Instruction: Question 1 to 50 is followed by four options A, B, C and D. Choose the best option for each question.
***Arahan**: Soalan 1 hingga 50 diikuti oleh empat pilihan jawapan A, B, C dan D. Pilih jawapan yang tepat bagi setiap soalan.*

1. Figure 1 shows structure of an animal cell.
Rajah 1 menunjukkan struktur sel haiwan.

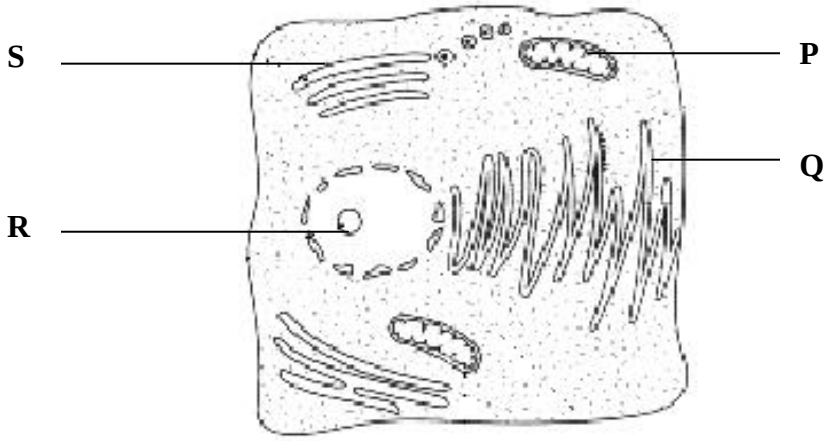


DIAGRAM 1

Choose the correct match
Pilih padanan yang betul

	Organelle/Organel	**Function/Fungsi**
A	P	Synthesizing protein *Mensintesis protein*
B	Q	Generating energy *Menjana tenaga*
C	R	Transporting protein to other part of the cell *Mengangkut protein ke bahagian lain dalam sel*
D	S	Modifying synthesized protein *Mengubahsuai protein yang telah disintesis*

2. Diagram 2 shows the transformation of gases in *Amoeba*
Rajah 2 menunjukkan pertukaran gas dalam Amoeba

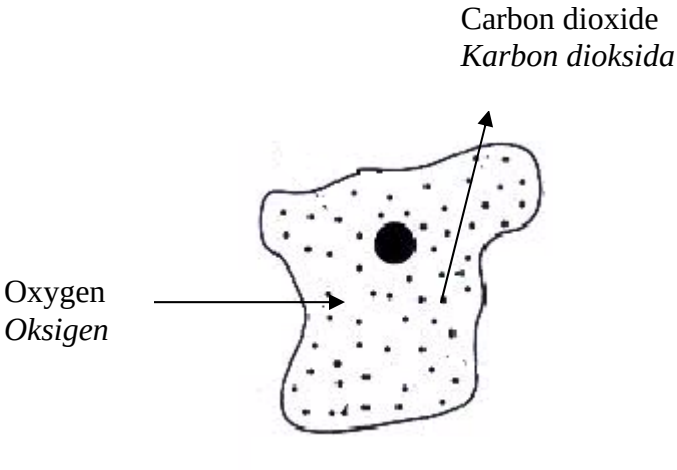


DIAGRAM 2

What process took place for both of the above gases?
Apakah proses yang berlaku bagi kedua-dua gas di atas ?

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

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

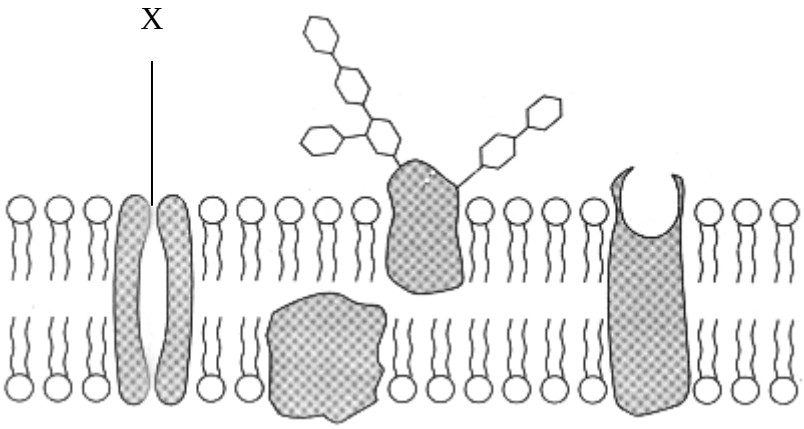


DIAGRAM 3

What is the structure labeled X?
Apakah struktur berlabel X ?

A. Lipid
Lipid

B. Tiny pore
Liang seni

C. Glycoprotein
Glikoprotein

D. Pore protein
Protein liang

4 Enzyme has an optimum temperature for its reaction. Which one is the most suitable temperature for enzyme reaction in human body?
Enzim mempunyai suhu yang optimum bagi tindakbalasnya. Antara berikut, suhu yang manakah paling sesuai untuk tindakan enzim dalam badan manusia?

A. 30 ^{o}C
B. 37 ^{o}C
C. 45 ^{o}C
D. 60 ^{o}C

5. Which process takes place in cloning?
Antara proses berikut yang manakah berlaku dalam pengklonan ?

A. Spermatogenesis
B. Oogenesis
C. Meiosis
D. Mitosis

6. Diagram 4 shows a phase in cell division.
Rajah 4 menunjukkan satu fasa pembahagian sel

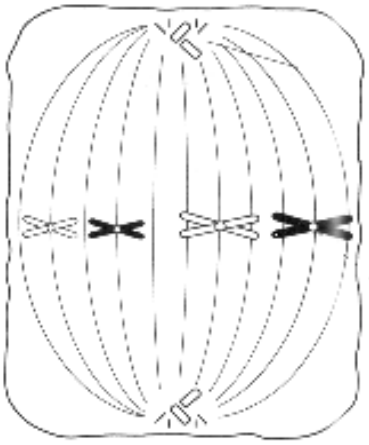


DIAGRAM 4

Name the above stage.
Namakan peringkat di atas.

A. Prophase
Profasa

B. Anaphase
Anafasa

C. Metaphase
Metafasa

D. Telophase
Telofasa

7. Diagram 5 shows part of a cow's digestion system
Rajah 5 menunjukkan sebahagian sistem pencernaan lembu

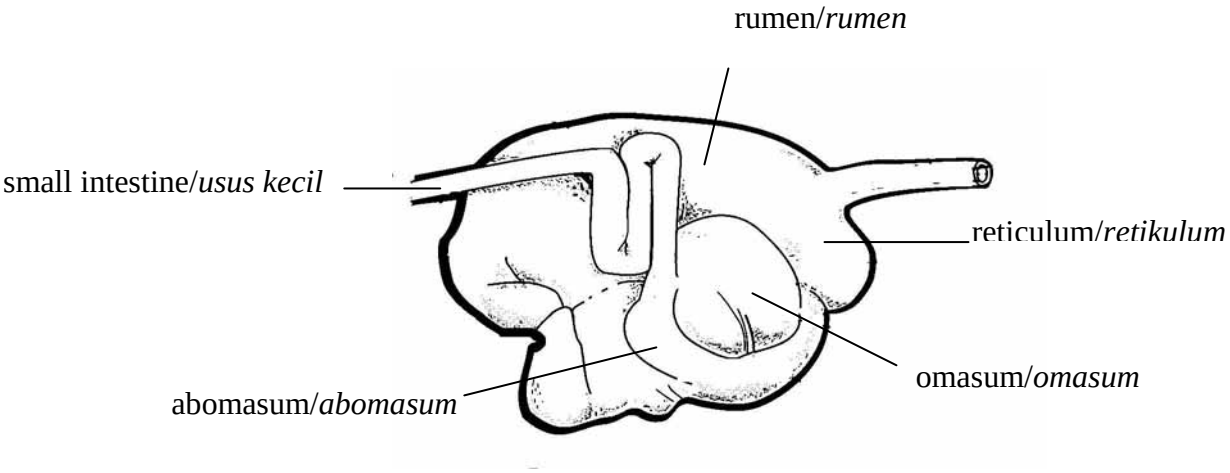


DIAGRAM 5

Which one shows the correct sequence of food digestion in the cow's stomach?
Antara berikut yang manakah menunjukkan urutan yang betul untuk laluan makanan dalam proses pencernaan di perut lembu?

A. Mouth → Rumen → Retikulum → Omasum →
Mouth → Abomasum → Small intestine

B. Mouth → Rumen → Mouth → Retikulum →
Omasum → Abomasum → Small intestine

C. Mouth → Retikulum → Rumen → Mouth →
Abomasum → Omasum → Small intestine

D Mouth/*Mulut* → Retikulum → Mouth/*Mulut* → Omasum →
Abomasum → Rumen → Small intestine/*Usus kecil*

8. Diagram 6 shows stages of protein digestion.
Rajah 6 menunjukkan peringkat pencernaan protein

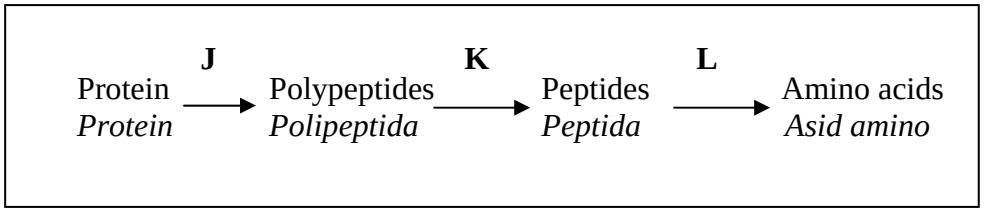


DIAGRAM 6

Which of the following enzymes represent **J, K** and **L?**
*Antara enzim berikut, yang manakah mewakili **J, K** dan **L** ?*

	J	**K**	**L**
A	Rennin/*Renin*	Erepsin	Trypsin/*Tripsin*
B	Rennin/*Renin*	Pepsin	Trypsin/*Tripsin*
C	Trypsin/*Tripsin*	Rennin/*Renin*	Pepsin
D	Pepsin	Trypsin/*Tripsin*	Erepsin

9. Diagram 7 shows part of a human alimentary canal.
Rajah 7 menunjukkan sebahagian daripada salur pencernaan manusia.

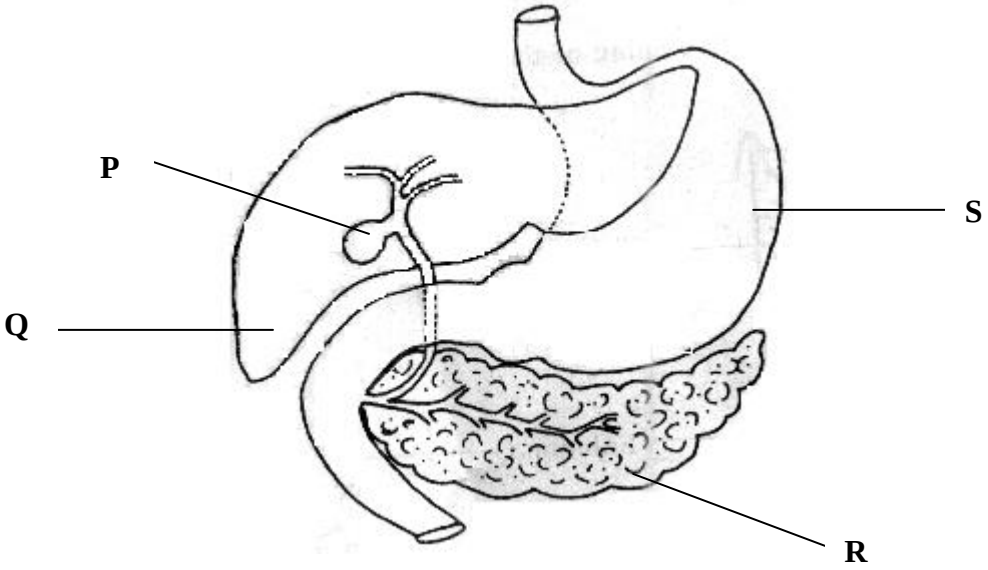


DIAGRAM 7

Which organ produces secretions to emulsify fats in duodenum?
Organ manakah yang menghasilkan rembesan untuk mengemulsikan lemak dalam duodenum ?

A. P
B. Q
C. R
D. S

10. Which is **correct** about the exhaled air sample?
*Yang manakah **benar** tentang sampel udara yang dihembus keluar ?*

Air Sample/ *Sampel Udara*	**Oxygen Percentage/ *Peratus Oksigen***	**Carbon Dioxide Percentage/ *Peratus Karbon Dioksida***	**Dampness Percentage/ *Peratus Kelembapan***
A	21	0.04	20
B	16	4.04	100
C	4	0.40	80
D	20	4.00	60

11. Which of the following statements are **incorrect** about the function of the lymph system?
*Antara pernyataan berikut yang manakah **tidak benar** tentang peranan sistem limfa ?*

A. To transport fatty acid and glycerol
Mengangkut asid lemak dan gliserol
B. To transport glucose and amino acid
Mengangkut glukosa dan asid amino
C. To produce antibodies to kill bacteria
Menghasilkan antibodi untuk membunuh bakteria
D. To return liquid into blood circulation system
Mengembalikan semula cecair ke dalam sistem peredaran darah

12. Diagram 8 shows the water movement through the leaf
Rajah 8 menunjukkan pergerakan air melalui daun

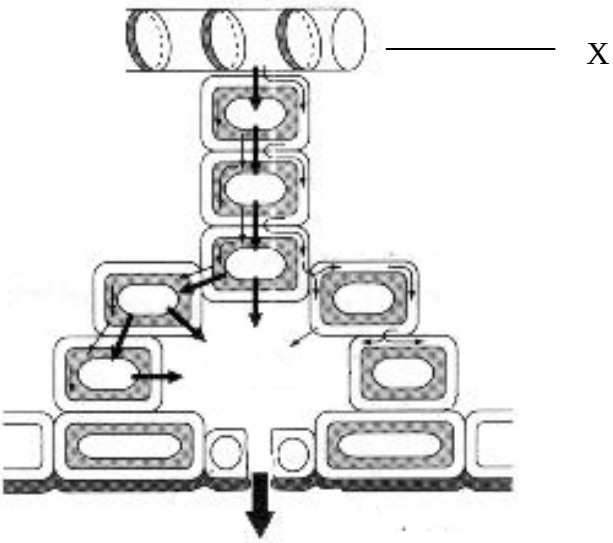


DIAGRAM 8

What is the function of X?
Apakah fungsi bahagian X?

A. To remove water
Menyingkirkan air

B. To support plants
Menyokong tumbuhan

C. To transport water and mineral
Mengangkut air dan mineral

D. To transport photosynthesis products
Mengangkut hasil fotosintesis

13. Diagram 9 shows human lumbar vertebrae
Rajah 9 menunjukkan vertebra lumbar manusia

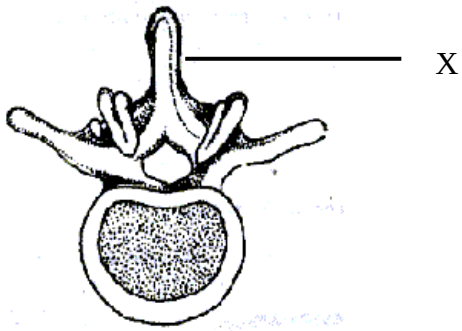


DIAGRAM 9

What is the function of X?
Apakah fungsi X?

A Protection for the spinal cord
Perlindungan bagi saraf tunjang

B Surface for muscle attachment
Permukaan untuk perlekatan otot

C Surface to join with vertebrae
Permukaan untuk persendian dengan vertebra

D Surface to join with ribs
Permukaan untuk persendian dengan tulang rusuk

14. Diagram 10 shows the structure of a synapse.
Rajah 10 menunjukkan struktur sinaps

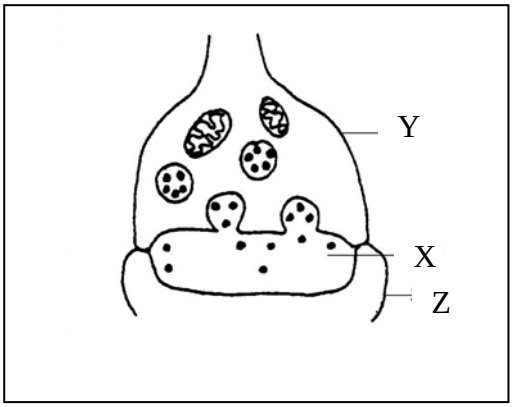


DIAGRAM 10

The role of X is
Peranan X ialah

A To transfer neurotransmitter from Z to Y
memindahkan bahan neurotransmitter dari Z ke Y

B To transfer impulse from Y to Z
memindahkan impuls dari Y ke Z

C To prevent impulse transfer
menghalang pemindahan impuls

D To excite Y membrane
menguja membran

15. Diagram 11 shows a human brain
Rajah 11 menunjukkan otak manusia.

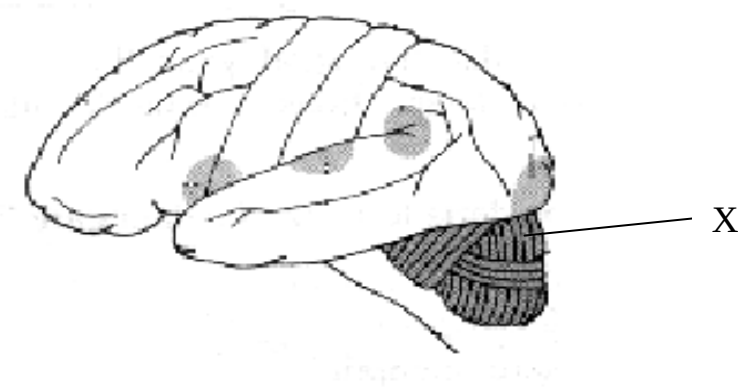


DIAGRAM 11

What is being controlled by X?
Apakah yang dikawal oleh X?

A. Making judgment
Membuat penilaian
B. Breathing
Pernafasan
C. Control balance
Mengawal keseimbangan
D. Involuntary actions
Tindakan luarkawal

16. Diagram 12 shows the structure of human kidney nephron
Rajah 12 menunjukkan struktur nefron ginjal manusia.

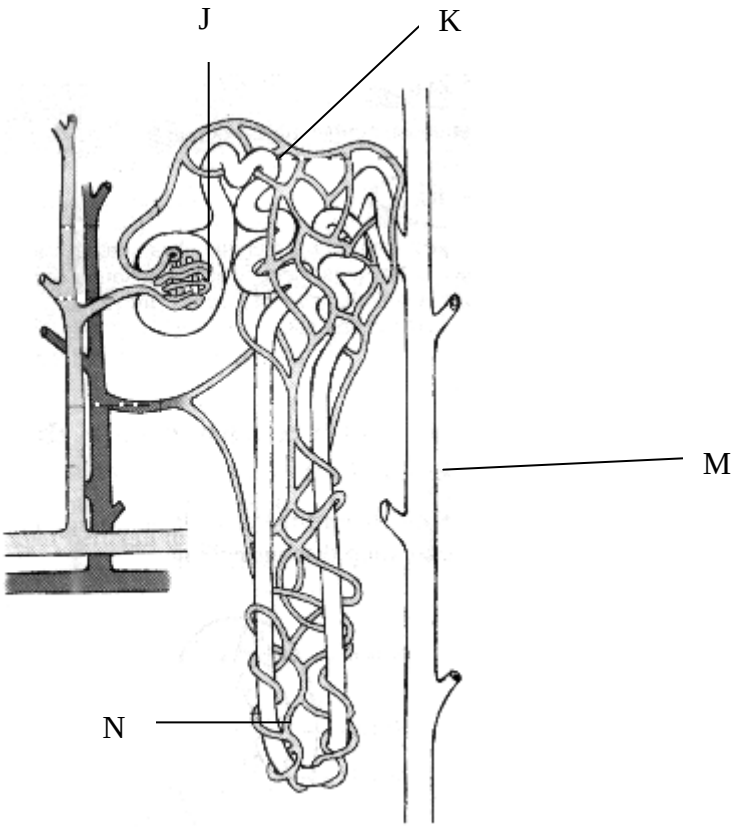


DIAGRAM 12

Which part does ultrafiltration happen?
Pada bahagian manakah ultraturasan berlaku ?

A. J
B. K
C. M
D. N

17. Which is **not** the importance of homeostasis mechanism to human?
*Antara berikut yang manakah **bukan** kepentingan mekanisme homeostasis pada manusia ?*

A. To control the balance of blood pressure osmosis
Mengawal keseimbangan tekanan osmosis darah
B. To control the waste content like urea
Mengawal kandungan bahan kumuh seperti urea
C. To control the gas exchange through respiration system
Mengawal pertukaran gas melalui sistem respirasi
D. To regulate the body temperature at the normal level
Mengawal suhu badan supaya sentiasa berada pada tahap normal

18. Diagram 13 shows the human reproductive system.
Rajah 13 menunjukkan sistem pembiakan manusia

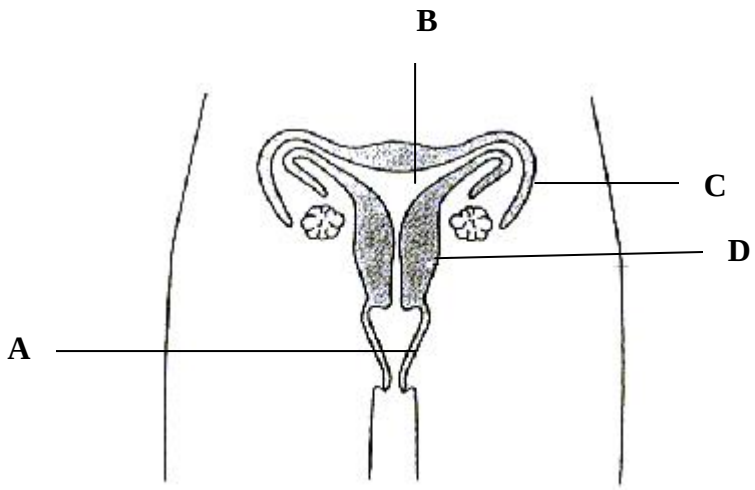


DIAGRAM 13

The above diagram is labeled A, B, C and D. Where implantation does occurs?
Rajah di atas berlabel A, B, C dan D. Di manakah berlakunya proses implantasi ?

19. Diagram 14 shows the embryo sac of a plant.
Rajah 14 menunjukkan pundi embrio satu tumbuhan

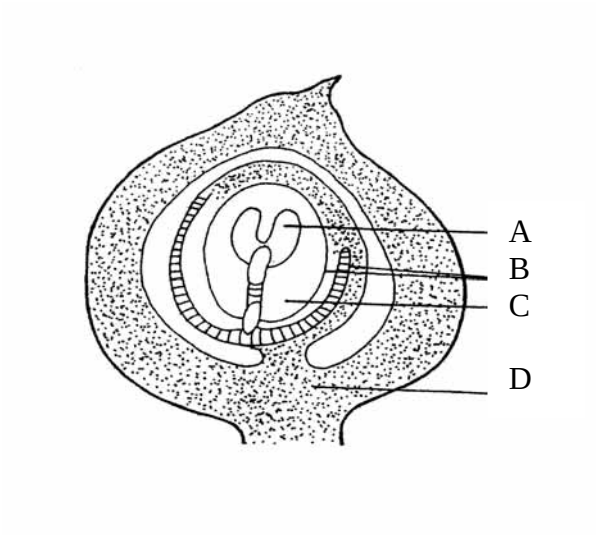
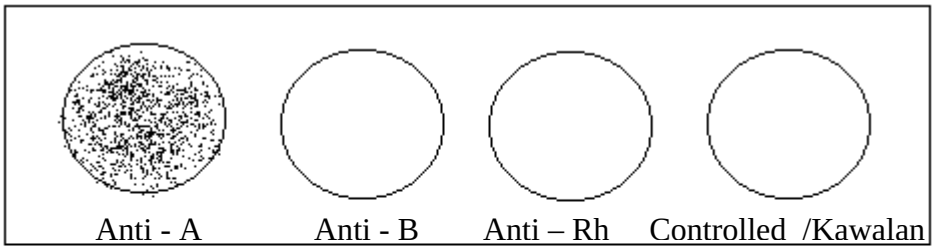


DIAGRAM 14

Which of the parts labeled A,B,C and D will develop into testa?
Antara bahagian berlabel A, B, C dan D, yang manakah berkembang menjadi testa?

20. Diagram 15 shows the blood test results using Elden Card for a student.
Rajah 15 menunjukkan keputusan ujian darah menggunakan Elden Kad bagi seorang pelajar.



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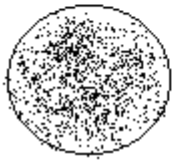
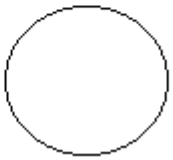


Agglutination
Aglutinat



No agglutination
Tiada aglutinat

RAJAH 15

Which of the statement below is **true** about the student's blood group?
*Antara berikut yang manakah **benar** tentang kumpulan darah pelajar itu ?*

A. Blood group A positive
Kumpulan darah A positif
B. Blood group A negative
Kumpulan darah A negatif
C. Blood group B positive
Kumpulan darah B positif
D. Blood group B negative
Kumpulan darah B negatif

21. The sequence of nitrogenous bases in nucleotide chain in a segment of DNA molecule is AATTCCGG.
What is the sequence of nitrogenous bases in nucleotide chain beside this chain (double helix chain)?
Susunan bes-bes bernitrogen dalam satu rantai nukleotida pada molekul DNA adalah seperti berikut, AATTCCGG.
Apakah susunan bes-bes bernitrogen dalam rantai nukleotida yang bersebelahan dengan rantai ini (rantai heliks ganda dua) ?

A ATCTATCG

B AATTCCGG

C TTAAGGCC

D CCGGAATT

22. Diagram 16 shows the basic DNA structure
Rajah 16 menunjukkan struktur asas DNA

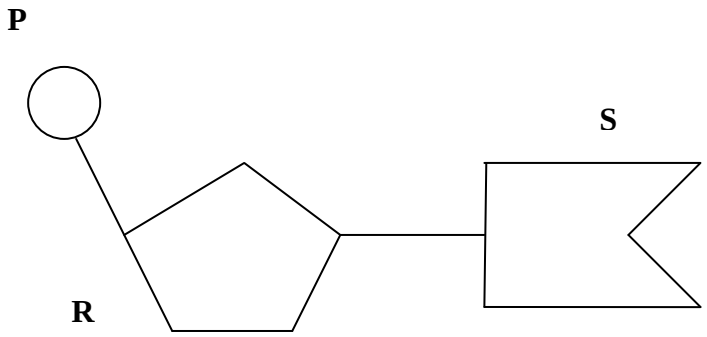


DIAGRAM16

What are P, R and S?
Apakah P, R dan S ?

	P	R	S
A	Nucleotide *nukleotida*	Phosphate *fosfat*	Deoxyribose sugar *gula deoksiribosa*
B	Phosphate *fosfat*	Deoxyribose sugar *gula deoksiribosa*	Nitrogenous base *bes bernitrogen*
C	Phosphate *fosfat*	Nucleotide *nukleotida*	Nitrogenous base *bes bernitrogen*
D	Nitrogenous base *bes bernitrogen*	Phosphate *fosfat*	Nucleotide *nukleotida*

23. Which sex chromosomes from the parents' ovum and sperm can be found in their son?
Kromosom seks yang manakah dalam ovum dan sperma ibubapa terdapat pada anak lelaki mereka ?

	Sex chromosomes in the ovum/ ***Kromosom seks dalam ovum***	**Sex chromosomes in the sperm/** ***Kromosom seks dalam sperma***
A	X	X
B	X	Y
C	Y	X
D	Y	Y

24. Diagram 17 shows stages of eutrophication.
Rajah 17 menunjukkan peringkat-peringkat eutrofikasi

P – Pool covered by weeds
Kolam ditutupi rumpai.
Q – Bacteria growth rates increase
Kadar pembiakan bakteria meningkat.
R – Aquatic life in pool reduces
Bilangan hidupan kolam berkurang.
S - BOD value increases
Nilai BOD bertambah.

DIAGRAM 17

Which of the following sequence is **true**?
*Antara urutan berikut, yang manakah **betul** ?*

A. Q, R, S and P
B. P, Q, S and R
C. P, R, S and Q
D. R, S, Q and P

25. Which of the following is the effect of oil spill at the sea?
Antara berikut, yang manakah kesan tumpahan minyak di laut ?

A. Increase the number of aquatic species organism
Menambah bilangan spesies organisma akuatik.
B. Reduce of photosynthesis level in aquatic plants.
Mengurangkan kadar fotosintesis tumbuhan akuatik.
C. Reduce the level of biochemical oxygen demand for aquatic organism
Mengurangkan tahap keperluan oksigen biokimia organisma akuatik
D. Increase the number of aquatic organism in their food chain
Menambahkan bilangan organisma akuatik dalam rantaian makanan mereka

26. Diagram 18 shows an experiment to study the diffusion through cell membrane
Rajah 18 menunjukkan eksperimen mengkaji resapan merentas membran sel.

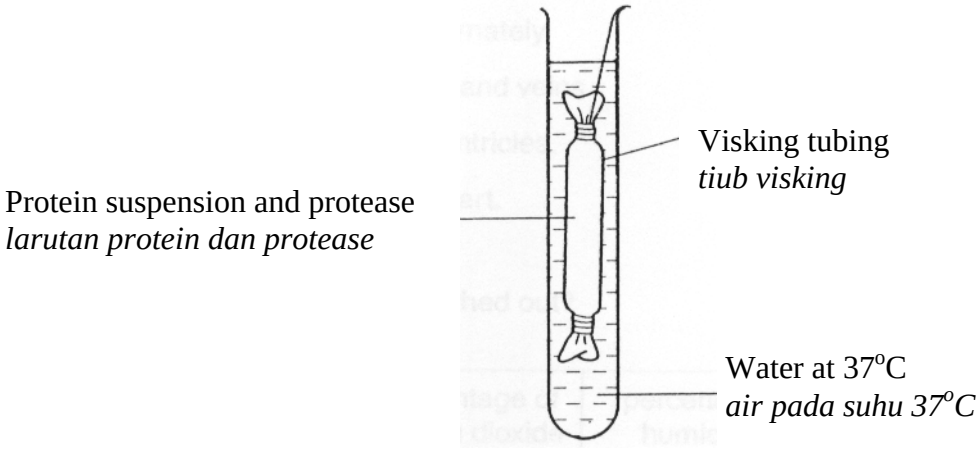


DIAGRAM 18

What can be found in the water after 15 minutes?
Apakah yang terdapat di dalam air selepas 15 minit ?

A amino acid
asid amino
B fatty acid
asid lemak
C glucose
glukosa
D glycerol
gliserol

27. Diagram 19 shows apparatus to detect the factors effecting photosynthesis
Rajah 19 menunjukkan radas untuk mengesan faktor yang mempengaruhi fotosintesis

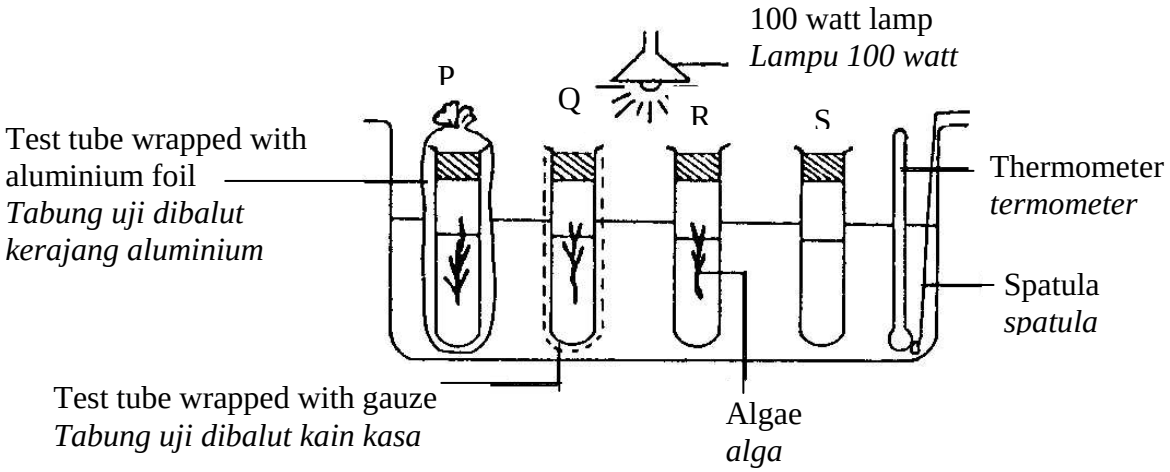


DIAGRAM 19

Which of the following test tube has the highest content of carbon dioxide?
Antara berikut tabung uji yang manakah mengandungi paling banyak gas karbon dioksida ?.

A. P B. Q C. R D. S

28. Diagram 20 shows the result of an experiment to study the effect of macronutrient deficiency.
Rajah 20 menunjukkan keputusan eksperimen untuk mengkaji kesan kekurangan makronutrien

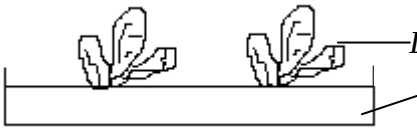
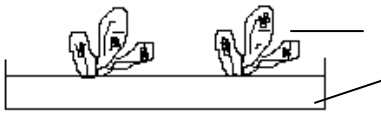
Treatment ***Rawatan***	**Observation of Lemna sp. leaves colour after 6 weeks** ***Pemerhatian warna daun Lemna sp. Selepas 6 minggu***
	Yellow leaves Stunted growth *Daun kuning* *Pertumbuhan terbantut*
	Dark green leaves with red dots Stunted growth *Daun hijau tua dengan bintik merah.* *Pertumbuhan terbantut*

DIAGRAM 20

Which of the following elements **cannot** be found in solution X and Y?
*Antara unsur berikut yang manakah **tidak** didapati dalam larutan X dan Y ?*

	Solution X ***Larutan X***	**Solution Y** ***Larutan Y***
A	Nitrogen *Nitrogen*	Phosphate *Fosfat*
B	Magnesium *Magnesium*	Phosphate *Fosfat*
C	Phosphate *Fosfat*	Nitrogen *Nitrogen*
D	Nitrogen *Nitrogen*	Magnesium *Magnesium*

29. Diagram 21 shows four muscular chambers of human heart.
Rajah 21 menunjukkan empat ruang jantung manusia.

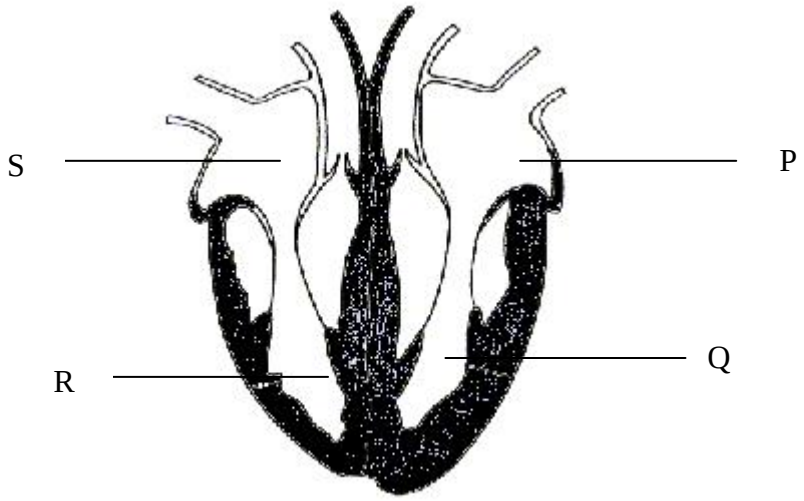


DIAGRAM 21

Which of the following statements are **correct** about blood circulation?
*Antara berikut, pernyataan manakah **benar** tentang aliran darah ?*

A Blood flows from lung enters P
Darah mengalir dari peparu terus masuk ke dalam P
B Blood flows from lung enters S
Darah mengalir dari peparu terus masuk ke dalam S
C Blood flows through Q to the lung
Darah mengalir melalui Q ke peparu
D Blood flows through Q to P
Darah mengalir melalui Q ke P

30. Diagram 22 shows an apparatus set up to measure the amount of gases in air.
Rajah 22 menunjukkan susunan radas untuk mengukur kandungan gas dalam udara.

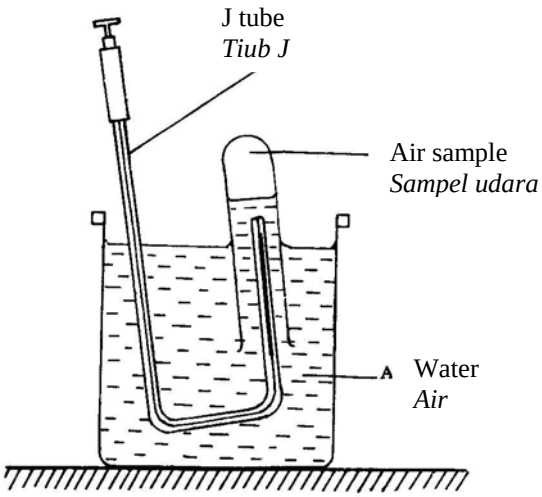


DIAGRAM 22

Initial length of air column
Panjang awal turus udara …….…… 10.00 cm

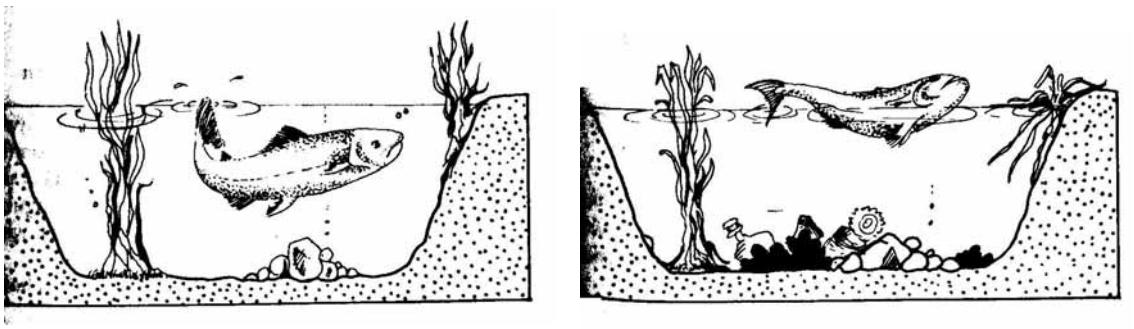
Length of air column upon adding potassium hydroxide solution
Panjang gelembung udara selepas dicampurkan larutan kalium hidroksida ….……..... 9.40 cm

Length of air column upon adding potassium pyrogallate solution
Panjang gelembung udara selepas dicampurkan larutan kalium pirogalat…… 8.00 cm

Percentage of oxygen in air sample
Peratus gas oksigen di dalam sampel udara tersebut ialah

A. 6 % B. 10% C. 14% D. 16%

31 Diagram 23 shows a situation of a pond in 1999 and 2003.
Rajah 23 menunjukkan keadaan sebuah kolam pada tahun 1999 dan 2003



1999 2003

DIAGRAM 23

Which of the following statements best explain the diagram above?
Antara pernyataan berikut yang manakah sesuai menerangkan kejadian dalam rajah di atas.

I. Factory waste is a main factor in pond pollution
Hasil buangan kilang adalah faktor utama pencemaran kolam
II. Additional quantity of nitrogenous material increases the number of microorganisms
Penambahan kuantiti bahan bernitrogen meningkatkan bilangan mikroorganisma
III. BOD will increase because the content of oxygen decrease
BOD akan meningkat kerana kandungan oksigen berkurang
IV. Aquatic organism died due to lack of oxygen
Organisma akuatik mati disebabkan kekurangan oksigen

A. II and IV
B. II and III
C. I, III and IV
D. I, II, III and IV

32. The respiratory surface has certain adaptation for gases exchange. How to increase the rate of gases exchanges at the respiratory surface?
Permukaan respirasi mempunyai penyesuaian tertentu bagi pertukaran gas. Bagaimananakah cara untuk meningkatkan kadar pertukaran gas melalui permukaan respirasi?

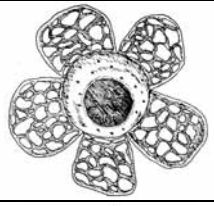
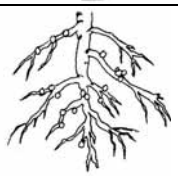
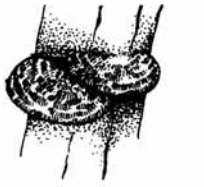
I	Increase blood supply through it *Meningkatkan bekalan darah melaluinya*
II	Increase the respiration surface area *Meningkatkan luas permukaan respirasi*
III	Thicken mucosa layer at the surface *Menebalkan lagi lapisan mukosa pada permukaannya*
IV	Increase the rate of ventilation *Meningkatkan kadar ventilasi*

A I and II
B II and III
C I, II and IV
D I, II, III and IV

33. The following characteristic enables the organisms to survive in its habitat.
Ciri-ciri penyesuaian berikut membolehkan organisma hidup di habitatnya

I Has a modified part to store water
Mempunyai bahagian yang diubahsuai untuk menyimpan air
II Produce spore
Menghasilkan spora
III Has hyphae to absorb nutrients
mempunyai hifa untuk menyerap nutrien
IV Has nodule
Mempunyai nodul

Which of the suitable characteristic enables organisms to survive in their habitat
Antara berikut yang manakah ciri penyesuaian yang sesuai untuk membolehkan organisma hidup di habitatnya.

	ORGANISMS ***ORGANISMA***	**CHARACTERISTICS** ***CIRI-CIRI***
A		I, II and III
B		II, III and IV
C		III and IV
D		II and III

34. Diagram 24 shows the concentration of antibody in the blood after two antiserum injections
Rajah 24 menunjukkan kepekatan antibodi dalam darah selepas dua suntikan antiserum.

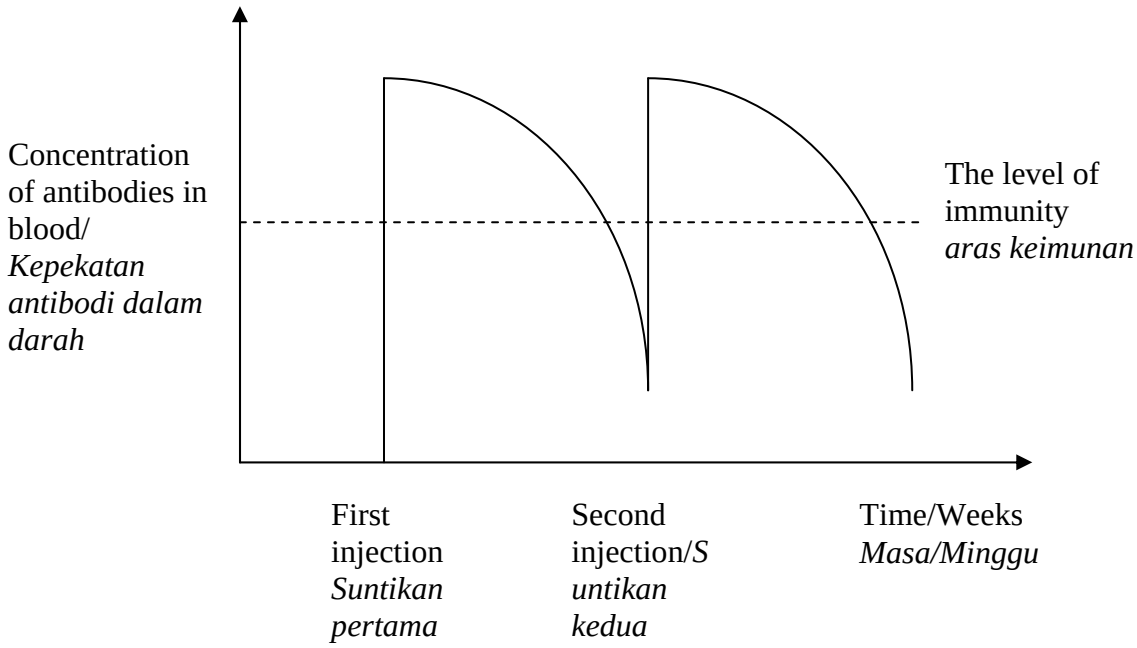


DIAGRAM 24/RAJAH 24

What type of immunity shown in the diagram above?
Apakah jenis keimunan yang ditunjukkan dalam rajah di atas?

A. Artificial active immunity
Keimunan aktif buatan
B. Artificial passive immunity
Keimunan pasif buatan
C. Natural active immunity
Keimunan aktif semulajadi
D. Natural passive immunity
Keimunan pasif semulajadi

35. Diagram 25 shows the number of industries area, mirrored building and agriculture area, at four towns A, B, C and D.
Rajah 25 menunjukkan bilangan kawasan perindustrian, bangunan bercermin, dan kawasan pertanian, dalam empat buah Bandar A, B, C, dan D.

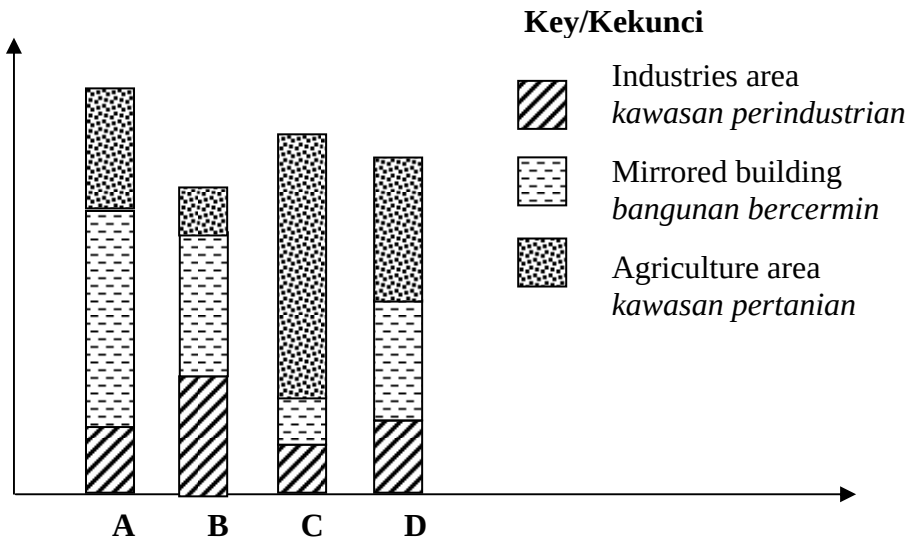
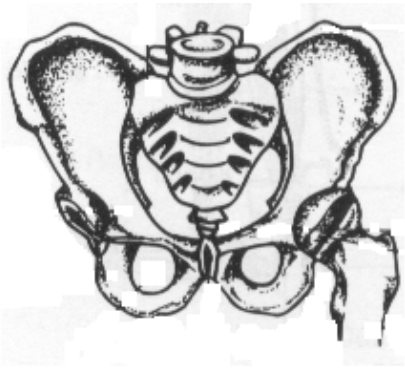


DIAGRAM 25

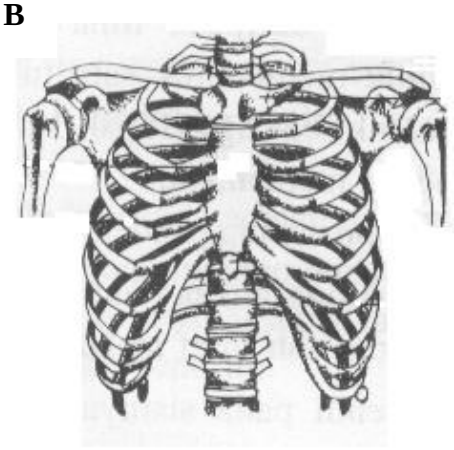
Which town A, B, C and D will have the worst eutrophication effects?
Antara bandar A, B, C, dan D yang manakah menghadapi kesan eutrofikasi yang paling teruk ?

36. Which of the following is an axial skeleton?
Antara yang berikut yang manakah merupakan rangka paksi ?

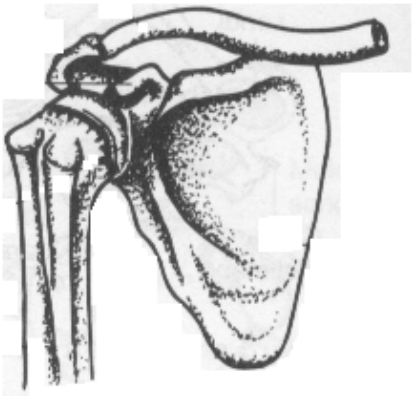
A



B



C



D

37 Diagram 26 shows the movement of a frog.
Rajah 26 menunjukkan pergerakan katak

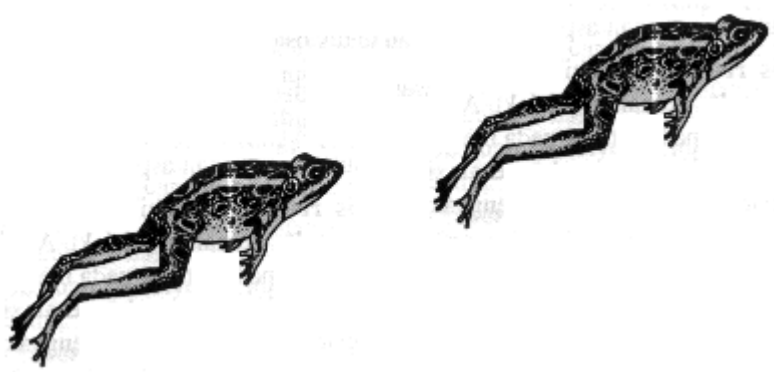


DIAGRAM26

Which of the following enables the above movement?
Antara berikut yang manakah membolehkan berlakunya pergerakan di atas ?

I Compact foot bone
Tulang kaki yang padat
II The hind leg folded into a "Z" shape
Kaki belakang dilipat berbentuk Z
III The muscle of front leg is small
Otot kaki hadapan yang kecil
IV The hind leg has well developed muscle
Kaki belakang mempunyai otot yang berkembang maju

A. I and II
B. II and III
C. II and IV
D. I,III and IV

38. Diagram 27 shows the structure of spinal cord.
Rajah 27 menunjukkan struktur saraf tunjang

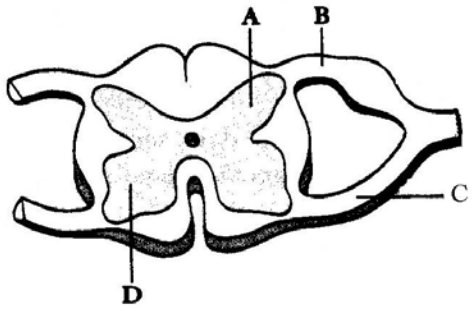


DIAGRAM 27

Which of A, B, C,and D has an efferent axon?
*Antara **A, B, C** dan **D** yang manakah mengandungi akson eferen?*

39. Diagram 28 shows a twin.
Rajah 28 menunjukkan pasangan kembar.

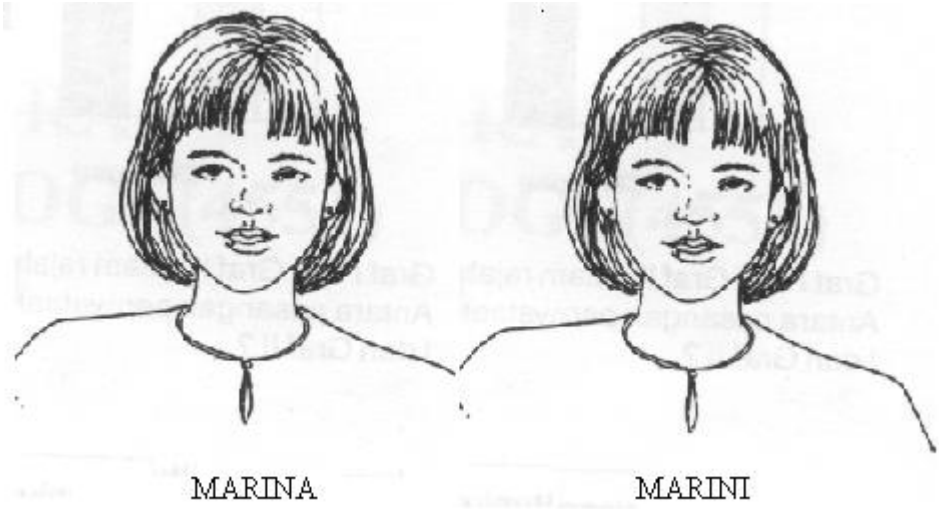


DIAGRAM 28

Which of the following statement is **correct** about the twin above?
*Yang manakah **benar** tentang kejadian kembar di atas?*

A. Fertilization between one sperm and one ovum developed a zygote and the zygote will divide into two
Persenyawaan satu sperma dengan satu ovum hingga membentuk satu zigot dan zigot membahagi kepada dua

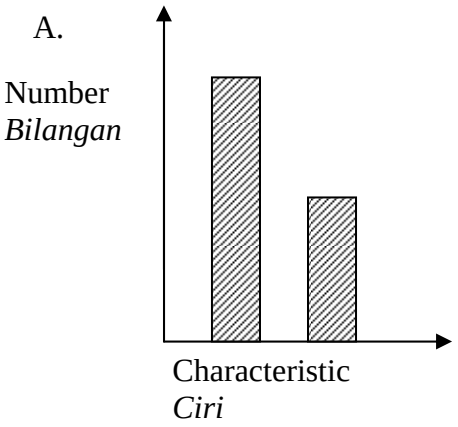
B. Fertilization between two sperms and one ovum developed a zygote and the zygote is divided into two
Persenyawaan dua sperma dengan satu ovum hingga membentuk zigot dan zigot membahagi dua

C. Fertilization between two sperms and one ovum developed into two zygote
Persenyawaan dua sperma dengan satu ovum hingga membentuk dua zigot

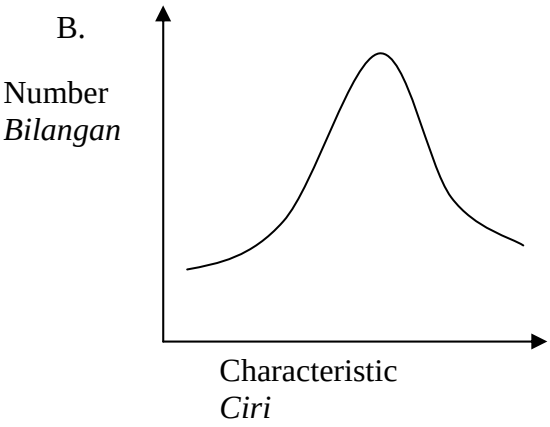
D. Fertilization between two sperms and two ovum developed two zygote
Persenyawaan dua sperma dengan dua ovum hingga membentuk dua zigot

40. Which of the following shows a variation caused by genetic factor only?
Antara berikut yang manakah menunjukkan variasi yang disebabkan oleh faktor genetik sahaja ?

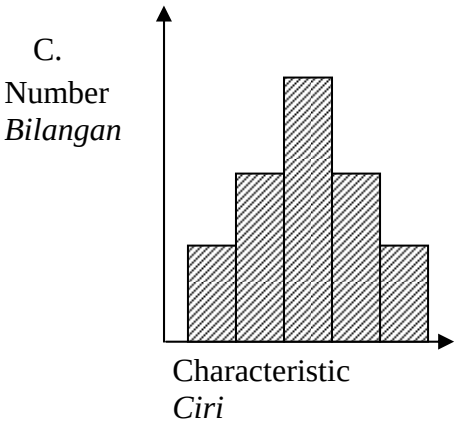
A.



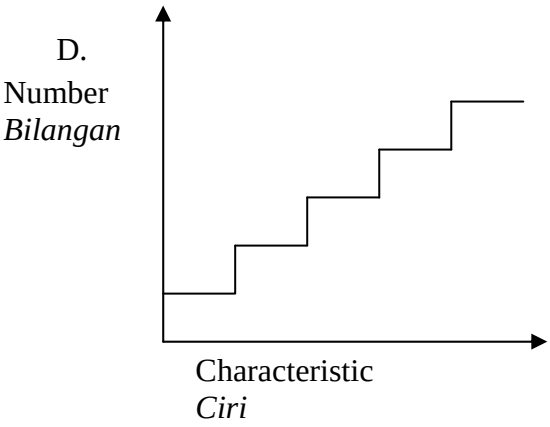
B.



C.



D.



41. The following results are obtained in an experiment to determine vitamin C content in mango juice.
Keputusan berikut telah diperolehi dalam satu eksperimen untuk menentukan kandungan vitamin C dalam air buah mangga.

0.1% volume of vitamin C solution needed to decolourise 0.1% DCPIP solution = $0.3cm^3$ Volume of mango juice needed to decolourise 0.1% DCPIP solution = $0.1cm^3$ *Isipadu vitamin C 0.1% yang diperlukan untuk menyahwarna 0.1% larutan DCPIP = 0.3 cm^3* *Isipadu jus buah mangga yang diperlukan untuk menyahwarna 0.1 % larutan DCPIP = 0.1 cm^3*

How much is the content of vitamin C in mango juice?
Berapakah kandungan vitamin C dalam jus buah mangga?

A. 3.0 $mgml^{-1}$
B. 0.3 $mgml^{-1}$
C. 0.03 $mgml^{-1}$
D. 0.003 $mgml^{-1}$

42. Diagram 29 shows changes of hormone in human menstrual cycle
Rajah 29 menunjukkan perubahan hormon dalam kitar haid manusia.

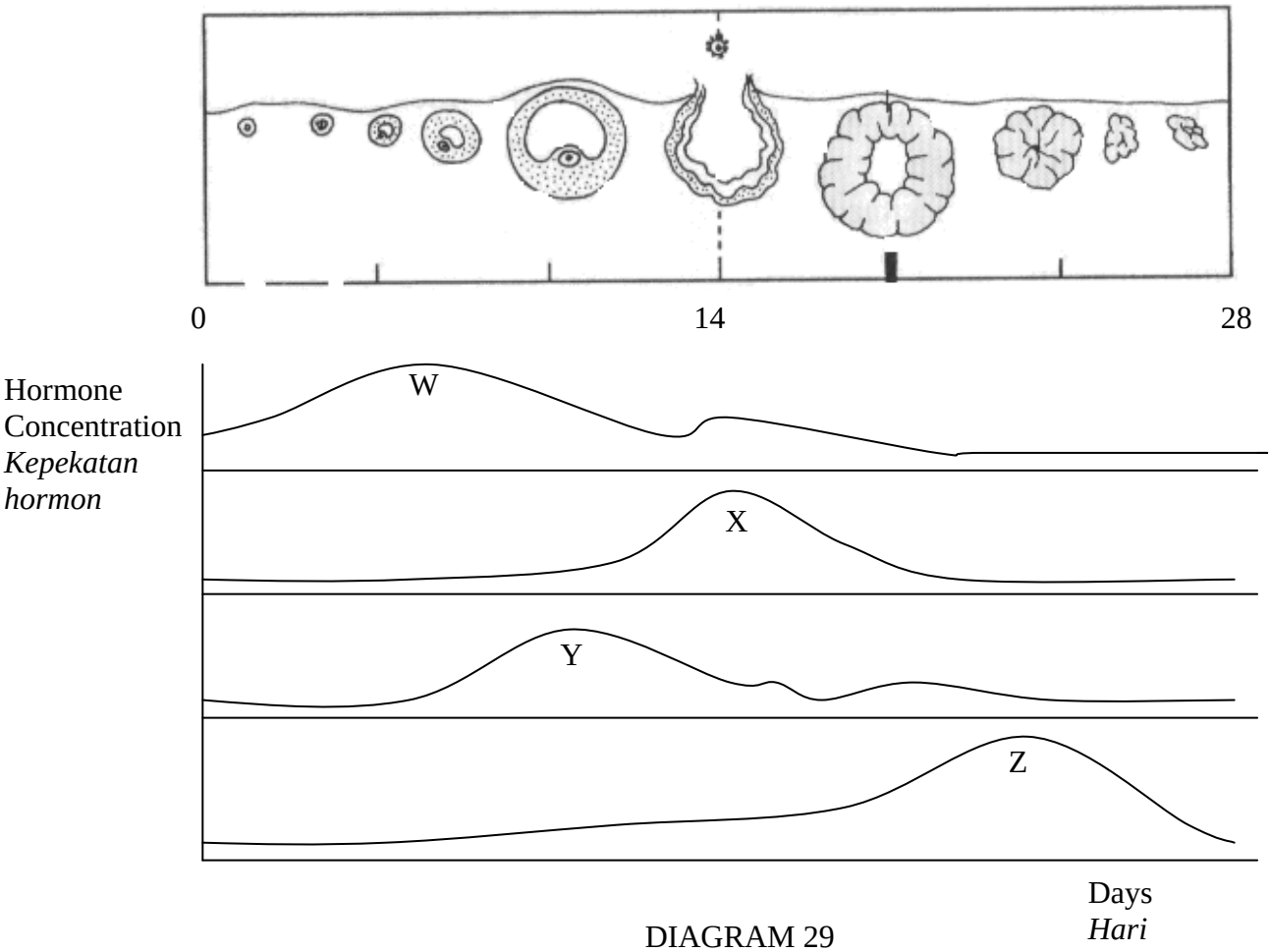


DIAGRAM 29

Which of the following is **true** about W, X, Y and Z hormone?
*Antara berikut, yang manakah **benar** tentang hormon W, X, Y dan Z?*

	W	**X**	**Y**	**Z**
A	Progesterone *Progestron*	Follicle-stimulating hormone *Hormon perangsang folikel*	Oestrogen *Estrogen*	Luteinising hormone (LH) *Hormon Peluteinan (LH)*
B	Follicle-stimulating hormone *Hormon perangsang folikel*	Luteinising hormone (LH) *Hormon Peluteinan (LH)*	Oestrogen *Estrogen*	Progesterone *Progestron*
C	Luteinising hormone (LH) *Hormon Peluteinan (LH)*	Progesterone *Progestron*	Follicle-stimulating hormone *Hormon perangsang folikel*	Oestrogen *Estrogen*
D	Oestrogen *Estrogen*	Luteinising hormone(LH) *Hormon Peluteinan(LH)*	Progesterone *Progestron*	Follicle-stimulating hormone *Hormon perangsang folikel*

43. Diagram 30 shows pattern of animal growth with time
Rajah 30 menunjukkan pola pertumbuhan sejenis haiwan dengan masa.

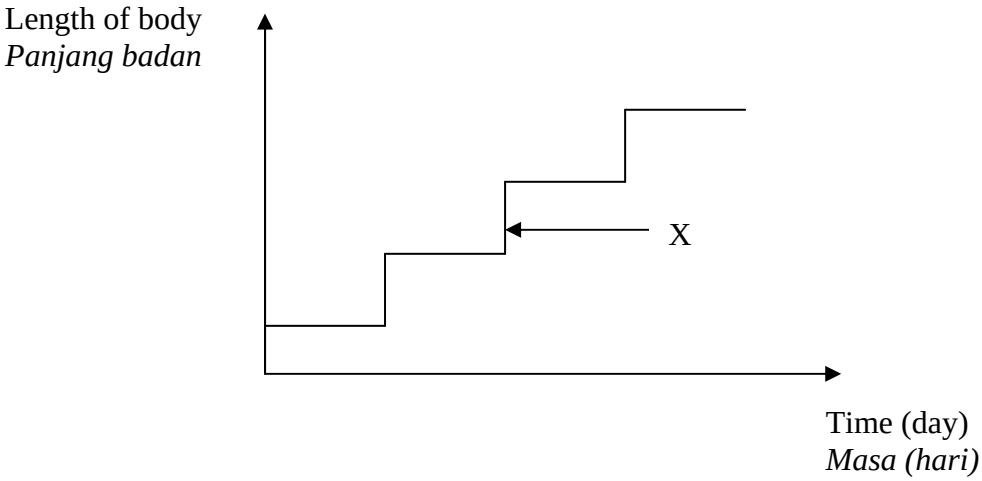


DIAGRAM 30

What happen to the part labeled X?
Apakah yang berlaku pada bahagian bertanda X?

I Taking a lot of food
Pengambilan makanan yang banyak
II Rapid growth
Pertumbuhan yang pesat
III Old outer skeleton peeled off and replaced by new outer skeleton
Rangka luar lama tanggal dan digantikan dengan rangka luar baru
IV Metamorphosis is taking place
Metamoforsis sedang berlaku

A I and II
B II and III
C II, III and IV
D I, II and III

44. Diagram 31 shows schematic hybrid of a hamster.
Rajah 31 menunjukkan skema kacukan tikus belanda

Parents ***Induk***	Black fur/ *Bulu Hitam*	X	Gray fur *Bulu Kelabu*
F1	1 Black fur *1Bulu Hitam*	:	1 Gray fur *1 Bulu Kelabu*

DIAGRAM 31

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

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

45. A hybrid is done between heterozygote *Drosophila melanogaster* for red eye with white eye. Red eye is dominant over white eye. What is the phenotype ratio for eye colour characteristic in F1 generation?
Satu kacukan dilakukan antara Drosophila melanogaster yang heterozigot bagi mata merah dengan 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

46. Diagram 32 shows the inheritance of dimpled trait.
Rajah 32 menunjukkan pewarisan trait berlesung pipit

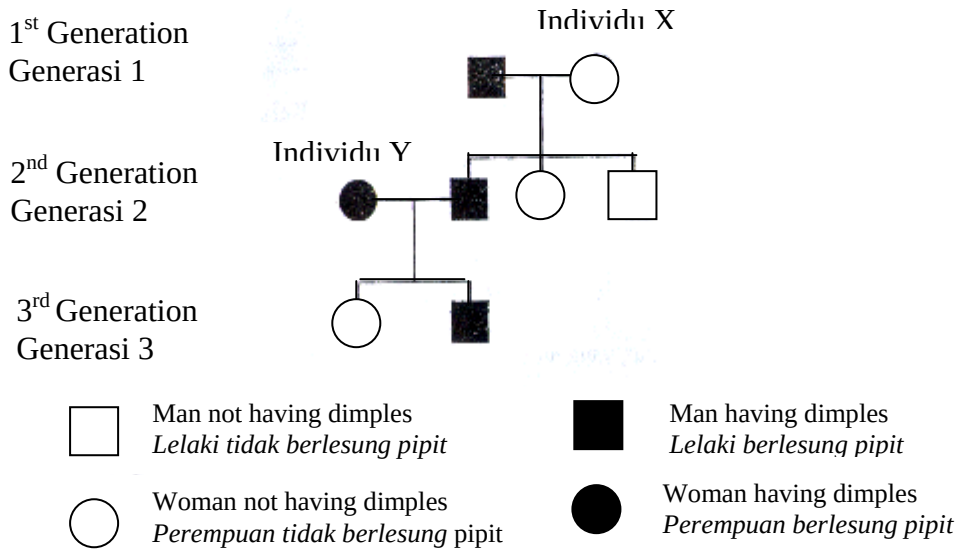
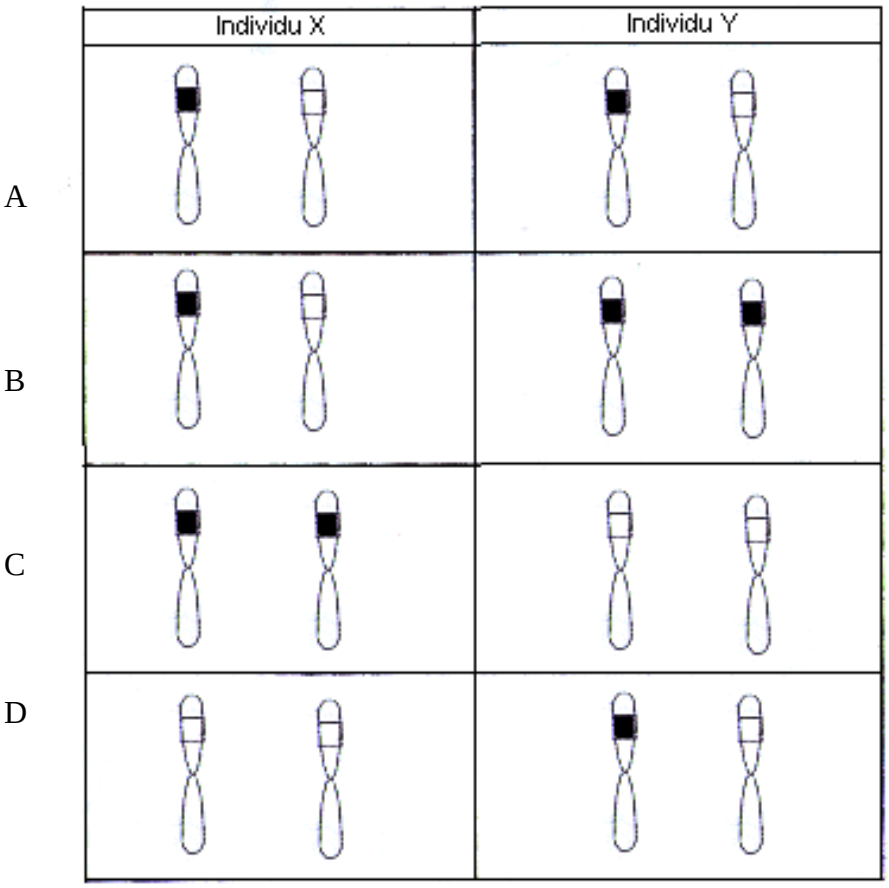


DIAGRAM 32

Having dimples is dominant and is represented by H whereas not having dimples is represented by h. Which below is genotype for person X and Y?
Berlesung pipit adalah dominan dan diwakili H manakala tidak berlesung pipit diwakili h. Antara berikut yang manakah genotip individu X dan Y?



47. Diagram 33 shows the number of frogs caught by capture-mark-release-recapture method.
Rajah 33 menunjukkan bilangan tangkapan katak melalui kaedah tangkap-tanda-lepas-tangkap semula

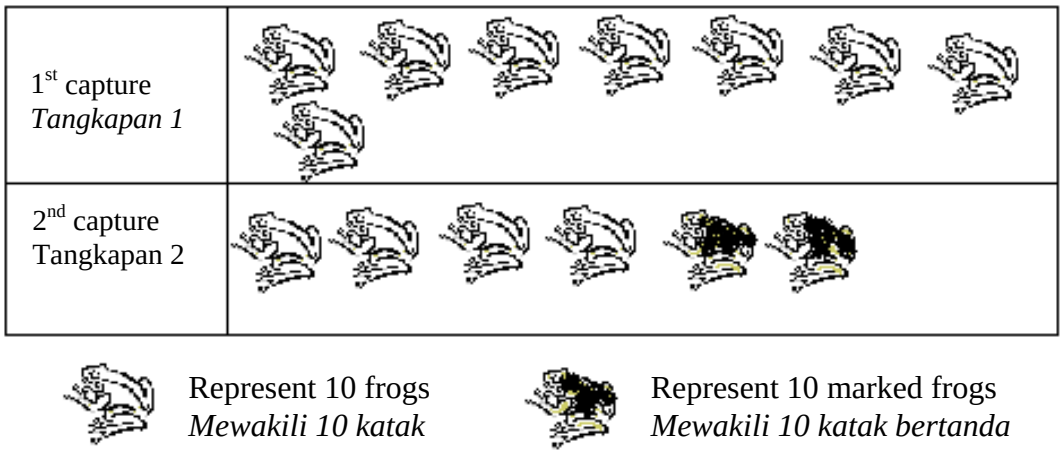


DIAGRAM 33

Estimate the frog population size
Anggarkan saiz populasi katak.

A. 11 frogs
11 katak
B. 60 frogs
60 katak
C. 80 frogs
80 katak
D. 240 frogs
240 katak

48. Diagram 32 shows the graph of air volume changes in Ahmad's lungs during inhalation and exhalation.
Rajah 32 menunjukkan graf perubahan isipadu udara dalam peparu Ahmad semasa menarik dan menghembus nafas.

Air volume in lungs
Isipadu udara dalam peparu

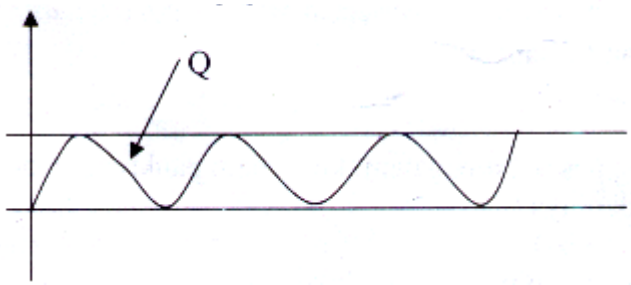


DIAGRAM 34

What happens in Q?
Apakah yang berlaku di Q?

I. External intercostal muscles contract
Otot interkosta luar mengecut
II. Internal intercostal muscles contract
Otot interkosta dalam mengecut
III. The rib cage moves downwards and inwards
Sangkar rusuk digerakkan ke bawah dan ke dalam
IV. The rib cage moves upwards and outwards
Tulang rusuk digerakkan ke atas dan ke luar

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

49. Diagram 35 shows a nitrogen cycle
Rajah 35 menunjukkan kitar nitrogen

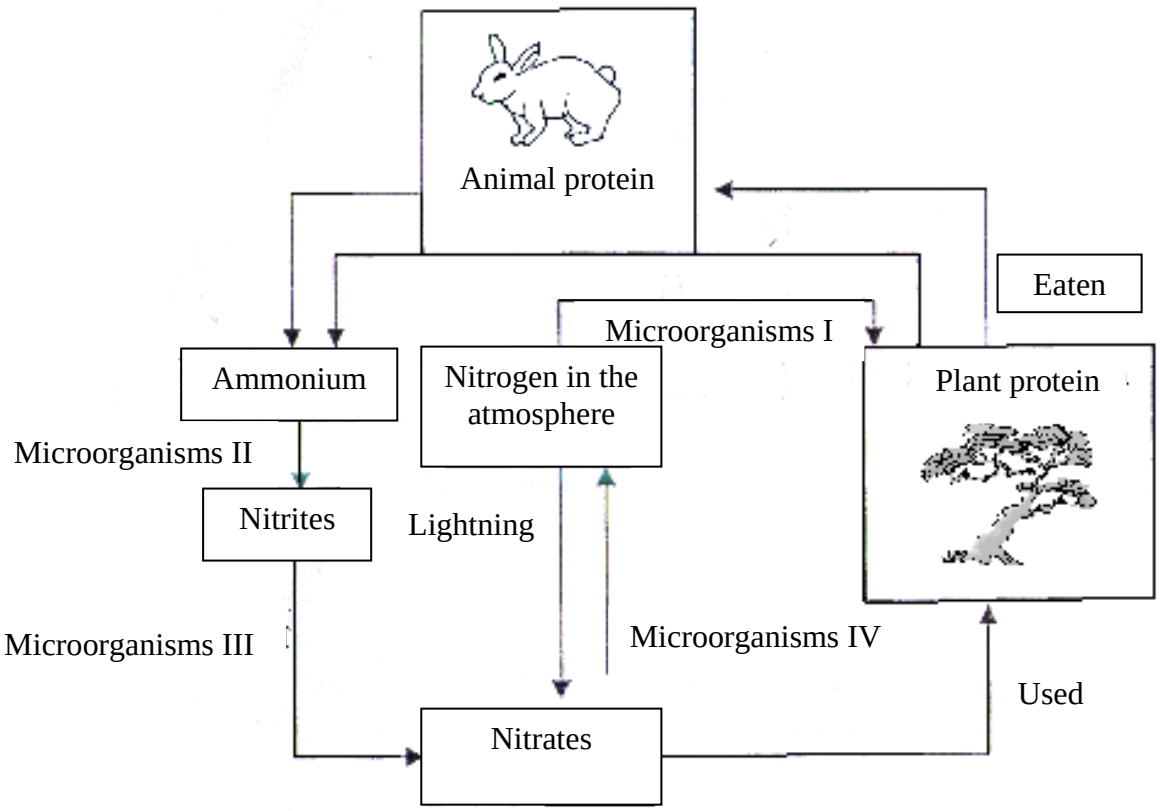
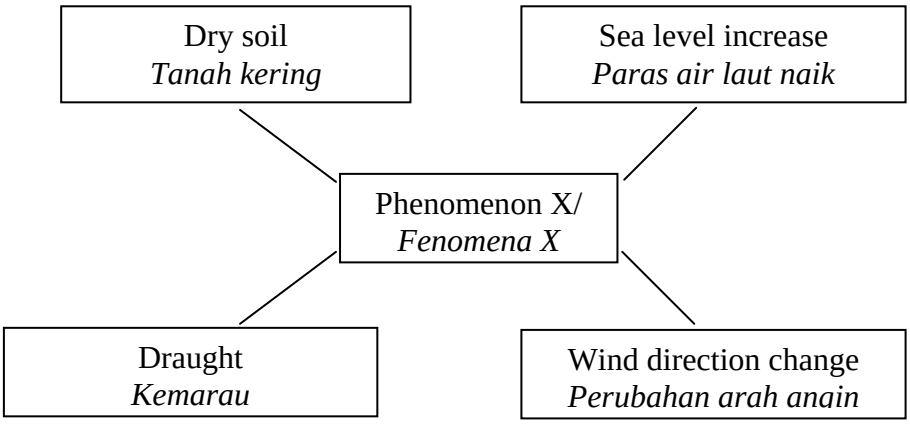


DIAGRAM 35

Which microorganisms carry out the nitrification?
Mikroorganisma manakah yang melakukan penitritan ?

A. II and III
B. III and IV
C. I,II and III
D. II,III and IV

50 Diagram 36 shows the negative effects of phenomenon X.
Rajah 36 menunjukkan kesan negatif fenomena X



RAJAH 36

What might be the X phenomenon?
Apakah mungkin fenomena X ?

A. Green house effect
Kesan rumah hijau
B. Ozone layer depletion
Penipisan lapisan ozon
C. Thermal pollution
Pencemaran terma
D. Deforestation
Penyahhutanan

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SKEMA JAWAPAN KERTAS 1
PEPERIKSAAN PERCUBAAN SPM 2007
JABATAN PENDIDIKAN TERENGGANU

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

SECTION A
[60 marks]
Answer all the questions
Jawab semua soalan dalam bahagian ini

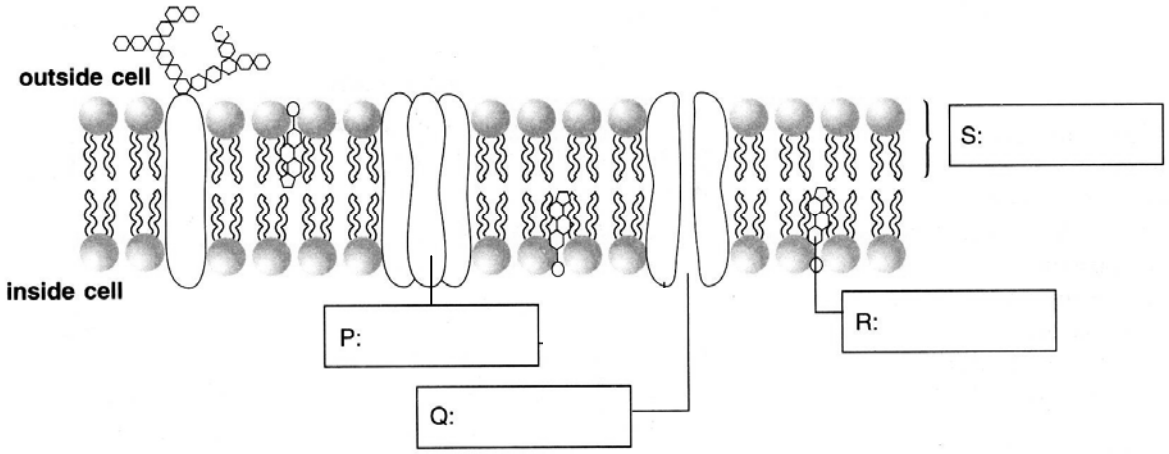


FIGURE 1.1

1. Figure 1.1 shows a fluid mosaic model of plasma membrane.
Rajah 1.1 menunjukkan model cecair mozaik membram plasma.

(a) Label structures P, Q, R and S using the following:
Dengan menggunakan istilah yang diberi labelkan struktur P, Q, R dan S.

- Pore
- Cholesterol
- Carrier protein
- Phospholipid

[2 *marks*]

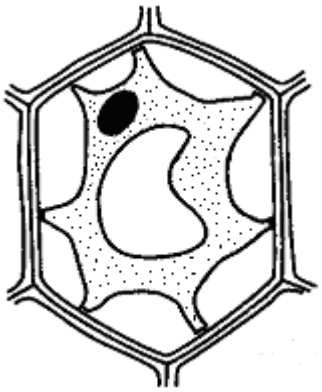


FIGURE 1.2

An experiment has been carried out on plant cell, S which is soaked in solution T. The result is shown in Figure 1.2.
Satu eksperimen telah dijalankan terhadap sel tumbuhan S yang direndam ke dalam larutan T. Hasilnya seperti Rajah 1.2 telah diperolehi.

(b) State the type of solution T.
Nyatakan jenis larutan T

…….
[1 *mark*]

(c)(i) Name the phenomenon that occurs on plant cell S.
Namakan fenomena yang berlaku pada sel tumbuhan S tersebut.

……
[1 *mark*]

(ii) Explain how does the phenomenon in (c) (i) occurs.
Huraikan bagaimana fenomena di (c)(i) di atas berlaku.

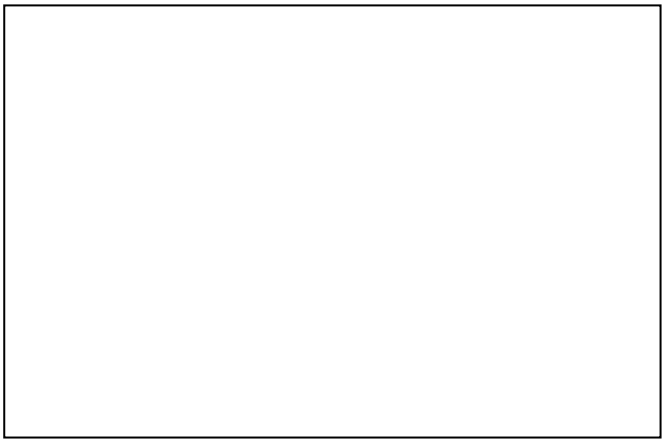
……

……

……

……
[2 *marks*]

(d)(i) Draw the shape of the plant cell after it is soaked in distilled water in the space provided below.
Pada ruangan di bawah lukiskan bentuk sel tumbuhan itu selepas direndam semula dalam air suling.



[1 *mark*]

(ii) State the process that takes place in the cell.
Nyatakan proses yang dialami oleh sel tersebut.

……..
[1 *mark*]

(e) The erythrocytes are put into distilled water. Explain the phenomenon that occurs to the cell.
Sel-sel eritrosit di masukkan ke dalam air suling. Terangkan fenomena yang berlaku pada sel tersebut.

……

……

……

……

[2 *marks*]

(f) A farmer sprayed the excess fertiliser to the vegetables in his farm. Explain the effects to the vegetables.
Seorang petani menyembur baja secara berlebihan pada tanaman sayur-sayurannya. Terangkan kesan kepada sayur-sayuran tersebut.

……

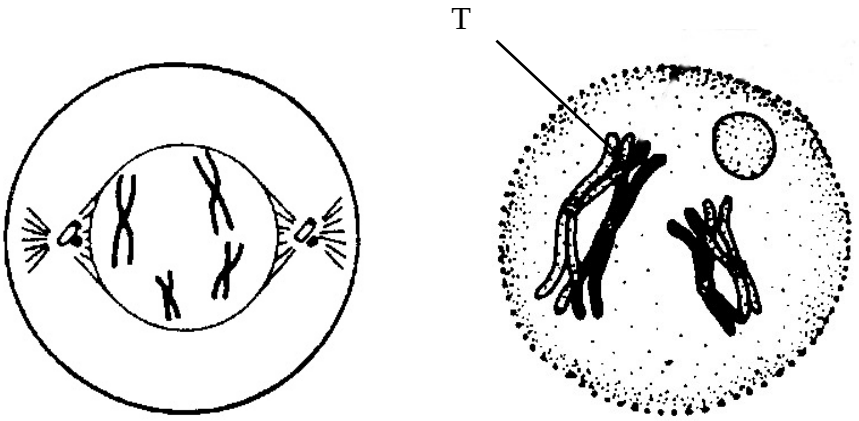
……

……

……

[3 *marks*]

2. Figure 2 shows cell X and cell Y during prophase stage for both type of cell division.
Rajah 2 menunjukkan sel X dan sel Y dalam peringkat profasa bagi kedua-dua jenis pembahagian sel.



Cell X Cell Y

FIGURE 2

(a) (i) Which cell undergoes meiosis?
Sel yang manakah mengalami meiosis?

.....

[1 *mark*]

(ii) State the reasons for your answer in (a)(i).
Nyatakan alasan bagi jawapan anda pada (a)(i).

.....

.....

.....

[2 *marks*]

b) (i) Draw the anaphase stage for cell X.
Lukiskan peringkat anafasa bagi sel X.

[2 *marks*]

(ii) State **one** difference between anaphase in cell X and anaphase I in cell Y.
*Nyatakan **satu** perbezaan antara peringkat anafasa pada sel X dan anafasa I pada sel Y.*

.....

.....

[1 *mark*]

(c) (i) Name a process that occurs at the part labeled T in cell Y.
Namakan satu proses yang berlaku pada bahagian berlabel T dalam sel Y.

.....

[1*mark*]

(ii) Explain how the process in (c)(i) play a role in producing variation in organisms.
Terangkan bagaimana proses di (c)(i) berperanan dalam menghasilkan variasi dalam organisma.

.....

.....

.....

.....
[3 *marks*]

(d) (i) State the number of chromosomes in the daughter cells for each cell X and cell Y.
Nyatakan bilangan kromosom dalam sel anak bagi sel X dan sel Y.

X: .....

Y: .....
[1 *mark*]

(ii) Explain your answer in (d) (i)
Jelaskan jawapan anda dalam (d) (i)

…….....

…….....
[1 *mark*]

3. Figure 3 shows the use and production of energy in human body.
Rajah 3 menunjukkan penggunaan dan penghasilan tenaga di dalam badan manusia.

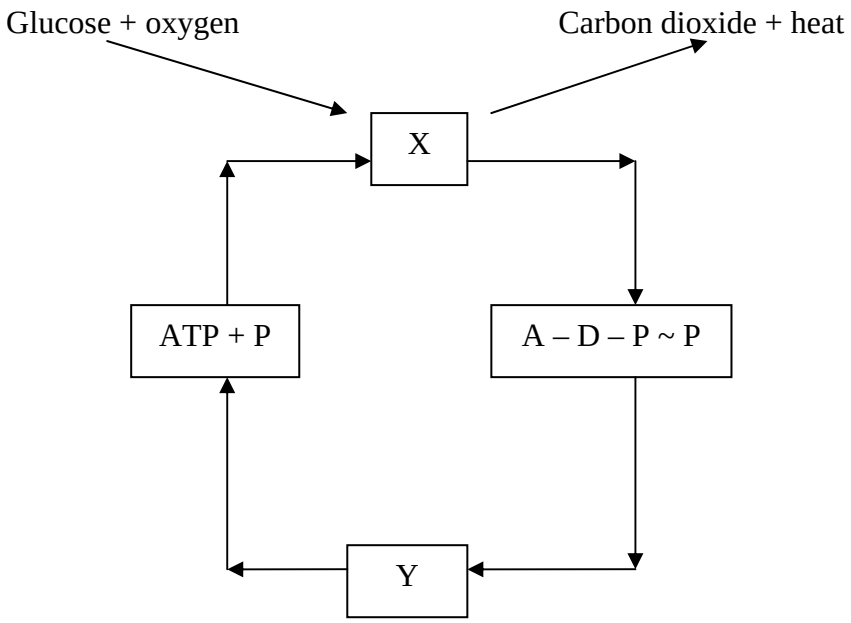


FIGURE 3

(a) (i) Name the processes labeled X and Y.
Namakan proses yang berlabel X dan Y.

X : ……

Y : ……
[2 *marks*]

(ii) Name the organelle in the cell that is able to synthesis ATP.
Namakan organel di dalam sel yang boleh mensintesiskan ATP.

……..
[1 *mark*]

(b) State two differences between aerobic respiration and anaerobic respiration when one molecule of glucose is used.
Nyatakan dua perbezaan di antara respirasi aerob dan respirasi anaerob apabila satu molekul glukosa digunakan.

……...

……..
[2 *marks*]

(c) (i) After a vigorous exercise, the oxygen content in human body decrease while the carbon dioxide content increase.
State the receptor that detect the change of oxygen and carbon dioxide content.

Selepas melakukan senaman cergas, kandungan oksigen menurun di dalam badan manusia manakala kandungan karbon dioksida meningkat
Nyatakan reseptor yang mengesan perubahan kandungan oksigen dan karbon dioksida.

……
[1 *mark*]

(ii) Describe how the change of oxygen and carbon dioxide content are regulated by the body.
Huraikan bagaimana perubahan kandungan oxygen dan karbon dioksida dikawalatur oleh badan.

……

……

……

……
[4 *marks*]

(d) (i) Based on your knowledge in Biology, state another situation where our body will give the same response as in (c)(ii)
Berdasarkan pengetahuan biologi anda, nyatakan satu situasi lain di mana badan kita dapat memberi gerakbalas yang sama seperti (c)(ii)

……
[1 *mark*]

(ii) State the symptoms that caused by the above situation.
Nyatakan simptom-simptom yang disebabkan oleh situasi di atas.

……
[1 *mark*]

4. Figure 4.1 shows the human female reproduction system and Figure 4.2 shows the formation of twin.
Rajah 4.1 menunjukkan sistem pembiakan perempuan dan Rajah 4.2 menunjukkan pembentukan anak kembar.

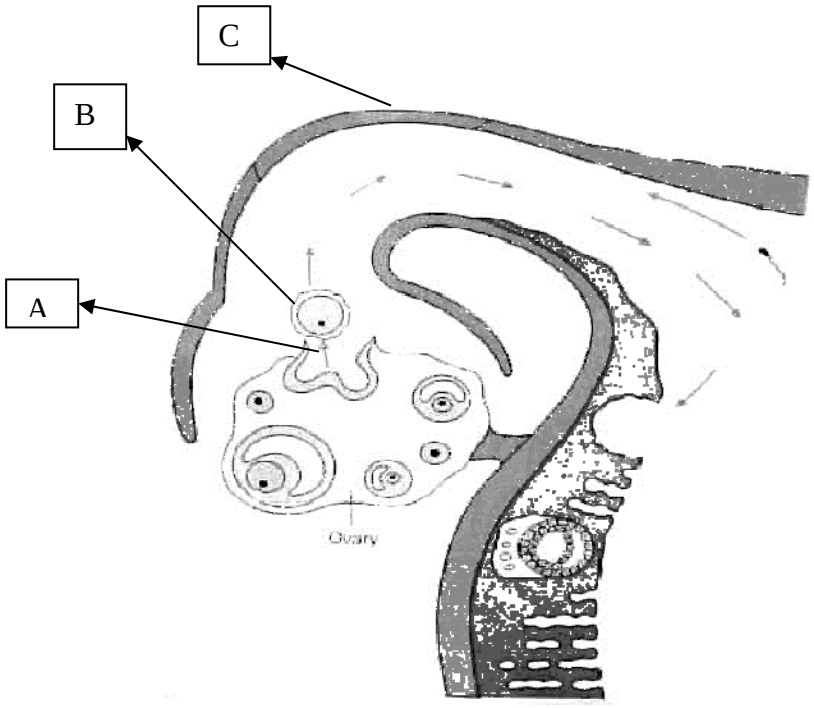


FIGURE 4.1

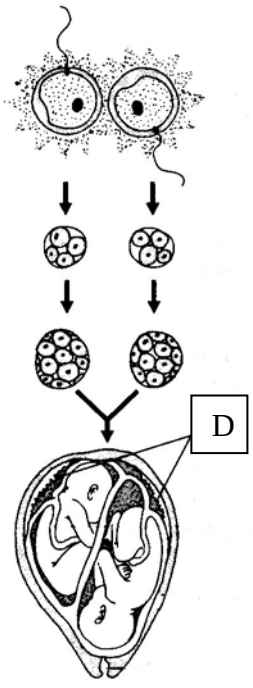


FIGURE 4.2

(a) Name the structures and process
Namakan struktur dan proses

i. Process A: ……

ii. Structure B: .....

iii. Structure C: ……

[2 *marks*]

(b) (i) Nucleus of structure B and sperm fuse together to form a zygote and then divides repeatedly. What division process is involved?
Nukleus struktur B dan sperma berpadu bersama membentuk zigot dan membahagi berulangkali. Apakah proses pembahagian yang terlibat?

……

[1 *mark*]

(ii) Circle the location of fertilisation occur in figure 4.1
Bulatkan kawasan persenyawaan yang berlaku pada rajah 4.1

[1 *mark*]

(iii) Describe two main stages in the development of a zygote in preparation for implantation.
Huraikan dua peringkat utama perkembangan zigot dalam persediaan penempelan.

……

……

……

……

……

[3 *marks*]

(c) Based on Figure 4.2, explain the formation of a twin.
Berdasarkan Rajah 4.2, terangkan pembentukan anak kembar.

……..

……..

……..

……..

……..

[3 *marks*]

(d) Structure D is an important organ for development of foetal. State **two** importances of the organ.
*Struktur D adalah merupakan organ penting dalam perkembangan fetus. Nyatakan **dua** kepentingan organ tersebut.*

……..

……..

……..
[2 *marks*]

5. The structure on the head of a chicken (the comb) can be of different shapes. Figure 5 shows how two different shapes of comb were inherited. Walnut comb is dominant.
Struktur di atas kepala ayam (balung) adalah pelbagai bentuk. Rajah 5 menunjukkan dua bentuk balung yang diwariskan. Balung Walnut adalah dominan

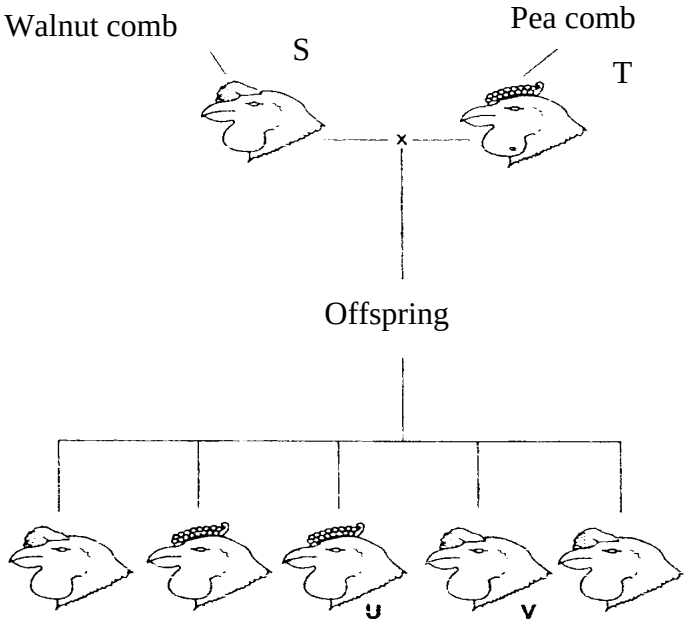


FIGURE 5

Comb shape is controlled by one pair of allele. *Bentuk balung dikawal oleh sepasang alel* Key: W – dominant allele *W – alel dominan* : w - recessive allele *w – alel resesif*

(a) Write the genotypes of the following chicken
Tuliskan genotip bagi ayam berikut

S :…….

T :…….

U :…….

V :…….

[2 *marks*]

(b) Draw the schematic diagram below to show genotype ratio and phenotype ratio if S and V were bred together.
Lukis rajah skematik untuk menunjukkan nisbah genotip dan nisbah Fenotip jika S dan V dikacukkan.

[5 *marks*]

(c) Explain how we can get phenotype ratio in (b).
Terangkan bagaimana kita mendapat fenotip dalam (b).

…….....

…….....

…….....

…….....

…….....

[2 *marks*]

(d) Explain how we can get chicken with pea comb if one of their parent is walnut comb?

…….....

…….....

…….....

…….....

[2 marks]

SECTION B
[20 *marks*]
Answer **any one** *question.*
Jawab **mana-mana satu** *soalan*

6. (a)

Enzymes which are isolated from cells can function outside the cells. Enzymes can be used as catalysts in industries. The use of enzymes in industrial processes is known as **enzyme technology.**
Enzim yang diasingkan daripada sel boleh berfungsi di luar sel. Enzim boleh digunakan sebagai pemangkin di dalam industri.Penggunaan enzim di dalam perindustrian dikenali sebagai ***teknologi enzim****.*

Based on the statement:
Berdasarkan penyataan di atas:

(i) list the general characteristic of enzymes .
senaraikan ciri-ciri umum enzim [4 *marks*]

(ii) Using suitable examples, discuss the uses of enzymes in industrial processes and our daily life. [6 *marks*]
Dengan menggunakan contoh-contoh yang sesuai. bincangkan kegunaan enzim di dalam proses industri dan kehidupan harian.

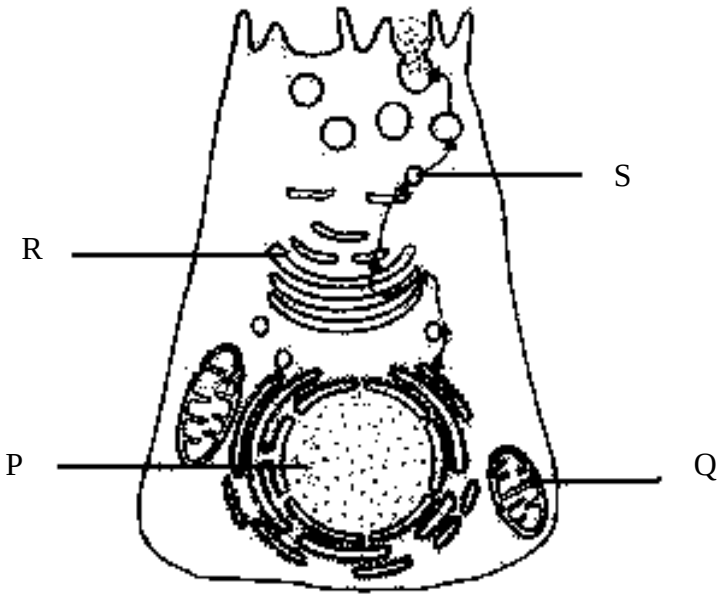


FIGURE 6

(b) Figure 6 shows the organelles involved during the synthesis and secretion of an enzyme in an animal cell.

Based on Figure 6, explain how extracellular enzyme are produced by emphasizing on the role of P, Q, R and S.
Rajah 6 menunjukkan organel-organel yang terlibat semasa penghasilan dan perembesan enzim di dalam sel haiwan.
Berdasarkan Rajah 6, terangkan bagaimana enzim luar sel dihasilkan dengan menekankan peranan P, Q, R dan S.

[10 Marks]

7. (a) Figure 7(a) shows the role of auxins hormone towards the root tip of certain plants.
Rajah 7(a) menunjukkan peranan hormone auksin terhadap gerakbalas hujung akar suatu tumbuhan.

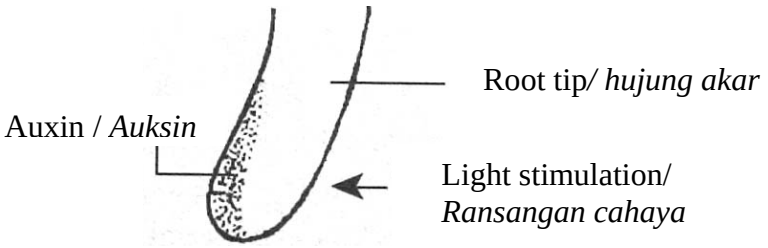


FIGURE 7(a)

Explain the process shown in Figure 7(a)
Terangkan proses yang ditunjukkan dalam Rajah 7(a)

[4 *marks*]

(b)

Plants hormone are very important in growth and development of plants. Therefore they are use widely in the agricultural sector. *Hormon tumbuhan sangat penting dalam pertumbuhan dan perkembangan tumbuh-tumbuhan.* *Oleh itu ia digunakan secara meluas dalam bidang pertanian.*

State **two** functions of auxin, ethylene and cytokinin. Explain the usage of these hormones in the agricultural.
*Nyatakan **dua** fungsi auksin , etilena dan sitokinin. Terangkan kegunaan hormon-hormon ini dalam bidang pertanian.*

[6 *marks*]

(c) (i) Figure 7(b) shows a part of the organ of digestion system.
Rajah 7(b) menunjukkan sebahagian organ dalam system pencernaan manusia.

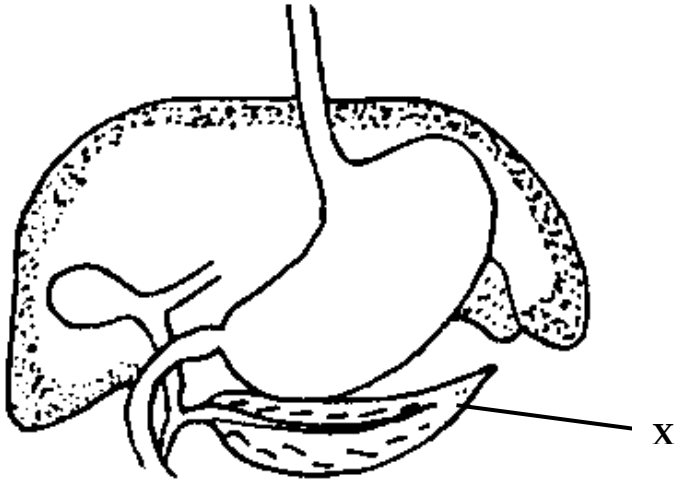


FIGURE 7(b)

Based on Figure 7(b), explain the role of X in the regulation of glucose level in the blood.
Berdasarkan Rajah 7(b), terangkan peranan organ X dalam pengawalan aras glukosa di dalam darah.

[4 *marks*]

(ii) Figure 7(d)(i) and 7(d)(ii) shows the physiology process that occurs in female reproductive system.
Rajah 7(d)(i) dan 7(d)(ii) menunjukkan proses fisiologi yang berlaku di dalam sistem pembiakan perempuan.

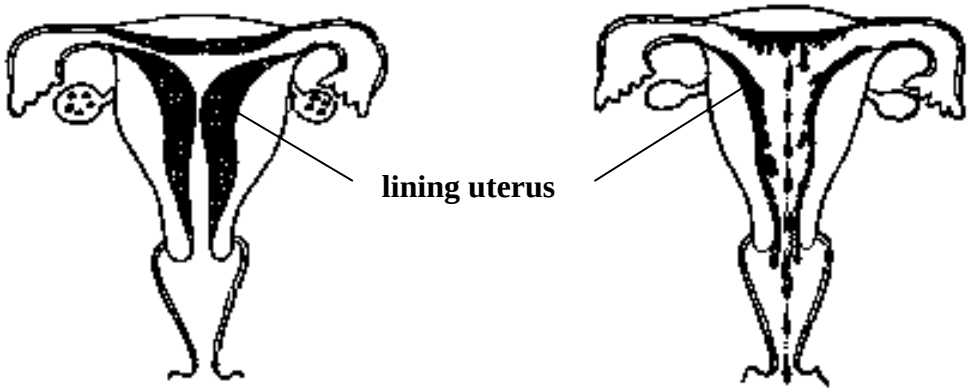


FIGURE 7(d)(i) **FIGURE 7(d)(ii)**

Compare and explain the differences lining uterus shown in figure 7(d)(i) and 7(d)(ii)
Banding dan terangkan perbezaan dinding uterus yang ditunjukkan dalam rajah 7(d)(i) dan 7(d)(ii).

[6 *marks*]

SECTION C
[20 Marks]
Answer **any one** *question.*
Jawab mana-mana satu soalan

8.

Food preservation involves methods of preparing food to extend the lifespan and to avoid wastage of food.
Pengawetan makanan melibatkan kaedah peyediaan untuk memanjangkan tempoh hayat dan mengelakkan pembaziran makanan.

a) Based on the above statement, explain the necessity for food processing.
Berdasarkan pernyataan di atas, terangkan keperluan pemprosesan makanan.
[10 *marks*]

Type of food ***Jenis makanan***	**Food preservation method** ***Kaedah pengawetan makanan***
Milk *Susu*	Pasteurisation *Pempasteuran*
Fruits *Buah-buahan*	Canning *Pengetinan*
Meat and fish *Daging dan ikan*	Refrigeration *Penyejukbekuan*

TABLE 1

b) Table 1 shows several methods of food preservation that being used in food processing. Describe how the method can preserve food for along period of time.
Jadual 1menunjukkan beberapa kaedah pengawetan yang digunakan dalam pemprosesan makanan. Jelaskan bagaimana kaedah itu boleh mengawet makanan untuk satu jangka masa yang panjang.
[10 *marks*]

9. (a) Figure 9.1 and 9.2 shows the histogram about distribution of genetic variation in human.
Rajah 9.1 dan 9.2 menunjukkan histogram mengenai taburan variasi genetik dalam manusia.

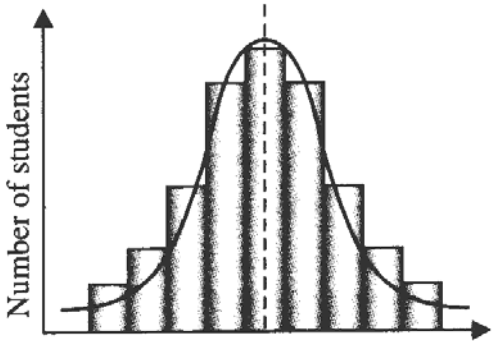


FIGURE 9.1

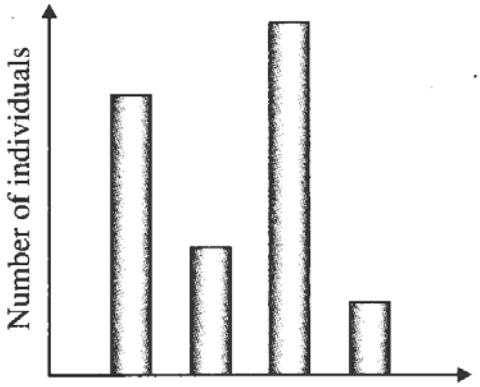


FIGURE 9.2

With a suitable example, explain the comparison of two kinds of variation.
Dengan menggunakan contoh yang sesuai, terangkan perbandingan di antara kedua-dua variasi tersebut.

[10 *marks*]

(b) The variation of ABO blood group determined by three different alleles, but an individual can carry only two of the three alleles.
With schematic diagram, explain the possibilities of the blood group and the genotypes of the offspring if the father's blood group is A and the mother's blood group is B.
Variasi dalam kumpulan darah ABO ditentukan oleh tiga alel yang berbeza, tetapi setiap individu hanya membawa dua daripada tiga alel tersebut.
Dengan gambarajah skema, terangkan kebarangkalian kumpulan darah dan genotip pada anak jika ayahnya mempunyai kumpulan darah A dan ibu kumpulan darah B.

[10 *marks*]

END OF QUESTION

Answer **all** *question.*

Question 1

A group of students carried out an experiment to show **the effect of moving air on the rate of transpiration**. Figure 1 shows the set up of the apparatus. An air bubble was trapped in the capillary tube.
Sekumpulan pelajar menjalankan esperimen untuk menunjukkan kesan pergerakan udara ke atas kadar transpirasi. Rajah 1 menunjukkan set radas yang digunakan dengan satu gelembung udara diperangkap dalam tiub kapilari.

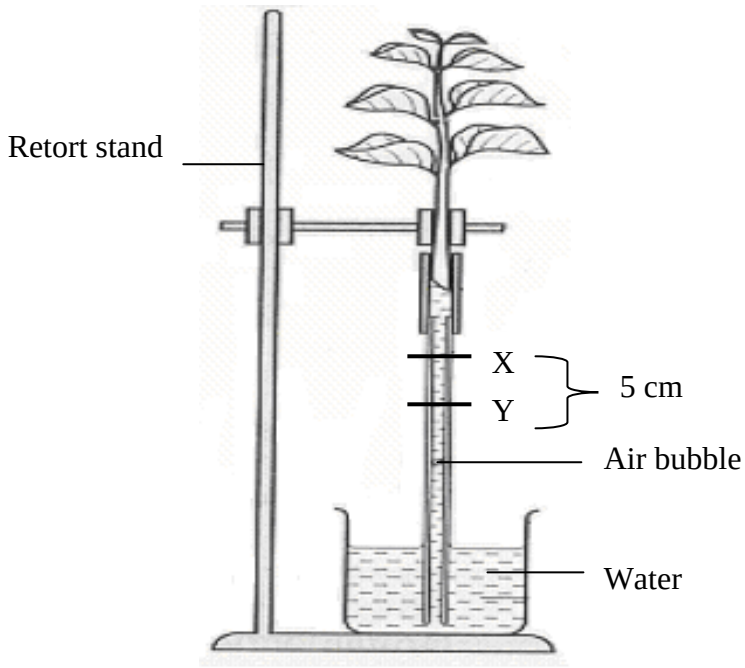


Figure 1

At the beginning of the experiment, the apparatus was placed under a fast moving fan. The time for the air bubble to move from X to Y (5cm) was taken. The experiment was repeated three times. Next, the apparatus was then placed at one corner of the laboratory with no air movement. The time for the air bubble to move from X to Y was recorded. The experiment was repeated three times. The results are shown in Table 1.

Pada awal eksperimen, set radas tersebut diletakkan di bawah kipas yang sedang berpusing. Masa pergerakan gelembung udara daripada X ke Y (5cm) dicatat. Eksperimen ini dijalankan sebanyak tiga kali. Selepas itu, eksperimen ini dilakukan di satu sudut makmal yang tidak melibatkan pergerakan udara. Masa pergerakan gelembung udara dari X ke Y direkodkan. Eksperimen tersebut juga dijalankan sebanyak tiga kali. Keputusan eksperimen ditunjukkan dalam Jadual 1.

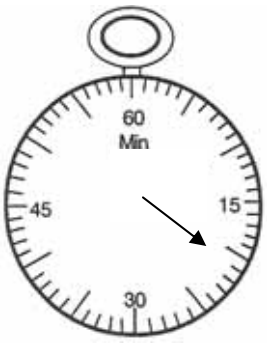
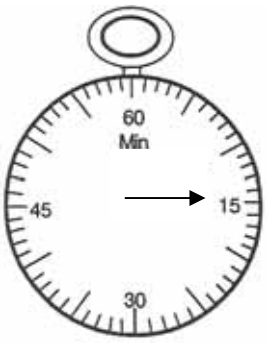
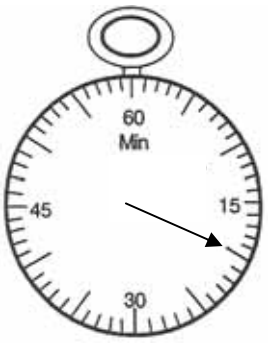
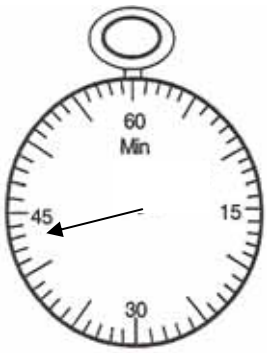
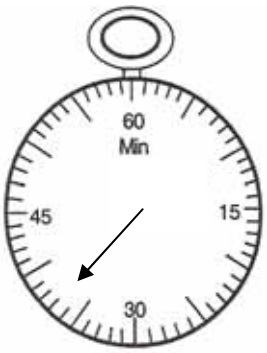
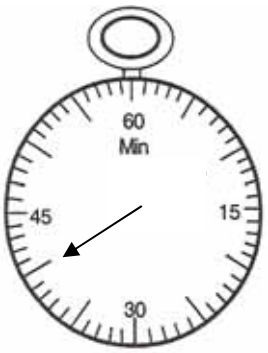
Environment condition *Keadaan persekitaran*	First reading *Bacaan pertama*	Second reading *Bacaan kedua*	Third reading *Bacaan ketiga*
Moving air *Udara yang bergerak*	 Time taken *Masa*	 Time taken *Masa*	 Time taken *Masa*
Still air *Udara yang tidak bergerak*	 Time taken *Masa*	 Time taken *Masa*	 Time taken *Masa*

Table 1

Untuk kegunaan pemeriksa

1(a) (i) State **two** different observations made from Table 1.
*Nyatakan **dua** pemerhatian yang berlainan yang dibuat daripada Jadual 1.*

1. .....

.....

2. .....

.....

[3 *marks*]

1(a) (i)

(ii) State **two** inferences from the observation in (a)(i).
*Nyatakan **dua** inferens daripada pemerhatian di (a) (i).*

1. .....

.....

2. .....

.....

[3 *marks*]

1(a) (ii)

(b) Record the time taken for the air buble to move a distance of 5 cm under each condition in the boxes provided in Table 1.
Catatkan masa yang diambil untuk gelembung udara bergerak sejauh 5 cm bagi setiap keadaan dalam kotak yang disediakan di Jadual 1.

[3 *marks*]

1(b)

(c) (i) Calculate the rate of transpiration in the following condition.
Hitungkan kadar transpirasi dalam keadaan berikut.

Moving air:
Udara yang bergerak :

= _____ mms^{-1}

Still air :
Udara yang tidak bergerak :

= _____ mms^{-1}

[3 *marks*]

1(c) (i)

(ii) Construct a table and record all data collected in the experiment.
Binakan satu jadual dan rekodkan data-data yang didapati dalam eksperimen itu.

[3 *marks*]

1(c)(ii)

(d) (i) Complete Table 2 based on the experiment.
Lengkapkan Jadual 2 berdasarkan eksperimen.

Variable *Pembolehubah*	Particulars to be implemented *Perkara yang dikendalikan*
1. Manipulated *Dimanipulsi*	How the alter the manipulated variable *Bagaimana mengubah pembolehubah dimanipulasi* ....
2. Responding *Bergerakbalas*	How to determine the responding variable *Bagaimana menentukan pembolehubah bergerakbalas* ....
3. Controlled *Dimalarkan*	How to maintain the controlled variable *Bagaimana menetapkan pemboleh ubah dimalarkan* ....

Table 2

[3 *marks*]

1(d) (i)

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

.....

.....

.....

[3 *marks*]

1(d) (ii)

(e) Based on the result of the experiment, what can you deduce about the transpiration rate?
Berdasarkan keputusan eksperimen, apakah yang dapat anda rumuskan tentang kadar transpirasi?

.....

.....

.....

[3 *marks*]

1(e)

(f) If the experiment carried out every hour during the day, state the relationship between the rate of transpiration and time in that day.
Jika eksperimen dijalankan setiap jam sepanjang hari, nyatakan hubungan antara kadar transpirasi dengan masa dalam satu hari tersebut.

.....

.....

.....

[3 *marks*]

1(f)

(g) The experiment in the room with air movement is repeated. This time, two fans instead of one are used to blow at the leaves of the shoot.
Predict the observation and the rate of transpiration that will be obtained.

Eksperimen yang dijalankan dibawah kipas yang sedang berpusing diulang dengan menggunakan dua buah kipas berbanding sebuah untuk menghasilkan pergerakan udara di bahagian pucuk tumbuhan.
Ramalkan pemerhatian dan kadar transpirasi yang mungkin diperolehi.

.....

.....

.....

[3 *marks*]

1(g)

(h) The following list is part of the apparatus and material used in this experiment.

Bulb, stopwatch, volume of water, beaker, power of bulb, air bubble in the capillary tube

Complete Table 3 below, by matching each variable with the apparatus and material used in this experiment.

Variables	Apparatus	Material
Manipulated	.....	.....
Responding	.....	.....
Controlled	.....	.....

Table 3

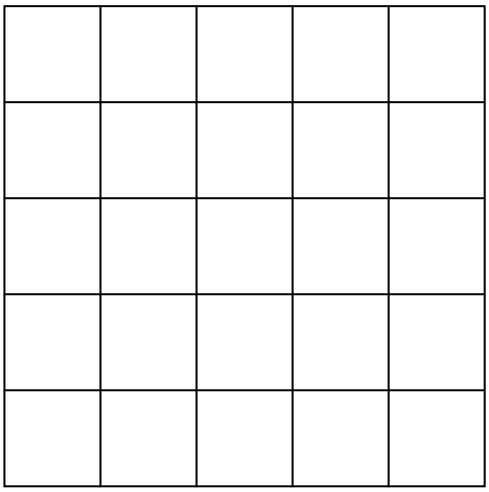
[3 *marks*]

1(h)

QUESTION 2

A group of students carried out a field work study to determine the population size of plants species by using the quadrat sampling technique. Figure below shows how the technique was used using a quadrat of 1m x 1m.

Sekumpulan pelajar telah menjalankan suatu projek kajian luar untuk menentukan saiz populasi spesies tumbuhan menggunakan teknik persampelan kuadrat. Rajah di bawah menunjukkan bagaimana teknik tersebut digunakan dengan kuadrat beukuran 1m x 1m .



Based on the above diagram, design an experiment to study how the percentage coverage of certain plant species can be determined. Your experimental planning should include the following aspects:
Berdasarkan rajah di atas, reka bentuk suatu eksperiment untuk mengkaji bagaimana peratus taburan sesuatu spesies tumbuhan dapat ditentukan. Perancangan eksperiment anda hendaklah mengandungi aspek-aspek berikut:

- Statement of the identified problem
  Pernyataan Masalah dinyatakan
- Objective of the study.
  Objektif kajian atau tujuan
- Variables.
  Pembolehubah.
- Statement of the Hypothesis.
  Pernyataan Hypothesis
- List of materials and apparatus.
  Senarai Radas dan bahan
- Technique used.
  Teknik digunakan
- Experimental procedure.
  Prosedur eksperiment.
- Presentation of data.
  Data dikomunikasikan
- Conclusion
  Kesimpulan..

[17 marks]

END OF THE QUESTION PAPER

For Examiner's Use

RUANG UNTUK JAWAPAN/ SPACE FOR ANSWERS

No. Soalan/ Question No: …….

No. Soalan / Question No : ……

Untuk Kegunaan Pemeriksa

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For Examiner's Use

No. Soalan / Question No : …………………………….

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No soalan / Question No : ……

Untuk Kegunaan Pemeriksa

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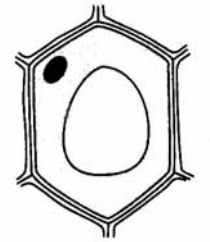
For Examiner's Use

No Soalan / Question No:

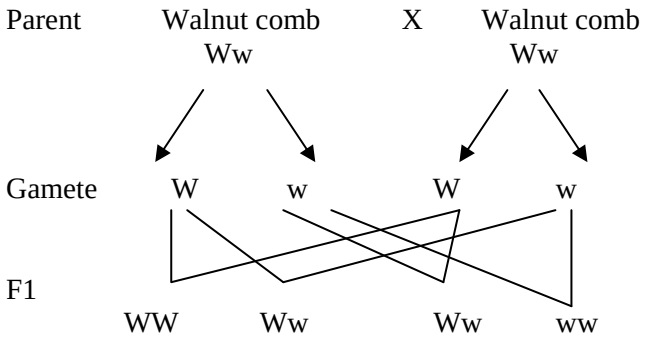
ITEM NUMBER	SCORING CRITERIA	MARK		REMARK
1	Able to label the structure a) P: carrier protein Q: pore R: cholestrol S: phospolipid	2	4 correct = 2 2-3 correct=1	
	b) hypertonic	1		
	c)(i) plasmolysis	1		
	(ii) P1: the concentration of water molecule is higher inside the cell compare to the outside cell	1		
	P2: water molecules in the cell diffuse out by osmosis	1		
	P3: the cytoplasm contract and the plasma membrane moves away from the cell wall	1	Any 2	
	d)(i) 	1		
	(ii) deplasmolysis	1		
	e) F : erythrocytes undergo haemolysis P1: water molecules diffuse into the erythrocytes P2: cell will expend and burst because it does not have cell wall	2		
	f) F: vegetables will die P1: soil solution become hypertonic then cell sap of vegetables P1: excess fertiliser cause water to diffuse out from the hair root cell by osmosis P2: plant cells undergo plasmolysis // become flaccid and plant will die	3		
	TOTAL	**13**		

2 a(i)	*Able to state which cell undergoes meiosis* Answer : Cell Y	 1		
2 a(ii)	*Able to give the reasons to the answer in a(i)* Suggested answer P1 : There is synapsis between the homologous chromosomes P2 : Each pair of homologous chromosomes (bivalent) consists of four chromatics (tetrad)	 1 1		
2 b(i)	*Able to draw the anaphase stage for cell X* Answer : 	 1 1	Correct diagram Behaviour of chromosome	
2 b(ii)	*Able to state **one** difference between anaphase in cell X and anaphase I in cell Y.* Anaphase in cell X: separation of the sister chromatids Anaphase I in cell Y: separation of the homologous chromosomes (bivalent)	 1		
2 c(i)	*Able to name a process that occurs at the part labeled T in cell Y.* Answer : Crossing over	 1		

2 c(ii)	*Able to explain the role of crossing over process in producing variation in organisms* Suggested answer: P1 : Crossing over involves the exchange of DNA segments between non-sister chromatics P2 : The points at which segments of chromatics cross over is called chiasmata P3 : Crossing over results in a new combination of genes on a chromosome	1 1 1	3	
2 d(i)	*Able to state the number of chromosomes in the daughter cells for each cell X and cell Y.* Answer : Cell X – 4 chromosomes Cell Y – 2 chromosomes Both must correct	1		
2 d(ii)	*Able to explain the answer in d(i)* Answer : There is separation of chromosomes from the homologous pair during telophase I **TOTAL**	1	**12**	
3	(a)(i) Able to name the process X and Y Sample answer : X : Cellular respiration Y : Cell activity // muscles contraction (ii) Able to name the organel in the cell Sample answer : Mitochondria (b) Able to state differences between aerobic respiration and anaerobic respiration Sample answer :	1 1 1		
	<table><tr><th>Aerobic respiration</th><th>Anaerobic respiration</th></tr><tr><td>- oxygen is present - carbon dioxide, water and energy are produced</td><td>- oxygen is absence - lactic acid and energy (in muscle</td></tr></table>	1 1		

	cells) or ethanol, carbon dioxide, and energy (in yeast)			
- 38 molecules of ATP are generate	- 2 molecules of ATP are generate	1		
- large amount of energy is released (2898 kJ)	- small amount of energy is released (210 kJ during fermentation) and (150kJ in muscle cells)	1		
- in mitochondria	- in cytoplasm	1		
(c) (i) Able to state an example of receptor Sample answer : Central chemoreceptors // Peripheral Chemoreceptor // Aortic bodies and Carotid bodies		1		
(ii) Able to describe how the change of oxygen content and carbon dioxide content is regulated by the body. Sample answer : - The higher level of carbon dioxide in the blood cause the drop of pH value - The drop in pH is detected by Central Chemoreceptor in Medulla Oblongata - Then the Central Chemoreceptor send the nerve impulses to the diaphragm and intercostal muscle, causing (respiratory muscles) to contract and relax - Finally, increases the breathing and ventilation rate - Concentration of carbon dioxide and pH value of the blood return to normal levels		1 1 1 1 1		
(d) (i) Able to state another situation Sample answer : - Climbing a mountain		1		
(ii) Able to state the symptom Sample answer : - headaches, nauses and dizziness		1	**12**	

	TOTAL			
4 (a)	Able to name the structures and process i. A: ovulation ii.B: secondary oocyte/ovum iii.C: fallopian tube	2	3 correct = 2 2 correct = 1	
(b)(i)	Able to state division process Mitosis	1		
(b)(ii)	Able to circle/mark on along the fallopian tube	1		
(b)(iii)	Able to describe two main stages in the development of zygote -zygote undergoes series of mitosis -to produce solid ball / morula -the growing mass of hundred of cells forms a hollow ball/blastocyst.	1 1 1	3	
(c)	Able to explain the twin formation -2 ovum/eggs are fertilized by two different sperms -these zygote will implant in endometrium -each foetal have developed in their own placenta	1 1 1	3	
(d)	Able to explain two importance of structure D -Forms a selective barrier between the mother's blood and the foetal blood -allows some substance/ oxygen/nutrient/ glucose/amino acid/lipid/vitamin/antibodies / to pass from mother to the foetus -allows substances/carbon dioxide/nitrogenous waste materials/urea to pass from the foetus to the mother -secretes progesterone and oestrogen to maintain the thickness of uterine wall -to prevent the action of maternal hormones and other chemical in the mother's blood that harms the development of the foetus - to protect the foetus from the high blood pressure of the maternal circulation that can cause the feotal capillaries burst	1 1 1 1 1 1	Any 2	
	TOTAL		**12**	

5(a)	Able to write the genotypes of the following chicken S: Ww T: ww U: ww V:Ww 3- 4 correct 1-2 correct	2 1		
(b)	Able draw the schematic diagram below to show genotype ratio and phenotype ratio if S and V were cross together.  Walnut comb Walnut comb Walnut comb Pea comb genotype ratio 1WW: 2Ww: 1ww phenotype ratio 3 Walnut comb : 1 Pea comb	1 1 1 1 1 1		
(c)	Able to explain how to get phenotype ratio F: allele W is dominant to allele w E1: if organism is homozygote dominant/WW or heterozygote/Ww it shows the phenotype Walnut comb E2: if organism is homozygote/ww it also shows the phenotype Pea comb	1 1 1		
(d)	Able explain how we can get chicken with pea comb if one of their parent is walnut comb F: Both of their parent are walnut comb with genotype Ww E1: both their gamete have recessive allele w E2: when gamete w are fertilized with another gamete w, we can get chicken with pea comb **TOTAL**	1 1 1 **11**		

SECTION B

ITEM NO.	SCORING CRITERIA	MARK	REMARK
6 (a)(i)	**Able to list the general characteristics of enzymes** *Sample answer* P1 – Enzymes are proteins which are synthesised by living organisms. P2 – Enzymes bind to their substrates and convert them to product in the enzymatic reaction P3 – Enzymes have specific sites called active sites to bind to specific substrates // enzymes are highly specific in their reaction // each enzyme can only catalyse one kind of substrate / specific substrate P4 – Enzymes speed up the rates of chemical reactions but remain unchanged (at the end of the reaction) // They are not destroyed by the reactions they catalyse. P5 – Enzymes are needed in small quantities because they are not used up (but released at the end of a reaction) P6 – Most enzyme-catalysed reactions are reversible // enzymes can catalyse the reaction in either direction. P7 – The activity of an enzyme can be slowed down or completely stopped by inhibitors // In order to function well , many enzymes require helper molecules,called cofactors.	1 1 1 1 1 1 1	Max: 4 m
6(a)(ii)	**Able to discuss the uses of enzymes in industrial processes and our daily life, using suitable examples** *Sample answer*		

Type of industry/ Application (T)	Enzymes used (E)	Uses (U)	
1. Food processing industry (a)Dairy products	Rennin	•Solidifies milk proteins	
	Lipase	•Ripening of cheese	
	Lactase	•Hydrolyses lactose to glucose in the making of ice-cream	1 1
(b)Bread and other bakery products (baking industry)	Amylase	•amylase convert starch flour into sugar in the making of the bread	1
	Protease	•protease convert protein in the making of biscuit	1
(c)Alchoholic drinks	Amylase	•amylase convert starch in	

	(beer / wine making industry)	Zymase	malt into glucose for the fermentation of yeast (in wine and beer production.) •Converts sugars into ethanol during fermentation of yeast (in wine and beer production.)	1 1	
	(d)Fish products	Protease	•Protease removes the skin of fish	1	
	(e)Meat products	Protease	•Tenderises meat	1	
	(f)Cereal grain products	Cellulase	•Breaks down cellulose and removes seed coats from cereal grain	1	Max: 7m
	(g)Seaweed products	Cellulose	•Digest cell wall and extracts agar from seaweed	1	
	(h)Starch products	Amylase Glucose isomerase	•Change starch to sugar in the making of syrup •Convert glucose into fructose // Production of high fructose syrup	1 1	
	2. Leather products	Trypsin / Protease	•Removal of hair from animal hides	1	
	3. Medical / phartimaceutical product	(Pancreatic) tripsin (Microbial) trypsin	• Treats inflammation • Dissolves blood clots	1 1	
	4 .Biological washing powder or detergent	Protease and amylase	•Dissolve protein and starch stains in clothes	1	
	Grant marks : All the three corresponding (T + E + U) should be correct			1	***10 marks***
6(b)	**Able to explain how extracellular enzyme is produced by emphasising on the role of P, Q, R and S** *Sample answer* P1– **P :** nucleus, store genetic imformation / gene (for the synthesis of enzymes) in chromosome / DNA / is carried by the DNA P2– The messenger RNA/ mRNA is synthesised according to the instruction on the DNA // The genetic information to synthesis the enzyme in DNA is transfered to RNA in code form // mentioning of the transcription process briefly. P3– **Q :** mitochondrion, produce energy by cellular respiration (used in the production of extracellular enzyme			1 1	

	P4 –The messenger RNA / mRNA / RNA then leaves the nucleus and moves to the ribosome (which is the site of protein synthesis) P5– The messenger RNA / mRNA /RNA attaches itself to the ribosome P6– Protein that are synthesised at the ribosome are transported through the spaces within the rough endoplasmic reticulum P7– Proteins depart from the rough endoplasmic reticulum wrapped in vesicle that bud off from the sides of the rough endoplasmic reticulum / from the membranes of the rough endoplasmic reticulum P8 – These transport vesicles fuse with the membrane of the **R,** Golgi apparatus / body and empty their contents into the membranous space P9– These proteins are modified during their transport in the Golgi apparatus**, R** . P10– For example, sugar to make glycoproteins/ carbohydrate are added to protein P11– **S**, secretory vesicle containing these modified proteins bud off from the Golgi membrane and travel to plasma membrane P12– These vesicle will then fuse with the plasma membrane before releasing the proteins outside the cell as extacellular enzymes. **Grant marks:** If student mention the names of P,Q, R and S before or after explaining the process.	1 1 1 1 1 1 1 1 1 1	Max: 10m **Total:** ***20 marks***
7 (a)	Able to explain the auxin effect towards the bend of root tip - Auxins are produce in the apical meristem of the root tip (in the cell division zone) - The high concentration of auxin in the shoot tip stimulate cell elongation but the high concentration of auxin in the root tip inhibits cell elongation. - The stimulation of light to cause auxins diffuse away from light - (Therefore) the concentration of auxins higher in the shaded region/ light protect region // the rate of cell elongation is higher (to cause root tip bend)	1 1 1 1	4 marks

NO ITEM	SCORING CRITERIA	MARK	REMARK
7(b)	Able to state the hormone functions and using in agricultural sector		

Type of hormone	Function	Uses in agriculture	
Auxins	(a) Stimulate growth and cell elongation. Auxins promote elongation of cells in shoots and roots.	To promote growth in plants.	1
	(b) Stimulate the growth of adventitious roots.	To promote the growth of adventitious roots, so that the cuttings may grow faster.	1
	(c) Stimulate ovaries in flowers to form fruits without being fertilised. The process is called parthenocarpy.	The stigma and ovaries of certain flowers are sprayed with auxins to form fruits without being fertilised.	1
	(d) Inhibit the growth of weeds in high concentration.	Used as a herbicide (weed killer)	1
	(e) Prevent the developing fruits and leaves from falling off prematurely.	Sprayed on fruits a few days before harvest to ensure the fruits do not fall off the plant before they are ripe.	1
Ethylene	(a) It stimulates the ripening of fruits.	Sprayed in air-tight storage rooms with fruits such as bananas, water melon and tomatoes to stimulate the ripening of fruits.	1
	(b) Stimulate the falling off (abscission) of leaves and fruits.	Sprayed on fruits before harvest to promote abscission.	1

		Cytokinins	(a) Stimulate cell division and cell elongation	Used in tissue culture to promote cell division and growth.	1
			(b) Delay the aging and death (senescence) of leaves.	Sprayed on vegetables to ensure that the leaves are green and fresh during packaging.	1 6 marks
7(c)(i)	Able to explain the role of X organ to regulate the glucose content/ concentration in the blood **Sample answer** - X is the pancrease gland - It secrete insulin and glucagon hormones - If the concentration of glucose higher (excess 80 mg/100 cm3). X glands secrete insulin to convert excess glucose to glycogen then store in liver. - If glucose concentration is lower (less than 80 mg/100 cm3), X glands secrete glucagons hormone to convert glycogen in liver to glucose				1 1 1 1 4marks
(ii)	Able to explain the similarities and differences the uterus lining thickness during menstrual cycle **Similarities : (2 marks)** - Both occur during menstrual cycle - The changes of thickness influence by the oestrogen and progestrone hormone **Differences :**				1 1 2 marks
		Figure 3a	**Figure 3b**		
		Uterus lining more thick	The thickness lining of uterus decrease / breakdown		1
		The thickness lining of uterus increase caused by the development ovarian follicle (From primary follicle to graafian follicle)	The thickness lining of uterus decrease because the corpus luteum degenerate		1
		The thickness lining of uterus maintain when secondary oocyte fertilized by sperm	The thickness lining of uterus breakdown when secondary oocyte not fertilized by sperm		1
		The thickness lining of uterus stimulated by oestrogen hormone before ovulation and progesterone after ovulation	The thickness lining of uterus breakdown because progesterone decreasing after ovulation / the end of menstrual cycle		1 4 marks

SECTIONC

ITEM NO	SCORING CRITERIA	MARKS	REMARK
8 (a)	Able to explain the necessity of food processing *Sample answer* F1 – prevent food spoilage E1 – (food spoilage) causes by the action of microorganism E2 – decomposing bacteria/fungi on carbohydrate/protein E3 – produced carbon dioxide, water, ammonia hydrogen E4 – make food become toxic F2 – Oxidation of food when cut/expose to air E1 – oxygen react with enzymes/chemicals released by cell F3 – Increase it commercial value E1 – food additives is added in preserving the freshness of food E2 – Improve the taste/appearance/texture F4 – Intention of diversifying the uses of food E1 – increased the variety of products	 1 1 1 1 1 1 1 1 1 1 1 1 1	 12 **10**
(b)	Able to describe how each method can preserve food for along period of time *Sample answer* Pasteurisation: - milk is treated to 63°C for 30 minutes//72°C for 15 seconds - followed by rapid cooling to below 10°C - destroy bacterias but not the spores - retains the natural flavour of milk//nutrients//vitamin B - must refrigerated to avoid the growth of sperms Canning: - use heat sterilisation - kill microorganisms and spores - steamed at high temperature and pressure to drive out air - sealed while the food is being cooled - vacuum in the can prevent growth of microorganism Refrigeration: - stored at temperature below 0°C - prevent the growth of microorganisms/the germination of spores **TOTAL**	 1 1 1 1 1 1 1 1 1 1 1 1	 **Max4** **Max4** **2** **10**

<table>
<tr><th>ITEM NO</th><th>SCORING CRITERIA</th><th>MARKS</th><th>REMARK</th></tr>
<tr><td>9(a)</td><td>
Able to
(i) State the example of continuous variation and discontinuous variation
(ii) Explain the similarity and the contrast of continuous variation and discontinuous variation

Sample answer:

Example of continuous variation: Height or weight
Example of discontinuous variation: ABO blood group

Similarity:
- both create varieties in the population of species
- both type of variations are caused by environment factor or genetic factors or both

Differences
<table>
<tr><th>Continuous variation</th><th>Discontinuous variation</th></tr>
<tr><td>Graf distribution shows a normal distribution</td><td>Graf distribution shows a discrete distribution</td></tr>
<tr><td>The characters are quantitative / can be measured and graded (from one extreme to the other)</td><td>The characters are qualitative / cannot be measured and graded (from one extreme to the other)</td></tr>
<tr><td>Exhibits a spectrum of phenotypes with intermediate character</td><td>Exhibits a few distinctive phenotypes with no intermediate character</td></tr>
<tr><td>Influenced by environmental factors</td><td>Is not Influenced by environmental factors</td></tr>
<tr><td>Two or more genes control the same character</td><td>A single genes determines the differences in the traits of the character</td></tr>
<tr><td>The phenotype is usually controlled by many pair of alleles</td><td>The phenotype is controlled by a pair of alleles</td></tr>
</table>
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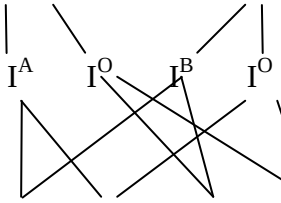
1</td><td>10</td></tr>
</table>

NO.ITEM	KRITERIA PEMARKAHAN	MARKAH	CATATAN
9(b)	Able to explain the possibilities of the blood group and the genotypes of the offspring when the father's blood group is A and the mother's blood group is B. Sample answer: There are four possibilities; (a) Parent's genotype: $I^A I^A$ X $I^B I^B$ Gamete I^A I^B Genotype F1 $I^A I^B$ Phenotype F1 All offspring have Blood group AB (b) Parent's genotype: $I^A I^A$ X $I^B I^O$ Gamete I^A I^B I^O Genotype F1 $I^A I^B$ $I^A I^O$ Phenotype F1 50% of offspring have blood group AB and 50% have blood group A (c) Parent's genotype: $I^A I^O$ X $I^B I^B$ Gamete I^A I^O I^B Genotype F1 $I^A I^B$ $I^B I^O$ Phenotype F1 50% of offspring have blood group AB and 50% have blood group B	1 1 1 1 1 1 1 1 1 1	

	(d) Parent's genotype: $I^A I^O$ X $I^B I^O$ Gamete  I^A I^O I^B I^O Genotype F1 $I^A I^B$ $I^A I^O$ $I^B I^O$ $I^O I^O$ Phenotype F1 AB A B O 25% chance that offspring has blood group AB, A, B, O	1 1 1	

Question 1

1 (i) [KB0601 - Observing]

Score	Explanation
3	Able to state any two observations based on four criteria K1 – difference environment / condition K2 – movement of air bubble from X to Y / distance 5 cm K3 – the time taken *Sample answer* : 1. At the air movement condition, the time taken for air bubble move from X to Y / a distance of 5 cm on first reading / second reading / third reading is 21 / 15 / 20 minutes. 2. At the still air condition, the time taken for air bubble move from X to Y / a distance of 5 cm on first reading / second reading / third reading is 43 / 37 / 40 minutes. 3. At the air movement condition, the time taken for air bubble move from X to Y / a distance of 5 cm are faster than still air condition.
2	Able to state any two of the above observation correctly *Sample answer* : 1. At the air movement condition, the time taken for air bubble move from X to Y / a distance of 5 cm is 21 / 15 / 20 minutes. 2. At the still air condition, the time taken for air bubble move from X to Y / a distance of 5 cm is 43 / 37 / 40 minutes.
1	Able to state the ideas of observtion.
0	No response or wrong response.

(a) (ii) [KB0602-Making Inferens]

Score	Explanation
3	Able to state any two reasonable inference for the observation *Sample answer* : At the air movement condition, a lot of water is absorbed by plant because the rate of transpiration is higher / faster. At the still air condition, not much water is absorbed by plant because the rate of transpiration is lower / slower.
2	Able to state one possible inference for each observation or able to state two inference but incomplete. *Sample answer* : When there is air movement, traspiration is fast When there is no air movement, transpiration is slow.

1	Able to state the ideas of observations *Sample answer* : Rate of transpiration is affected by air movement
0	No respone or wrong response.

(b) [KB0603- Measuring using numbers]

Score	Explanation
3	Able to record six data and units correctly in the boxes provided. *Sample answers* : Condition | Time taken for air bubble to move from X to Y (minutes) | First reading / 1 | Second reading / 2 | Third reading / 3 | Average Air movement | 21 | 15 | 20 | 18.67 Still air | 43 | 37 | 40 | 120.00
2	Able to record 4 – 5 data and units correctly *Sample answers* : Condition | First reading / 1 | Second reading / 2 | Third reading / 3 | Average (minutes) Air movement | 21 minutes | 15 minutes | 20 minutes | 18.67 Still air | 43 minutes | 37 minutes | 40 minutes | 120.00
1	Able to record 2 – 3 data and unit correctly
0	No respone or wrong response.

(c) (i) [KB0608 - Mentafsir data]

Score	Explanation
3	Able to calculate the rate of transpiration with unit correctly. *Sample answer* : The rate of transpiration at air movement $= \frac{\text{the distance travelled by air bubble}}{\text{average time}}$ $= \frac{5 \times 10}{1120}$ $= 0.04\ mms^{-1}$

	The rate of transpiration at still air = the distance travelled by air bubble / average time = 5 x 10 / 2400 = 0.02 mms^{-1}
2	Able to calculate the rate of transpiration with unit. *Sample answer* : The rate of transpiration at air movement = 5 / 18.67 = 0.26 $cmmin^{-1}$ The rate of transpiration at still air = 5 / 120 = 0.04 $cmmin^{-1}$
1	Able to state the answer with unit in mms^{-1} / $cmmin^{-1}$ = 0.04 mms^{-1} = 0.02 mms^{-1}
0	No respone or wrong response.

(c) (ii) [KB 0606 – Communicating]

Score	Explanation
3	Able to construct a table and record the results of the experiment with the following criteria : K1 – state all three aspects with unit correctly K2 – transfer all data for environment condition and time taken K3 – state the values for rate of transpiration correctly *Sample answer* :

Condition of the environment	Time taken for the air bubble to move from X to Y (minutes)				Rate of transpiration ($cmmin^{-1}$)
	1	2	3	Average	
Air movement	21	15	20	18.67	0.26
Still air	43	37	40	120.00	0.04

Or

Condition of the environment	Time taken for the air bubble to move from X to Y (seconds)				Rate of transpiration (mms^{-1})
	1	2	3	Average	
Air movement	1260	900	1200	1120	0.04
Still air	2580	2220	2400	2400	0.02

2	Able to construct a table and record any two criteria
1	Able to construct a table and record any one criteria
0	No respone or wrong response.

(d) (i) [KB0610 – Controlling variables]

Score	Explanation
3	Able to state 6 items correctly *Sample answer :* Variables / Particular to implemented *Manipulated* — With or without environment // environment condition // under moving air / still air: Places the simple potometer / apparatus in a room with air movement and then (in a room) without air movement / still air *Responding* — The time taken for the air bubble to move from X to Y / a distance of 5 cm // rate of transpiration: Record the time taken for the air bubble to move a distance of 5 cm / from X to Y using a stopwatch // calculate the rate of transpiration using the formula = the distance travelled by air bubble / average time *Controlled* — Light intensity // temperature // type and size of plant // distance X to Y: Used 60 watts bulb (in the experiment) // used 28^{o}C temperature // used Hibiscuss plant // fixed the distance X to Y is 5 sm
2	Able to state any 4 – 5 item from the table above correctly.
1	Able to state any 2 – 3 item from the table above correctly
0	No respone or wrong response.

(d) (ii) [KB0611 – Stating hypothesis]

Score	Explanation
3	Able to state the hypothesis correctly based on the following criteria K1 – state the manipulated variable K2 – state the responding variable K3 – state the relationship between K1 and K2 *Sample answer* : (any one of the answer) 1. If the air movement in the room increases, the rate of transpiration also increases 2. When the air movement in the room increases, the time taken for air bubble to move from X to Y is faster/higher. 3. As air movement increases, the higher the rate of transpiration
2	Able to state the hypothesis but less accurate // able to state 2 criteria only *Sample answer* : 1. Different condition of the environment causes the different rate of transpiration / time taken for the air bubble to move a distance of 5 cm / from X to Y 2. The increases of air movement affects the rate of transpiration.
1	Able to state the idea of the hypothesis // able to state 1 criteria only *Sample answer :* 1. Different environment affects transpiration 2. Rate of transpiration is affected by environment.
0	No respone or wrong response.

(e) [KB0609 – Defining by operation]

Score	Explanation
3	Able to state the definition of rate of transpiration operationally, complete and correct, based on the following criteria: K1 – time taken for the air bubble to move from X to Y / a distance of 5 cm K2 – the rate of water uptake by the plant shoot K3 – the factor that affects the rate of transpiration Sample answer : Rate of transpiration is the rate of water uptake by the plant shoot which result in the time taken for the air bubble travelled a distance of 5 cm / from X to Y affected by the air movement.

2	Able to state the definition of rate of transpiration based on any two criteria
1	Able to state the idea of the definition or state the definition based on any one criteria
0	No respone or wrong response.

(f) [KB0607 – Using Spatial and Time Relationship]

Score	Explanation
3	Able to explain the relationship between the rate of transpiration and time correctly based on the following criteria: K1 – the relationship between rate of transpiration and time K2 – light intensity during the day K3 – the opening of the stomata *Sample answer* : The rate of transpiration increases from morning to afternoon and reduces from evening to night because the light intensity is highest in the afternoon and the size of the stomata is biggest at this time.
2	Able to explain briefly the relationship between the rate of transpiration and time based on any two criteria.
1	Able to explain the idea of the relationship between the rate of transpiration and time based on any one criteria.
0	No respone or wrong response.

(g) [KB0605 – Predicting]

Score	Explanation
3	Able to predict correctly and explain the prediction based on the following criteria ; P1 – air bubble moves faster in the same distance P2 – the rate of transpiration is more than 0.04 mms^{-1} / 0.26 cm min^{-1} P3 – air movement increases using two fans compare to one fan *Sample question* : The movement of air bubble from X to Y becomes faster and the rate of transpiration is more than 0.04 mms^{-1} because the air movement increases when two fans are used instead of one.
2	Able to predict based on any two criteria
1	Able to state the idea to predict or predict based on any one criteria.
0	No respone or wrong response.

(h) [KB0602 – Classifying]

<table>
<tr><td>Score</td><td>Explanation</td></tr>
<tr><td>3</td><td>Able to match the apparatus and material used to obtain data for the following variables correctly.

Sample answer:
<table>
<tr><th>Variable</th><th>Apparatus</th><th>Material</th></tr>
<tr><td>Manipulated</td><td>bulb</td><td>Power of bulb</td></tr>
<tr><td>Responding</td><td>stopwatch</td><td>Air bubble in the capillary tube</td></tr>
<tr><td>Controlled</td><td>beaker</td><td>Volume of water</td></tr>
</table></td></tr>
<tr><td>2</td><td>Able to classify any two pairing items / 3-4 items correctly</td></tr>
<tr><td>1</td><td>Able to classify any one pairing items / 1-2 items correctly</td></tr>
<tr><td>0</td><td>No respone or wrong response.</td></tr>
</table>

ANSWER FOR QUESTION 2

Problem statement

Score	Criteria
3	Able to state the problem statement of the experiment correctly that include criteria: **C 1: Manipulate variables** **C 2: Responding variables** **C 3: Relation in question form and question symbol [?]** *Example* : **Problem statement:** 1. What is the percentage coverage / population size / density of plant from species A and B in the school field? 2 Does the type of plant species affects the percentage coverage / population size / density of the plants ? 3. Which type of the plant species/ species A or B has the highest percentage coverage/ population size?
2	Able to state the problem statement of the experiment with two criteria; Example: **Problem statement:** 1. Species A and B have different population size/ percentage coverage/ density. 2. What is the percentage coverage/ population size / density of plants?
1 Tick	Able to state the of problem statement with one criteria. Example: **Problem statement:** 1. Which plant is dominant?
0	No response or wrong response.

Aim

Score	Criteria
Tick	To estimate/ determine / study the population size // percentage coverage of plant from species A and B using the quadrat sampling technique.

Hypothesis

Score	Criteria

3	Able to state the hypothesis correctly according to the criteria: **C 1: Manipulate variables** **C 2: Responding variables** **C 3: Relationship of the variables** *Example* 1. The percentage coverage// population size of species A plant is higher than species B in the school field. 2. Different plant species have different percentage coverage// population size . 3. Plant species A is more dominant than species B in this habitat.
2	Able to state the hypothesis with two criteria Example: 1. Plant species affects percentage coverage// population size 2. Species A/ B has the highest percentage coverage// population size. 3. Species A is more dominant in the habitat.
1 Tick	Able to state the idea of the hypothesis.
0	No response or wrong response.

Variables

Score	Criteria
Tick	Able to state the **three variables correctly** Example: Manipulated variable: Type of plant species// species A and B// two example of plant species. Responding variable: Population size // percentage coverage of plants // Density of species Controlled variable : Quadrat size, school field.

Materials and apparatus

Score	Criteria
3 Tick	Able to state all functional materials/ 2 materials and 4 apparatus for the experiment. Materials : Plant species A and B // any 2 plant species Apparatus : Plastic quadrat, marker pen, A4 Paper, graph paper.
2	Able to state 1 material and 2 apparatus for the experiment
1	Able to state 1 material and 1 apparatus for the experiment.
0	No response or wrong response

Bonus marks:technique and data = 2 marks

Technique :

Score	Criteria
Tick Bonus 1	Able to state the action on responding variable with an apparatus. Example: Measure and record the area of each type of species using a quadrat 1m x 1m // Calculate the percentage coverage of plant // species A and B using the formula: $\frac{\text{Total area covered by the species}}{\text{Number of quadrats X area of one quadrat}}$ X 100% // Calculate the density of plant species using the formula: $\frac{\text{Total number of organisms in all quadrats}}{\text{Number of quadrats X area of one quadrat}}$

Procedure (Refer to procedure in example)

Score	Criteria
3	Able to state **five** procedures P1,P2,P3,P4 & P5 correctly: P1 : How To Set Up The Apparatus P2 : How To Make Constant The Control Variable P3 : How To Manipulate The Manipulated Variable P4: How To Record The Responding Variable P5 : Precaution
2	Able to state **three** of any procedures correctly
1 Tick	Able to state **two** of any procedures correctly

0	No response or wrong response

Data

Score	Criteria
Tick Bonus 1	Able to tabulate the **correct table with units** **Example:**

Plant species	Number/ area of plant species in the quadrat										Total number/area of plant species(m^2)	Density/ percentage coverage area (%)
	1	2	3	4	5	6	7	8	9	10		
A												
B												

Conclusion

Score	Criteria
Tick	Able to rewrite the hypothesis correctly. Example: 1. The percentage coverage// population size of species A plant is higher than species B in the school field? or 2. Different plant species have different percentage coverage// population size . or 3. Plant species A is more dominant than species B in this habitat. Hypothesis is accepted.

Planning the experiment

Score	Criteria
3	Able to plan the experiment based on 8-9 of the following criteria : • Statement of identified problem • Objective of study • Variables • Statement of hypothesis • List of materials and apparatus • Technique used • Experimental procedures • Presentation of data • Conclusion

2	Able to plan the experiment based on 4-7 of the criteria :
1	Able to plan the experiment based on2-3 of the criteria :
0	No response or wrong response

Example of Procedure.

1. School field was chosen as the field study. (P1)
2. Quadrats of size 1m x 1m was used. (P2)
3. Two plants species / species A and B was identified (P3)
4. The quadrats were thrown at random in the school field. (P1)
5. The area of (coverage) each plant species/ species A and species B was counted. (P4)
   // the number of individual plant species in each quadrat was counted.
6. If more than half of the squares in the quadrat is covered, the area of (P5) plant species will be counted . The area is not counted if only less than half is covered.
7. Steps 5 to 7 was repeated for nine quadrats. (P1)
8. The area covered by plant species / species A and species B / number of individual plant species studied in each quadrat were recorded and tabulated in a table. (P4)
9. The percentage coverage / density / frequency of plant species / species A and species B were calculated by using this formula: (P4)

Percentage coverage of plant species :

$$= \frac{\text{Total area covered plant species in all quadrats}}{\text{Total number of quadrats X area of a quadrat}} \times 100\%$$

// Frequency of species = $\frac{\text{Number of quadrat containing plant species}}{\text{Total number of quadrats}} \times 100\%$

// Density of plant species = $\frac{\text{total number of individual species in all quadrats}}{\text{Total number of quadrats X area of a quadrat}}$

PERATURAN PERMARKAHAN TAMAT