SECTION A
[60 marks]
Answer **all** *questions in this section.*
Jawab ***semua*** *soalan di bahagian ini*

Note
Catatan

1. Diagram 1 shows a microscopic structure of a part of pancreatic cell.
Rajah 1 menunjukan struktur mikroskopik sebahagian sel pancreas.

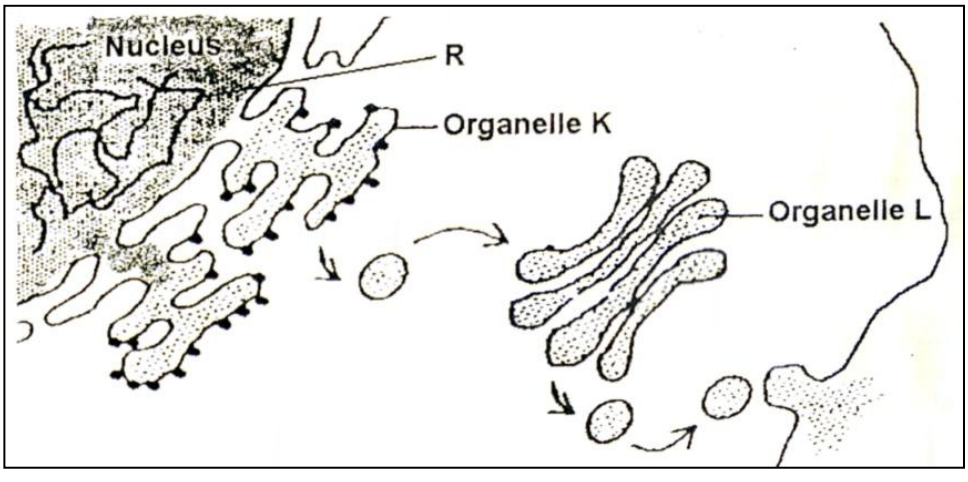


Diagram 1
Rajah 1

(a) (i) Name the organelle K and organelle L
Namakan organel K dan organel L.

K: Rough Endoplasmic Reticulum

L : Golgi apparatus / body

[2 marks]

(ii) Explain how the organelle K and organelle L are interrelated in their function
Terangkan bagaimana organel K dan organel L adalah saling berkaitan dari segi fungsi mereka.

P1 : Rough endoplasmic reticulum /K transports protein synthesized in the ribosomes

P2 : then forms a *transport vesicle* which carries the protein to Golgi body / L

P3 : Golgi body *processes, modifies* the protein into a functional one /

enzyme / hormone (before forming a secretory vesicle)

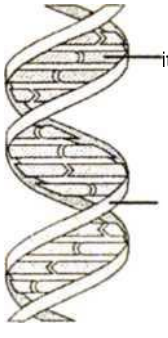
[2 marks]

(b) (i) Name one chemical substance in the structure R which is involved in the synthesis of protien in a cell.
Namakan satu bahan kimia dalam structur R yang terlibat dalam sintesis protien dalam suatu sel.

The chemical substance in the chromosome - DNA / Deoxyribonucleic acid

[1 marks]

(ii) Draw the structure of the chemical compound in (b)(i) in the blank space below.
Lukis struktur bahan kimia dalam (b)(i) dalam ruang kosong di bawah.
DNA structure:



Drawing = 1 mark

2 correct labels = 1 mark

[2 marks]

(c) (i) Based on the diagram, describe the synthesis of a specific pancreatic hormone in the cell.
Berdasarkan gambarajah itu, huraikan bagaimana suatu hormon tertentu disintesiskan dalam sel itu

The synthesis of hormone in the pancreas cell:

P1 : The genetic information for the synthesis of the protein/ hormone (eg. Insulin contained in the DNA) is copied to RNA / messenger –

RNA

P2: (RNA) carries the information to ribosome

P3: (Ribosome) synthesize the protein and

P4 : (Protein) is transfer to the Rough Endoplasmic Reticulum

P5: then protein is transported to Golgi Apparatus

P6: (In Golgi Apparatus) protein is modified to hormone // processed /packed and sorted / transport to plasma membrane

[3 marks]

(ii) The structure R in Diagram 1 undergoes some changes due to exposure to radioactive rays. Explain the possible effect to the synthesis of the hormone.
Struktur R dalam Rajah 1 mengalami perubahan akibat pendedahan kepada sinaran radioaktif. Terangkan kemungkinan kesanya ke atas sintesis hormon itu.

Effect of changes of the structure R / chromosome on hormone synthesis:

P1: there will be some changes in the gene / base sequence / gene mutation responsible for the synthesis of the hormone

P2: protein synthesis changes , a different protein / not the original hormone is synthesized or no hormone is being synthesized

[2 marks]

2. Diagram 2.1 shows two individual, P and Q in two different situations. P is in a vigorous activity while Q is at rest. Processes of R and S occurs in a human muscle cell.

Rajah 2.1 menunjukkan dua individu, P dan Q dalam dua situasi yang berbeza. P sedang melakukan satu aktiviti cergas manakala Q berada dalam keadaan rehat. Proses R dan S berlaku dalam satu sel otot manusia.

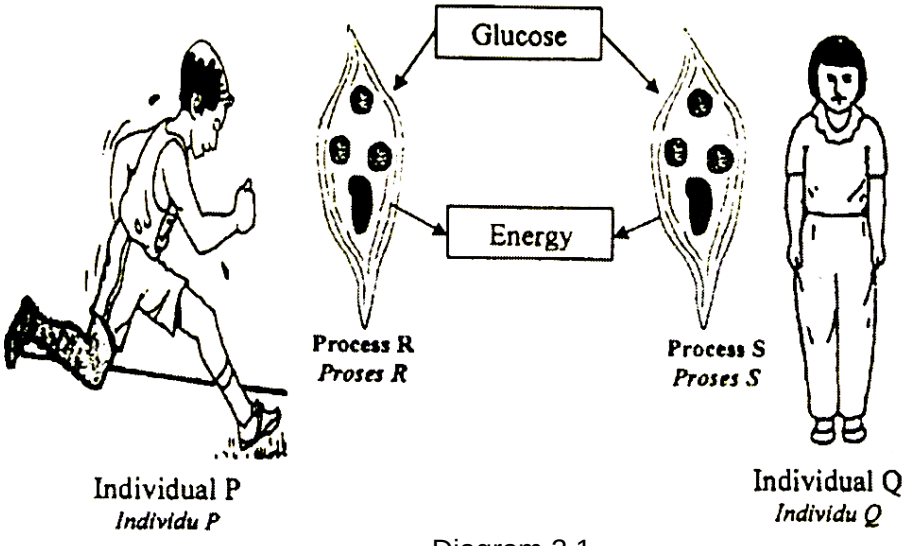


Diagram 2.1
Rajah 2.1

(a) Based on Diagram 2.1, name the processes R and S.
Berdasarkan Rajah 2.1, namakan proses R dan S.

Process R/ Proses R : **Anaerobic respiration**

Process S/ Proses S : **Aerobic respiration**

[2 marks]

(b) Write the equation of process S.
Tuliskan persamaan bagi proses S.

Glucose + Water ⟶ Carbon dioxide + Water + Energy

[1 marks]

(c) State two differences between process R and process S.
Nyatakan perbezaan diantara proses R dan proses S.

Process R/ Anaerobic respiration	**Process S/ Aerobic respiration**

Glucose is broken down partially	Glucose is broken down completely
ATP produced – 2 ATP	ATP produces – 38 ATP
Product – Lactic acid and energy	Product – Carbon dioxide , water and energy
Occurs in the absence of oxygen	Occurs in the presence of oxygen

[2 marks]

(d) Diagram 2.2(a) shows fish respiratory structure and Diagram 2.2(b) shows human respiratory structure.
Rajah 2.2(a) menunjukkan struktur respirasi ikan dan Rajah 2.2(b) menunjukkan struktur respirasi manusia.

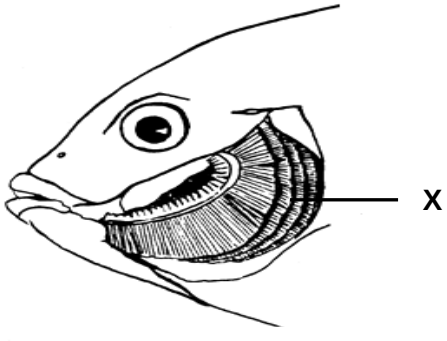


Diagram 2.2(a)
Rajah 2.2(a)

Diagram 2.2(b)
Rajah 2.2(b)

(i) What is X?
Apakah X?

Answer : Gills

[1 mark]

(ii) Structure X has adaptation for good gases exchange in fish.
Explain **one** adaptation of X.

Answer: 1. A :(Gills) have lamellae
E :to increase total surface area (for gases exchange)

2. A : (Gills) have network of blood capillary
E : to transport gases rapidly

3. A : Counter current of blood and water
E: increase diffusion of gases in and out of the gills

4: A :Numerous in number
E: to increase total surface area (for gases exchange)

[2 marks]

(e) A man is a heavy smoker.

Explain how this habit affect the efficiency of gases exchange on the respiratory structure in Diagram 2.2(b).

Seorang lelaki adalah seorang perokok tegar.

Terangkan bagaimana tabiat ini mempengaruhi kecekapan pertukaran gas pada struktur respirasi dalam Diagram 2.2(b).

Answer:

P1: Tobacco smoke contain tar

P2: (Tar) deposit on the surface of alveolus

P3 : Tobacco smoke contain heat

P4 : reduce moisture on the surface of alveolus

P5 : Tobacco smoke contain NO_2

P6 : increase acidity / corrode the surface of alveolus

[4 marks]

3. Diagram 3.1 shows the sequence of hydrolysis of starch to molecules P and molecule Q by enzymes.

Rajah 3.1 menunjukkan urutan hidrolisis kanji kepada molekul P dan molekul Q oleh enzim.

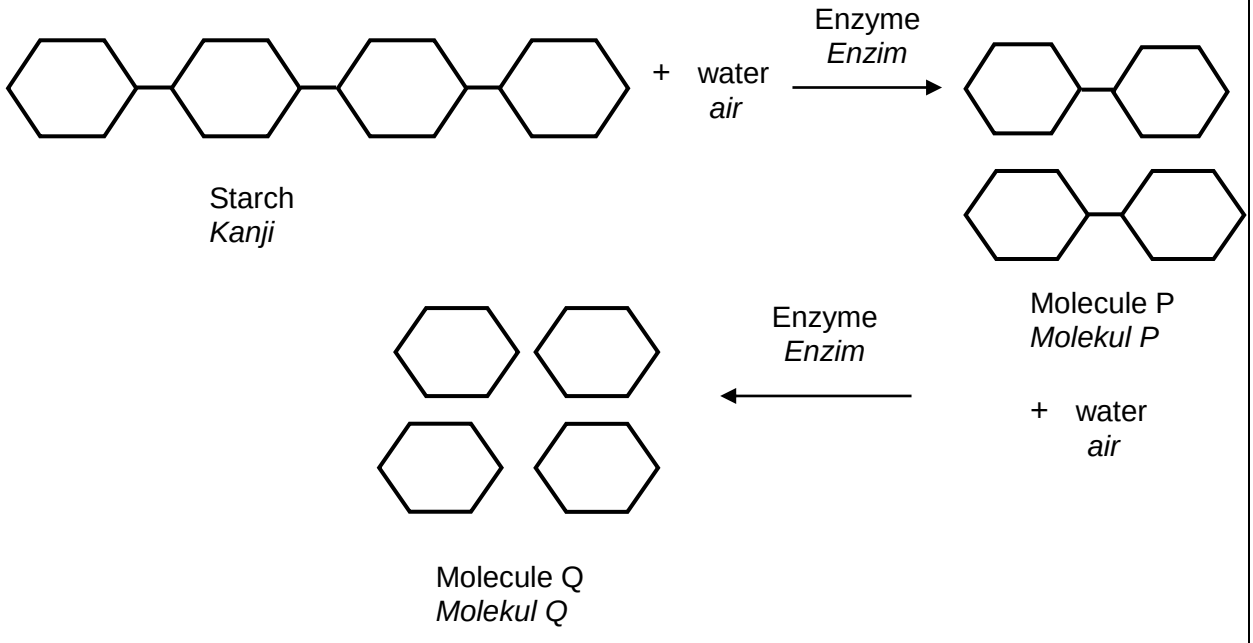


Diagram 3
Rajah 3

(a) (i) Complete Table 3.1.
Lengkapkan Jadual 3.1

Molecule *Molekul*	Name of molecule *Nama molekul*	Name the enzyme involved in hydrolysis *Namakan enzim yang terlibat dalam hidrolisiss*
P	**Maltose**	**Amylase**
Q	**Glucose**	**Maltase**

Table 3.1 / *Jadual 3.1*

[4 marks]

(ii) Based on your biological knowledge, explain the effect of consuming food that

contain excessive of starch on health.

Berdasarkan pengetahuan biologi anda, terangkan kesan pengambilan makanan yang mengandungi kanji berlebihan keatas kesihatan.

Answer :

P1 : Glucose level in blood increase/ hyperglycemia

P2 : Starch (finally) is digested into glucose

P3 : Glucose is absorbed into blood (capillary)

P4 : causes diabetes mellitus / obesity

[2 marks]

(b) Table 3.2 shows the energy value and nutrient content in a few types of food taken by student.
Jadual 3.2 menunjukkan nilai tenaga dan kandungan nutrient di dalam beberapa jenis makanan yang diambil oleh seorang pelajar.

Food *Makanan* (/100g)	Energy *Tenaga* (kJ)	Carbohydrate *Karbohidrat* (g)	Fats *Lemak* (g)	Protein *Protein* (g)	Vitamin C *Vitamin C* (µg)
Rice *Nasi*	1530	86.8	1.0	6.4	0.0
Fish *Ikan*	320	0.0	0.5	17.5	0.0
Egg *Telur*	612	0.0	10.9	12.4	0.0
Orange *Oren*	150	8.5	0.0	0.8	50

Table 3.2/ Jadual 3.2

(i) Based on Table 3.2, which type of food supplies the most energy?

Berdasarkan Jadual 3.2, jenis makanan manakah yang membekalkan paling banyak tenaga?

Answer: Rice

[1 mark]

(ii) Which type of food should be taken regularly to prevent scurvy?

Jenis makanan manakah yang perlu kerap diambil untuk mengelakkan penyakit skurvi?

Answer: Orange

[1 mark]

(iii) Calculate the amount of energy obtained by the student if he eats a meal which contain 200 g rice and 150g fish.

Kirakan jumlah tenaga yang diperolehi oleh pelajar tersebut jika dia mengambil 200 g nasi dan 150 g ikan.

Answer:

Rice - 1530 kJ x 2 = 3060 kJ

Fish - 320 kJ x 1.5 = 480 kJ

Total : 3060 + 480 = 3540 kJ

[3 marks]

(c) Why does an egg produces double amount of energy compared to a fish?

Mengapakah sebiji telur menghasilkan jumlah tenaga dua kali ganda berbanding seekor ikan?

Answer:

Egg contain more fat/lipid than fish

[1 mark]

4. Diagram 4.1 shows a longitudinal section of the reproductive parts of a flower during fertilization.

Rajah 4.1 menunjukkan keratan memanjang bahagian pembiakan bunga semasa persenyawaan.

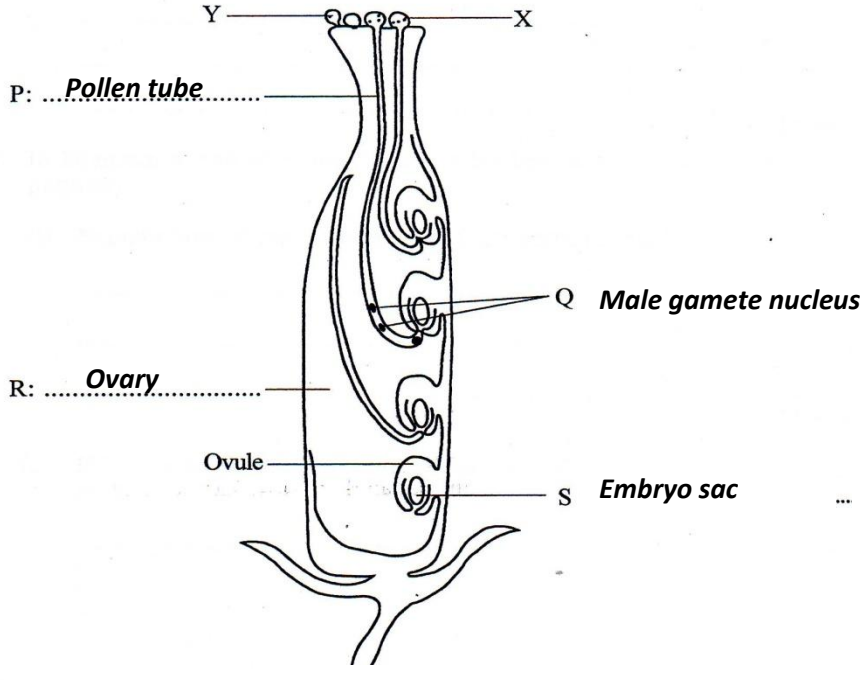


Diagram 4.1
Rajah 4.1

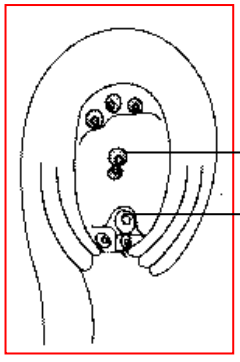
(a) (i) In Diagram 4.1, label P,Q, R and S

Pada Rajah 4.1, labelkan P, Q, R dan S

[2 marks]

(ii) In the space below, draw a section through the ovule showing all the cells in S. Label the cells involved in fertilization.

Dalam ruang di bawah , lukiskan keratan melalui ovul menunjukkan semua sel-sel dalam S. Labelkan sel-sel yang terlibat dalam persenyawaan



Drawing: clear diagram with 8 nucleus – 1 mark

Label : 2 label = 1 mark

(iii) Describe the fertilization process that occurs.
Huraikan proses persenyawaan yang berlaku .

[2marks]

P1 :One of the Q/ male nucleus fertilizes an egg to form the diploid zygote
P2:One of the Q/ male nucleus fertilizes 2 polar nuclei to form the triploid endosperm

(b) (i) In Diagram 4.1, the structure Y has to be kept dormant for future research purposes.
Explain how Y can be prevented from germinating.
Dalam Rajah 4.1, struktur Y perlu disimpan tidak aktif untuk tujuan penyelidikan pada masa hadapan.
Terangkan bagaimana Y boleh dihalang daripada bercambah .

[2 marks]

P1 : Keep Y in dry place/ low temperature
P2 : Because moisture initiate germination// enzyme is in inactive state

(ii) Suggest one method to stimulate the germination of Y
Cadangkan satu kaedah untuk merangsang percambahan Y.

[1mark]

Dropping/ spraying sucrose / sugary solution on Y

(e) Diagram 4.2 shows a watermelon with seed and watermelon without seed..
Rajah 4.2 menunjukkan buah tembikai dengan biji dan buah tembikai tanpa biji.

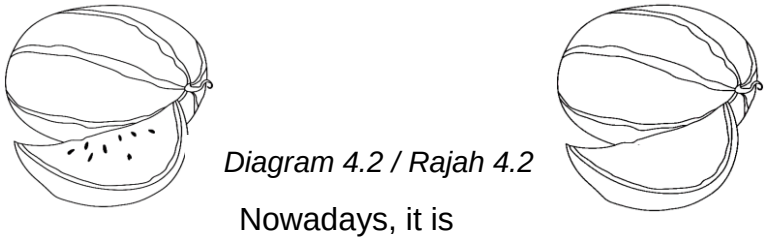


Diagram 4.2 / Rajah 4.2

Nowadays, it is more easier to find seedless watermelon in market. Shoppers also can find varieties of seedless oranges, grapes, and cucumbers.
Explain how to produce varieties of fruits without seed.

Pada masa kini, adalah lebih lebih untuk mencari tembikai tanpa biji di pasaran. Pembeli juga boleh mendapatkan buah limau , anggur dan timun tanpa biji .

Terangkan bagaimana untuk menghasilkan buah tanpa biji . [3marks]

P1 : Parthenocarpy

P2 : Spraying flower with auxin,

P3 : stigma and anther becomes degenerate

P4 : auxin diffuse into ovary and stimulate ovary to develop.

5 Diagram 5.1 shows a uriniferous tubule and its associated blood vessels.
Diagram 5.2 shows cells from structure P as seen through an electron microscope.
Gambarajah 5.1 menunjukkan tubul uriniferus dan salurdarah yang berkaitan.
Gambarajah 5.2 menunjukkan struktur sel P seperti yang dilihat di bawah mikroskop elektron.

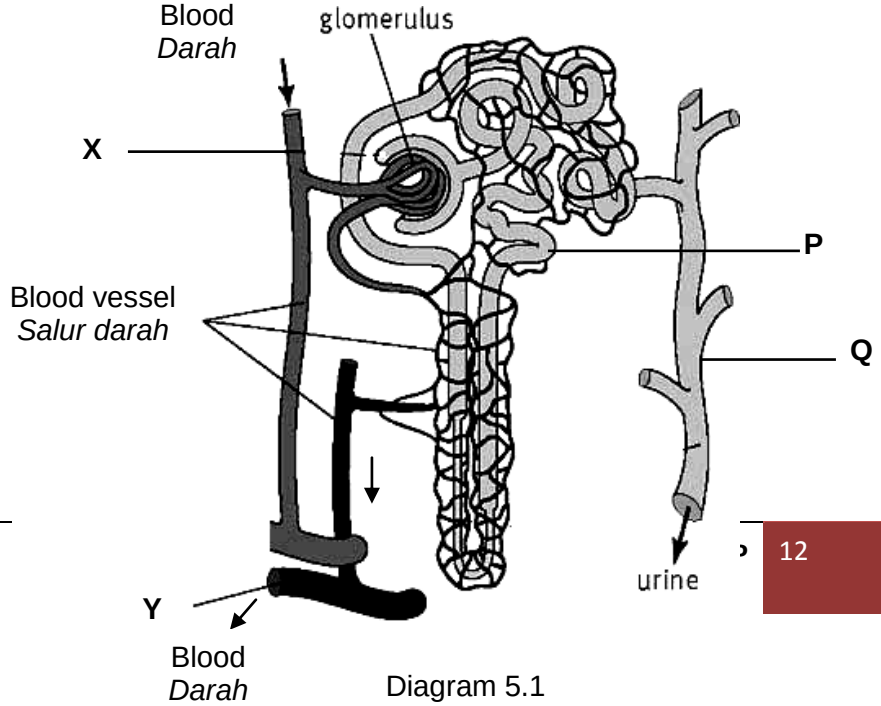


Diagram 5.1
Rajah 5.1

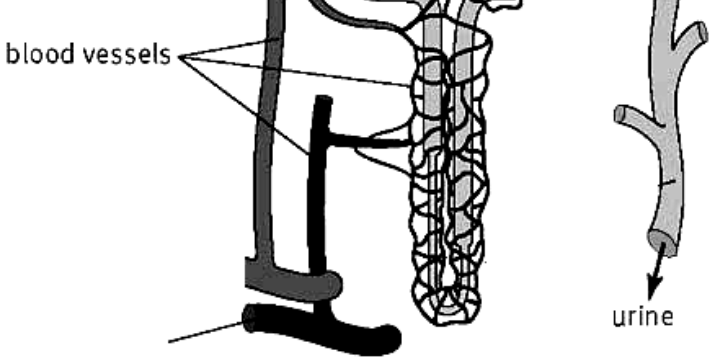


Diagram 5.1
Rajah 5.1

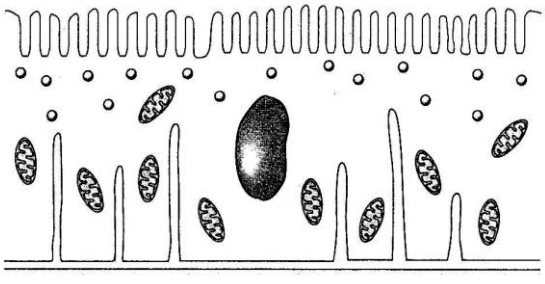


Diagram 5.2
Rajah 5.2

(a) State the difference in the urea composition between the blood vessel X and Y.
Nyatakan perbezaan kandungan urea antara salur darah X dan Y.
Urea concentration is lowest in Y but higher in X.

[1 mark]

(b) Based on the Diagram 5.2 explain how the cells are structured for reabsorption of substances.

Berdasarkan Gambarajah 5.2, terangkan bagaimana sel distrukturkan untuk penyerapan semula bahan.

P1 :They have many/abundant mitochondria
P2 : Produce a lot of energy needed for active transport
or
P1 :Numerous/many microvilli
P2 : Increase total surface area for reabsorption

[2 marks]

(c) Table 5.1 shows the concentration of certain substances found in structure Q.

Jadual 5.1 menunjukkan kepekatan beberapa bahan yang terdapat di dalam struktur Q.

Substances *Bahan*	Water *Air*	Protein *Protein*	Glucose *Glukosa*	Urea *Urea*	Salts *Garam*
Concentration *Kepekatan* (%)	95.0	0.00	0.00	2.00	1.50

Table 5.1 / Jadual 5.1

Explain how the concentration of the substances present in Q would change after eating meat and eggs.

Terangkan bagaimana kepekatan bahan-bahan yang terdapat dalam Q akan berubah selepas memakan daging dan telur.

P1 :meat and eggs contains high protein/ main source of amino acid

P2:(Excess) amino acids are deaminated / converted into ammonia / urea in the liver

P3 :The urea is transported to the kidneys and removed as urine

P4 :The concentration of urea in the urine would increase then 2.00

[3 marks]

(d) Diagram 5.2 shows the flow of blood and dialysis fluid through a dialysis machine.
Rajah 5.2 menunjukkan aliran darah dan bendalir dialisis melalui suatu mesin dialisis.

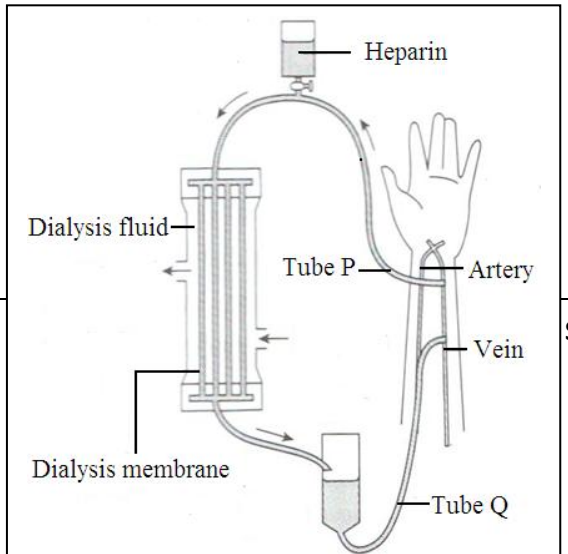


DIAGRAM 5.2/ *RAJAH* 5.2

Tube P contain more nitrogenous waste compared to tube Q. Explain why.

Tiub P mengandungi banyak bahan kumuh bernitrogen berbanding tiub Q. Terangkan mengapa.

P1 - The concentration of dialysis fluid is maintained at a concentration similar to the blood plasma of healthy person

P2 - the concentration of nitrogenous waste / urea / salt in P higher than dialysis fluid

P3 - urea / salt diffused out into dialysis fluid

P4 - through semi-permeable tubing

(Any 3)
[3 marks]

(e) Explain the importance of kidney in maintaining human health.

Terangkan kepentingan ginjal dalam mengekalkan kesihatan manusia.

- **To eliminate waste materials / urea / toxics / excess water / salts from the blood.**
- **Maintaining normal osmotic pressure in the blood / constant internal environment.**
- **Ensure an optimal physical / chemical condition (in the internal environment).**

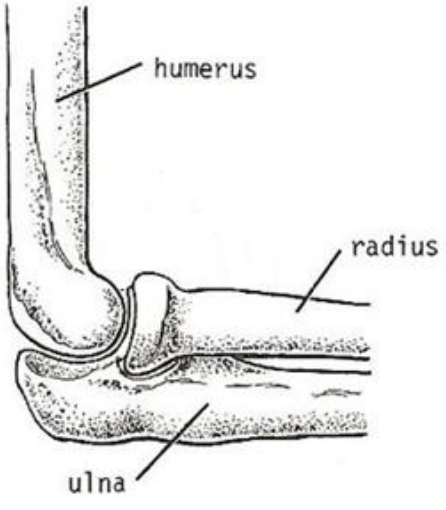
[3 marks]

Section B
Bahagian B

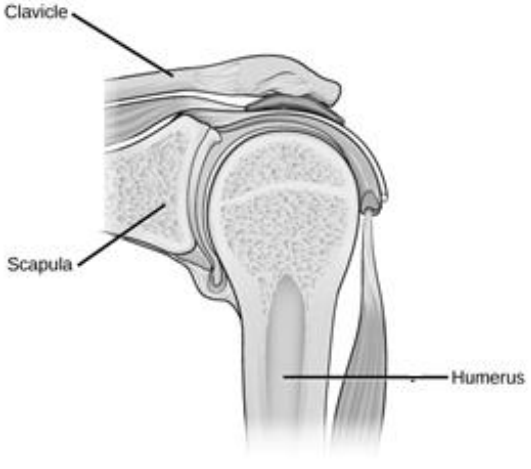
[40 markah]

Answer all question from this section
Jawab semua soalan dalam bahagian ini.

6(a) Diagram 6.1 shows a forearm of humans.
Rajah 6.1 menunjukkan lengan atas manusia.



Joint S
Sendi S



Joint T
Sendi T

Diagram 6.1
Rajah 6.1

A joint is the location at which bones connect. They are constructed to allow movement and provide mechanical support.
Explain the similarity and difference between joint S and T?

Sendi adalah tempat di mana tulang-tulang bertemu. Sendi dibina untuk membolehkan pergerakan dan member sokongan mekanikal berlaku.
Terangkan persamaan dan perbezaan antara sendi S dan T?

[6 marks/*6 markah*]

SKEMA JAWAPAN	
6(a)	Similarities: S1 : Both joint has cavity filled with synovial fluid// lines with synovial membrane S2 : (synovial fluid) act as lubricant to reduce friction between two bones. S3 :The end surface of bone are covered with cartilage

S4 : (Cartilage) to protect the bone /reduce friction between the bones

S5 : Both joint are connected with ligament

S6 : (Ligament) allow movement/ avoid dislocation of bone during movement

Differences:

	Joint S	Joint T
D1	Hinge joint /Elbow joint	Ball and socket joint/Shoulder joint
D2	Allow the movement in one plane	Allow rotation movement // all direction movement
D3	Articulation between humerus, ulna and radius	Articulation between humerus,scapula and clavicle.

(b)

A man has swollen ankle and is painful during movement after having a habit of taking high protein diet and practicing unhealthy lifestyle.

Seorang lelaki mengalami bengkak pada buku lali dan berasa sakit ketika bergerak setelah mengamalkan pengambilan diet yang tinggi kandungan yang protein dan tidak mengamalkan gaya hidup sihat.

Based on your biological knowledge, discuss the statement above.

Dengan menggunakan pengetahuan biologi anda, bincangkan pernyataan di atas.

[6 marks/*6 markah*]

SKEMA JAWAPAN

(b)

P1 : problem / disease : arthritis/gout

P2 : (diet high protein intake) cause accumulation of uric acid in the joint

P3: inflammation at joint // joint become stiff and pain

P4 : Lack of exercise

P5 : Diet lack of calcium / vitamin D

P6 : reduce the mass of bone //bone become lighter

P7: practice wrong posture during activity

	P8 : give pressure to skeleton system [6 marks]

(c) Diagram 6.2 show an earthworm and structure in its body.
Rajah 6.2 menunjukkan seekor cacing tanah dan struktur pada badannya.

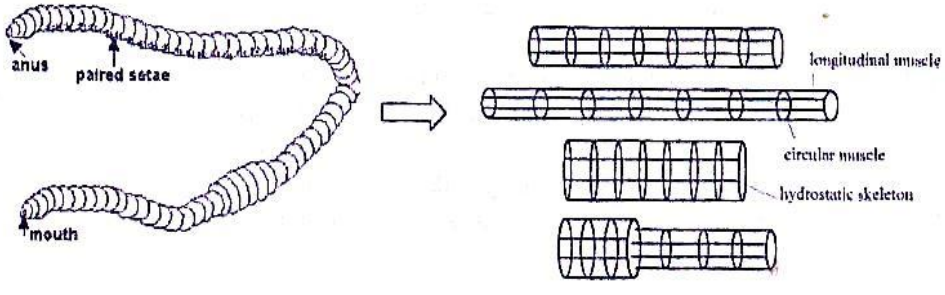


Diagram 6.2 /*Rajah 6.2*

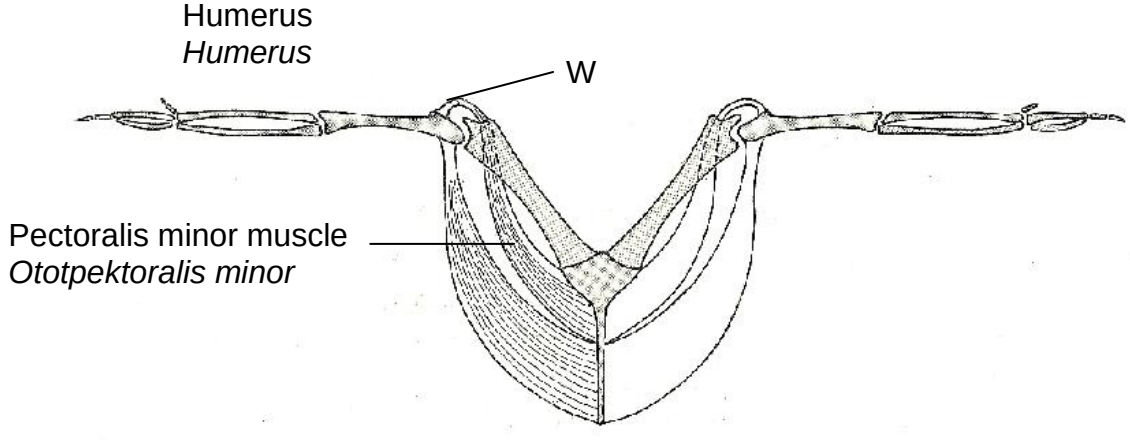
Explain how the structure in the earthworm involve in their movement .
*Terangkan bagaimana struktur pada cacing tanah terlibat dengan pergerakan*nya.

[4 marks/*4 markah*]

SKEMA PEMARKAHAN	
(c)	P1 : Hydrostatic skeleton P2 : fluid in the body cavity helps the earthworm to move / give support P3 : muscle at the body wall are longitudinal and circular muscle //antagonistic muscle P4 : contraction of circular muscle(and relaxation of longitudinal muscle) cause segment of body extended/longer/thinner P5 : contraction of longitudinal muscle (and relaxation of circular muscle) cause segment of body shorten/ thicken P6 : (The presence of) chaetae P7 : secure/anchor the shorted segment on the ground [4 marks]

(d) Diagram 6.3 shows flight muscle of a bird.

Rajah 6.3 menunjukkan otot penerbangan seekor burung.



Explain the effect to locomotion of bird if structure W is torn.

Terangkan kesan terhadap pergerakan burung kastuktur W terkoyak.

[4 marks/4 mark]

SKEMA PEMARKAHAN:	
(d)	P1: W is tendon P2 : Tendon is inelastic /strong/ tough P3 : Function of tendon is to connect (pectoralis minor) muscle to bone (/humerus) P4 : Contarction of (pectoralis minor) muscle produces (pulling) force P5 : (If tendon is torn), (pulling) force (that produced by contraction of muscle)

	cannot be transferred to the bone P5 : the bone/humerus is not pulled upward P6 : no movement of wing [4 marks]

7 Diagram 7.1 shows part of the blood circulatory system and the lymphatic system in the human body.

Rajah 7.1 menunjukkan system peredaran darah dan sistem limfa dalam badan manusia.

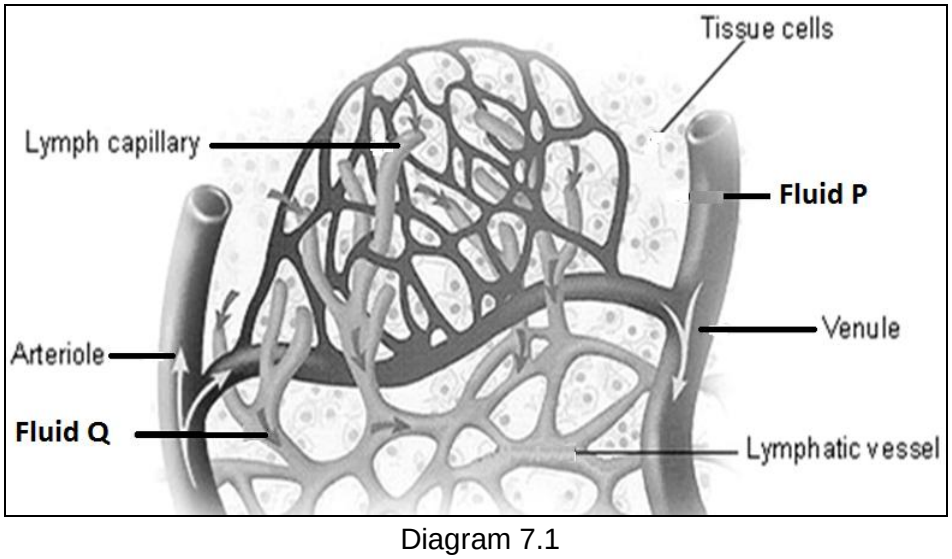


Diagram 7.1

Rajah 7.1

(i) Explain the differences between the composition of fluid P and fluid Q

Terangkan perbezaan antara komposisi bendalir P dan bendalir Q.

[4 marks]
[4 markah]

(a) (i)	Able to explain the diffrences of composition fluid P and fluid Q **Sample answer**: F1: Fluid Q/lymph has a larger numbers of lymphocyte compare to fluid P/blood P1: lymphocyte is produced by the lymph nodes in lymph system F2: Fluid Q/lymph has lower contents of oxygen compare to fluid P/blood P2: oxygen has been used up by the cell	1 1 1 1	4

(ii) Describe how the fluid Q is formed from blood until it is incorporated back into the blood circulatory system.
Huraikan bagaimana bendalir Q terbentuk daripada darah sehingga bendalir tersebut masuk semula ke dalam sistem peredaran darah.

(a) (ii)	Able to describe how lymph is formed from blood until it is brought back into the blood circulatory system. **Sample Answer** : P1: (When the blood flows from arteries into capillaries) there is higher hydrostatic pressure at the arterial end of the capillaries P2: (This high pressure) forces some plasma to pass through the capillary walls into the intercellular spaces (between the cells) P3: Once the fluid leaves the capillary walls, it is called interstitial/tissue fluid // The interstitial fluid fills the spaces between the cells and constantly bathes the cells P4: 90% of the interstitial fluid diffuses back into blood capillary P5: 10% of the interstitial fluid that has not been reabsorbed into the bloodstream goes into the lymph capillaries.(Once inside the lymph capillaries) the fluid is known as lymph.	1 1 1 1 1 1	6

	P6: The lymph capillaries unite to form larger lymphatic vessels. P7: From the lymphatic vessels, lymph eventually passes into the thoracic duct/the right lymphatic duct. P8:The thoracic duct empties its lymph into the right subclavian vein. (Hence, lymph drains back into the blood). *Any 6 P*	1 1 **Max 6**	

[6 marks]*[6 markah]*

(c) (i) Describe how are lacteals in the villi related with the lymphatic system?

Huraikan bagaimana lakteal di dalam vilus dapat dikaitkan dengan sistem limfa?

(c) (i)	Able to describe the how are lacteals related with the lymphatic		

	system. **Sample answer**: P1: A lacteal is a lymphatic capillary P2: absorbs fatty acids and glycerol in the villi of the small intestine P3: lacteals merge to form larger lymphatic vessels P4: that transport the fats to the thoracic duct which empties into the left subclavian vein.	1 1 1 1	4

(ii) Helmie takes fried chicken at lunch.

Explain the absorption and assimilation process of lipid content in the fried chicken.

Helmie mengambil ayam goreng semasa makan tengah hari.

Huraikan proses penyerapan dan asimilasi lemak yang terkandung dalam ayam goreng tersebut.

[6 marks]

(c) (i)	Able to explain the absorption and assimilation of lipid **Absorption** P1: Digestion of lipid produce fatty acid and glyserol P2: Absorption of lipid occur at ileum P3: At ileum there are villi which have lacteal P4: Fatty acid and glyserol are absorbed into lacteal P5: In the lacteal condensation of fatty acid and glyserol forms lipid P6: The lipids then transported via the subclavian vein into the blood steam **Assimilation** P7: In the cells lipid is use as a main component of plasma membrane P8: lipid also is use as a main component of some hormone and vitamin P9: Excess lipid will be stored underneath the skin as adipose tissue	1 1 1 1 1 1 1 1 1 1 1	max 6

8(a) Diagram 8.1 shows the process of colonisation and succession in a habitat.
Rajah 8.1 *menunjukkan proses pengkolonian dan penyesaran dalarn suatu habitat.*

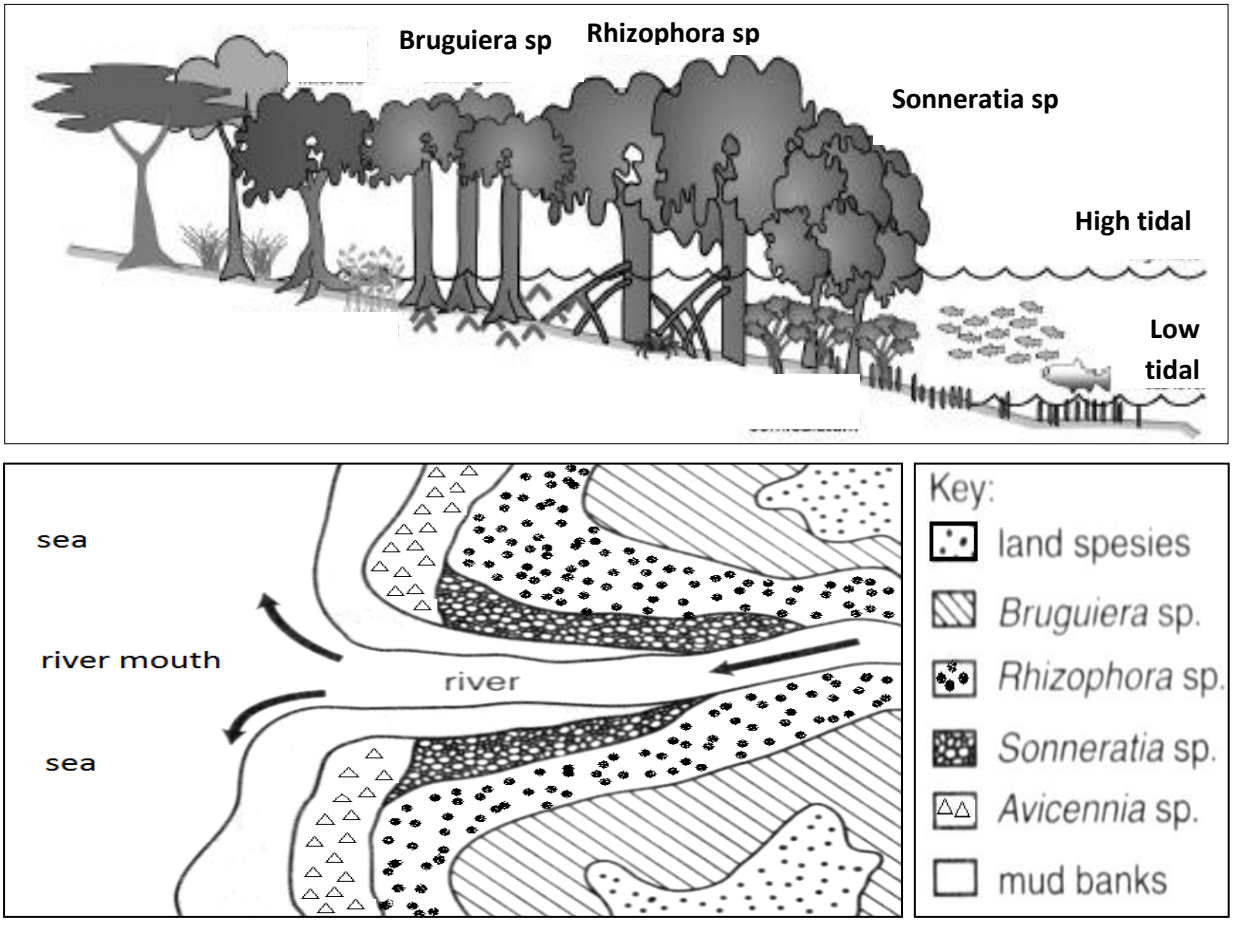


Diagram 8.1

What is meant by "colonisation and succession in a habitat"?

Based on Diagram 8.1 .explain how colonisation and succession bring about the formation of the primary forest.

[10 marks]

Apakah yang dimaksudkan dengan "pengkolonian dan penyesaran dalam suatu habitat"?

Berdasarkan Rajah 8.1, *terangkan bagaimana pengkolonian dan penyesaran membawa kepada pembentukan hutan primer dalam suatu habitat.* *[10 markah]*

8.0	F1: COLONISATION The process whereby living organisms move into this newly formed area which is completely devoid of life.	1

	F2: SUCCESSION The gradual process where one community changes its environment so that it is replaced by another community.	1
	***Zone 1* / *Avicennia* sp. and *Sonneratia* sp.**	
	P1: The pioneer species in a mangrove swamp are the *Avicennia* sp. and *Sonneratia* sp.	1
	P2: The *Avicennia* sp. grows in the part of the mangrove swamp that **faces the sea** while *Sonneratia* sp. **grows at the mouth of the river which is sheltered.**	1
	P3: A root system that spreads out widely to give support to the trees in the soft muddy soil	1
	P4: The *Avicennia* sp. and *Sonneratia* sp. have asparagus-shaped pneumatophores that grow vertically upwards from the main roots through the mud into the air.	1
	P5: The widely spread roots of the *Avicennia* sp. and *Sonneratia* sp. trap mud.	1
	P6: As more and more mud accumulate, the bank is slowly raised and would then contain less water.	1
	P7: The mangrove swamp is now more suitable for another mangrove tree which is the *Rhizophora* sp. Hence the *Rhizophora* sp. as the successor will slowly replace the pioneer species.	1
	Zone 2 / Rhizophora sp. zone	
	P8: This zone is higher and less waterlogged.	1
	P9: The *Rhizophora* sp. has prop roots to support and anchor the tree in the soft muddy soil.	1
	P10: The *Rhizophora* sp. has viviparity seeds to ensure that the seedlings can grow and are not carried away by the seawater.	1
	1: The prop roots of the *Rhizophora* sp. are able to trap mud. The pioneer species and the *Rhizophora* sp. that are old, will die and decay, adding humus to the soil.	1 1
	2: The banks are raised up even higher. The soil becomes more solid/compact, more fertile and less saline.	1

	3: The soil that is harder and drier now is not suitable for the *Rhizophora* sp. Hence, the *Rhizophora* sp. is replaced by the *Bruguiera* sp. ***Zone 3 / Bruguiera sp. zone*** 4: Trees of *Bruguiera* sp. grow well in hard clay soil that subjects to flooding during high tide. 5: Trees of *Bruguiera* sp. have buttress roots for support and knee-shaped pneumatophores for gaseous exchange (Figure 8.24(c)). 6: As more sedimentation of decayed substances occur, new mud banks are being built up seawards while the old banks move further inland, away from the sea. 7 : The soil becomes harder and dry land is formed. 8: *Bruguiera* sp. are replaced by other types of plants such as coconut trees, palm trees and *Pandanus* sp. 9: These are later replaced by other land plants. 0: Finally, after a few hundred years, the process of succession stops and a tropical rain forest, which is the climax community, is formed. At least one point in each zone. [10 *marks]*	1 1 1 1 1 1 Max 10

(b) Diagram 8.2 shows sources of greenhouse gases arising from human activities and natural processes.
Rajah 8.2, menunjukan sumber-sumber gas rumah hijau yang dihasilkan daripada aktiviti manusia dan proses-proses semulajadi.

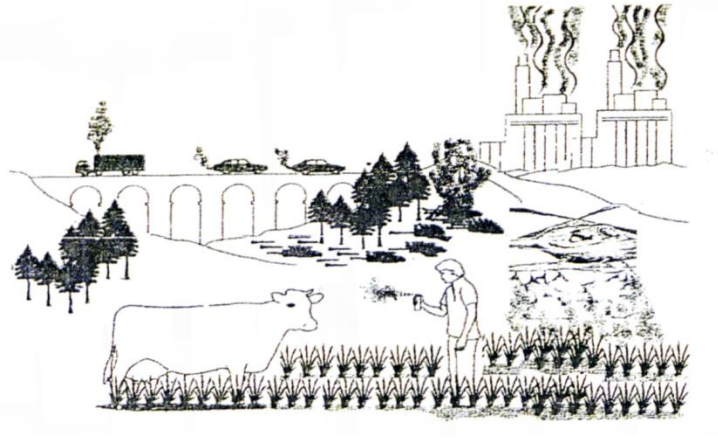


Diagram 8.2 *Rajah 8.2*

Based on Diagram 8.2, Explain the green house effectand global warming as a result of human activities.
Berdasarkan Rajah 8.2, terangkan kesan rumah hijau dan pemanasan global akibat aktiviti-aktiviti manusia

[5 marks].

	b) *The formation of* ***greenhouse effect*** *caused by;*	
	P1: Solar radiation , containing uv rays penetrate earth atmosphere and reaches the earth surface	1
	P2: Part of uv rays is reflected back by earth's surface to atmosphere in the form of infrared radiation / light which contains heat	1
	P3: Heat (energy) is trapped by greenhouse gases (such as carbon dioxide, oxides of nitrogen, methane)	1
	P4: Human activities such as combustion of fossil fuel by factories and vehicles increase the amount of greenhouse gases	1
	P5: Higher concentration of greenhouse gases in the atmosphere results in more heat being absorbed / trapped	1
	P6: Extensive forest burning, burning of fossil fuel and higher rate of evaporation worldwide causes accumulation of great amount of water vapour in the air	1
	P7: which also contribute to the increase in the earth's temperature / causes global warming	1 Max 5

8 (c) Diagram 8.3 shows the emission of gases from factories.
Rajah 8.3 menunjukkan pelepasan gas daripada kilang.

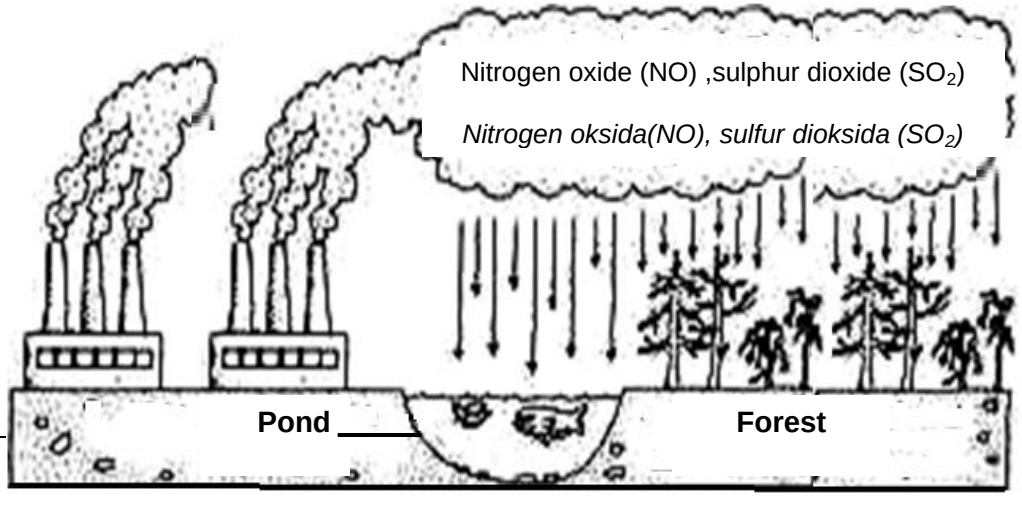


Diagram 8.3/*Rajah 8.3*

(i) Explain the effects of the emission of the gases to the ecosystem.
Terangkan kesan pembebasan gas tersebut kepada ekosistem.

[5 marks]

SKEMA PEMARKAHAN	
8(c)	P1: (The release of nitrogen oxides / sulphur dioxides) leads to the formation of acid rain P2 : the gases dissolve in the rain water P3 : Acid rain causes damage on the leaves / chloroplast P3 : Lower rate of photosynthesis P4 : Leads to stunted growth / death of plants//population reduced P5 : Acid rain lowers pH of the pond// more acidic P6 : causes death to aquatic organisms /fishes P7 : pH of soil lower//more acidic P8 : crop yield decrease [max : 5 marks]

9.(a) Diabetics do not correctly produce or use their insulin hormone. The insulin hormone helps control how much sugar is in your bloodstream. Millions of diabetics need to take insulin. Insulin from cows and pigs has been used since the early 1900s to treat diabetes. Now human insulin hormone can be mass-produced through genetic engineering processes.

Pesakit kencing manis tidak dapat menghasilkan atau menggunakan insulin dengan betul. Hormone insulin membantu mengawal kandungan gula dalam aliran darah . Berjuta-juta pesakit kencing manis perlu mengambil insulin. Insulin daripada lembu dan babi telah digunakan seja kawal 1900-an untuk merawat kencing manis. Sekarang hormon insulin manusia boleh dihasilkan secarabesar-besaran melalui proses kejuruteraan genetik.

Diagram 9.1shows a few stage that involves in the production of insulin hormone through genetic engineering technology.

Rajah 9.1 menunjukkan sebahagian daripada peringkat yang terlibat dalam proses penghasilan hormon insulin melalui teknologi kejuruteraan genetik.

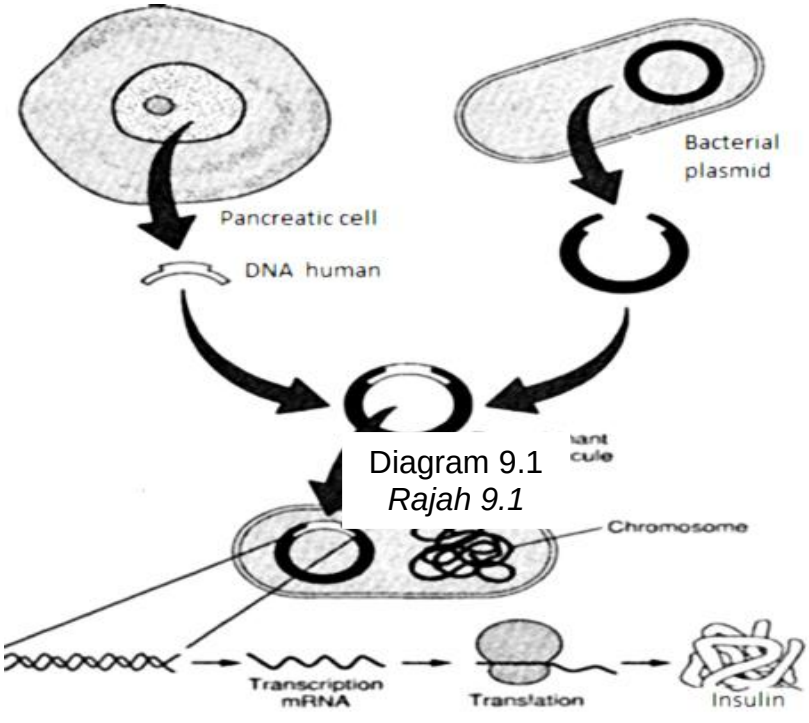


Diagram 9.1
Rajah 9.1

By using your knowledge , explain how this technology can be used in insulin hormone production.

Berdasarkan pengetahuan biologi anda huraikan bagaimana teknologi ini dijalankan bagi menghasilkan hormone insulin.

[6 marks/ *6 markah*]

SKEMA JAWAPAN	
9(a)	P1 -The gene for the insulin is isolated from human pancreas cell P2 - The bacterial plasmid is isolated (DNA found in bacteria) P3 - The bacterial plasmid is cut by using enzyme P4 - The enzyme used to incorporate gene for insulin production into the plasmid P5 - the bacteria are cultured in bioreactor P6 - the plasmid replicate as a bacteria divide asexually . P7 - the bacteria can produce insulin in large quantity, purified and isolate.

(b) Genetic engineering (GE) is the manipulation of genetic material (DNA or genes) in a cell or an organism in order to produce desired characteristics and to eliminate unwanted ones. GE includes a range of different techniques with many different uses,

and can be applied to plants, animals and humans.
For example, the genetic modification of food is a form of GE that involves manipulating the cells of plants.
Kejuruteraan genetik (GE) adalah manipulasi bahan genetik (DNA atau gen) di dalam selatau organism untuk menghasilkan ciri-ciri yang dikehendaki dan untuk menghapuskan organisma yang tidak diingini. GE termasuk pelbagai teknik yang berbeza dengan kegunaan yang berbeza, dan boleh digunakan untuk tumbuh-tumbuhan, haiwan dan manusia. Sebagai contoh, pengubahsuaian genetic makanan adalah satubentuk GE yang melibatkan memanipulasi sel-sel tumbuh-tumbuhan.

Diagram 9.2 shows twotoma to leaves which have been exposed to a bacterial pathogen, *Pseudomonas syringae*. Leaf A is the normal leaf show disease when infected with the bacteria while Leaf B, the genetically engineered leaf shows practically no signs of damage.

Rajah 9.2 menunjukkan dua helai daun tomato yang telah didedahkan kepada sejenis pathogen bacteria ,Pseudomonas syringae. Daun A adalah daun bias yang menunjukkan tanda-tanda penyakit setelah dijangkiti oleh bacteria tersebut, manakala daun B yang telah mengalami pengubahsuaian kandungan genetiknya tidak menunjukkan tanda kerosakan.

Leaf A /*Daun A* Leaf B /*Daun B*

Diagram 9.2/ *Rajah 9.2*

Discuss **the benefits** and **the risks** of using the genetically engineered organisms in agriculture and food production.
*Bincangkan **faedah** dan **risiko** menggunakan organism yang terubah suai kandungan genetiknya dalam pertanian dan penghasilan makanan*.

[10 marks/*10 markah*]

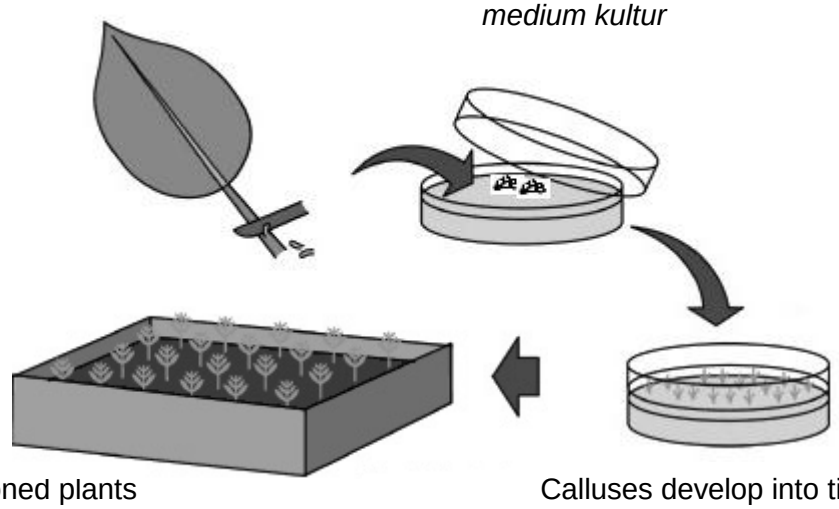
SKEMA PEMARKAHAN	
9(b)	The benefit: **P1: Genetic engineering used to produce disease resistant /pest resistant plant**. P2 : Less pesticide are used P3 : Less pollution to the environment //better health for consumer **P4: Increase crop yield** P5 : help to solve problem of insufficient food P6 :better livehood for farmer **P7 : Increase resistance to herbicide** P8 : which allow weeds to be killed without affecting the crop plant **P9 : Able to survive on poorer quality grassland** P10 : can resist drought // climatic changes **P11 : create crops with better nutrition value** P12 : with high vitamin A / protein content P13 : help to solve problems of malnutrition **P14: create crops with longer shelf live** P15: less food wastage **P16: genetically modified livestock (eg :cow)** P17: produce meat with less fat / more milk [Max : 6 marks] The risk: **K1 : Pest resistant genes may be transferred to weed** K2 : may be difficult to control the growth of weed **K3: some transgenic crops may have animal genes** K4: this may not be acceptable to certain groups for religious reasons **K5: genetically modified food may be harmful to health** K6: may activate human genes to cause cancer **K7: transgenic organism may affected the survival of other organism in the ecosystem** K8: may cause the imbalance of nature / ecosystem **K9 : decrease biodiversity** K10: certain cultivar are being planted to the exclusion of others **K11: this will less the genetic variation in environment.** [Max: 4 marks]

(c) Diagram 9.3 shows a cloning process of a plant.

Rajah 9.3 menunjukkan proses pengklonan satu tumbuhan.

Leaf cells are taken from the parent plant
Sel daun diambil dari tumbuhan induk

Leaf cells form calluses in culture medium
Sel daun membentuk kalus di dalam medium kultur



Cloned plants
Tumbuhan klon

Calluses develop into tiny plantlets
Kalus berkembang menjadi anak pokok kecil

Diagram 9.3
Rajah 9.3

Explain the characteristic of cloned plant.
Terangkan ciri-ciri tumbuhan yang diklon.

[4 marks]

SKEMA PEMARKAHAN	
9(C)	P1: Clones are genetically identical to the parent cell P2: no exchange of genetic materials P3: Clones have the same chromosomal number as the parent cell P4: no reduction in the chromosomal number P5: Clones easily get disease // shorter life span P6: Clones have the same body resistance against disease

End ..