

NAMA:

TINGKATAN:



**MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
NEGERI PERAK**

**MODUL KECEMERLANGAN SPM 2024
SET 1**

**BIOLOGI
KERTAS 1
1 JAM 15 MINIT**

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

ARAHAN:

1. Kertas peperiksaan ini mengandungi **40 soalan aneka pilihan**.
 2. Anda dikehendaki menjawab **semua** soalan.
 3. Jawab **semua** soalan dalam kertas objektif yang disediakan.
 4. Calon dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
-

- 1 Rajah 1 menunjukkan simbol pada beg plastik W.
Diagram 1 shows a symbol on plastic bag W.



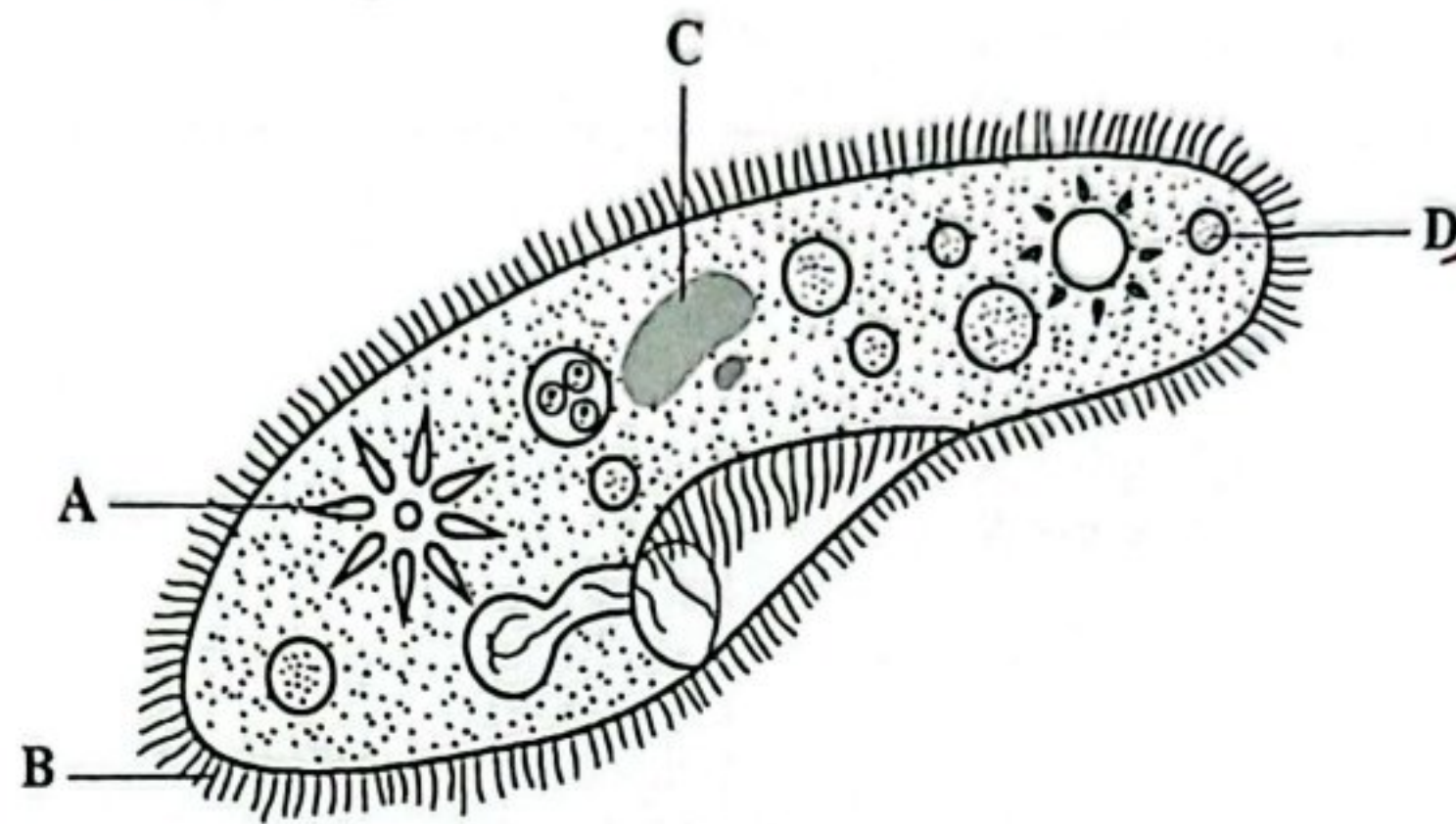
Rajah 1
Diagram 1

Antara yang berikut, yang manakah betul tentang kegunaan beg plastik W dalam pengurusan bahan sisa biologi?

Which of the following is correct about the use of plastic bag W in biological waste management?

- A Membungkus agar nutrien yang tercemar
Pack contaminated nutrient agar
- B Menyimpan medium kultur
Store culture medium
- C Membalut tabung uji pecah
Wrap broken test tube
- D Meletak skalpel
Place scalpel

- 2 Rajah 2 menunjukkan *Paramecium sp.*
 Diagram 2 shows *Paramecium sp.*



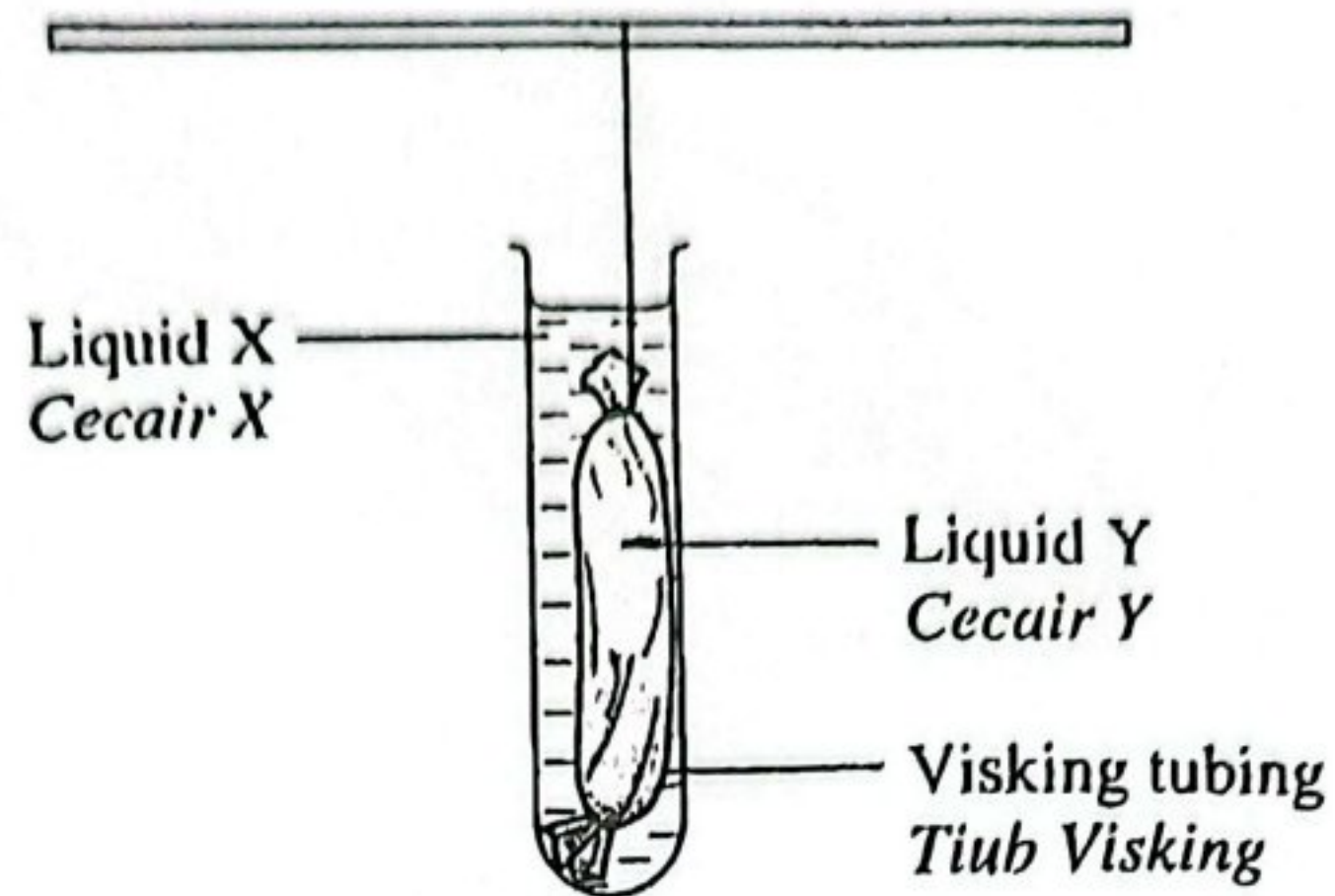
Rajah 2
 Diagram 2

Antara A, B, C dan D, yang manakah adalah vakuol makanan?
 Which of the following A, B, C or D is food vacuole?

- 3 Antara yang berikut, yang manakah adalah tisu penghubung bergentian?
 Which of the following is a fibrous connective tissue?

- A Darah /
Blood
- B Adipos
Adipose
- C Tulang
Bone
- D Tendon
Tendon

- 4 Rajah 3 menunjukkan satu eksperimen.
Diagram 3 shows an experiment.



Rajah 3
Diagram 3

Selepas satu jam, tiub Visking mengecut.

Antara yang berikut, yang manakah betul tentang eksperimen ini?

After an hour, the Visking tubing shrinks.

Which of the following is correct about the experiment?

	Cecair X <i>Liquid X</i>	Cecair Y <i>Liquid Y</i>	Molekul yang bergerak merentasi tiub Visking <i>Molecules that move across the Visking tubing</i>
A	Larutan sukrosa 10 % <i>10 % sucrose solution</i>	Larutan sukrosa 30 % <i>30 % sucrose solution</i>	Air <i>Water</i>
B	Larutan sukrosa 10 % <i>10 % sucrose solution</i>	Air suling <i>Distilled water</i>	Air dan sukrosa <i>Water and sucrose</i>
C	Air suling <i>Distilled water</i>	Larutan sukrosa 30 % <i>30 % sucrose solution</i>	Air dan sukrosa <i>Water and sucrose</i>
D	Larutan sukrosa 30 % <i>30 % sucrose solution</i>	Larutan sukrosa 10 % <i>10 % sucrose solution</i>	Air <i>Water</i>

- 5 Seorang pemain bola sepak baru sahaja selesai menjalani latihan bola sepak selama dua jam.

Antara A, B, C dan D minuman yang manakah paling sesuai untuk pemain tersebut untuk mendapatkan tenaga segera selepas latihan itu?

[Julat normal bagi kepekatan glukosa darah manusia adalah 4.0 – 5.7 %]

A football player has just finished football practice for two hours.

Which of the following drinks A, B, C or D is the most suitable for the player to obtain instant energy after the practise?

[The normal range of blood glucose concentration in human is 4.0 – 5.7 %]

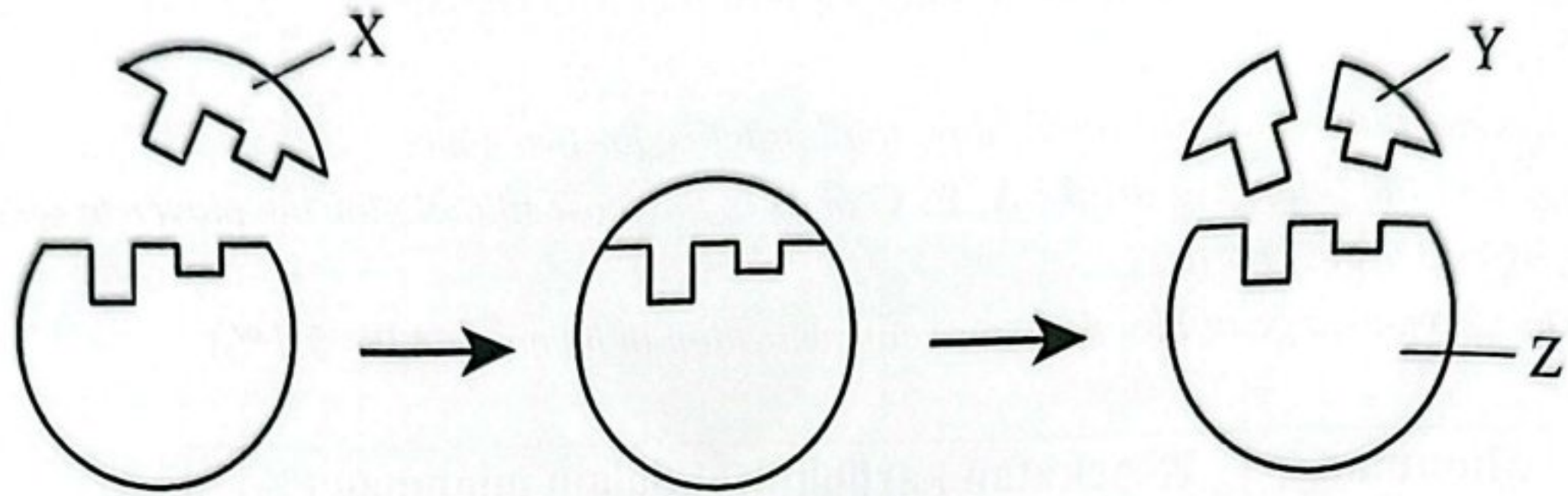
Minuman <i>Drink</i>	Kepekatan karbohidrat dalam minuman (%) <i>Carbohydrate concentration in the drink (%)</i>
A	1.5 – 3.0
B	4.5 – 5.5
C	6.0 – 7.0
D	10.0 – 11.5

- 6 Apakah ikatan yang terbentuk antara molekul air?

What bond is formed between water molecules?

- A Ikatan peptida
Peptide bond
- B Ikatan kovalen
Covalent bond
- C Ikatan hidrogen
Hydrogen bond
- D Ikatan ganda dua
Double bond

- 7 Rajah 4 menunjukkan satu tindakan enzim.
Diagram 4 shows an enzyme action.

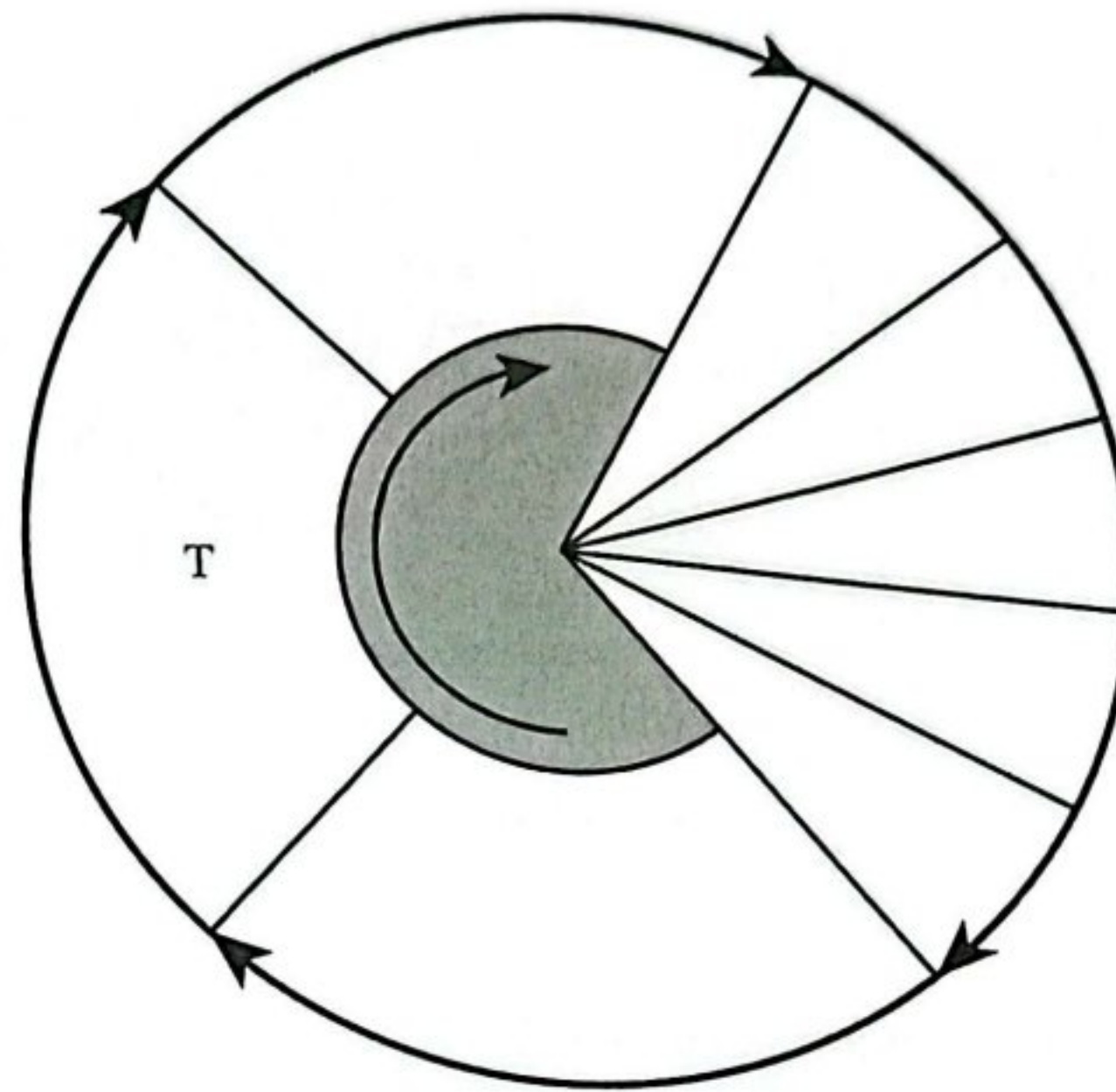


Rajah 4
 Diagram 4

Apakah X, Y dan Z?
 What are X, Y and Z?

	X	Y	Z
A	Enzim <i>Enzyme</i>	Substrat <i>Substrate</i>	Hasil <i>Product</i>
B	Substrat <i>Substrate</i>	Hasil <i>Product</i>	Enzim <i>Enzyme</i>
C	Hasil <i>Product</i>	Substrat <i>Substrate</i>	Enzim <i>Enzyme</i>
D	Substrat <i>Substrate</i>	Enzim <i>Enzyme</i>	Hasil <i>Product</i>

- 8 Rajah 5 menunjukkan fasa dalam kitar sel.
Diagram 5 shows the phases in a cell cycle.

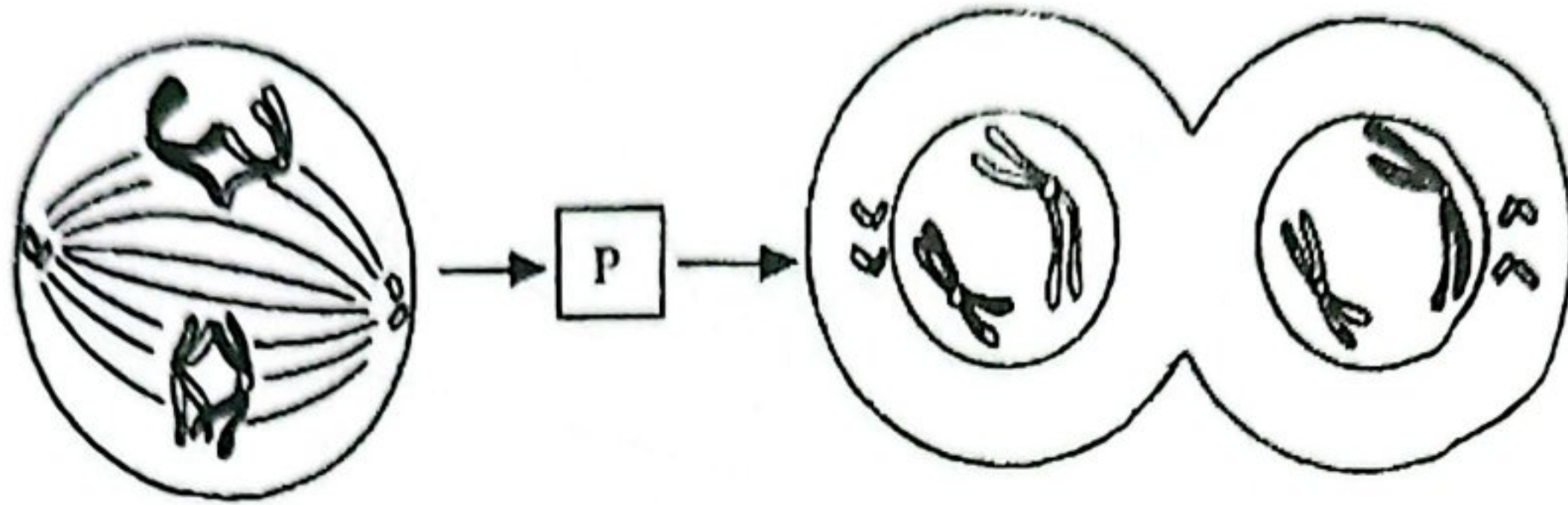


Rajah 5
 Diagram 5

Apakah fasa **T**?
What is phase T?

- | | |
|----------|----|
| A | S |
| B | M |
| C | G1 |
| D | G2 |

- 9 Rajah 6 menunjukkan beberapa peringkat dalam satu pembahagian sel.
Diagram 6 shows several stages in a cell division.



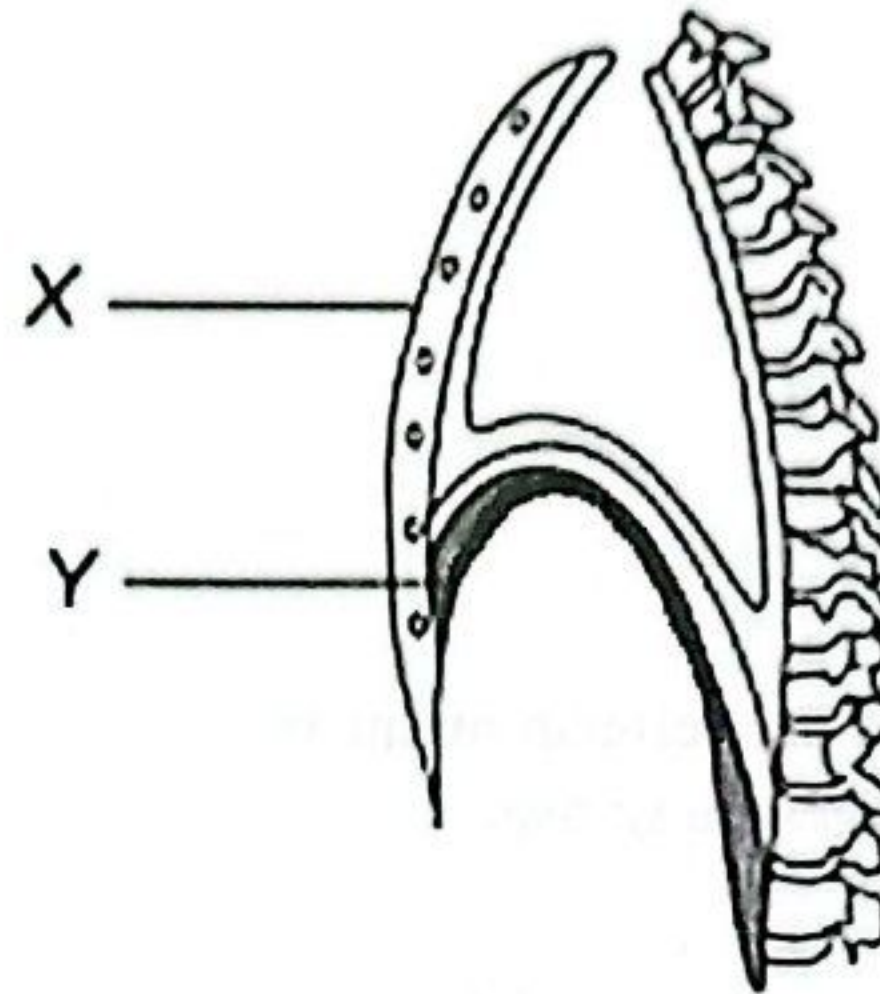
Rajah 6
 Diagram 6

Apakah perlakuan kromosom dalam peringkat P?
What is the chromosomal behaviour in stage P?

- A Kromosom menjalani pindah silang
Chromosomes undergo crossing over
 - B Kromosom tersusun di satah khatulistiwa
Chromosomes are arranged at the equatorial plane
 - C Kromosom homolog berpasangan membentuk bivalen
Homologous chromosomes pair together forming bivalent
 - D Kromosom homolog berpisah dan bergerak ke kutub yang bertentangan
Homologous chromosomes separate and move to the opposite poles
- 10 Persamaan yang manakah mewakili fermentasi yang berlaku di dalam yis?
Which equation represents the fermentation that occurs in the yeast?

- A Glukosa $\longrightarrow$ Asid laktik + tenaga
Glucose $\longrightarrow$ Lactic acid + energy
- B Glukosa + oksigen $\longrightarrow$ Karbon dioksida + air + tenaga
Glucose + oxygen $\longrightarrow$ Carbon dioxide + water + energy
- C Glukosa $\longrightarrow$ Etanol + karbon dioksida + tenaga
Glucose $\longrightarrow$ Ethanol + carbon dioxide + energy

- 11** Rajah 7 menunjukkan rongga toraks manusia.
Diagram 7 shows the thoracic cavity of human.



Rajah 7
 Diagram 7

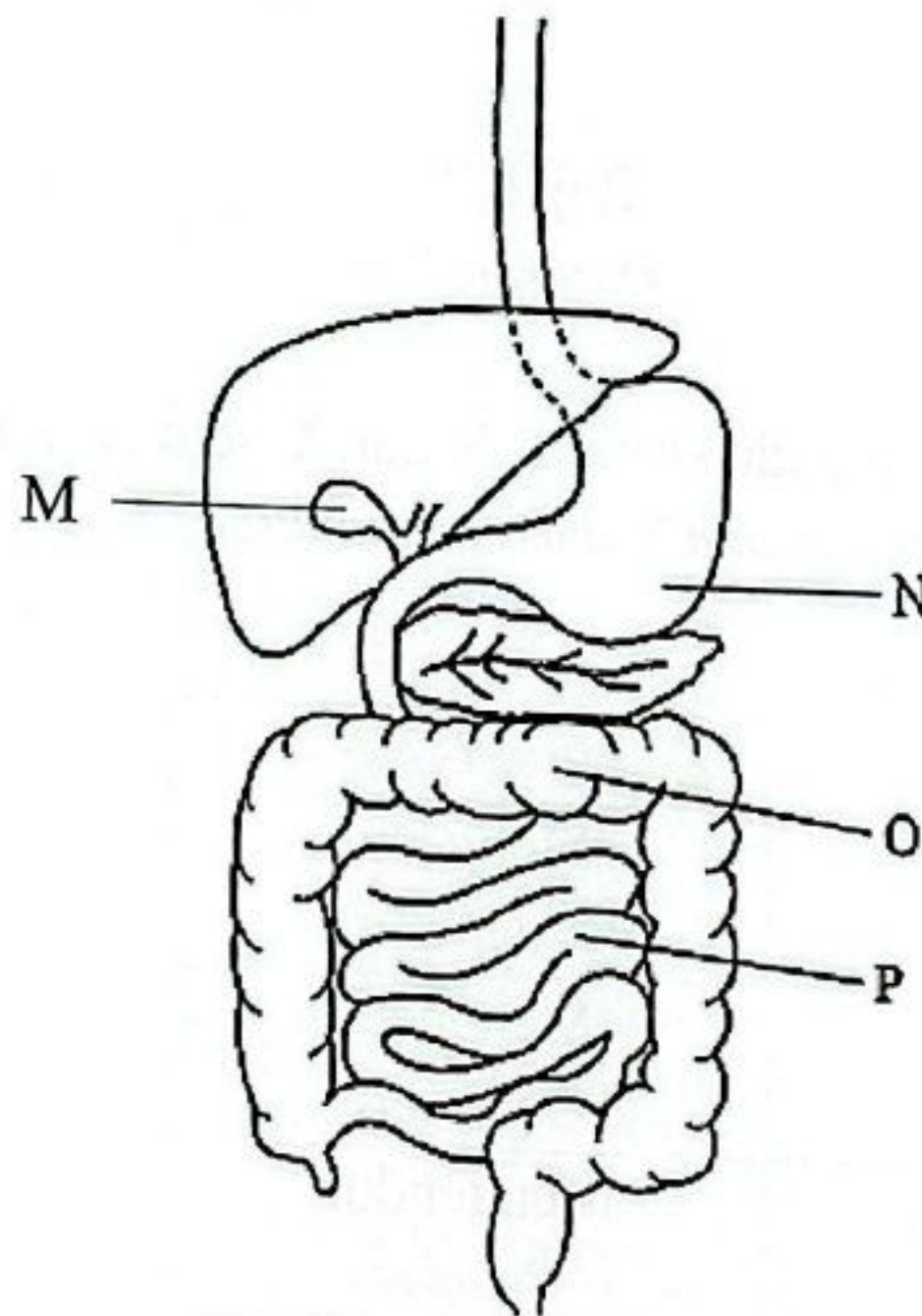
Apakah yang akan berlaku pada struktur X dan Y semasa tarikan nafas?
What will happen to structure X and Y during inhalation?

	X	Y
A	Mengendur <i>Relaxes</i>	Mengecut <i>Contracts</i>
B	Mengecut <i>Contracts</i>	Mengecut <i>Contracts</i>
C	Mengendur <i>Relaxes</i>	Mengendur <i>Relaxes</i>
D	Mengecut <i>Contracts</i>	Mengendur <i>Relaxes</i>

- 12 Dalam bentuk apakah peratusan karbon dioksida yang paling rendah diangkut di dalam sistem peredaran darah manusia?
In what form is the lowest percentage of carbon dioxide transported in the human blood circulatory system?

- A Ion bikarbonat
Bicarbonate ions
- B Asid karbonik
Carbonic acid
- C Karbaminohemoglobin
Carbaminohaemoglobin

- 13 Rajah 8 menunjukkan sistem pencernaan manusia.
Diagram 8 shows the human digestive system.



Rajah 8
 Diagram 8

Di manakah kim terbentuk?
Where is chyme formed?

- A M
- B N
- C O
- D P

- 14 Jadual 1 menunjukkan keputusan yang diperolehi dalam eksperimen untuk menentukan nilai tenaga dalam isi kelapa.

Table 1 shows the results obtained in an experiment to determine the energy value in coconut flesh.

Jisim air dalam tabung didih (g) <i>Mass of water in boiling tube (g)</i>	20.0
Jisim isi kelapa (g) <i>Mass of coconut flesh (g)</i>	0.5
Suhu awal air (°C) <i>Initial temperature of water (°C)</i>	28.0
Suhu akhir air (°C) <i>Final temperature of water (°C)</i>	90.0

Jadual 1

Table 1

[Muatan haba tentu air = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

[*Specific heat capacity of water* = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

Apakah nilai tenaga dalam isi kelapa tersebut?

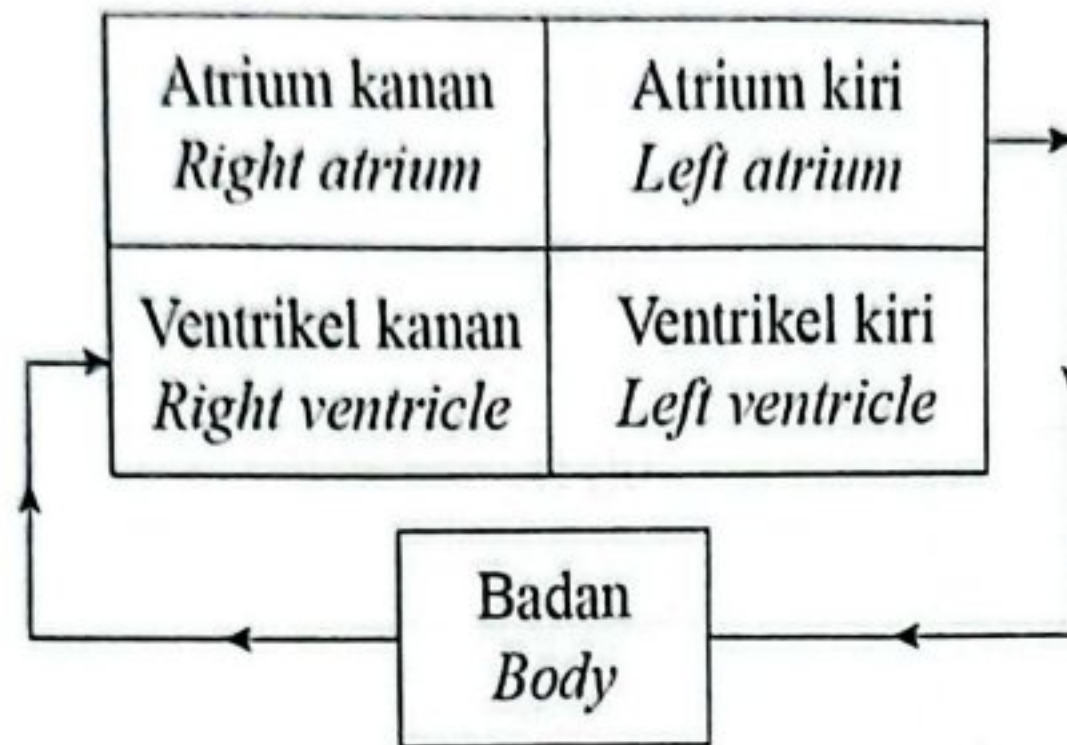
What is the energy value in the coconut flesh?

- A 10.42 kJ g^{-1}
- B 15.12 kJ g^{-1}
- C 10416 kJ g^{-1}
- D 15120 kJ g^{-1}

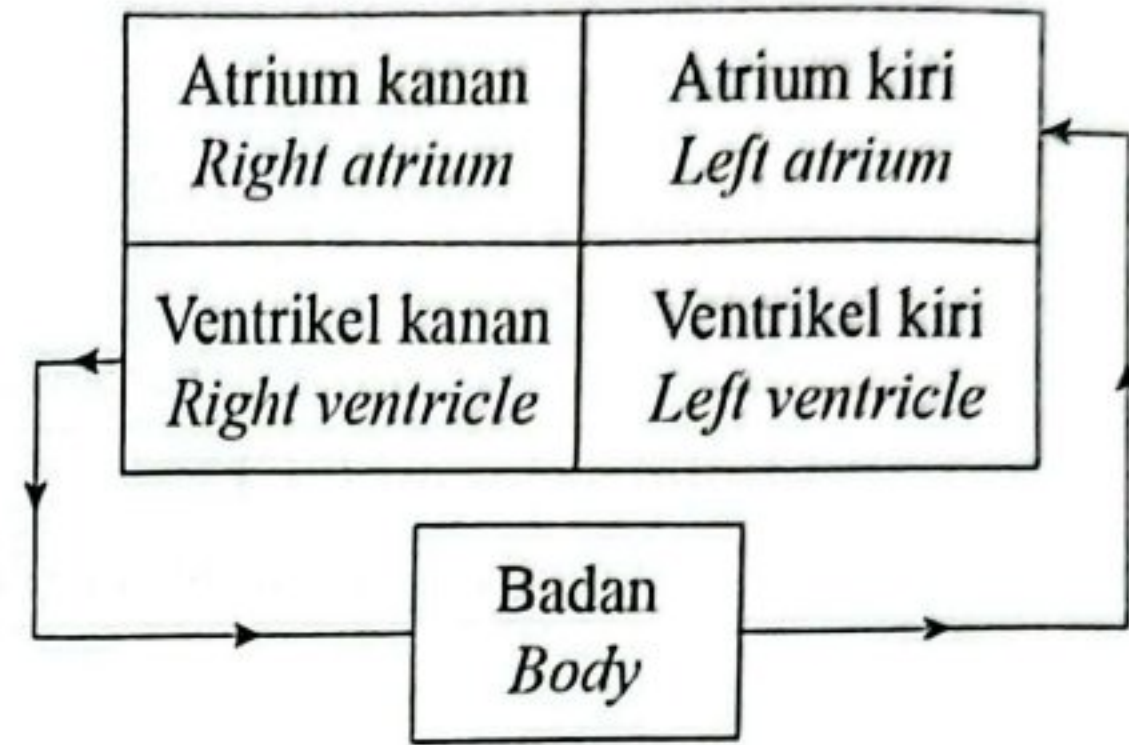
- 15 Antara yang berikut yang manakali yang menunjukkan peredaran sistemik dalam sistem peredaran darah manusia?

Which of the following shows the systemic circulation in the human blood circulatory system?

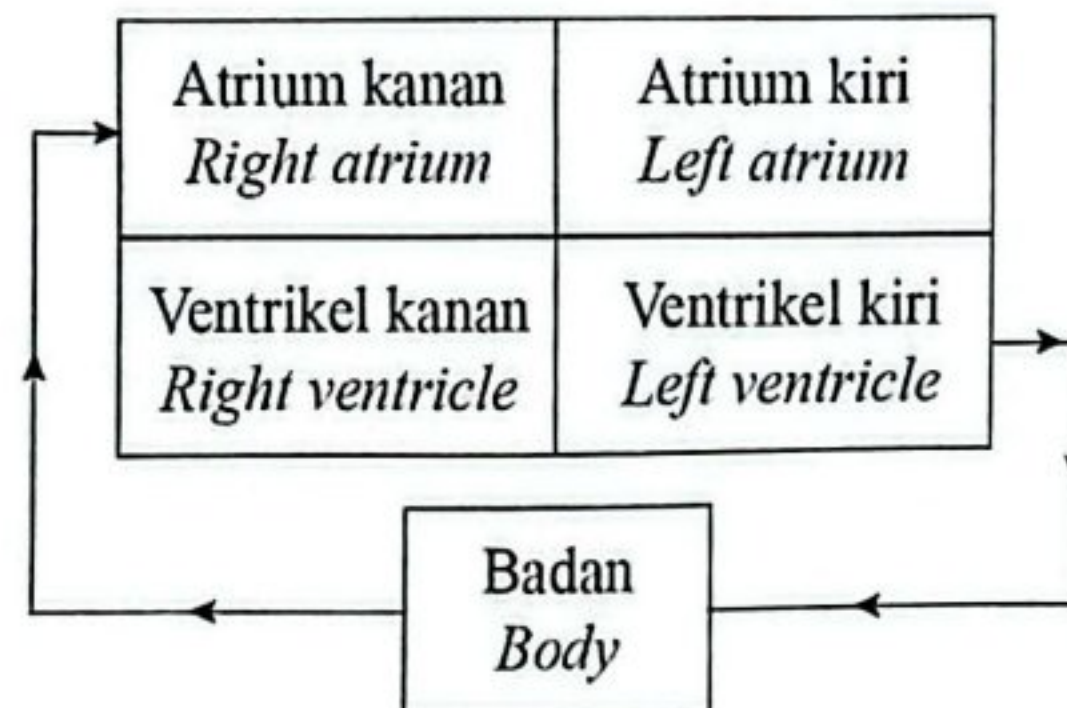
A



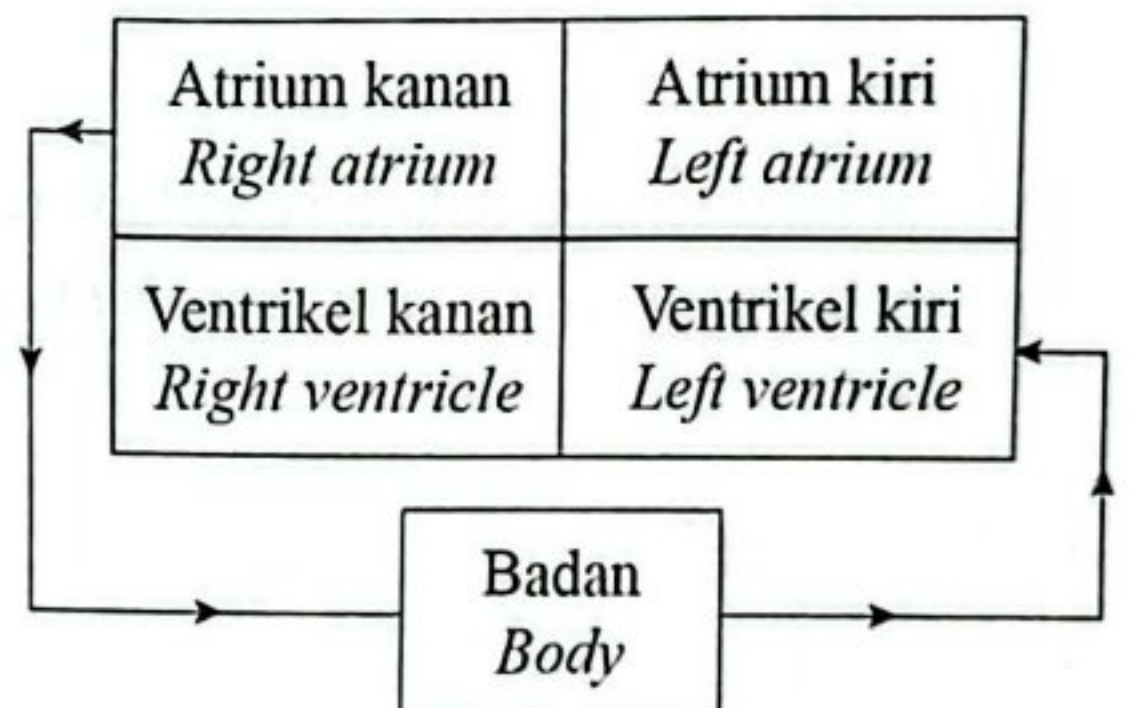
B



C



D



- 16 Rajah 9 menunjukkan isyarat peringatan pada jam tangan digital Encik Q hampir setiap hari akibat tabiatnya.

Diagram 9 shows the warning signal of Mr. Q's digital watch almost every day due to his habit.



Rajah 9
Diagram 9

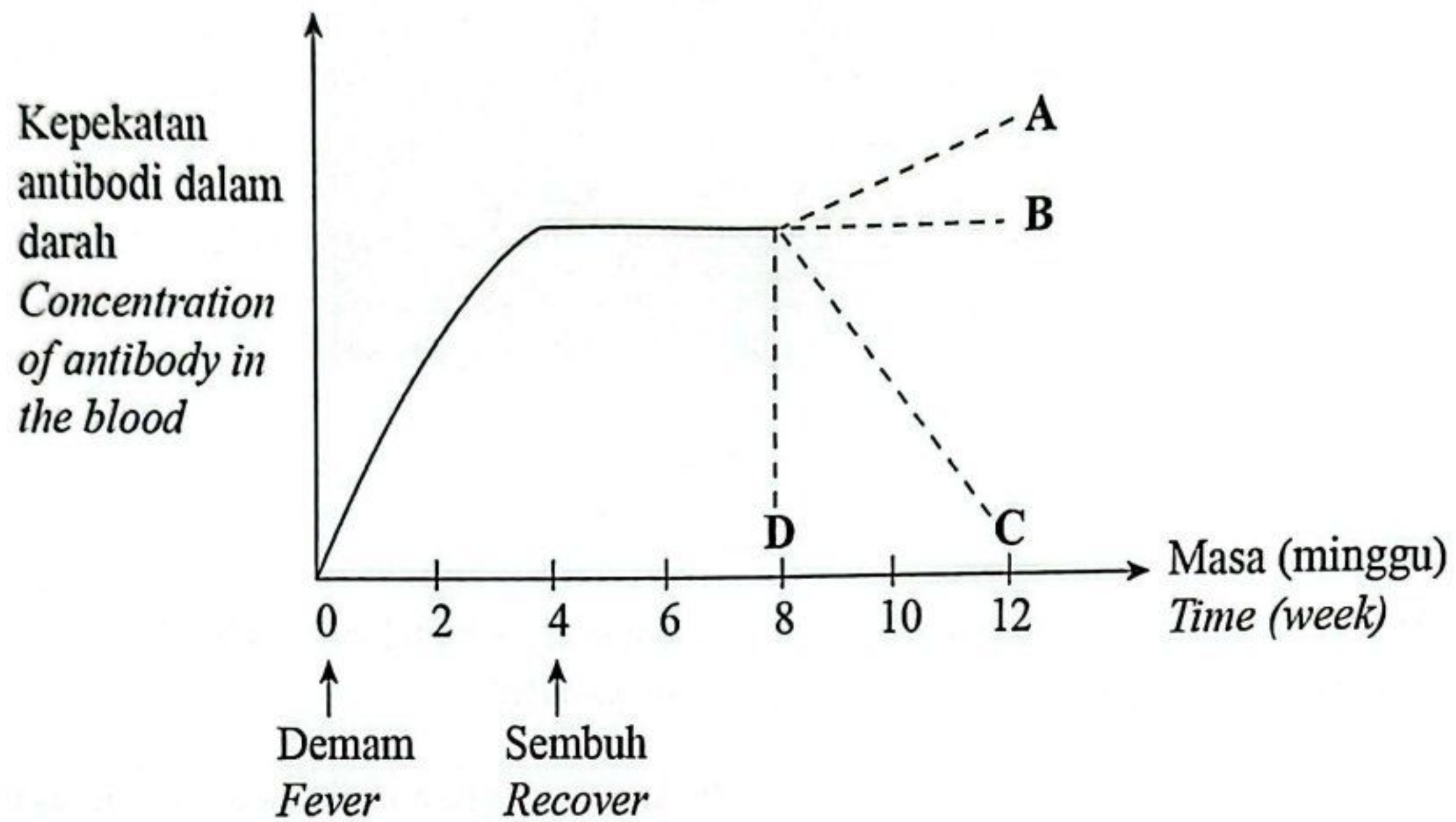
Antara yang berikut, yang manakah betul mengenai risiko tabiat tersebut?

Which of the following is correct about the risk of the habit?

	Risiko <i>Risk</i>	Kaedah mengurangkan risiko semasa melakukan tabiat tersebut <i>Method of reducing the risk while doing the habit</i>
A	Trombosis <i>Thrombosis</i>	Melakukan senaman leher sekali-sekala <i>Do neck exercise once in a while</i>
B	Embolisme <i>Embolism</i>	Melakukan senaman leher sekali-sekala <i>Do neck exercise once in a while</i>
C	Trombosis <i>Thrombosis</i>	Menggerakkan kaki sekali-sekala <i>Move legs once in a while</i>
D	Embolisme <i>Embolism</i>	Menggerakkan kaki sekali-sekala <i>Move legs once in a while</i>

- 17 Rajah 10 menunjukkan graf bagi kepekatan antibodi dalam darah seorang individu yang dijangkiti demam campak.

Diagram 10 shows the graphs for the concentration of antibody in the blood of an individual who was infected with measles.

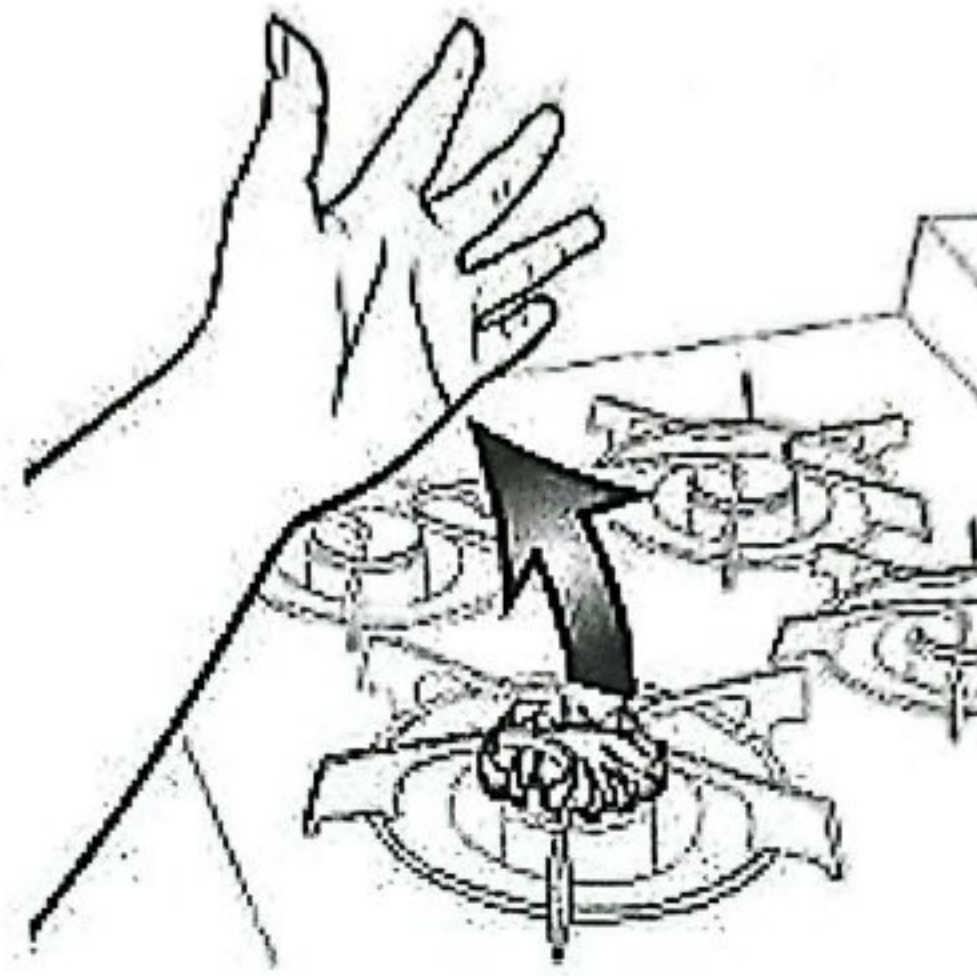


Rajah 10
Diagram 10

Antara lengkung A, B, C dan D yang manakah menunjukkan kepekatan antibodi selepas minggu ke-8?

Which curve A, B, C or D shows the concentration of the antibody after the 8th week?

- 18 Rajah 11 menunjukkan satu gerak balas yang dilakukan oleh seorang individu.
Diagram 11 shows a response done by an individual.



Rajah 11
Diagram 11

Antara yang berikut yang manakah betul tentang gerak balas tersebut?
Which of the following is correct about the response?

- A Melibatkan tiga neuron
Involves three neurones
- B Dikawal oleh korteks serebrum
Controlled by cerebral cortex
- C Interpretasi impuls saraf berlaku
Interpretation of nerve impulses occurs
- D Neuron deria menghantar impuls saraf ke neuron motor
Sensory neurone transmits the nerve impulses to the motor neurone

19 Puan M membuat ujian darah secara sendiri dengan menggunakan glukometer.

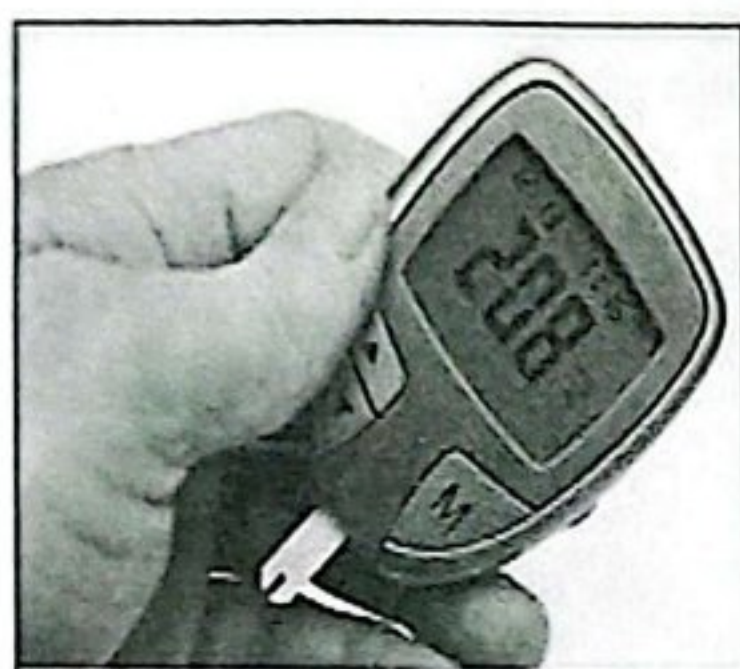
Ujian dijalankan dua jam selepas beliau mengambil sarapan pagi.

Mrs. M did a self-blood test by using a glucometer.

The test was conducted two hours after she had breakfast.

Rajah 12 menunjukkan bacaan glukometer beliau manakala Jadual 2 menunjukkan julat bacaan glukosa di dalam darah.

Diagram 12 shows her glucometer reading while Table 2 shows the range of glucose readings in the blood.



Rajah 12
Diagram 12

Masa ujian Time of test	Julat bacaan (mg/dL) Range of reading (mg/dL)		
	Normal	Pra-diabetes	Diabetes
	Normal	Pre-diabetes	Diabetes
Rambang Random	< 200	-	≥ 200
Berpuasa Fasting	< 100	100 – 125	≥ 126
2 jam selepas makan 2 hours after eating	< 140	140 – 199	≥ 200

Jadual 2
Table 2

Berdasarkan bacaan yang diperolehi, langkah manakah yang perlu diamalkan oleh Puan M?

Based on the reading obtained, which steps should be practiced by Mrs. M?

- I Mengurangkan pengambilan makanan bergluten tinggi
Reduce the intake of high gluten food
- II Mengambil lebih kurang 25 % karbohidrat dalam setiap hidangan
Consume approximately 25 % of carbohydrates in each meal
- III Meningkatkan pengambilan bijirin semasa sarapan
Increase the intake of cereals during breakfast
- IV Kerap makan makanan berbentuk separa cecair seperti bubur
Frequent intake of semi-liquid food such as porridge

- 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



20 Antara yang berikut, yang manakah betul mengenai pengawalaturan suhu badan apabila suhu badan jatuh di bawah julat normal?

Which of the following is correct about the regulation of body temperature when the body temperature drops below the normal range?

- A Kelenjar peluh tidak dirangsang
Sweat gland is not stimulated
- B Otot erektor mengendur
Erector muscle relaxes
- C Kelenjar adrenal kurang dirangsang
Adrenal gland is less stimulated
- D Arteriol di dalam kulit mengalami pemvasodilatan
Arterioles in the skin undergo vasodilation

21 Maklumat berikut menerangkan simptom yang dialami oleh seorang perempuan tua disebabkan oleh kekurangan hormon dan garam mineral tertentu.

The following information describes the symptoms experienced by an elderly woman due to certain hormone and mineral salt deficiencies.

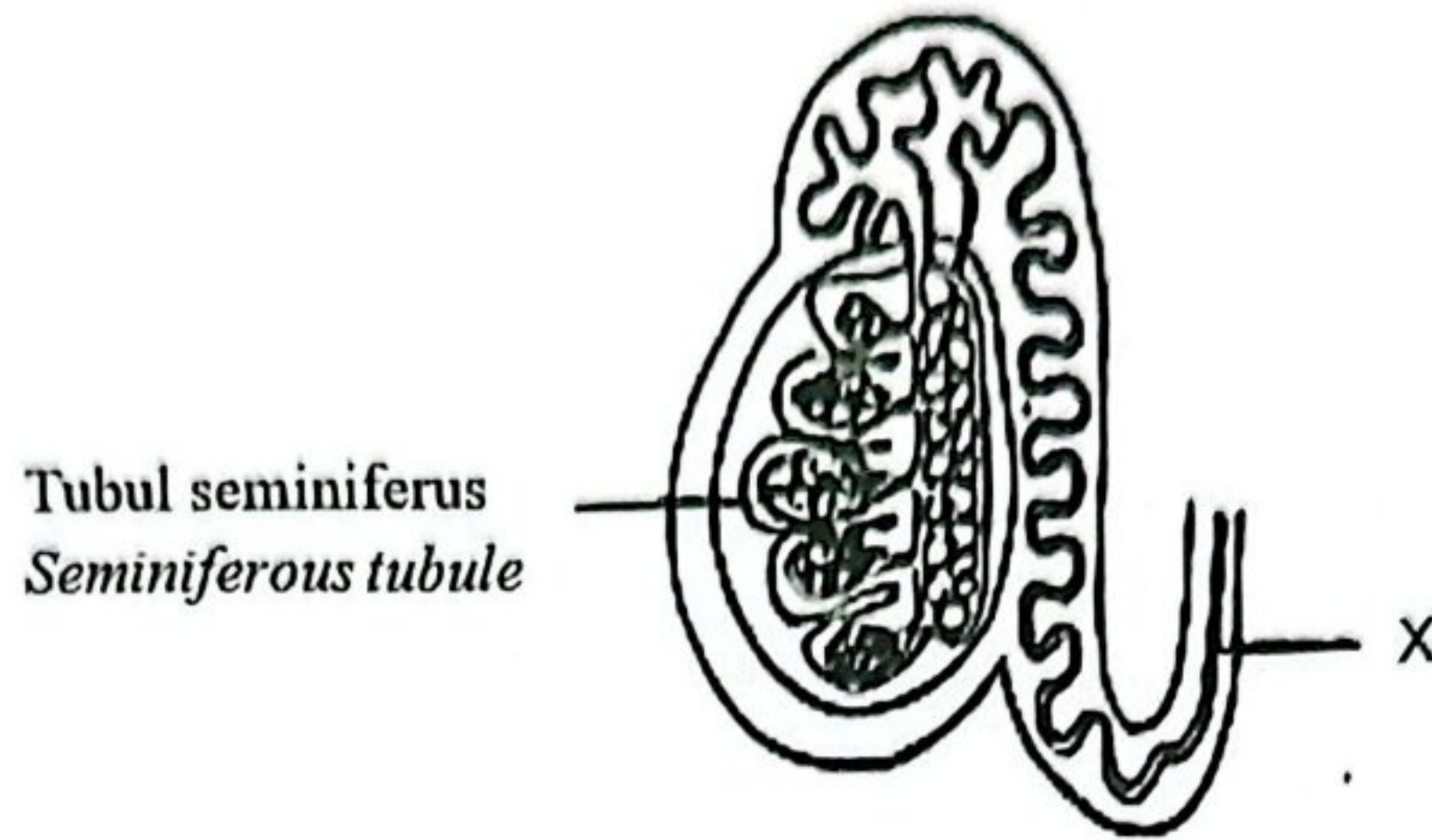
- ❖ Tulang mudah patah
Bones are easy to break
- ❖ Pengurangan ketinggian
Height reduction
- ❖ Postur yang bengkok
Stooped posture

Apakah hormon dan garam mineral tersebut?

What are the hormone and mineral salt?

- A Progesteron dan ferum
Progesterone and iron
- B Progesteron dan kalsium
Progesterone and calcium
- C Estrogen dan ferum
Oestrogen and iron
- D Estrogen dan kalsium
Oestrogen and calcium

- 22 Rajah 13 menunjukkan keratan membujur testis.
Diagram 13 shows a longitudinal section of the testis.

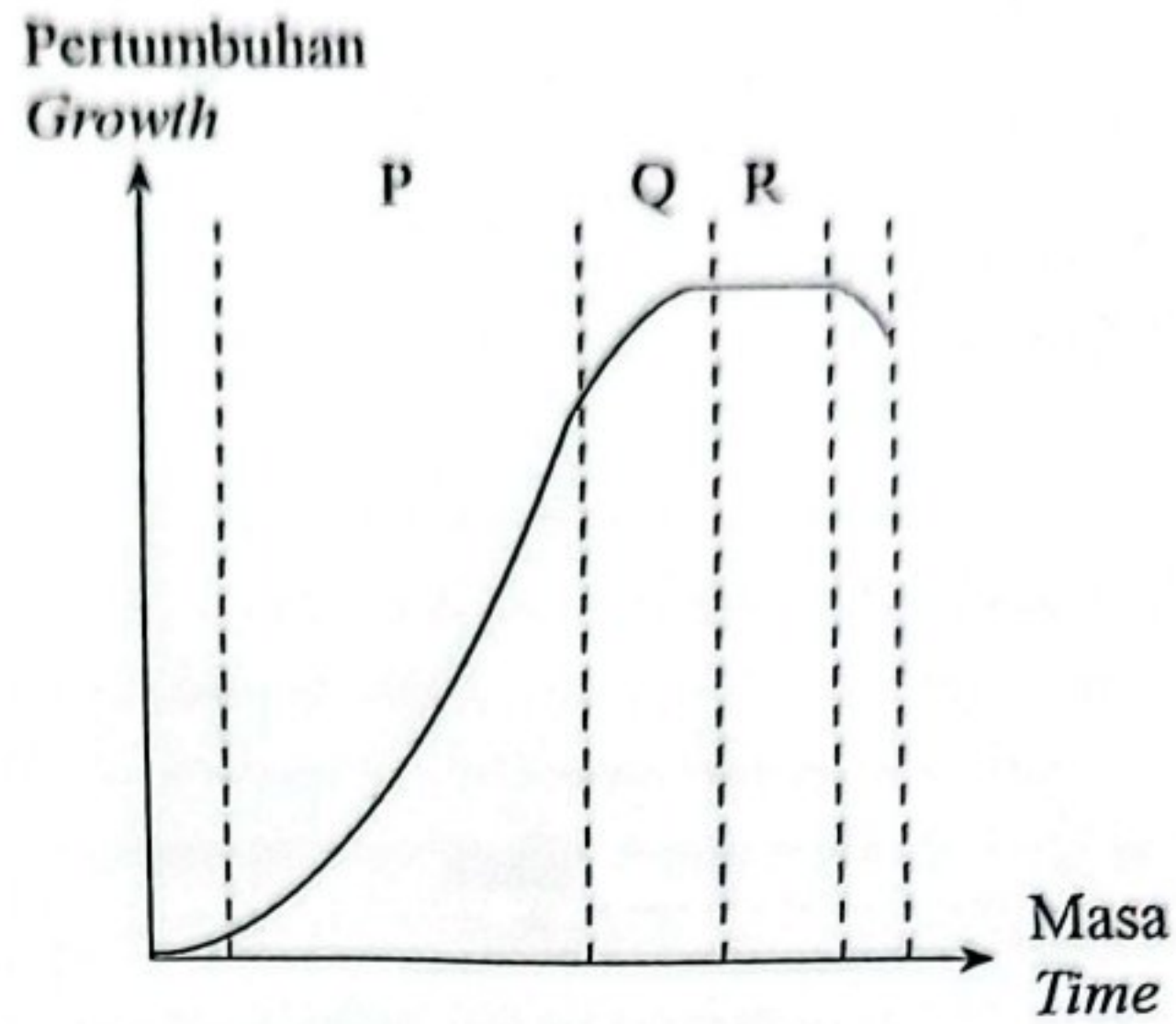


Rajah 13
Diagram 13

Apakah akan berlaku jika struktur X tersumbat?
What will happen if structure X is blocked?

- A Spermatogenesis direncat
Spermatogenesis is inhibited
- B Tiada testosteron dihasilkan
No testosterone is produced
- C Sperma tidak dibebaskan
Sperm are not released
- D Ciri-ciri seks sekunder lelaki berubah
The male's secondary sex characteristics change

- 23 Rajah 14 menunjukkan lengkung sigmoid bagi pertumbuhan suatu organisma.
Diagram 14 shows the sigmoid curve for the growth of an organism.



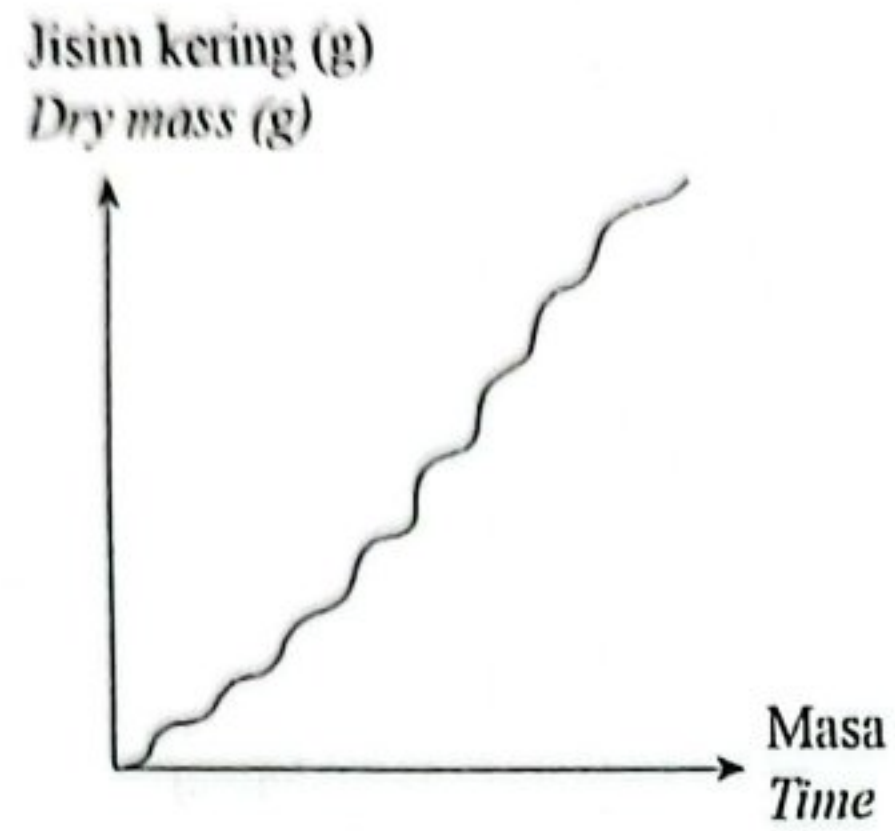
Rajah 14
Diagram 14

Apakah fasa P, Q dan R?
What are phases P, Q and R?

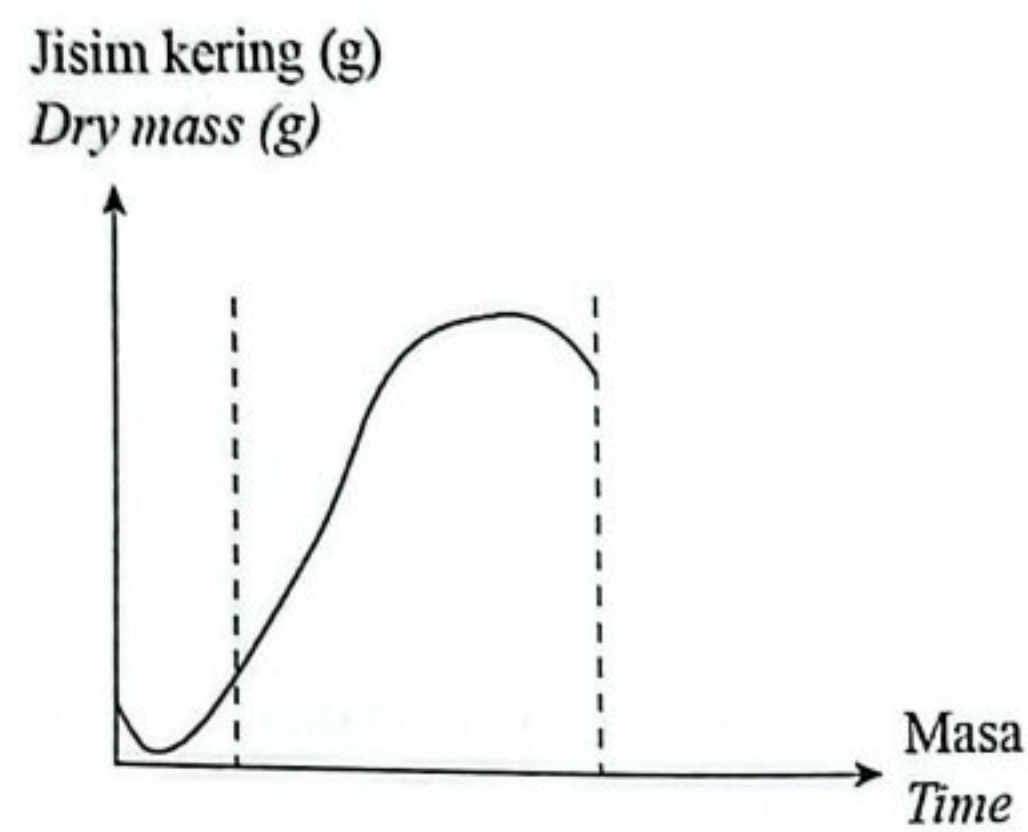
	P	Q	R
A	Fasa pertumbuhan pesat <i>Exponential phase</i>	Fasa pertumbuhan perlahan <i>Stationary phase</i>	Fasa penuaan <i>Senescence phase</i>
B	Fasa permulaan <i>Lag phase</i>	Fasa pertumbuhan pesat <i>Exponential phase</i>	Fasa matang <i>Maturation phase</i>
C	Fasa permulaan <i>Lag phase</i>	Fasa matang <i>Maturation phase</i>	Fasa penuaan <i>Senescence phase</i>
D	Fasa pertumbuhan pesat <i>Exponential phase</i>	Fasa pertumbuhan perlahan <i>Stationary phase</i>	Fasa matang <i>Maturation phase</i>

- 24 Antara yang berikut, yang manakah menunjukkan lengkung pertumbuhan bagi pokok padi?
Which of the following shows the growth curve for a paddy plant?

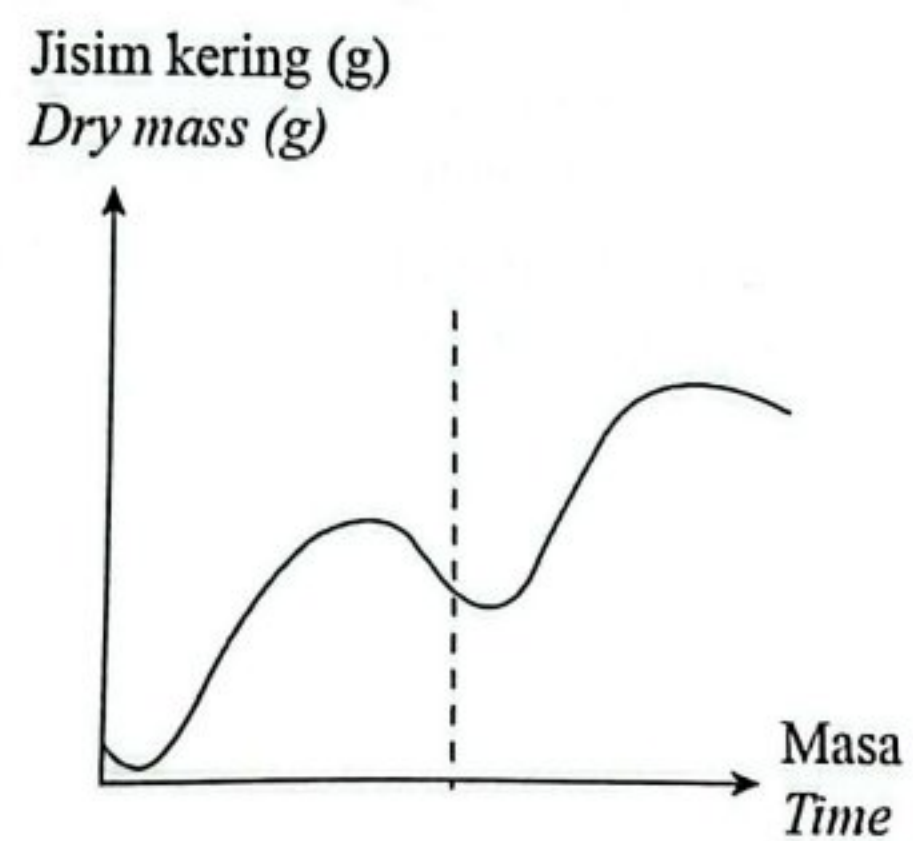
A



B



C



- 25 Sebuah kilang simen terletak berhampiran sebuah kebun sayuran. Petani itu mendapati kualiti sayur-sayurannya semakin lama semakin menurun. Antara yang berikut, pernyataan yang manakah menerangkan keadaan sayur-sayuran tersebut?

A cement factory is situated nearby a vegetable garden.

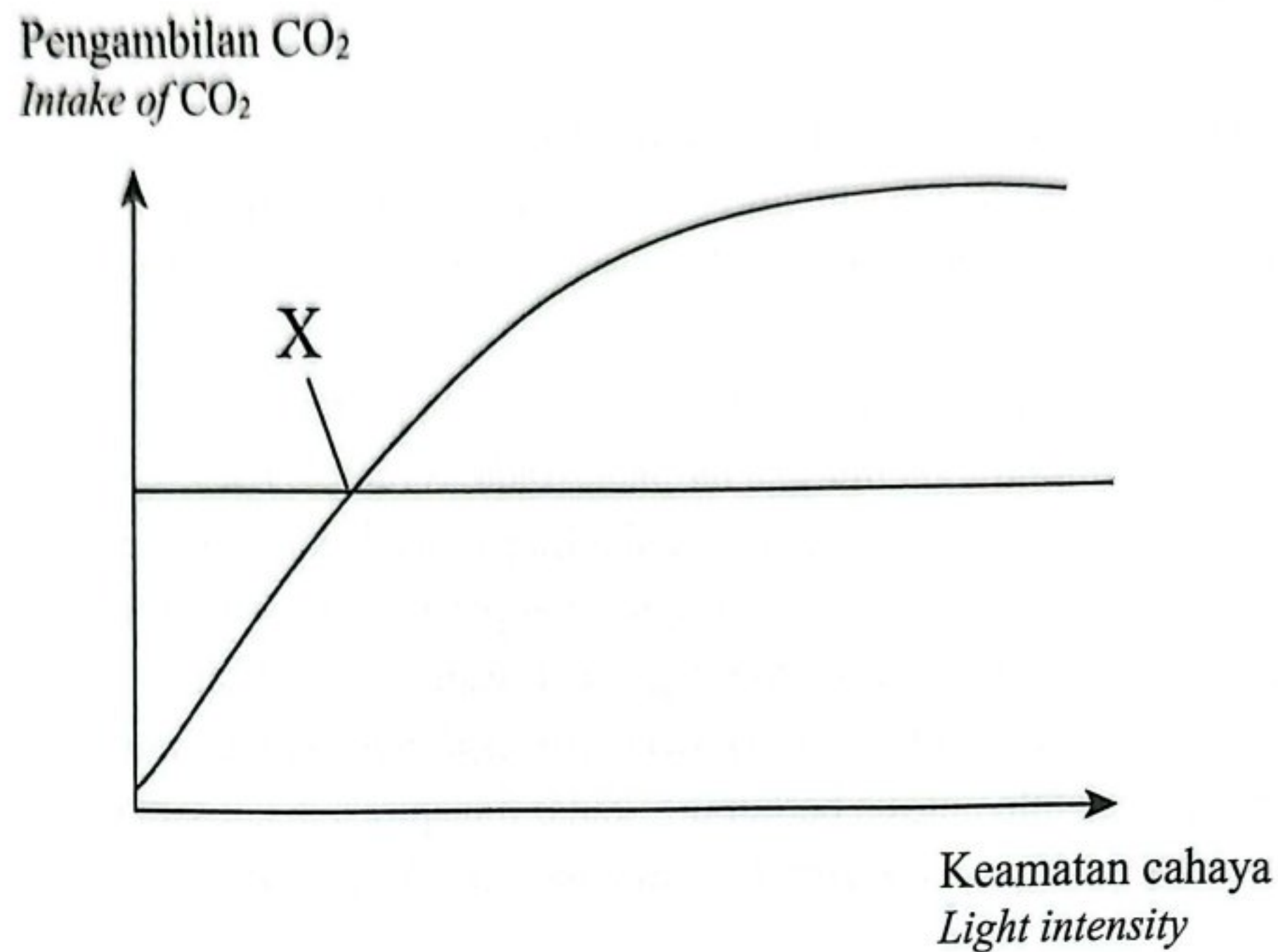
The farmer found that the quality of his vegetables is decreasing over time.

Which of the following statement describes the condition of the vegetables?

- A Kadar transpirasi dan kadar fotosintesis berkurang
The transpiration rate and the photosynthesis rate decrease
- B Kadar respirasi berkurang, kadar transpirasi kekal sama
The respiration rate decreases, the transpiration rate remains the same
- C Kadar fotosintesis berkurang, kadar respirasi kekal sama
The photosynthesis rate decreases, the respiration rate remains the same
- D Kadar fotosintesis berkurang, kadar transpirasi kekal sama
The photosynthesis rate decreases, the transpiration rate remains the same

t.me/cikgufazliebiosensei

- 26 Rajah 15 menunjukkan graf keamatan cahaya dan titik X.
 Diagram 15 shows the graph for light intensity and point X.



Rajah 15
 Diagram 15

Antara yang berikut, pernyataan manakah yang betul?
 Which of the following statement is correct?

- A** Kadar penghasilan glukosa lebih tinggi daripada kadar penggunaan glukosa apabila keamatan cahaya melepasi titik X
The rate of glucose production is higher than the rate of glucose usage when the light intensity is beyond point X
- B** Kadar respirasi lebih tinggi daripada kadar fotosintesis apabila keamatan cahaya melepasi titik X
The rate of respiration is higher than the rate of photosynthesis when the light intensity is beyond point X
- C** Keamatan cahaya sebelum titik X menyebabkan lebih banyak kanji disimpan
The light intensity before point X causes more starch is stored
- D** Keamatan cahaya pada titik X menyebabkan untung bersih dalam glukosa
The light intensity at point X causes net gain in glucose

27 Apakah fungsi kalium dalam tumbuhan?
What is the function of potassium in plants?

- A Mensintesis protein
Synthesise protein
- B Membentuk klorofil
Forms chlorophyll
- C Terlibat dalam metabolisme nitrogen
Involves in nitrogen metabolism
- D Sebagai komponen utama asid nukleik
As a main component of nucleic acid

28 Bahagian manakah pada *Eichhornia crassipes* yang terlibat dalam fitoremediasi?
Which part of the Eichhornia crassipes is involved in phytoremediation?

- A Bunga
Flower
- B Daun
Leaves
- C Batang
Stem
- D Akar
Roots

- 29 Pernyataan berikut menerangkan satu gerak balas tumbuhan terhadap rangsangan.
The following statement describes a plant's response to a stimulus.

Gerak balas ritma sirkadian tumbuhan terhadap keadaan gelap. Daun pokok kekacang seperti daun pokok petai belalang akan menguncup pada waktu malam dan kembali terbuka pada waktu siang.

Circadian rhythm response plants against dark conditions. Leaves legumes like the leaves of the locust tree will fold in at night and return open during the day.

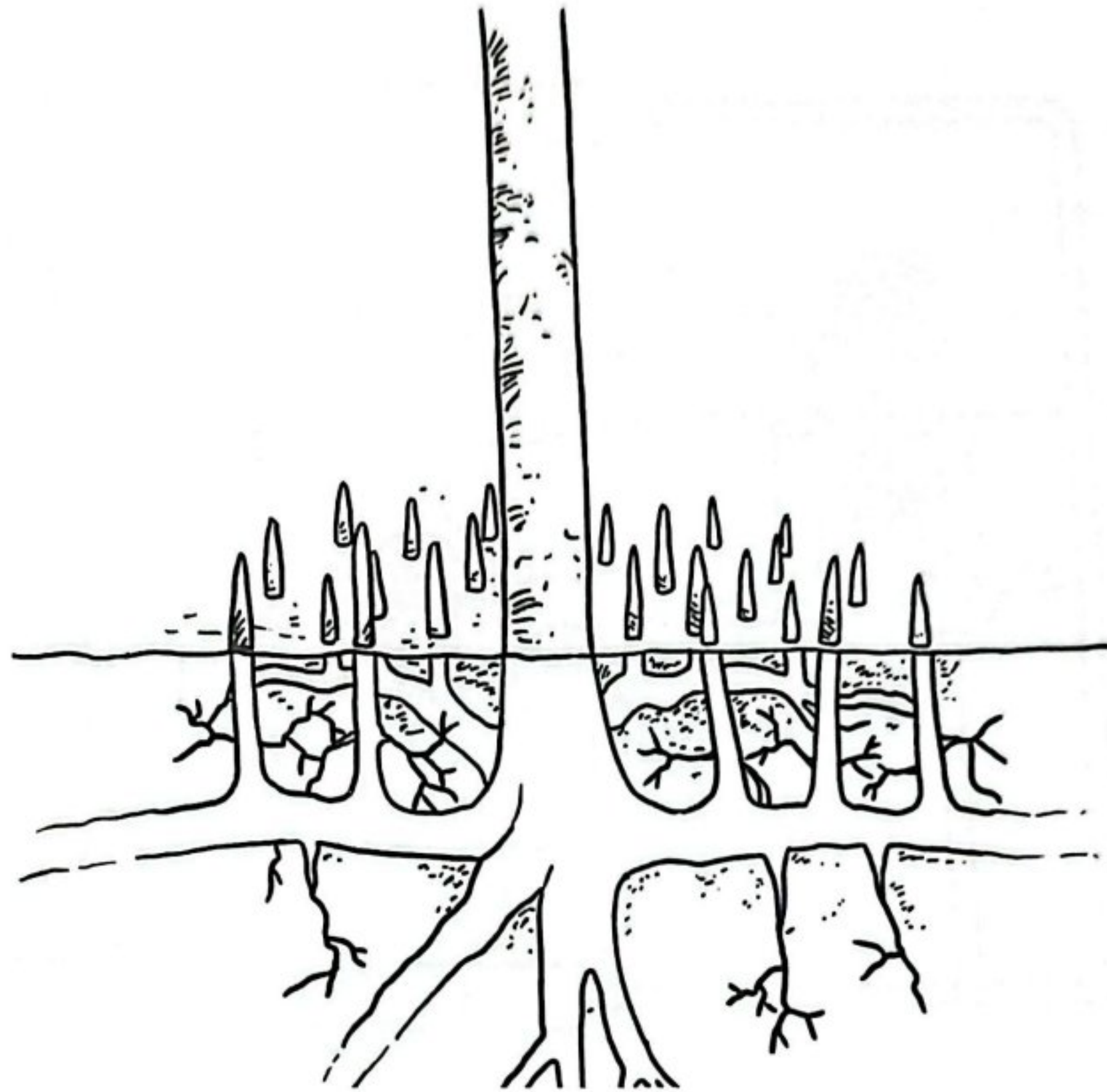
Apakah jenis gerak balas tersebut?
What is the type of the response?

- A Fotonasti
Photonasty
 - B Niktinasti
Nyctinasty
 - C Seismonasti
Seismonasty
 - D Tigmonasti
Thigmonasty
- 30 Seorang petani menyembur racun serangga di kebun tomatonya.
 Selepas sebulan, petani itu mendapati hasil buah tomato semakin berkurangan.
 Mengapakah keadaan ini berlaku?

*A farmer sprayed insecticide in his tomatoes garden.
 After a month, the farmer found that the yield of tomatoes was decreasing.
 Why does this happen?*

- A Persaingan antara agen pendebungaan dengan organisma lain berlaku
Competition between pollinating agent and other organism occurs
- B Pengurangan populasi agen pendebungan berlaku
Reduction in the population of the pollinating agent occurs
- C Racun serangga merencat rembesan sukrosa pada stigma
The insecticide inhibits the secretion of sucrose at stigma
- D Racun serangga menghalang pembentukan tiub debunga
The insecticide prevents the formation of pollen tubes

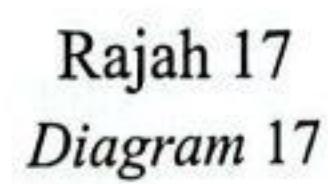
- 31 Rajah 16 menunjukkan sistem akar sejenis tumbuhan.
 Diagram 16 shows the root system for a type of plant.



Rajah 16
 Diagram 16

Apakah keadaan habitat yang memerlukan sistem akar tersebut?
 What is the condition of the habitat that requires the root system?

- A Terdedah kepada tiupan angin yang kuat
 Expose to strong wind
- B Tanah dengan kandungan oksigen rendah
 Soil with low oxygen content
- C Berkepekatan garam yang tinggi
 High salt concentration
- D Tidak terlalu kering dan tidak terlalu berair
 Not too dry nor too wet



- A** Proses pengikatan nitrogen berkurang
Nitrogen-fixing process decreases
- B** Proses amonifikasi berkurang
Ammonification process decreases
- C** Proses nitrifikasi tidak dapat berlaku
Nitrification process cannot occur
- D** Proses pendenitrifikan tidak dapat berlaku
Denitrification process cannot occur

- 33 Maklumat berikut menerangkan nutrisi bagi sejenis bakteria.
The following information describes the nutrition of a type of bacteria.

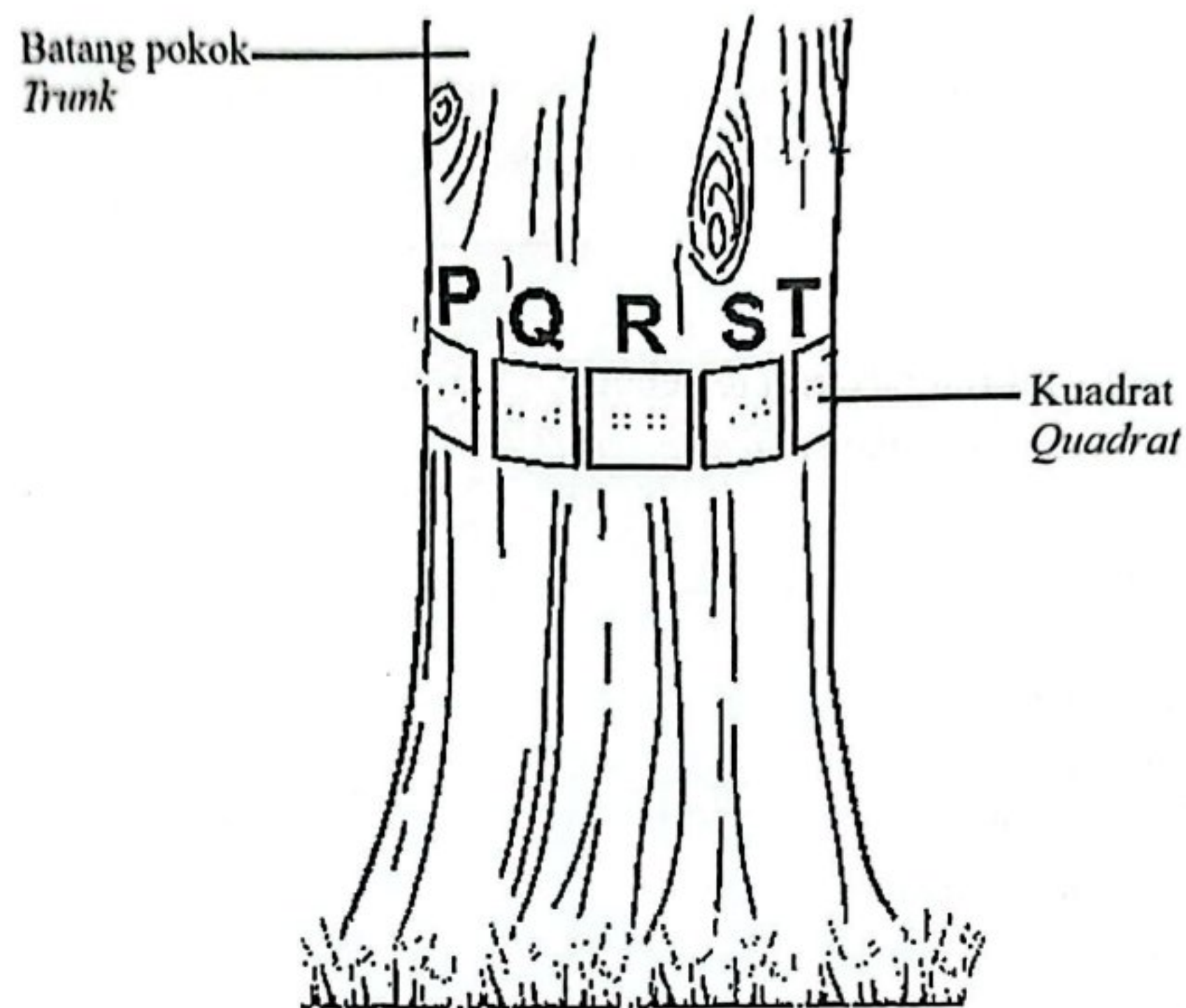
- ✓ Memperoleh tenaga melalui pengoksidaan bahan tak organik seperti ammonia
Obtaining energy through the oxidation of inorganic substances such as ammonia
- ✓ Mensintesis sebatian organik tanpa menggunakan cahaya *Synthesise organic compounds without using light*

Apakah jenis nutrisi bakteria tersebut?
What is the type of nutrition of the bacteria?

- A Parasit
Parasitic
- B Holozoik
Holozoic
- C Kemoautotrof
Chemoautotrophic
- D Saprotrof
Saprotrophic

- 34 Rajah 18 menunjukkan teknik persampelan kuadrat yang dijalankan untuk mengenal pasti peratus litupan *Pleurococcus sp.* pada batang pokok.

*Diagram 18 shows the quadrat sampling technique which was carried out to identify the coverage percentage of *Pleurococcus sp.* on a tree trunk.*



Rajah 18
Diagram 18

Saiz kuadrat yang manakah paling sesuai digunakan dalam kajian lapangan tersebut?
Which of the following quadrat size is the most suitable to use in the field study?

- A $2\text{ cm} \times 2\text{ cm}$
- B $15\text{ cm} \times 15\text{ cm}$
- C $1\text{ m} \times 1\text{ m}$
- D $5\text{ m} \times 5\text{ m}$

- 35 Jadual 3.1 menunjukkan Indeks Pencemaran Udara (IPU) bagi empat buah bandar P, Q, R dan S.

Jadual 3.2 menunjukkan kualiti udara berdasarkan Indeks Pencemaran Udara (IPU).

Table 3.1 shows the Air Pollution Index (API) for four cities P, Q, R and S.

Table 3.2 shows the air quality based on the Air pollution Index (API).

Bandar City	IPU API
P	49
Q	171
R	88
S	117

Jadual 3.1

Table 3.1

IPU API	Kualiti udara Air quality
0-50	Baik Good
51-100	Sederhana Moderate
101-200	Tidak sihat Unhealthy
201-300	Sangat tidak sihat Very unhealthy
>300	Berbahaya Dangerous

Jadual 3.2

Table 3.2

Antara yang berikut, pernyataan manakah yang betul?

Which of the following statements is correct?

- A Penggunaan bahan api fosil yang tinggi di P dan R
High usage of fossil fuels in P and R
- B Pembebasan karbon dioksida dan karbon monoksida di R adalah lebih tinggi daripada Q dan S
The release of carbon dioxide and carbon monoxide in R is higher than Q and S
- C P tidak menggunakan pengangkutan awam sebagai sistem pengangkutan utama
P does not use public transport as the main transportation system
- D Pengangkutan hijau kurang diamalkan di Q berbanding S
Green transport is less practiced in Q compared to S

- 36 Antara yang berikut, bahan manakah yang boleh diguna untuk menghasilkan bioplastik semula jadi?

Which of the following material can be used to produce natural bioplastic?

- A Sisa pepejal organik
Organic solid waste
- B Kulit oren
Orange peels
- C Sisa dapur
Kitchen waste
- D Kulit pisang
Banana peels

- 37 Jadual 4 menunjukkan keputusan bagi tiga kacukan monohibrid yang dilakukan oleh Mendel antara pokok-pokok kacang pis, *Pisum sativum*.

Table 4 shows the results for three monohybrid crosses that were carried out by Mendel between pea plants, Pisum sativum.

Ciri <i>Characteristics</i>	Trait <i>Traits</i>	
	Dominan <i>Dominant</i>	Resesif <i>Recessive</i>
Bentuk biji benih <i>Seed shape</i>	K bulat <i>K round</i>	1850 berkedut <i>1850 constricted</i>
Kedudukan bunga <i>Flower position</i>	651 aksial <i>651 axial</i>	207 terminal <i>207 terminal</i>
Warna pod <i>Pod colour</i>	428 hijau <i>428 green</i>	L kuning <i>L yellow</i>

Jadual 4
Table 4

Hitung dan tentukan nilai yang sesuai bagi K dan L.

Calculate and determine the suitable values for K and L.

	K	L
A	5474	101
B	5474	152
C	7289	101
D	7289	152

- 38 Antara yang berikut, pasangan penyakit genetik yang manakah disebabkan oleh gen terangkai seks?

Which of the following pair of genetic diseases is caused by sex-linked genes?

- A Albinisme dan anemia sel sabit
Albinism and sickle cell anaemia
- B Talasemia dan sistik fibrosis
Thalassemia and cystic fibrosis
- C Hemofilia dan buta warna
Haemophilia and colour blindness
- D Sindrom Turner dan sindrom Cri du chat
Turner syndrome and Cri du chat syndrome

- 39 Dalam terapi gen, gen yang normal dimasukkan ke dalam gen pesakit untuk menggantikan gen yang abnormal dengan menggunakan W.
Apakah W?

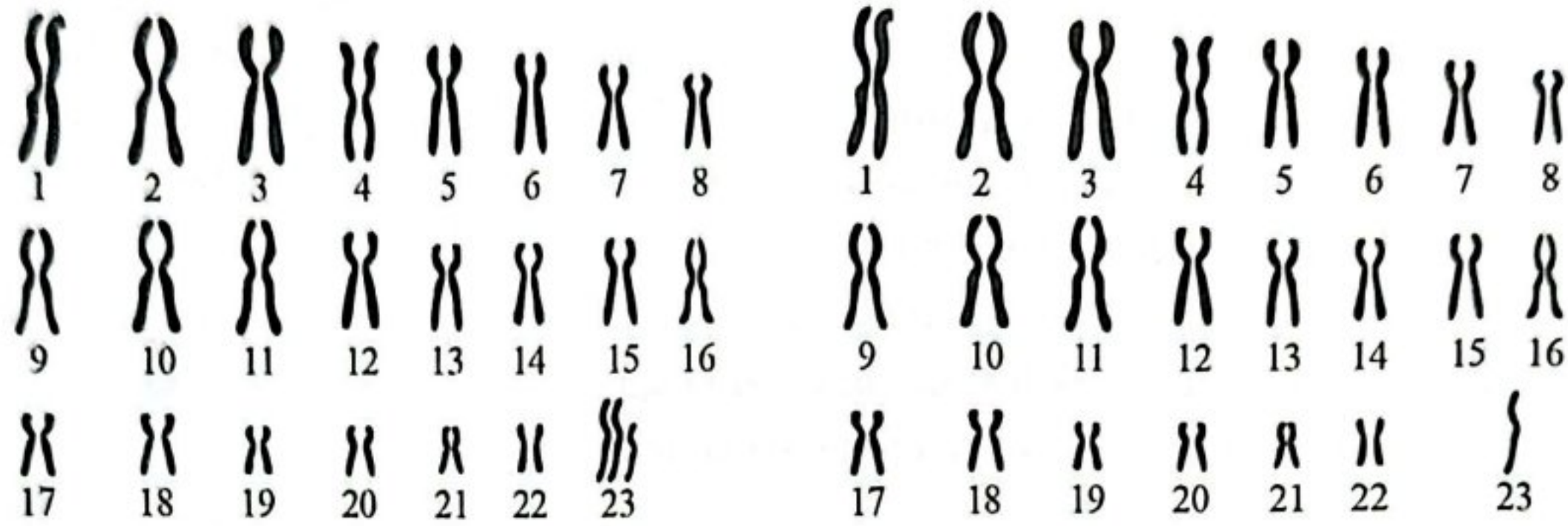
In gene therapy, a normal gene is inserted into the patient to replace the abnormal gene by using W.

What is W?

- A Protozoa
Protozoa
- B Bakteria
Bacteria
- C Virus
Virus
- D Fungi
Fungi

- 40 Rajah 19.1 dan Rajah 19.2 menunjukkan kariotip bagi dua individu yang mempunyai penyakit genetik.

Diagram 19.1 and Diagram 19.2 show the karyotypes of two individuals with genetic diseases.



Rajah 19.1
Diagram 19.1

Rajah 19.2
Diagram 19.2

Antara berikut aspek manakah yang membezakan kedua-dua penyakit genetik tersebut?

Which of the following aspects distinguishes both genetic diseases?

- I Jantina
Gender
 - II Bilangan kromosom seks
Number of sex chromosomes
 - III Bilangan autosom
Number of autosome
 - IV Jenis mutasi
Type of mutation
-
- 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