehydrated / edema / tired / unhealthy. ▪ Blood contains high amount of waste materials / urea / toxics / water / salts. ▪ Blood constituents / osmotic pressure more / less than normal. ▪ (Because both) kidneys are malfunction / damage. Any 3	 1 1 1 1 3	3
(d)	Able to explain the importance of kidney in maintaining human health. Sample answer: ▪ To eliminate waste materials / urea / toxics / excess water / salts from the blood. ▪ Maintaining normal osmotic pressure in the blood / constant internal environment. ▪ Ensure an optimal physical / chemical condition (in the internal environment).	 1 1 1	3
TOTAL			**12**

Question 6

No	Criteria	Marks	
(a)	Able to explain the digestion of butter. Sample answer: ▪ (Butter) contains lipids / fats ▪ Digestion occurs in the duodenum / ileum ▪ The bile salts emulsify the fats / turn into tiny droplets ▪ (Catalyses by enzyme) lipase ▪ By hydrolysis ▪ Fat into fatty acids and glycerol Any 4	 1 1 1 1 1 1 4	4
(b)	Able to describe the absorption and assimilation of the food taken in during breakfast. Sample answers: <u>Absorption</u> ▪ Products of digestion; glucose, amino acids, fatty acids and glycerols. ▪ Glucose and amino acids enters the blood capillaries of villi ▪ Fatty acids and glycerols enters lacteal of villi <u>Assimilation</u> Any two (i) Glucose ▪ Used by cells to produce energy // Cellular respiration ▪ Excess glucose is converted into glycogen ▪ And stored in the liver / muscles ▪ (When liver is saturated with glycogen) glucose is converted into fats. Any 3 (ii) Amino acids ▪ Used to make proteins / enzymes / cell cytoplasm / muscle cells ▪ Used in growth / cell repairs ▪ Excess amino acids converted into urea ▪ And eliminate in the urine ▪ Excess may be converted into fats (iii) Fats Any 4 ▪ Used in building plasma membrane / cell membranes ▪ Excess fats are stored in adipose tissues Any 1	 1 1 1 2 1 1 1 1 3 1 1 1 1 1 4 1 1 1	10
(c)	Able to explain the effect to the function of villi and to the amount of glycogen in the liver when 50% of the ileum is removed.. Sample answer: <u>To the function of villi</u> ▪ Less digested food is absorbed ▪ Because total surface area decrease / less ▪ Less digested food transported ▪ Because less blood capillaries / lacteals <u>To the amount of glycogen in the liver</u> ▪ Less glycogen (stored in the liver) ▪ No excess glucose ▪ Absorbed by villi ▪ Glucose absorbed (by villi) does not meet the body needs Any 6	 1 1 1 1 1 1 1 1 6	6
TOTAL			**20**

Question 7

No	Criteria	Marks	
(a)	Able to explain the body's response towards the entry of bacteria into the body (i.e. the second line of body's defense mechanism). Sample answer: ▪ Pathogens / bacteria succeed in penetrating the skin / first line of defence. 1 ▪ Chemicals / proteins / antigens (produced by the pathogens) 1 ▪ Attract the phagocytes / neutrophils / macrophages / monocytes (to the infected area) 1 ▪ By using pseudopodia 1 ▪ Surround / engulf / kill / destroy the pathogens / bacteria 1 ▪ by lysozymes / lysosomes. 1 ▪ A non-specific immune response. 1 Any 4 4		4
(b)	Able to explain by using examples two applications of useful microorganism in medicinal field. Sample answers: <u>Example 1</u> ▪ The production of insulin. 1 ▪ Insert human gene (which controls the synthesis of insulin) into bacteria 1 ▪ Bacteria are cultured / multiplied 1 ▪ Insulin produced (by bacteria is collected). 1 Any 3 3 <u>Example 2</u> ▪ The production of antiserum. 1 ▪ (Specific) antigens / pathogens are injected into an animal. 1 ▪ The animal produces (specific) antibody 1 ▪ Antiserum is extracted / taken (from the animal's blood). 1 ▪ To stimulate passive immunity (in humans). 1 Any 3 3 <u>Example 3</u> ▪ The production of vaccine. 1 ▪ (A suspension) containing weakened / dead antigens / pathogen. 1 ▪ Injected into human (body / blood) 1 ▪ To stimulate the production of antibody (actively) // to achieve active immunity. 1 Any 3 3 <u>Example 4</u> ▪ The production of antibiotics. 1 ▪ Chemicals produced by microorganisms / *Penicilium notatum* / *Streptomyces* to kill other microorganisms / bacteria. 1 ▪ Example: penicillin / streptomycin. 1 ▪ Penicillin is used to treat gonorrhea / syphilis / lung infection. 1 ▪ Streptomycin is used to treat tuberculosis / TB. 1 Any 3 3 Any 2 examples 6		6

(c) (i)	Able to explain why both individuals are immuned to specific diseases. Sample answer: ▪ Individual X is immune to (a disease such as) tuberculosis / TB / chicken pox / poliomyelitis / polio. ▪ Individual Y is immune to (a disease / toxin such as) tetanus / snake venom. ▪ Both involved in the increase in the level / concentration of antibodies (in the blood / body), ▪ Above the immunity level. ▪ The antibodies attack / neutralise specific antigens / pathogens in the body // The active sites on the antibodies are specific to certain antigens. ▪ Produce specific (immune) response. Any 5	1 1 1 1 1 1 5	5
(ii)	Able to describe the differences between the immunity obtained by both individuals. Sample answer: ▪ X - Active immunity Y - Passive immunity ▪ X - Immunity achieved through the injection of a <u>vaccine</u>, Y - Immunity achieved through the injection of an <u>antiserum</u> / serum which contains a specific antibody. ▪ X - Does not result in an immediate immunity (against a disease), Y - result in an immediate immunity (against a disease). ▪ X - Lymphocytes (in the body will be activated to) produce antibody, Y - Antibody is received from the injections. ▪ X - The immunity usually last for a long time, Y - The immunity lasts only for a short term / and offers temporary protection. ▪ X - Second injection (booster) is necessary to increase the antibody production (to a level that protects the person against the disease), Y - Second injection is given when (the person still infected and) his antibodies has dropped below immunity level, (therefore he needs antiserum injection against the disease). Any 5 differences	1 1 1 1 1 5	5
TOTAL			**20**

Question 8

No	Criteria	Marks	
(a)	Able to describe how the menstrual cycle is affected if the pituitary hormones peak up seven days later. Sample answer: ▪ F1 - Menstruation / menses will occur a week later (than usual) // on the 7th day of the following cycle / month. ▪ E1 - FSH peaks up on day-20 / a week later / just before day-21. ▪ E2 - LH peaks up on day 20 / a week later / just before day-21. ▪ F2 - ovulation only occur a week later / day-21 ▪ E3 - due to stimulation / from a rise of LH ▪ F3 - level of estrogen remains high until day-21 because ▪ E4 - graafian follicle that release estrogen remains intact / due to no LH ▪ F4 - corpus luteum will only be formed on day-21 / a week later ▪ E5 - this causes level of progesterone to increase after day 21 and remains high ▪ E6 - as level of progesterone high, the lining of uterine wall / endometrium will remains thick longer ▪ E7 - when corpus luteum degenerate, level of progesterone drops ▪ E8 - this causes the lining of endometrium to disintegrate causing menses which occurs a week later than usual Any 10	 1 1 1 1 1 1 1 1 1 1 1 1 1 10	10
(b)	Able to discuss the advantages and the disadvantages in the application of science and technology in human reproduction in handling the issue. Sample answers: <u>Advantages</u>: ▪ F1 - Sterilise method; vasectomy / by cutting the vas deferens in testes ▪ E1 - to prevent the sperms from going to prostate glands// ejaculation does not contain sperms ▪ F2 - use of (male) condoms ▪ E2 - prevent / reduce chances of sperms from going into cervix / uterus ▪ F3 - Use female diaphragm that covers the cervix // Use of female condom which is fitted inside vagina ▪ E3 - Block entrance of sperms into the uterus // Prevent entrance of sperms into uterus // sexually transmitted disease ▪ F4 - Contraceptive pills // Contraceptive implant// Depo-vera injection ▪ E4 - prevent development of follicle // inhibit ovulation // difficulties in implantation of zygote ▪ F5- Morning after pill ▪ E5- Prevent fertilization/ ▪ F6- Sterilization by cutting and tying the fallopian tube ▪ E6- Prevent the egg travelling along the fallopian tube / sperms reaching the ovum. Any 8	 1 1 1 1 1 1 1 1 1 1 1 1 1 8	10

	Disadvantages: ▪ B1 - Sterilising method cause permanent disabilities to produce sperm / ovum hence the person is not able to produce off springs anymore ▪ B2 – Condoms; sometimes sperms can still penetrate therefore chances of getting pregnant is still there ▪ B3 - Pills are unreliable because they have to be taken consistently ▪ B4 - All these methods will cause teenages / unmarried adults to increase their sexual activities (because they are not afraid to get pregnant thus increasing the moral issues in the societies). Any 2	1 1 1 1 2	
TOTAL			**20**

Question 9

No	Criteria	Marks	
(a)	Able to explain how the human activity affects the river aquatic ecosystem. Sample answer: ▪ Water pollution ▪ Caused by abundant supply of fertilisers (that are discharged from the plantation into the river). ▪ Fertilisers contain high concentration of nitrates and phosphates ▪ Encourage eutrophication. ▪ They promote the rapid growth of algae // As a result, the population of algae increases. ▪ The surface of river is covered up by the algae (which grow extensively). ▪ The plants in the lower depths of the water cannot obtain sunlight. ▪ Hence, the plants die (when they are unable to carry out photosynthesis). ▪ The number of aerobic bacteria / decompose the dead plants also increases. ▪ They use more of the oxygen (in the water) during the decomposition. ▪ This reduces the concentration of oxygen in the water ▪ Causes the death of more aquatic organisms. ▪ The biochemical oxygen demand (BOD) increases (as a result of the rapid growth of the algae and the process of decomposition of the bacteria). Any 10	 1 1 1 1 1 1 1 1 1 1 1 1 1 1 10	10
(b) (i)	Able to discuss the good and bad effects in the formation of a layer of greenhouse gases in the atmosphere. Sample answer: Good effect: ▪ Trap heat / provide temperature suitable to sustain life on earth. Bad effects: ▪ Increase global temperature // Greenhouse effect. ▪ Reduce agricultural productivity // Rate of photosynthesis. ▪ Change in global climate // Draught // Hurricane.	 1 1 1 1	5

	▪ Melting of ice caps in the artic. ▪ Rise in sea level // Big flooding // Sea water entering agricultural area. ▪ Death of plants / animals / humans // Reduce biodiversity. 1 good effect + 4 bad effects	1 1 1 5	
(b) (ii)	Able to discuss the good and bad effects in the formation of a layer of greenhouse gases in the atmosphere. Sample answer: ▪ Opinion: Yes <u>Suggestion</u>: ▪ F1: Avoid cutting down tress/ deforestration ▪ E1 : Plants absorb CO2 in the atmosphere ▪ F2 : Replanting ▪ E2 : To absorb CO2 by plants ▪ F3 : Avoid open burning ▪ E3 : To avoid the release of CO2 into the atmosphere ▪ F4: Use public transport/LRT ▪ E4 : Less vehicles producing CO2 ▪ F5 : Use alternative energy from natural source (such as solar, wind, water flow) ▪ E5 : To decrease the release of CO2 by using fossil fuels as the energy source. Opinion + Any 2 pairs of F and E	 1 1 1 1 1 1 1 1 1 1 1 5	5
TOTAL			**20**

PAPER 3

Question 1

1 (a) [KB0603 - Measuring Using Number]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to record all the final diameter of the potato discs in the spaces provided accurately.

Sample answers:
<table>
<tr><td>Concentration of sucrose solution, M</td><td>0.2</td><td>0.4</td><td>0.6</td></tr>
<tr><td>Final diameter of potato disc, cm</td><td>1.85 / 1.9 / 1.95</td><td>1.55 / 1.6 / 1.65</td><td>1.35 / 1.4 / 1.45</td></tr>
</table></td></tr>
<tr><td>2</td><td>Able to record any 2 readings accurately.</td></tr>
<tr><td>1</td><td>Able to record any 1 readings accurately.</td></tr>
</table>

1 (b) (i) [KB0601 - Observation]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to state any two observations correctly according to the criteria:
▪ Concentration of sucrose solution
▪ Final diameter of potato disc

Sample answers:
<u>Horizontal observations</u>
1. In 0.2M / 0. 4M / 0.6M of sucrose solution, the final diameter of potato disc is 1.90 cm / 1.60 cm / 1.40 cm.
<u>Vertical observations</u>
2. The final diameter of potato disc in 0.2M / 0.4M of sucrose solution is bigger than in 0.6M (of sucrose solution) // Inversely.</td></tr>
<tr><td>2</td><td>Able to state one correct observation and one inaccurate observation.
OR Able to state any two inaccurate observations.

Sample answers:
<u>Inaccurate horizontal observations</u>
1. In 0.2M / 0.4M of sucrose solution, the final diameter of potato disc increases.
2. In 0.6M of sucrose solution, the final diameter of potato disc decreases.
<u>Inaccurate vertical observations</u>
3. The final diameter of potato disc in 0.2M / 0.4M of sucrose solution is bigger.
4. The final diameter of potato disc in 0.6M of sucrose solution is smaller.</td></tr>
<tr><td>1</td><td>Able to state two observations at idea level (based on any 1 criterion).
OR One correct observation and one observation at idea level
OR One correct observation and one wrong observation
OR One inaccurate observation and one observation at idea level

Sample answers:
1. Diameter of potato disc changes.
2. Concentration of sucrose solution is different.</td></tr>
</table>

1 (b) (ii) [KB0604 - Making inferences]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to make one accurate inference for each observation based on two criteria:
▪ Water (molecule) diffuses into / out of the potato (tissue / disc)
▪ By osmosis

Sample answers:
<u>For horizontal observations</u>
1. (At 0.2M / 0.4M of sucrose solution) water molecule diffuses into the potato (tissue / disc) by osmosis.
2. (At 0.6M of sucrose solution) water molecule diffuses out of the potato (tissue / disc) by osmosis.
<u>For vertical observations</u>
3. More water molecule diffuses into the potato (tissue / disc) by osmosis in 0.2M of sucrose solution compared to 0.4M of sucrose solution.</td></tr>
<tr><td>2</td><td>Able to make one accurate inference and one inaccurate inference corresponds to the observation.
OR
Able to make two inaccurate inference observation corresponds to the observation.

Sample answers:
<u>Inaccurate inference for horizontal observation</u>
1. (At 0.2M / 0.4M of sucrose solution) water molecule diffuses into the potato.
<u>Inaccurate inference for vertical observation</u>
2. More water molecule diffuses into the potato cell in 0.2M of sucrose solution compared to 0.4M of sucrose solution.</td></tr>
<tr><td>1</td><td>Able to make an idea of inference based on one criterion.

Sample answers:
1. Osmosis occurs.
2. Water molecule diffuses.</td></tr>
<tr><td></td><td>Summary of scoring for observation and inference:
<table>
<tr><th>Score</th><th>Correct</th><th>Inaccurate</th><th>Idea</th><th>Wrong</th></tr>
<tr><td>3</td><td>2</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">2</td><td>1</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td>-</td><td>2</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">1</td><td>1</td><td>-</td><td>1</td><td></td></tr>
<tr><td>-</td><td>-</td><td>2</td><td>-</td></tr>
<tr><td>1</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>-</td><td>1</td><td>1</td><td>-</td></tr>
<tr><td>0</td><td>-</td><td>1</td><td>-</td><td>1</td></tr>
<tr><td>0</td><td>-</td><td>-</td><td>1</td><td>1</td></tr>
</table></td></tr>
</table>

1 (c) [KB061001 - Controling Variables]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to state all the variables and the method to handle the variables correctly.

Sample answers:
<table>
<tr><th>Variables</th><th>Method to handle the variables</th></tr>
<tr><td>Manipulated variable:
Concentration of sucrose solutions</td><td>Prepare / Use five different concentrations of sucrose solutions
// Use 0.2M, 0.4M and 0.6M of sucrose solutions</td></tr>
<tr><td>Responding variable:
Final diameter of potato disc // Change / difference in diameter of potato disc // Percentage change in diameter of potato disc</td><td>Record the final diameter of potato disc by using metre rule
// Calculate the change in diameter of potato disc as; Final – initial diameter of potato disc
// Calculate the percentage change in diameter of potato disc by using the formula:
$\frac{\text{(Final – Initial) diameter of potato disc}}{\text{Initial diameter of potato disc}} \times 100\%$</td></tr>
<tr><td>Controlled variable:
Type of solution // Time taken to immerse the potato discs</td><td>Use sucrose solution only (to immerse the potato discs) / throughout the experiment
// Fix the time (to immerse the potato discs) at 20 minutes.</td></tr>
</table></td></tr>
<tr><td>2</td><td>Able to state 4 - 5 of the variables and the method to handle the variables correctly.</td></tr>
<tr><td>1</td><td>Able to state 1 - 3 of the variables and the method to handle the variables correctly.</td></tr>
</table>

1 (d) [KB0611 - Making Hypothesis]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to state a hypothesis to show a relationship between the manipulated variable and responding variable and the hypothesis can be validated, based on 3 criteria:
P1: Manipulated variable (concentration of sucrose solution)
P2: Responding variable (final diameter of potato disc / the percentage change in diameter of potato disc)
P3: Relationship between manipulated variable and responding variable (increase ... decreases) // (isotonic … does not change)

Sample answers:
1. As the concentration of sucrose solution increases / decreases, the final diameter of potato disc / the percentage change in diameter decreases / increases.
2. The concentration of sucrose solution which is isotonic to the cell sap of potato (disc) does not change the diameter of the potato discs.</td></tr>
<tr><td>2</td><td>Able to state less accurate hypothesis to show a relationship between manipulated variable and responding variable based on any two criteria.</td></tr>
</table>

	Sample answers: 1. Concentration of sucrose solution affects / influences the final diameter of potato discs. 2. As the concentration increases / decreases, the final diameter of potato disc / the percentage change in diameter decreases / increases.
1	Able to state hypothesis **at idea** level to show a relationship between manipulated variable and responding variable based on 1 criterion. Sample answers: 1. Final diameter of potato disc / the percentage change in diameter decreases / increases <u>Reverse hypothesis</u> 2. As the final diameter of potato disc / the percentage change in diameter decreases / increases concentration of sucrose solution increases / decreases

1 (e)(i) [KB0606 - Communicating]

Score	Criteria
3	Able to construct a table and fill in the data accurately with **four** correct titles and units: ▪ Concentration of sucrose solution,(M) ▪ Initial diameter of potato disc, (cm) ▪ Final diameter of potato disc, (cm) ▪ Percentage change in diameter of potato disc, (%) $\frac{\text{(Final – Initial) diameter of potato disc}}{\text{Initial diameter of potato disc}} \times 100\%$ Sample answers: Title, **T** Concentration of sucrose solution,(M) | Initial diameter of potato disc, (cm) | Final diameter of potato disc, (cm) | Percentage change in diameter of potato disc, (%) 0.2 | 1.5 | 1.90 | 26.7 0.4 | 1.5 | 1.60 | 6.7 0.6 | 1.5 | 1.40 | – 6.7 Data, **D** Calculation, **C**
2	Able to tabulate a table based on **two** criteria.
1	Able to Able to tabulate a table based on **one** criterion.

1 (e)(ii) [KB0608 - Space and Time Relationship]

Score	Criteria
3	Able to plot a graph of the percentage change in diameter of potato disc against the concentration of sucrose solution based on three criteria: ▪ Both axes with correct units (A) ▪ All points plotted correctly (P) ▪ Smooth curve touching all points (C)
2	Able to plot the graph of the percentage change in diameter of potato disc against concentration of sucrose solution based on any **two** criteria.
1	Able to plot the graph of the percentage change in diameter of potato disc against concentration of sucrose solution based on any **one** criterion.

1 (f) [KB0607 - Interpreting Data]

Score	Criteria
3	Able to interpret data correctly and explain the relationship based on the following aspects: P1 : Concentration of sucrose solution which is isotonic to the cell sap of potato disc P2 : The percentage change in diameter is zero P3 : The rate of water moves in and out is equal / zero Sample answer: 1. The concentration of sucrose solution which is isotonic to the cell sap of potato disc is *0.49M. The percentage change in diameter is zero because the rate of water that diffuses in and out of the cell / potato is equal. ** Accept 0.48 – 0.50M (based on the graph drawn).*
2	Able to interpret data correctly and explain the relationship based on any two criteria.
1	Able to interpret data correctly and explain of the relationship based on any one criterion at idea level.

1 (g) [KB0605 - Predicting]

Score	Criteria
3	Able to predict the result **accurately** based on the criteria: <u>Prediction (P)</u> : Expected diameter of the potato disc // Expected percentage change in diameter <u>Reason 1 (R1)</u> : Distilled water is hypotonic to the cell sap of potato disc <u>Reason 2 (R2)</u> : More water diffuse into the potato disc by osmosis. Sample answers: 1. Diameter (of potato disc) is more than 1.9 cm / any value more than 1.9 cm. Distilled water is hypotonic to the cell sap of potato disc so more water diffuse into the potato (disc) by osmosis.

2	Able to predict the result **less accurately** based on any 2 criteria. Sample answers: 1. Diameter (of potato disc) is more than 1.9 cm / any value more than 1.9 cm. Distilled water is hypotonic to the cell sap of potato disc. 2. Diameter (of potato disc) increases. Distilled water is hypotonic to the cell sap of potato disc so more water diffuse into the potato (disc) by osmosis.
1	Able to give **idea** of the result. 1. Diameter / percentage change in diameter (of potato disc) increases / more. 2. Distilled water is hypotonic to the cell sap of potato disc.

1 (h) [KB0609 - Define Operationally]

Score	Criteria
3	Able to define osmosis based on the experiment **correctly** based on 4 criteria: ▪ Movement of water to / from potato disc ▪ Plasma membrane (of potato) ▪ Difference concentration between sucrose solution and cell sap of potato ▪ Changes in diameter of potato disc Sample answer: 1. Osmosis is the movement of water to / from potato disc through the plasma membrane (of potato) due to the difference concentration between sucrose solution and cell sap of potato cell that will result in changes / decrease / increase in diameter of potato disc.
2	Able to define osmosis based on experiment less accurately based on any 2 to 3 criteria. Sample answers: 1. Osmosis is the movement of water to / from potato disc through the plasma membrane that will result in changes / decrease / increase in diameter of potato disc.
1	Able to define osmosis based on experiment less accurately based on any 1 criterion // Theoritical definition of osmosis. Theoritical definition must based on: ▪ Movement of water ▪ Higher concentration of water (region)/hypotonic solution to the lower concentration of water (region) / hypertonic solution ▪ Through a semi-permeable membrane Sample answers: 1. Osmosis is the movement of water to / from potato disc. 2. Osmosis is the movement of water from the higher concentration of water region to the lower concentration of water region through a semi-permeable membrane.

1 (i) [KB0602 - Classifying]

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>3</td><td>Able to classify all different concentrations of sucrose solutions into its correct type correctly.

Sample answer:

<table>
<tr><th>Concentration of sucrose solution, M
Kepekatan larutan sukrosa, M</th><th>Type of solution compared to the concentration of cell sap of spinach
Jenis larutan berbanding dengan kepekatan sap sel bayam</th></tr>
<tr><td>P</td><td>Hypertonic (solution)</td></tr>
<tr><td>Q</td><td>Isotonic (solution)</td></tr>
<tr><td>R</td><td>Hypotonic (solution)</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>Able to classify any 2 different concentrations of sucrose solutions into its correct term of solution correctly.</td></tr>
<tr><td>1</td><td>Able to classify any 1 concentration of sucrose solution into its correct term of solution correctly.</td></tr>
</table>

Question 2

Problem Statement

Score	Criteria
3 ✓	Able to state the problem statement of the experiment **correctly** that include criteria: ▪ Manipulate variables ▪ Responding variables ▪ Relation in question form and question symbol [?] Sample answers: 1. Does the number of leaves affect the rate of transpiration (in hibiscus plants)? 2. What is the relationship between the number of leaves and the rate of transpiration (in a hibiscus plant)?
2 ✓	Able to state the problem statement of the experiment with **two** criteria. Sample answers: 1. Do leaves affect the rate of transpiration (in a plant)? 2. Does the number of leaves affect the rate of transpiration. 3. What is the relationship between the number of leaves and transpiration?
1 ✓	Able to state the of problem statement with **one** criteria. Sample answers: 1. Do leaves affect the transpiration (in a plant)? 2. Does transpiration occurs through the leaves (in plants)?

Aim

Score	Criteria
✓	To investigate / determine the relationship between the <u>number of leaves</u> and the <u>rate of transpiration</u> <u>in a hibiscus plant</u>.

Hypothesis

Score	Criteria
3 ✓	Able to state the hypothesis **correctly** according to the criteria: ▪ Manipulate variables ▪ Responding variables ▪ Relationship of the variables Sample answers: 1. The more the number of leaves the higher rate of transpiration. 2. When the number of leaves increases the rate of transpiration increases. <u>Correct hypothesis but wrong concept based on theory</u> 3. The more the number of leaves the lower rate of transpiration. 4. More leaves cause the rate of transpiration to decrease.

2 ✓	Able to state the hypothesis with **two** criteria Sample answers: 1. When the number of leaves increases the transpiration increases. 2. The number of leaves affects the rate of transpiration in plants.
1 ✓	Able to state the **idea** of the hypothesis. Sample answers: 1. The number of leaves affects transpiration in plants.

Variables

Score	Criteria
✓	Able to state the **three variables correctly** Sample answers: Manipulated variable: Number of leaves / stomata Responding variable: Distance travelled by air bubble (in five minutes) // The rate of transpiration Controlled variable: Type of (terrestrial) plant / hibiscus // Light intensity // Surrounding temperature

Materials and Apparatus

Score	Criteria
3 ✓	Able to state all functional materials / 2*materials + 1 other material and 2*apparatus + 4 other apparatus for the experiment. Materials: *Hibiscus shoot / plant, water, and plasticine. Apparatus: *Ruler / weighing balance, capillary tube + rubber tubing // potometer // stoppered conical flask, beaker / basin, (sharp) knife, stopwatch, string / marker pen and tissue paper / filter paper.
2 ✓	Able to state all functional materials / 2*materials and 2*apparatus + 2 other apparatus for the experiment.
1 ✓	Able to state all functional materials / 2*materials and 2*apparatus for the experiment.

Technique

Score	Criteria
✓ Bonus 1m	Able to state how to operate the responding variable with an apparatus / a method. Sample answer: Recording the distance travelled by air bubble in five minutes using a stopwatch. *OR* Calculating (and record) the rate of transpiration by the formula: Rate of transpiration = Distance travelled by air bubble / Time

Procedure

Score	Criteria
3 ✓	Able to state **five** procedures P1, P2, P3, P4 and P5 correctly. P1 : How to Set Up The Apparatus (5P1) P2 : How to Make Constant The Control Variable (1P2) P3 : How to Manipulate The Manipulated Variable (1P3) P4: How to Record The Responding Variable (2P4) P5 : Precaution / Accuracy (2P5)
2 ✓	Able to state **three** of any procedures: 4P1 / 1P2 / 1P3 / 2P4 / 2P5 correctly
1 ✓	Able to state **two** of any procedures: 4P1 / 1P2 / 1P3 / 2P4 / 2P5 correctly

Example of Procedure:

1. (Diagram of experimental setup with at least 5 functional labels).	P1
2. Obtain a hibiscus shoot and immediately immerse in water.	P1 P5
3. By using a sharp knife, cut off 4 cm of the hibiscus stem under water.	P5
4. Fill in the capillary tube with attached rubber tubing / potometer with water.	P1
5. Fix in the stem of the hibiscus shoot into the rubber tubing / potometer. Make sure no air bubble trapped.	P1 P5
6. Immerse the capillary tube / potometer in a beaker of water.	P1
7. Wipe dry the leaves with tissue papers.	P5
8. Leave the setup for 5 minutes (for the plant to adapt with the new environment).	P5
9. Lift the capillary tube from the water to trap a column of air bubble // Trap an air bubble in the capillary tube / potometer.	P1
10. Tie a string on the capillary tube to mark the initial position of the air bubble.	P1
11. Start the stopwatch.	P1
12. After 5 minutes tie another string to mark the final position of the air bubble.	P1
13. Repeat step 12 to get another reading.	P5
14. Measure both distances by using a ruler. Calculate the average distance traveled by the air bubble in 5 minute. Record in a table // Tabulate the data.	P4 P4 P4
15. By using the same plant, repeat steps 7 until 13 by removing one leave each time.	P2 P3
16. Calculate the rate of transpiration.	P4

Data

<table>
<tr><th>Score</th><th>Criteria</th></tr>
<tr><td>✓
Bonus
1m</td><td>Able to construct the correct table with titles and units based on three criteria.
▪ Number of leaves
▪ Distance travelled (cm) // Time taken (minute)
▪ Rate of transpiration (cm minute^{-1})

Sample answers:
<table>
<tr><td rowspan="2">Number of leaves</td><td colspan="3">Distance travelled by air bubble in 5 minutes (cm)</td><td rowspan="2">Rate of transpiration (cm minute^{-1})</td></tr>
<tr><td>First reading</td><td>Second reading</td><td>Average</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>
OR
<table>
<tr><td rowspan="2">Number of leaves</td><td colspan="3">Time taken for the air bubble to travel a distance of 5 cm (minutes)</td><td rowspan="2">Rate of transpiration (cm minute^{-1})</td></tr>
<tr><td>First reading</td><td>Second reading</td><td>Average</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>
(*First and second readings + average = 1P5 Procedure)</td></tr>
</table>

Conclusion

Score	Criteria
✓	Able to rewrite the hypothesis correctly. Sample answers: 1. The more the number of leaves the higher rate of transpiration.

Planning the Experiment

Score	Criteria
3	Able to plan the experiment based on 7 – 9 (✓) of the following criteria: ▪ Problem statement ▪ Objective of investigation ▪ Hypothesis ▪ Variables ▪ List of materials and apparatus ▪ Technique used ▪ Experimental procedures ▪ Presentation of data ▪ Conclusion
2	Able to plan the experiment based on 4 – 6 (✓) of the criteria.
1	Able to plan the experiment based on 1 – 3 (✓) of the criteria.

END OF MARKING SCHEME

Graph of the percentage change in diameter of potato disc against the concentration of the sucrose solutions