

SPM EXAMINATION PAPER 2014

PAPER 1

Time: 1 hour and 15 minutes

Instructions: This question paper consists of 50 questions. Answer all questions.

Arahan: Kertas soalan ini mengandungi 50 soalan. Jawab semua soalan.

- 1 The following statements are the characteristics of an organelle in a cell.

Pernyataan berikut adalah ciri-ciri satu organel di dalam sel.

A pair of small cylindrical structures of microtubules and found only in animal cells
Sepasang struktur silinder kecil terdiri daripada mikrotubul dan terdapat dalam sel-sel haiwan sahaja

Which organelle has the above characteristics?

Organel manakah mempunyai ciri-ciri di atas?

- A Golgi apparatus
Jasad golgi
- B Chloroplast
Kloroplas
- C Lysosome
Lisosom
- D Centriole
Sentriol
- 2 An individual suffers from ulcer in the ileum. A part of his ileum has been removed.
 What is the effect to the product of starch digestion?
Seorang individu menghidap ulser di dalam ileum. Sebahagian daripada ileumnya perlu dibuang. Apakah kesan ke atas hasil pencernaan kanji?
- A The amount of glucose increase
Kuantiti glukosa meningkat
- B The amount of starch increases
Kuantiti kanji meningkat
- C The amount of maltose increases
Kuantiti maltosa meningkat
- D The amount of sucrose increases
Kuantiti sukrosa meningkat
- 3 Which process is involved in the movement of water molecules from soil into the root hairs of a plant?
Proses manakah yang terlibat dalam pergerakan molekul air dari tanah ke dalam akar rambut tumbuhan?

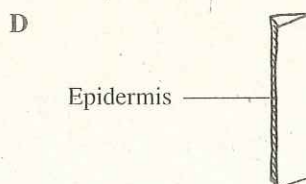
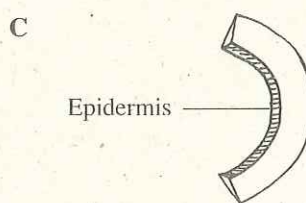
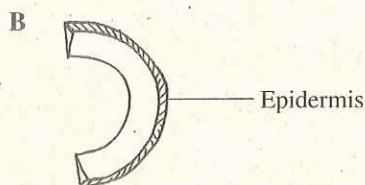
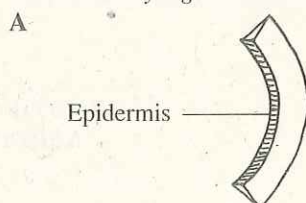
- A Facilitated diffusion
Resapan berbantu
- B Simple diffusion
Resapan ringkas
- C Active transport
Pengangkutan aktif
- D Osmosis
Osmosis

- 4 A slice of mustard green stem was immersed in 30% of sucrose solution.

Which observation is correct after one hour?

Sepotong batang sawi hijau telah direndam di dalam larutan sukrosa 30%.

Pemerhatian yang manakah betul selepas satu jam?



5 Which is an inorganic compound?

Manakah sebatian bukan organik?

- A Rice Nasi
B Fish Ikan
C Water Air
D Butter Mentega

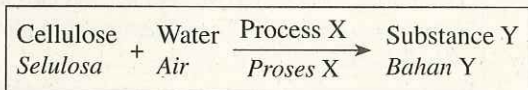
6 Which of the following is true about the enzyme reaction at 45°C?

Antara yang berikut, yang manakah benar tentang tindak balas enzim pada suhu 45°C?

- A Reaction increases
Tindak balas meningkat
B Reaction decreases
Tindak balas menurun
C Reaction at maximum
Tindak balas maksimum
D Reaction remains the same
Tindak balas kekal sama

7 The following equation shows digestion in a herbivor.

Persamaan berikut menunjukkan pencernaan dalam herbivor.



What are X and Y?

Apakah X dan Y?

	X	Y
A	Hydrolysis Hidrolisis	Galactose Galaktosa
B	Hydrolysis Hidrolisis	Glucose Glukosa
C	Condensation Kondensasi	Glucose Glukosa
D	Condensation Kondensasi	Galactose Galaktosa

8 Which food contains saturated fats?

Makanan manakah yang mengandungi lemak tepu?

- A Butter Mentega
B Corn oil Minyak jagung
C Margarine Marjerin
D Coconut oil Minyak kelapa

9 Diagram 1 shows organelle X with attached ribosomes.

Rajah 1 menunjukkan organel X dengan ribosom yang melekat padanya.

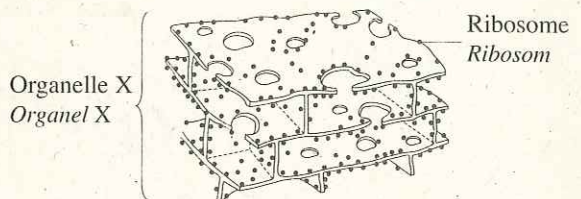


Diagram 1

Rajah 1

What happens if organelle X is damaged?

Apakah yang berlaku jika organel X rosak?

- A Protein will be denatured
Protein akan ternyahasli
B Protein changes its active site
Protein menukar tapak aktifnya
C Protein cannot be synthesised
Protein tidak dapat disintesis
D Protein cannot be transported
Protein tidak dapat diangkut

10 Which of the following helps enzyme to function well?

Antara yang berikut, yang manakah membantu enzim berfungsi dengan baik?

- A Product Hasil
B Cofactor Kofaktor
C Inhibitor Perencat
D Substrate Substrat

11 Diagram 2 shows a phase of mitosis in a cell.

Rajah 2 menunjukkan satu fasa mitosis di dalam sel.

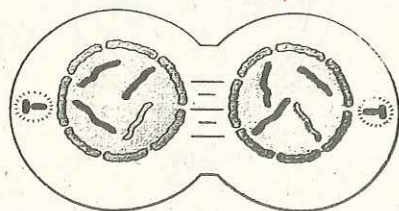


Diagram 2

Rajah 2

What is the phase?

Apakah fasa itu?

- A Prophase Profasa
B Metaphase Metafasa
C Anaphase Anafasa
D Telophase Telofasa

- 12 Diagram 3 shows the process of fertilisation in human.

Rajah 3 menunjukkan proses persenyawaan dalam manusia.

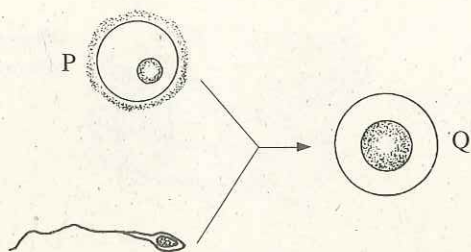


Diagram 3
Rajah 3

What is the number of chromosome in P and Q?
Apakah bilangan kromosom di P dan Q?

	P	Q
A	23	23
B	23	46
C	46	23
D	46	46

- 13 Diagram 4 shows metaphase I of meiosis in an animal cell.

Rajah 4 menunjukkan metafasa I bagi meiosis dalam suatu sel haiwan.

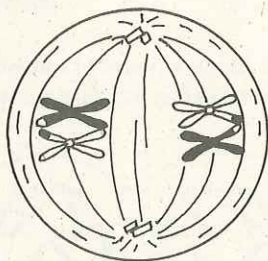


Diagram 4
Rajah 4

What is the number of chromosome in a gamete after the cell completes its division?

Apakah bilangan kromosom dalam gamet selepas sel membahagi dengan lengkap?

- A 2
B 3
C 4
D 5

- 14 A farmer practises organic farming. He wants to increase the soil fertility.

Which method is the most suitable to improve the soil fertility?

Seorang petani mengamalkan pertanian organik. Dia mahu meningkatkan kesuburan tanah.

Kaedah manakah yang paling sesuai untuk meningkatkan kesuburan tanah itu?

- A Ploughing
Membajak
B Crop rotation
Tanaman bergilir
C Direct seeding
Tabur terus
D Water drainage system
Sistem saliran air

- 15 The following information is about photosynthesis.

Maklumat berikut adalah mengenai fotosintesis.

Plants require water and carbon dioxide to produce starch in the presence of sunlight and chlorophyll.

Tumbuhan memerlukan air dan karbon dioksida untuk menghasilkan kanji dengan kehadiran cahaya matahari dan klorofil.

What will happen if the uptake of water is decreases?

Apakah akan berlaku sekiranya pengambilan air berkurangan?

- A Production of oxygen decreases
Penghasilan oksigen berkurang
B Production of glucose increases
Penghasilan glukosa meningkat
C The use of carbon dioxide increases
Penggunaan karbon dioksida bertambah
D Concentration of hydrogen ions increases
Kepekatan ion-ion hidrogen bertambah

- 16 Which group of organisms obtains nutrients from dead organic matter?

Kumpulan organisma yang manakah mendapat nutrien daripada bahan-bahan organik yang mati?

- A Parasite
Parasit
B Autotroph
Autotrof
C Commensal
Komensal
D Saprophyte
Saprofit

- 17 Diagram 5 shows a cross section of a leaf.
Rajah 5 menunjukkan keratan rentas bagi suatu daun.

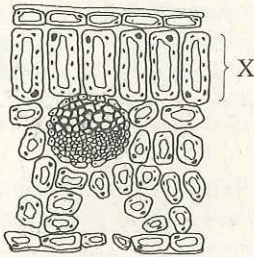


Diagram 5
Rajah 5

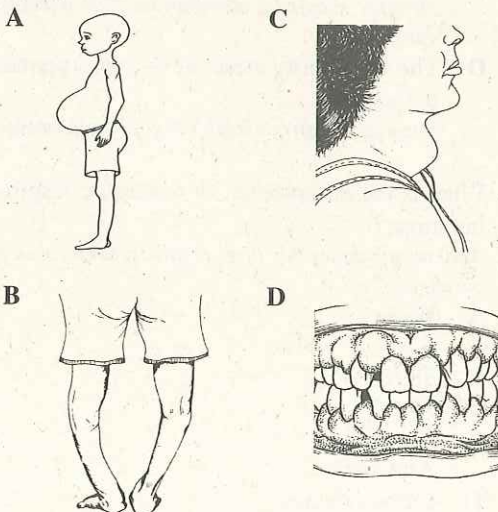
Why are cells X packed tightly together in an upright arrangement?

Mengapakah sel X tersusun bersama dengan rapat dalam kedudukan menegak?

- A To receive maximum amount of light
Untuk menerima jumlah cahaya yang maksimum
- B To receive maximum amount of water
Untuk menerima jumlah air yang maksimum
- C To receive maximum amount of oxygen
Untuk menerima jumlah oksigen yang maksimum
- D To receive maximum amount of carbon dioxide
Untuk menerima jumlah karbon dioksida yang maksimum

- 18 Which condition shows the effect of deficiency in vitamin C for a long period of time?

Keadaan manakah yang menunjukkan kesan kekurangan vitamin C untuk tempoh masa yang lama?



- 19 Diagram 6 shows levels of a food guide pyramid.
Rajah 6 menunjukkan aras bagi suatu panduan piramid makanan.

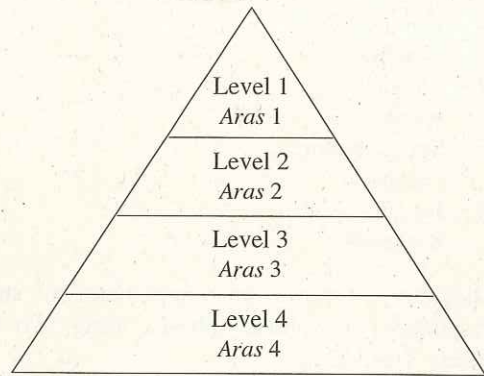


Diagram 6
Rajah 6

Food in which level should be taken less to avoid diabetes mellitus?

Makanan dalam aras manakah sepatutnya kurang diambil untuk mengelakkan diabetes mellitus?

- A Level 1 and Level 2
Aras 1 dan Aras 2
- B Level 1 and Level 4
Aras 1 dan Aras 4
- C Level 2 and Level 3
Aras 2 dan Aras 3
- D Level 2 and Level 4
Aras 2 dan Aras 4

- 20 Diagram 7 shows the digestive system of a ruminant.

Rajah 7 menunjukkan sistem pencernaan ruminan.

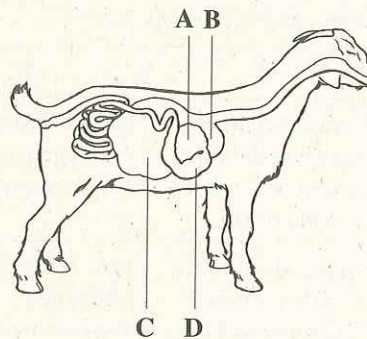


Diagram 7
Rajah 7

Which part labelled A, B, C or D is the abomasum?
Antara bahagian berlabel A, B, C dan D, yang manakah abomasum?

- 21 Which activity produces the highest concentration of lactic acid in the muscle?

Aktiviti manakah menghasilkan kepekatan asid laktik paling tinggi dalam otot?

- A Walking
Berjalan
- B Reading
Membaca
- C Sprint running
Lari pecut
- D Jogging
Berjoging

- 22 Diagram 8 shows an experiment to study respiration and photosynthesis, using two test tubes, X and Y.

Rajah 8 menunjukkan satu eksperimen untuk mengkaji respirasi dan fotosintesis, menggunakan dua tabung uji, tabung uji X dan tabung uji Y.

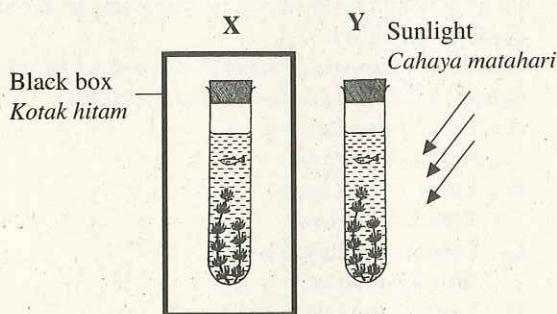


Diagram 8
Rajah 8

Which of the following are the result of the experiment after half an hour?

Antara yang berikut, yang manakah keputusan eksperimen selepas setengah jam?

	X	Y
A	High concentration of carbon dioxide <i>Kepekatan karbon dioksida tinggi</i>	High concentration of oxygen <i>Kepekatan oksigen tinggi</i>
B	High concentration of carbon dioxide <i>Kepekatan karbon dioksida tinggi</i>	Low concentration of oxygen <i>Kepekatan oksigen rendah</i>
C	Low concentration of carbon dioxide <i>Kepekatan karbon dioksida rendah</i>	High concentration of oxygen <i>Kepekatan oksigen tinggi</i>

D

X	Y
Low concentration of carbon dioxide <i>Kepekatan karbon dioksida yang rendah</i>	Low concentration of oxygen <i>Kepekatan oksigen rendah</i>

- 23 Diagram 9 shows part of human respiratory organ. *Rajah 9 menunjukkan sebahagian daripada organ respirasi manusia.*

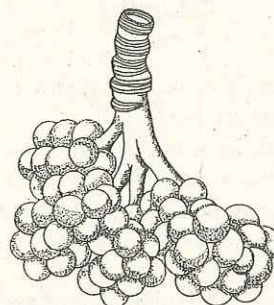


Diagram 9
Rajah 9

Which characteristic refers to the part shown in the diagram?

Ciri manakah merujuk kepada bahagian yang ditunjukkan dalam rajah itu?

- A The respiratory surface is moist
Permukaan respirasi lembab
- B The respiratory surface lining is thin
Lapisan permukaan respirasi adalah nipis
- C The respiratory structure has a large surface area
Struktur respirasi mempunyai luas permukaan yang besar
- D The respiratory structure is more permeable to oxygen
Struktur respirasi lebih telap kepada oksigen

- 24 What is the end product of anaerobic respiration in human?

Apakah produk akhir bagi respirasi anaerobik pada manusia?

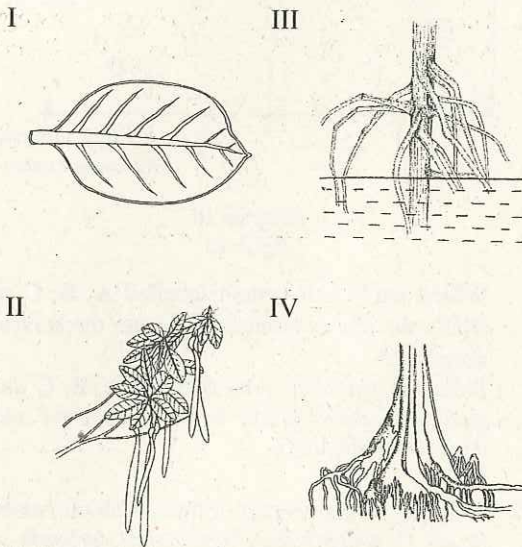
- A Water
Air
- B 38 ATP
38 ATP
- C Lactic acid
Asid laktik
- D Carbon dioxide
Karbon dioksida

- 25 Mangrove plants act as a natural barrier that absorbs energy waves.

Which characteristics of the mangrove plants can help to reduce the damage to the coastal area?

Pokok bakau bertindak sebagai penghalang semulajadi yang menyerap tenaga ombak.

Ciri-ciri pokok bakau manakah yang boleh membantu mengurangkan kerosakan di kawasan pantai?



- A I and II
I dan II
B I and III
I dan III
C II and IV
II dan IV
D III and IV
III dan IV

- 26 Which is an abiotic component of an ecosystem?
Yang manakah komponen abiosis bagi suatu ekosistem?

- A Bird
Burung
B Water
Air
C Fungus
Fungi
D Bacteria
Bakteria

- 27 A group of students carried out an experiment to estimate the density of *Mimosa pudica* in the school field using quadrats measuring $1\text{ m} \times 1\text{ m}$.

The density of *Mimosa pudica* is calculated using the following formula:

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrats}}{\text{Number of quadrats} \times \text{quadrat area}}$$

Sekumpulan pelajar menjalankan satu eksperimen untuk mengganggu kepadatan *Mimosa pudica* di padang sekolah menggunakan kuadrat berukuran $1\text{ m} \times 1\text{ m}$.

Kepadatan *Mimosa pudica* dihitung menggunakan formula berikut:

$$\text{Kepadatan} = \frac{\text{Jumlah bilangan individu bagi suatu spesies dalam semua kuadrat}}{\text{Bilangan kuadrat} \times \text{luas kuadrat}}$$

The result of the experiment is shown in Table 1.
Keputusan eksperimen ditunjukkan dalam Jadual 1.

Quadrat Kuadrat	1	2	3	4	5
Number of <i>Mimosa pudica</i> Bilangan <i>Mimosa pudica</i>	2	3	0	2	0

Table 1
Jadual 1

What is the estimated density of *Mimosa pudica* in the school field?

*Apakah anggaran kepadatan *Mimosa pudica* di padang sekolah?*

- A 0.7 m^{-2}
B 1.0 m^{-2}
C 1.4 m^{-2}
D 2.3 m^{-2}

- 28 Which mechanism will occur if the pH value of the blood decreases?

Mekanisma manakah yang akan berlaku jika nilai pH darah menurun?

- A Breathing and ventilation rate decrease
Kadar pernafasan dan ventilasi menurun
B Breathing and ventilation rate increase
Kadar pernafasan dan ventilasi meningkat
C Breathing rate increases but ventilation rate decreases
Kadar pernafasan meningkat tetapi kadar ventilasi menurun
D Breathing rate decreases but ventilation rate increases
Kadar pernafasan menurun tetapi kadar ventilasi meningkat

- 29 An experiment was carried out to investigate the level of water pollution in four water samples. Which of the following is the most polluted water sample?

Satu eksperimen telah dijalankan untuk menyiasat tahap pencemaran air dalam empat sampel air. Antara yang berikut, sampel air yang manakah paling tercemar?

	Water sample Sampel air	Time taken to decolourise methylene blue solution (min) Masa yang diambil untuk melunturkan warna larutan metilena biru (min)
A	S	10
B	T	30
C	U	50
D	V	120

- 30 The following information is about eutrophication. Maklumat berikut adalah mengenai eutrofikasi.

Eutrophication is a condition that encourages algae to grow rapidly.
Eutrofikasi ialah keadaan yang menggalakkan pertumbuhan alga dengan pesat.

Which substance causes eutrophication?

Bahan yang manakah menyebabkan eutrofikasi?

- A Lead
Plumbum
 - B Sediment
Enapan
 - C Phosphate
Fosfat
 - D Radioactive waste
Bahan buangan radioaktif
- 31 Diagram 10 is a graph which shows the effects of light intensity on the rate of transpiration in a plant.
Rajah 10 ialah graf yang menunjukkan kesan keamatan cahaya terhadap kadar transpirasi bagi suatu tumbuhan.

Rate of transpiration
Kadar transpirasi

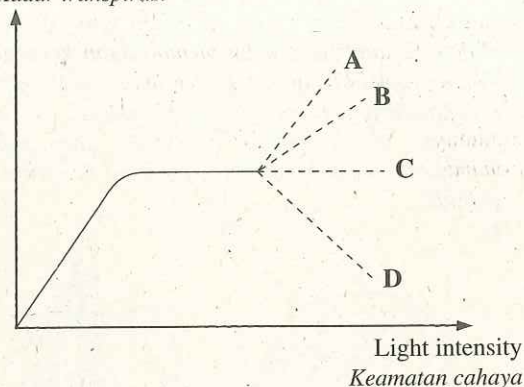


Diagram 10
Rajah 10

Which part of the graph labelled A, B, C or D shows the rate of transpiration after the leaves are removed?

Bahagian manakah yang berlabel A, B, C dan D pada graf, menunjukkan kadar transpirasi selepas daun-daun dibuang?

- 32 Diagram 11 shows part of human blood vessels. Rajah 11 menunjukkan sebahagian daripada salur darah manusia.

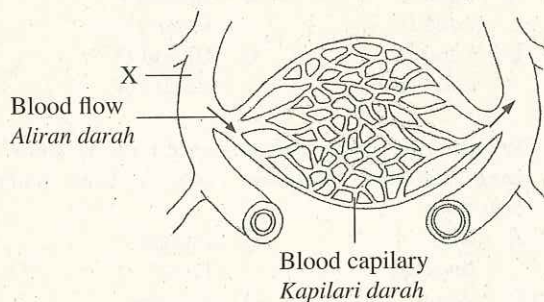


Diagram 11
Rajah 11

Which of the following is correct about X?

Antara yang berikut, yang manakah benar tentang X?

- A The presence of valve
Kehadiran injap
- B Thick muscular wall
Dinding otot tebal
- C Transport deoxygenated blood
Mengangkut darah terdeoksigen
- D Blood flows under lower pressure
Darah mengalir di bawah tekanan rendah

- 33 Diagram 12 is a graph which shows the concentration of antibodies during injection of antiserum.

Rajah 12 ialah graf yang menunjukkan kepekatan antibodi semasa suntikan antiserum.

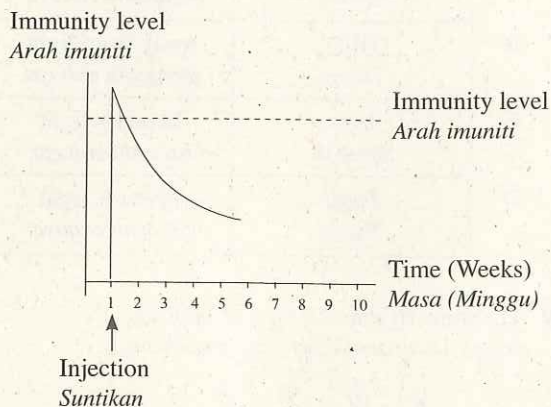


Diagram 12
Rajah 12

Which disease is related to the graph?

Penyakit manakah yang berkaitan dengan graf itu?

- A Rabies
Penyakit anjing gila
- B Meningitis
Meningitis
- C Hepatitis B
Hepatitis B
- D Poliomyelitis
Poliomielitis

- 34 Which ion involves in the opening and closing of stomata?

Ion manakah terlibat dalam pembukaan dan penutupan stomata?

- A Sodium ion
Ion natrium
- B Chloride ion
Ion klorida
- C Calcium ion
Ion kalsium
- D Potassium ion
Ion kalium

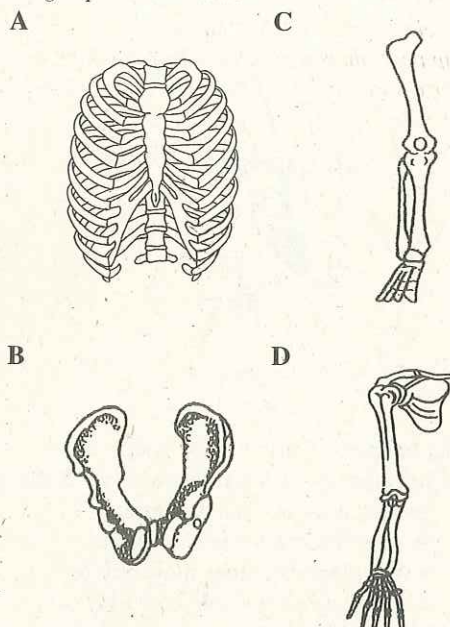
- 35 Which blood cells produce heparin?

Sel darah manakah menghasilkan heparin?

- A Basophils
Basofil
- B Neutrophils
Neutrofil
- C Lymphocytes
Limfosit
- D Monocytes
Monosit

- 36 Which of the following is part of the human axial skeleton?

Antara berikut, yang manakah sebahagian daripada rangka paksi manusia?



- 37 Diagram 13 shows human's forearm.

Rajah 13 menunjukkan lengan manusia.

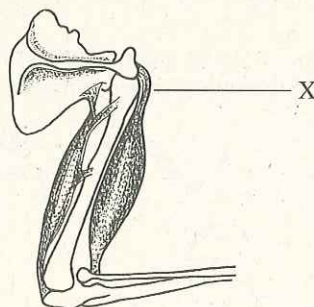


Diagram 13
Rajah 13

What is X?

Apakah X?

- A Joint
Sendi
- B Tendon
Tendon
- C Muscle
Otot
- D Ligament
Ligamen

- 38 Diagram 14 shows the response of skin in cold surrounding.

Rajah 14 menunjukkan gerak balas kulit dalam persekitaran yang sejuk.

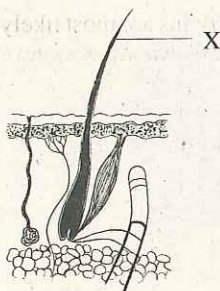


Diagram 14

Rajah 14

What happens if structure X is shaved?

Apakah yang akan berlaku jika struktur X dicukur?

- A Erector muscle cannot contract
Otot erektor tidak boleh mengecut
- B Sweat gland becomes more active
Kelenjar peluh menjadi lebih aktif
- C More heat is lost to the environment
Lebih banyak haba hilang ke persekitaran
- D More blood is supplied to skin surface
Lebih banyak darah dibekalkan ke bawah permukaan kulit

- 39 Diagram 15 shows a germination of seed.

Rajah 15 menunjukkan percambahan biji benih.

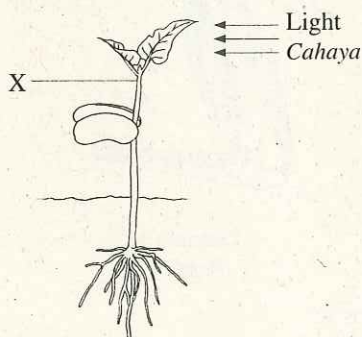


Diagram 15

Rajah 15

What happens to the concentration of auxin and direction of growth at X after being exposed to the light for a few days?

Apakah yang berlaku kepada kepekatan auksin dan arah pertumbuhan pada X selepas didedahkan kepada cahaya selama beberapa hari?

	Concentration of auxin Kepekatan auksin	Direction of growth Arah pertumbuhan
A	Low Rendah	Away from light Menjauhi cahaya
B	High Tinggi	Away from light Menjauhi cahaya
C	Low Rendah	Towards light Ke arah cahaya
D	High Tinggi	Towards light Ke arah cahaya

- 40 Diagram 16 shows a type of neurons.

Rajah 16 menunjukkan satu jenis neuron.

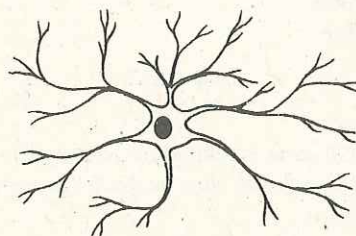


Diagram 16

Rajah 16

What is the type of this neurone?

Apakah jenis neuron ini?

- A Afferent neurone C Interneurone
Neuron aferen Neuron perantaraan
- B Efferent neurone D Neurotransmitter
Neurone eferen Neurotransmitter
- 41 The following are symptoms caused by lack of certain hormone in an adult.

Berikut adalah simptom-simptom yang disebabkan oleh kekurangan hormon tertentu pada seorang dewasa.

- Rate of heartbeat is low
Kadar denyutan jantung rendah
- Low metabolism
Metabolism rendah
- Weight gain
Berat bertambah

Which hormone causes the symptoms?

Hormon manakah menyebabkan simptom-simptom tersebut?

- A Insulin
Insulin

- B Thyroxine
Tioksina
- C Adrenaline
Adrenalina
- D Growth hormone
Hormon pertumbuhan

- 42 Diagram 17 shows the implantation of an embryo.
Rajah 17 menunjukkan penempelan embrio.

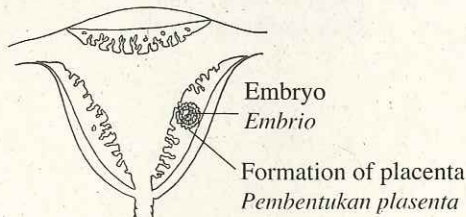


Diagram 17
Rajah 17

Misabortion of an embryo occurs due to lack of hormone secreted by the placenta. Which treatment is most suitable to secure the implantation of the embryo?

Keguguran embrio berlaku disebabkan kekurangan hormon yang dirembeskan oleh plasenta. Rawatan manakah yang paling sesuai untuk mengukuhkan penempelan embrio?

- A Injection of FSH
Suntikan FSH
- B Injection of GnRH
Suntikan GnRH
- C Injection of oestrogen
Suntikan estrogen
- D Injection of progesterone
Suntikan progesteron

- 43 Diagram 18 shows a seminiferous tubule.
Rajah 18 menunjukkan tubul seminiferus.

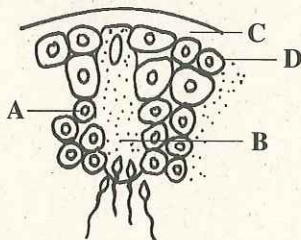


Diagram 18
Rajah 18

Which structure A, B, C or D provides nutrients for sperm cells?

Antara struktur A, B, C dan D, yang manakah menyediakan nutrien kepada sel sperma?

- 44 A woman released two secondary oocytes from the ovary during a menstrual cycle.
Seorang perempuan membebaskan dua oosit sekunder dari ovari semasa satu kitar haid.

What type of twins are most likely to be produced?
Apakah jenis kembar yang mungkin dihasilkan?

- A Siamese twins
Kembar siam
- B Identical twins
Kembar seiras
- C Fraternal twins
Kembar tak seiras
- D No formation of twins
Tiada pembentukan kembar

- 45 The following stages occur during spermatogenesis.
Peringkat-peringkat berikut berlaku semasa spermatogenesis.

P : Spermatid
Spermatid
Q : Spermatogonium
Spermatogonium
R : Secondary spermatocyte
Spermatisit sekunder
S : Primary spermatocyte
Spermatisit primer

Which sequence is correct?
Urutan manakah yang benar?

- A $P \rightarrow Q \rightarrow R \rightarrow S$
- B $S \rightarrow R \rightarrow Q \rightarrow P$
- C $Q \rightarrow S \rightarrow R \rightarrow P$
- D $Q \rightarrow S \rightarrow P \rightarrow R$

- 46 What is the basic unit of inheritance?
Apakah unit asas bagi pewarisan?

- A Genes
Gen
- C Character
Ciri
- B Trait
Trait
- D Chromosome
Kromosom

- 47 What type of gametes can be produced by a garden pea plant heterozygous (BbHh) for flower colour and flower position?
Apakah jenis gamet yang boleh dihasilkan oleh pokok kacang pea heterozigus (BbHh) untuk warna bunga dan kedudukan bunga?

- A Bb and Hh
Bb dan Hh
- C Bb, Hh, BH and bh
Bb, Hh, BH dan bh
- B BH and bh
BH dan bh
- D BH, Bh, bH and bh
BH, Bh, bH and bh

48 What is the number of chromosomes in an individual with Turner's Syndrome?

Apakah bilangan kromosom bagi individu yang mempunyai Sindrom Turner?

- A 45 C 47
B 46 D 48

49 Which of the following variations is caused by genetic factors only?

Antara variasi berikut, yang manakah disebabkan oleh faktor genetik sahaja?

- A Intelligence
Kepandaian
B Language
Bahasa
C Skin colour
Warna kulit
D Blood group
Kumpulan darah

50 Which characteristic represents continuous variation?

Ciri manakah mewakili variasi selanjut?

- A Height
Ketinggian
B Ability to roll tongue
Kemampuan menggulung lidah
C Pattern of fingerprints
Corak cap jari
D Type of blood group
Jenis kumpulan darah

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

This question paper consists of two sections: **Section A** and **Section B**.
Kertas soalan ini mengandungi dua bahagian: **Bahagian A** dan **Bahagian B**.

Section A
Bahagian A

[60 marks]
[60 markah]

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

- 1 Diagram 1.1 shows the structure of an *Amoeba* sp.
Rajah 1.1 menunjukkan struktur suatu *Amoeba* sp.

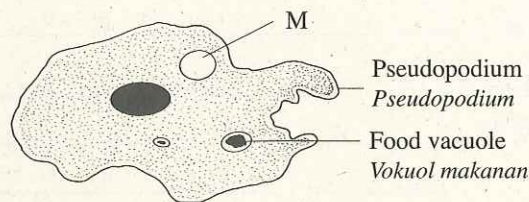


Diagram 1.1
Rajah 1.1

- (a) (i) State the level of cell organisation of *Amoeba* sp.
Nyatakan peringkat organisasi sel bagi *Amoeba* sp.

1(a)(i)

	1
--	---

[1 mark]
[1 markah]

- (ii) Using an arrow (→) match M to its correct structure.
Dengan menggunakan anak panah (→) padankan M kepada strukturnya yang betul.

M ●

● Contractile vacuole
Vakuol mengecut

● Nucleus
Nukleus

[1 mark]
[1 markah]

1(a)(ii)

	1
--	---

- (b) (i) Explain why the water content in M increases when the *Amoeba* sp. is in fresh water pond.
Terangkan mengapa kandungan air di dalam M bertambah apabila *Amoeba* sp. itu berada dalam kolam air tawar.

1(b)(i)

	2
--	---

[2 marks]
[2 markah]

1(b)(ii)

2

- (ii) Explain the role of M in controlling the water balance in the *Amoeba* sp.
Terangkan peranan M dalam mengawal keseimbangan air di dalam *Amoeba* sp. itu.

.....

.....

.....

[2 marks]

[2 markah]

- (iii) In an activity, a student places the *Amoeba* sp. in a sea water.

Predict what happens to the *Amoeba* sp.

Explain your answer.

Dalam satu aktiviti, seorang pelajar meletakkan *Amoeba* sp. itu dalam air laut.

Ramalkan apakah yang akan berlaku kepada *Amoeba* sp. itu.

Terangkan jawapan anda.

1(b)(iii)

3

Prediction :

Ramalan

Explanation :

Penerangan

.....

.....

[3 marks]

[3 markah]

- (c) Diagram 1.2 shows the phagocytosis in *Amoeba* sp.

Rajah 1.2 menunjukkan fagositosis dalam *Amoeba* sp.

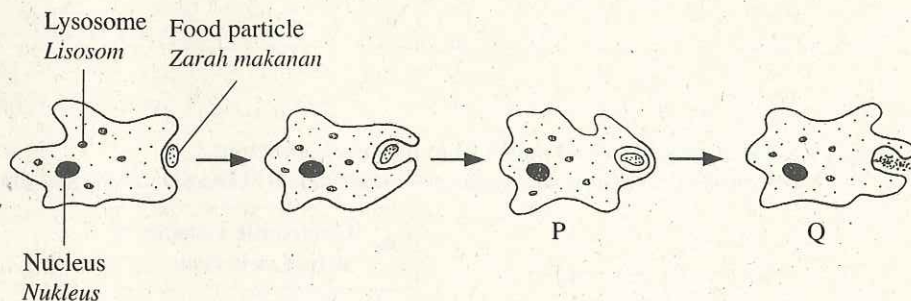


Diagram 1.2

Rajah 1.2

Explain what happens during P and Q.

Terangkan apa yang berlaku semasa P dan Q.

.....

.....

.....

.....

[3 marks]

[3 markah]

1(c)

3

Total A1

12

- 2 Diagram 2 shows a stage of meiosis in an animal cell.
Rajah 2 menunjukkan suatu peringkat meiosis dalam sel haiwan.

For
Examiner's
Use

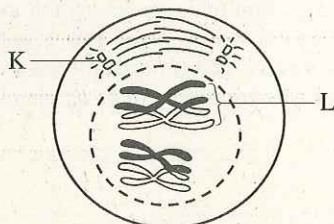


Diagram 2
Rajah 2

- (a) (i) Name the stage.
Namakan peringkat itu.

[1 mark]

[1 markah]

2(a)(i)

	1
--	---

- (ii) Describe the chromosomes behaviour during the stage.
Huraikan perlakuan kromosom semasa peringkat itu.

[2 marks]

[2 markah]

2(a)(ii)

	2
--	---

- (b) Explain the importance of process L.
Terangkan kepentingan proses L.

[2 marks]

[2 markah]

2(b)

	2
--	---

- (c) (i) Name structure K.
Namakan struktur K.

[1 mark]

[1 markah]

2(c)(i)

	1
--	---

- (ii) What happens to a gamete formed if structure K fails to function in the process of gamete formation?
Apakah yang berlaku kepada gamet terbentuk jika struktur K gagal berfungsi dalam proses pembentukan gamet?

[3 marks]

[3 markah]

2(c)(ii)

	1
--	---

2(d)

3

Total A2

12

- (d) Mutation is a random change in the genetic composition of a cell. A student is needed to produce a pamphlet about mutation.

Explain one example of mutation that can be written in the pamphlet.

Mutasi ialah perubahan rawak dalam komposisi genetik bagi satu sel. Seorang murid dikehendaki menyediakan sebuah risalah berkaitan mutasi.

Terangkan satu contoh mutasi yang boleh ditulis dalam risalah itu.

.....

.....

.....

.....

[3 marks]

[3 markah]

- 3 Diagram 3.1 shows the endocrine system in human.

Rajah 3.1 menunjukkan sistem endokrin manusia.

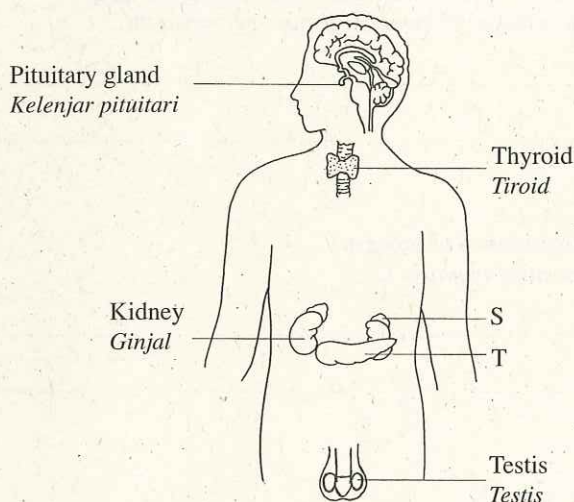


Diagram 3.1

Rajah 3.1

- (a) Name structures S and T.

Namakan struktur S dan struktur T.

S :

T :

[2 marks]

[2 markah]

- (b) (i) Name one hormone secreted by T.

Namakan satu hormon yang dirembeskan oleh T.

.....

[1 mark]

[1 markah]

3(a)

2

3(b)(i)

1

- (ii) Explain the role of the hormone named in 3(b)(i) in regulating the level of glucose in the blood.

Terangkan peranan hormon yang dinamakan di 3(b)(i) dalam mengawal atur aras glukosa dalam darah.

.....

.....

.....

[2 marks]

[2 markah]

- (c) Table 3 shows the concentration of amino acid in blood plasma and urine.

Jadual 3 menunjukkan kepekatan asid amino dalam plasma darah dan dalam air kencing.

Content <i>Kandungan</i>	Concentration in blood plasma entering kidney (g per 1000 cm ³) <i>Kepekatan dalam plasma darah yang memasuki ginjal (g per 1000 cm³)</i>	Concentration in urine (g per 1000 cm ³) <i>Kepekatan dalam air kencing (g per 1000 cm³)</i>
Amino acid <i>Asid amino</i>	74	0

Table 3

Jadual 3

Explain the differences between the concentration of amino acid in blood plasma and urine.

Terangkan perbezaan di antara kepekatan asid amino dalam plasma darah dengan dalam air kencing.

.....

.....

.....

[2 marks]

[2 markah]

- (d) (i) Both kidneys of a patient fail to function. This situation causes water imbalance and accumulation of urea in the blood.

Explain the effect of kidney failure to the regulation of water balance in the blood.

Kedua-dua ginjal seorang pesakit gagal berfungsi. Keadaan ini menyebabkan ketidakseimbangan air dan pengumpulan urea dalam darah.

Terangkan kesan kegagalan ginjal terhadap kawal atur keseimbangan air dalam darah.

.....

.....

.....

[2 marks]

[2 markah]

For
Examiner's
Use

3(b)(ii)

2

3(c)

2

3(d)(i)

2

- (ii) Diagram 3.2 shows a treatment carried out on the patient.
Rajah 3.2 menunjukkan rawatan yang dijalankan ke atas pesakit itu.

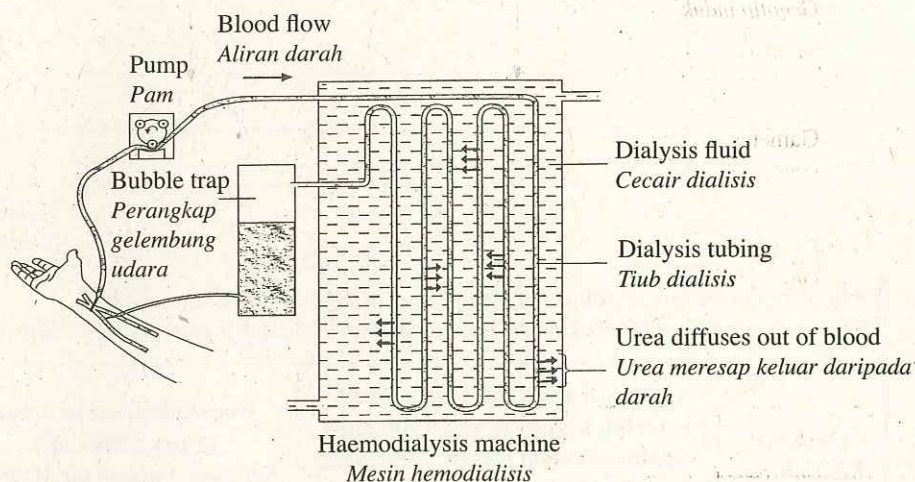


Diagram 3.2
Rajah 3.2

Explain how urea is removed from his blood using a haemodialysis machine.
Terangkan bagaimana urea disingkirkan daripada darahnya menggunakan mesin hemodialisis.

.....

.....

.....

.....

.....

[3 marks]
[3 markah]

3(d)(ii)

3

Total A3

12

- 4 Diagram 4 shows a tall, white flower pea plant is crossed with a short, purple flower pea plant.
Rajah 4 menunjukkan pokok kacang pea tinggi berbunga putih dikacukkan dengan pokok kacang pea rendah berbunga ungu.

- T : represents the dominant allele for tall plant
mewakili alel dominan bagi pokok tinggi
- t : represents the recessive allele for short plant
mewakili alel resesif bagi pokok rendah
- B : represents the dominant allele for purple flower
mewakili alel dominan bagi bunga ungu
- b : represents the recessive allele for white flower
mewakili alel resesif bagi bunga putih

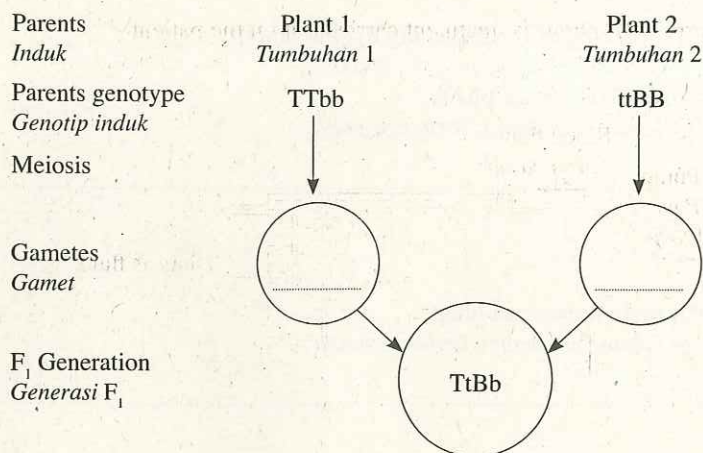


Diagram 4
Rajah 4

- (a) State the phenotype of the parents.
Nyatakan fenotip bagi induk tersebut.

Plant 1 / Tumbuhan 1:

Plant 2 / Tumbuhan 2:

[2 marks]

[2 markah]

4(a)

2

- (b) (i) Write the genotype of the gametes in the circles provided in Diagram 4.
Tulis genotip bagi gamet dalam bulatan yang disediakan pada Rajah 4.

[2 marks]

[2 markah]

4(b)(i)

2

- (ii) State the phenotype of F₁ generation.
Nyatakan fenotip bagi generasi F₁.

[1 mark]

[1 markah]

4(b)(ii)

1

- (c) Table 4 shows the genotype of the F₂ generation after F₁ generation is crossed with another F₁ generation. The total number of F₂ offsprings is 16.

Jadual 4 menunjukkan genotip generasi F₂ selepas generasi F₁ dikacukkan dengan generasi F₁ yang lain. Jumlah bilangan anak F₂ ialah 16.

Gametes from other F ₁ parent Gamet dari induk F ₁ yang lain	Gametes from F ₁ parent Gamet dari induk F ₁			
	TB	Tb	tB	tb
TB	TTBB	TTBb	TtBB	TtBb
Tb	TTBb	TTbb	TtBb	Ttbb
tB	TtBB	TtBb	ttBB	ttBb
tb	TtBb	Ttbb	ttBb	ttbb

Table 4
Jadual 4

State the probability of the following F_2 generation:

Nyatakan kebarangkalian generasi F_2 berikut:

- (i) Tall, white flower pea plant

Pokok kacang pea tinggi, berbunga putih

4(c)(i)

1

[1 mark]

[1 markah]

- (ii) Tall, purple flower pea plant

Pokok kacang pea tinggi, berbunga ungu

4(c)(ii)

1

[1 mark]

[1 markah]

- (d) In Table 4, circle genotype of F_2 generation for short, purple flower pea plant. Then determine the probability of F_2 generation for the phenotype.

Dalam Jadual 4, bulatkan genotip generasi F_2 bagi pokok kacang pea rendah berbunga ungu. Kemudian tentukan kebarangkalian generasi F_2 bagi fenotip tersebut.

4(d)

2

[2 marks]

[2 markah]

- (e) State the phenotype ratio of the offspring of F_2 generation in Table 4.

Nyatakan nisbah fenotip anak dalam generasi F_2 dalam Jadual 4.

Tall,
purple flower
*Tinggi,
bunga ungu*

Tall,
white flower
*Tinggi,
bunga putih*

Short,
purple flower
*Rendah,
bunga ungu*

Short,
white flower
*Rendah,
bunga putih*

4(e)

1

[1 mark]

[1 markah]

- (f) Based on Diagram 4 and Table 4, describe Mendel Second Law.

Berdasarkan Rajah 4 dan Jadual 4, huraikan Hukum Mendel Kedua.

4(f)

2

[2 marks]

[2 markah]

Total A4

12

- 5 Diagram 5.1 shows the conditions of the thorax during processes J and K in breathing mechanism.

Rajah 5.1 menunjukkan keadaan toraks semasa proses J dan proses K dalam mekanisme pernafasan.

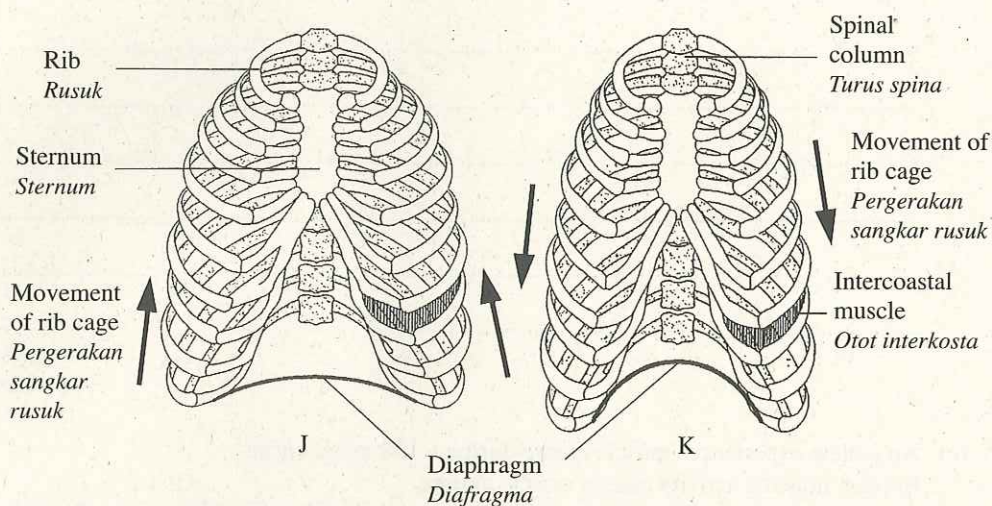


Diagram 5.1
Rajah 5.1

- (a) (i) Name processes J and K.
Namakan proses J dan proses K.

J :

K :

[2 marks]

[2 markah]

5(a)(i)

	2
--	---

- (ii) State three differences between processes J and K.
Nyatakan tiga perbezaan antara proses J dengan proses K.

Process J Proses J	Process K Proses K

[3 marks]

[3 markah]

5(a)(ii)

	3
--	---

- (b) Breathing is an involuntary process controlled by the respiratory centre in medulla oblongata.

Describe what happens to the rate of respiration of a climber at the peak of a mountain.
Pernafasan adalah proses luar kawal yang dikawal oleh pusat pernafasan dalam medula oblongata.

Jelaskan apa yang berlaku kepada kadar pernafasan bagi seorang pendaki apabila berada di puncak gunung yang tinggi.

.....

.....

.....

.....

.....

.....

[4 marks]
[4 markah]

5(b)

4

- (c) An athlete experiences muscle cramp during a 100 meter sprint.

Explain how the activity causes muscle cramp.

Seorang atlet mengalami kekejangan otot semasa larian pecut 100 meter. Terangkan bagaimana aktiviti tersebut menyebabkan kekejangan otot.

.....

.....

.....

.....

.....

[3 marks]
[3 markah]

5(c)

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 Diagram 6.1 shows a plant in two different conditions M and N.

Rajah 6.1 menunjukkan suatu tumbuhan dalam dua keadaan yang berbeza, M dan N.

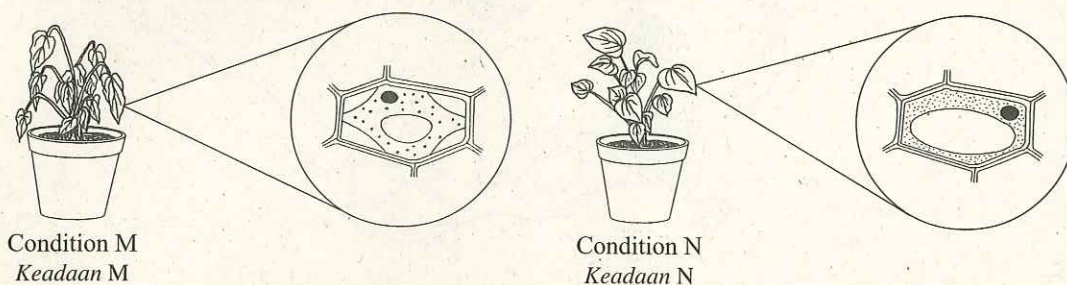


Diagram 6.1

Rajah 6.1

- (a) (i) Based on Diagram 6.1, explain what happens to the plant in condition M. [4 marks]

Berdasarkan Rajah 6.1, Terangkan apa yang akan berlaku kepada tumbuhan itu dalam keadaan M.

[4 markah]

- (ii) Explain **one** way which enables the plant in condition M to be as in condition N. [6 marks]

Terangkan **satu** kaedah yang membolehkan tumbuhan dalam keadaan M menjadi seperti di dalam keadaan N.

[6 markah]

- (b) A student carries out an experiment to investigate the percentage of red blood cell undergoes haemolysis when immersed in different concentration of sodium chloride solution.

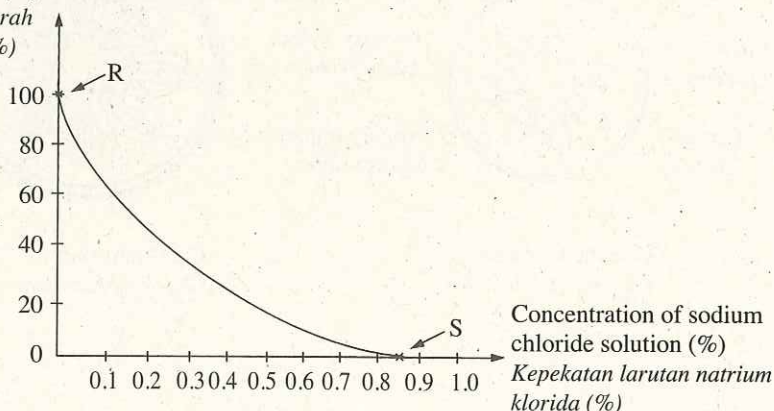
Seorang murid menjalankan eksperimen untuk menyiasat peratusan sel darah merah yang mengalami hemolisis apabila direndam ke dalam larutan natrium klorida berlainan kepekatan.

The following graph shows the result of the experiment.

Graf berikut menunjukkan keputusan eksperimen itu.

Percentage of red blood
undergoes haemolysis (%)

Peratusan sel darah merah
mengalami hemolisis (%)



Based on the graph, explain what happens to the red blood cells at R and S. [10 marks]

Berdasarkan kepada graf, terangkan apakah yang berlaku kepada sel darah merah pada R dan S. [10 markah]

7 Diagram 7.1 shows the development of follicles in ovarian cycle.

Rajah 7.1 menunjukkan perkembangan folikel dalam kitar ovari.

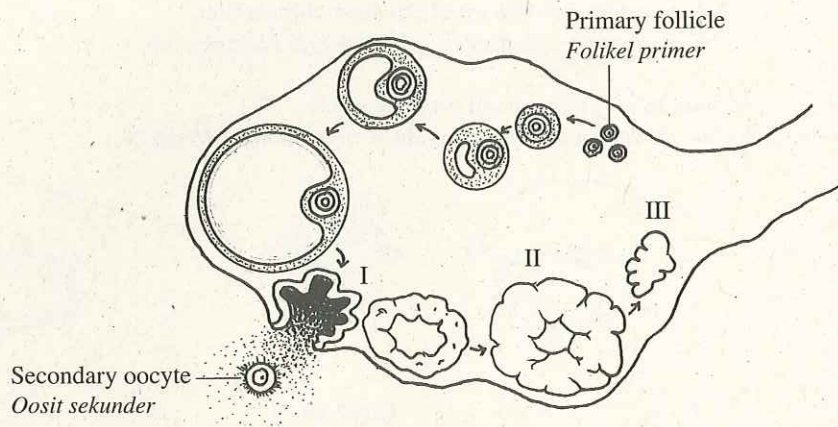


Diagram 7.1

Rajah 7.1

(a) Explain what happens during stages I and II in the ovarian cycle. [4 marks]

Terangkan apa yang berlaku semasa peringkat I dan peringkat II dalam kitar ovari. [4 markah]

(b) (i) A woman takes contraceptive pills to prevent pregnancy. The content of the pills inhibits the secretion of follicle stimulating hormone (FSH) by the pituitary gland. [3 marks]

Explain the effect of taking contraceptive pills on stage I in the ovarian cycle. [3 marks]

Seorang wanita mengambil pil perancang untuk mencegah kehamilan. Kandungan pil itu merencat perembesan hormon perangsang folikel (FSH) oleh kelenjar pituitari.

Terangkan kesan pengambilan pil perancang terhadap peringkat I dalam kitar ovari. [3 markah]

(ii) Explain what are the causes for stage III to occur and its effect. [3 marks]

Terangkan apa yang menyebabkan peringkat III berlaku dan kesannya. [3 markah]

(c) Diagram 7.2 shows the cross section of stems, X and Y of two dicotyledonous plants.

Rajah 7.2 menunjukkan keratan rentas batang X dan batang Y daripada dua tumbuhan dikotiledon.

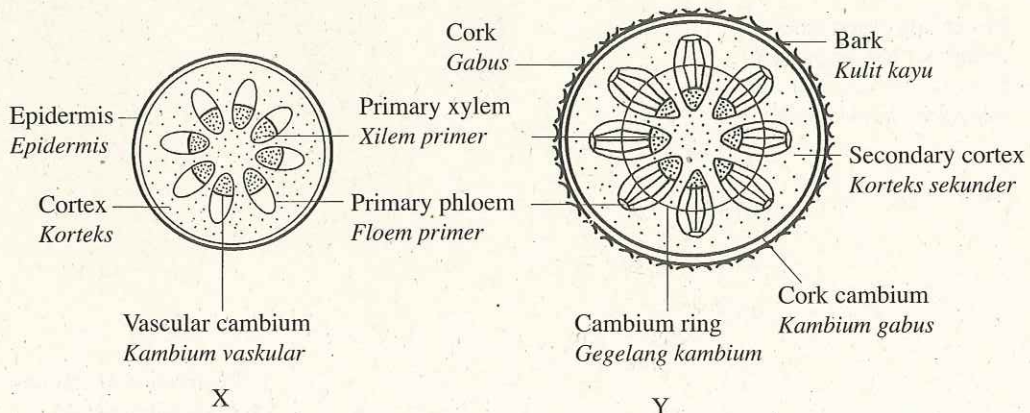


Diagram 7.2

Rajah 7.2

- (i) Stem X is from the plant that undergoes a primary growth. Stem Y is from the plant that undergoes a secondary growth.

Explain the differences in structure between stems X and Y.

[6 marks]

Batang X ialah daripada tumbuhan yang mengalami pertumbuhan primer. Batang Y ialah daripada tumbuhan yang mengalami pertumbuhan sekunder.

Terangkan perbezaan dalam struktur antara batang X dengan batang Y.

[6 markah]

- (ii) Diagram 7.3 shows the growth curve of a perennial plant.

Rajah 7.3 menunjukkan lengkung pertumbuhan bagi tumbuhan saka (bermusim).

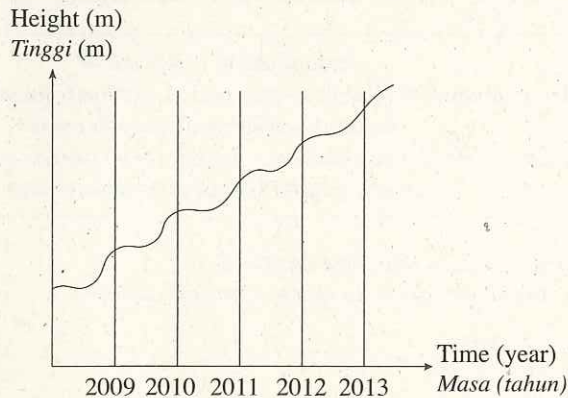


Diagram 7.3

Rajah 7.3

Explain the growth pattern of the plant.

[4 marks]

Terangkan corak pertumbuhan bagi tumbuhan itu.

[4 markah]

- 8 (a) Diagram 8.1 shows a food chain in a paddy field.

Rajah 8.1 menunjukkan satu rantai makanan di sawah padi.

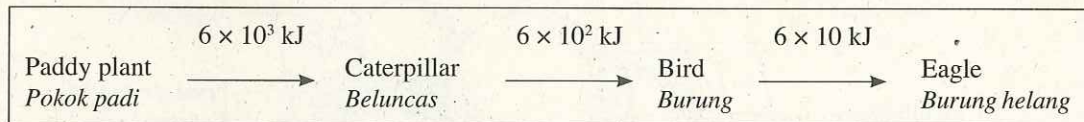


Diagram 8.1

Rajah 8.1

Explain the importance of each organism in the food chain to maintain ecosystem balance. [10 marks]

Terangkan kepentingan setiap organisma di dalam rantai makanan itu untuk mengekalkan keseimbangan ekosistem.

[10 markah]

- (b) Diagram 8.2 shows two types of human activities in an ecosystem.

Rajah 8.2 menunjukkan dua jenis aktiviti manusia dalam suatu ekosistem.



Diagram 8.2

Rajah 8.2

Explain the impact of each activity on the ecosystem.
Terangkan impak setiap aktiviti kepada ekosistem tersebut.

[10 marks]
[10 markah]

- 9 The following information is about eating habits of individuals U and W.
Maklumat berikut ialah berkaitan tabiat makan bagi individu U dan individu W.

Individual U / Individu U

Taking food at irregular time which causes frequent empty stomach
Makan tidak mengikut masa yang menyebabkan perut selalu kosong

Individual W / Individu W

Taking large amount of food in a short period of time followed by immediate self induced vomiting after each meal
Makan dengan banyak dalam masa yang singkat diikuti dengan memuntahkannya semula secara sengaja setiap kali selepas makan

- (a) Explain how the eating habits affect the health of:
Terangkan bagaimana tabiat makan itu mempengaruhi kesihatan:
- (i) individual U
individu U
 - (ii) individual W
individu W

[10 marks]
[10 markah]

- (b) Diagram 9 shows a set of nasi lemak.
Rajah 9 menunjukkan satu set nasi lemak.

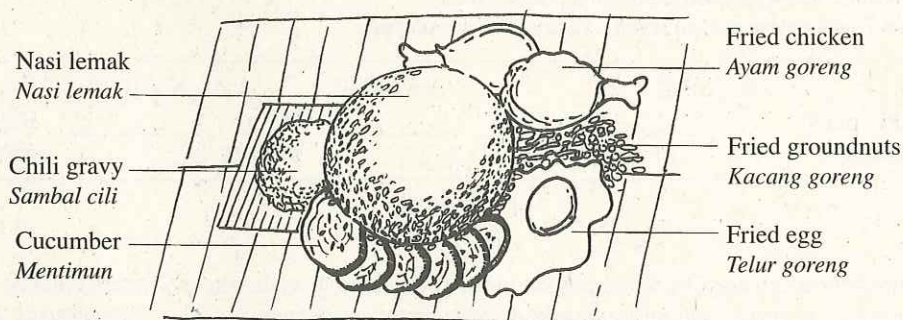


Diagram 9
Rajah 9

A girl consumes a set of nasi lemak daily as breakfast for a long period of time.

Discuss the good and the bad effects of the diet to her health.

[10 marks]

Seorang kanak-kanak perempuan mengambil satu set nasi lemak sebagai sarapan setiap hari dalam jangka masa yang panjang.

Bincangkan kesan baik dan kesan buruk diet itu terhadap kesihatannya.

[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

This question paper consists of two questions: **Question 1** and **Question 2**.

Kertas soalan ini mengandungi dua soalan: Soalan 1 dan Soalan 2.

Answer all question

Jawab semua soalan

- 1** Variation is the differences between organisms of the same species. Variation in plants can be affected by environmental factor such as pH value of the soil.

A group of students carried out an experiment to study the variation on the growth of ladies' fingers plants which is affected by pH value of the soil.

Variasi adalah perbezaan di antara organisma-organisma bagi spesies yang sama. Variasi dalam tumbuhan boleh disebabkan oleh faktor persekitaran seperti nilai pH tanah.

Sekumpulan pelajar menjalankan eksperimen untuk mengkaji variasi ke atas pertumbuhan pokok kacang bendi yang dipengaruhi oleh nilai pH tanah.

The following steps were carried out:

Langkah-langkah berikut telah dijalankan:

Step 1 : Five pots, A, B, C, D and E were prepared and filled with different types of soils.

Langkah 1 : Lima pasu, A, B, C, D dan E disediakan dan diisi dengan jenis tanah yang berlainan.

Step 2 : Pots A and B were filled with acidic soils. Pot C was filled with neutral soil. Pots D and E were filled with alkaline soils.

Langkah 2 : Pasu A dan pasu B diisi dengan tanah berasid. Pasu C diisi dengan tanah neutral. Pasu D dan pasu E diisi dengan tanah beralkali.

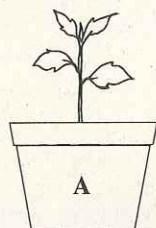
Step 3 : All the pots were planted with seedlings of ladies' fingers of the same size and species.

Langkah 3 : Kesemua pasu itu ditanam dengan anak benih kacang bendi yang sama saiz dan sama spesies.

Step 4 : All the seedlings were watered and placed under sunlight every day for two months.

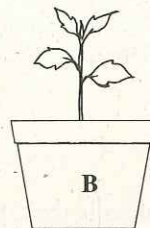
Langkah 4 : Kesemua anak benih itu disiram dengan air dan diletakkan di bawah cahaya matahari setiap hari selama dua bulan.

Diagram 1 shows the seedlings of the ladies' fingers in five pots.
Rajah 1 menunjukkan anak benih kacang bendi dalam lima buah pasu.

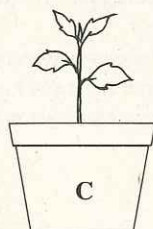


pH value : 6.0
Nilai pH : 6.0

Pots A and B filled with acidic soils
Pasu A dan pasu B diisi dengan tanah berasid

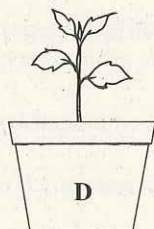


pH value : 6.5
Nilai pH : 6.5



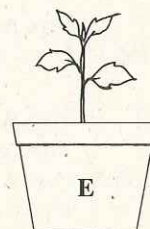
pH value : 7.0
Nilai pH : 7.0

Pots C filled with a
neutral soils
Pasu C diisi dengan
tanah neutral



pH value : 7.5
Nilai pH : 7.5

Pots D and E filled with alkaline soils
Pasu D dan pasu E diisi dengan tanah beralkali


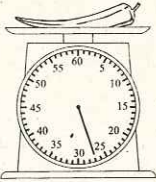


pH value : 8.0
Nilai pH : 8.0

Diagram 1
Rajah 1

The mass of two samples of ladies' fingers were taken randomly from each pot after two months. Table 1 shows the result of the experiment.

Jisim bagi dua sampel kacang bendi diambil secara rawak dari setiap pasu selepas dua bulan.
Jadual 1 menunjukkan keputusan eksperimen itu.

Pot Pasu	Soil pH pH tanah	Mass of the ladies' fingers (g) Jisim kacang bendi (g)	
		1	2
A	6.0		

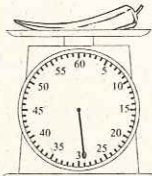
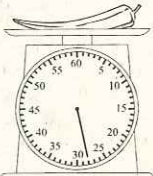
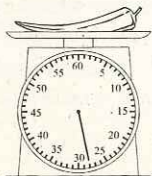
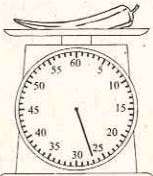
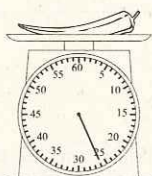
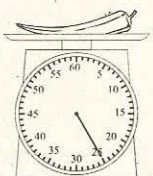

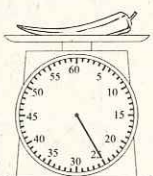
Pot Pasu	Soil pH pH tanah	Mass of the ladies' fingers (g) Jisim kacang bendi (g)	
		1	2
B	6.5		
C	7.0		
D	7.5		
E	8.0		

Table 1
Jadual 1

- (a) Record the mass of the ladies' fingers in the boxes provided in Table 1.
Rekodkan jisim kacang bendi dalam petak yang disediakan dalam Jadual 1.

[3 marks]
[3 markah]

1(a)

	3
--	---

1(b)(i)

3

- (b) (i) Based on Table 1, state **two** different observations.
*Berdasarkan Jadual 1, nyatakan **dua** pemerhatian yang berbeza.*
 Observation 1:
Pemerhatian 1:

.....

.....

Observation 2:

Pemerhatian 2:

.....

.....

[3 marks]

[3 markah]

- (ii) State the inferences which correspond to the observation in 1(b)(i).
Nyatakan inferens yang sepadan dengan pemerhatian di 1(b)(i)
 Inference from observation 1:
Inferens daripada pemerhatian 1:

.....

.....

Inference from observation 2:

Inferens daripada pemerhatian 2:

.....

.....

[3 marks]

[3 markah]

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

Variable <i>Pembolehubah</i>	Method to handle the variable <i>Cara mengendalikan pembolehubah</i>
Manipulated variable <i>Pembolehubah dimanipulasikan</i>	
.....
.....
Responding variable <i>Pembolehubah bergerak balas</i>	
.....
.....
Constant variable <i>Pembolehubah dimalarakan</i>	
.....
.....

Table 2

Jadual 2

[3 marks]

[3 markah]

1(c)

3

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

For
Examiner's
Use

1(d)

	3
--	---

[3 marks]

[3 markah]

- (e) (i) Construct a table and record all the data collected from this experiment.

Your table should have the following titles:

Bina satu jadual dan rekodkan semua data yang dikumpul daripada eksperimen ini.

Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- pH value of soil
Nilai pH tanah
- Mass of the ladies' fingers 1 and 2
Jisim kacang bendi 1 dan kacang bendi 2
- Average mass of ladies's fingers
Jisim purata kacang bendi

1(e)(i)

	3
--	---

[3 marks]

[3 markah]

- (ii) Use the graph paper provided on page 166 to answer this question.

Using the data in 1(e)(i), draw a bar chart of the average mass of the ladies' fingers against the pH values.

Guna kertas graf yang disediakan di halaman 166 untuk menjawab soalan ini.

Menggunakan data di 1(e)(i), lukis sebuah carta bar bagi jisim purata kacang bendi melawan nilai pH.

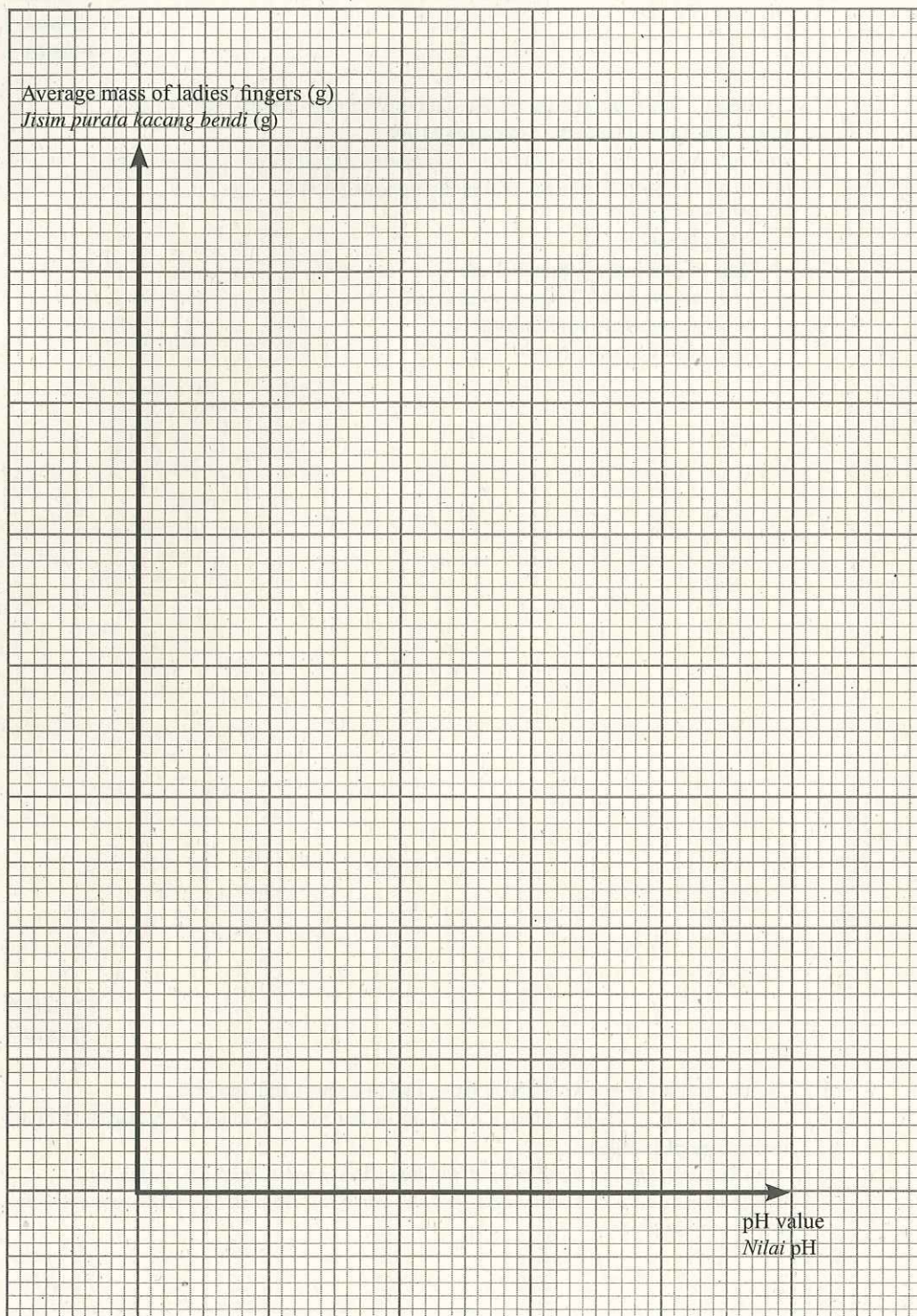
1(e)(ii)

	3
--	---

[3 marks]

[3 markah]

The average mass of the ladies' fingers against the pH value.
Jisim purata kacang bendi melawan nilai pH.



- (f) Based on the bar chart in 1(e)(ii) and the results of the experiment in Table 1, state the type of the variation.

Explain your answer.

Berdasarkan carta bar di 1(e)(ii) dan keputusan eksperimen dalam Jadual 1, nyatakan jenis variasi itu.

Terangkan jawapan anda.

.....

.....

.....

.....

[3 marks]

[3 markah]

1(f)

	3
--	---

- (g) Another group of students carried out the same experiment by using the soil at pH 6.5.

The plants were watered once a week instead of every day.

Predict the average mass of the ladies' fingers.

Explain your prediction.

Sekumpulan murid yang lain menjalankan eksperimen yang sama dengan menggunakan tanah pH 6.5. Tanaman itu disiram sekali dalam seminggu berbanding tiap-tiap hari.

Ramalkan jisim purata bagi kacang bendi itu.

Terangkan ramalan anda.

.....

.....

.....

.....

[3 marks]

[3 markah]

1(g)

	3
--	---

- (h) Based on the result of this experiment, state the operational definition for the variation.

Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi bagi variasi.

.....

.....

.....

[3 marks]

[3 markah]

1(h)

	3
--	---

- (i) The following list are factors that cause variation in plants.

Senarai berikut ialah faktor-faktor yang menyebabkan variasi pada tumbuhan.

Temperature Suhu	Gamma rays Sinar gamma	Light intensity Keamatan cahaya
Pesticides Racun perosak	Amount of fertilizers Jumlah baja	Type of soil Jenis tanah

Classify the factors that cause continuous variation and discontinuous variation in Table 3.
Kelaskan faktor-faktor yang menyebabkan variasi selang dan variasi tak selang dalam Jadual 3.

Continuous variation <i>Variasi selang</i>	Discontinuous variation <i>Variasi tak selang</i>

Table 3
Jadual 3

[3 marks]
[3 markah]

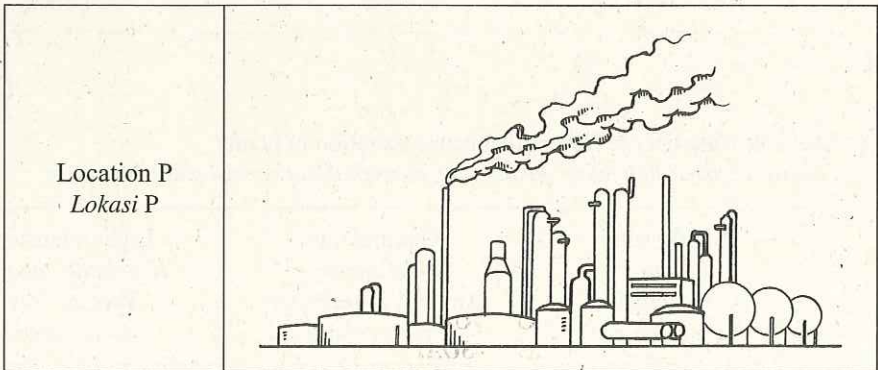
1(i)

3

Total 1

33

- 2 Pollutants in the form of small particles and harmful gases enter the air from various sources. Carbon and dust particles are pollutants produced by the burning of fossil fuels. This will cause air pollution.
- Diagram 2 shows three locations, P, Q and R in an area which have different Air Pollution Index (API).
- Air Pollution Index (API) is used to determine the level of air pollution.
- Bahan pencemar dalam bentuk zarah-zarah kecil dan gas berbahaya memasuki udara dari pelbagai sumber. Zarah-zarah karbon dan habuk ialah bahan pencemar yang dihasilkan oleh pembakaran bahan api fosil. Ini akan menyebabkan pencemaran udara.*
- Rajah 2 menunjukkan tiga lokasi P, Q dan R di sebuah kawasan yang mempunyai Indeks Pencemaran Udara (IPU) yang berbeza.*
- Indeks Pencemaran Udara (IPU) digunakan untuk menentukan tahap pencemaran udara.*



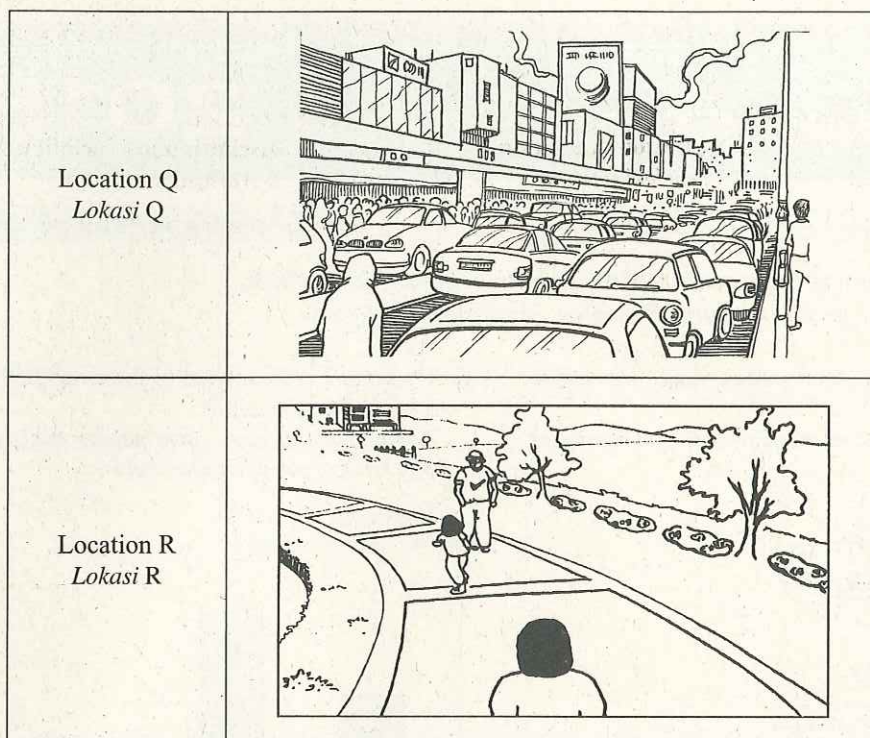


Diagram 2
Rajah 2

Based on the above information, plan an experiment to compare the amount of solid air pollutants in locations P, Q and R.

The planning of your experiment must include the following aspects:

Berdasarkan maklumat di atas, rancang satu eksperimen untuk membandingkan kuantiti bahan pencemar udara pepejal di lokasi P, Q dan R.

Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

- Problem statement
Pernyataan masalah
- Hypothesis
Hipotesis
- Variables
Pembolehubah
- List of apparatus and materials
Senarai radas dan bahan
- Procedure of the experiment
Prosedur eksperimen
- Presentation of data
Persembahan data

[17 marks]
[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT