

1. Jadual 1 menunjukkan keputusan suatu eksperimen.

*Table 1 shows the result for an experiment.*

| <i>Sampel</i><br><i>Sample</i> | <i>Suhu awal</i><br><i>Initial temperature</i> | <i>Suhu akhir</i><br><i>Final temperature</i> | <i>Perbezaan suhu</i><br><i>Difference in temperature</i> |
|--------------------------------|------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|
| <i>A</i>                       | 28                                             | 38                                            | 10                                                        |
| <i>B</i>                       | 28                                             | 45                                            | 17                                                        |
| <i>C</i>                       | 28                                             | 62                                            | 34                                                        |

Jadual 1 / *Table 1*

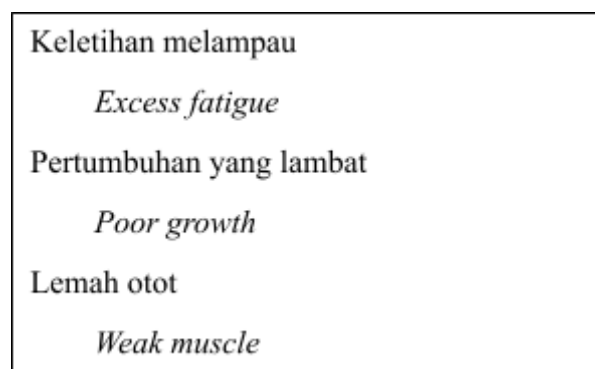
Manakah antara berikut, merupakan pembolehubah dimanipulasi dalam eksperimen ini?

*Which of the following is the manipulated variable for the experiment?*

- A Sampel  
*Sample*
- B Suhu awal  
*Initial temperature*
- C Suhu akhir  
*Final temperature*
- D Perbezaan suhu  
*Difference in temperature*

2. Rajah 1 menunjukkan kesan kegagalan fungsi organel X terhadap kanak-kanak.

*Diagram 1 shows the effects of malfunction of organelle X on a child.*



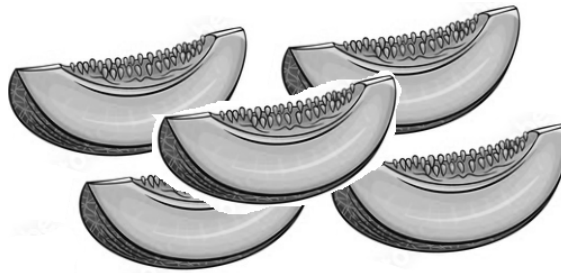
Rajah 1/*Diagram 1*

Apakah organel X?

*What is organell X?*

- A Lisosom  
*Lysosome*
- B Ribosom  
*Ribosome*
- C Mitokondria  
*Mitochondria*
- D Jasad Golgi  
*Golgi body*

3. Rajah 2 menunjukkan kepingan jambu batu sebelum ditabur dengan serbuk garam.  
*Diagram 2 shows guava pieces before being sprinkled with salt grain .*



Rajah 2/*Diagram 2*

Ramalkan keadaan potongan jambu batu tersebut selepas 15 minit?

*Predict the condition of guava slices after 15 minutes?*

- A Potongan jambu batu menjadi keras  
*The guava slices become hard*
- B Potongan jambu batu tidak berubah  
*The guava slices remain unchanged*
- C Potongan jambu batu menjadi lembut  
*The guava slices become soft*

4 Pernyataan ini menerangkan tentang suatu sebatian kimia.

*This statement explains a chemical compound.*

|  |                                                                                                                                                                                         |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Terdiri daripada 1 molekul alkohol dan 1 molekul asid lemak.</p> <p><i>It consists of 1 alcohol molecule and 1 fatty acid molecule</i></p> <p>Kalis air</p> <p><i>Waterproof</i></p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Sebatian kimia tersebut ialah

*The chemical compound is*

A Lemak

*Fat*

B Lilin

*Wax*

C Fosfolipid

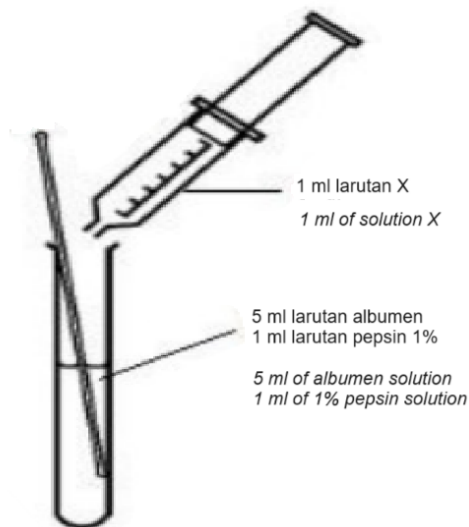
*Phospholipid*

D Steroid

*Steroid*

- 5 Rajah 3 menunjukkan susunan radas untuk suatu eksperimen bagi mengkaji kesan pH terhadap aktiviti enzim.

*Diagram 3 shows the arrangement of apparatus for an experiment to study the effect of pH on enzyme activity.*



Rajah 3/Diagram 3

Selepas direndam selama 15 minit di dalam kukusan air pada suhu 37°C, larutan albumen didapati bertukar menjadi jernih.

Apakah larutan X?

*After being immersed for 15 minutes in water bath at a temperature of 37°C, the albumen solution was found to turn clear.*

*What is solution X?*

- A Air suling  
Distilled water
- B Asid hidroklorik

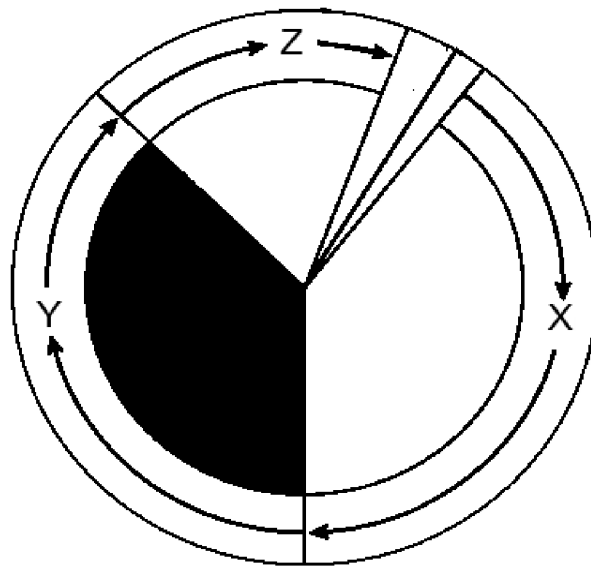
*Hydrochloric acid*

C     *Natrium hidroksida*

*Sodium hydroxide*

6     Rajah 4 menunjukkan satu kitar sel.

*Diagram 4 shows a cell cycle.*



Rajah 4/Diagram 4

Apakah yang berlaku semasa fasa Y?

*What happens during the Y phase?*

A     Kandungan DNA akan berganda iaitu berlakunya proses replikasi DNA

*The DNA content will double, which is the process of DNA replication*

B     Nukleus kelihatan besar dan kromosom adalah dalam bentuk kromatin

*The nucleus appears large, and the chromosomes are in the form of chromatin*

C     Sel mengumpul tenaga dan membuat persiapan terakhir untuk memasuki peringkat pembahagian sel yang seterusnya

*Cells gather energy and make final preparations to enter the next stage of cell division*

D     Komponen sel seperti mitokondrion dan jalinan endoplasma dan protein untuk kegunaan kitar sel juga dihasilkan

*Cell components such as mitochondria and endoplasmic reticulum and proteins for use in the cell cycle are also produced*

- 7      Sekotak susu yang terdedah kepada udara selama beberapa jam menunjukkan bacaan pH 3.8.

*A carton of milk exposed to air for several hours shows a pH reading of 3.8.*

*Manakah antara berikut, penjelasan terbaik bagi menerangkan fenomena tersebut?*

*Which of the following is the best explanation for the phenomena?*

- A      Susu tersebut terdedah kepada oksigen

*The milk was exposed to oxygen*

- B      Tindakbalas bakteria *Lactobasillus*

*The action of Lactobasillus bacteria*

- C      Peningkatan asid laktik dalam susu

*The increase of lactic acid in milk*

- D      Penguraian laktosa secara tidak lengkap

*Incomplete dissociation of lactose*

- 8      Bagaimanakah mekanisme lawan arus membantu respirasi ikan?

*How does the counter current mechanism help fish respiration?*

- A      Menambahkan luas permukaan untuk pertukaran gas

*Increase the surface area for gaseous exchange*

- B      Membantu resapan gas berlaku lebih baik

*Facilitate better diffusion of gases*

- C      Meningkatkan kadar pengangkutan gas

*Increase the rate of transportation of gases*

- D      Memaksimumkan kadar resapan gas

*Maximize the rate of gas diffusion*

- 9 Pasangan tindakan manakah yang meningkatkan tekanan di dalam rongga toraks semasa menarik nafas?

*Which pair of actions increases the pressure in the thoracic cavity during inhalation?*

|   | <b>Otot interkosta luar</b><br><i>External intercostal muscle</i> | <b>Diafragma</b><br><i>Diaphragm</i> |
|---|-------------------------------------------------------------------|--------------------------------------|
| A | Mengecut<br><i>Contract</i>                                       | Mengecut<br><i>Contract</i>          |
| B | Mengendur<br><i>Relax</i>                                         | Mengendur<br><i>Relax</i>            |
| C | Mengendur<br><i>Relax</i>                                         | Mengecut<br><i>Contract</i>          |
| D | Mengecut<br><i>Contract</i>                                       | Mengendur<br><i>Relax</i>            |

- 10 **Sayur dan buah-buahan mampu mencegah sembelit.**

***Vegetables and fruits can prevent constipation.***

*Antara fungsi serat ialah*

*Some of the functions of fibre are to*

- I Merangsang peristalsis  
*Stimulates peristalsis*
- II Menyerap dan menyingkirkan bahan toksik  
*Absorb and expel toxic substances*

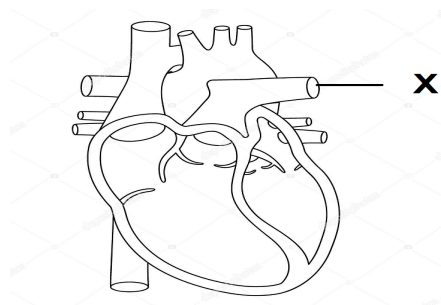
- Mengawal atur penyerapan lemak bagi pesakit
- III kardiovaskular  
*Regulates the absorption of fat for cardiovascular patients*
- Meningkatkan populasi bakteria berfaedah dalam usus besar
- IV *Increase the population of beneficial bacteria in large intestine*

Bagaimanakah serat membantu penyahtinjaan?

*How does fibre help in defaecation?*

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

11. Rajah 5 menunjukkan keratan memanjang jantung manusia.  
*Diagram 5 shows the longitudinal section of a human heart.*



Rajah 5 / *Diagram 5*

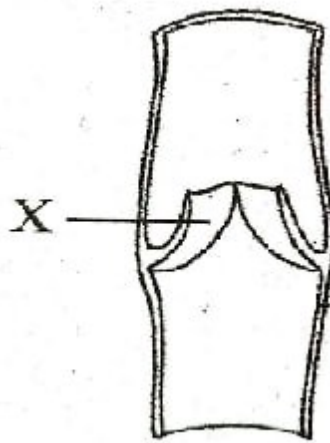
Apakah salur darah X?

*What is blood vessel X?*

- A Aorta  
*Aorta*

- B Arteri Pulmonari  
*Pulmonary artery*
- C Vena Pulmonari  
*Pulmonary Vein*
- D Vena Kava  
*Vena Cava*

12. Rajah 6 menunjukkan struktur X di dalam vena.  
*Diagram 6 shows structure X in a vein.*



Rajah 6 / *Diagram 6*

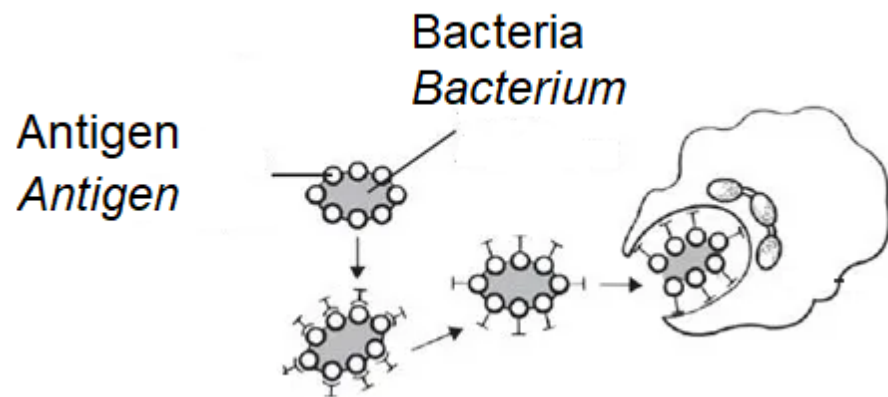
Apakah fungsi struktur X?

*What is the function of structure X?*

- A. Menyebabkan darah mengalir turun ke kaki  
*Causes the blood to flow downwards to the feet*
- B. Menghalang pengaliran balik darah  
*Prevent backflow of blood*
- C. Mengurangkan tekanan darah dalam vena  
*Decreasing the blood pressure inside the vein*
- D. Mengurangkan saiz lumen  
*Reducing the size of the lumen*

13. Rajah 7 menunjukkan mekanisme tindakan antibodi.

*Diagram 7 shows the mechanism of the action of antibodies.*



Rajah 7 / Diagram 7

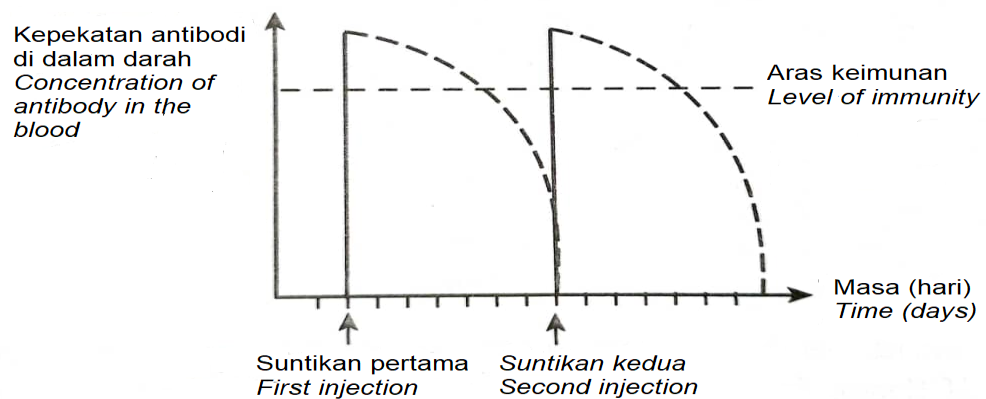
Apakah mekanisme tersebut?

*What is the mechanism?*

- A pengaglutinan  
*agglutination*
- B Peneutralan  
*Neutralisation*
- C Pemendakan  
*Precipitation*
- D Pengopsoninan  
*Opsonisation*

14. Rajah 8 menunjukkan graf sejenis keimunan.

*Diagram 8 shows a graph of a type of immunity.*



Rajah 8 / Diagram 8

Penyakit yang manakah dapat dicegah dengan keimunan tersebut?

*Which disease can be prevented through this immunity?*

- A Kayap  
*Shingles*
- B Influenza  
*Influenza*
- C Cacar air  
*Chicken pox*
- D Tetanus  
*Tetanus*

15. Antara berikut yang manakah tindakan luar kawal?

*Which the following are involuntary action?*

- I Menyanyi  
*Singing*
- II Pencernaan  
*Digestion*
- III Menyepak bola  
*Kicking a ball*
- IV Denyutan jantung  
*Heartbeat*

- 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*

16. Rajah 9 menunjukkan reaksi Muthu terhadap suatu rangsangan ketika bersiar-siar di tepi pantai pada waktu pagi.

*Diagram 9 shows Muthu's reaction to a stimulus while walking by the beach in the morning.*



Rajah 9 / *Diagram 9*

Reseptor deria yang manakah dirangsang?

*Which sensory receptor is stimulated?*

- A Nosisseptor  
*Nociceptor*

- B Baroreseptor  
*Baroreceptor*
- C Fotoreseptor  
*Photoreceptor*
- D Termoreseptor  
*Thermoreceptor*

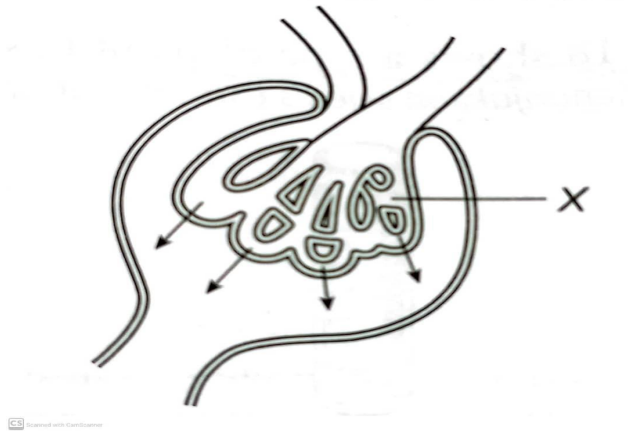
17. Selepas berbasikal 10 km, suhu badan Mustafa meningkat dan dia berpeluh dengan banyak. Antara berikut yang manakah berlaku untuk mengembalikan suhu badannya kepada julat yang normal?

*After cycling 10 km, Mustafa's body temperature increases and he sweat heavily. Which of the following takes place to return his body temperature to its normal range?*

- A Kelenjar adrenal kurang dirangsang  
*The adrenal glands are less stimulated.*
- B Arteriol di dalam kulit dirangsang supaya mengerut (pemasoconstriction)  
*Arteriole in the skin are stimulated to contract (vasoconstriction)*
- C Otot rangka mengecut dan mengendur lebih kerap  
*Skeletal muscles contract and relax more frequently*
- D Kelenjar tiroid dirangsang untuk merembeskan lebih banyak hormon tiroksina  
*The thyroid gland is stimulated to secrete more thyroxine.*

18. Rajah 10 menunjukkan proses ultraturasan yang berlaku di ginjal.

*Diagram 10 shows ultrafiltration that occurs in the kidney.*



Rajah 10 / *Diagram 10*

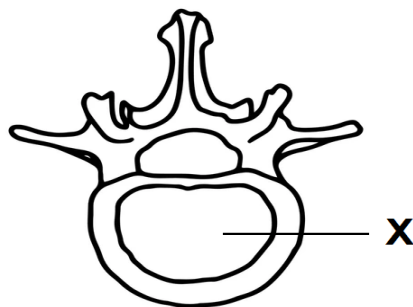
Apakah bahan yang boleh bergerak merentasi X?

*What are the substances that can move across X?*

- A Eritrosit  
*Erythrocyte*
- B Asid amino  
*Amino acid*
- C Fibrinogen  
*Fibrinogen*
- D Albumin  
*Albumin*

19. Rajah 11 menunjukkan struktur suatu vertebra lumbar pada manusia

*Diagram 11 shows the structure of a human vertebra.*



Rajah 11 / *Diagram 11*

Apakah struktur X dan fungsinya?

*What is the structure X and its function?*

|   | Struktur X<br><i>Structure X</i>       | Fungsi<br><i>Function</i>                                                                          |
|---|----------------------------------------|----------------------------------------------------------------------------------------------------|
| A | Cuaran spina<br><i>Spinous Process</i> | Menyokong berat bahagian bawah belakang badan<br><i>Bears weight of the lower back of the body</i> |
| B | Sentrum<br><i>Centrum</i>              | Menyokong berat bahagian bawah belakang badan<br><i>Bears weight of the lower back of the body</i> |
| C | Sentrum<br><i>Centrum</i>              | Tempat perlekatan otot dan ligament<br><i>Attachment site for muscles and ligaments</i>            |
| D | Cuaran spina<br><i>Spinous Process</i> | Tempat perlekatan otot dan ligament<br><i>Attachment site for muscles and ligaments</i>            |

20. Rajah 12 menunjukkan system otot rangka terjejas yang menyebabkan bengkak dan sakit pada sendi.

*Diagram 12 shows an impaired musculoskeletal system which causes swollen and painful joint.*



Rajah 12 / *Diagram 12*

Apakah masalah sistem otot rangka yang ditunjukkan dalam rajah 12.

*What is the impairment of the musculoskeletal system shown in diagram 12?*

- A Arthritis  
*Arthritis*
- B Osteoporosis



*Osteoporosis*

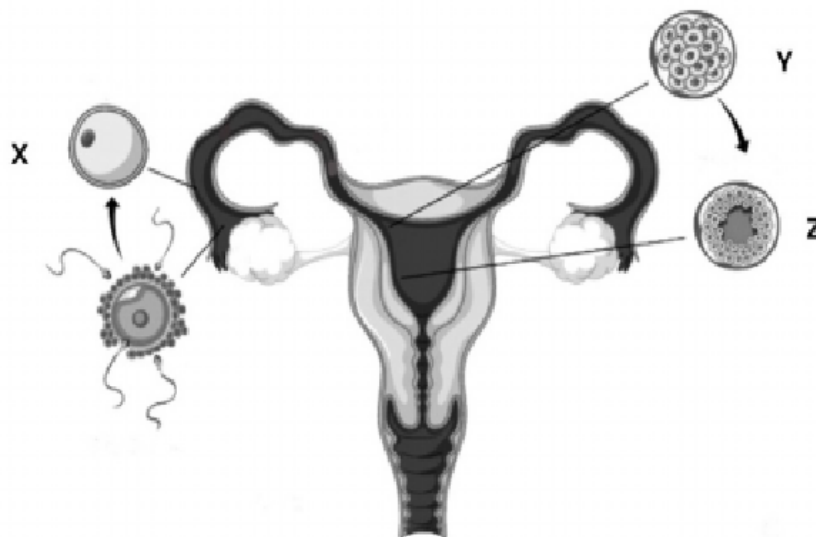
C Distrofi otot

*Muscular dystrophy*

D Kekejangan otot

*Muscle cramp*

21. Rajah 13 menunjukkan urutan perkembangan embrio.  
*Diagram 13 shows a series of embryo development.*



Rajah 13/ *Diagram 13*

Apakah X, Y dan Z?

*What is X, Y and Z?*

|  |   |   |   |
|--|---|---|---|
|  | X | Y | Z |
|--|---|---|---|

|   |                                  |                                  |                                  |
|---|----------------------------------|----------------------------------|----------------------------------|
| A | Zigot<br><i>Zygote</i>           | Morula<br><i>Morula</i>          | Blastosista<br><i>Blastocyst</i> |
| B | Morula<br><i>Morula</i>          | Embrio<br><i>embryo</i>          | Blastosista<br><i>Blastocyst</i> |
| C | Blastosista<br><i>Blastocyst</i> | Zigot<br><i>Zygote</i>           | Morula<br><i>Morula</i>          |
| D | Zigot<br><i>Zygote</i>           | Blastosista<br><i>Blastocyst</i> | Morula<br><i>Morula</i>          |

22. Antara berikut yang manakah benar tentang proses yang berlaku dalam rajah 14 ?  
*Which of the following is true about the process that occur in diagram 14?*

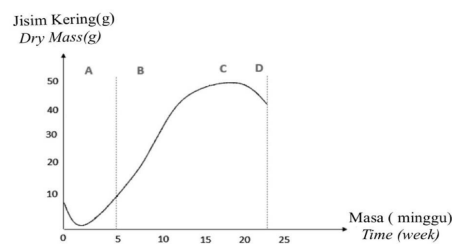


Rajah 14/ *Diagram 14*

- A Pola pertumbuhan berbentuk sigmoid (S)  
*Growth curve pattern is sigmoid (S)*

- B Pada peringkat ini organisma tersebut menjalani instar  
*At this stage the organism undergo instar*
- C Serangga aktif membina tisu dan menambahkan jisim badan  
*The insect actively build a tissue and increase body mass*
- D Pada peringkat ini organisma tersebut menjalani proses ekdisis  
*At this stage the organism undergo ecdysis*

23 Rajah 15 menunjukkan lengkung pertumbuhan dalam tumbuhan semusim.  
*Diagram 15 shows a growth curve in annual plants.*



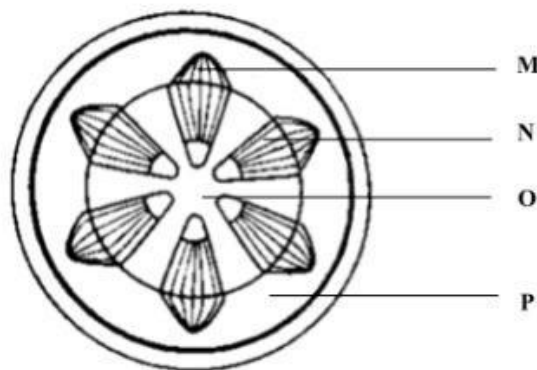
Rajah 15/ *Diagram 15*

Antara berikut yang manakah menerangkan peringkat A?

*Which of the following explain about stage A?*

- A Tumbuhan matang pada peringkat ini  
*Plant matured at this stage*
- B Tumbuhan menjalankan fotosintesis secara aktif  
*Plants undergo photosynthesis actively*
- C Makanan yang disimpan dalam kotiledon digunakan untuk percambahan  
*Food stored in the cotyledon is used for germination*
- D Berlaku penuaan, kadar fotosintesis rendah , keguguran daun dan bunga  
*Aging occur, rate of photosynthesis low and shedding of leaves and flower*

- 24 Rajah 16 menunjukkan keratan rentas batang tumbuhan saka.  
*Diagram 16 shows a stem cross section of perennial plant.*



Rajah 16/ *Diagram 16*

Antara bahagian yang berlabel M,N,O dan P yang manakah hasil dari aktiviti meristem lateral?

*Which combination of the part labelled M,N,O and P is the result of the activity of the lateral meristem?*

- A P dan N

B O dan M sahaja

C P,M,N sahaja

D M,N,O and P

- 25 Encik S bercadang untuk membina sebuah rumah hijau di Cameron Highland. Selepas membuat sedikit kajian beliau telah memilih dua jenis cahaya untuk meningkatkan kadar fotosintesis dan hasil tanamannya. Antara yang berikut yang manakah pilihan Encik X?

*Mr. S plan to build a greenhouse in Cameron Highland. After doing a little research he has chosen two types of light to increase rate of photosynthesis and the yield of his crops. Which of the following is Mr. X's choice?*

A Cahaya merah dan cahaya putih

*Red light and white light*

B Cahaya merah dan cahaya hijau

*Red light and green light*

C Cahaya biru dan cahaya hijau

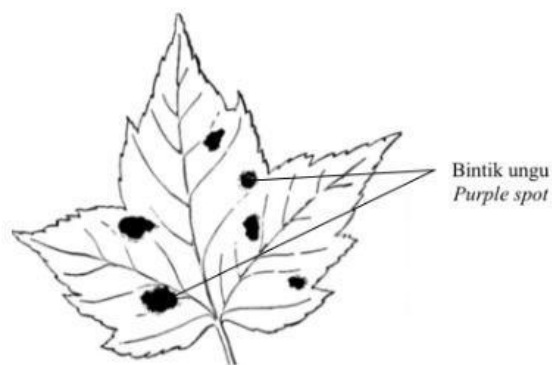
*Blue light and green light*

D Cahaya ungu dan cahaya putih

*Violet light and white light*

- 26 Rajah 17 menunjukkan sehelai daun yang menunjukkan kesan akibat dari kekurangan satu nutrient.

*Diagram 17 shows a leaf that shows effect of deficiency one of nutrient.*



Rajah 17/ Diagram 17

Apakah nutrient tersebut?

*What is the nutrient?*

A Ferum

*Iron*

B Fosforus

- Phosphorus*  
 C *Magnesium*  
*Magnesium*  
 D *Mangan*  
*Manganese*

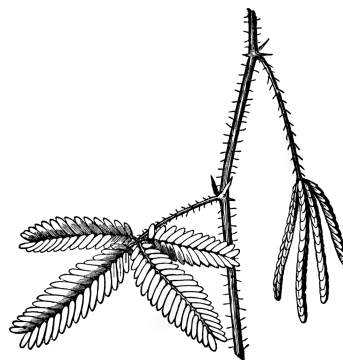
27 Gutasi pada tumbuhan selalunya berlaku pada waktu malam dan awal pagi. Antara berikut yang manakah kesan sekiranya tumbuhan tidak menjalani gutasi.

*Guttation in plants usually occurs at night and early morning. Which of the following is the effect if the plant does not undergo guttation.*

- A Bahan kumuh tumbuhan tidak dapat disingkirkan  
*Plant waste substances cannot be eliminated*  
 B Ion mineral tidak dapat diangkut dari akar ke daun untuk fotosintesis  
*Mineral ion cannot be transported from the roots to the leaves*  
 C Pengangkutan air ke seluruh tumbuhan akan berkurangan  
*Transport of water throughout the plants will be disrupted*  
 D Suhu optimum tumbuhan tidak dapat dikekalkan  
*Optimum temperature of plants cannot be maintained*

28 Rajah 18 menunjukkan sejenis tumbuhan yang menunjukkan gerak balas apabila disentuh.

*Diagram 18 shows a type of plant that shows a response when being touched.*



Rajah 18/ *Diagram 18*

Antara berikut yang manakah menerangkan gerak balas di atas.

*Which of the following explain about the response above.*

- A Gerak balas ini adalah kekal  
*The response is permanent*  
 B Gerak balas yang ditunjukkan ialah perlahan dan tidak jelas  
*The response is slow and not apparent*  
 C Gerak balas ini berlaku bergantung kepada arah ransangan

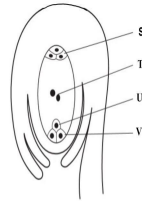
*The response is dependent on the direction of the stimulus*

- D Gerak balas tersebut adalah bertujuan untuk menyelamatkan diri

*The response are intended for survival*

- 29 Rajah 19 menunjukkan keratan rentas ovul.

*Diagram 19 shows the cross section of an ovule.*



Rajah 19/ *Diagram 19*

Percantuman gamet jantan dengan struktur yang manakah akan menghasilkan tisu endosperma?

*Fertilization of male gamete with which structure to form an endosperm tissue?*

- A S  
B T  
C U  
D V

- 30 Rajah 20 menunjukkan pembentukan tiub debunga dan pembentukan gamet jantan.

*Diagram 20 shows the formation of pollen tube and male gamete.*



Rajah 20/ *Diagram 20*

Jika tumbuhan tersebut mempunyai bilangan kromosom  $2n=42$ . Berapakah bilangan kromosom bagi gamet jantan dan nukleus tiub dalam tiub debunga tumbuhan di atas?

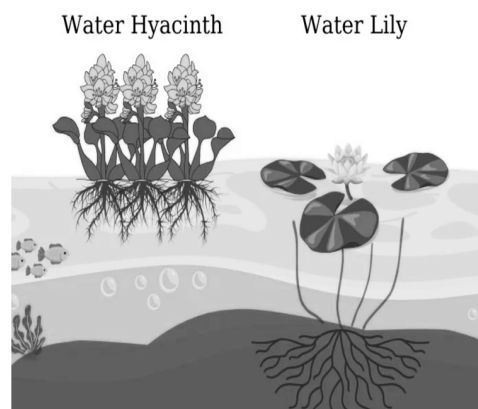
*If the plant has a number of chromosome  $2n=42$ . How many chromosomes are there in the male gametes and tube nucleus in the diagram?*

|          | Gamet jantan<br><i>Male gametes</i> | Nukleus tiub<br><i>Tube nucleus</i> |
|----------|-------------------------------------|-------------------------------------|
| <i>A</i> | 42                                  | 42                                  |
| <i>B</i> | 42                                  | 21                                  |
| <i>C</i> | 21                                  | 21                                  |
| <i>D</i> | 21                                  | 42                                  |

31

Rajah 21 menunjukkan tumbuhan terapung di permukaan air.

*Diagram 21 shows a floating plant on water.*



Rajah 21/ *Diagram 21*

Apakah ciri yang membolehkan tumbuhan ini terapung di permukaan air?

*What is the adaptation that cause the plant floats on water?*

A Batang yang kecil

*Small stem*

B Daun yang nipis dan kecil

*Thin and small leaves*

- C Akar serabut halus

*Fibrous root*

- D Batang tumbuhan yang padat terdiri dari tisu parenkima

*Plant stem consist dense tissues known as parenchyma tissue*

- 32 Rajah 22 menunjukkan seorang doktor sedang menerangkan keadaan kesihatan kepada seorang pesakit.

*Diagram 22 shows a doctor explaining to the patient about his health condition.*



Encik telah mendapat penyakit malaria  
*Sir you got infected by malaria disease.*

Rajah 22/ Diagram 22

Antara mikroorganisma berikut yang manakah yang menyebabkan pesakit itu mendapat penyakit tersebut.

*Which of the following microorganism cause the patient got the disease.*

- A *Trichonympha* sp
- B *Plasmodium* sp
- C *Ektomikoriza* sp
- D *Salmonella* sp

- 33 Antara berikut yang manakah **bukan** kepentingan utama pokok filogeni?

*Which of the following is **not** the importance of phylogenetic tree?*

- A Memahami hubungan evolusi sekumpulan organisma

*Understanding the evolutionary relationship among a group of organisms*

- B Memahami bagaimana spesies berkait antara satu sama lain melalui nenek moyang yang sama

*Understanding how species related to each other through same ancestors*

- C Pengecaman organisma berdasarkan persamaan dan perbezaan

*To identify organisms based on similarities and differences*

- 34 Jadual 2 menunjukkan satu jadual keputusan untuk menganggarkan peratus litupan Mimosa pudica di padang sekolah dengan menggunakan 5 kuadrat, setiap satu bersaiz 1 meter x 1 meter.

*Table 2 shows a table of experimental result to estimate the percentage coverage of Mimosa pudica in a school field using 5 quadrats, each quadrat measuring 1 meter x 1 meter.*

| Kuadrat<br><i>Quadrat</i>                                                                          | 1    | 2    | 3    | 4    | 5    |
|----------------------------------------------------------------------------------------------------|------|------|------|------|------|
| Luas litupan dalam kuadrat (m <sup>2</sup> )<br><i>Area of coverage in quadrat (m<sup>2</sup>)</i> | 0.12 | 0.06 | 0.07 | 0.02 | 0.07 |

Jadual 2/ *Table 2*

Berapakah peratus litupan Mimosa pudica tersebut?

*What is the coverage percentage the Mimosa pudica?*

- A 6.80  
B 3.40  
C 0.34  
D 0.68

- 35 Jadual 3 menunjukkan keputusan eksperimen Keperluan Oksigen Biokimia (BOD) ke atas empat sample air berbeza

Table 3 shows the results of the Biochemical Oxygen Demand (BOD) experiment on four different water samples.

| <b>Sampel Air</b><br><i>Water Sample</i> | <b>Masa untuk larutan metilena biru dalam sampel air luntur</b><br><i>Time for methylene blue solution in water sample to decolouris</i> |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| P                                        | 2 jam<br><i>2 hours</i>                                                                                                                  |
| Q                                        | 1 jam<br><i>1 hour</i>                                                                                                                   |
| R                                        | $\frac{1}{2}$ jam<br><i><math>\frac{1}{2}</math> hour</i>                                                                                |
| S                                        | 1 $\frac{1}{2}$ jam<br><i>1 <math>\frac{1}{2}</math> hour</i>                                                                            |

Jadual 3/ Table 3

Berdasarkan keputusan tersebut sampel air manakah paling kurang dicemari?  
*Based on the results, which water sample is the least contaminated?*

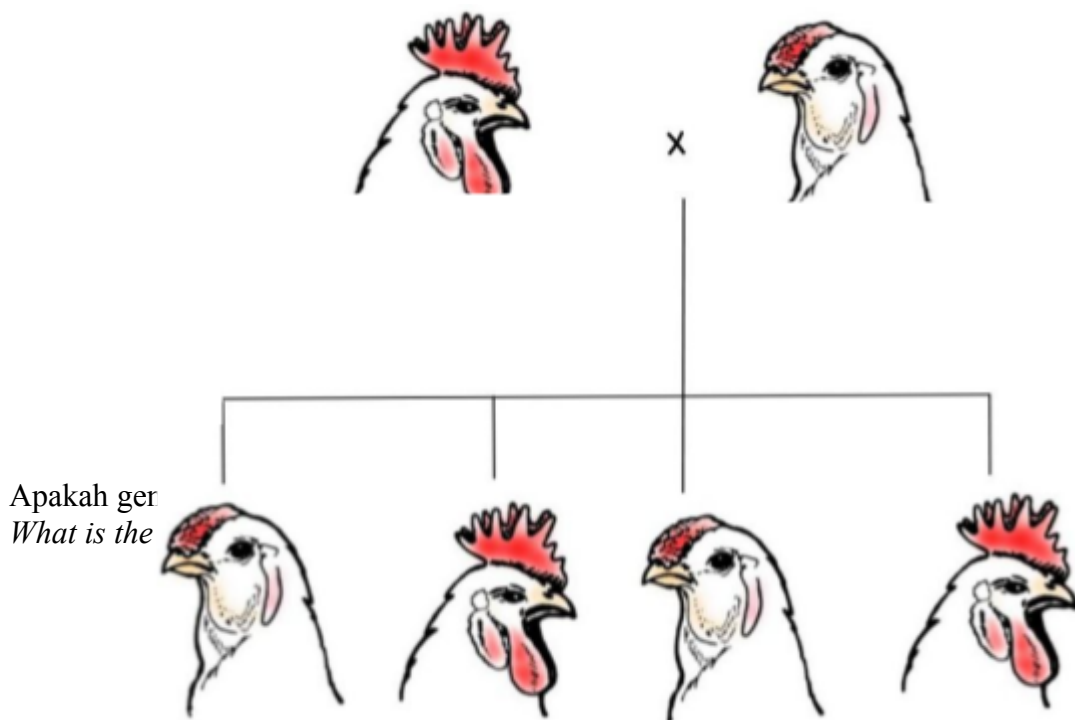
- A. P
  - B. Q
  - C. R
  - D. S
36. Seorang penghidap sindrom Jacob dilahirkan mempunyai bilangan autosom 44 dan satu lebihan pada kromosom seks.  
Manakah antara berikut merupakan punca keadaan ini berlaku  
*A person with Jacob syndrome is born with autosome 44 and one extra sex chromosome*  
*Which of the following is the cause of this condition?*
- A Mutasi berlaku semasa penghasilan oosit sekunder  
*Mutation happened during the production of the secondary oocyte*
  - B Ibu tersebut telah terdedah kepada sinar X semasa hamil  
*The mother was exposed to X rays while she was pregnant*
  - C Mutasi berlaku semasa penghasilan sperma  
*Mutation happened during the production of sperm*
  - D Radiasi telah menyebabkan perubahan struktur gen dalam sperma  
*Radiation caused a change in structure of a gene in the sperm*
37. Dalam satu eksperimen mengkaji ciri warna bunga pokok kacang pis, 250 tumbuhan heterozigot mengalami pendebungaan sesama sendiri dan menghasilkan 1800 bunga ungu. Bunga ungu adalah trait dominan manakala bunga putih adalah trait resesif. Berapakah bunga warna putih dihasilkan?

*In an experiment to study characteristics flower colour of peas, 250 heterozygote plants were self-pollinated and 1800 purple flower were produced. Purple flower is dominant trait while white flower is recessive trait. How many white flower were produced?*

- A 3600
- B 500
- C 450
- D 600

38. Rajah 23 menunjukkan keputusan kacukan monohibrid antara ayam balung Buttercup dan ayam balung Strawberry. Didapati, balung Buttercup adalah trait dominan dan balung Strawberry adalah trait resesif.

*Diagram 23 shows the result of monohybrid cross between Buttercup comb chicken and Strawberry comb chicken. Dominant trait is Buttercup comb while Strawberry comb is recessive trait.*



Rajah 23 / *Diagram 23*

Berdasarkan rajah skema kacukan tersebut, nyatakan genotip induk  
*Based on the diagram of the hybrid scheme, state the parent genotype*

|   | Balung Buttercup<br><i>Buttercup Comb</i> | Balung Strawberry<br><i>Strawberry Comb</i> |
|---|-------------------------------------------|---------------------------------------------|
| A | TT                                        | tt                                          |
| B | Tt                                        | tt                                          |
| C | Tt                                        | Tt                                          |
| D | TT                                        | Tt                                          |

39. Rajah 24 menunjukkan urutan bes rantai DNA yang mengalami mutasi gen.  
*Diagram 24 shows a bases sequence of DNA strand that undergo mutation.*



Rajah 24/*Diagram 24*

Apakah penyakit yang terhasil dari mutasi gen di atas?  
*What disease after the mutation?*

- A Sistik fibrosis  
*Cystic Fibrosis*
- B Haemofilia  
*Haemophilia*
- C Anemia  
*Anemia*
- D Talasemia

*Thalassemia*

40. Berikut adalah contoh variasi tak selangar kecuali  
*The following are examples of discontinuous variation except*
- A Jenis cuping telinga  
*Type of earlobes*
  - B Pola cap jari  
*Fingerprint pattern*
  - C Warna kulit  
*Skin colour*
  - D Warna bunga  
*Flower colour*