

# SPM EXAMINATION PAPER 2012

## PAPER 1

Time: 1 hour 15 minutes

This question paper consists of 50 questions. Answer all questions.  
Kertas soalan ini mengandungi 50 soalan. Jawab semua soalan.

- 1 Diagram 1 shows a plant cell.  
Rajah 1 menunjukkan satu sel tumbuhan.

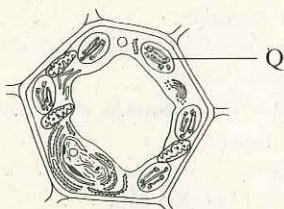


Diagram 1  
Rajah 1

What is organelle Q?  
Apakah organel Q?

- |                            |                                  |
|----------------------------|----------------------------------|
| A Vacuole<br>Vakuol        | C Mitochondrion<br>Mitokondrion  |
| B Chloroplast<br>Kloroplas | D Golgi apparatus<br>Jasad Golgi |

- 2 Which organelle is involved in the formation of spindle fibres?  
Organel manakah yang terlibat dalam pembentukan gelendung?

- |                       |                         |
|-----------------------|-------------------------|
| A Nucleus<br>Nukleus  | C Lysosome<br>Lisosom   |
| B Ribosome<br>Ribosom | D Centriole<br>Sentriol |

- 3 The following statements are about organelle X.  
Pernyataan berikut adalah mengenai organel X.

- Contain hydrolytic enzymes  
Mengandungi enzim hidrolitik
- Eliminate worn out mitochondrion  
Memusnahkan mitokondrion sudah lesu

What is organelle X?  
Apakah organel X?

- |   |
|---|
| A Rough endoplasmic reticulum<br>Jalinan endoplasma kasar |
| B Golgi apparatus<br>Jasad Golgi                          |

- |                       |
|-----------------------|
| C Lysosome<br>Lisosom |
| D Ribosome<br>Ribosom |

- 4 Diagram 2 shows a type of animal tissue.  
Rajah 2 menunjukkan sejenis tisu haiwan.

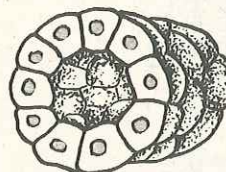


Diagram 2  
Rajah 2

What is the tissue?  
Apakah tisu itu?

- |                              |  |
|------------------------------|--|
| A Nerve tissue<br>Tisu saraf | C Epithelial tissue<br>Tisu epitelium  |
| B Muscle tissue<br>Tisu otot | D Connective tissue<br>Tisu penghubung |

- 5 Diagram 3 shows the initial level of 20% sucrose solution in a capillary tube at the beginning of the experiment.

Rajah 3 menunjukkan aras awal bagi 20% larutan sukrosa di dalam satu tiub kapilari pada permulaan eksperimen.

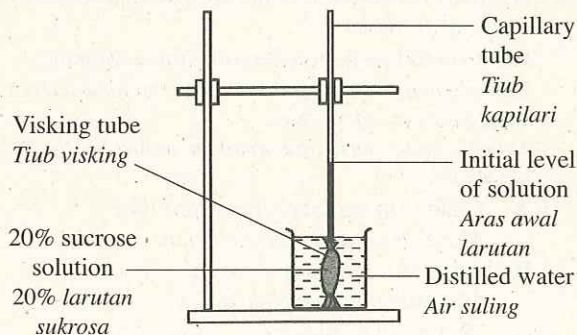
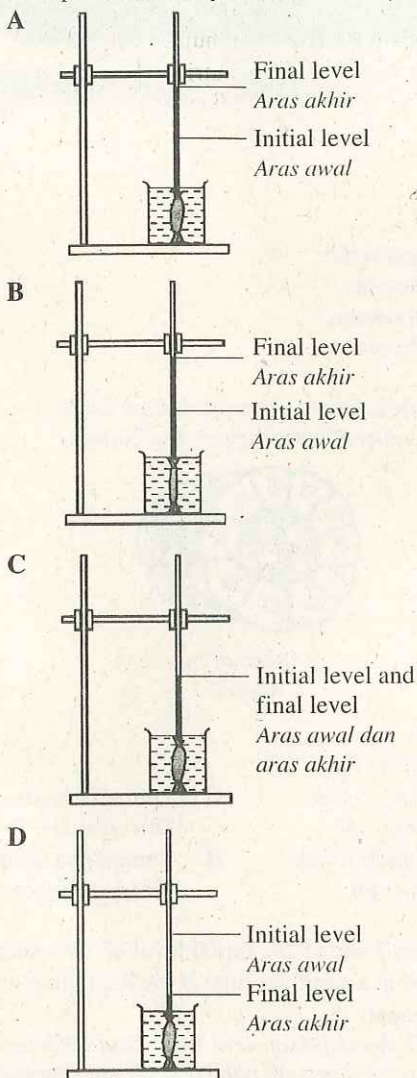


Diagram 3  
Rajah 3

Which diagram shows the correct result at the end of the experiment?

Rajah manakah yang menunjukkan keputusan yang betul pada akhir eksperimen?



6 A farmer found out that his crops wilt after using a type of fertiliser.

What should he do to overcome this problem?

Seorang petani mendapati tanamannya layu selepas menggunakan sejenis baja.

Apakah yang perlu dia lakukan untuk mengatasi masalah ini?

- A Change to another type of fertiliser  
Menukar kepada baja jenis lain
- B Add salt to the soil  
Menambah garam pada tanah
- C Add more fertiliser  
Menambah lebih banyak baja
- D Water the plants  
Menyiram pokok-pokok itu

7 A housewife noticed that the cucumber slices become soft when immersed in salt solution.

Which process causes the softening of the cucumber slices?

Seorang suri rumah mendapati bahawa hirisan timun menjadi lembik apabila direndam ke dalam larutan garam.

Proses manakah yang menyebabkan hirisan timun itu menjadi lembik?

- A Water diffuses into the cucumber slices by osmosis  
Air meresap masuk ke hirisan timun secara osmosis
- B Water diffuses out from the cucumber slices by osmosis  
Air meresap keluar daripada hirisan timun secara osmosis
- C Salt moves into the cucumber slices by active transport  
Garam memasuki hirisan timun secara pengangkutan aktif
- D Salt moves out from the cucumber slices by active transport  
Garam keluar daripada hirisan timun secara pengangkutan aktif

8 Which mineral is needed by a person suffering from goitre?

Apakah mineral yang diperlukan oleh seorang penghidap goiter?

- |                  |                      |
|------------------|----------------------|
| A Zinc<br>Zink   | C Iodine<br>Iodin    |
| B Ferum<br>Ferum | D Calcium<br>Kalsium |

9 Hormones like testosterone and oestrogen are lipids.

What is the type of lipid in testosterone and oestrogen.

Hormon seperti testosteron dan estrogen adalah lipid.

Apakah jenis lipid dalam testosteron dan estrogen?

- |                 |                               |
|-----------------|-------------------------------|
| A Wax<br>Lilin  | C Steroids<br>Steroid         |
| B Fats<br>Lemak | D Phospholipids<br>Fosfolipid |

10 Sample R is tested with Benedict's solution. It produced a brick-red precipitate.

What is R?

Sampel R diuji dengan larutan Benedict. Ia menghasilkan mendakan merah bata.

Apakah R?

- |                      |                         |
|----------------------|-------------------------|
| A Lactose<br>Laktosa | C Glycogen<br>Glikogen  |
| B Sucrose<br>Sukrosa | D Cellulose<br>Selulosa |



- 11 Which class of food can only be digested in the stomach with the presence of hydrochloric acid?  
*Kelas makanan yang manakah hanya dapat dicernakan di dalam perut dengan kehadiran asid hidroklorik?*

A Lipid Lipid	C Vitamin Vitamin
B Protein Protein	D Carbohydrate Karbohidrat

- 12 What is the significance of meiosis?  
*Apakah kepentingan meiosis?*

A Cloning  
Pengklonan

B Tissue culture  
Kultur tisu

C Produce haploid cells  
Menghasilkan sel haploid

D Produce diploid cells  
Menghasilkan sel diploid

- 13 The following information shows the characteristics of a child with a genetic disorder.  
*Maklumat berikut menunjukkan ciri-ciri seorang kanak-kanak yang mengalami kecacatan genetik.*

- Slanted eyes  
Mata sepet
- Protruding tongue  
Lidah terjelir
- Mentally retarded  
Terencat akal

What is the cause of this genetic disorder?  
*Apakah punca kecacatan genetik ini?*

A Synapsis did not occur during prophase I  
*Sinapsis tidak berlaku semasa profasa I*

B Cytokinesis did not occur during telophase II  
*Sitokinesis tidak berlaku semasa telofasa II*

C Nucleus membrane did not form during telophase II  
*Membran nukleus tidak terbentuk semasa telofasa II*

D Sister chromatid did not separate during anaphase II  
*Pasangan kromatid tidak terpisah semasa anafasa II*

- 14 The diploid chromosomal number of a horse is 64. How many chromosomes are in the gametes?  
*Nombor kromosom diploid bagi seekor kuda ialah 64.*

*Berapakah nombor kromosom dalam gamet itu?*

A 16	C 64
B 32	D 128

- 15 The following information shows nutrition in organism.

*Maklumat berikut menunjukkan nutrisi dalam suatu organisma.*

Organism P : Lives in human intestines and absorbs nutrients Organisma P : Tinggal di dalam usus manusia dan menyerap nutrien
--

What is the type of nutrition of organism P?  
*Apakah jenis nutrisi organisma P?*

A Autotrophism Autotrofisme	C Parasitism Parasitisme
B Saprophytism Saprofitisme	D Holozoic Holozoik

- 16 Which group of food prevents constipation?  
*Kumpulan makanan manakah yang mencegah sembelit?*

A Spinach, corn cereals, apple  
*Bayam, bijirin jagung, epal*

B Fish, seafood soup, chocolate cake  
*Ikan, sup makanan laut, kek coklat*

C Wholemeal bread, low fat milk, chicken burger  
*Roti berserat tinggi, susu rendah lemak, burger ayam*

D Orange juice, cream of mushroom soup, cheese biscuit  
*Jus oren, sup krim cendawan, biskuit keju*

- 17 Which statement explains why plants are unable to grow well if they are planted near industrial area?  
*Pernyataan manakah yang menerangkan mengapa tumbuh-tumbuhan tidak tumbuh dengan baik sekiranya ditanam berhampiran kawasan perindustrian?*

A The concentration of carbon dioxide is too low for photosynthesis to take place  
*Kepekatan karbon dioksida terlalu rendah untuk fotosintesis berlaku*

B The concentration of oxygen is too high for photosynthesis to take place  
*Kepekatan oksigen terlalu tinggi untuk fotosintesis berlaku*

C The increase in surrounding temperature will affect the rate of photosynthesis  
*Peningkatan suhu sekeliling akan memberi kesan ke atas kadar fotosintesis*

D The presence of smoke, dust and fumes decrease the light intensity which affect the rate of photosynthesis  
*Kehadiran asap, debu dan jelaga mengurangkan keamatan cahaya yang akan memberi kesan ke atas kadar fotosintesis*



- 18 Diagram 4 shows a part of human digestive system.

Rajah 4 menunjukkan sebahagian daripada sistem pencernaan manusia.

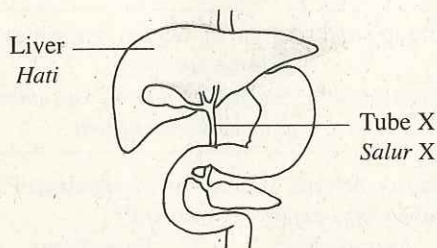


Diagram 4  
Rajah 4

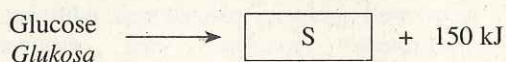
What will happen if tube X is blocked?

Apakah yang akan berlaku sekiranya salur X tersumbat?

- A Digested food cannot be carried to the liver  
*Makanan tercerna tidak dapat diangkut ke hati*
- B The rate of digestion of protein will decrease  
*Kadar pencernaan protein akan berkurang*
- C The rate of digestion of fats will decrease  
*Kadar pencernaan lemak akan berkurang*
- D Bile cannot be produced by the liver  
*Hempedu tidak dapat dihasilkan oleh hati*

- 19 The following equation shows anaerobic respiration in muscle cells.

Persamaan berikut menunjukkan respirasi anaerobik dalam sel otot.



What is S?

Apakah S?

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

- 20 Diagram 5 shows a part of human thorax.

Rajah 5 menunjukkan satu bahagian toraks manusia.

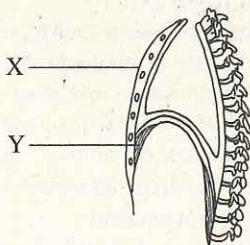


Diagram 5  
Rajah 5

What happens to structure X and Y during inhalation?

Apakah yang berlaku pada struktur X dan struktur Y semasa menarik nafas?

	X	Y
A	Moves downwards and inwards <i>Bergerak ke bawah dan ke dalam</i>	Contracts <i>Mengecut</i>
B	Moves upwards and outwards <i>Bergerak ke atas dan keluar</i>	Contracts <i>Mengecut</i>
C	Moves downwards and inwards <i>Bergerak ke bawah dan ke dalam</i>	Relaxes <i>Mengendur</i>
D	Moves upwards and outwards <i>Bergerak ke atas dan keluar</i>	Relaxes <i>Mengendur</i>

- 21 Diagram 6 is a graph showing the release and intake of oxygen by plant.

Rajah 6 adalah graf yang menunjukkan pembebasan dan pengambilan oksigen oleh suatu tumbuhan.

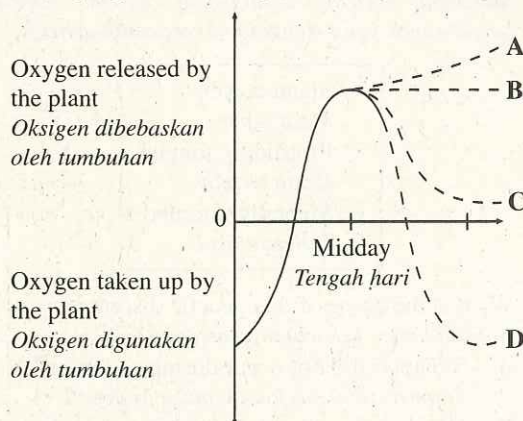


Diagram 6  
Rajah 6

Which of the curves A, B, C or D shows the effect of the increasing light intensity after midday?

Antara lengkungan A, B, C dan D, yang manakah menunjukkan kesan daripada peningkatan keamatan cahaya selepas tengah hari?

- 22 The following information is about two conditions of planting plants R and S.

Maklumat berikut adalah tentang dua keadaan penanaman tumbuhan R dan tumbuhan S.

Plant R	: Planted in highland
Tumbuhan R	: Ditanam di tanah tinggi
Plant S	: Planted in waterlogged area
Tumbuhan S	: Ditanam di kawasan air bertakung



Which of the following are the products of respiration of the roots of plants R and S?

Antara yang berikut, yang manakah adalah hasil respirasi akar bagi tumbuhan R dan tumbuhan S?

	Plant R <i>Tumbuhan R</i>	Plant S <i>Tumbuhan S</i>
A	Carbon dioxide and water <i>Karbon dioksida dan air</i>	Ethanol and carbon dioxide <i>Etanol dan karbon dioksida</i>
B	Lactic acid and carbon dioxide <i>Asid laktik dan karbon dioksida</i>	Ethanol and carbon dioxide <i>Etanol dan karbon dioksida</i>
C	Ethanol and carbon dioxide <i>Etanol dan karbon dioksida</i>	Lactic acid and carbon dioxide <i>Asid laktik dan karbon dioksida</i>
D	Ethanol and carbon dioxide <i>Etanol dan karbon dioksida</i>	Carbon dioxide and water <i>Karbon dioksida dan air</i>

- 23 Which pair of organisms shows commensalism?  
*Pasangan organisma manakah yang menunjukkan komensalisme?*

- A Algae and fungi  
*Alga dan kulat*  
B Flea and cat  
*Kutu dan kucing*  
C Shark and remora  
*Ikan yu dan ikan remora*  
D Rhizobium and legume  
*Rhizobium dan legum*

- 24 Diagram 7 shows ecosystem in a pond.  
*Rajah 7 menunjukkan ekosistem dalam sebuah kolam.*

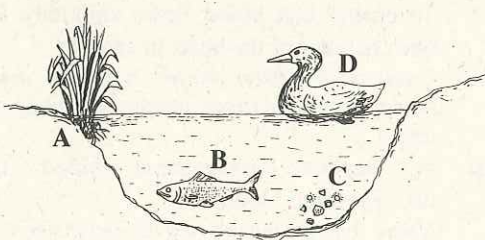


Diagram 7  
*Rajah 7*

Which of the organisms labelled A, B, C or D is at the highest trophic level?

Antara organisma berlabel A, B, C dan D, yang manakah berada pada aras trof tertinggi?

- 25 Diagram 8 shows the process carried out by a farmer to make compost.

*Rajah 8 menunjukkan proses yang dilakukan oleh seorang petani untuk membuat kompos.*

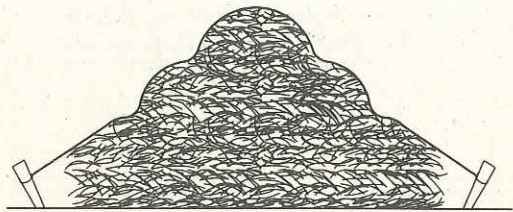


Diagram 8  
*Rajah 8*

Which organism involved in this process?

*Organisma manakah yang terlibat dalam proses ini?*

- A Algae  
*Alga*  
B Virus  
*Virus*  
C Bacteria  
*Bakteria*  
D Protozoa  
*Protozoa*

- 26 Table 1 shows the result of an experiment to estimate the number of plant P in 10 quadrats, each measuring 1 m × 1 m.

*Jadual 1 menunjukkan keputusan eksperimen untuk menganggarkan bilangan tumbuhan P dalam kuadrat, yang setiapnya berukuran 1 m × 1 m.*

Quadrat number <i>Nombor kuadrat</i>	1	2	3	4	5	6	7	8	9	10
Number of plant P <i>Bilangan tumbuhan P</i>	10	0	15	20	0	0	8	12	0	16

Table 1  
*Jadual 1*

Calculate the frequency of plant P.

*Hitung frekuensi tumbuhan P.*

- A 20 %  
B 40 %  
C 60 %  
D 100 %

- 27 What is the pioneer species in a bareland?

*Apakah spesies perintis di tanah gundul?*

- A Trees  
*Pokok*  
B Shrubs  
*Tumbuhan renek*  
C Grasses  
*Rumput*  
D Herbaceous plants  
*Tumbuhan herba*



- 28 Diagram 9 shows the formation of acid rain.  
Rajah 9 menunjukkan pembentukan asid.

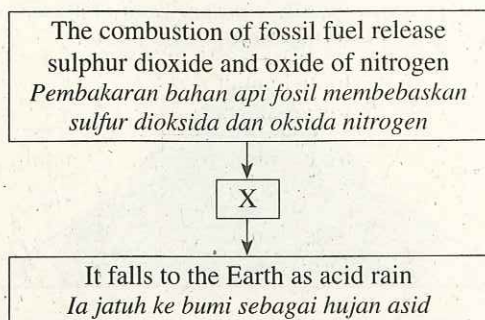


Diagram 9  
Rajah 9

Which of the following refers to X?

Antara yang berikut, yang manakah merujuk kepada X?

- A Combines with hydrogen  
*Bergabung dengan hydrogen*
  - B Combines with dilute acid  
*Bergabung dengan asid cair*
  - C Combines with carbon dioxide  
*Bergabung dengan karbon dioksida*
  - D Combines with water vapour  
*Bergabung dengan wap air*
- 29 Which way can reduce pollution?  
*Cara manakah yang dapat mengurangkan pencemaran?*
- A Use plastic bags  
*Guna beg plastik*
  - B Use leaded petrol  
*Guna petrol berplumbum*
  - C Use energy saving bulbs  
*Guna lampu yang menjimatkan tenaga*
  - D Use styrofoam containers  
*Guna bekas stirobusa*
- 30 Diagram 10 shows a lake located near an agricultural land.  
*Rajah 10 menunjukkan satu tasik yang terletak berdekatan kawasan pertanian.*

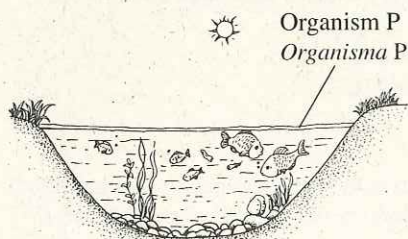


Diagram 10  
Rajah 10

What is organism P and its effect on the lake?  
Apakah organisma P dan kesannya kepada tasik itu?

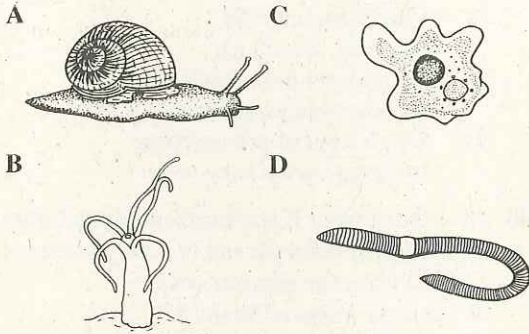
	Organism P <i>Organisma P</i>	Effect to the lake <i>Kesan kepada tasik</i>
A	Bacteria <i>Bakteria</i>	Decreases biochemical oxygen demand <i>Mengurangkan keperluan oksigen biokimia</i>
B	Algae <i>Alga</i>	Restricts the penetration of light into the lake <i>Menghalang penembusan cahaya ke dalam tasik</i>
C	Water hyacinths <i>Keladi bunting</i>	Provides habitat for other organisms <i>Menyediakan habitat untuk organisma lain</i>
D	Mosquito larvae <i>Larva nyamuk</i>	Food for fish <i>Makanan kepada ikan</i>

- 31 Which of the following substance transports oxygen?  
*Antara bahan berikut, yang manakah mengangkut oksigen?*
- A Haemolymph  
*Hemolimfa*
  - B Haemoglobin  
*Hemoglobin*
  - C Fibrinogen  
*Fibrinogen*
  - D Plasma  
*Plasma*
- 32 What is the function of septum in a heart?  
*Apakah fungsi septum dalam jantung?*
- A To ensure that blood flows smoothly from one chamber of the heart to another  
*Untuk memastikan darah mengalir dengan lancar dari satu ruang jantung ke ruang yang lain*
  - B To separate oxygenated blood from deoxygenated blood  
*Untuk mengasingkan darah beroksigen dan darah terdeoksigen*
  - C To ensure that the heart is divided into two sides  
*Untuk memastikan jantung dibahagikan kepada dua bahagian*
  - D To strengthen the structure of the heart  
*Untuk menguatkan struktur jantung*



- 33 Which organism has the largest total surface area to volume (TSA/V) ratio?

Organisma manakah yang mempunyai nisbah jumlah luas permukaan per isi padu (JLP / I) yang paling besar?



- 34 A patient who is bed ridden and cannot move for a long time has an excess amount of interstitial fluid in his body.

Which statement is the best to explain the condition?

Seorang pesakit yang terbaring lama dan tidak boleh bergerak dalam jangka masa yang lama biasanya mempunyai lebih cecair interstis di dalam badannya.

Pernyataan manakah yang terbaik menerangkan keadaan itu?

- A The lymphatic valve cannot close properly  
Injap limfa tidak boleh tertutup rapat
- B The lymphatic nodes are blocked  
Nodus limfa tersumbat
- C No muscle contraction to help lymphatic flow  
Tiada pengecutan otot untuk membantu pengaliran limfa
- D Filtration in the kidney is less so water accumulates in the body  
Penurasan dalam ginjal kurang oleh itu air berkumpul di dalam badan

- 35 Diagram 11 shows a cross-section of a bird's thorax.

Rajah 11 menunjukkan keratan rentas toraks seekor burung.

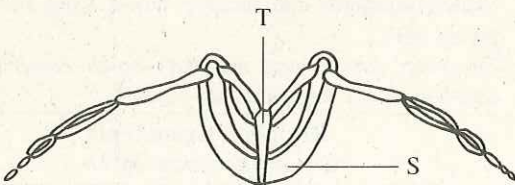


Diagram 11  
Rajah 11

What are S and T?  
Apakah S dan T?

	S	T
A	Pectoralis major Pektoralis major	Sternum Sternum
B	Pectoralis major Pektoralis major	Humerus Humerus
C	Pectoralis minor Pektoralis minor	Sternum Sternum
D	Pectoralis minor Pektoralis minor	Humerus Humerus

- 36 Which pair of bones form ball-and-socket joint?  
Pasangan tulang manakah yang membentuk sendi lesung?

- A Femur and tibia  
Femur dan tibia
- B Tibia and fibula  
Tibia dan fibula
- C Humerus and radius  
Humerus dan radius
- D Humerus and scapula  
Humerus dan skapula

- 37 Which of the following adaptations help plants to float?

Antara penyesuaian berikut, manakah yang membantu tumbuhan untuk terapung?

- I Broad leaves  
Daun lebar
- II Air sacs  
Ruang udara
- III Turgid cells  
Sel segah
- IV Woody stems  
Batang berkayu
- 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

- 38 Diagram 12 shows a human joint.

Rajah 12 menunjukkan sendi pada manusia.

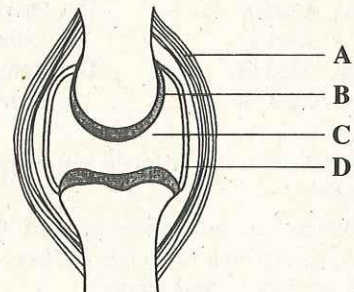


Diagram 12  
Rajah 12

Which of the part A, B, C or D lubricates the joint?  
Antara bahagian A, B, C dan D yang manakah melincirkan pergerakan sendi?

- 39 Diagram 13 shows parts of human brain.  
Rajah 13 menunjukkan bahagian-bahagian otak manusia.

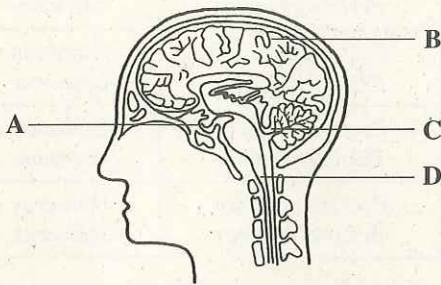


Diagram 13  
Rajah 13

Which of the part A, B, C or D coordinates body movement?

Antara bahagian A, B, C dan D, yang manakah mengkoordinasi pergerakan badan?

- 40 Diagram 14 shows the longitudinal section of human kidney.

Rajah 14 menunjukkan keratan memanjang ginjal manusia.

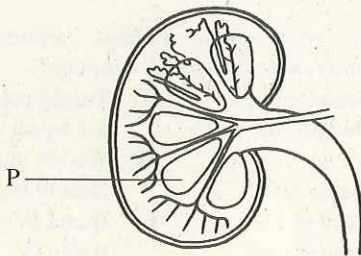


Diagram 14  
Rajah 14

What is P?

Apakah P?

- |                     |                                 |
|---------------------|---------------------------------|
| A Cortex<br>Korteks | C Pelvis<br>Pelvis              |
| B Medulla<br>Medula | D Renal artery<br>Arteri ginjal |

- 41 A farmer wants to ripen his mangoes quickly for sale.

Which hormone should be used for this purpose?

Seorang petani mahu menjadikan buah mangganya cepat masak untuk dijual.

Apakah hormon yang perlu digunakan untuk tujuan ini?

- |                       |                            |
|-----------------------|----------------------------|
| A Auxin<br>Auksin     | C Gibberellin<br>Giberilin |
| B Ethylene<br>Etilena | D Cytokinin<br>Sitokinin   |

- 42 Which of the following stimulates ovulation?  
Antara yang berikut, manakah yang merangsangkan pengovulan?

- A A high level of LH  
Aras LH yang tinggi  
B A high level of FSH  
Aras FSH yang tinggi  
C A high level of oestrogen  
Aras estrogen yang tinggi  
D A high level of progesterone  
Aras progesteron yang tinggi

- 43 M is the number of spermatozoa formed from one primary spermatocyte and N is the number of ova formed from one primary oocyte.

What is the value of M and N?

M adalah bilangan spermatozoa yang terbentuk daripada satu spermatosit primer dan N adalah bilangan ovum yang terbentuk daripada satu oosit primer.

Apakah nilai M dan N?

	M	N
A	1	1
B	1	4
C	4	1
D	4	4

- 44 The following statements are the characteristics of an organism.

Pernyataan berikut adalah ciri-ciri suatu organisma.

- Produce its own food  
Menghasilkan makanan sendiri
- Grow on other plant  
Tumbuh di atas pokok lain

Which organism has the characteristics?

Organisma manakah yang mempunyai ciri-ciri tersebut?

- |                        |                           |
|------------------------|---------------------------|
| A Epizotes<br>Epizoit  | C Epiphytes<br>Epifit     |
| B Parasites<br>Parasit | D Saprophytes<br>Saprofit |

- 45 Which recipient can receive blood from blood group AB?

Penerima darah yang manakah boleh menerima darah daripada kumpulan darah AB?

	Recipient's genotype Genotip penerima darah
A	I <sup>A</sup> I <sup>B</sup>
B	I <sup>A</sup> I <sup>O</sup>
C	I <sup>B</sup> I <sup>O</sup>
D	I <sup>O</sup> I <sup>O</sup>



- 46 Which is the correct pairing of nitrogenous bases in a DNA molecule?

*Pasangan bes bernitrogen manakah yang betul dalam molekul DNA?*

- A Adenine with guanine  
*Adenina dengan guanina*
- B Adenine with thymine  
*Adenina dengan timina*
- C Guanine with thymine  
*Guanina dengan timina*
- D Cytosine with thymine  
*Sitosina dengan timina*

- 47 Diagram 15 shows a schematic diagram of the sex inheritance.

*Rajah 15 menunjukkan rajah skema pewarisan seks.*

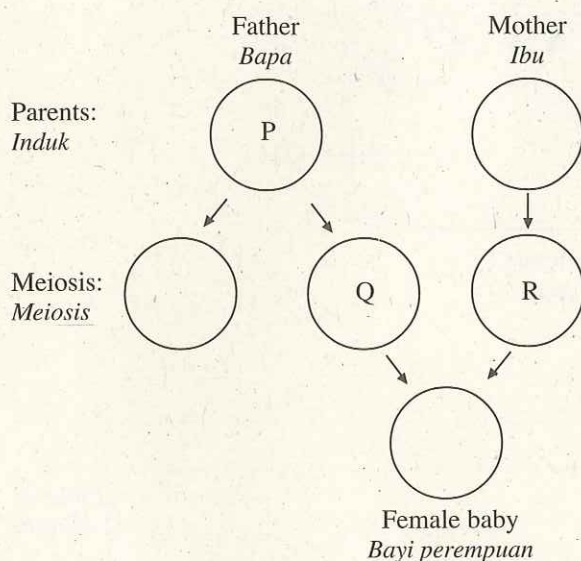


Diagram 15  
*Rajah 15*

What is the possible number of chromosomes for P, Q and R?

*Apakah kemungkinan jumlah kromosom P, Q dan R?*

	P	Q	R
A	44 + XY	22 + X	22 + X
B	44 + XY	22 + Y	22 + X
C	44 + XX	22 + X	22 + X
D	44 + XX	22 + Y	22 + X

- 48 Which statement is correct about discontinuous variation?

*Pernyataan manakah yang betul mengenai variasi tak selanjut?*

- A It is a quantitative variation  
*Ia merupakan variasi kuantitatif*
- B An example is height  
*Ketinggian ialah suatu contoh*
- C The characteristics in this variation fall into distinct categories  
*Ciri-ciri dalam variasi ini tergolong dalam kategori-kategori yang ketara*
- D It is influenced by genetic and environmental factors  
*Ia dipengaruhi oleh faktor genetik dan persekitaran*

- 49 Which of the following chemicals are mutagen?

*Antara bahan kimia berikut, yang manakah mutagen?*

- I Benzene  
*Benzena*
- II Nitrous oxide  
*Nitrus oksida*
- III Carbon monoxide  
*Karbon monoksida*
- IV Carbon tetrachloride  
*Karbon tetraklorida*
- A I and II  
*I dan II*
- B I and IV  
*I dan IV*
- C II and III  
*II dan III*
- D III and IV  
*III dan IV*

- 50 Diagram 16 shows in tongue-rolling ability of human.

*Rajah 16 menunjukkan variasi kebolehan menggulung lidah pada manusia.*

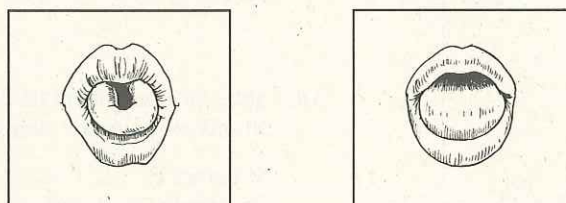


Diagram 16  
*Rajah 16*

What is the factor that causes this variation?

*Apakah faktor yang menyebabkan variasi ini?*

- A Nutrition  
*Nutrisi*
- B Genetic  
*Genetik*
- C Environmental  
*Persekitaran*
- D Genetic and environmental  
*Genetik dan persekitaran*

END OF QUESTION PAPER  
*KERTAS SOALAN TAMAT*



## PAPER 2

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 a plant cell.  
Rajah 1.1 menunjukkan struktur satu sel tumbuhan.

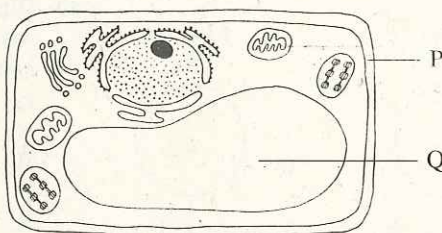


Diagram 1.1  
Rajah 1.1

- (a) (i) Name structures P and Q.  
Namakan struktur P dan Q.

P: .....

Q: .....

[2 marks]  
[2 markah]

- (ii) State the component that build up structure P and the content of Q.  
Nyatakan komponen yang membina struktur P dan kandungan Q.

Structure P: .....  
Struktur P

Content Q: .....  
Kandungan Q

[2 marks]  
[2 markah]

- (b) Explain **one** characteristic of structure P which is related to its function.  
Terangkan **satu** ciri struktur P yang berkait dengan fungsinya.

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

[2 marks]  
[2 markah]



- (c) Explain **one** role of structure Q to a herbaceous plant.  
*Terangkan satu peranan struktur Q kepada tumbuhan herba.*

For  
Examiner's  
Use

1(c)

	2
--	---

[2 marks]

[2 markah]

- (d) Diagram 1.2 shows the formation of xylem vessel through process X.  
 The plant cells undergo the process of differentiation.  
*Rajah 1.2 menunjukkan pembentukan salur xilem melalui proses X.*  
*Sel tumbuhan tersebut telah mengalami proses pembezaan.*

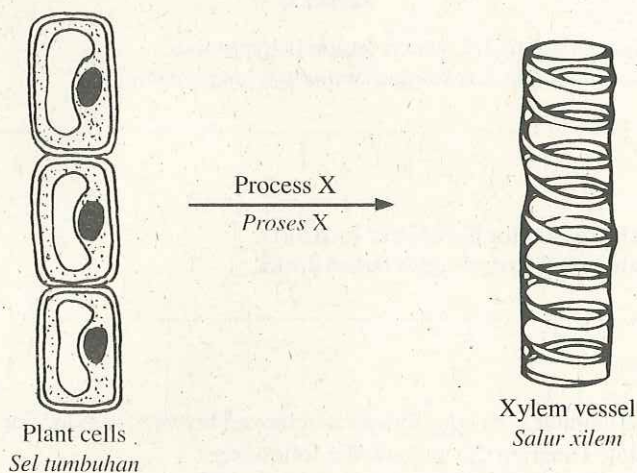


Diagram 1.2

*Rajah 1.2*

- (i) Name process X.  
*Namakan proses X.*

1(d)(i)

	1
--	---

[1 mark]

[1 markah]

- (ii) Describe how xylem vessel is adapted to transport water in the plant.  
*Huraikan bagaimana salur xilem diadaptasi untuk mengangkut air dalam tumbuhan.*

1(d)(ii)

	3
--	---

[3 marks]

[3 markah]

**Total A1**

	12
--	----



- 2 Diagram 2.1 shows two regions, R and S, which are separated by a semi-permeable membrane.  
Rajah 2.1 menunjukkan dua kawasan, R dan S, yang dipisahkan oleh satu membran separa telap.

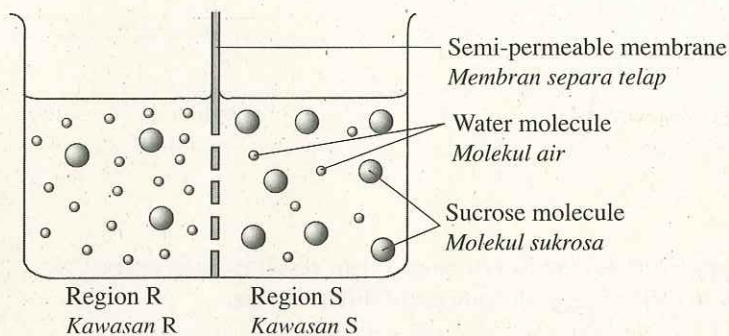


Diagram 2.1  
Rajah 2.1

- (a) (i) Based on Diagram 2.1, which region is hypotonic?  
Berdasarkan Rajah 2.1, kawasan manakah yang hipotonik?

2(a)(i)

1
---

[1 mark]  
[1 markah]

- (ii) Give **one** reason for the answer in 2(a)(i).  
Beri **satu** sebab bagi jawapan dalam 2(a)(i).

2(a)(ii)

1
---

[1 mark]  
[1 markah]

- (iii) After 20 minutes, an equilibrium is achieved between region R and S.  
Complete Diagram 2.2 to show the following:
- The number of water molecules in both regions
  - The level of the solution in both regions

Selepas 20 minit, keseimbangan antara kawasan R dan kawasan S tercapai.  
Lengkapkan Rajah 2.2 untuk menunjukkan perkara berikut.

- Bilangan molekul air dalam kedua-dua kawasan
- Aras larutan dalam kedua-dua kawasan

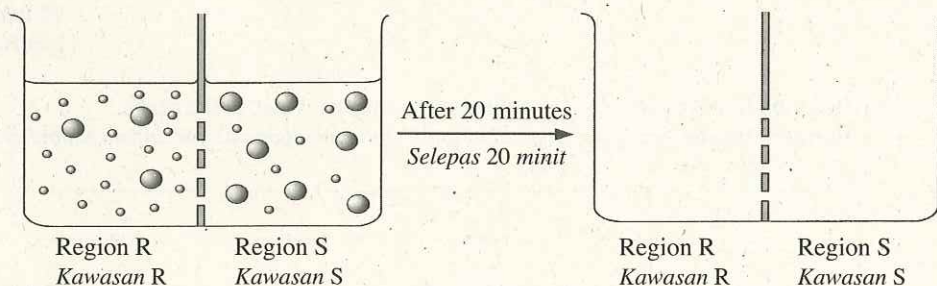


Diagram 2.2  
Rajah 2.2

2(a)(iii)

2
---

[2 marks]  
[2 markah]

- (iv) Name the process which occurs in 2(a)(iii).  
*Namakan proses yang berlaku dalam 2(a)(iii).*

[1 mark]

[1 markah]

- (b) A few pieces of cabbage is immersed in a concentrated salt solution.

*Beberapa keping kubis direndam dalam larutan garam yang pekat.*

- (i) Explain why the above action is able to preserve the cabbage for a long period of time.  
*Terangkan mengapa tindakan di atas dapat mengawet kubis itu untuk jangka masa yang panjang.*

[2 marks]

[2 markah]

- (ii) Complete Diagram 2.3 by drawing the condition of the cabbage cell after the preservation process.

*Lengkapkan Rajah 2.3 dengan melukis keadaan sel kubis itu selepas proses pengawetan.*

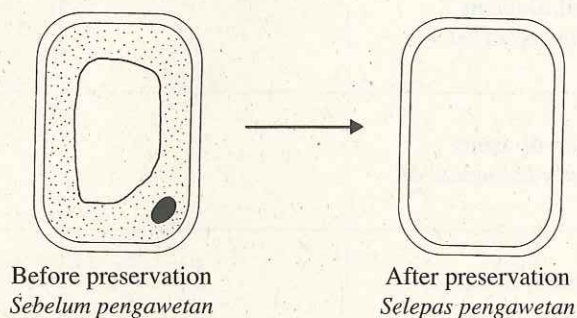


Diagram 2.3

*Rajah 2.3*

[2 marks]

[2 markah]

- (iii) State the condition of the cabbage cell in 2(b)(ii).

*Nyatakan keadaan sel kubis di 2(b)(ii).*

[1 mark]

[1 markah]

- (c) A badminton player is advised to drink an isotonic drink during a tournament.

Give **two** reasons.

*Seorang pemain badminton dinasihatkan meminum minuman isotonik semasa pertandingan.*

*Berikan **dua** sebab.*

1. ....

2. ....

[2 marks]

[2 markah]

For  
Examiner's  
Use

2(a)(iv)

1
---

2(b)(i)

2
---

2(b)(ii)

2
---

2(b)(iii)

1
---

2(c)

2
---

Total A2

12
----



- 3 Diagram 3 shows cell P and cell Q undergo two different types of cell division.  
Rajah 3 menunjukkan sel P dan sel Q mengalami dua jenis pembahagian sel yang berlainan.

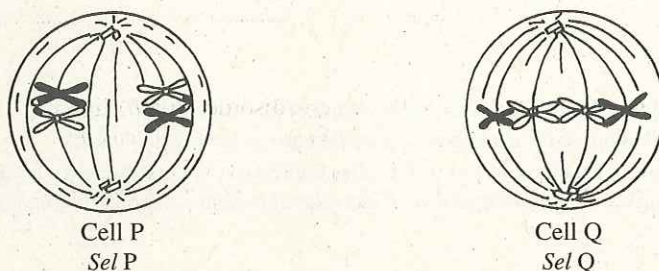


Diagram 3  
Rajah 3

- (a) Complete Table 3 by filling in the following aspects of cell P and cell Q.  
Lengkapkan Jadual 3 dengan mengisi aspek-aspek berikut bagi sel P dan sel Q.

Aspect Aspek	Cell P Sel P	Cell Q Sel Q
Type of cell division Jenis pembahagian sel		
Stage of cell division Peringkat pembahagian sel		
Chromosomal behavior Perlakuan kromosom		

Table 3  
Jadual 3

[6 marks]  
[6 markah]

- (b) A female has sex chromosome of 44 + XO. This genetic disorder is due to the failure of sex chromosome to separate completely during meiosis.  
Seorang perempuan mempunyai kromosom seks 44 + XO. Kecacatan genetik ini disebabkan oleh kegagalan kromosom seks berpisah dengan lengkap semasa meiosis.

- (i) State the number of chromosome in this female.  
Nyatakan bilangan kromosom bagi perempuan ini.

[1 mark]  
[1 markah]

- (ii) Name this genetic disorder.  
Namakan kecacatan genetik ini.

[1 mark]  
[1 markah]

- (iii) Give **one** characteristic of this genetic disorder.  
 Berikan **satu** ciri kecacatan genetik ini.

[1 mark]

[1 markah]

- (c) (i) State **one** factor that causes the genetic disorder in 3(b)(ii).

Nyatakan **satu** faktor yang menyebabkan kecacatan genetik pada 3(b)(ii).

[1 mark]

[1 markah]

- (ii) Explain how the factor stated in 3(c)(i) causes genetic disorder.

Terangkan bagaimana faktor yang dinyatakan dalam 3(c)(i) menyebabkan kecacatan genetik itu.

[2 marks]

[2 markah]

- 4 Diagram 4.1 shows the sequence of change in a pond ecosystem.

Rajah 4.1 menunjukkan urutan perubahan pada ekosistem sebuah kolam.

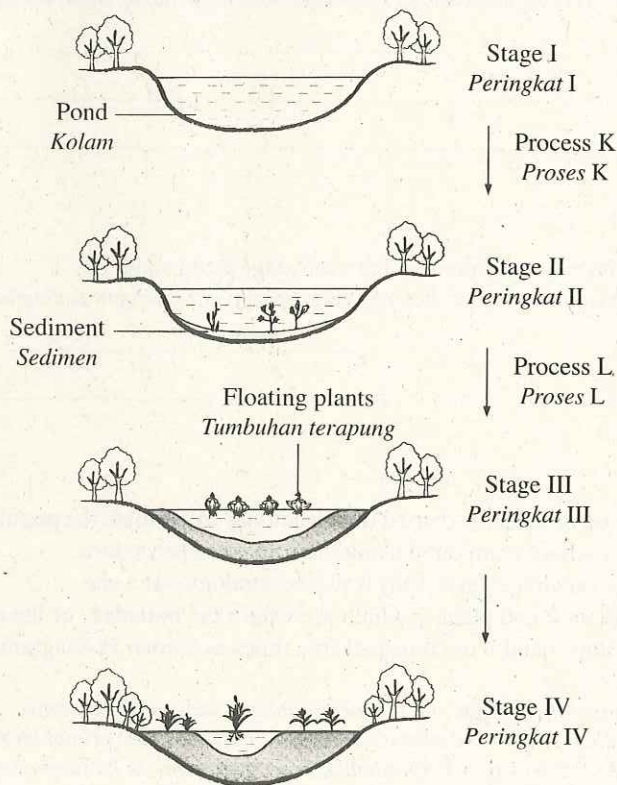


Diagram 4.1

Rajah 4.1

For  
Examiner's  
Use

3(b)(iii)

1
---

3(c)(i)

1
---

3(c)(ii)

2
---

Total A3

12
----



4(a)

	2
--	---

- (a) Name process K and process L.  
*Namakan proses K dan proses L.*

Process K: .....  
*Proses K*

Process L: .....  
*Proses L*

[2 marks]

[2 markah]

- (b) (i) Explain how stage III is formed from stage II through process L.  
*Terangkan bagaimana peringkat III terbentuk daripada peringkat II melalui proses L.*

.....

.....

.....

[2 marks]

[2 markah]

4(b)(i)

	2
--	---

- (ii) At stage III, farming activities are carried out near the pond.  
Explain how the farming activity affects the ecosystem.  
*Pada peringkat III, aktiviti perladangan telah dijalankan berhampiran kolam.  
Terangkan bagaimana aktiviti perladangan mempengaruhi ekosistem.*

.....

.....

.....

[2 marks]

[2 markah]

4(b)(ii)

	2
--	---

- (iii) State **two** differences between stage I and stage IV.  
*Nyatakan **dua** perbezaan antara peringkat I dengan peringkat IV.*

1. ....

2. ....

[2 marks]

[2 markah]

4(b)(iii)

	2
--	---

- (c) A group of students carried out an activity to estimate the population of plant P and plant Q in a school compound using the following procedure:
- A quadrat ( $1\text{ m} \times 1\text{ m}$ ) is placed randomly at a site.
  - Plant P and plant Q which are within the boundary of the quadrat are counted.
  - Steps i and ii are repeated five times as shown in Diagram 4.2.

*Sekumpulan pelajar telah menjalankan satu aktiviti untuk menganggarkan populasi tumbuhan P dan tumbuhan Q di kawasan sekolah menggunakan prosedur berikut.*

- Kuadrat ( $1\text{ m} \times 1\text{ m}$ ) diletakkan secara rawak di kawasan itu.*
- Tumbuhan P dan tumbuhan Q di dalam kuadrat dikira.*
- Langkah i dan ii diulang lima kali seperti ditunjukkan dalam Rajah 4.2.*

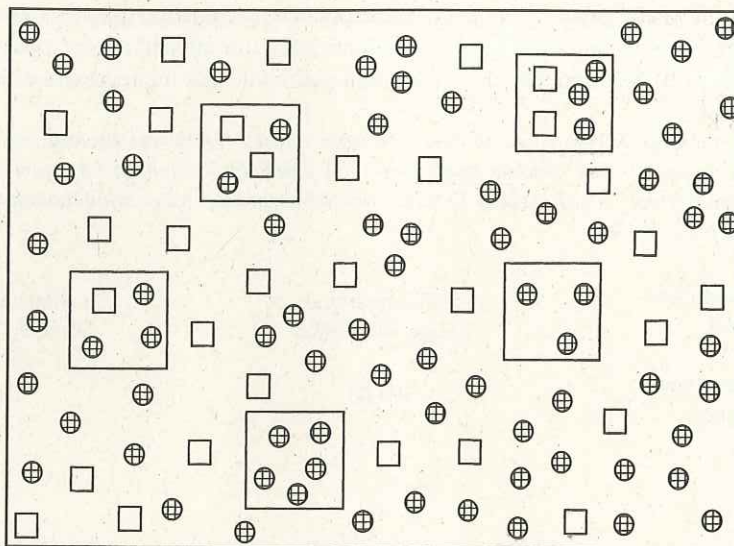


Diagram 4.2  
Rajah 4.2

Key:

Kekunci:

⊕ Plant P  
Tumbuhan P

□ Plant Q  
Tumbuhan Q

- (i) Record the total number of plant P and plant Q in the five quadrats into Table 4.  
Rekod jumlah bilangan tumbuhan P dan tumbuhan Q dalam kelima-lima kuadrat ke dalam Jadual 4.

Plant Tumbuhan	Total number Jumlah bilangan
P	
Q	

Table 4  
Jadual 4

[2 marks]  
[2 markah]

- (ii) Based on the result in 4(c)(i), which plant is dominant?  
Berdasarkan keputusan dalam 4(c)(i), tumbuhan manakah yang dominan?

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

- (iii) Give **one** reason for the answer in 4(c)(ii).  
Berikan **satu** sebab bagi jawapan dalam 4(c)(ii).

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

4(c)(i)

2
---

4(c)(ii)

1
---

4(c)(iii)

1
---

Total A4

12
----



- 5 Diagram 5 shows the genetic diagram of the cross between tall and green pod pea plant with a short and yellow pod pea plant. T is the dominant allele for tall and t is the recessive allele for short. Allele G is the dominant allele for green pod while g is the recessive allele for yellow pod.

Rajah 5 menunjukkan rajah genetik bagi kacukan antara tumbuhan kacang pea pokok tinggi, buah hijau dengan pokok rendah, buah kuning. T ialah alel dominan bagi pokok tinggi dan t ialah alel resesif bagi pokok rendah. G ialah alel dominan bagi buah hijau manakala g ialah alel resesif bagi buah kuning.

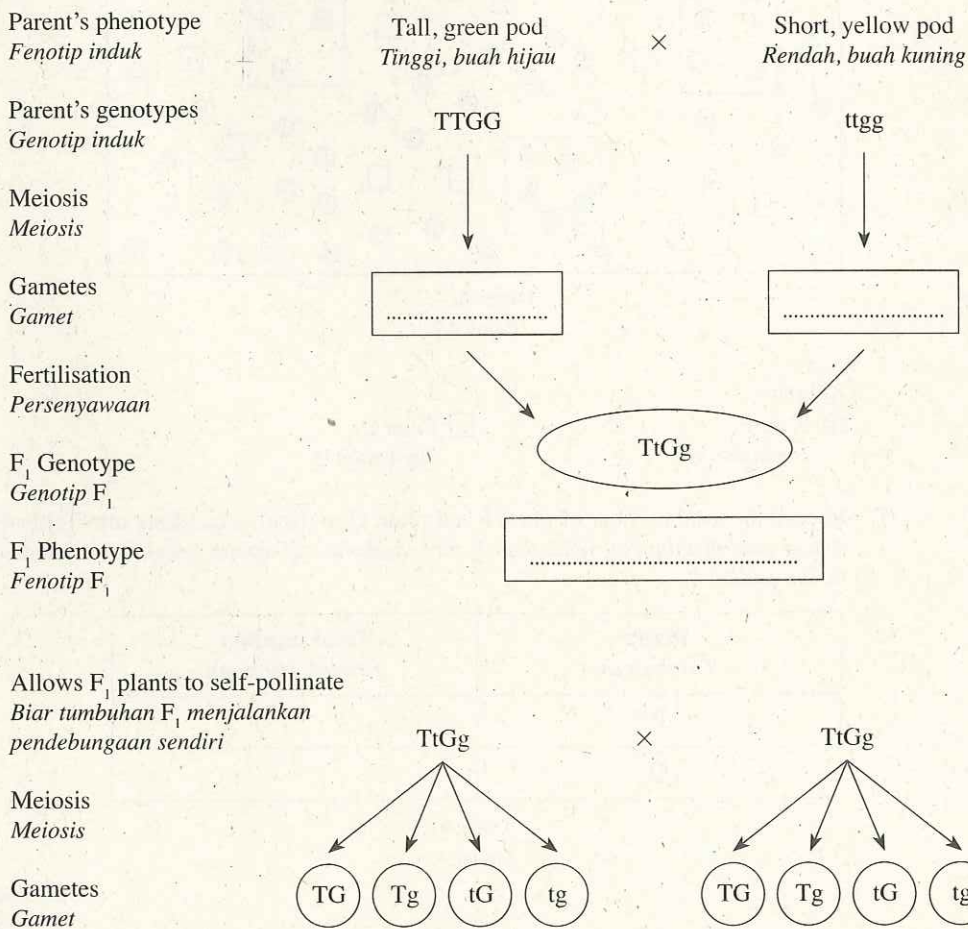


Diagram 5  
*Rajah 5*

5(a)(i)

	2
--	---

- (a) (i) Write the genotype of gametes in the boxes provided in the Diagram 5.  
*Tuliskan genotip gamet dalam petak yang disediakan dalam Rajah 5.*

[2 marks]  
[2 markah]

5(a)(ii)

	2
--	---

- (ii) State the phenotype of F<sub>1</sub> generation in the box provided in Diagram 5.  
*Nyatakan fenotip bagi generasi F<sub>1</sub> dalam petak yang disediakan dalam Rajah 5.*

[2 marks]  
[2 markah]

- (b) Table 5 shows the Punnett's square of the self cross between offsprings in  $F_1$  generation to from the  $F_2$  generation.

Jadual 5 menunjukkan segi empat sama Punnett bagi kacukan sesama sendiri anak generasi  $F_1$  Menghasilkan generasi  $F_2$ .

Male gamete Gamet jantan	TG	Tg	tG	tg
Female gamete Gamet betina				
TG	TTGG	TTGg	TtGG	TtGg
Tg	.....	.....	.....	.....
tG	TtGG	TtGg	ttGG	ttGg
tg	.....	.....	.....	.....

Table 5  
Jadual 5

- (i) Complete the Punnett's square by filling the genotype in the empty spaces in Table 5.  
Lengkapkan segi empat sama Punnett dengan mengisi genotip ke dalam ruang kosong dalam Jadual 5.

[2 marks]  
[2. markah]

5(b)(i)

2
---

- (ii) Determine the probability of having a tall and yellow pod pea plant in  $F_2$  generation.  
Tentukan kebarangkalian memperoleh pokok kacang pea tinggi, berbuah kuning dalam generasi  $F_2$ .

[1 mark]  
[1 markah]

5(b)(ii)

1
---

- (c) (i) Explain the ratio of the offsprings produced in  $F_2$  generation based on Mendel's Law.  
Terangkan nisbah anak-anak generasi  $F_2$  yang terhasil berdasarkan kepada Hukum Mendel.

[3 marks]  
[3 markah]

5(c)(i)

3
---

- (ii) Based on the Punnett's square, explain why the offsprings of pea plants in  $F_2$  generation has varieties of trait.  
Berdasarkan segi empat sama Punnett, terangkan mengapa anak pokok kacang pea dalam generasi  $F_2$  mempunyai trait yang pelbagai.

[3 marks]  
[3 markah]

5(c)(ii)

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 part of a female reproductive system.

The development of zygote occurs in this system.

Rajah 6.1 menunjukkan sebahagian daripada sistem pembiakan perempuan.

Perkembangan zigot berlaku dalam sistem ini.

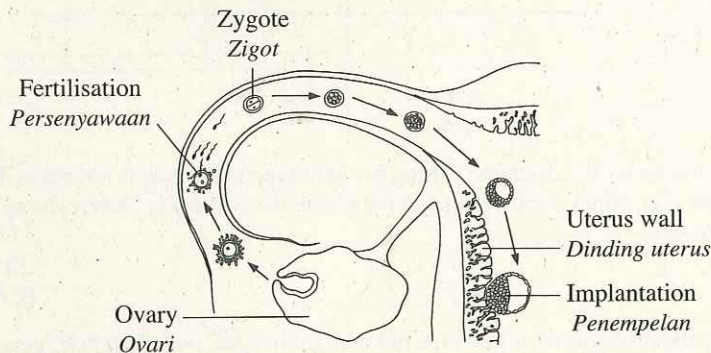


Diagram 6.1

Rajah 6.1

Based on the Diagram 6.1, describe the development of the zygote after fertilisation until implantation.

[4 marks]

Berdasarkan Rajah 6.1, huraikan perkembangan zigot selepas persenyawaan sehingga penempelan.

[4 markah]

- (b) Diagram 6.2 shows a method to overcome infertility in a married woman with a blockage in her both Fallopian tubes.

Rajah 6.2 menunjukkan satu kaedah untuk mengatasi masalah kesuburan bagi seorang perempuan yang telah berkahwin yang kedua-dua tiub Fallopinya tersumbat.

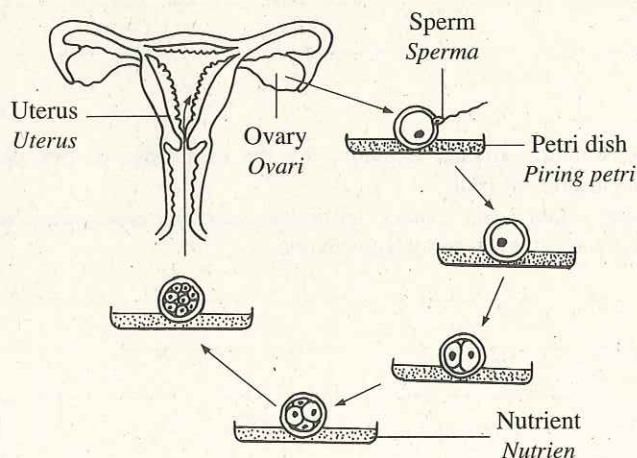


Diagram 6.2

Rajah 6.2

Explain how this method helps this woman to have a baby.

*Terangkan bagaimana kaedah ini membantu wanita ini mendapatkan anak.*

[6 marks]

[6 markah]

(c) Diagram 6.3 shows the schematic diagram of spermatogenesis and oogenesis in human.

*Rajah 6.3 menunjukkan rajah skema spermatogenesis dan oogenesis pada manusia.*

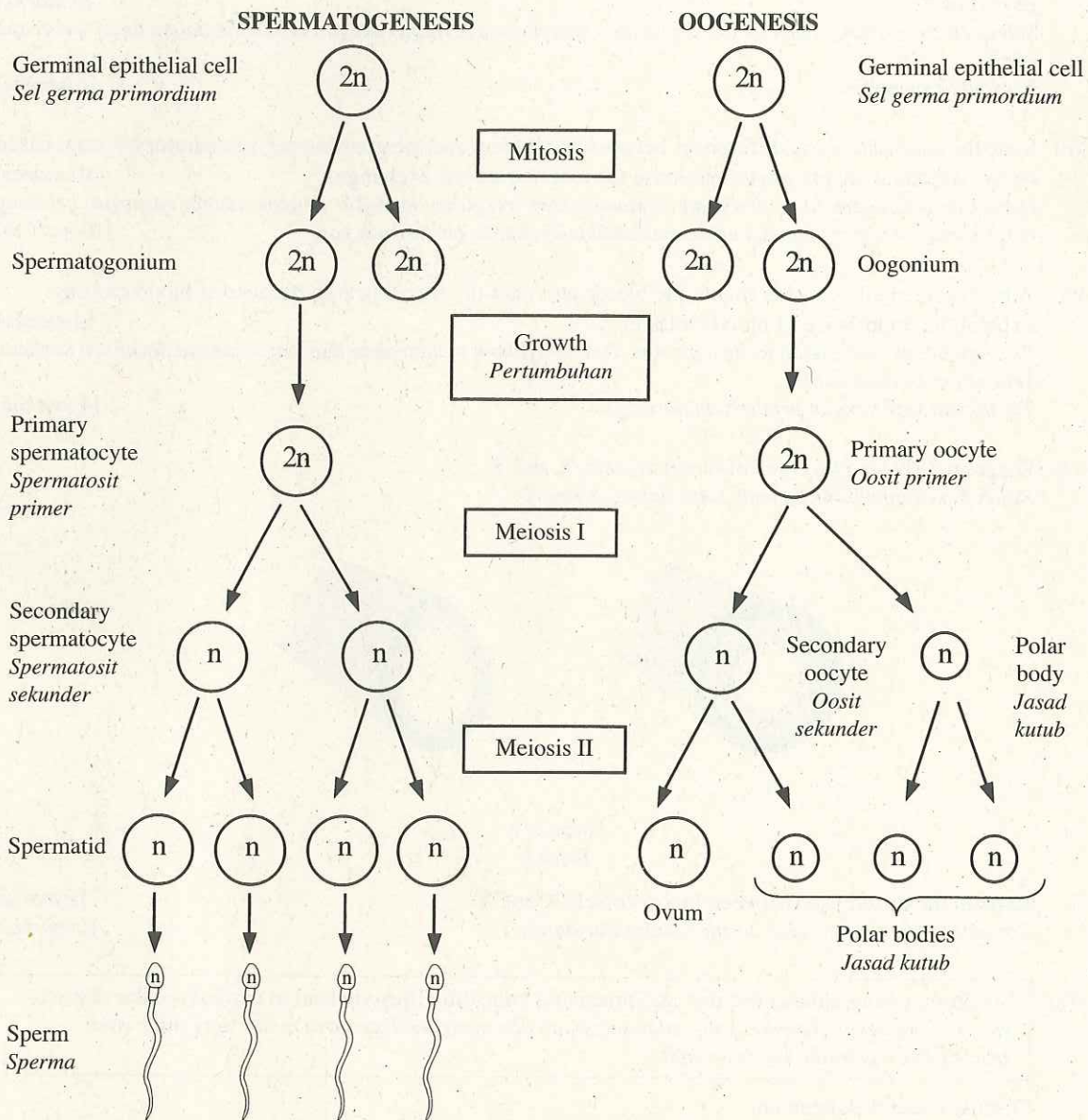


Diagram 6.3

*Rajah 6.3*

Explain the similarities and differences between spermatogenesis and oogenesis.

*Terangkan persamaan dan perbezaan antara spermatogenesis dan oogenesis.*

[10 marks]

[10 markah]



- 7 (a) Sugar is oxidised during respiration.

Explain the process.

[4 marks]

*Gula dioksidakan semasa respirasi.*

*Terangkan proses itu.*

[4 markah]

- (b) After an athlete finished running a race, his breathing is still fast and deep for several minutes.

Explain why.

[6 marks]

*Selepas menamatkan lumba lari, seorang atlet masih terus bernafas dengan cepat dan dalam untuk beberapa minit.*

*Terangkan mengapa.*

[6 markah]

- (c) State the similarities and differences between the human and the grasshopper's respiratory system based on the structural adaptation to maximise the rate of gaseous exchange.

[10 marks]

*Nyatakan persamaan dan perbezaan antara sistem respirasi manusia dengan sistem respirasi belalang berdasarkan struktur adaptasi untuk memaksimumkan kadar pertukaran gas.*

[10 markah]

- 8 (a) A boy accidentally cuts his finger. He bleeds and later the bleeding stop because of blood clotting.

Explain the importance of blood clotting.

[4 marks]

*Seorang budak lelaki telah terluka jarinya. Dia mengalami pendarahan dan kemudiannya darahnya berhenti kerana pembekuan darah.*

*Terangkan kepentingan pembekuan darah ini.*

[4 markah]

- (b) Diagram 8 shows two types of blood vessels, X and Y.

*Rajah 8 menunjukkan dua jenis salur darah, X dan Y.*

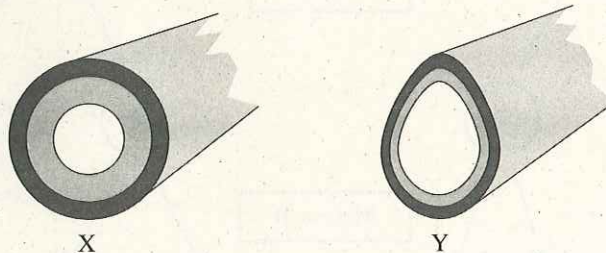


Diagram 8

*Rajah 8*

Explain the differences between blood vessels X and Y.

[6 marks]

*Terangkan perbezaan salur darah X dan salur darah Y.*

[6 markah]

- (c) Smoking, taking unbalanced diet and practising unhealthy lifestyle lead to cardiovascular diseases.

*Merokok, mengamalkan diet yang tidak seimbang dan mengamalkan gaya hidup yang tidak sihat menyebabkan penyakit kardiovaskular.*

Discuss about the statement.

*Bincangkan mengenai pernyataan itu.*

[10 marks]

[10 markah]

- 9 (a) Diagram 9.1 shows three recycle bins P, Q and R. These recycle bins are used to collect used materials. *Rajah 9.1 menunjukkan tiga tong sampah kitar semula P, Q dan R. Tong sampah kitar semula ini digunakan untuk mengumpul bahan-bahan terpakai.*

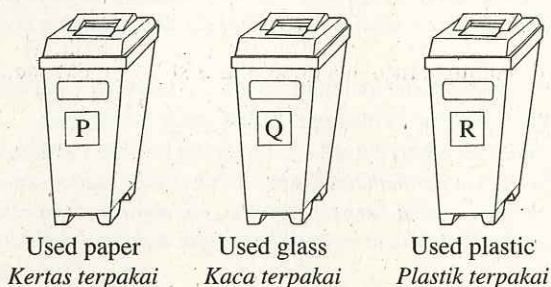


Diagram 9.1  
*Rajah 9.1*

The used materials are from natural resources.

- Paper from trees
- Glass from minerals
- Plastic from petroleum

Explain how the practice in recycling of the used materials in Diagram 9.1 contribute in maintaining the balance of nature. [10 marks]

*Bahan-bahan terpakai tersebut adalah daripada sumber bahan semula jadi.*

- *Kertas daripada pokok*
- *Kaca daripada mineral*
- *Plastik daripada petroleum*

Terangkan bagaimana amalan mengitar semula bahan-bahan terpakai dalam Rajah 9.1 menyumbangkan kepada pengekalan keseimbangan alam. [10 markah]

- (b) Diagram 9.2 shows the daily used appliances in homes. *Rajah 9.2 menunjukkan alatan kegunaan harian di rumah.*

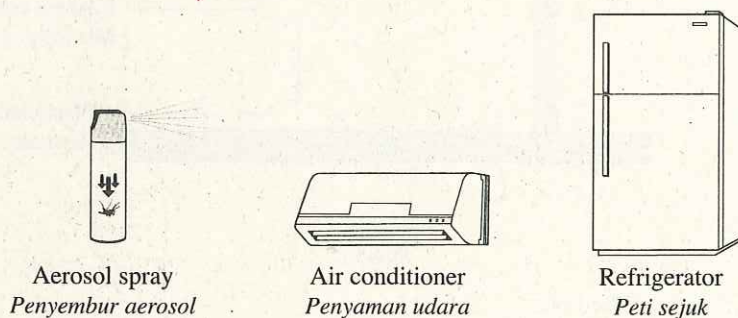


Diagram 9.2  
*Rajah 9.2*

Spraying of aerosol and leakage of air conditioner and refrigerator release chlorofluorocarbon (CFC). Explain the effect of the released chlorofluorocarbon on human health and ecosystem. [10 marks]  
*Penyemburan aerosol dan kebocoran penyejukan udara serta peti sejuk membebaskan klorofluorokarbon (CFC).*

Terangkan kesan klorofluorokarbon ke atas kesihatan manusia dan ekosistem.

[10 markah]

**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**



This question paper consists of two questions: Question 1 and Question 2. Answer **all** questions.  
Kertas soalan ini mengandungi dua soalan: Soalan 1 dan Soalan 2. Jawab **semua** soalan.

- 1 An experiment is carried out to determine the energy value in three types of food. Different food has different amount of energy value. When the food is burning, heat energy is released.

Diagram 1 shows the apparatus set-up to determine the energy value in three types of food.

Satu eksperimen telah dijalankan untuk mengenal pasti nilai tenaga dalam tiga jenis makanan. Makanan yang berbeza mengandungi jumlah tenaga yang berbeza. Apabila makanan terbakar, tenaga haba dibebaskan.

Rajah 1 menunjukkan susunan radas untuk mengenal pasti nilai tenaga dalam tiga jenis makanan.

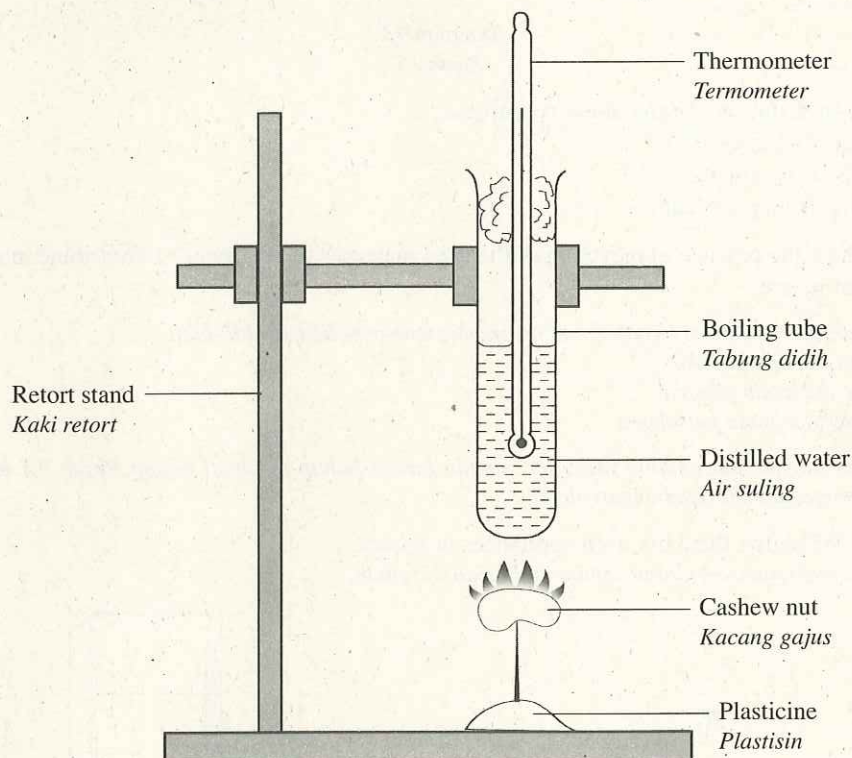


Diagram 1  
Rajah 1

The following steps were carried out:

Langkah-langkah berikut telah dijalankan:

Step 1

20 mL of distilled water is filled in a boiling tube.

Langkah 1

20 mL air suling dimasukkan ke dalam satu tabung didih.

Step 2

The initial temperature of water is recorded.

Langkah 2

Suhu awal air itu direkodkan.

Step 3

A cashew nut is weighted and its mass is recorded.

Langkah 3

Sebiju kacang gajus ditimbang dan jisimnya direkodkan.

Step 4

The cashew nut is burnt completely under the boiling tube.

Langkah 4

Kacang gajus itu dibakar dengan lengkap di bawah tabung didih.

Step 5

The final temperature of the water is recorded.

Langkah 5

Suhu akhir air itu direkodkan.

Step 6

Steps 1 to 5 are repeated by using dried bread and dried fish.

Langkah 6

Langkah 1 hingga 5 diulangi dengan menggunakan roti kering dan ikan kering.

Table 1 shows the result of this experiment.

Jadual 1 menunjukkan keputusan eksperimen ini.

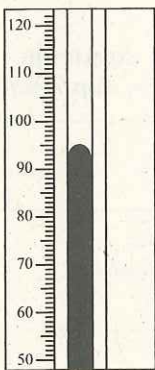
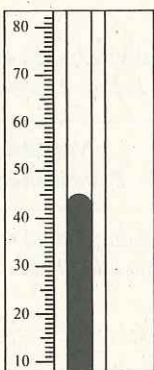
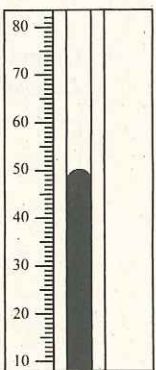
Food sample <i>Sampel makanan</i>	Cashew nut <i>Kacang gajus</i>	Dried bread <i>Roti kering</i>	Dried fish <i>Ikan kering</i>
Mass of food (g) <i>Jisim makanan (g)</i>	2	2	2
Volume of distilled water (mℓ) <i>Isi padu air suling (mℓ)</i>	20	20	20
Initial temperature of distilled water (°C) <i>Suhu awal air suling (°C)</i>	30	30	30
Final temperature of distilled water (°C) <i>Suhu akhir air suling (°C)</i>	 ..... °C	 ..... °C	 ..... °C

Table 1  
Jadual 1

- (a) Record the final temperature of distilled water in Table 1.  
*Rekod suhu akhir air suling dalam Jadual 1.*

[3 marks]  
[3 markah]

1(a)

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 from the observation in **1(b)(i)**.

*Nyatakan inferens daripada 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 the experiment.

*Lengkapkan Jadual 2 berdasarkan eksperimen ini.*

Variable <i>Pemboleh ubah</i>	Method to handle the variable <i>Cara mengendali pemboleh ubah</i>
Manipulated variable <i>Pemboleh ubah dimanipulasikan</i>	
.....	.....
.....	.....
Responding variable <i>Pemboleh ubah bergerak balas</i>	
.....	.....
.....	.....

Variable <i>Pemboleh ubah</i>	Method to handle the variable <i>Cara mengendali pemboleh ubah</i>
Constant variable <i>Pemboleh ubah dimalarkan</i>	
.....	.....
.....	.....

Table 2  
Jadual 2

For  
Examiner's  
Use

[3 marks]  
[3 markah]

1(c)

3
---

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

.....

.....

[3 marks]  
[3 markah]

1(d)

3
---

- (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 dalam eksperimen ini. Jadual anda hendaklah mengandungi tajuk-tajuk berikut:*

- Food sample  
*Sampel makanan*
- Increase in water temperature  
*Kenaikan suhu air*
- Energy value  
*Nilai tenaga*

$$\left[ \text{Energy value} = \frac{\text{Mass of water} \times 4.2 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1} \times \text{temperature increase}}{\text{Mass of food}} \right]$$

$$\left[ \text{Nilai tenaga} = \frac{\text{Jisim air} \times 4.2 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1} \times \text{kenaikan suhu}}{\text{Jisim makanan}} \right]$$

[3 marks]  
[3 markah]

1(e)(i)

3
---



For  
Examiner's  
Use

1(e)(ii)

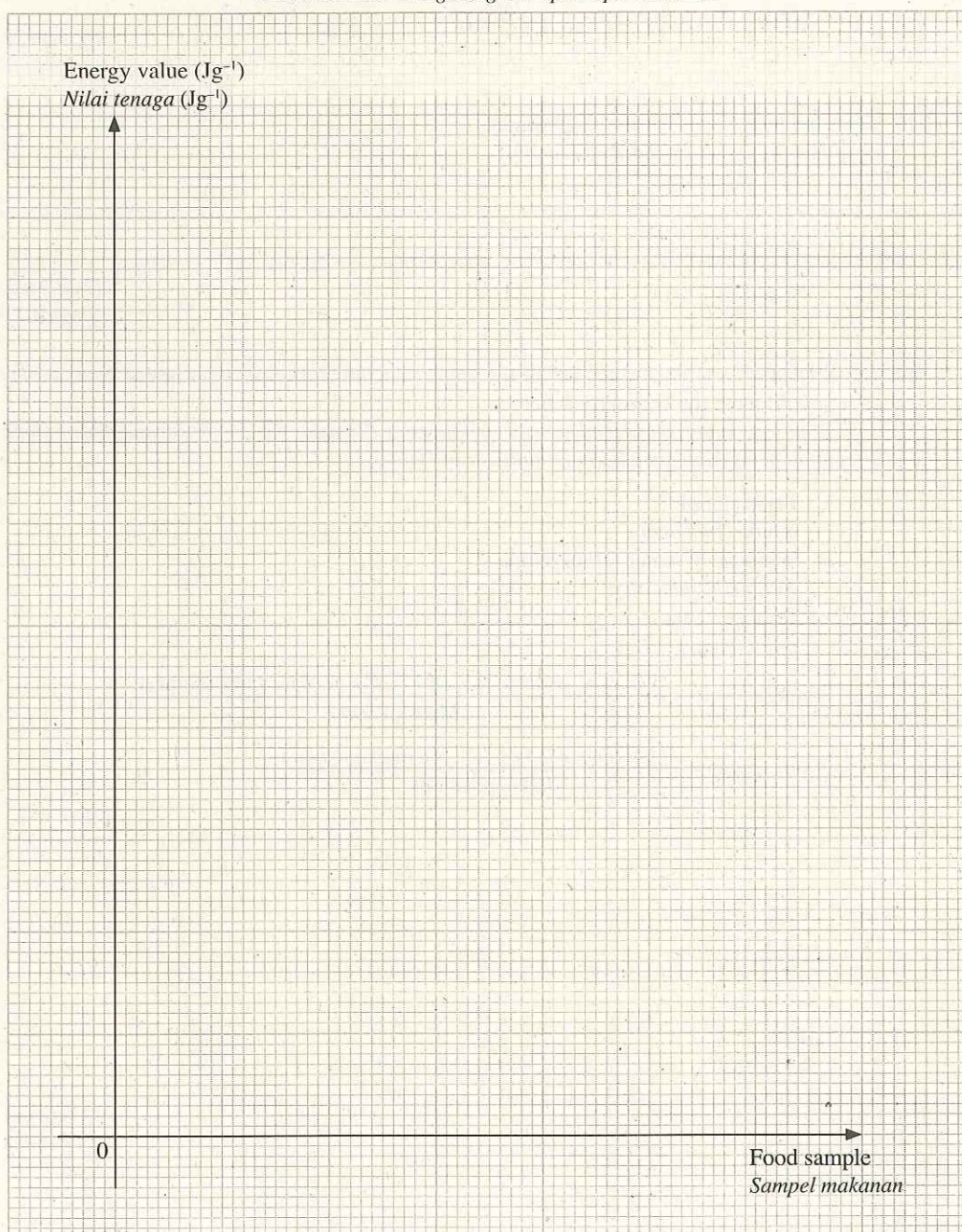
3
---

- (ii) Use the graph paper provided on page 98 to answer this question.  
Using the data in 1(e)(i), draw a bar chart to show the energy value of each food sample.  
*Guna kertas graf yang disediakan di halaman 98 untuk menjawab soalan ini.  
Dengan menggunakan data di 1(e)(i), lukis satu carta bar untuk menunjukkan nilai tenaga bagi setiap sampel makanan.*

[3 marks]

[3 markah]

Bar chart of energy value of each food sample  
*Carta bar nilai tenaga bagi setiap sampel makanan*



- (f) Based on the bar chart drawn in 1(e)(i), state the relationship between the food sample and the energy value.

Berdasarkan carta bar yang dilukis di 1(e)(ii), nyatakan hubungan antara sampel makanan dengan nilai tenaga.

.....

.....

[3 marks]  
[3 markah]

1(f)

	3
--	---

- (g) Based on this experiment, define operationally the energy value of food.  
Berdasarkan eksperimen ini, beri definisi secara operasi nilai tenaga makanan.

.....

.....

[3 marks]  
[3 markah]

1(g)

	3
--	---

- (h) This experiment is repeated by using 2 g of dried coconut kernel.  
Predict the energy value of this food sample.  
Eksperimen ini diulang dengan menggunakan 2 g isirong kelapa kering.  
Ramalkan nilai tenaga dalam sampel makanan ini.

.....

.....

[3 marks]  
[3 markah]

1(h)

	3
--	---

- (i) Classify the following food sample according to food classes in Table 3.  
Kelaskan sampel makanan berikut berdasarkan kelas makanan dalam Jadual 3.

Rice Nasi	Egg white Putih telur	Butter Mentega	Fish Ikan
Prawn Udang	Sweet potato Ubi keledak	Corn oil Minyak jagung	

Carbohydrate Karbohidrat	Protein Protein	Lipids Lipid

Table 3  
Jadual 3

1(i)

	3
--	---

Total 1

	33
--	----

[3 marks]  
[3 markah]



- 2 One of the functions of kidney is to carry out osmoregulation. Osmoregulation is a homeostasis mechanism to maintain blood osmotic pressure. One way to maintain the optimum osmotic pressure of our body is to excrete excess water by producing urine.

Based on the above information, design an experiment that can be carried out in a laboratory to study the effect of the volume of water intake on the volume of urine produced by kidney.

The planning of your experiment must include the following aspects:

*Satu daripada fungsi ginjal adalah menjalankan pengosmokawalaturan. Pengosmokawalaturan adalah mekanisma homeostasis untuk mengekalkan tekanan osmosis darah. Satu cara mengekalkan tekanan osmosis yang optimum bagi bendalir badan ialah menyingkirkan air berlebihan melalui penghasilan air kencing.*

*Berdasarkan maklumat di atas, reka bentuk satu eksperimen yang boleh dijalankan di dalam makmal untuk mengkaji kesan isi padu air yang diminum terhadap isi padu air kencing yang terhasil oleh ginjal.*

*Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:*

- Problem statement  
*Pernyataan masalah*
- Hypothesis  
*Hipotesis*
- Variables  
*Pemboleh ubah*
- List of apparatus and materials  
*Senarai bahan dan radas*
- Experimental procedure  
*Prosedur eksperimen*
- Presentation of data  
*Persembahan data*

[17 marks]

[17 markah]

**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**