

NAMA:

TINGKATAN :

SULIT

4551/1

BIOLOGI

Ogos

2011

1 1/4 jam

**BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA**

PEPERIKSAAN PERCUBAAN SPM SETARA

TAHUN 2011

BIOLOGI

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu*
3. *Calon dikehendaki membaca maklumat di halaman 32*

Kertas soalan ini mengandungi 32 halaman bercetak

1. Diagram 1 shows a process carried out by an *Ameoba* sp.
Rajah 1 menunjukkan suatu proses yang dijalankan oleh Ameoba sp.

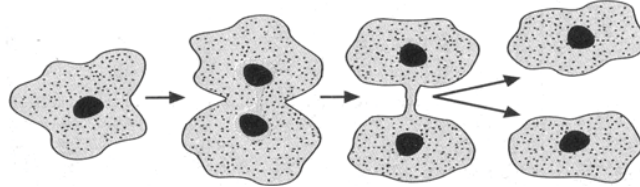


Diagram 1
Rajah 1

What is the process ?
Apakah proses tersebut ?

- | | | | |
|---|--|---|--|
| A | Meiosis
<i>Meiosis</i> | C | Osmoregulation
<i>Pengosmokawalaturan</i> |
| B | Binary fission
<i>Belahan dedua</i> | D | Conjugation
<i>Konjugasi</i> |
2. Diagram 2 shows one of the human tissues.
Rajah 2 menunjukkan salah satu daripada tisu manusia

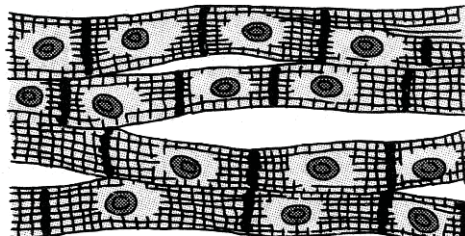


Diagram 2
Rajah 2

What organelle is found abundantly in the tissue ?
Apakah organel paling banyak terdapat dalam tisu tersebut ?

- | | | | |
|---|---------------------------------------|---|--|
| A | Golgi Apparatus
<i>Jasad Golgi</i> | C | Ribosomes
<i>Ribosom</i> |
| B | Mitochondria
<i>Mitokondria</i> | D | Endoplasmic reticulum
<i>Jalinan endoplasma</i> |

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

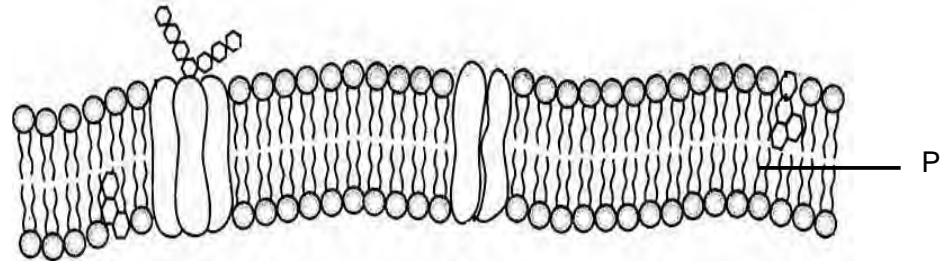


Diagram 3
Rajah 3

What substance can cross through P ?
Apakah bahan yang boleh merentasi P ?

- | | | | |
|---|---------------------------------|---|----------------------------------|
| A | Glucose
<i>Glukosa</i> | C | Amino acid
<i>Asid Amino</i> |
| B | Sodium ion
<i>Ion sodium</i> | D | Fatty acids
<i>Asid Lemak</i> |
4. Diagram 4 shows an experiment to investigate the movement of water molecules across a semi permeable membrane from A to B
Rajah 4 menunjukkan satu eksperimen untuk mengkaji pergerakan molekul air merentasi satu membran separa telap dari A ke B.

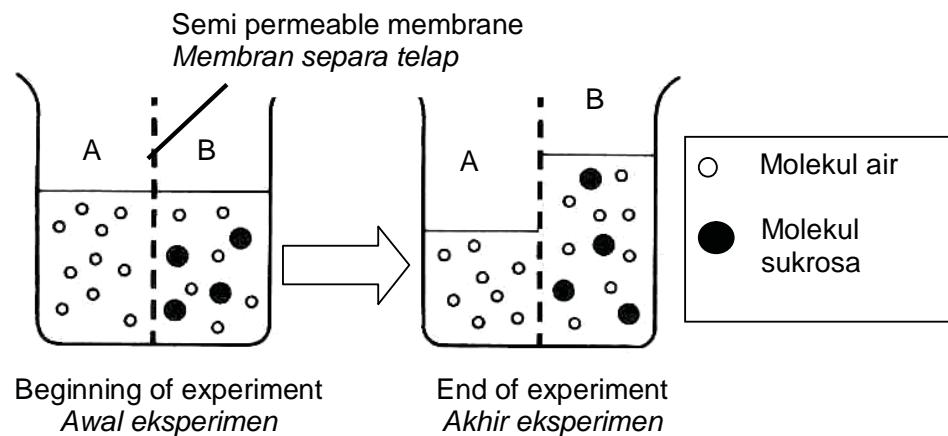


Diagram 4
Rajah 4

Which of the following is true about the movement of water molecules at the end of the experiment ?

Antara berikut, yang manakah benar tentang pergerakan molekul air pada akhir eksperimen ?

- A The rate of water molecules diffusing from A to B is higher than from B to A
Kadar molekul air meresap daripada A ke B lebih tinggi daripada B ke A
- B The rate of water molecules diffusing from B to A is higher than from A to B
Kadar molekul air meresap daripada B ke A lebih tinggi daripada A ke B
- C No water molecules diffuses from A to B
Tiada molekul air meresap masuk daripada A ke B.
- D The rate of water molecules diffusing from A to B and from B to A is the same
Kadar molekul air meresap daripada A ke B dan daripada B ke A adalah sama.

5. Diagram 5 shows a potato osmometer.

Rajah 5 menunjukkan satu osmometer kentang.

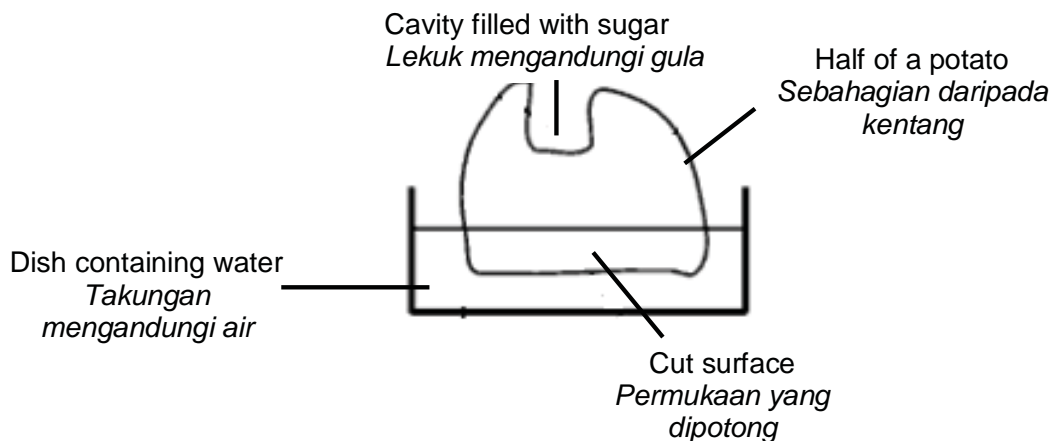


Diagram 5
Rajah 5

What will be observed after thirty minutes if the potato is cooked before being used in the experiment ?

Apakah yang akan dapat diperhatikan selepas tiga puluh minit sekiranya kentang tersebut dimasak terlebih dahulu sebelum digunakan dalam eksperimen ini ?

- A The amount of sugar in the cavity decreases
Kandungan gula di dalam lekuk berkurangan
- B The amount of sugar in the cavity increases
Kandungan gula di dalam lekuk bertambah.
- C The level of water in the dish decreases
Aras air di dalam takung berkurangan
- D The level of water in the dish remain the same
Aras air di dalam takung kekal

6. Which organelle involves in the synthesis of extracellular enzymes ?
Organel yang manakah terlibat dalam sintesis enzim luar sel ?

- A Centriole
Sentriol
- B Smooth Endoplasmic Reticulum
Jalinan Endoplasma Licin
- C Golgi Apparatus
Jasad Golgi
- D Lysosome
Lisosom

7. Diagram 6 shows the action of an enzyme sucrase on sucrose.
Rajah 6 menunjukkan tindakan enzim sukrase ke atas sukrosa.

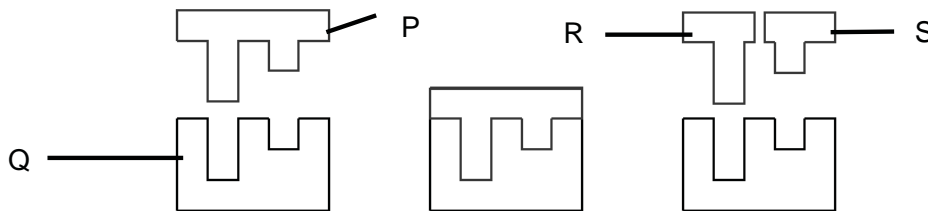


Diagram 6
Rajah 6

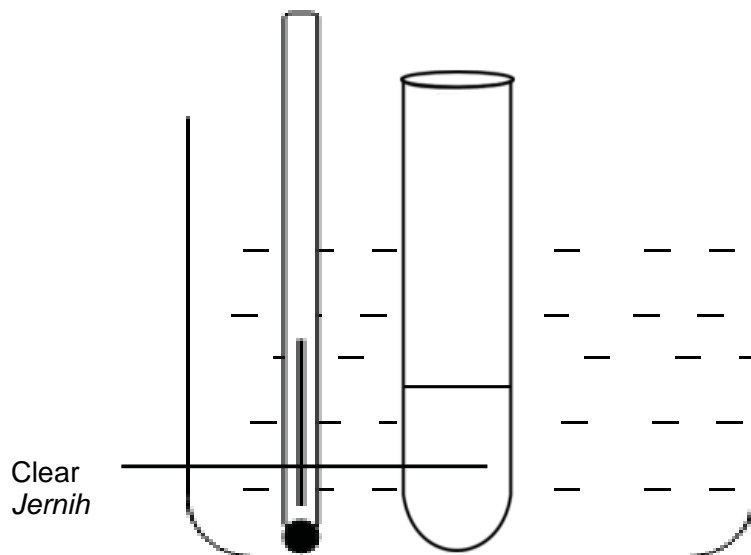
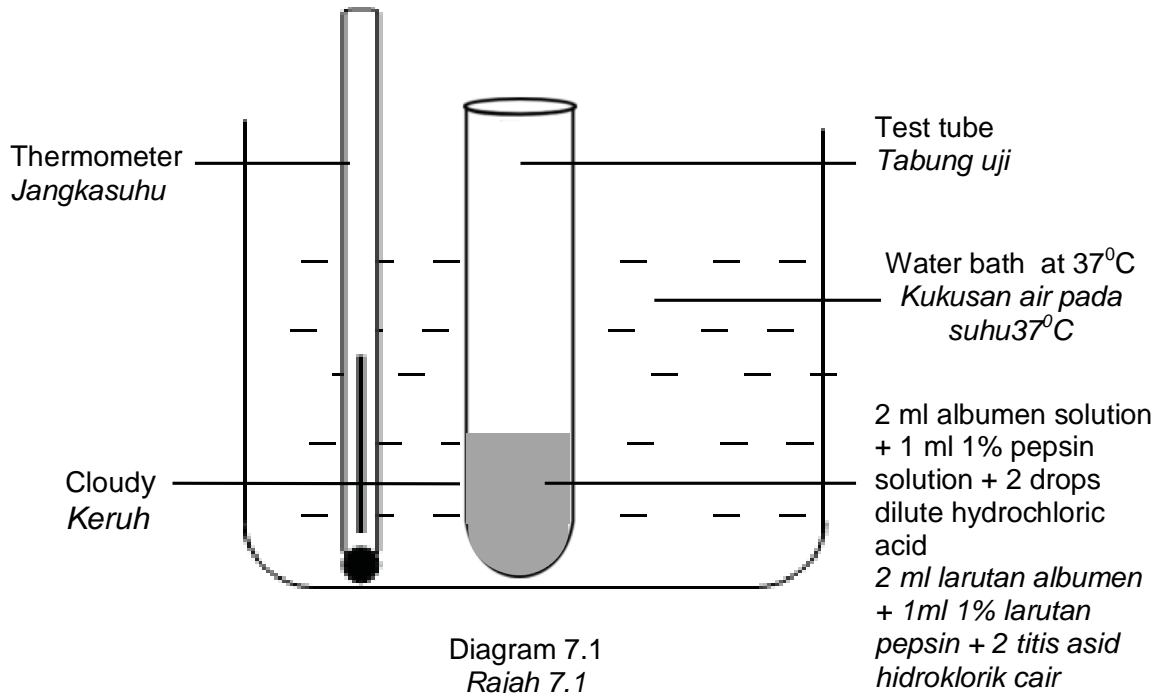
What is P, Q, R and S ?
Apakah P, Q, R dan S ?

	P	Q	R	S
A	Sucrose	Sucrase	Glucose	Fructose
B	Sucrase	Sucrose	Glucose	Fructose
C	Sucrose	Sucrase	Galactose	Glucose
D	Sucrase	Sucrose	Galactose	Fructose

8. Diagram 7.1 shows a set up of apparatus to study the action of pepsin on protein. Diagram 7.2 shows the result of the experiment after one hour.

Rajah 7.1 menunjukkan satu set radas untuk mengkaji tindakan pepsin ke atas protein.

Rajah 7.2 menunjukkan keputusan eksperimen tersebut selepas satu jam.

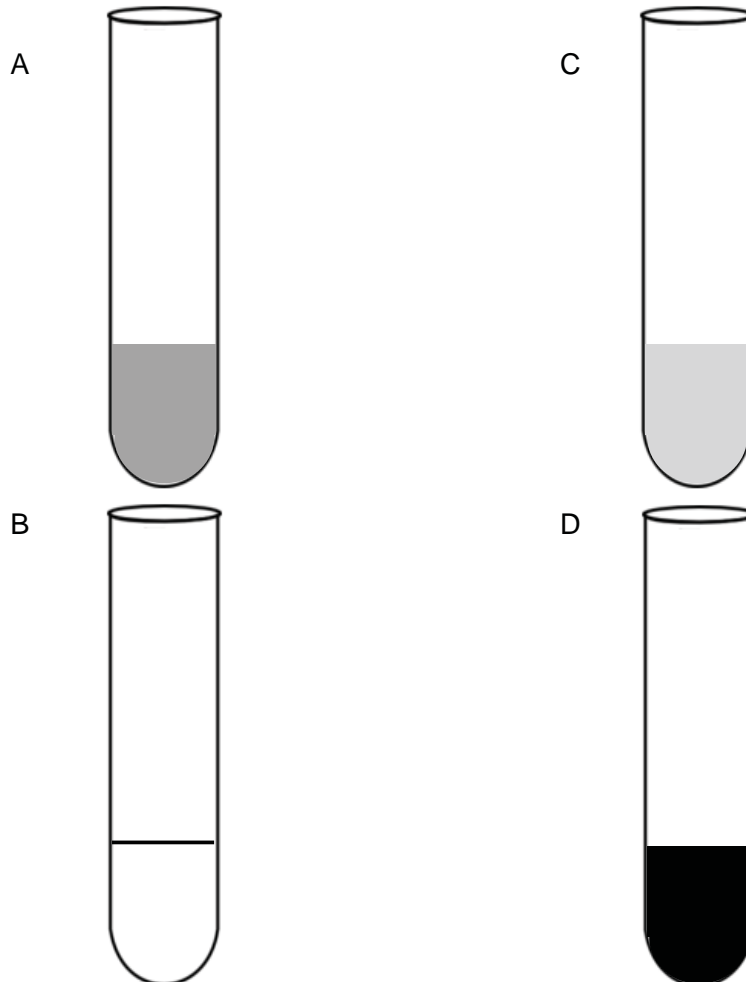


The experiment in diagram 7.1 is repeated using 4 ml of 1% boiled pepsin.

Which of the following is the result of the experiment after one hour ?

Eksperimen dalam rajah 7.1 diulang dengan menggunakan 4 ml 1% pepsin yang dididihkan..

Antara yang berikut, yang manakah merupakan keputusan eksperimen tersebut ?



9. Which of the following carbohydrates is disaccharide ?
Yang manakah antara karbohidrat berikut merupakan disakarida ?

- | | |
|-------------------------------|---------------------------------|
| A Fructose
<i>Fruktosa</i> | C Starch
<i>Kanji</i> |
| B Lactose
<i>Laktosa</i> | D Galactose
<i>Galaktosa</i> |

10. Diagram 8 shows a stage of meiosis in a plant cell.
Rajah 8 menunjukkan satu peringkat meiosis dalam satu sel tumbuhan.

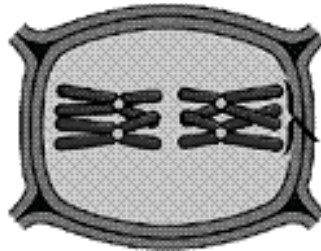


Diagram 8
Rajah 8

What is the stage ?
Apakah peringkat tersebut ?

- | | |
|------------------------------------|----------------------------------|
| A Metaphase 1
<i>Metafasa 1</i> | C Anaphase 1
<i>Anafasa 1</i> |
| B Metaphase 2
<i>Metafasa 2</i> | D Anaphase 2
<i>Anafasa 2</i> |
11. Diagram 9 shows a chromosomal behavior during meiosis.
Rajah 9 menunjukkan perlakuan kromosom sewaktu meiosis.



Diagram 9
Rajah 9

What is the importance of this chromosomal behaviour ?
Apakah kepentingan perlakuan kromosom ini ?

- | | |
|--|--|
| A Producing new cells
<i>Penghasilan sel-sel baru</i> | C Repairing injured tissues
<i>Membaiki tisu rosak</i> |
| B Producing variation
<i>Menghasilkan variasi</i> | D Regenerating new tissues
<i>Petumbuhan semula tisu baru</i> |

12. Diagram 10 shows the process of cloning a sheep.
Rajah 10 menunjukkan proses pengklonan kambing biri-biri.

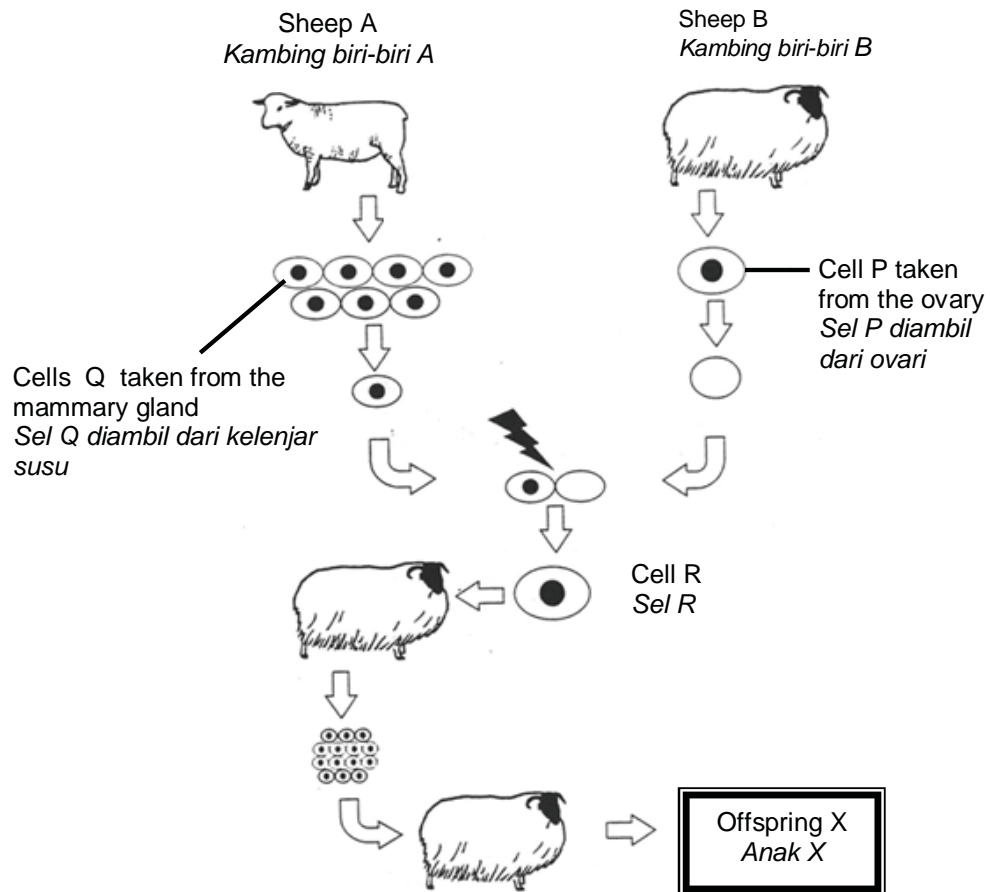


Diagram 10
Rajah 10

Which of the following is **true** about the process ?
*Antara berikut, yang manakah **benar** berkaitan proses tersebut ?*

- I. Cell P has diploid number of chromosomes
Sel P mempunyai bilangan kromosom diploid
- II. Cell Q has diploid number of chromosomes
Sel Q mempunyai bilangan kromosom diploid
- III. Cell R is formed by asexual reproduction
Sel R dihasilkan oleh pembiakan aseksual
- IV. The characteristics of offspring X are the same as in sheep B
Ciri-ciri anak X sama dengan kambing biri-biri B

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

13. Diagram 11 shows the nucleus of a cell. The cell is treated with Vinblastine which is a chemical that inhibits the formation of spindle fibres.
Rajah 11 menunjukkan nucleus satu sel. Sel tersebut telah dirawat dengan Vinblastine iaitu sejenis bahan kimia yang merencatkan penghasilan gentian gelendung.



Diagram 11
Rajah 11

What is the correct number of chromosomes in its daughter cells after a mitotic division?
Apakah bilangan kromosom yang betul dalam sel anak selepas satu pembahagian mitosis ?

	Daughter cell 1	Daughter cell 2
A	6	0
B	3	0
C	3	3
D	6	6

14. Diagram 12 shows a condition of a child who is lack of protein and carbohydrate in his diet.
Rajah 12 menunjukkan keadaan seorang kanak-kanak yang kekurangan protein dan karbohidrat dalam gizinya.

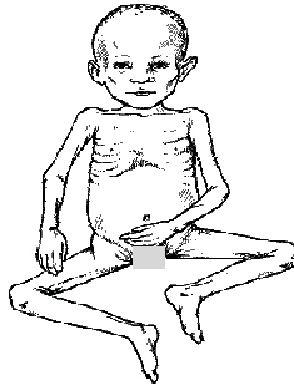


Diagram 12 / *Rajah 12*

What is the health problem suffered by the child ?

Apakah masalah kesihatan yang dialami oleh kanak-kanak tersebut ?

- | | |
|-------------------------------------|---------------------------------------|
| A Kwasyiorkor
<i>Kwasyiorkor</i> | C Osteoporosis
<i>Osteoporosis</i> |
| B Rickets
<i>Ricket</i> | D Marasmus
<i>Marasmus</i> |
- 15 Diagram 13 shows a stomach of a cow.
Rajah 13 menunjukkan perut seekor lembu.

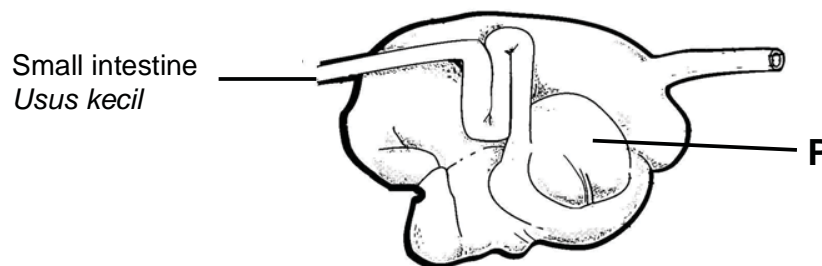


Diagram 13 / *Rajah 13*

What is the part labeled P ?

Apakah bahagian yang berlabel P ?

- | | | | |
|---|-------------------------------|---|-----------------------------|
| A | Rumen
<i>Rumen</i> | C | Omasum
<i>Omasum</i> |
| B | Reticulum
<i>Retikulum</i> | D | Abomasum
<i>Abomasum</i> |

16. Diagram 14 shows a structure of a villus.
Rajah 14 menunjukkan satu struktur villus.

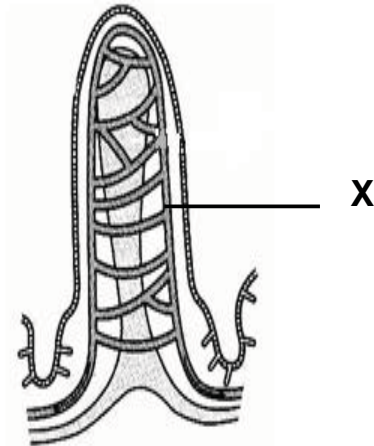


Diagram 14
Rajah 14

Which of the following nutrients are found in X?
Yang manakah antara nutrient berikut terdapat dalam X?

- | | | | |
|---|-----------------------------|---|---------------------------------|
| A | Glucose
<i>Glukosa</i> | C | Fatty Acid
<i>Asid Lemak</i> |
| B | Glycerol
<i>Gliserol</i> | D | Vitamin A
<i>Vitamin A</i> |

17. Diagram 15 shows a part of the human digestive system.
Rajah 15 menunjukkan sebahagian daripada sistem pencernaan manusia.

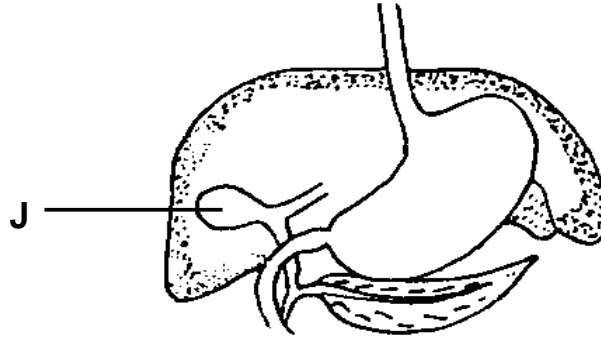


Diagram 15
Rajah 15

What the function of J?
Apakah fungsi J?

- | | | | |
|---|--|---|--|
| A | Secrete bile
<i>Merembeskan jus hempedu</i> | C | Destroy bile
<i>Memusnahkan jus hempedu</i> |
| B | Channel out bile
<i>Menyalurkan jus hempedu</i> | D | Store bile
<i>Menyimpan jus hempedu</i> |
18. The following shows the results of an experiment to determine the content of vitamin C in orange juice.
Berikut adalah keputusan eksperimen untuk menentukan kandungan vitamin C di dalam jus oren.

Volume of orange juice = 3.4 cm^3 <i>Isipadu jus oren</i>	Volume of DCPIP solution = 1 cm^3 <i>Isipadu larutan DCPIP</i>
(1.3 cm^3 of 0.1% ascorbic acid is needed to decolourise 1 cm^3 of DCPIP solution.) <i>(1.3 cm^3 0.1% asid askorbik diperlukan untuk melunturkan 1 cm^3 larutan DCPIP)</i>	

What is the percentage of Vitamin C in the orange juice ?
Apakah peratusan Vitamin C dalam jus oren tersebut ?

- | | | | |
|---|---------|---|---------|
| A | 0.026 % | C | 0.038 % |
| B | 0.260 % | D | 0.380 % |

19. Which of the following is the product of anaerobic respiration in human muscle cells ?
Antara yang berikut, yang manakah merupakan hasil respirasi anaerob dalam sel otot manusia ?
- A Lactic acid
Asid Laktik
- B Carbon dioxide
Karbon dioksida
- C Ethanol
Etanol
- D Water
Air
20. Diagram 16 shows the respiratory structure of an insect.
Rajah 16 menunjukkan struktur respirasi seekor serangga

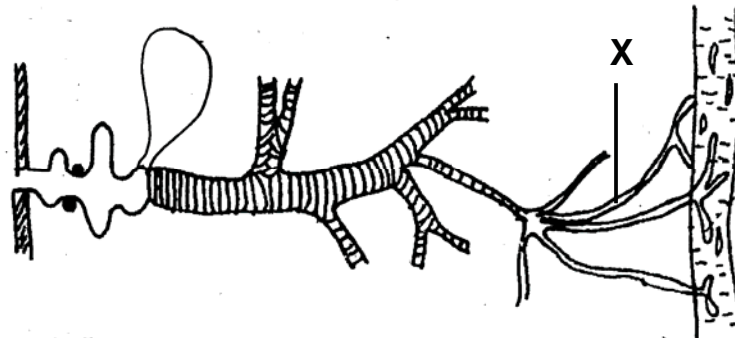


Diagram 16
Rajah 16

What is X ?
Apakah X

- A Trachea
Trakea
- B Tracheol
Trakeol
- C Spiracle
Spirakel
- D Chitin
Kitin

21. Diagram 17 shows diffusion of gas Y from an alveolus to a blood capillary.
Rajah 17 menunjukkan resapan gas Y daripada alveolus ke kapilari darah.

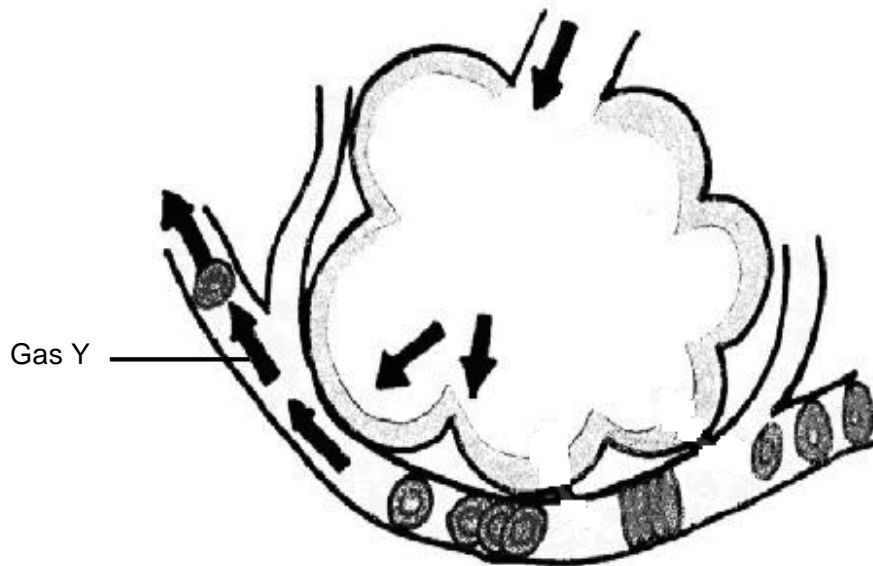


Diagram 17 / *Rajah 17*

Which of the following is true about the difference in the concentration of gas Y of a healthy person and a cigarette smoker?

Antara yang berikut, yang manakah benar tentang perbezaan antara kepekatan gas Y dalam kapilari darah seorang yang sihat dengan seorang penghisap rokok?

	Healthy individu <i>Individu sihat</i>	Cigarette smoker <i>Penghisap rokok</i>
A	Higher <i>Tinggi</i>	Higher <i>Tinggi</i>
B	Lower <i>Rendah</i>	Higher <i>Tinggi</i>
C	Lower <i>Rendah</i>	Lower <i>Rendah</i>
D	Higher <i>Tinggi</i>	Lower <i>Rendah</i>

22. Diagram 18 shows an interaction between oxpacker birds and a rhinoceros.
Rajah 18 menunjukkan interaksi antara burung tenggek kerbau dengan badak sumbu.



Diagram 18
Rajah 18

What is the interaction shown by the two organisms ?
Apakah interaksi yang ditunjukkan oleh kedua-dua organism ?

- | | |
|--|------------------------------------|
| A Commensalism
<i>Komensalisme</i> | C Parasitism
<i>Parasitisme</i> |
| B Saprophytisme
<i>Saprofitisme</i> | D Mutualism
<i>Mutualisme</i> |
23. The following statement is an ecology term.
Penyataan berikut adalah mengenai istilah dalam ekologi.

- A group of organism that looks alike and has similar characteristics
Sekumpulan organism yang kelihatan serupa dan mempunyai ciri-ciri yang sama

What is the statement referred to ?
Apakah yang dirujuk oleh pernyataan ini ?

- | | |
|--------------------------------|---------------------------------|
| A Niche
<i>Nic</i> | C Population
<i>Populasi</i> |
| B Community
<i>Komuniti</i> | D Species
<i>Spesis</i> |

24. Diagram 19 shows a part of nitrogen cycle.
Rajah 19 menunjukkan sebahagian daripada kitar nitrogen.

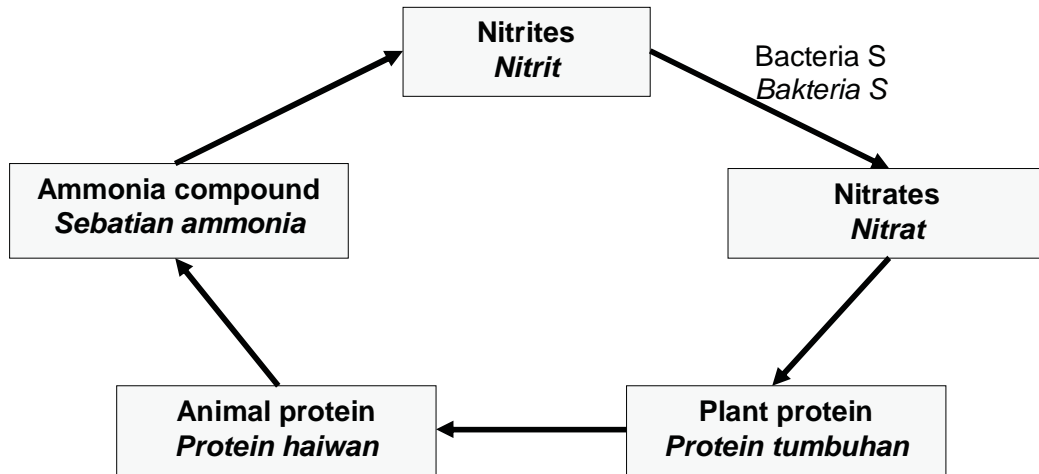


Diagram 19
Rajah 19

What is bacteria S?
Apakah bakteria S ?

- | | | | |
|---|--|---|--|
| A | <i>Azobacter sp.</i>
<i>Azobacter sp.</i> | C | <i>Nitrobacter sp.</i>
<i>Nitrobacter sp.</i> |
| B | <i>Rhizobium sp</i>
<i>Rhizobium sp</i> | D | <i>Nitrosomonas sp.</i>
<i>Nitrosomonas sp.</i> |

27. What element in chlorofluorocarbon gas that can destroy the ozone layer?
Apakah unsur dalam gas kloroflorokarbon yang boleh memusnahkan lapisan ozon?

A Carbon
Karbon

C Chlorine
Klorin.

B Fluorine
Fluorin

D Fluorine and Chlorine
Fluorin dan Klorin

28. Diagram 21 shows a phenomenon that causes an endangered ecosystem.
Rajah 21 menunjukkan fenomena yang menyebabkan ekosistem terancam

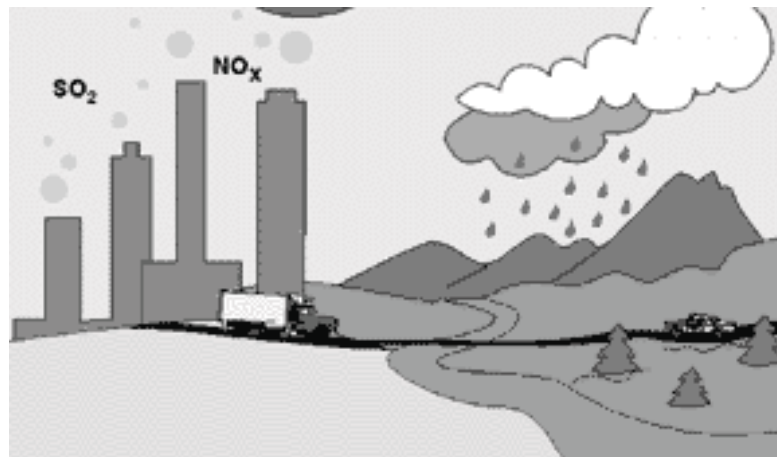


Diagram 21
Rajah 21

What is the effect of the phenomenon ?
Apakah kesan fenomena tersebut ?

A Soil becomes acidic
Tanah menjadi berasid

C Eutrophication
Eutrofikasi

B Blurring of vision
Penglihatan menjadi kabur

D Nitrification
Nitritfikasi

29. The following information is about process **M** that occurs in an ecosystem.
Maklumat berikut adalah berkaitan dengan proses yang berlaku pada ekosistem.

- Nitrates runs off into lakes
Nitrat mengalir ke dalam tasik
- Rapid growth of algae and floating plant.
Pertumbuhan pesat alga dan tumbuhan terapung.

What is process **M** ?
*Apakah proses **M** ?*

- | | |
|---|--|
| <p>A Colonisation
<i>Pengkolonian</i></p> <p>B Succession
<i>Penyesaran</i></p> | <p>C Eutrophication
<i>Eutrofikasi</i></p> <p>D Nitrification
<i>Nitrifikasi</i></p> |
|---|--|

30. Which of the following describes a vein ?
Yang manakah antara berikut menerangkan tentang vein ?

	Valve <i>Injap</i>	Thickness of muscular wall <i>Ketebalan dinding berotot</i>
A	Present <i>Ada</i>	Thick <i>Tebal</i>
B	Present <i>Ada</i>	Thin <i>Nipis</i>
C	Absent <i>Tiada</i>	Thick <i>Tebal</i>
D	Absent <i>Tiada</i>	Thin <i>Nipis</i>

31. Diagram 22 shows a cross section of a dicotyledonous stem.
Rajah 22 menunjukkan keratan rentas bagi batang dikotiledon..

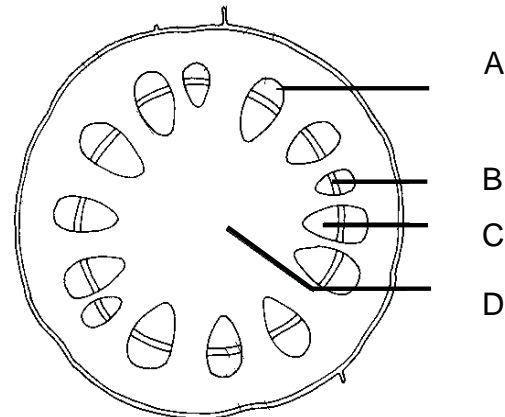


Diagram 22
Rajah 22

Which of the parts A, B, C and D is phloem?
Antara bahagian A, B C dan D, yang manakah merupakan floem ?

32. Diagram 23 shows an open circulatory system of an arthropod .
Rajah 23 menunjukkan sistem peredaran terbuka seekor artropoda

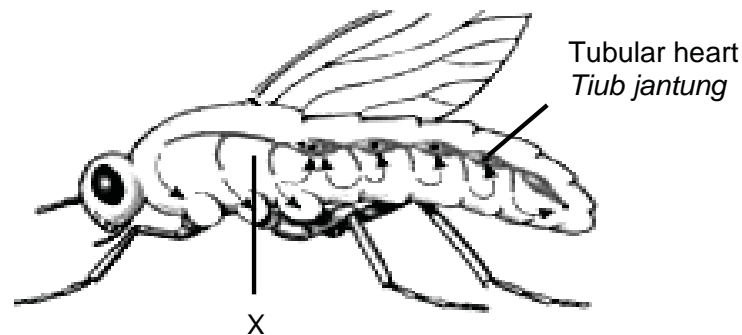


Diagram 23 / *Rajah 23*

What is the colourless fluid found in X ?
Apakah cecair tidak berwarna yang terdapat dalam X?

- | | |
|--|--|
| A Lymph fluid
<i>Bendalir limfa</i> | C Haemolymph
<i>Hemolimfa</i> |
| B Plasma
<i>Plasma</i> | D Interstitial fluid
<i>Bendalir tisu</i> |

33. Diagram 24 shows a type of a circulatory system.
Rajah 24 menunjukkan sejenis sistem peredaran darah.

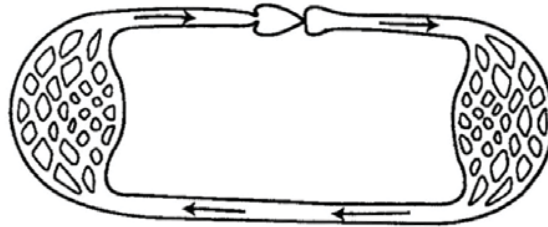


Diagram 24
Rajah 24

Which organism has this type of circulatory system?

Antara yang berikut yang manakah organisma yang mempunyai sistem peredaran darah ini?

- | | |
|-----------------|------------------|
| A Fish
Ikan | C Bird
Burung |
| B Frog
Katak | D Worm
Cacing |
34. Diagram 25 shows the concentration of antibodies in a patient's blood after being immunized
Rajah 25 menunjukkan kepekatan antibodi dalam darah pesakit selepas diberi immunisasi

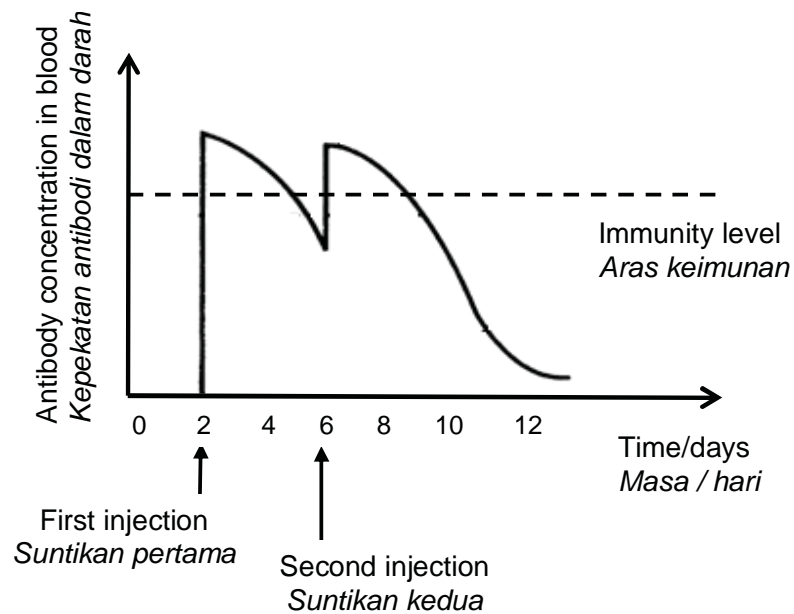


Diagram 25
Rajah 25

Which of the following is **true** about the immunity shown?

*Antara yang berikut, yang manakah **benar** tentang keimunan yang ditunjukkan ?*

- I. It gives temporary protection
la memberi perlindungan sementara
- II. Antiserum is injected into the patient's body
Antiserum disuntik dalam badan pesakit
- III. It gives immediate immunity against the disease
la memberi keimunan sementara menentang penyakit
- IV. White blood cells are stimulated to produce antibody
Sel darah putih dirangsang untuk menghasilkan antibodi

A II and III only

C II, III and IV only

B I, II and III only

D I, II, III and IV

35. Diagram 26 shows a vertebrae in vertebral column.

Diagram 26 menunjukkan vertebra dalam turus vertebra.



Diagram 26

Rajah 26

What is the vertebrae ?

Apakah vertebra ini ?

A Cervical
Servikal

C Sacrum
Sakrum

B Thoracic
Toraks

D Lumbar
Lumbar

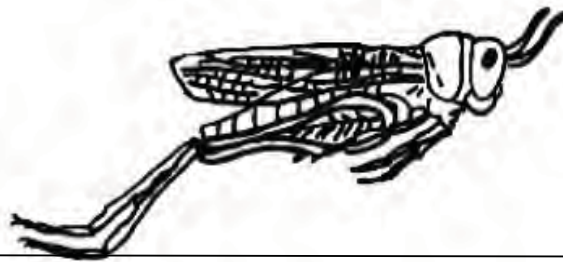
36. Diagram 27 shows an impaired musculoskeletal system which causes swollen and painful at the joint.
Rajah 27 menunjukkan sistem otot rangka terjejas yang menyebabkan bengkak dan sakit pada sendi.



Diagram 27
Rajah 27

What is the impairment of the musculoskeletal system shown in the diagram?
Apakah masalah sistem otot rangka yang ditunjukkan dalam rajah ?

- | | |
|---------------------------------------|-----------------------------------|
| A Arthritis
Artritis | C Osteoporosis
Osteoporosis |
| B Muscular dystrophy
Distrofi otot | D Muscle cramp
Kekejangan otot |
37. Diagram 28 shows a movement of a grasshopper.
Rajah 28 menunjukkan pergerakan seekor belalang.



Substratum
Tapak

Diagram 28
Rajah 28

What are the action of the flexor muscle and extensor muscle to allow the movement ?
 Apakah tindakan otot fleksor dan otot ektensor untuk membolehkan pergerakan tersebut ?

	Flexor muscle Otot fleksor	Extensor muscle Otot extensor
A	Contract <i>Mengecut</i>	Contract <i>Mengecut</i>
B	Relax Mengendur	Relax Mengendur
C	Relax Mengendur	Contract <i>Mengecut</i>
D	Contract <i>Mengecut</i>	Relax Mengendur

38. Diagram 29 shows the transmission of the nerve impulse through a synapse.
 Rajah 29 menunjukkan penghantaran impuls melalui sinaps

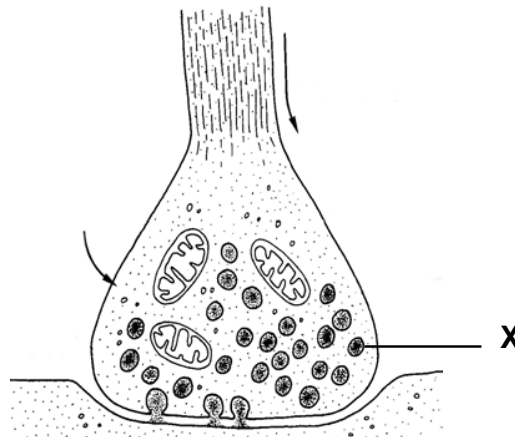


Diagram 29
 Rajah 29

Which of the following is substance X?
 Manakah antara berikut adalah bahan X?

- | | |
|--|---------------------------------|
| A Adrenaline
<i>Adrenalin</i> | C Sodium ion
Ion natrium |
| B Acetylcholine
<i>Asetilkolina</i> | D Potassium ion
Ion potasium |

39. What makes the shoot of a plant bends towards light?
Apakah yang menyebabkan pucuk tumbuhan membengkok ke arah cahaya?
- A The shoot needs light for photosynthesis
Pucuk perlu cahaya untuk proses fotosintesis
 - B The shoot needs to grow longer to avoid competition for light
Pucuk perlu cahaya untuk tumbuh lebih panjang bagi mengelakkan persaingan untuk mendapatkan cahaya
 - C The cells in the shaded side elongate more than the cells in the brighter side.
Sel –sel di kawasan terlindung memanjang lebih banyak daripada sel-sel di kawasan cerah.
 - D The concentration of auxin is higher in cells exposed to light
Kepekatan auksin adalah lebih tinggi dalam sel yang terdedah kepada cahaya
40. Diagram 30 shows a section of the human brain.
Rajah 30 menunjukkan keratan otak manusia.

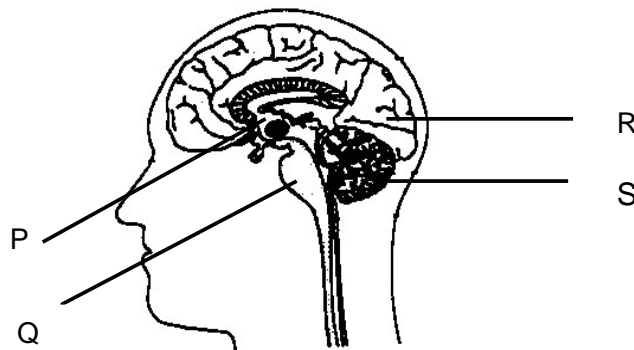


Diagram 30
Rajah 30

Which part controls the breathing and regulation of body temperature?
Bahagian manakah mengawal proses pernafasan dan kawalan suhu badan?

	Breathing Pernafasan	Regulation of body temperature Kawalatur suhu badan
A	P	Q
B	R	S
C	P	R
D	Q	P

41. Diagram 31 shows a female reproductive system.
Rajah 31 menunjukkan sistem pembiakan wanita

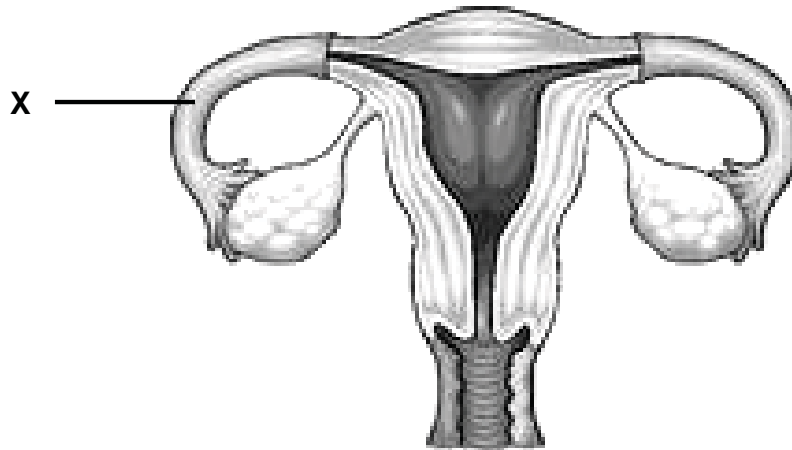


Diagram 31
Rajah 31

What is the part label X?
Apakah bahagian yang berlabel X ?

- | | | | |
|---|---|---|-------------------------|
| A | Fallopian tube
<i>Tiub fallopian</i> | C | Uterus
<i>Rahim</i> |
| B | Ovary
<i>Ovari</i> | D | Vagina
<i>Vagina</i> |
42. Which of the following sequence is the development of a human zygote?
Antara berikut yang manakan urutan yang betul bagi perkembangan zigot manusia?
- | | | | | | | | |
|---|--------|---|-------------|---|-------------|---|-------------|
| A | Zygote | → | morula | → | blastocyst | → | embryo |
| | Zigot | → | morula | → | blastosista | → | embrio |
| B | Zygote | → | blastocyst | → | morula | → | embryo |
| | Zigot | → | blastosista | → | morula | → | embrio |
| C | Zygote | → | morula | → | foetus | → | embryo |
| | Zigot | → | morula | → | fetus | → | embrio |
| D | Zygote | → | embryo | → | foetus | → | blastocyst |
| | Zigot | → | embrio | → | fetus | → | blastosista |

45. Diagram 33 shows a pair of chromosomes in a cell of an organism.
Rajah 33 menunjukkan sepasang kromosom dalam satu sel organism.

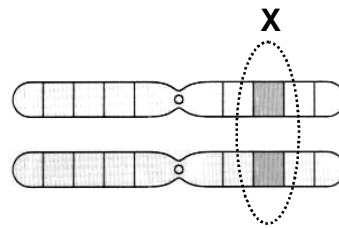


Diagram 33
Rajah 33

What is X ?
Apakah X ?

- A Gene
Gen
- B Allele
Alel
- C Nucleotides
Nukleotida
- D Chromosomes
Kromosom
46. Diagram 34 shows a schematic diagram of a cross between a pair of hamster. H represents dominant allele for black fur.
Rajah 34 menunjukkan rajah skema bagi kacukan sepasang hamster. H mewakili alel dominan bagi bulu hitam

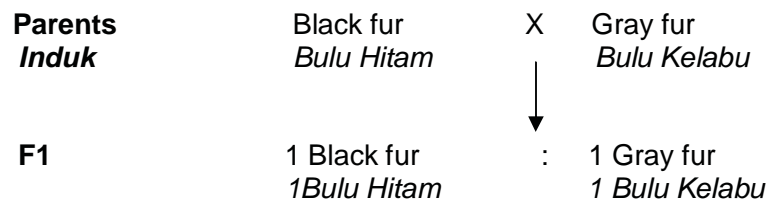


Diagram 34
Rajah34

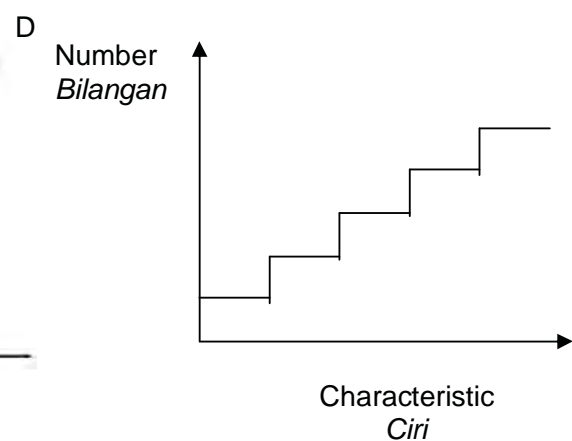
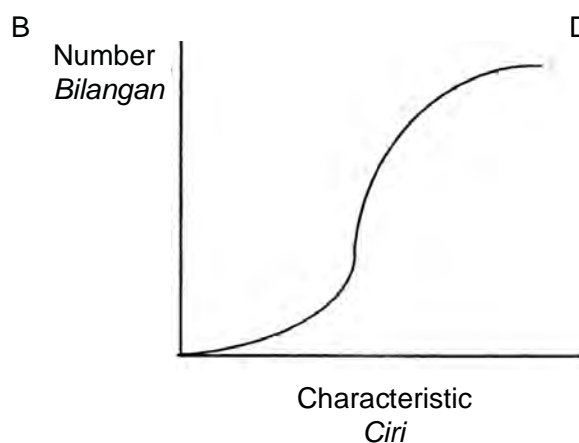
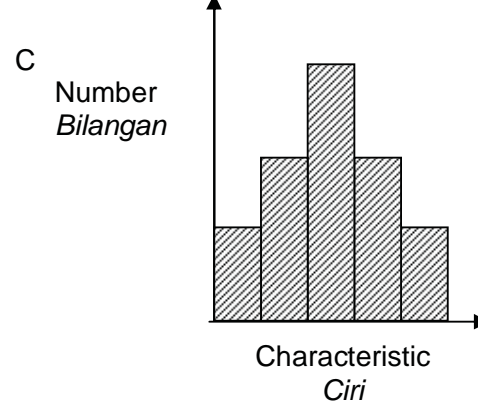
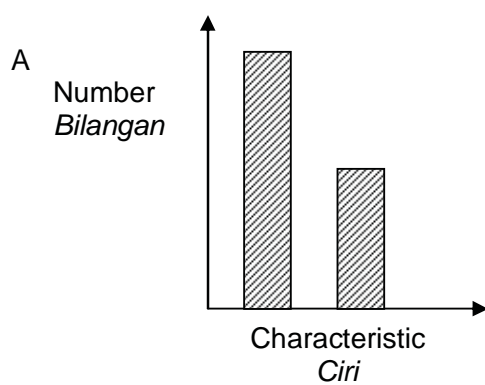
Which of the following is **true** to represent the genotype of both parents?
Antara yang berikut, yang manakah benar mewakili genotip kedua-dua induk ?

- A Hh X Hh
- B Hh X hh
- C HH X Hh
- D HH X hh

47. A heterozygous *Drosophila melanogaster* with red eye is crossed with a *Drosophila melanogaster* with white eye. Red eye is dominant over white eye. What is the phenotype ratio for eye colour characteristic in F1 generation?
 Seekor *Drosophila melanogaster* yang heterozigot yang bermata merah dikacukkan dengan seekor *Drosophila melanogaster* yang bermata putih. Sifat warna mata merah adalah dominan ke atas warna mata putih.
 Apakah nisbah fenotip bagi sifat warna mata dalam generasi F1 ?

- A All white eye
Semua bermata putih
- B All red eye
Semua bermata merah
- C 3 red eye : 1 white eye
3 bermata merah : 1 bermata putih
- D 1 red eye:1 white eye
1 bermata merah : 1 bermata putih

48. Which of the graph shows a continuous variation ?
 Antara graf berikut yang manakah menunjukkan variasi selanjat?



49. Diagram 35 shows a DNA strand containing a bases sequence .
Rajah 35 menunjukkan satu rantaian DNA yang mengandungi satu urutan bes.

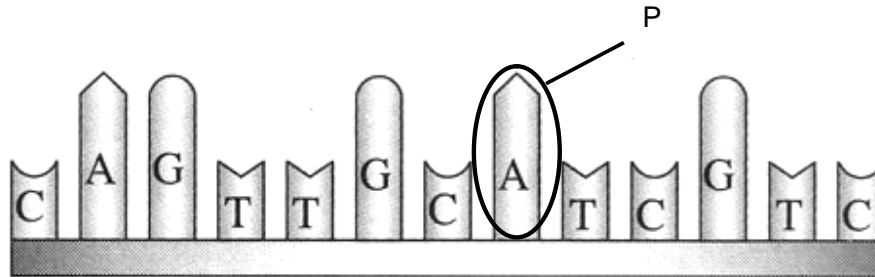


Diagram 35
Rajah 35

Which of the following might happen if base P is exposed to a mutagen ?
Antara yang berikut, yang manakah mungkin akan berlaku kepada bes P jika ia terdedah kepada bahan mutasi .

- | | | | |
|---|--|---|--|
| A | It might be inverted
<i>la akan terbalik</i> | C | It might be substituted with other base
<i>la akan diganti dengan bes yang lain</i> |
| B | It might be translocated
<i>la akan dipindahkan</i> | D | It might be splitted into half
<i>la akan terbelah dua</i> |
50. Diagram 36 shows the changes in a chromosome before and after experiencing a mutation.
Rajah 36 menunjukkan perubahan pada satu kromosom sebelum dan selepas mengalami mutasi.

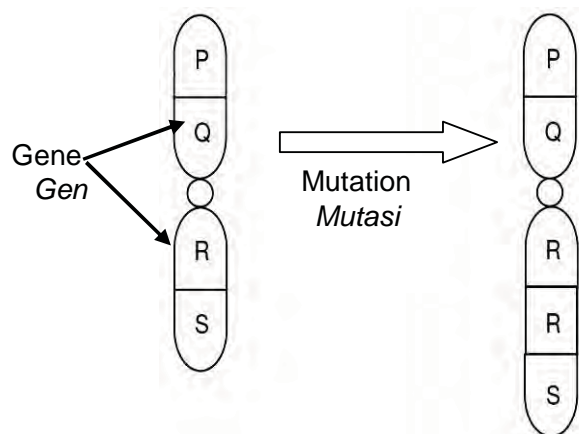


Diagram 36
Rajah 36

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

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

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

INFORMATION FOR CANDIDATES

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

SULIT Nama : Tingkatan : 4551/2

4551/2
Biologi
Kertas 2
Mei
2011
2 $\frac{1}{2}$ jam



**BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA**

**PEPERIKSAAN PERCUBAAN SPM SETARA
TINGKATAN 5 2011**

BIOLOGI

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis nama dan tingkatan anda pada ruang yang disediakan.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Kertas soalan ini mengandungi dua bahagian : **Bahagian A** dan **Bahagian B**.
5. Jawab semua soalan dalam **Bahagian A** . Jawapan anda bagi **Bahagian A** hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.
6. Jawab mana-mana **dua** soalan daripada **Bahagian B**. Jawapan anda bagi **Bahagian B** hendaklah ditulis dalam helaian tambahan yang dibekalkan.
7. Rajah yang mengiringi soalan tidak dilukis mengikut skala.
8. Penggunaan kalkulator saintifik yang **tidak** boleh diprogramkan adalah dibenarkan.

<i>Untuk Kegunaan Pemeriksa</i>			
Bahagian	Soalan	Markah penuh	Markah dipeolehi
A	1	12	
	2	12	
	3	12	
	4	12	
	5	12	
B	6	20	
	7	20	
	8	20	
	9	20	
Jumlah		100	

Kertas soalan ini mengandungi 25 halaman bercetak

Section A
Bahagian A
[60 marks]
[60 markah]

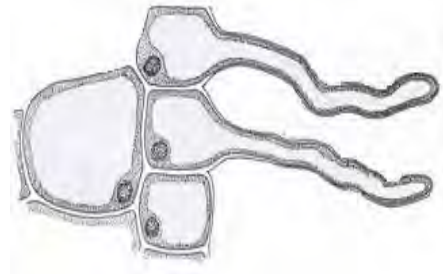
Answer **all** questions in this section.
Jawap **semua** soalan dalam bahagian ini.

1

Diagram 1 shows some specialised cells and tissue.
Rajah 1 menunjukkan beberapa sel khusus dan tisu.



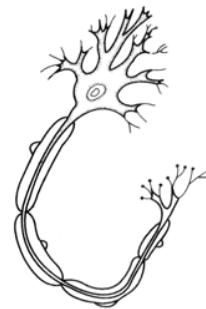
Cell P
Sel P



Tissue Q
Tisu Q



Tissue R
Tisu R



Cell S
Sel S

Diagram 1
Rajah 1

(a) (i) Name cell P and tissue R.
Namakan sel P dan tisu R.

P :

R :

[2 marks]
[2 markah]

1 (a)(i)

2

- (ii) State **one** function of cell P and cell R.
*Nyatakan **satu** fungsi sel P dan sel R.*

Cell P / Sel P :

.....

Cell R / Sel R :

.....

[2 marks]
[2 markah]

1 (a)(ii)

2

- (b) (i) Name the system which consist cell S.
Namakan sistem yang mengandungi sel S.

.....

[1 mark]
[1 markah]

1 (b)(i)

1

- (ii) Explain **one** role of cell S in the system named in (b)(i).
*Terangkan **satu** peranan sel S di dalam sistem yang dinamakan di (b)(i).*

.....

.....

.....

[2 marks]
[2 markah]

1 (b)(ii)

2

- (c) Explain **one** characteristic of tissue Q to facilitate water absorption from soil.
*Terangkan **satu** ciri tisu Q untuk membantu penyerapan air daripada tanah.*

.....

.....

.....

[2 marks]
[2 markah]

1 (c)

2

(d) Herbicide is capable to stop the transportation of some mineral into a plant through tissue Q.
Explain why.
Racun rumput boleh menghentikan pengangkutan mineral tertentu ke dalam tumbuhan melalui tisu Q.
Terangkan mengapa.

.....

.....

.....

.....

[3 marks]
[3 markah]

1 (d)

3

TOTAL
A1

12

- 2 Diagram 2.1 shows a photomicrograph showing stages in a cell cycle that occur in the animal skin.
Rajah 2.1 menunjukkan fotomikrograf bagi peringkat-peringkat di dalam kitar sel yang terjadi dalam kulit haiwan.

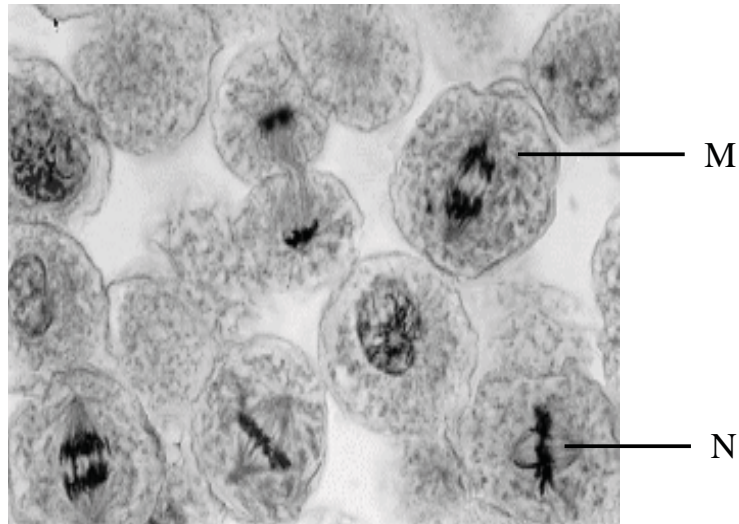


Diagram 2.1
Rajah 2.1

- (a) (i) State the type of cell division involved in the cell cycle.
Nyatakan jenis pembahagian sel yang terlibat di dalam kitar sel itu.

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

2 (a)(i)

1

- (ii) State **one** reason for your answer in (a)(i).
*Nyatakan **satu** sebab untuk jawapan anda di (a)(i).*

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

2 (a)(ii)

1

(b) (i) Explain the chromosomal behaviour in stage N.
Terangkan perlakuan kromosom dalam peringkat N.

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

[2 marks]
[2 markah]

2 (b)(i)

2

(ii) State the importance of the chromosomal behaviour in mentioned in (b)(i).
Nyatakan kepentingan perlakuan kromosom yang dinyatakan dalam (b)(i).

.....
.....

[1 mark]
[1 markah]

2 (b)(ii)

1

(c) Somatic cells of the animal has four chromosomes.
In Diagram 2.2, draw and label a diagram showing the chromosomal behavior after stage M.
Sel-sel soma haiwan itu mempunyai empat kromosom.
Pada Rajah 2.2, lukis dan label rajah menunjukkan perlakuan kromosom selepas peringkat M.



Diagram 2.2
Rajah 2.2

[3 marks]
[3 markah]

2 (c)

3

- (d) (i) A farmer wants to breed a good variety of banana plants for commercial production. Suggest a suitable method to be used which involved the cell cycle in Diagram 2.1.
Seorang peladang hendak membiakkan variasi tanaman pisang yang baik untuk penghasilan komersial. Cadangkan kaedah yang sesuai digunakan, melibatkan kitar sel dalam Rajah 2.1.

.....
.....

[1 mark]
[1 markah]

2 (d)(i)

1

- (ii) Explain how the method named in (d)(i) can increased the crop yield.
Terangkan bagaimana kaedah yang dinamakan di (d)(i) boleh meningkatkan hasil tanaman.

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

[3 marks]
[3 markah]

2 (d)(ii)

3

TOTAL
Δ?

12

- 3 (a) Diagram 3 shows a terrestrial ecosystem.
Rajah 3 menunjukkan ekosistem daratan.



Diagram 3
Rajah 3

- (i) State the definition of ecosystem.
Nyatakan definisi ekosistem.

.....
.....

[1 mark]
[1 markah]

3 (a)(i)

1

- (ii) A niche of an organism is its roles in the ecosystem.
Based on organisms in Diagram 3, state an example of niche.
Nic bagi organisma adalah peranannya dalam suatu ekosistem.
Berdasarkan organism dalam Rajah 3, nyatakan satu contoh nic.

.....
.....

[1 mark]
[1 markah]

3 (a)(ii)

1

- (b) (i) Based on the Diagram 3, construct a food web showing the interaction of **four** organisms.
Berdasarkan Rajah 3, bina satu jaringan makanan menunjukkan interaksi empat organism.

[2 marks]
[2 markah]

3 (b)(i)

2

- (b) (ii) Based on constructed food web in (b)(i) construct a pyramid of numbers.
Berdasarkan jaringan makanan yang telah dibina di (b)(i) binakan pyramid nombor.

[2 marks]
[2 markah]

3 (b)(ii)

2

- (c) (i) The organisms in the first trophic level absorbs 15 000kJ solar energy. Energy loss at each trophic level is 90%. Calculate the total energy transferred to the organisms in the third trophic level. *Organisma-organisma dalam aras trof pertama menyerap 15 000kJ tenaga matahari. Tenaga hilang sebanyak 90% pada setiap aras trof. Kirakan jumlah tenaga yang dipindahkan kepada organism pada aras trof ketiga.*

=.....kJ

[2 marks]
[2 markah]

3 (c)(i)

2

- (ii) State **two** ways in which energy may be lost in the food web. *Nyatakan **dua** cara yang memungkinkan kehilangan tenaga dalam jaringan makanan.*

1.

2.

[2marks]
[2 markah]

3 (c)(ii)

2

- (d) Many problems related to the environment are the results of human activities. Explain **one** bad effect of the activities on the ecosystem. *Banyak masalah berkaitan alam sekitar adalah disebabkan oleh aktiviti manusia. Terangkan **satu** kesan buruk aktiviti-aktiviti itu ke atas ekosistem.*

.....

.....

.....

[2 marks]
[2 markah]

3 (d)

2

TOTAL
A3

12

4

Diagram 4 shows a human foetus in his mother's uterus
Rajah 4 menunjukkan fetus manusia dalam uterus ibunya.

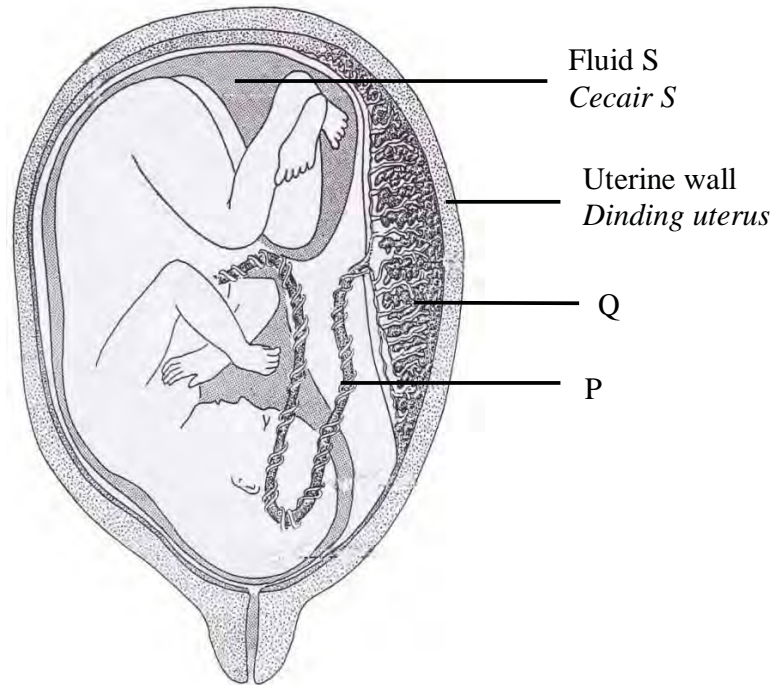


Diagram 4
Rajah 4

(a) State the importance of fluid S.
Nyatakan kepentingan cecair S.

.....

.....

[1 mark]
[1 markah]

(b) (i) Structure P consist of two types of blood vessels.
Name both blood vessels
Struktur P terdiri daripada dua jenis salur darah.
Namakan kedua-dua salur darah tersebut

1.

2.

[2 marks]
[2 markah]

4 (a)

1

4 (b)(i)

2

(ii) State the function of each blood vessels named in (b)(i)
Nyatakan fungsi bagi setiap salur darah yang dinamakan di (b)(i).

- 1.
- 2.

[2 marks]
[2 markah]

4 (b)(ii)

2

(c) In the 16th week, a pregnant mother is infected with a disease. The infection causes structure Q to stop functioning. The mother miscarriage. Explain this statement.
Pada minggu ke 16, ibu hamil dijangkiti penyakit. Jangkitan itu menyebabkan struktur Q berhenti berfungsi. Ibu mengalami keguguran. Jelaskan pernyataan ini.

-
-
-

[2 marks]
[2 markah]

4 (c)

2

(d) Explain why the foetus has a separate blood circulatory system from his mother.
Terangkan mengapa fetus mempunyai sistem peredaran darah yang berasingan daripada ibunya.

-
-
-

[2 marks]
[2 markah]

4(d)

2

(e)

Human chorionic gonadotrophin hormone (HCG) has a similar role to luteinizing hormone (LH).
A wife has a problem conceiving due to the failure in ovulation. The wife becomes pregnant after a doctor has given her injections of HCG.
Hormon gonadotrofin manusia (HCG) mempunyai satu persamaan dengan hormon peluteinan. Seorang isteri mempunyai masalah untuk hamil

Based on above statement, explain how HCG injections enable the process of pregnancy.

Berdasarkan pernyataan di atas, terangkan bagaimana suntikan HCG menyebabkan kehamilan.

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

[3 marks]
[3 markah]

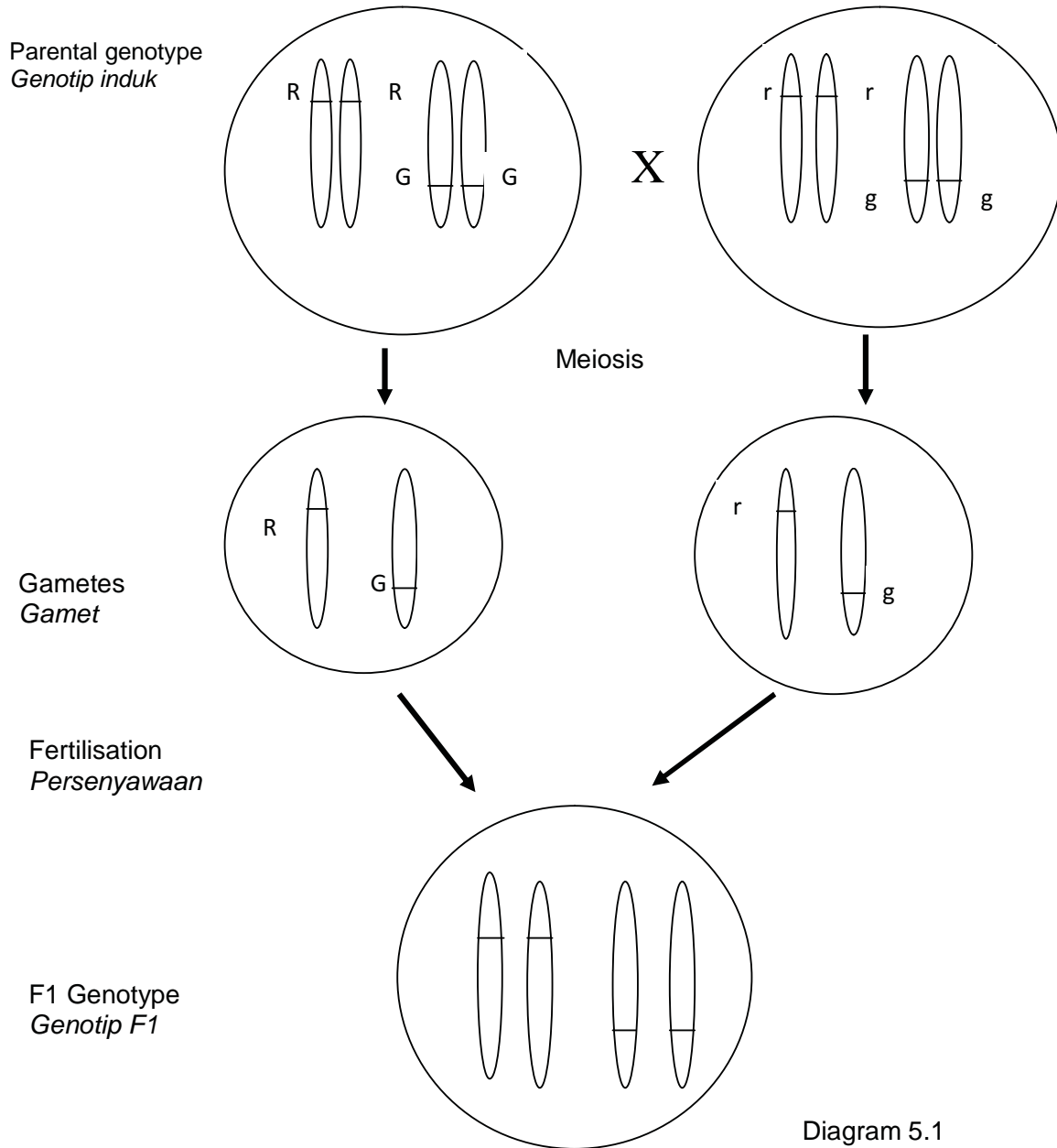
4 (e)

3

**TOTAL
A4**

12

- 5 Diagram 5.1 shows a dihybrid cross of pure-breeding round and yellow seeds with wrinkled and green seeds of pea plant.
Rajah 5.1 menunjukkan kacukan dihibrid baka tulen, biji bulat berwarna kuning dengan biji berkedut berwarna hijau pokok kacang pea.



Key / *kekunci*:

R : Represents dominant allele round seed

Mewakili alel dominan biji bulat

G : Represents dominant allele yellow colour

Mewakili alel dominan biji berwarna kuning

- (a) (i) In Diagram 5.1, label the alleles for F1 genotype.
Dalam Rajah 5.1, label alel-alel untuk genotip F1.

[1 mark]
[1 markah]

5 (a)(i)

1

- (ii) State the phenotype for F1 generation.
Nyatakan fenotip untuk generasi F1.

[1 mark]
[1 markah]

5 (a)(ii)

1

- (b) Diagram 5.2 shows two possibilities of gametes formation by F1 generation.
Rajah 5.2 menunjukkan dua kemungkinan gamet-gamet yang terbentuk oleh generasi F1.

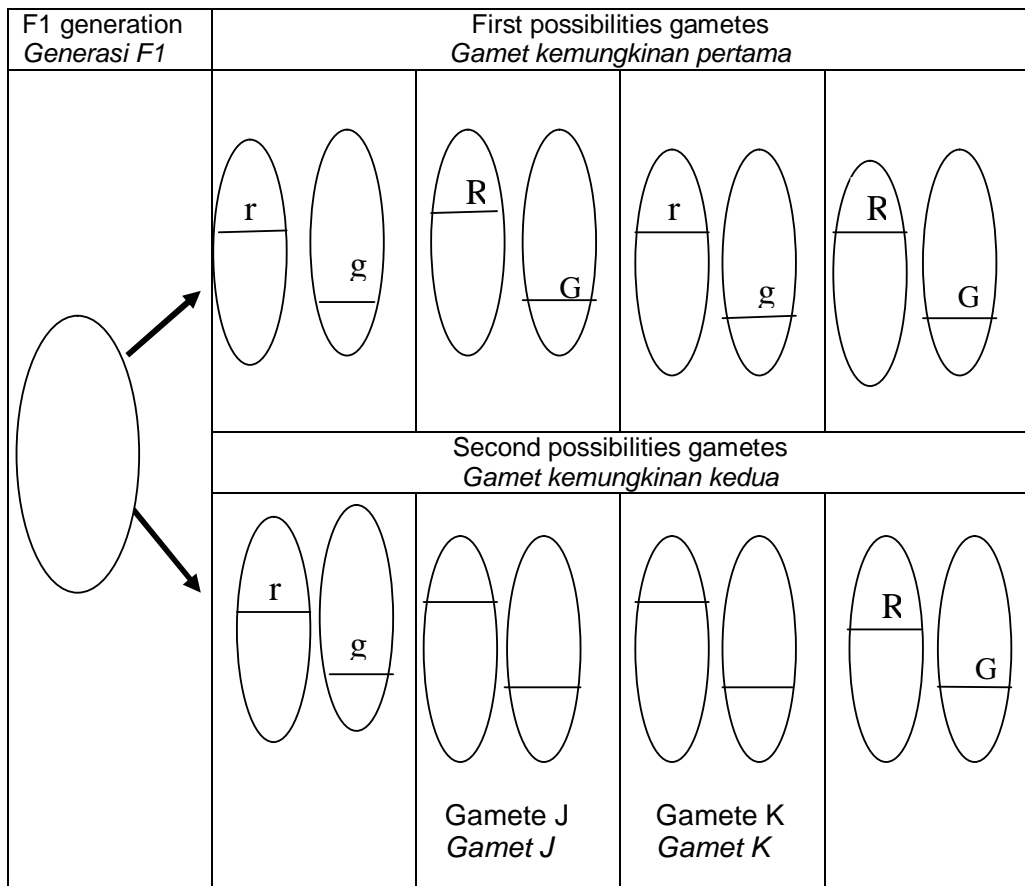


Diagram 5.2
Rajah 5.2

For
Examiner's
Use

- (b) Name the process that occurred during meiosis which produced different gametes in second possibilities.
Namakan proses yang terjadi semasa meiosis yang menghasilkan gamet-gamet berbeza dalam kemungkinan kedua.

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

5 (b)

1

- (c) In diagram 5.2, Complete gamete J and gamete K which are produced in second possibility.
Pada Rajah 5.2, lengkapkan gamet J dan gamet K yang dihasilkan dalam kemungkinan kedua.

[2 marks]
[2 markah]

5 (c)

2

- (d) (i) State which possibilities will cause more variation to the offsprings.
Nyatakan kemungkinan yang mana menyebabkan lebih variasi kepada anaknya.

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

5 (d)(i)

1

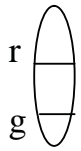
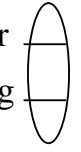
- (ii) Explain **one** reason for your answer in (d)(i).
Terangkan satu sebab bagi jawapan anda di (d)(i).

.....
.....
.....
.....
[3 marks]
[3 markah]

5 (d)(ii)

3

- (e) The pea plant of F1 generation which has undergone second possibility is crossed with the parent which has wrinkled-green seed. Complete Diagram 5.3 by filling in F1 generation gametes drawn in (c), genotype of F2 generation and phenotype of F2 generation which will be produced.
Pokok kacang pea generasi F1 yang telah mengalami proses kemungkinan kedua, dikacukkan semula dengan induk yang mempunyai biji lisut dan berwarna hijau. Lengkapkan Rajah 5.3 dengan mengisi gamet F1 yang dilukis di (c) , genotip generasi F2 dan fenotip generasi F2 yang akan terhasil.

Gametes from F1 generation. <i>Gamet generasi F1</i>	Gametes from parent <i>Gamet induk</i>	Genotype of F2 generation <i>Genotip generasi F2</i>	Phenotype of F2 generation <i>Fenotip generasi F2</i>
	r  g		
	r  g		

[3 marks]
[3 markah]

5 (e)

	3
--	---

**TOTAL
A5**

	12
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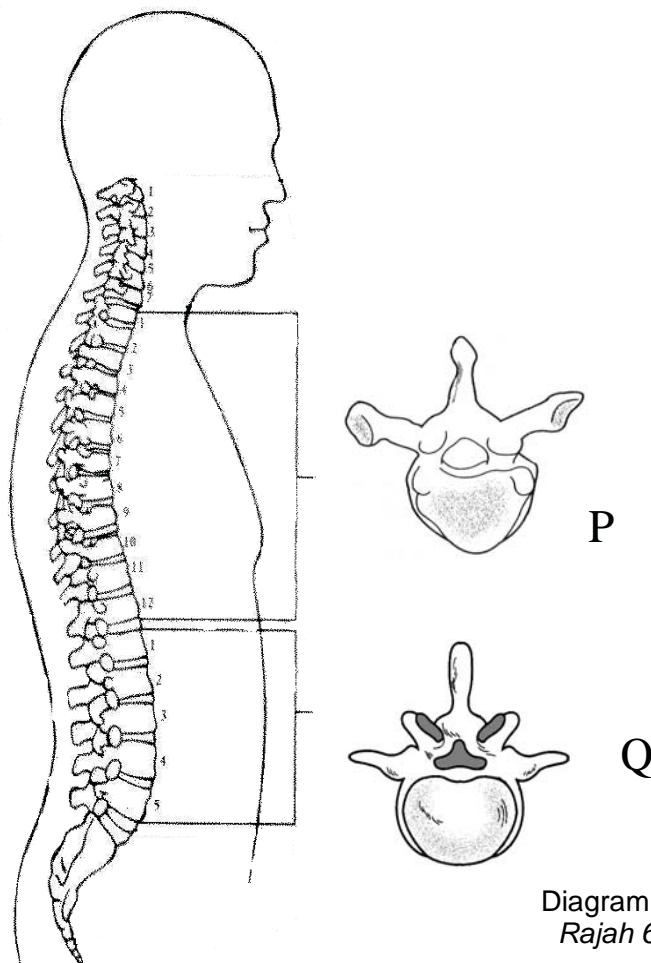
Section B
Bahagian B

[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 the human vertebral column. P and R are two types of vertebrae in the human vertebral column.
Rajah 6.1 menunjukkan turus vertebra manusia. P dan R adalah dua jenis vertebra pada turus vertebra manusia.



- (i) Explain the adaptation of vertebrae P and vertebrae Q to function efficiently.
Terangkan penyesuaian vertebra P dan vertebra R untuk berfungsi dengan cekap.

[6 marks]
[6 markah]

- (ii) Explain why human requires endoskeleton for efficient daily activities.
Terangkan mengapa manusia memerlukan rangka luar untuk kecekapan aktiviti harian.

[4 marks]

[4 markah]

- (b) Explain why :

- An athlete must do a warming up before the event
- Elderly people experiences pain at their joint.

Terangkan mengapa :

- *Seorang atlet mesti melakukan senaman memanaskan badan sebelum memulakan acara*
- *Orang-orang tua mengalami kesakitan pada sendi*

[10 marks]

[10 markah]

- 7 (a) (i)

Movement of substances across the plasma membrane in the cell is important for the continuity in life of organisms. The process helps to maintain a constant internal environment.
Pergerakan bahan merentasi membran plasma di dalam sel adalah penting untuk kemandirian hidup organisma. Proses ini mengekalkan persekitaran dalaman organism.

Explain the importance of plasma membrane for the survival of living organism.
Terangkan kepentingan membran plasma untuk kemandirian organism hidup.

[4 marks]

[4 markah]

- (ii) Diagram 7.1 shows two types of transport of substances through plasma membrane.
Rajah .1 menunjukkan dua jenis pengangkutan bahan melalui membran plasma.

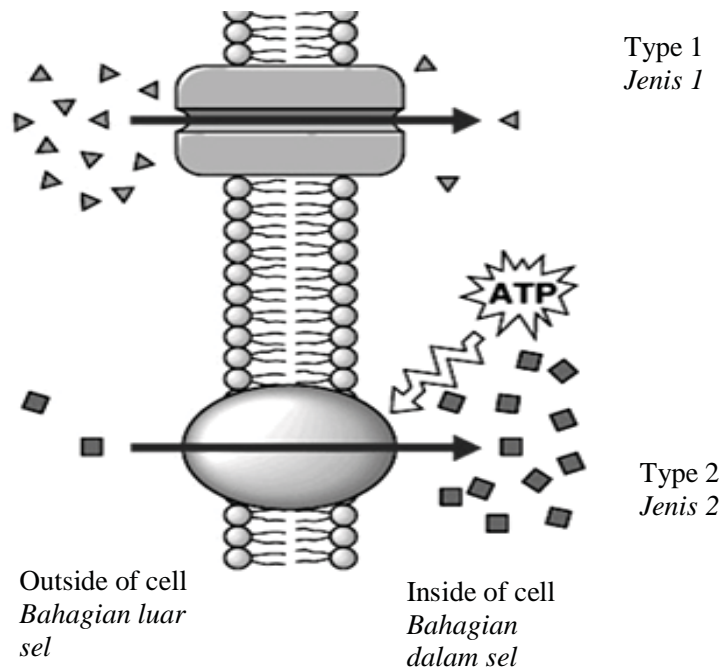


Diagram 7.1
Rajah 7.1

Explain the two types of transport of substances through plasma membrane shown in Diagram 7.

Terangkan kedua-dua jenis pengangkutan bahan melalui membran plasma yang ditunjukkan dalam Rajah 7.

[6 marks]
[6 markah]

- (b) A student carry out the experiment to determine the concentration of an external solution which is isotonic to the cell sap. The student immersed the potato strips in a different concentration of sugar in 30 minutes time. Diagram 7.2 shows graph plotted to show the change in mass against concentration of solution.

Seorang pelajar menjalankan eksperimen untuk mengetahui kepekatan larutan di luar sel yang isotonik dengan kepekatan sap sel. Pelajar itu merendam jalur ubi kentang di dalam kepekatan larutan gula yang berbeza.

Rajah 7.2 menunjukkan graf yang diplot untuk menunjukkan perubahan dalam jisim melawan kepekatan larutan

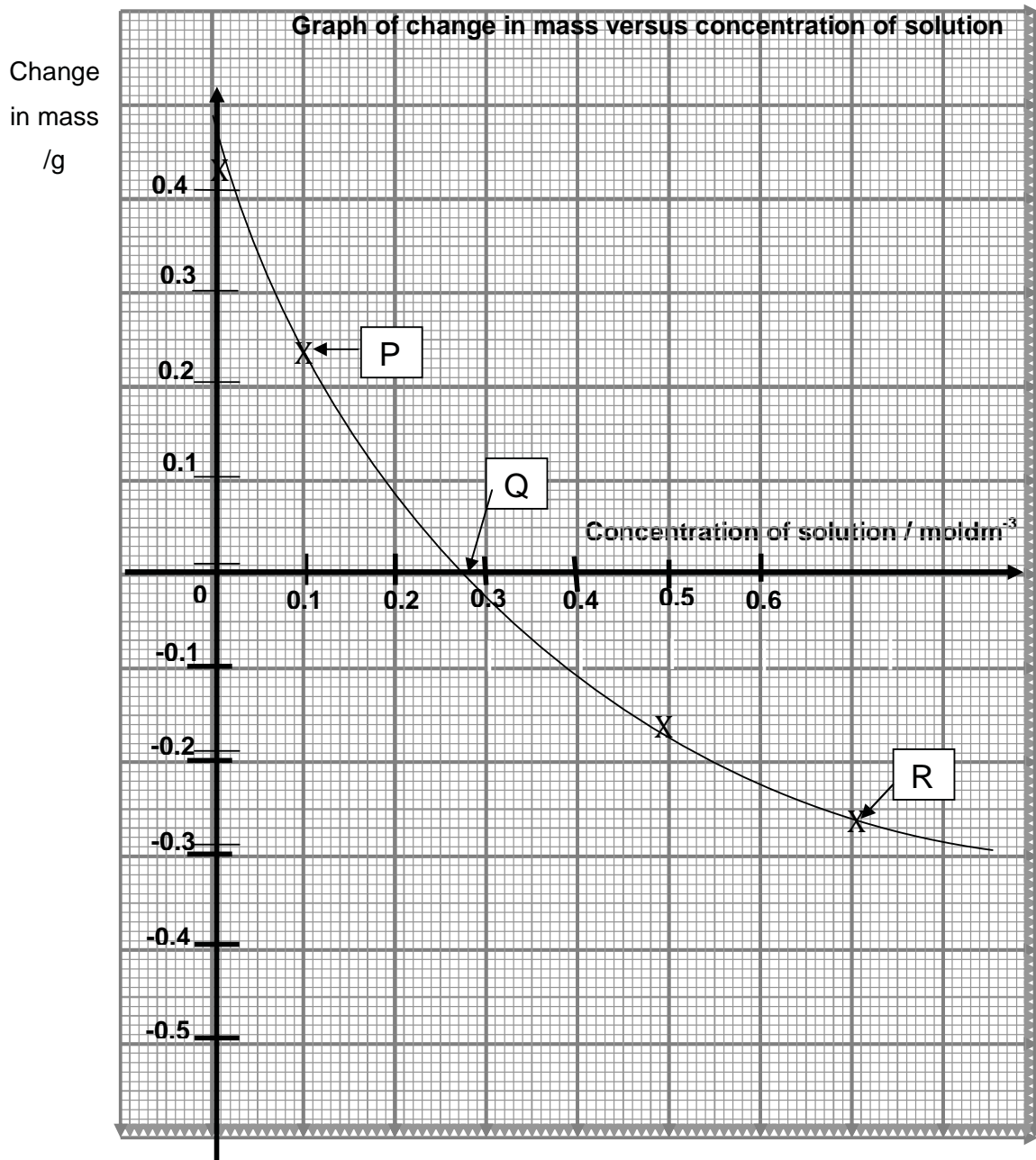


Diagram 7.2
Rajah 7.2

- (i) Based on the graph in Diagram 7.2, state the concentration of the solution that is isotonic to cell sap.
Berdasar graf pada Rajah 7.2, nyatakan kepekatan larutan yang isotonik kepada sel sap.

[1mark]
[1 markah]

- (ii) Explain what happen to the cell at point P , Q and R.
Terangkan apa yang berlaku terhadap sel di titik P, Q dan R.

[9 marks]
 [9 markah]

- 8 (a) Diagram 8.1 shows the digestive system of a herbivore.
Rajah 8.1 menunjukkan sistem pencernaan sesuatu herbivor.

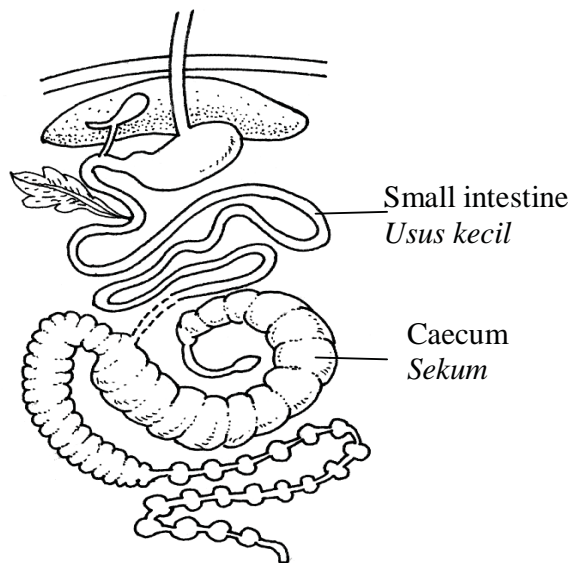


Diagram 8.1
 Rajah 8.1

Describe how cellulose in the plant fibres are digested and how the products of digestion of cellulose are absorbed into the body of the herbivore.

Huraikan bagaimana selulosa dalam serat tumbuhan itu dicernakan dan bagaimana hasil-hasil pencernaan selulosa diserap kedalam badan herbivor itu.

[10 marks]
 [10 markah]

(b) Diagram 8.2 shows a food pyramid.

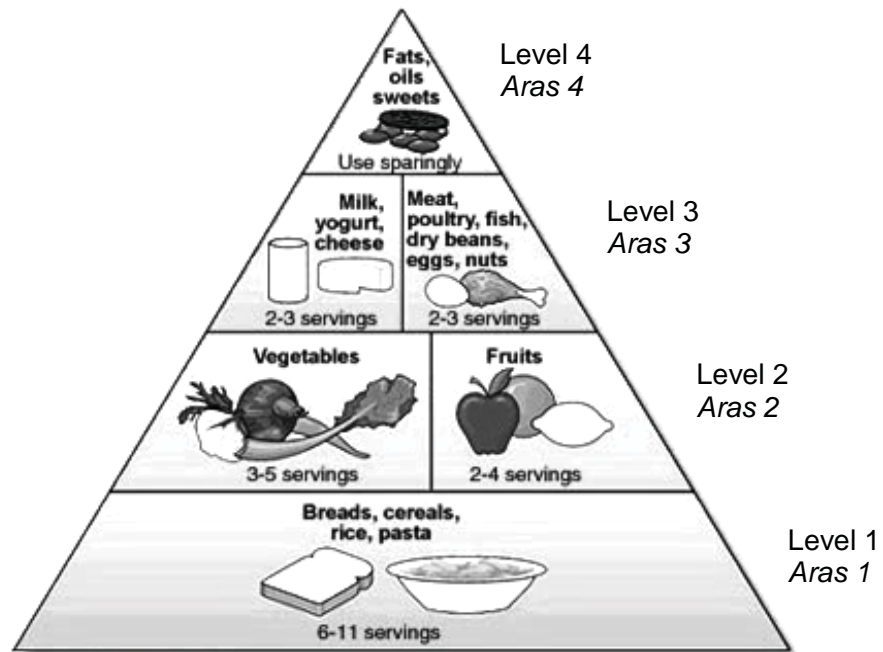


Diagram 8.2
Rajah 8.2

Based on Diagram 8.2, explain how a teenager may be able to plan his daily diet wisely to maintain his normal growth and good health.

Berdasarkan Rajah 8.2, terangkan bagaimana seorang remaja lelaki akan mengatur gizi hariannya secara bijak untuk mengekalkan proses pertumbuhan yang normal dan kesihatan yang baik.

[10 marks]
[10 markah]

- 9 (a) Diagram 9.1 and 9.2 shows the stages in blood clotting.
Rajah 9.1 dan 9.2 menunjukkan peringkat pembekuan darah.

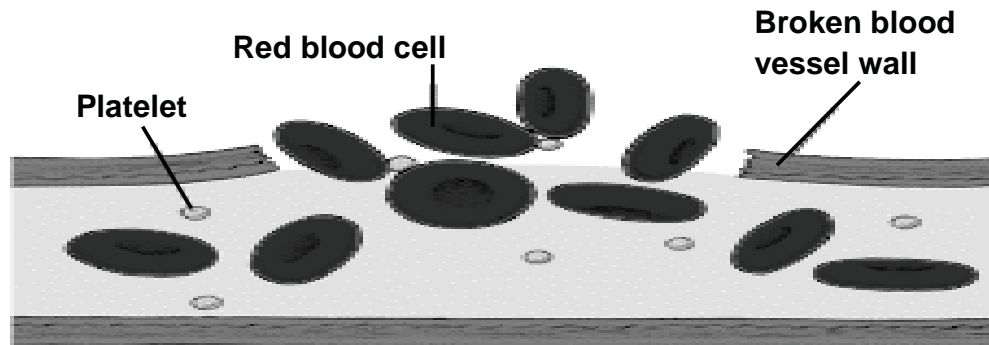


Diagram 9.1
Rajah 9.1

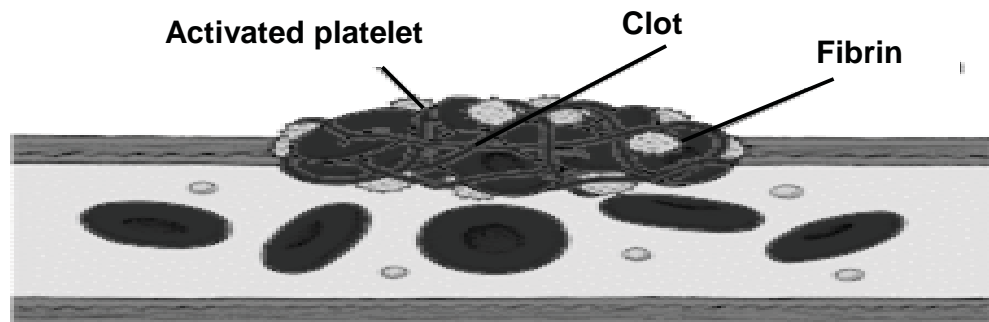


Diagram 9.2
Rajah 9.2

Based on the diagram and on your biological knowledge, describe how the mechanism of blood clotting help to prevent infection when a wound occurs.
Berdasarkan rajah dan pengetahuan biologi anda, huraikan bagaimana mekanism pembekuan darah membantu untuk mengelakkan jangkitan apabila berlakunya luka.

[10 marks]
 [10 markah]

- (b) The statement below describe the lymphatic system
Pernyataan di bawah menerangkan sistem limfa.

- Lacteals in interstinal villi transport products of lipids
Lacteal di vilus mengangkut produk lipid
- About 10% of interstitial fluid returns to the circulatory system via the lymphatic system.
10 % cecair interstitial akan kembali ke sistem peredaran darah melalui sistem limfa.

Based on these statements, explain why the lymphatic system is considered complementary to the blood circulatory system.

Berdasarkan pernyataan ini, terangkan kenapa sistem limfa dikatakan pelengkap kepada sistem peredaran darah.

[10 marks]
[10 markah]

**END OF QUESTION PAPER
KERTAS SOALAN TAMAT**

SULIT

NAMA: TINGKATAN :

SULIT
4551/3
BIOLOGI
Kertas 3
Ogos 2011
1½ jam



BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM SETARA
TAHUN 2011

BIOLOGI
Kertas 3
Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis **nama** dan **kelas** anda pada ruang yang disediakan
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

<i>Untuk Kegunaan Pemeriksa</i>		
Soalan	Markah penuh	Markah diperolehi
1	33	
2	17	
Jumlah	50	

Kertas soalan ini mengandungi 11 halaman bercetak.

INFORMATION FOR CANDIDATES
MAKLUMAN UNTUK CALON

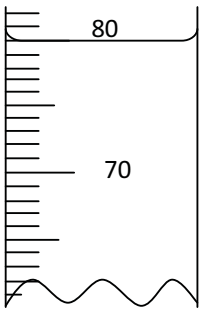
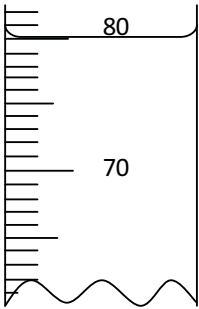
1. This question paper consists of two question: **Question 1** and **Question 2**
*Kertas soalan ini mengandungi dua soalan: **Soalan 1** dan **Soalan 2***
2. Answer all questions. Write your answer for **Question 1** in the spaces provided in this question paper.
*Jawab semua soalan. Jawapan anda bagi **Soalan 1** hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*
3. Write your answer for **Question 2** on the 'helaian tambahan' provided by the invigilators.
You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
*Jawapan anda bagi **Soalan 2** hendaklah ditulis dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*
4. Show your working, it may help you to get marks.
Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.
5. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
6. The marks allocated for each question or sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.
7. If you wish to change your answer, cross out the answer that you have done. Than write down the new answer.
Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
8. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
9. You are advised to spend 45 minutes to answer **Question 1** and 45 minutes for **Question 2**.
*Anda dinasihatkan supaya mengambil masa 45 minit untuk menjawab **Soalan 1** dan 45 minit untuk menjawab **Soalan 2**.*
10. Tie the 'helaian tambahan' together with this question paper and hand in to the invigilator at the end of examination.
Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

Answer **all** questions

Jawab **semua** soalan

1. An experiment to study osmoregulation in human was carried out by relating the volume of water intake to the volume of urine produced. Three groups of students which are group P, group Q, group R and group S were given different volume of plain water to drink. After one hour, each student in the groups urinated and collected their urine in a measuring cylinder. The volume of urine produced is recorded in Table 1.

Satu eksperimen untuk mengkaji pengosmokawalaturan dalam manusia telah dijalankan dengan mengaitkan isipadu air yang diminum dengan isipadu air kencing yang dihasilkan. Tiga kumpulan pelajar iaitu kumpulan P, kumpulan Q, kumpulan R dan kumpulan S telah diberi air kosong yang berbeza isipadu untuk diminum. Selepas satu jam, setiap pelajar dalam kumpulan membuang air kecil dan mengumpulkan air kencing mereka di dalam silinder penyukat. Isipadu air kencing yang dihasilkan direkodkan dalam Jadual 1.

Group Kumpulan	Volume of water intake, ml <i>Isipadu air yang diminum, ml</i>	Volume of urine produced, ml <i>Isipadu air kencing yang dihasilkan, ml</i>		
		Student 1 <i>Pelajar 1</i>	Student 2 <i>Pelajar 2</i>	Average <i>Purata</i>
P	100	 <div style="border: 1px solid black; width: 100px; height: 30px; margin: 5px auto;"></div>	 <div style="border: 1px solid black; width: 100px; height: 30px; margin: 5px auto;"></div>

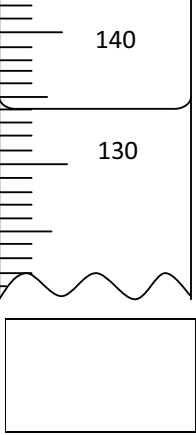
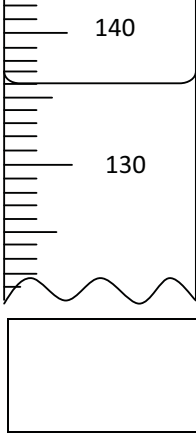
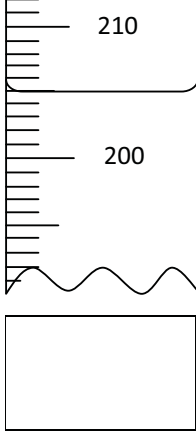
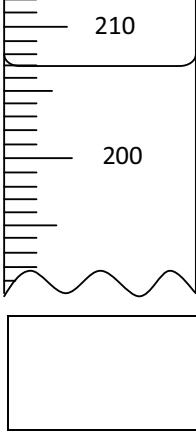
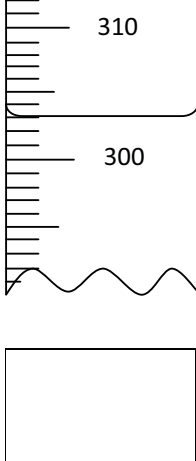
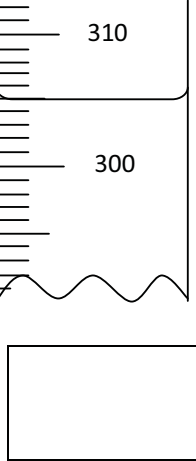
Q	300		
R	300		
S	400		

Table 1
Jadual 1

- (a) Record the volume of the urine produced by each student in group P,Q,R and S and the average volume of the urine in the spaces provided in Table 1.

Rekodkan isipadu air kencing yang dihasilkan oleh setiap pelajar dalam kumpulan P,Q,R dan S serta isipadu purata air kencing di dalam ruang yang disediakan di Jadual 1.

[3 marks]
[3 markah]

1 (a)

	3
--	---

- (b) (i) Based on Table 1, state two different observations that can be made in this experiment.

Berdasarkan Jadual 1, nyatakan dua pemerhatian yang berbeza yang boleh dibuat dalam eksperimen ini.

Observation 1:
Pemerhatian 1:

.....
.....

Observation 2:
Pemerhatian 2:

.....
.....

[3 marks]
[3 markah]

1(b) (i)

	3
--	---

- (ii) State the inference which corresponds to each observation in (b) (i).
Nyatakan inferens yang sepadan dengan pemerhatian yang di (b)(i).

Inference for observation 1:
Inferens untuk pemerhatian 1:

.....
.....

Inference for observation 2:
Inferens untuk pemerhatian 2:

.....
.....

[3 marks]
[3 markah]

1(b) (ii)

	3
--	---

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

Variables <i>Pemboleh ubah</i>	Method to handle variables <i>Cara mengendalikan pemboleh ubah</i>
Manipulated variable <i>Pemboleh ubah dimanipulasikan</i>
Responding variable <i>Pemboleh ubah bergerak balas</i>
Constant variable <i>Pemboleh ubah dimalarkan</i>

Table 2
Jadual 2

[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 the data collected in this experiment.
Bina satu jadual dan rekodkan semua data yang dikumpul dalam eksperimen ini.

Your table should contain the following titles:

Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- Volume of water intake
Isipadu air yang diminum
- Volume of urine produced by each student
Isipadu air kencing yang dihasilkan oleh setiap pelajar
- Average volume of urine produced
Purata isipadu air kencing yang dihasilkan

[3 marks]
[3 markah]

1(e)(i)

	3
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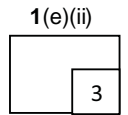
For
examiner's
use

- (ii) Use the graph paper provided on page 8 to answer this part of question. Using the data in 1(e)(i), draw the graph of average volume of urine produced against the volume of water intake.

Gunakan kertas graf yang disediakan di muka surat 8 untuk menjawab soalan bahagian ini.

Menggunakan data 1(e)(i), lukiskan graf isipadu air kencing yang dihasilkan melawan isipadu air yang diminum.

[3 marks]
[3 markah]



- (f) Based on the graph in 1 (e) (ii) , explain the relationship between the volume of water intake to the average volume of urine produced.

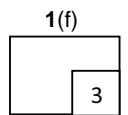
Berdasarkan graf di 1(e)(ii), terangkan perhubungan antara isipadu air yang diminum dengan purata isipadu air kencing yang dihasilkan.

.....

.....

.....

[3 marks]
[3 markah]



- (g) Another group of student is given 100 ml of plain water which is added with 10g of table salt .

Predict the average volume of urine produced after one hour. Explain your prediction.

Sekumpulan pelajar lain telah diberi 100 ml air kosong yang dicampurkan dengan 10g garam .

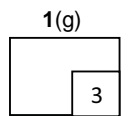
Ramalkan purata isipadu air kencing yang dihasilkan selepas satu jam. Terangkan ramalan anda.

.....

.....

.....

[3 marks]
[3 markah]



- (h) Based on the results from the experiment, what can be deduced about osmoregulation?

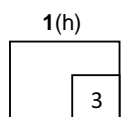
Berdasarkan keputusan eksperimen ini, apakah yang dapat dirumuskan tentang pengosmokawalaturan?

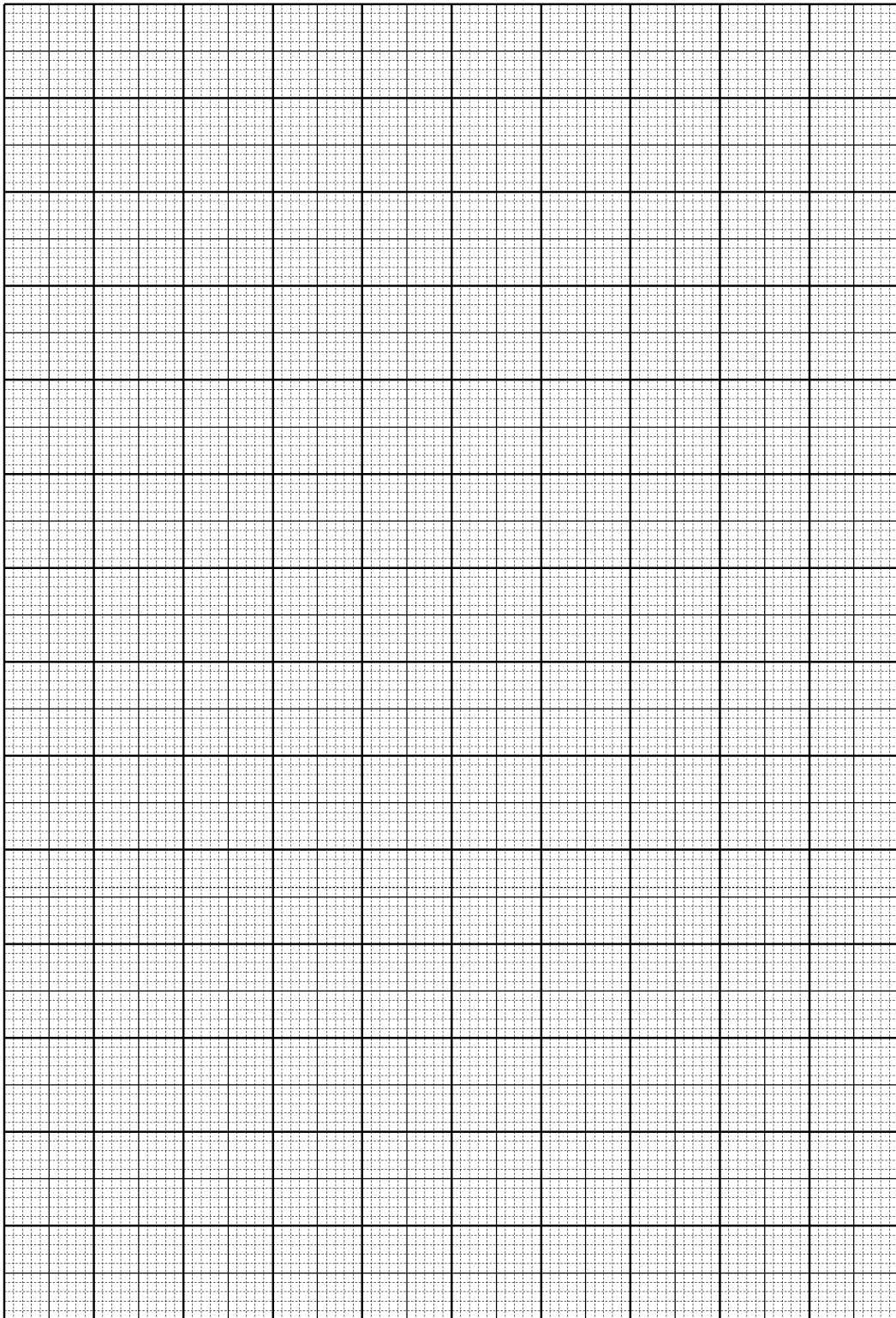
.....

.....

.....

[3 marks]
[3 markah]





- (i) The following is a list of materials and apparatus used in another experiment to study osmoregulation.

Berikut ialah senarai bahan dan radas yang digunakan dalam satu eksperimen yang lain bagi mengkaji pengosmokawalaturan.

Cup, beaker, measuring cylinder, students, stopwatch, mineral water
Cawan, bikar, silinder penyukat, pelajar-pelajar, jam randik, air mineral

Classify the apparatus and materials into their respective variables in Table 2.
Kelaskan bahan dan radas tersebut kepada pemboleh-pemboleh ubah yang sewajarnya di dalam Jadual 2.

	Manipulated Variable <i>Pemboleh ubah dimanipulasikan</i>	Responding Variables <i>Pemboleh ubah bergerak balas</i>	Fixed Variable <i>Pemboleh ubah dimalarkan</i>
Apparatus / Materials			
<i>Radas / Bahan</i>			

Table 2
Jadual 2

[3 marks]
[3 markah]

1(i)

	3
--	---

- 2 Plants require carbon dioxide and water to synthesize organic compounds in the presence of light energy in a process called photosynthesis. The rate of photosynthesis is affected by factors such as concentration of carbon dioxide, light intensity, and temperature.

Based on the above information, plan a laboratory experiment to study the effect of carbon dioxide concentration on the rate of photosynthesis in an aquatic plant.

The planning of your experiment must include the following aspects:

Tumbuh-tumbuhan memerlukan karbon dioksida dan air untuk mensintesis sebatian organik dalam kehadiran tenaga cahaya dalam satu proses yang dipanggil fotosintesis. Kadar fotosintesis dipengaruhi oleh faktor-faktor seperti kepekatan karbon dioksida, keamatan cahaya, dan suhu.

Berdasarkan maklumat di atas, rancang satu eksperimen dalam makmal untuk mengkaji kesan kepekatan karbon dioksida terhadap kadar fotosintesis dalam suatu tumbuhan akuatik.

Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

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

[17 marks]
[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SULIT

4551/1

BIOLOGI

Ogos

2011

1 1/4 jam

**BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA**

PEPERIKSAAN PERCUBAAN SPM SETARA

TAHUN 2011

BIOLOGI

Kertas 1

PERATURAN PEMARKAHAN

**MARKING SCHEME
PAPER 1
TRIAL SBP 2011**

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

SULIT

4551/2

BIOLOGI

Peraturan Pemarkahan

Ogos

2011

2 ½ jam

**BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA**

**PEPERIKSAAN PERCUBAAN SPM SETARA
TINGKATAN LIMA 2011**

BIOLOGI

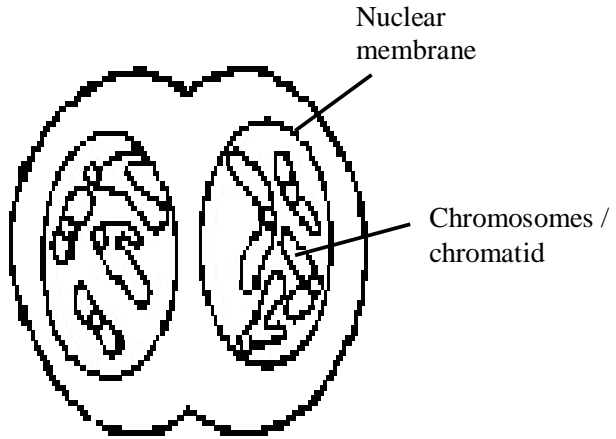
Kertas 2

PERATURAN PEMARKAHAN
Untuk kegunaan pemeriksa sahaja

Peraturan Pemarkahan ini mengandungi 14 halaman bercetak

No	Mark Scheme	Sub mark	Total Mark
1(a)(i)	Able to name cell P and cell R. <u>Answer :</u> P : White blood cell / monocyte /leucocyte R : Phloem	1 + 1	2
(ii)	Able to state one function of cell P and cell R. <u>Sample answer</u> P : to fight infections / engulf / digest bacteria / defence mechanism // carry out phagocytosis R : to transport organic food / sugar / sucrose / glucose from leaves to all parts of plant / example	1 + 1	2
(b)(i)	Able to name the system which consists of cell S. <u>Answer</u> Nervous system	1	1
(ii)	Able to explain one role of cell S in the system. <u>Sample answer</u> F : control / coordinate activities of the body E1 : detect stimuli E2 : transmit electrical signals / nerve impulse E3 : to muscle / gland / effector <p style="text-align: right;">Any two</p>	2	2
(c)	Able to explain one characteristic of cell Q/root hair to facilitate water absorption from soil. <u>Sample answer</u> F1 : have large number E1 : to provide large surface area F2: (cells in tissue Q is) one-cell thick E2 : to increase diffusion / osmosis rate. E2: have a higher concentration of solutes than the water in surrounding soil <p style="text-align: right;">Any two</p>	2	2
(d)	Able to explain how herbicide is capable to stop the transportation of some mineral into a plant through <u>Sample answer</u> F : Herbicide contains active respiratory poison / toxic E1: denatures the respiratory enzymes E2. which stops cellular respiration E3 : no production of ATP. E4 . Active transport of the ions cannot take place in the absence of ATP <p style="text-align: right;">Any three</p>	3	3
	TOTAL		12

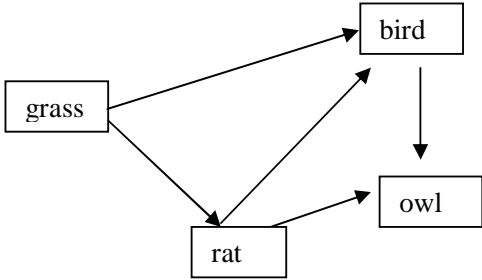
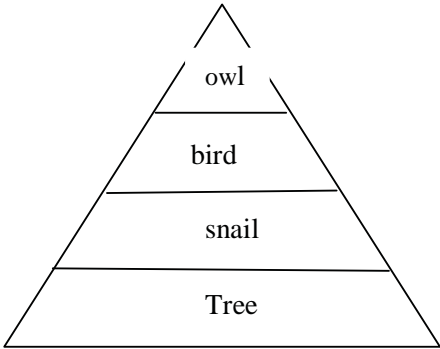
QUESTION 2

No	Mark Scheme	Sub mark	Total Mark
2(a)(i)	Able to state the type of cell division involved in the cell cycle. <u>Answer</u> Mitosis	1	1
(a)(ii)	Able to state one reason for the answer in (a)(i). <u>Sample answer</u> Because the cell cycle mitosis occur in skin cell /somatic cell	1	1
(b)(i)	Able to explain the chromosomal behavior in stage N. <u>Sample answer</u> F : N is metaphase E1 : Chromosome align at metaphase plate E2: spindle fibres (fully) formed E3 : attach to centromere of the chromosome Any two	1+1	2
(ii)	Able to state the importance of the chromosomal behavior in mentioned in (b)(i). <u>Sample answer</u> P1. To ensure new cells produced are identical in chromosomal number. P2. to ensure the sister chromatid can separate / move to opposite poles Any one	1	1
(c)	Able to draw a diagram showing the chromosomal behavior after stage M. <ul style="list-style-type: none"> • Chromosomal number = 1 mark • Chromosomal behavior = 1 mark • Label (at least 2) = 1 <u>Sample answer</u> 	1+1+1	3

(d)(i)	Able to suggest a suitable method to be used which involved the cell cycle in mitosis. <u>Sample answer</u> Cloning / tissue culture	1	1
(ii)	Able to explain how the cloning / culture tissue can increased the crop yield. <u>Sample answer</u> F : large numbers of clones can be produced E1: within a short period of time / any time E2 : clones inherited good characteristic E3 : example on good characteristic /resistance to diseases/ fast growth rate / large fruit / Any three	Max 3	3
	TOTAL		12

QUESTION 3

No	Mark Scheme	Sub mark	Total Mark
3(a)(i)	Able to state the definition of ecosystem <u>Sample answer</u> An ecosystem is a community of organisms / biotic components which interact with their non-living environment/abiosis components.	1	1
(ii)	Able to state an example of niche Criteria : <ul style="list-style-type: none"> • Organism • Activity • place <u>Sample answer</u> Squirrel eat fruits from the tree // big bird eat mouse in the garden.	1	1
(b)(i)	Able to construct a food web showing the interaction of four organisms. Criteria : C1 : producer C2 : correct arrows C3 : At least 2 food chains C4 : 4 organisms correctly	1+1	

	<p><u>Sample answer</u></p>  <pre> graph LR grass --> rat grass --> bird rat --> bird bird --> owl </pre> <p>All C`s correct = 2marks At least 3 C = 1 mark . Without C1 = no marks</p>		2
(ii)	<p>Able to construct a pyramid of numbers showing the interaction of four organisms.</p> <p>criteria C1 : 4 trophic levels C2 : sequence and position of organism in pyramid is correct.</p> <p><u>Sample answer</u></p> 	1 1	2
(c) (i)	<p>Able to calculate the total energy transferred to the organisms in the third trophic level.</p> <p><u>Sample answer</u> C1 : $10\% \times 1500 \text{ kJ}$ C2 : = 150 kJ</p>	1 1	2
(c)(ii)	<p>Able to state two ways in which energy may be lost in the food web.</p> <p><u>Sample answer</u> P1 lost to atmosphere as heat energy P2 used to decompose dead matter (by decomposer) P3 used to carry out metabolism reaction in cells P4 respiration</p>	1+1	

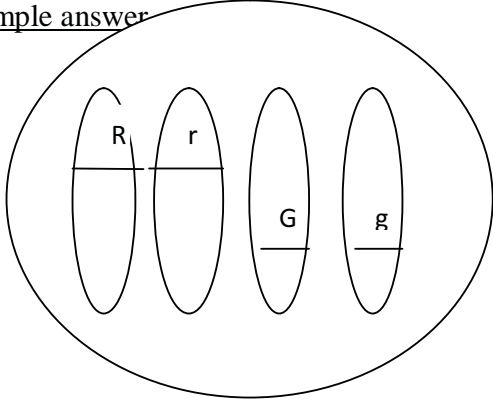
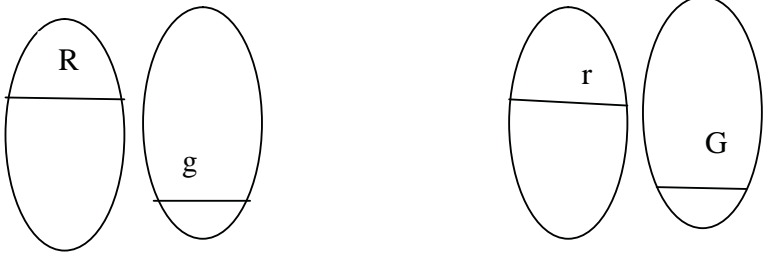
	P5 excretion P6 defaecation Any two		2
(d)	Able to explain one bad effect of human activities on the ecosystem. <u>Sample answer</u> F : deforestation / logging / open burning E1 : extinction / destroy of flora / fauna E2 : loss of biodiversity E3 : disruption of food chain/web E4 : Land slides / soil erosion / water pollution / flash flood Any two	1+1	2
	TOTAL		12

QUESTION 4

No	Mark Scheme	Sub mark	Total Mark
4(a)	Able state the importance of fluid S. <u>Sample answer</u> P1 : protect the foetus by absorbing shock P2 : protects foetus from physical damage P3 : allow movement of the foetus Any one	1	1
(b)(i)	Able to name both blood vessels. <u>Answer</u> 1. Umbilical artery 2. umbilical vein.	1+1	2
(b)(ii)	Able to state the function of each blood vessels named in (b)(i) <u>Sample answer</u> Umbilical artery : carry waste product / deoxygenated blood from the foetus to the placenta. Umbilical vein : carry oxygenated blood from placenta to the Foetus	1+1	2
(c)	Able to explain why the foetus is aborted . <u>Sample answer</u> F : Q secrete progesterone to stimulate / induce the thickening endometrium E1 : infection caused Q does not secrete progesterone E 2 : endometrium are no longer thicken // endometrium break down	1+1	

	(so, foetus is aborted). Any two		2
(d)	<p>Able to explain why the foetus has a separate blood circulatory system from his mother.</p> <p><u>Sample answer</u> F : Prevents the mixing of blood groups of the mother and the foetus which may be incompatible. E1 : If incompatible bloods mix, they clot / agglutinate E2 : and cause blockage in important organs / death</p> <p style="text-align: right;">Any Two</p> <p style="text-align: center;">OR</p> <p>F : Protect the foetus from the high blood pressure of the mother. E1 : Foetus has fine and delicate blood vessel. E2 : High pressure of mother's blood will cause the foetal blood vessels burst and damage.</p> <p style="text-align: right;">Any two</p> <p style="text-align: center;">OR</p> <p>F : Prevent the action of maternal hormones / chemicals / harmful bacteria E1 : from crossing the foetal blood E2 : which could harm the development of the foetus.</p> <p style="text-align: right;">Any two</p>	1+1	2
(d)	<p>Able to explain how HCG injections enable the process of pregnancy</p> <p><u>Sample answer</u> P1: (the function of HCG is similar to that of LH so) HCG stimulates Ovulation. P2 : ovum / secondary oocyte is released from the ovary to fallopian tube. P3: ovum fuses with sperm in fallopian tube forming a zygote . P4: corpus luteum secretes progesterone. P5 : progesterone maintains the thickness of the uterine wall / endometrium P6: the thickness of the uterine wall enables implantation to occur.</p> <p style="text-align: right;">Any three</p>	1+1+1	3
	TOTAL		12

QUESTION 5

No	Mark Scheme	Sub mark	Total Mark
5(a)(i)	Able to label the alleles for F1 genotype. <u>Sample answer</u> 	1	1
(a)(ii)	Able to state the phenotype for F1 generation <u>Answer</u> Round , yellow (colour)	1	1
(b)	Able name the process that occurred during meiosis which produced different gametes in second possibilities. <u>Answer</u> Crossing-over // cross-over	1	1
(c)	Able to draw gametes J and gamete K which are produced in second possibility. <u>Sample answer</u> 	1+1	2
(d)(i)	Able to state which possibilities will cause more variation to the offsprings <u>Answer</u> Second possibility	1	1
(ii)	Able to explain one reason for your answer in (d)(i).	1+1+1	

	<p><u>Sample answer</u></p> <p>F : crossing over occurred between (chromatids from a pair of) homologous chromosomes E1 : in prophase 1 /meiosis 1 / meosis E2 : (the exchange of parts between chromatids) results in new genetic Combinations // a different genetic composition. E3 : (four) different gametes produced. E4 : (thus, each time) gametes from two individuals fertilize randomly, it produced large number of variations between offspring</p> <p style="text-align: right;">Any three</p>		3												
(e)	<p>Able to Complete Digram 5.3 by filling in F1 generation gametes drawn in (c), genotype of F2 generation and phenotype of F2 generation which will be produced.</p> <p>Criteria :</p> <ul style="list-style-type: none"> • All Gametes from F1 generation correct = 1mark • All Genotype of F2 generation = 1 mark • All Phenotype of F2 generation = 1mark <p><u>Sample answer</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Gametes from F1 generation.</th> <th>Gametes from parent</th> <th>Genotype of F2 generation</th> <th>Phenotype of F2 generation</th> </tr> </thead> <tbody> <tr> <td>Rg</td> <td style="background-color: #cccccc;"></td> <td>Rrgg</td> <td>Round, Green</td> </tr> <tr> <td>rG</td> <td style="background-color: #cccccc;"></td> <td>rrGg</td> <td>Wrinkle, Yellow</td> </tr> </tbody> </table>	Gametes from F1 generation.	Gametes from parent	Genotype of F2 generation	Phenotype of F2 generation	Rg		Rrgg	Round, Green	rG		rrGg	Wrinkle, Yellow	1+1+1	3
Gametes from F1 generation.	Gametes from parent	Genotype of F2 generation	Phenotype of F2 generation												
Rg		Rrgg	Round, Green												
rG		rrGg	Wrinkle, Yellow												
TOTAL			12												

QUESTION 6

No	Mark Scheme	Sub mark	Total Mark
6(a)(i)	<p>Able to explain the adaptation of vertebrae P and vertebrae Q to function efficiently.</p> <p><u>Sample answer</u> F1 : P is thoracic vertebrae E1 : Have long spinous processes E2 : and directed downwards E3 : for muscle / ligament attachment E4 : articulate with ribs to make up the side of the thoracic cavity.</p>		

	<p style="text-align: right;">Any three</p> <p>F2 : Q is lumbar vertebrae E1 : Largest / strongest vertebrae E3 : Their processes are short / thick E4 : Have large centrum which bear the weight of lower back E5 : To provide support to the (upper) body E6 : Are attach to many of the back muscles</p> <p style="text-align: right;">Any three</p>	3	
		3	6
(a)(ii)	<p>Able to explain why human requires endoskeleton for efficient daily activities</p> <p><u>Sample answer</u> P1 : Mechanical support P2 : Protection for internal organs P3 : A firm base the attachment of muscles P4 : Gives shape to the organism P5 :Helps in movement of the organism P6 :Site for production of blood cells P7 : Storage for phosphate and calcium</p> <p style="text-align: right;">Any four</p>	Max 4	
(b)	<p>Able to explain why :</p> <ul style="list-style-type: none"> • An athlete must do a warming up before the event • Elderly people experiences pain at their joint. <p><u>Sample answer</u> An athlete must do a warming up before the event F: to increase temperature of body / muscle E1 : enabling more efficient use of energy E2 : more efficient of glucose oxidation E3 : increase blood circulation / increase heartbeat/supply oxygen faster E4 : prevent injuries to muscle E5 : muscle can contract more efficiently E6 : prevent muscle cramp / allow muscle to be stretch more easily</p> <p style="text-align: right;">Any 5</p> <p><u>Sample answer</u> Elderly people experiences pain at their joint. F1 : small amount of synovial fluid produced (by the synovial membrane) E1 : thus increase friction between the end of the bones E2 : cartilage has become thinner E3 : thus cartilage is unable to cushions the joint / absorbs shock / further increases the friction between the end of bone E4 : ligaments become shorter / loss elasticity E5 : result in stiff / painful joint</p>	5+5 Max 10	

	E5 : need energy / ATP Any three	3	6
(b)	<p>Able to explain what happen to the cell at point P, Q and R.</p> <p><u>Sample answer</u> Isotonic to the sap cell : 0.27 moldm^{-3} / 0.28 moldm^{-3} / 0.29 moldm^{-3}</p> <p>Point P F1 : The mass of potato increase E1 : (This occur because) the solution concentration is hypotonic to the sap cell of the potato E2 : The water molecule diffuse out from lower concentration/ hypotonic region to the higher concentration/ hypertonic region E3 : by osmosis E4 : cell becomes turgid (so the mass increased)</p> <p>Point Q F2 : The potato does not lose or gain mass E1 : This occur because the concentration o the solution is isotonic to the cell sap E2 : Diffusion of water molecule is at equilibrium / equal rate E3 : no net gain or loss of water molecule (so the mass is matained)</p> <p>Point R F3 : The mass of potato decrease E1 : (This occur because) the solution is hypertonic to the cell sap E2 : The water molecule diffuse out from cells / from higher concentration to the lower concentration / solution at surrounding E3 : by osmosis E4 : cell becomes flaccid (so the mass decreased)</p> <p>Any 10</p>	Max 10	
	TOTAL		10 20

QUESTION 8

No	Mark Scheme	Sub mark	Total Mark
(a)	<p>Able to describe how cellulose in the plant fibres are digested and how the products of digestion of cellulose are absorbed into the body of the herbivore.</p> <p><u>Sample answer</u> P1 : This is the digestive system of a non ruminant example a rabbit. P2 : Mouth: Plant tissues are cut, crushed and grind by the teeth/ incisors/premolars/ molars . P3 : Plant cell walls are disrupted / cellulose exposed P4 : Stomach/ duodenum/ ileum – No enzyme cellulase secreted / No digestion of cellulose. P5 : Caecum (Enlarged)/ contains microorganisms/ bacteria / protozoa which secrete cellulase P6 : to digest the cellulose P7 : Appendix Enlarged / contains mi.croorganisms/ bacteria / protozoa which secrete cellulase P8 : to digest the cellulose. P9 : Cellulase hydrolyse cellulose to glucose in the caecum and appendix</p> <p>Able to describe absorption of glucose.</p> <p><u>Sample answer:</u> P10 :Some glucose are absorbed by the caecum. P11 : No absorption of glucose in rectum P12 : Re-swallow the digested cellulose/glucose / pallet from the caecum after it has left the anus / coprophagy P13 : All the glucose is absorbed into the blood capillaries of the villus in the ileum</p> <p style="text-align: right;">Any 10</p>	Max 10	10
(b)	<p>Able to explain how a teenager may be able to plan his daily diet wisely to maintain his normal growth and good health.</p> <p><u>Sample answer:</u> A good dietary habit for normal growth and good health of an adolescent:</p> <p>P1 : practicing a daily balance diet P2 : the diet comprises all food classes // carbohydrates, lipoids, proteins, vitamins, mineral salts and fibers // foods from level 1, level 2, level 3 and level 4. P3 : in the correct amount</p>	Max 10	

	<p>P4 : should take more foods from level 1, 2 and 3 / containing carbohydrates, fruits and vegetables / proteins</p> <p>P5 : for sustaining better general body growth / normal metabolism of the body.</p> <p>P6: the adolescent requires more carbohydrates (as level 1)</p> <p>P7 : for example energy production / energy resources in the body</p> <p>P8 : More proteins (as level 3)</p> <p>P9: for rapid muscular growth / replacement of dead tissues / cells / repairing damaged cells</p> <p>P10 : and synthesis of functional proteins/ enzymes / antibody /hormones / insulin</p> <p>P11 : vitamins / minerals serve as co-enzyme / co-factor for normal enzyme activities</p> <p>P12 : elements like Ca/ P / iodine are important for growth of bones / teeth / development of endocrine gland / thyroid</p> <p>P13 : fibers helps peristalsis in the alimentary canal / avoiding constipation</p> <p>P14 : should avoid from consuming excessive fats (as level 4)</p> <p>P15 : which is the principal cause of cardiovascular problems / heart problem / hypertension / thromboses coronary / arterosclerosis / obesity</p>		
	Any 10		10
	TOTAL		20

QUESTION 9

No	Mark Scheme	Sub mark	Total Mark
9(a)	<p>Able to explain the mechanism of blood clotting</p> <p><u>Sample answer:</u></p> <p>P1 : Wall of blood vessel is broken / damage / injured / severed</p> <p>P2 : The connective tissue in the vessel wall is exposed to blood.</p> <p>P3 : Platelets stick to the collagen fibres in the connective tissue.</p> <p>P4 : Then aggregation of platelets forms platelet plug.</p> <p>P5 : The clumped platelet, damaged cells and clotting factors in the plasma</p> <p>P6 : forms activators known as thromboplastine.</p> <p>P7 : Thromboplastine, in the presence of Ca²⁺ and vitamin K</p> <p>P8 : convert prothrombin (inactive plasma protein) into thrombin (active plasma protein).</p> <p>P9 : Thrombin catalyses the conversion of soluble fibrinogen to insoluble fibrin.</p> <p>P10 : Fibrin threads form a network that mesh over the wound trapping red blood cells</p> <p>P11 : and sealing the wound.</p> <p>P13 : A blood clot is formed preventing further blood loss from the</p>	Max 10	

	<p>vessel.</p> <p>P14 : prevent bacteria / pathogen / microbe from entering the cell through wound</p> <p style="text-align: right;">Any 10</p>		10
(b)	<p>Able to explain how lymphatic system complement to the blood circulatory system.</p> <p><u>Sample answer:</u></p> <p>Statement 1 :</p> <p>P1 : In the small intestine, the products of lipid which are fatty acids and glycerol</p> <p>P2 : are first transport into the lacteals in the villi.</p> <p>P3 : The lacteals fuse to form larger lymphatic vessels</p> <p>P4 : and enter the lymphatic system.</p> <p>P5 : Lymphatic fluid carrying the products of lipid digestion eventually drains into the thoracic duct.</p> <p>P6 : The thoracic duct merges into the left subclavian vein which is a part of the blood circulatory system.</p> <p>P7 : Thus the lymphatic system complements the circulatory system in transporting the products of digestion.</p> <p>Statement 2 :</p> <p>P8 : (90% of) tissue fluid form at capillary network (interstitial fluid) must be return to the circulatory system.</p> <p>P9 : The remaining (10%) flows into blind-ended lymph capillaries</p> <p>P10 : which are found in capillary network.</p> <p>P11 : These lymph capillaries drain into larger lymph vessels</p> <p>P12 : which eventually drain back into the blood circulatory system</p> <p>P13 : via the thoracic duct and the right lymphatic duct.</p> <p>P14 : Thus, the lymphatic system complements the circulatory system in ensuring that the volume of blood in blood vessels is kept constant.</p> <p style="text-align: right;">Any 10</p>	Max 10	10
	TOTAL		20

PERATURAN PEMARKAHAN TAMAT

SULIT
4551/3
BIOLOGI
Kertas 3
Peraturan Pemarkahan
Ogos 2011
1½ jam



BAHAGAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM SETARA
2011

BIOLOGI
Kertas 3

PERATURAN PEMARKAHAN (PP)

Untuk kegunaan pemeriksa sahaja

Peraturan pemarkahan ini mengandungi 15 halaman bercetak.

QUESTION 1

No	MARK SCHEME	Score																											
1(a)	<p>Able to record all 12 data for the volume of urine produced and the average volume of urine produced correctly.</p> <p><u>Sample answers:</u></p> <table border="1" data-bbox="292 645 1082 1003"> <thead> <tr> <th rowspan="2">Group</th> <th rowspan="2">Volume of water intake, ml</th> <th colspan="2">Volume of urine produced,ml</th> <th rowspan="2">Average volume of urine produced, ml</th> </tr> <tr> <th>Student 1</th> <th>Student 2</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>100</td> <td>80</td> <td>80</td> <td>80</td> </tr> <tr> <td>Q</td> <td>200</td> <td>134</td> <td>136</td> <td>135</td> </tr> <tr> <td>R</td> <td>300</td> <td>205</td> <td>207</td> <td>206</td> </tr> <tr> <td>S</td> <td>400</td> <td>303</td> <td>305</td> <td>304</td> </tr> </tbody> </table>	Group	Volume of water intake, ml	Volume of urine produced,ml		Average volume of urine produced, ml	Student 1	Student 2	P	100	80	80	80	Q	200	134	136	135	R	300	205	207	206	S	400	303	305	304	3
Group	Volume of water intake, ml			Volume of urine produced,ml			Average volume of urine produced, ml																						
		Student 1	Student 2																										
P	100	80	80	80																									
Q	200	134	136	135																									
R	300	205	207	206																									
S	400	303	305	304																									
	Able to record 8 - 11 data correctly	2																											
	Able to record 4 – 7 data correctly	1																											
	Able to record only 0 - 3 data or not able to respond / wrong response.	0																											
(b) (i)	<p>Able to state two different observations correctly based on two criteria:</p> <p>C1- Volume of water intake // Group C2 – Volume of urine produced // Average volume of urine produced</p> <p><u>Sample answers:</u></p> <ol style="list-style-type: none"> When the volume of water intake is 100 ml /200 ml /300 ml /400 ml / Group P / group Q / Group R / Group S, the average volume of urine produced is 80ml / 135 ml / 206 ml /304 ml. When the volume of water intake is 100 ml /200 ml /300 ml /400 ml / Group P / group Q / Group R / Group S, the volume of urine produced is 80 / 134 ml / 136 ml / 205 ml / 207 ml / 303 ml / 305 ml. The average volume of urine produced in Group P is lower / smaller than that in Group Q / R / S // The average volume of urine produced in Group S is higher than that in Group P / Q / R. 	3																											

	<p>Able to state one correct observation and one inaccurate observation .</p> <p><u>Sample answer (inaccurate):</u></p> <p>1. When the volume of water intake is 100 ml /200 ml /300 ml /400 ml // Group P / group Q / Group R / Group S, the average volume of urine produced is the least / less / high / the highest.</p>	2
	<p>Able to state only one correct observation or two observation at idea level.</p> <p><u>Sample answer (idea level):</u></p> <p>1. The volume / average volume of urine produced is different. 2. The volume of water intake affects the (average) volume of urine produced.</p>	1
	<p>No response or incorrect response or two inaccurate observation or one idea only.</p>	0
(b) (ii)	<p>Able to make two accurate inferences based on two criteria: C1 – more / less (amount) of water reabsorbed C2 – higher / lower osmotic pressure // permeability of kidney / tubule to water increases / decreases // more / less ADH / aldosterone secreted to kidney tubule</p> <p><u>Sample answer:</u> (For observation 1 and 2 in sample answers)</p> <p>1. More/high/much/ (amount) of water reabsorbed due to high osmotic pressure // vice versa</p> <p>(For observation 3 in sample answers)</p> <p>2. More / higher (amount) of water reabsorbed due to higher osmotic pressure in Group P compared to Group Q/R/S.</p>	3
	<p>Able to state one correct inference and one inaccurate inference or able to state two inaccurate inferences.</p> <p><u>Sample answer (inaccurate):</u></p> <p>1. More/high/much/ (amount) of water reabsorbed // inversely. 2. Higher / high / lower / low osmotic pressure. 3. Less / more ADH is secreted to the kidney tubule.</p>	2

	<p>Able to state one correct inference or two inferences at idea level.</p> <p><u>Sample answer for idea level:</u></p> <ol style="list-style-type: none"> 1. ADH is secreted. 2. Salt reabsorbed. 3. Water reabsorbed. 	1																																																		
	No response or inaccurate respons.	0																																																		
	<p>Summary of scoring for 1(b)(i) and 1(b)(ii) :</p> <table border="1" style="margin: auto;"> <thead> <tr> <th>Score</th> <th>Correct</th> <th>Inaccurate</th> <th>Idea</th> <th>Wrong</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td></td> <td style="text-align: center;">-</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> </tr> <tr> <td></td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> </tr> <tr> <td></td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </tbody> </table>	Score	Correct	Inaccurate	Idea	Wrong	3	2	-	-	-	2	1	1	-	-		-	2	-	-	1	1	-	1	-		-	-	2	-		1	-	-	1		-	1	1	-	0	-	1	-	1	0	-	-	1	1	
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(c)	Able to state all 3 variables and methods to handle each variable correctly.		3
	<u>Sample answer</u>		
	Variable	Method to handle the variable	
	<u>Manipulated variable</u> Volume of water intake	(The students) drink different volume of (plain) water // Change the volume of water (from 100 ml to 200 ml, 300 ml and 400 ml).	
<u>Responding Variable:</u> Average volume of urine produced (after one hour)	Measure and record the volume of urine produced by using a measuring cylinder. // Calculate the (average) volume of urine produced by using formula : Volume of urine produced by student 1 + student 2 ----- 2		
<u>Constant variable:</u> Number of students in each group // Time taken to collect/measure/record the urine// type of water	Fix the number of student // Fix the time taken (to collect/measure/record the urine) at one hour/ use only plain water		
	Able to state 4 – 5 ticks	2	
	Able to state 2 – 3 ticks	1	
	No response or incorrect respons or 1 tick only	0	

(d)	<p>Able to state the hypothesis relating the manipulated variable and the responding variable correctly based on three criteria: P1 : manipulated variable (Volume of water intake) P2 : responding variable (Volume of urine produced) H : relationship</p> <p><u>Sample answer</u> P1 + P2 + H</p> <ol style="list-style-type: none"> 1. As the volume of water intake increases, the volume of urine produced increase // vice versa. 	3
	<p>Able to state a hypothesis based on any two criteria. <u>Sample answer</u> :</p> <p>P1 + P2 // P1/P2 + H</p> <ol style="list-style-type: none"> 1. The volume of urine produced depends on the volume of water intake. 2. Different group of students has different volume of urine produced. 	2
	<p>Able to state a hypothesis based on any one criterion or at idea level. <u>Sample answer</u></p> <ol style="list-style-type: none"> 1. Volume of urine produced is different. 	1
	No response or incorrect respons	0
	Any two correct aspect	2
	Any one aspect correct	1
	No response or incorrect respons	0

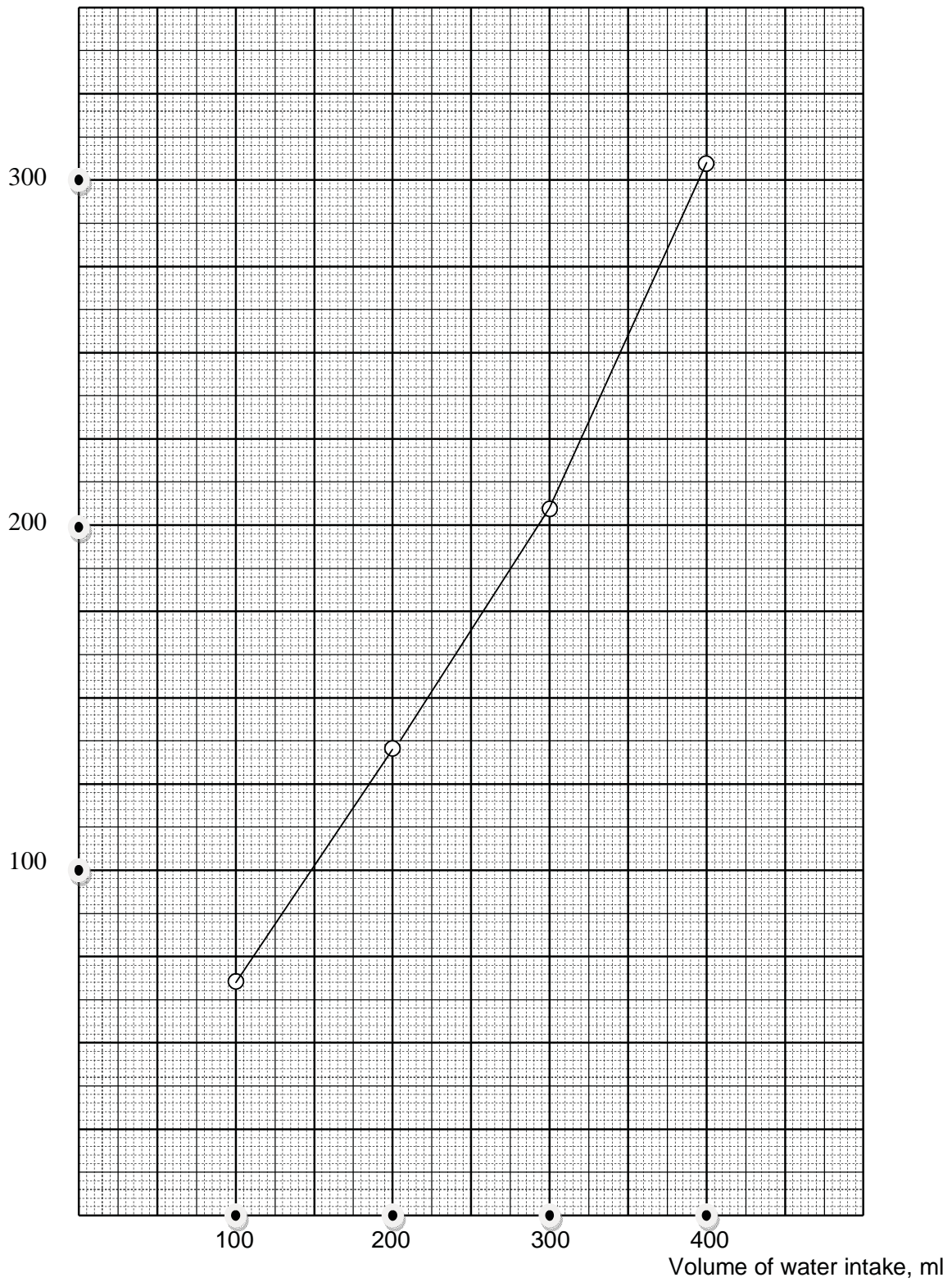
<p>(e) (i)</p>	<p>Able to construct a table correctly with the following aspects: T : Titles with correct units - 1 mark D : Data - 1 mark C : Average volume of urine produced - 1 mark</p> <p><u>Sample answer :</u></p> <div style="text-align: center;"> <p>Title, T</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Volume of water intake, ml</th> <th colspan="2">Volume of urine produced,ml</th> <th rowspan="2">Average volume of urine produced, ml</th> </tr> <tr> <th>Student 1</th> <th>Student 2</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>80</td> <td>80</td> <td>80</td> </tr> <tr> <td>200</td> <td>134</td> <td>136</td> <td>135</td> </tr> <tr> <td>300</td> <td>205</td> <td>207</td> <td>206</td> </tr> <tr> <td>400</td> <td>303</td> <td>305</td> <td>304</td> </tr> </tbody> </table> <p style="text-align: center;">Data, D</p> <p style="text-align: right;">C – Calculation</p> </div>	Volume of water intake, ml	Volume of urine produced,ml		Average volume of urine produced, ml	Student 1	Student 2	100	80	80	80	200	134	136	135	300	205	207	206	400	303	305	304	<p>3</p>
Volume of water intake, ml	Volume of urine produced,ml		Average volume of urine produced, ml																					
	Student 1	Student 2																						
100	80	80	80																					
200	134	136	135																					
300	205	207	206																					
400	303	305	304																					
	<p>Any two correct aspect</p>	<p>2</p>																						
	<p>Any one aspect correct</p>	<p>1</p>																						
	<p>No response or incorrect respons</p>	<p>0</p>																						
<p>(e) (ii)</p>	<p>Able to draw the graph of average volume of urine produced against volume of water intake based on the following aspects :</p> <p>P(paksi) : title of x-axis and y-axis - 1 mark T(Titik) : four points plotted correctly - 1 mark B(bentuk) : all points connected smoothly - 1 mark</p> <p>All three correct aspects</p>	<p>3</p>																						
	<p>Any two correct aspects</p>	<p>2</p>																						
	<p>Any one aspect correct</p>	<p>1</p>																						
	<p>No response or incorrect response</p>	<p>0</p>																						

(f)	Able to explain the relationship between the volume of water intake to the volume of urine produced based on the following criteria. R1 : Relationship – The higher the volume of water intake, the higher the (average) volume of urine produced R2 : Osmotic pressure decreases R3 : Less water reabsorbed (from the kidney) // less ADH is produced // Kidney tubules become less permeable to water <u>Sample answer :</u> The higher the volume of water intake, the higher the (average) volume of urine produced because the osmotic pressure decreases. Thus, less water reabsorbed from the kidney.	3
	Able to explain the relationship using any two aspects.	2
	Able to explain the relationship using one aspect only.	1
	No response or incorrect respons	0
(g)	Able to predict and explain the volume of urine produced based on the following criteria: P1 : Prediction – volume of urine less than 80 ml // any value less than 80 ml P2 : Explanation - Osmotic pressure of increases P3 : More water reabsorbed (from the kidney) <u>Sample answer</u> Volume of urine in less than 80 ml // 75 ml Because the osmotic pressure increases, so more water reabsorbed (from the kidney)	3
	Able to predict and explain the volume of urine produced based on any two criteria:	2
	Able to predict and explain the volume of urine produced based on any one criterion:	1
	No response or incorrect response	0

(h)	<p>Able to define osmoregulation operationally based on the following criteria. D1 : A <u>process</u> that causes D2 : (Average) volume of urine produced by the students / group A,B,C and D after one hour D3 : after taking different volume of water // depends on the volume of water intake // the higher the volume of water intake, the higher the volume of urine produced.</p> <p><u>Sample answer :</u></p> <p>Osmoregulation is the process that causes the (average) volume of urine produced by the students / group P,Q,R and S after one hour. The average volume of urine produced depends on the volume of water intake.</p>	3								
	Any two criteria stated	2								
	Any one criteria stated	1								
	No response or incorrect response	0								
(i)	<p>Able to classify apparatus and materials into their respective variables.</p> <p><u>Sample answer :</u></p> <table border="1" data-bbox="290 1211 1082 1447"> <thead> <tr> <th></th> <th>Manipulated Variable</th> <th>Responding Variables</th> <th>Fixed Variable</th> </tr> </thead> <tbody> <tr> <td>Apparatus / Materials</td> <td>cup Beaker // Measuring cylinder</td> <td>Measuring cylinder // beaker</td> <td>stopwatch students mineral water</td> </tr> </tbody> </table> <p>All 6 corrects</p>		Manipulated Variable	Responding Variables	Fixed Variable	Apparatus / Materials	cup Beaker // Measuring cylinder	Measuring cylinder // beaker	stopwatch students mineral water	3
	Manipulated Variable	Responding Variables	Fixed Variable							
Apparatus / Materials	cup Beaker // Measuring cylinder	Measuring cylinder // beaker	stopwatch students mineral water							
	1 – 2 wrongs	2								
	3 – 4 wrongs	1								
	5 – 6 wrongs or no response	0								

e(i) Sample answer

Average volume of urine produced, ml



QUESTION 2

Aspect	Mark Scheme	Marks	Notes on scoring
Problem statement	<p>Able to state a problem statement relating manipulated variable to the responding variable correctly based on criteria: P1 : MV (Carbon dioxide concentration) P2 : RV (The rate of photosynthesis) R : Relationship in question form (What is the effect of.....? // Does the...affect...?)</p> <p>Sample answers: 1. Does the percentage/concentration of carbon dioxide affect the rate of photosynthesis? 2. What is the effect of percentage of / concentration of carbon dioxide on the rate of photosynthesis?</p>	3	P1+P2+R
	<p>Able to state a problem statement inaccurately based on any two criteria:</p> <p>Sample answers: 1. What is the effect of different concentration of carbon dioxide on the rate of photosynthesis. (No R) 2. What can affect the rate of photosynthesis? (No P1) 3. What is the effect of different concentration of carbon dioxide on photosynthesis? (No P2) 4. Different concentration of carbon dioxide can affect the rate of photosynthesis. (No R) 5. Can carbon dioxide affect the rate of photosynthesis? (No P1)</p>	2	P1 and P2 only P1/P2 and R only
	<p>Able to state a problem statement based on any one criterion at idea level. 1. Does carbon dioxide affect photosynthesis? (No P1 and P2) 2. Does the rate of photosynthesis affected by carbon dioxide gas.(No P1 and R) 3. What is the factor that affect the rate of photosynthesis.(No P1 and R) 4. Does percentage / concentration of carbon dioxide affect the photosynthesis. (No P2 and R)</p>	1	

	No response/wrong response	0 mark	
Hypothesis	<p>Able to state a hypothesis by relating the manipulated variable to the responding variable correctly based on criteria:</p> <p>P1 : MV (Carbon dioxide concentration / percentage) P2 : RV (The rate of photosynthesis) R : Relationship between P1 and P2.</p> <p>Sample answer:</p> <ol style="list-style-type: none"> As/When the percentage/concentration of carbon dioxide increases/decreases the rate of photosynthesis/number of bubble release increases/decreases. 	3 marks	<p>P1+P2+R</p> <p>R:....increases/ decreases..... increases /decreases</p>
	<p>Able to state a hypothesis inaccurately correctly based on any two criteria:</p> <ol style="list-style-type: none"> As/When the concentration of carbon dioxide increases the photosynthesis increases.(no P2) As/When the carbon dioxide increases the rate photosynthesis increases.(no P1) Carbon dioxide concentration influence/affect the rate of photosynthesis (no R) 	2	<p>P1 + P2 only P1/P2 + R only</p>
	<p>Able to state a hypothesis at idea level based on any one criterion:</p> <ol style="list-style-type: none"> Carbon dioxide influence/affect the rate of photosynthesis.(P2 only) Carbon dioxide concentration influence/affect the photosynthesis.(P1 only) Carbon dioxide influence/affect the photosynthesis. (idea) 	1	
	No response/wrong response/R only.	0 mark	

Variables	Able to state all three variables correctly. <u>Sample answers:</u> Manipulated variable : Concentration / percentage of carbon dioxide Responding variable : The rate of photosynthesis// The number of bubbles released per minute Constant variable : Light intensity / temperature / type of plant / size of plant	3	
	Able to state any two variables correctly.	2	
	Able to state any one variable correctly.	1	
	No response / wrong response	0	
Apparatus and materials	Able to list all the apparatus and materials correctly. 4A + 3M <u>Sample answers:</u> Materials : * Elodea/Hydrilla/aquatic plant , different concentration of * sodium bicarbonate , distilled * water Apparatus : Beaker, boiling tube, clip, table * lamp * - compulsory	3	
	3A + 3M including * - compulsory materials and apparatus	2	
	1-2 A + 1-2 M including aquatic plant and a light source.	1	
	No response / wrong response	0	

<p>Procedure</p>	<p>Able to describe the steps of the experiment procedure or method correctly based on the following criteria:</p> <p>K1 : How to set up the apparatus (at least 3 steps)</p> <p>K2 : How to operate the the control variable (Any one)</p> <p>K3 : How to operate the responding variable (Any one)</p> <p>K4: How to operate the manipulated variable (Any one)</p> <p>K5 : Precaution // steps to increase accuracy (Any one)</p> <p><u>K1- How to set up the apparatus</u></p> <ul style="list-style-type: none"> • <u>Diagram of apparatus and material set up with 5 correct labels.</u> • <u>Choose / Cut 7 cm length of fresh <i>Elodea/Hydrilla</i></u> • <u>Clip the tip with a paper clip</u> • <u>and put it in the boiling tube (with the clip down)</u> <p><u>K2- How to operate the constant variable</u></p> <ul style="list-style-type: none"> • Pour <u>40 ml</u> of 1% sodium bicarbonate solution into the boiling tube. • Place the apparatus at <u>20 cm</u>(other suitable example) distant from a light source <p><u>K3 – How to operate the responding variable</u></p> <ul style="list-style-type: none"> • Count and <u>record</u> the number of bubbles released in 5 minutes by using <u>stopwatch</u>. • <u>Calculate</u> the rate of photosynthesis using <u>formula : number of bubbles released / time</u> <p><u>K4 – How to operate the manipulated variable</u></p> <ul style="list-style-type: none"> • Change the concentration of sodium bicarbonate solution to <u>2%</u> sodium bicarbonate solution, <u>3%</u> sodium bicarbonate solution, <u>4%</u> sodium bicarbonate solution and 5% sodium bicarbonate solution. (at least 4 different concentration) <p><u>K5 - Precaution</u></p> <ul style="list-style-type: none"> • Place the boiling tube in a beaker of water /water bath at room temperature throughout the experiment • Give a time duration of five minutes for the plant to adjust to the new carbon dioxide concentration before taking the reading. 	3	
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	All 5K																	
	3 - 4K	2																
	2 K	1																
	0 K or wrong response / no response	0																
Presentation of data	<p>Able to present all the data with the units correctly based on criteria:</p> <p>Titles and units : 1m</p> <ul style="list-style-type: none"> • MV – Concentration of sodium bicarbonate solution (%) • Operating RV - Number of bubbles released in 5 minutes • RV - Rate of photosynthesis - number of bubbles/minute) <p>Data : 1m</p> <ul style="list-style-type: none"> • At least four different concentration of sodium bicarbonate <p><u>Sample</u> :</p> <table border="1"> <thead> <tr> <th>Concentration of sodium bicarbonate solution / carbon dioxide (%)</th> <th>Number of bubbles released in 5 minutes</th> <th>Rate of photosynthesis (number of bubbles/minute)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> </tr> </tbody> </table>	Concentration of sodium bicarbonate solution / carbon dioxide (%)	Number of bubbles released in 5 minutes	Rate of photosynthesis (number of bubbles/minute)	1			2			3			4			2	
Concentration of sodium bicarbonate solution / carbon dioxide (%)	Number of bubbles released in 5 minutes	Rate of photosynthesis (number of bubbles/minute)																
1																		
2																		
3																		
4																		

Sample answer for procedure:

No	Steps	Criteria
1.	<u>Choose / Cut 7 cm</u> length of fresh <i>Elodea/Hydrilla</i> .	K1,K2
2.	<u>Clip</u> the tip the plant with a paper clip.	K1
3.	<u>Pour 40 ml</u> of 1% sodium bicarbonate solution into the boiling tube.	K1,K2
4.	<u>Put the plant into the boiling tube</u> (with the clip down)	K1,K2
5.	<u>Place</u> the apparatus at <u>20 cm</u> (other suitable example) distant from a light source.	K1,K2
6.	<u>Count and record</u> the number of bubbles released in <u>5 minutes</u> by using <u>stopwatch</u> .	K2,K3
7.	Change the concentration of sodium bicarbonate solution to <u>2%</u> sodium bicarbonate solution, <u>3%</u> sodium bicarbonate solution, <u>4%</u> sodium bicarbonate solution and <u>5%</u> sodium bicarbonate solution. (at least 4 different concentration)	K4
8.	<u>Calculate</u> the rate of photosynthesis by using <u>formula : number of bubbles released / time</u>	K3
9.	Place the boiling tube in a beaker of water at <u>room temperature throughout the experiment</u>	K5
10	Give a time duration of <u>five minutes</u> for the plant to <u>adjust to the new carbon dioxide concentration</u> before taking the reading.	K5
11	Record the results in a <u>table</u> .	K1