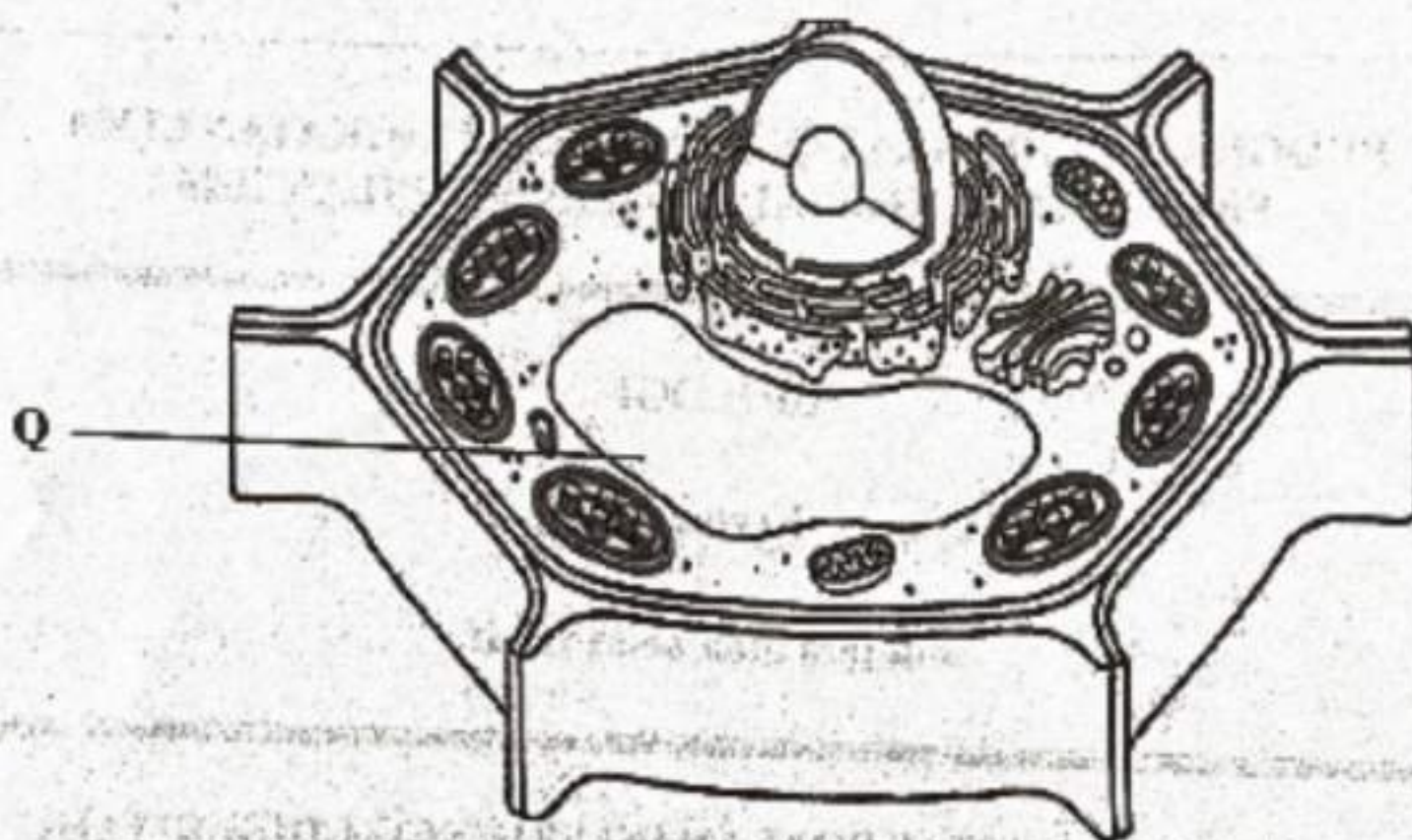


- 1 Antara yang berikut, sisa biologi yang manakah perlu disterilkan secara autoklaf sebelum dilupuskan?
Which of the following biological waste should be sterilised in an autoclave before disposal?

- | | |
|---------------------------|--------------------------------|
| A Picagari
Syringe | C Tisu haiwan
Animal tissue |
| B Sarung tangan
Gloves | D Skalpel
Scalpel |

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



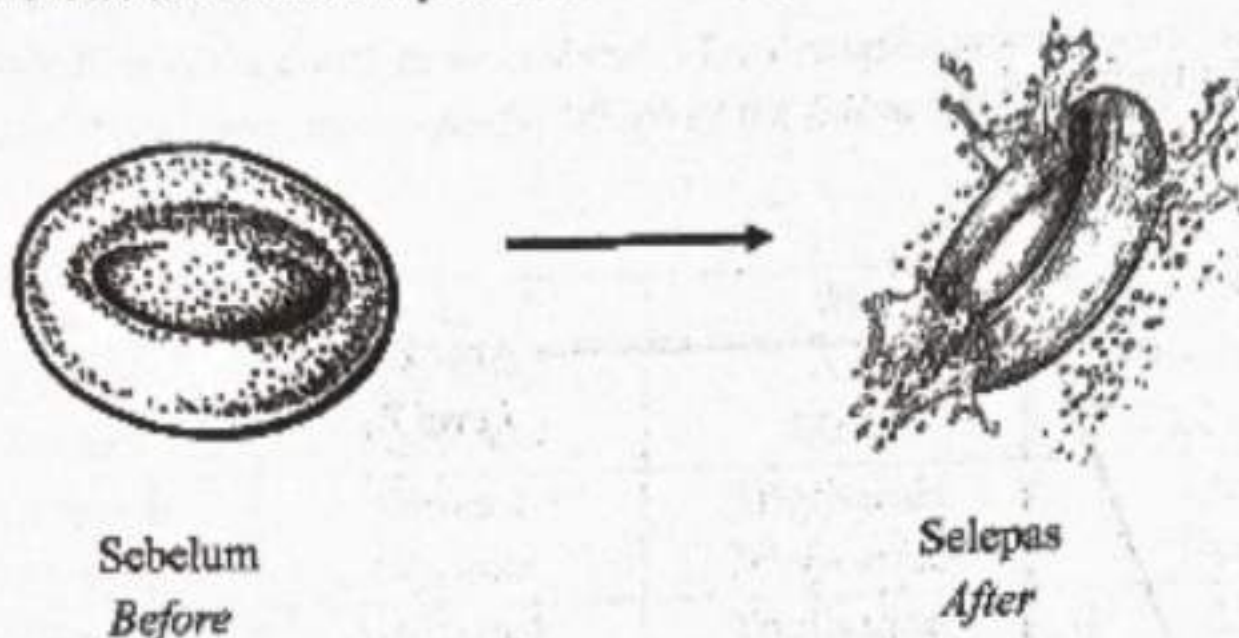
Rajah 1 / Diagram 1

- Apakah struktur berlabel Q?
What is the structure labelled Q?

- | | |
|-------------------------|-----------------------|
| A Vakuol
Vacuole | C Nukleus
Nucleus |
| B Tonoplas
Tonoplast | D Lisosom
Lysosome |

- 3 Rajah 2 menunjukkan keadaan sel darah merah yang telah direndam di dalam suatu larutan.

Diagram 2 shows the condition of a red blood cell after being immersed in a solution.



Rajah 2 / Diagram 2

Apakah fenomena yang dialami oleh sel tersebut?

What is the phenomenon shown by the cell?

- A Krenasi
Crenation
B Hemolisis
Haemolysis

- C Flasid
Flaccid
D Plasmolisis
Plasmolysis

- 4 Seorang suri rumah memotong nanas muda kepada kepingan-kepingan kecil dan menaburkan gula pada potongan buah tersebut. Selepas 20 minit, dia mendapati potongan nanas menjadi lembut. Antara yang berikut, penerangan manakah yang betul mengenai keadaan itu?

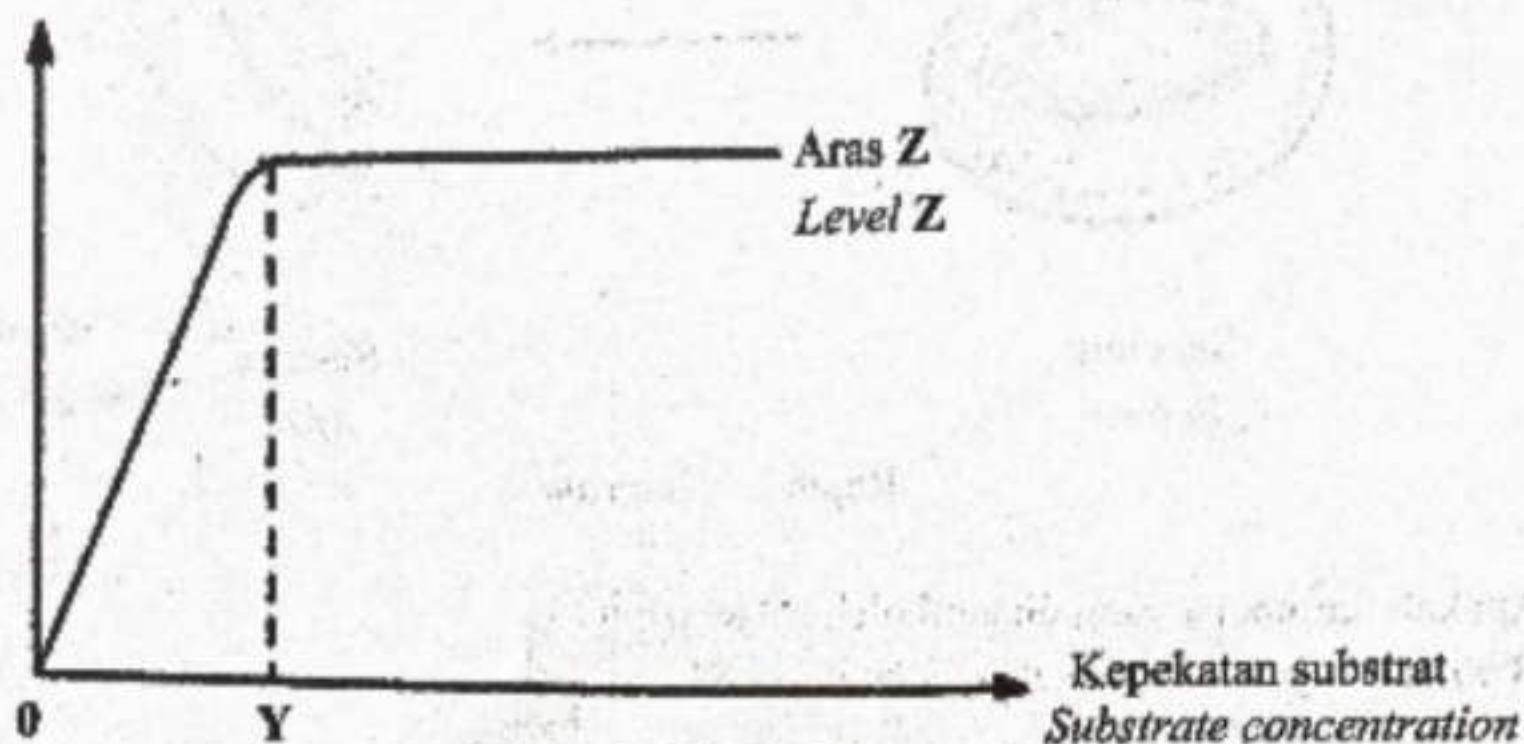
A housewife cut a pineapple into small slices and sprinkles sugar on the fruit slices. After 20 minutes, she noticed that the fruit slices become soft. Which of the following statement is correct about the condition?

- A Air meresap keluar daripada sel nanas secara osmosis
Water diffuses out from the pineapple cell by osmosis
B Air meresap masuk ke dalam sel nanas secara osmosis
Water diffuses into the pineapple cell by osmosis
C Gula diangkut masuk ke dalam sel nanas secara pengangkutan aktif
Sugar is transported into the pineapple cell by active transport
D Gula meresap masuk ke dalam sel nanas secara resapan berbantu
Sugar is transported into the pineapple cell by facilitated diffusion



- 5 Rajah 3 menunjukkan graf kesan kepekatan substrat ke atas kadar tindak balas enzim.
Diagram 3 shows a graph of the effect of substrate concentration on the rate of enzyme reaction.

Kadar tindak balas
Rate of reaction



Rajah 3 / Diagram 3

Antara yang berikut, yang manakah kesimpulan terbaik bagi graf itu?

Which of the following conclusion is the best for the graph?

- I Kepekatan enzim adalah faktor pengehad pada aras Z
Enzyme concentration is the limiting factor at level Z
- II Pada kepekatan Y, tiada tindak balas yang berlaku kerana semua tapak aktif telah tepu sepenuhnya
At concentration Y, no more reaction takes place as all the active sites of enzymes are fully saturated
- III Apabila kepekatan substrat bertambah dari 0 ke Y, lebih banyak molekul substrat mengikat kepada tapak aktif enzim
When substrate concentration increases from 0 to Y, more substrate molecules bind with the active site of enzymes
- IV Kadar tindak balas pada aras Z boleh ditingkatkan jika lebih banyak substrat ditambah
Rate of reaction at level Z can be increased if more substrate is added

A I dan II / I and II

C II dan IV / II and IV

B I dan III / I and III

D III dan IV / III and IV

- 6 Satu molekul K bergabung dengan tiga molekul L melalui proses kondensasi untuk menghasilkan satu molekul M dan tiga molekul N. Antara yang berikut, yang manakah merupakan K, L, M dan N?

One molecule K combines with three molecules L by condensation process to produce one molecule M and three molecules N. Which of the following is correct for K, L, M and N?

	K	L	M	N
A	Gliserol <i>Glycerol</i>	Asid lemak <i>Fatty acid</i>	Air <i>Water</i>	Trigliserida <i>Triglyceride</i>
B	Asid lemak <i>Fatty acid</i>	Gliserol <i>Glycerol</i>	Trigliserida <i>Triglyceride</i>	Air <i>Water</i>
C	Gliserol <i>Glycerol</i>	Asid lemak <i>Fatty acid</i>	Trigliserida <i>Triglyceride</i>	Air <i>Water</i>
D	Asid lemak <i>Fatty acid</i>	Gliserol <i>Glycerol</i>	Air <i>Water</i>	Trigliserida <i>Triglyceride</i>

- 7 Rajah 4 menunjukkan sejenis makanan yang dihasilkan melalui proses fermentasi.
Diagram 4 shows a type of food produced using fermentation process.



Rajah 4 / Diagram 4

Persamaan perkataan manakah yang menunjukkan proses fermentasi yang berlaku dalam makanan tersebut?

Which word equation shows the fermentation process that occur in the food?

- A Glukosa + Oksigen $\longrightarrow$ Etanol + Karbon dioksida + Tenaga
Glucose + Oxygen $\longrightarrow$ Ethanol + Carbon dioxide + Energy
- B Glukosa + Oksigen $\longrightarrow$ Asid laktik + Tenaga + Air
Glucose + Oxygen $\longrightarrow$ Lactic acid + Energy + Water
- C Glukosa $\longrightarrow$ Etanol + Karbon dioksida + Tenaga
Glucose $\longrightarrow$ Ethanol + Carbon dioxide + Energy
- D Glukosa $\longrightarrow$ Asid laktik + Tenaga
Glucose $\longrightarrow$ Lactic acid + Energy

- 8 Rajah 5 menunjukkan satu peringkat pembahagian sel dalam organ pembiakan seekor haiwan.

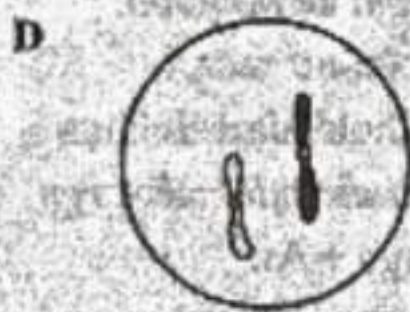
Diagram 5 shows a stage of a cell division in the reproductive organ of an animal.



Rajah 5 / Diagram 5

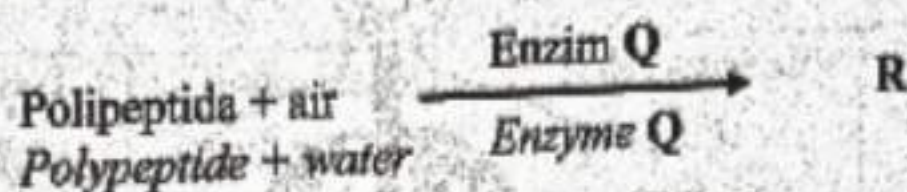
Rajah manakah yang mewakili sel gamet setelah pembahagian sel itu lengkap?

Which diagram represents the gamete cell after the cell division is completed?



- 9 Persamaan perkataan berikut menunjukkan suatu proses yang berlaku dalam organ P dalam sistem pencernaan manusia.

The following word equation shows a process that occurs in organ P in the human digestive system.



Apakah organ P, enzim Q dan R?

What is organ P, enzyme Q and R?

	P	Q	R
A	Perut <i>Stomach</i>	Pepsin <i>Pepsin</i>	Peptida <i>Peptide</i>
B	Mulut <i>Mouth</i>	Amilase liur <i>Salivary amilase</i>	Maltosa <i>Maltose</i>
C	Duodenum <i>Duodenum</i>	Tripsin <i>Trypsin</i>	Peptida <i>Peptide</i>
D	Duodenum <i>Duodenum</i>	Erepsin <i>Erypsin</i>	Asid amino <i>Amino acids</i>

- 10 Rajah 6 menunjukkan sistem respirasi manusia.
Diagram 6 shows the human respiratory system.



Rajah 6/ Diagram 6

Apakah perubahan yang berlaku kepada Q semasa menarik nafas?
What changes happen to Q during inhalation?

- A Mengecut, menjadi leper dan mendatar
Contracts, becomes flat and horizontal
- B Mengecut dan melengkung ke atas membentuk kubah
Contract and curves upwards to form a dome
- C Mengendur, menjadi leper dan mendatar
Relaxes, becomes flat and horizontal
- D Mengendur dan melengkung ke atas membentuk kubah
Relaxes and curves upwards to form a dome
- 11 Pernyataan berikut menunjukkan ciri-ciri sistem peredaran dalam satu organisma.
The following statements are the characteristics of a circulatory system in an organism.

- Mempunyai sistem peredaran tertutup
Has a closed circulatory system
- Darah mengalir dalam peredaran pulmokutanens dan peredaran sistemik
Blood flows in the pulmocutaneous circulation and systemic circulation

Apakah organisma tersebut?
What is the organism?

- A Ikan / Fish
B Belalang / Grasshopper
C Katak / Frog
D Manusia / Human

- 12 Jadual 1 menunjukkan keputusan eksperimen untuk menentukan nilai tenaga bagi sampel makanan yang berbeza.

Table 1 shows the results of an experiment to determine the energy value of different food samples.

Sampel makanan <i>Food sample</i>	Jisim sampel makanan (g) <i>Food sample mass (g)</i>	Suhu awal air (°C) <i>Initial temperature of water (°C)</i>	Suhu akhir air (°C) <i>Final temperature of water (°C)</i>
P	2.50	28	90
Q	2.17	28	59
R	1.95	28	75
S	1.49	28	85

Jadual 1 / Table 1

[Muatan haba tentu air ialah $4.2 \text{ Jg}^{-1}\text{°C}^{-1}$ / *Specific heat capacity of water is $4.2 \text{ Jg}^{-1}\text{°C}^{-1}$*]

[Jisim air ialah 20g / *Mass of water is 20g*]

Antara yang berikut, sampel makanan yang manakah mempunyai nilai tenaga paling tinggi?

Which of the following food sample has the highest energy value?

A P

C R

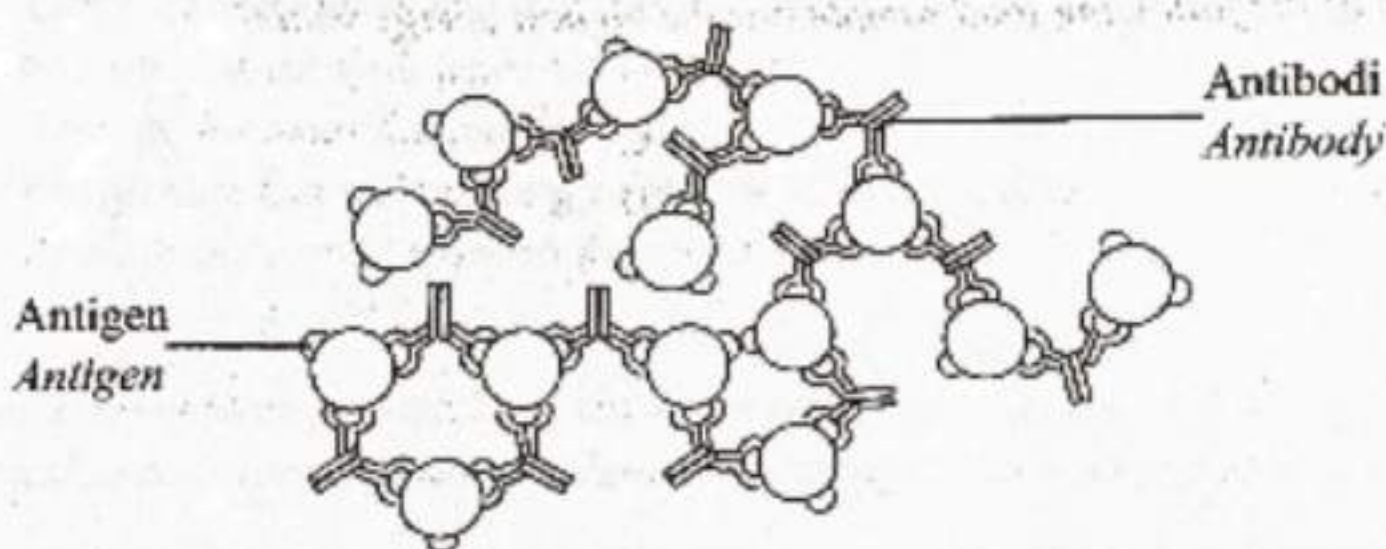
B Q

D S

- 13 Seorang individu mendapati luka kecil pada jarinya mengambil masa yang lama untuk berhenti berdarah. Selepas pemeriksaan, doktor mencadangkan pengambilan makanan yang kaya dengan vitamin K. Bagaimanakah vitamin K membantu dalam situasi ini?
An individual noticed that a small cut on his finger took a long time to stop bleeding. After examination, the doctor suggested consuming foods rich in vitamin K. How does vitamin K help in this situation?

- A Menghasilkan lebih banyak sel darah merah untuk menutup luka
Produces more red blood cells to close wound
- B Mempercepatkan penukaran fibrin kepada fibrinogen
Accelerates the conversion of fibrin to fibrinogen
- C Membantu trombokinase menukarkan protrombin kepada trombin
Helps thrombokinase convert prothrombin to thrombin
- D Menghalang tindakan heparin di kawasan luka
Blocks the action of heparin in the wound area

- 14 Rajah 7 menunjukkan tindak balas antara antibodi dengan antigen.
Diagram 7 shows a reaction between the antibodies and the antigens.



Rajah 7/ Diagram 7

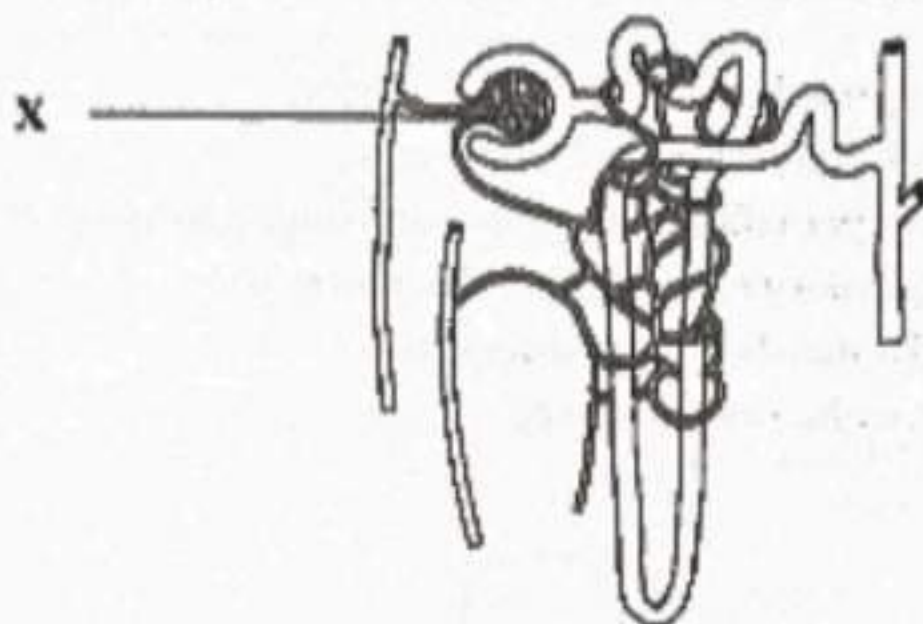
Antara yang berikut, yang manakah merupakan mekanisme tindak balas yang ditunjukkan dalam Rajah 7?

Which of the following mechanism refers to the reaction shown in Diagram 7?

- A Pengopsoninan / Opsonisation
- B Penguraian / Lysis
- C Peneutralan / Neutralisation
- D Pengaglutinan / Agglutination



- 15 Rajah 8 menunjukkan struktur nefron.
Diagram 8 shows the structure of a nephron.



Rajah 8 / Diagram 8

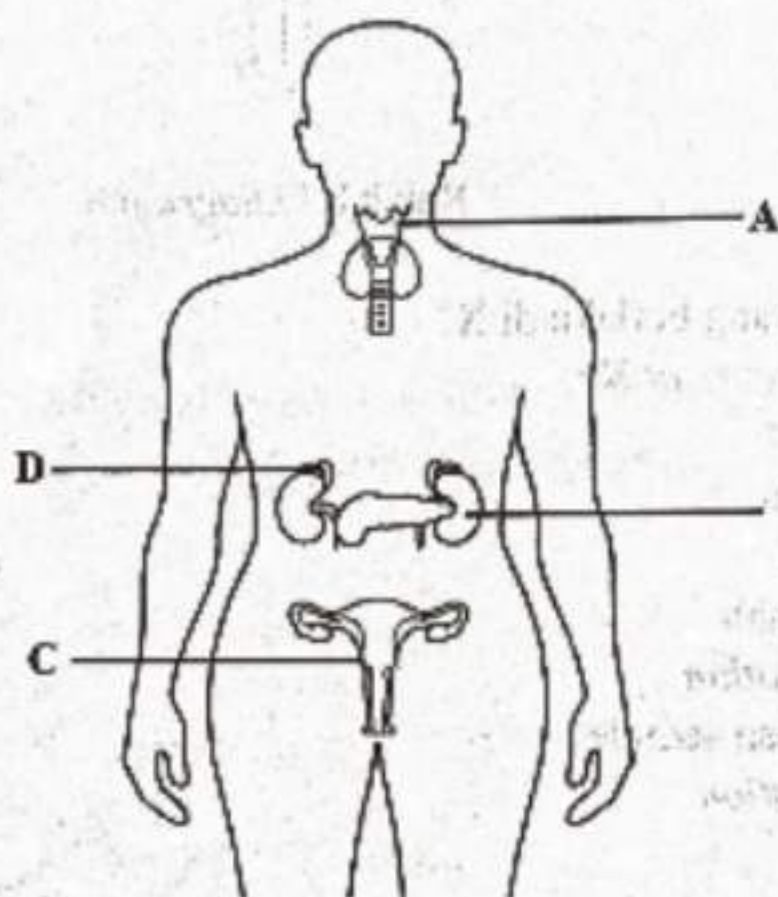
Apakah proses yang berlaku di X?
What process occurs at X?

- A Rembesan
Secretion
 - B Ultraturasan
Ultrafiltration
 - C Penyerapan semula
Reabsorption
- 16 Seorang pesakit diabetes insipidus menghasilkan air kencing yang banyak dan sentiasa berasa haus. Apakah punca penyakit ini?
A patient with diabetes insipidus produces a lot of urine and constantly feeling thirsty. What is the cause of this disease?
- A Kekurangan rembesan hormon tiroksina
Deficiency of thyroxine hormone secretion
 - B Peningkatan rembesan hormon tiroksina
Increased secretion of thyroxine hormone
 - C Kekurangan rembesan hormon ADH
Deficiency of ADH secretion
 - D Peningkatan rembesan hormon ADH
Increased secretion of ADH

- 17 Maklumat berikut menunjukkan gerak balas terhadap situasi yang dihadapi oleh seseorang individu.

The following information shows the responses to a situation faced by an individual.

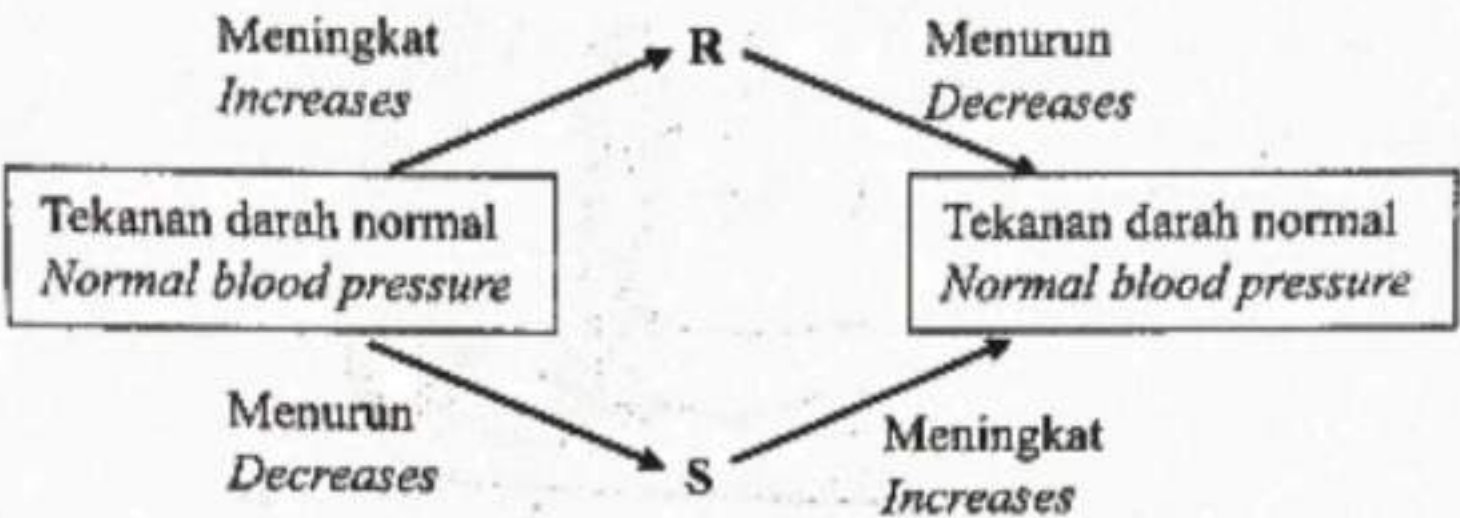
- Aras gula dan asid lemak meningkat
Sugar and fatty acid levels increase
- Kadar pernafasan dan denyutan jantung meningkat
Respiratory rate and heartbeat increase
- Kadar metabolisme meningkat
Metabolic rate increases



Antara A, B, C dan D, kelenjar endokrin yang manakah dirangsang semasa situasi tersebut?

Which endocrine glands A, B, C or D is stimulated during the situation?

- 18 Rajah 9 menunjukkan mekanisme kawal atur tekanan darah.
Diagram 9 shows the regulatory mechanism of blood pressure.

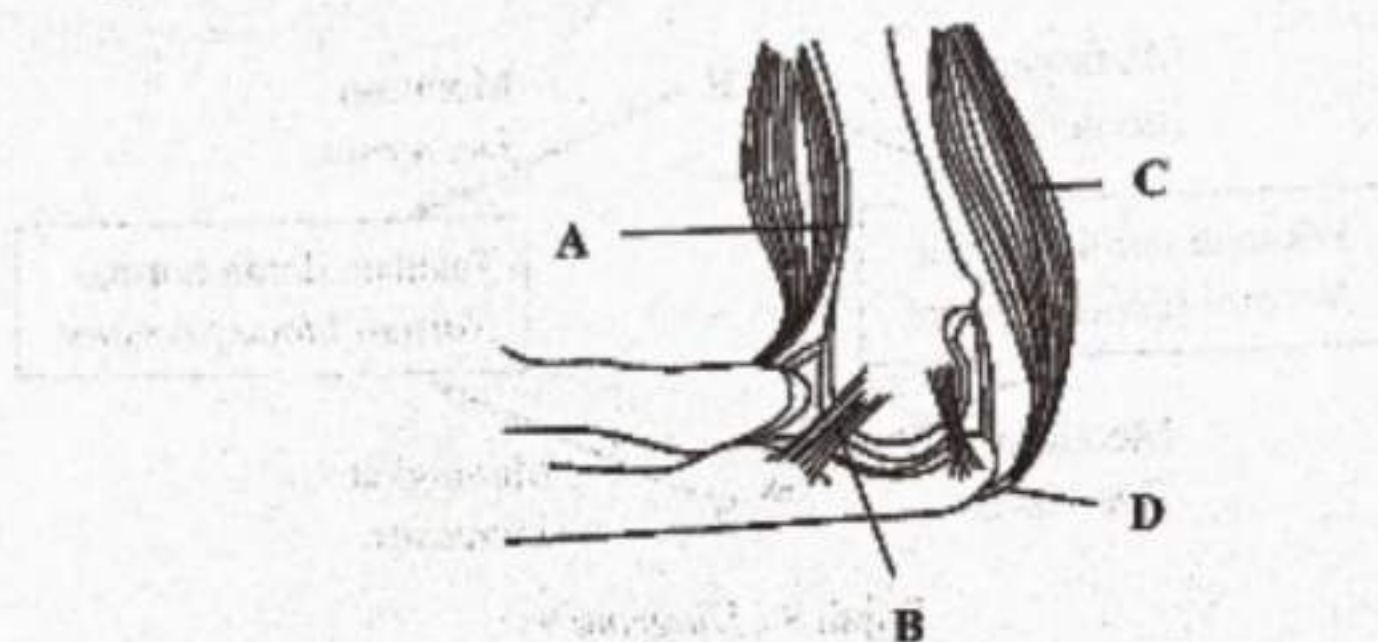


Rajah 9 / Diagram 9

Pernyataan yang manakah betul tentang R dan S?
Which statements are correct about R and S?

	R	S
A	Baroreseptor di arka aorta dan arteri karotid kurang dirangsang <i>Baroreceptors in the aortic arch and carotid artery are less stimulated</i>	Baroreseptor di arka aorta dan arteri karotid dirangsang <i>Baroreceptors in the aortic arch and carotid artery are stimulated</i>
B	Baroreseptor di arka aorta dan arteri karotid dirangsang <i>Baroreceptors in the aortic arch and carotid artery are stimulated</i>	Baroreseptor di arka aorta dan arteri karotid kurang dirangsang <i>Baroreceptors in the aortic arch and carotid artery are less stimulated</i>
C	Baroreseptor di arka aorta dan arteri karotid direncat <i>Baroreceptors in the aortic arch and carotid artery are inhibited</i>	Baroreseptor di arka aorta dan arteri karotid kurang direncat <i>Baroreceptors in the aortic arch and carotid artery are less inhibited</i>
D	Baroreseptor di arka aorta dan arteri karotid kurang direncat <i>Baroreceptors in the aortic arch and carotid artery are less inhibited</i>	Baroreseptor di arka aorta dan arteri karotid direncat <i>Baroreceptors in the aortic arch and carotid artery are inhibited</i>

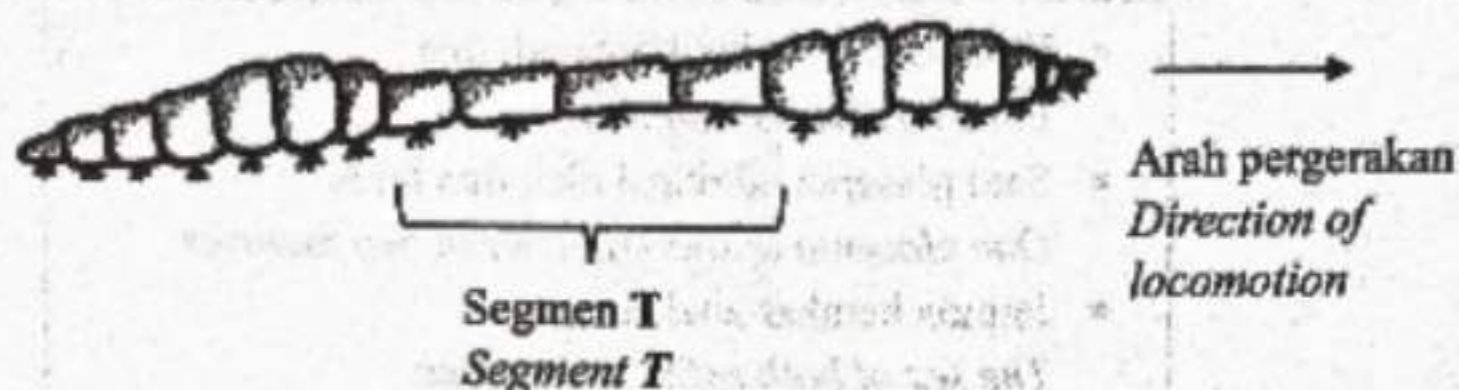
- 19 Rajah 10 menunjukkan struktur suatu sendi.
Diagram 10 shows the structure of a joint.



Rajah 10 / Diagram 10

Antara A, B, C dan D, struktur manakah yang kukuh, tidak kenyal dan boleh dilentur?
Which of the following structures A, B, C or D is strong, not elastic but flexible?

- 20 Rajah 11 menunjukkan pergerakan seekor cacing tanah.
Diagram 11 shows the locomotion of an earthworm.



Rajah 11 / Diagram 11

Antara yang berikut, yang manakah betul tentang tindakan otot pada segmen T?
Which of the following is correct about the action of muscles in segment T?

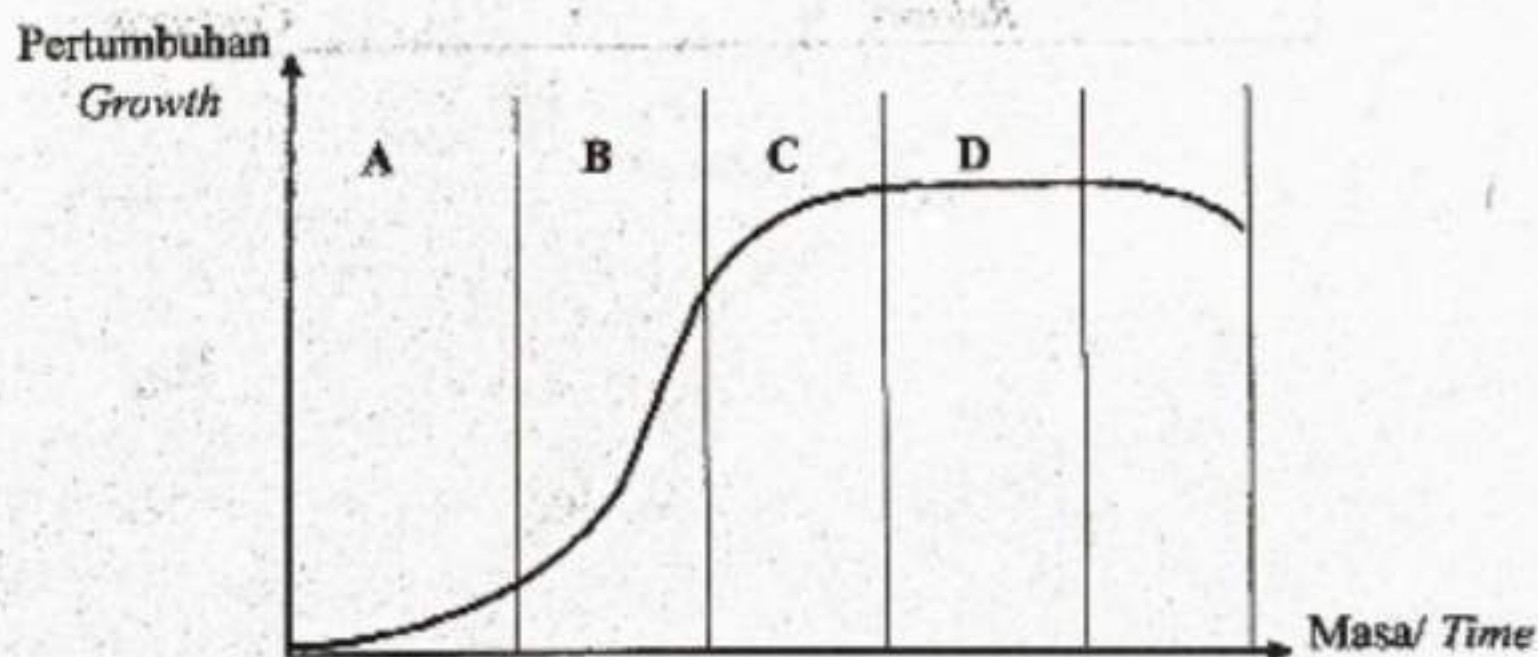
	Otot lingkar <i>Circular muscle</i>	Otot membujur <i>Longitudinal muscle</i>
A	Mengecut <i>Contracts</i>	Mengecut <i>Contracts</i>
B	Mengecut <i>Contracts</i>	Mengendur <i>Relaxes</i>
C	Mengendur <i>Relaxes</i>	Mengendur <i>Relaxes</i>
D	Mengendur <i>Relaxes</i>	Mengecut <i>Contracts</i>

- 21 Maklumat berikut adalah tentang ciri-ciri anak kembar.
The following informations are about the characteristics of twins.

- Embrio membahagi menjadi dua
Embryo divides into two
- Satu plasenta dikongsi oleh dua fetus
One placenta is shared between two foetuses
- Jantina kembar adalah sama
The sex of both twins is the same

Apakah jenis anak kembar tersebut?
What is the type of the twins?

- A Kembar Siam
Conjoined twins
- B Kembar seiras
Identical twins
- C Kembar tak seiras
Fraternal twins
- 22 Rajah 12 menunjukkan lengkung pertumbuhan dalam manusia.
Diagram 12 shows a growth curve in human.

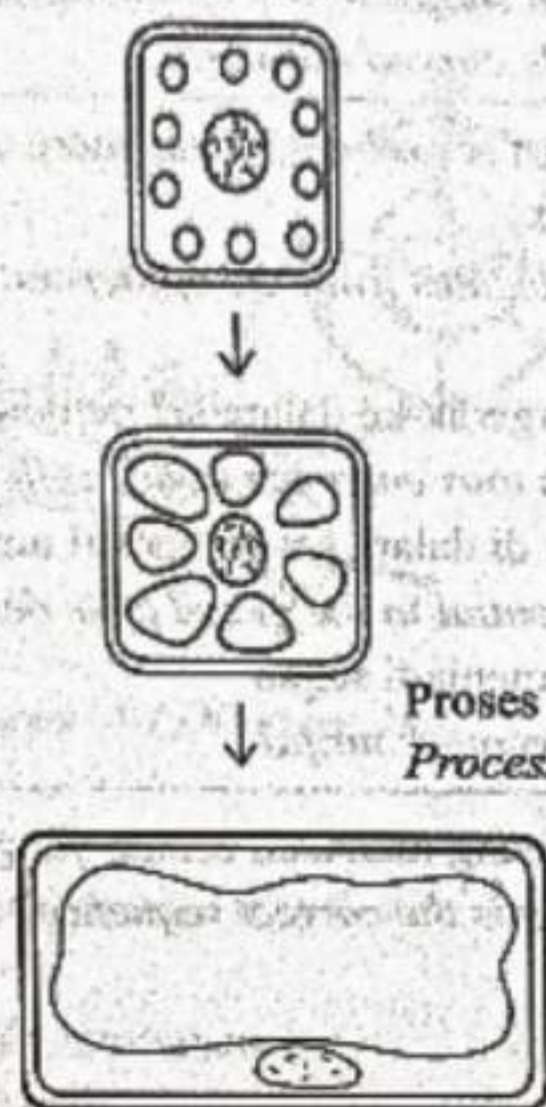


Rajah 12 / Diagram 12

Antara A, B, C dan D, fasa yang manakah berlakunya kadar pertumbuhan lambat dan berlaku pada kadar yang tetap?
Which of the following phases A, B, C or D, the growth rate slows down and occurs at a constant rate?

<https://t.me/cikgufazLiebiosensei>

- 23 Rajah 13 menunjukkan perubahan yang berlaku semasa pemanjangan sel tumbuhan.
Diagram 13 shows the changes that occur during plant cell elongation.



Rajah 13 / Diagram 13

Pernyataan manakah yang menerangkan proses K?

Which statement explains process K?

- A Pertambahan bilangan sel menyebabkan pemanjangan organ tumbuhan
An increase in the number of cells causes the elongation of the plant organ
- B Sel membeza apabila mencapai saiz maksimum
Cells differentiates after reaching the maximum size
- C Sel berubah bentuk untuk menjadi sel khusus dengan fungsi tertentu
Cell changes its shape to become a specialised cell with a specific function
- D Vakuol-vakuol kecil bergabung untuk membentuk satu vakuol besar
Small vacuoles fuse to form a large vacuole

- 24 P, Q, R dan S adalah peringkat dalam pengambilan ion kalium oleh sel pengawal yang menyebabkan sel pengawal melengkung ke luar.
P, Q, R and S are the stages in the uptake of potassium ions by guard cells which caused the guard cells curved outwards.

- P – Molekul air dari sel-sel epidermis meresap masuk ke dalam sel pengawal secara osmosis
The water molecules from the epidermal cells diffuse into the guard cells by osmosis
- Q – Ion kalium bergerak ke dalam sel pengawal
The potassium ions enter the guard cells
- R – Keupayaan air di dalam sel pengawal menurun
The water potential in the guard cells decreases
- S – Sel pengawal menjadi segar
Guard cells becomes turgid

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

- A S, R, P, Q
B R, Q, S, P
C Q, R, P, S
D P, Q, R, S
- 25 Maklumat berikut adalah ciri struktur X di dalam akar.
The following information are the characteristics of structure X in the root.

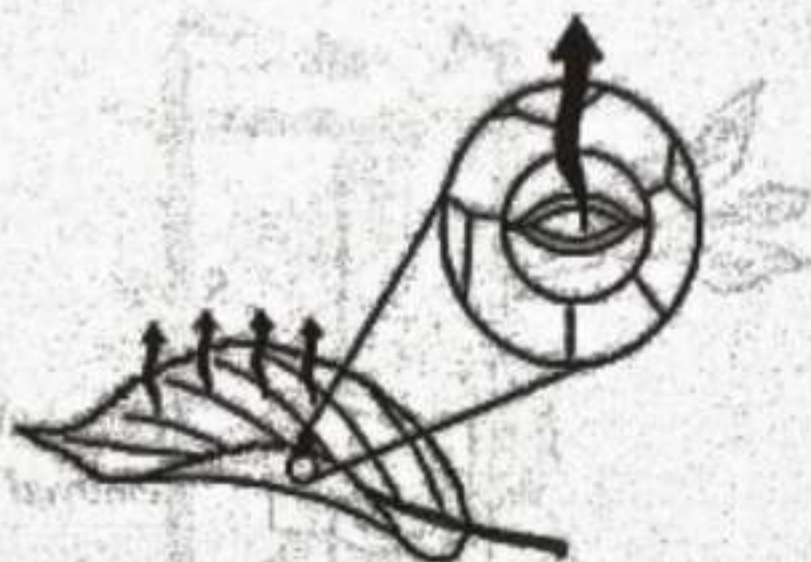
- Tersusun rapat dan setebal satu lapisan sel
Closely arranged and one cell thick
- Sebahagian besar sel mengalami penebalan suberin atau lignin pada dinding sel yang membentuk jalur Casparian
Most of the cells have suberin or lignin thickening at the walls which form Casparian strips

Apakah struktur X?
What is structure X?

- A Epidermis
Epidermis
- B Endodermis
Endodermis
- C Korteks
Cortex
- D Silinder vaskular
Vascular cylinder

- 26 Rajah 14 menunjukkan proses P yang berlaku di permukaan bawah daun pada keamatan cahaya yang tinggi.

Diagram 14 shows process P that occurs in a leaf at high light intensity.



Rajah 14 / Diagram 14

Apakah kepentingan proses P?

What is the importance of process P?

- A Menyingkirkan bahan kumuh tumbuhan

Eliminate plant waste substances

- B Meningkatkan tekanan urat daun

Increases leaf vein pressure

- C Mengekalkan suhu optimum tumbuhan

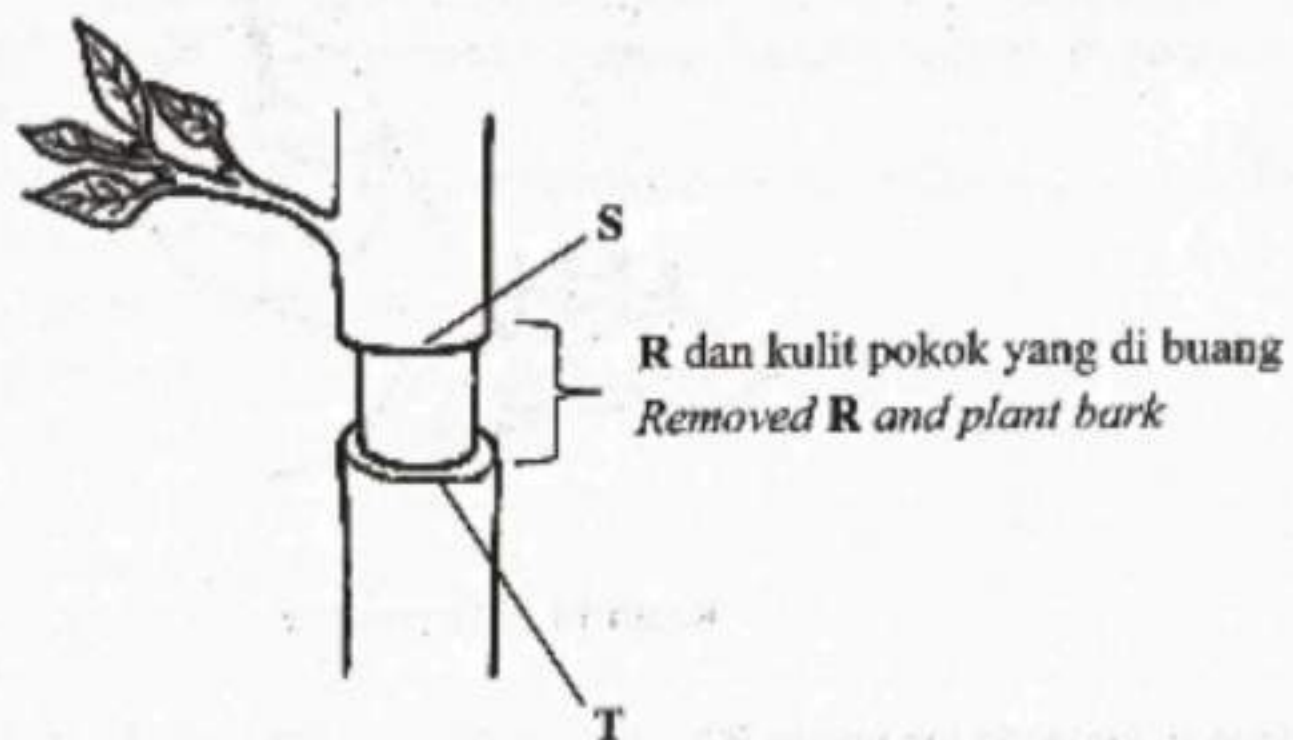
Maintains optimum plant temperature

- D Mengekalkan tekanan akar yang efektif

Maintains effective root pressure

- 27 Rajah 15 menunjukkan satu eksperimen untuk mengkaji pengangkutan bahan organik dalam tumbuhan.

Diagram 15 shows an experiment to study the transport of organic substances in plants.



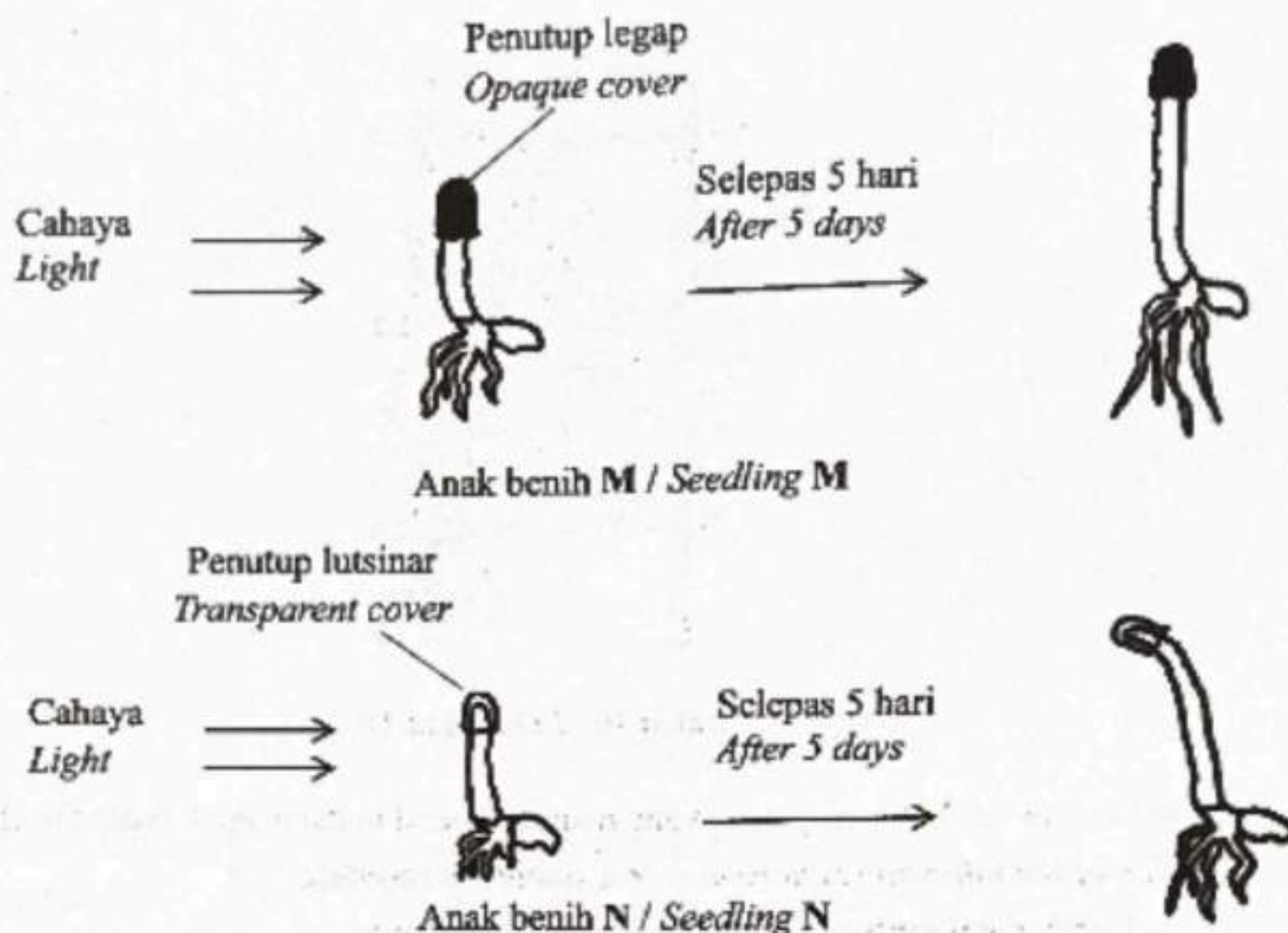
Rajah 15 / Diagram 15

Antara yang berikut, yang manakah betul tentang R, keadaan S dan T selepas 4 minggu?

Which of the following is correct about R, and the conditions of S and T after 4 weeks?

	R	Keadaan pada S <i>Condition at S</i>	Keadaan pada T <i>Condition at T</i>
A	Xilem <i>Xylem</i>	Mengecut <i>Shrink</i>	Membengkak <i>Swell</i>
B	Xilem <i>Xylem</i>	Membengkak <i>Swell</i>	Mengecut <i>Shrink</i>
C	Floem <i>Phloem</i>	Mengecut <i>Shrink</i>	Membengkak <i>Swell</i>
D	Floem <i>Phloem</i>	Membengkak <i>Swell</i>	Mengecut <i>Shrink</i>

- 29 Rajah 17 menunjukkan gerak balas pertumbuhan anak benih M dan N terhadap cahaya.
Diagram 17 shows the growth response of seedling M and seedling N towards light.

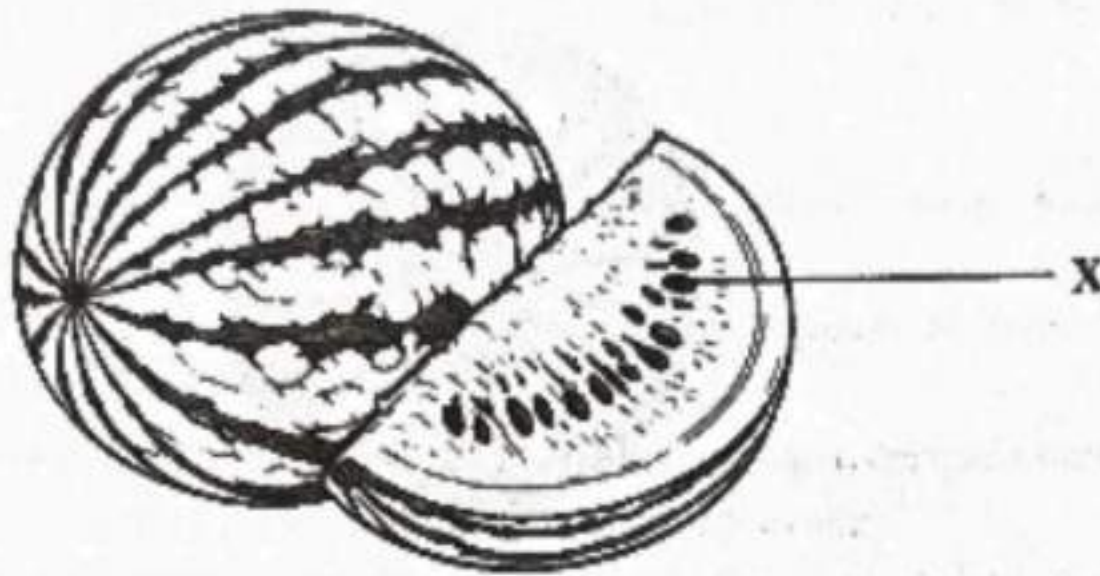


Rajah 17 / Diagram 17

Antara berikut yang manakah menerangkan gerak balas pertumbuhan selepas 5 hari?
Which of the following explain the growth response after 5 days?

	Anak benih M Seedling M	Anak benih N Seedling N
A	Taburan auksin pada pucuk adalah sekata <i>Distribution of auxin in shoot is uniform</i>	Auksin bergerak menjauhi cahaya <i>Auxin moves away from the light</i>
B	Auksin bergerak mendekati cahaya <i>Auxin moves towards light</i>	Taburan auksin pada pucuk adalah sekata <i>Distribution of auxin in shoot is uniform</i>
C	Taburan auksin pada pucuk adalah sekata <i>Distribution of auxin in shoot is uniform</i>	Auksin bergerak mendekati cahaya <i>Auxin moves towards light</i>
D	Auksin bergerak menjauhi cahaya <i>Auxin moves away from the light</i>	Taburan auksin pada pucuk adalah sekata <i>Distribution of auxin in shoot is uniform</i>

- 30 Rajah 18 menunjukkan sejenis buah.
Diagram 18 shows a type of fruit.



Rajah 18 / Diagram 18

Apakah kepentingan tumbuhan menghasilkan buah yang mengandungi banyak struktur X?

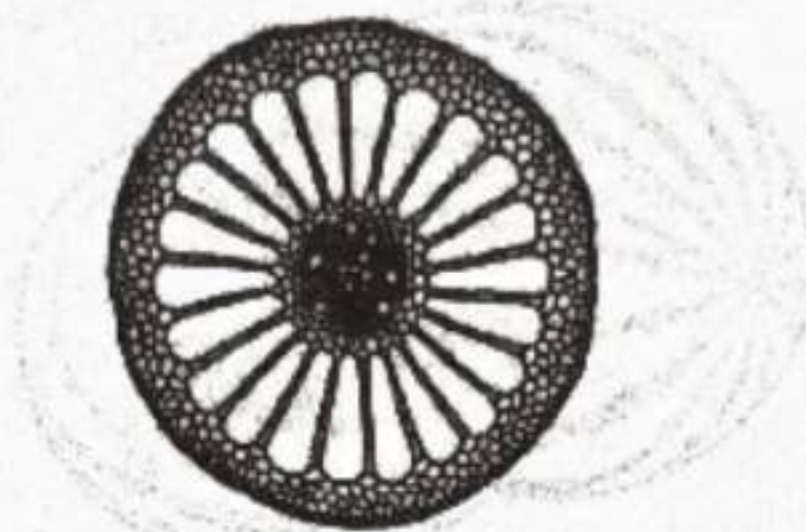
What is the importance of the plant producing fruits with many structure X?

- | | | |
|---|--|----|
| A | Memastikan pembentukan tisu endosperma untuk menyimpan makanan
<i>Ensure the formation of endosperm tissue to store food</i> | |
| B | Meningkatkan peluang bagi melakukan persenyawaan ganda dua
<i>Increases the chances for double fertilisation to occur</i> | 47 |
| C | Meningkatkan peluang pembiakan untuk kemandirian spesies
<i>Increases the chances of reproduction for survival of the species</i> | 50 |
| D | Memastikan pembentukan mesokarpa yang besar dan berjus
<i>Ensure the formation of a big and juicy mesocarp</i> | 53 |

- 31 Antara yang berikut, yang manakah dikelaskan di bawah alam Eubacteria?
Which of the following is classified under the kingdom of Eubacteria?

- | | | | |
|---|---------------------------------|---|---------------------------------|
| A | <i>Streptococcus pneumoniae</i> | C | <i>Elephas maximus</i> |
| B | <i>Halobacterium salinarum</i> | D | <i>Saccharomyces cerevistae</i> |

- 32 Rajah 19 menunjukkan sejenis tisu yang ditemui pada tumbuhan P.
Diagram 19 shows a type of tissue found in plant P.



Rajah 19 / Diagram 19

Antara yang berikut, padanan manakah yang betul bagi tumbuhan P berdasarkan habitatnya?

Which of the following is the correct match for plant P based on its habitat?

	Kelas tumbuhan P <i>Class of plant P</i>	Habitat <i>Habitat</i>
A	Halofit <i>Halophytes</i>	Hutan paya bakau <i>Mangrove forest</i>
B	Hidrofit <i>Hydrophytes</i>	Tasik air tawar <i>Freshwater lake</i>
C	Halofit <i>Halophytes</i>	Tasik air tawar <i>Freshwater lake</i>
D	Hidrofit <i>Hydrophytes</i>	Hutan paya bakau <i>Mangrove forest</i>

- 33 Maklumat berikut adalah ciri-ciri penyesuaian tumbuhan K terhadap keadaan persekitaran yang kurang sesuai.

The following information are the adaptation features of plant K in an inapt environment.

- Mempunyai daun berkutikel tebal serta stoma yang terbenam untuk mengurangkan kadar transpirasi
Has leaves with thick cuticles and sunken stomata to reduce the rate of transpiration
- Mempunyai akar jangkang untuk memberi sokongan daripada ombak yang kuat
Has prop roots to provide support from strong waves
- Mempunyai benih vivipariti yang tercacak di atas tanah berlumpur agar tidak dihanyutkan oleh ombak
Has viviparous seeds that stuck into the muddy soil to prevent from being uprooted by the waves

Apakah tumbuhan K?

What is plant K?

A *Avicennia* sp.

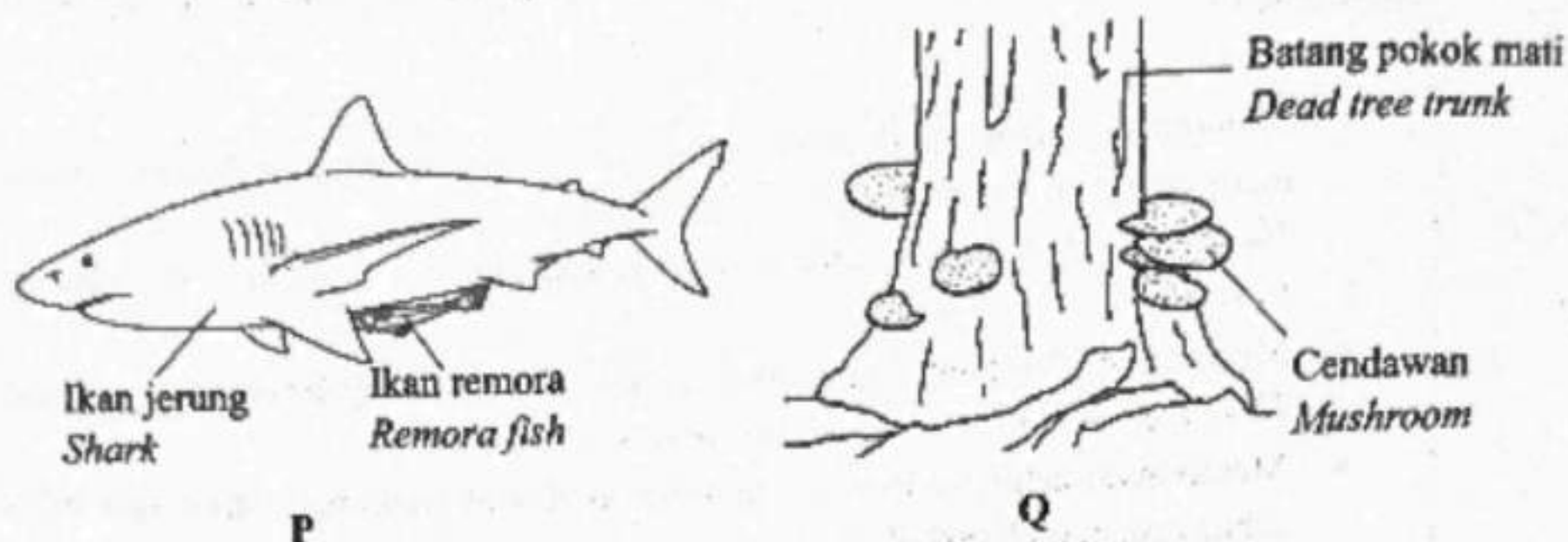
C *Rhizophora* sp.

B *Sonneratia* sp.

D *Bruguiera* sp.

<https://t.me/olkufazliebiosensei>

- 34 Rajah 20 menunjukkan dua jenis interaksi antara organisma, P dan Q.
Diagram 20 shows two types of interactions between organisms P and Q.



Rajah 20 / Diagram 20

Apakah jenis interaksi yang ditunjukkan oleh P dan Q?
What are the types of interactions shown by P and Q?

	P	Q
A	Mutualisme / Mutualism	Parasitisme / Parasitism
B	Mutualisme / Mutualism	Saprophytisme / Saprophytism
C	Komensalisme / Commensalism	Parasitisme / Parasitism
D	Komensalisme / Commensalism	Saprophytisme / Saprophytism

- 35 Antara bahan pencemar udara berikut, yang manakah boleh menyebabkan hujan asid?
Which of the following air pollutants can cause acid rain?
- A Sulfur dioksida dari pembakaran bahan api fosil
Sulphur dioxide from burning of fossil fuel
 - B Karbon monoksida dari asap ekzos kenderaan
Carbon monoxide from car exhaust fumes
 - C Asap dari pembakaran kayu
Smoke from burning of woods
 - D Debu dari kilang simen
Dust from cement factories

- 36 Antara yang berikut, yang manakah kesan pencemaran termal?
Which of the following is the effect of thermal pollution?

- I Keterlarutan oksigen dalam air bertambah
The solubility of oxygen in water increases
- II Kandungan oksigen dalam air berkurangan
Oxygen content in water decreases
- III Keperluan oksigen biokimia berkurangan
Biochemical oxygen demand decreases
- IV Habitat organisma akuatik terjejas
The habitat of aquatic organism is disrupted

A I dan II / *I and II*

C II dan IV / *II and IV*

B I dan III / *I and III*

D III dan IV / *III and IV*

- 37 Dalam pokok kacang pis, bentuk biji benih bulat adalah dominan kepada biji benih berkedut. Kacukan antara pokok kacang pis biji benih bulat dengan pokok kacang pis biji benih berkedut menghasilkan 101 pokok biji benih bulat dan 98 pokok biji benih berkedut. Jika B adalah alel dominan bagi biji benih bulat dan b adalah alel resesif bagi biji benih berkedut, apakah genotip bagi pokok induk?

In pea plants, the round-shaped seed is dominant over wrinkled-shaped seed. A cross between a round-shaped seed pea plant and a wrinkled-shaped seed pea plant gave rise to 101 plants with round-shaped seed and 98 plants with wrinkled-shaped seed.

If B is the dominant allele for round-shaped seed and b is the recessive allele for wrinkled-shaped, what are the genotypes of the parents?

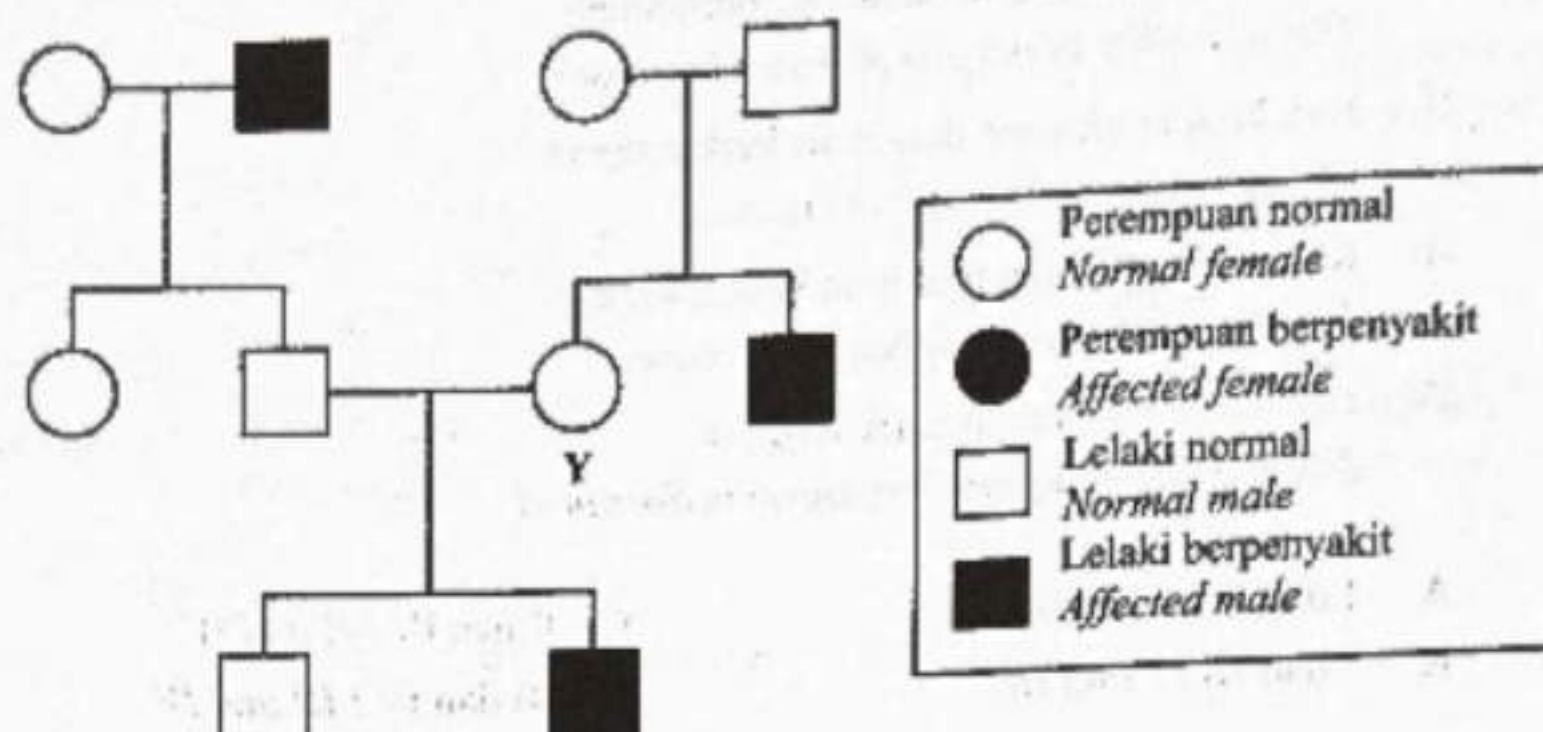
A BB x bb

C BB x Bb

B Bb x bb

D Bb x Bb

- 38 Rajah 21 menunjukkan pewarisan penyakit distrofi otot dalam suatu keluarga.
Diagram 21 shows the inheritance of muscular dystrophy in a family.



Rajah 21 / Diagram 21

- Distrofi otot merupakan penyakit genetik yang disebabkan oleh alel resesif pada kromosom X. Jika X^D ialah alel dominan dan X^d adalah alel resesif bagi penyakit tersebut, apakah genotip bagi individu Y?
Muscular dystrophy is a genetic disease caused by the recessive allele on the X chromosome. If X^D is the dominant allele and X^d is the recessive allele for the disease, what is the genotype of individual Y?

- A $X^D X^d$ C $X^D Y$
B $X^d X^d$ D $X^d Y$

- 39 Antara yang berikut, yang manakah kegunaan pemprofilan DNA?
Which of the following is the application of DNA profiling?

- A Meningkatkan nilai nutrien dalam makanan terubahsuai genetik
Increase the nutritional value in genetically modified food
- B Membantu perempuan yang sukar hamil
Assist women with difficulty to conceive
- C Menentukan keserasian penderma dan penerima organ
Determine the suitability of organ donor and the recipient
- D Merawat penyakit pewarisan seperti hemofilia
Treating inherited disease such as haemophilia

- 40 Rajah 22 menunjukkan variasi rama-rama *Biston betularia* pada batang pokok.
Diagram 22 shows the varietles of Biston betularia moths on a tree trunk.



Rajah 22 / Diagram 22

Apakah kesimpulan yang boleh dibuat daripada pemerhatian dalam Rajah 22?
What can be concluded from the observation shown in Diagram 22?

- I Variasi menyebabkan kepupusan organisma
Variation causes extinction of organisms
 - II Variasi dalam rama-rama adalah disebabkan oleh mutasi kromosom
Variation of the moths is caused by chromosomal mutation
 - III Variasi penting bagi kemandirian organisma
Variation is important for the survival of the organisms
 - IV Variasi membolehkan mangsa melindungi diri daripada pemangsa
Variation enables prey to protect themselves from predators
- A I dan II / *I and II*
 - B I dan III / *I and III*
 - C II dan IV / *II and IV*
 - D III dan IV / *III and IV*

KERTAS SOALAN TAMAT