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

1. Diagram 1.1 shows the structure of animal cell

   Rajah 1.1 menunjukkan struktur sel haiwan

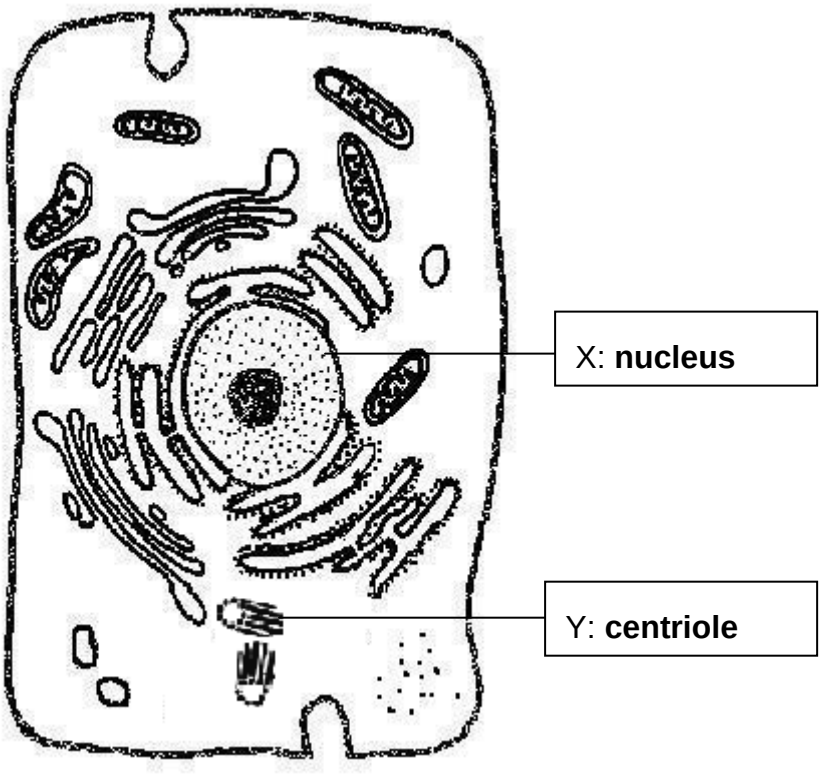


Diagram 1.1
Rajah 1.1

(a) On Diagram 1.1, label X and Y.
Pada Rajah 1.1, labelkan X dan Y

[1marks]

(b) Explain **one** characteristic of Y related to cell division.
*Terangkan satu **ciri** Y berkaitan dengan pembahagian sel*

Sample answer:

F: Composed of a complex arrangement of microtubules

E: Form spindle fibers during cell division (in animal cell)

[2marks]

(c) Explain the function of X in cell division

Terangkan fungsi X dalam pembahagian sel

Sample answer:

F: nucleus containchromosomes which carry genetic information

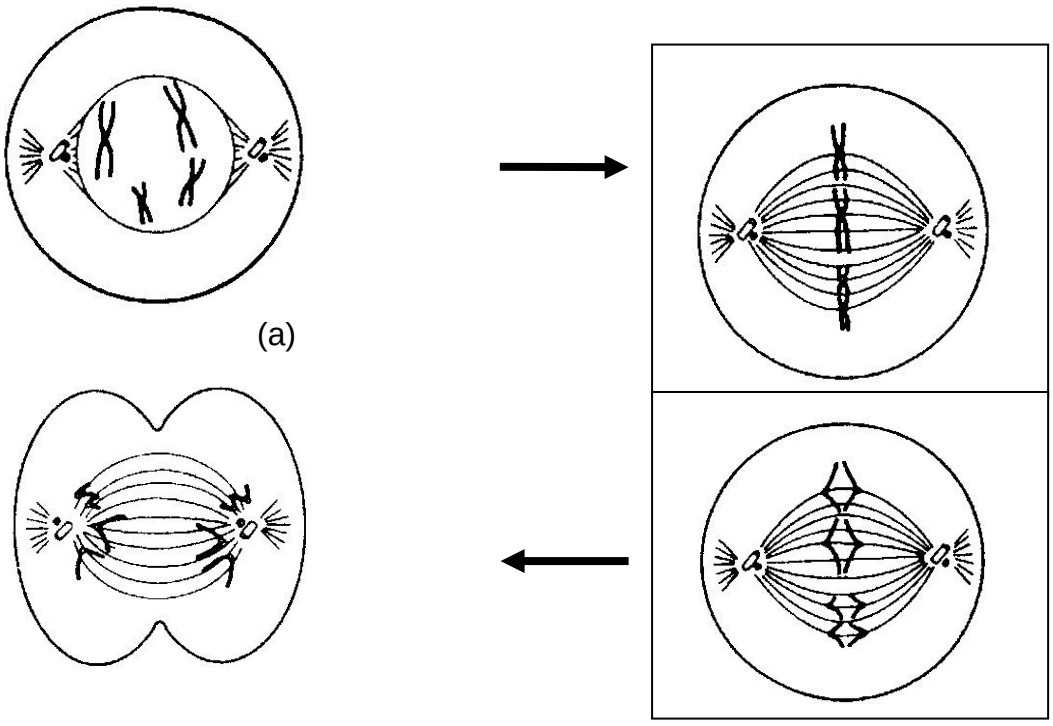
E: behavior of chromosome in stage of mitosis/meiosis/cell division transfer genetic information to daughter cell

[2marks]

(d) Diagram 1.2 below shows stage of cell division in somatic cell of human.

In the box given, draw another two stage in that cell division.

Rajah 1.2 di bawah menunjukkan peringkat pembahagian sel dalam sel soma manusia. Dalam kotak yang diberi, lukis dua peringkat dalam pembahagian tersebut



[2marks]

Diagram 1.2

Rajah 1.2

(e) If spindle fibre is not form in Diagram 1.2 (d), explain the effect on the number of chromosome in the daughter cell.
Jika gentian gelendong tidak terbentuk dalam Rajah 1.2 (d), terangkan kesan keatas bilangan kromosom dalam sel anak

Sample answer:

F:the number of chromosome in the daughter cell less/ extra
E: no contraction of spindle fibre to pull chromosome toward the pole

[2marks]

(f) Explain how the cell division above can be used to increase in a short time the number of given example of the plant in the farm.
Terangkan bagaimanakah pembahagian sel di atas dapat digunakan untuk meningkatkan bilangan dalam masa yang singkat tumbuhan yang dinamakan dalam ladang.

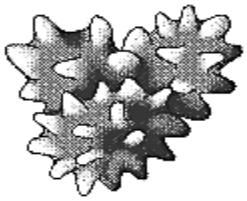
Sample answer:

Example of the plant: banana/ palm oil/ any other example
F:tissue culture
E1: cut off explants / part of plant / young shoot, leaves, roots, seeds, embryos
E2: explants are sterilized and placed in cultured medium containing nutrient such as glucose, amino acids, minerals and growth hormone/ auxin
E3: the culture medium need to be maintained at optimum pH and temperature 25 -35°C
E4: explants divide by mitosis form callus// undifferentiated mass of tissues
E5: callus develop into embryoid/ somatic embryos and later into plantlets
E6: plantlets are transferred to the soil where they grow into adult plant

[3marks]

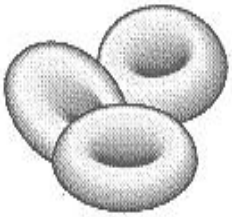
2.(a) Diagram 2.1 shows the shape of red blood cells after being immersed for 30 minutes in three solutions with different concentration.

Rajah 2.1 menunjukkan bentuk sel darah merah selepas direndam selama 30 minit dalam tiga larutan yang berbeza kepekatannya.



Red blood cells in P solution
Sel darah merah dalam larutan P

Red blood cells in Q solution
Sel darah merah dalam larutan Q



Red blood cells in R solution
Sel darah merah dalam larutan R

Diagram 2.1

Based on the Diagram 2.1
Berdasarkan Rajah 2.1

(i) State the condition of the red blood cells after being immersed in
Nyatakan keadaan sel darah merah selepas direndam di dalam

Sample answer:

Solution P: Crenation / shrink / shrivel
Solution Q: Haemolysis / swell and burst

[2 *marks*]

(ii) Name the type of solution R in which the red blood cells are immersed.
Namakan jenis larutan R yang mana sel darah merah direndam.

Sample answer:

Solution R is isotonic solution.

[1 *mark*]

(iii) Explain your answers given in a(ii)
Terangkan jawapan yang anda berikan di a(ii)

Sample answer:

P1:The cell retains its normal shape/ biconcave disc shape.
P2:The water diffuses in and out of the cells at equal rate by <u>osmosis</u>
P3:Solution R has the same osmotic concentration as the cytoplasmic fluid in the red blood cells

[3 *marks*]

(b)

Food such as mushrooms, fruits, vegetables and fish can be preserved longer by using natural preservatives such as salt, sugar and vinegar.

Makanan seperti cendawan, buah-buahan, sayur-sayuran dan ikan boleh diawet untuk tahan lama menggunakan bahan-bahan pengawet semulajadi seperti garam,gula dan cuka .

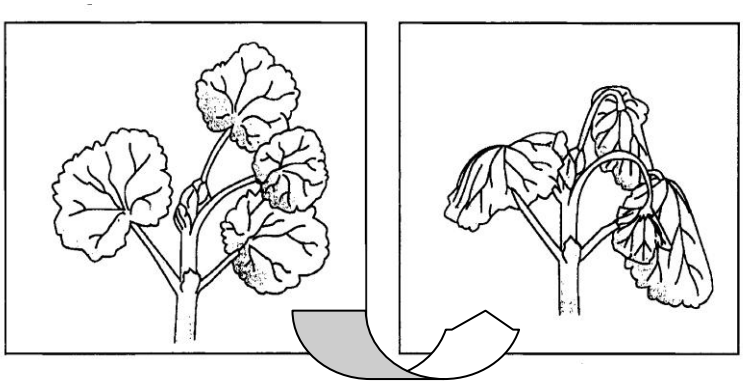
Based on the statement, explain why vinegar is suitable to be used as the natural preservative for the preservation of garlic.
Berdasarkan pernyataan di atas ,terangkan mengapa cuka adalah sesuai digunakan sebagai pengawet semulajadi untuk bawang putih.

Sample answer:

F1:Vinegar has a low pH/acidic
E1: Vinegar diffuses into the tissues of the garlic
E2: The tissues of the garlic becomes acidic
E3: The low pH prevents the growth of microorganisms in garlics
E4: The garlic can be preserved to last longer

[3 *marks*]

(c) Diagram 2.2 shows the condition of herbaceous plant due to water shortage in soil.
Rajah 2.2 menunjukkan keadaan pokok herba disebabkan oleh kekurangan air dalam tanah.



Water shortage after one week
Kekurangan air selepas satu minggu

Diagram 2.2

Explain the condition of the plant in Diagram 2.2 after one week.
Terangkan keadaan pokok dalam Rajah 2.2 selepas satu minggu.

Sample answer:

F:The plant wilt

E1: The cells become flaccid / plasmolysed // both the vacuole the vacuole and cytoplasm shrink // the plasma membrane of the root cells pull away from the cell wall.

E2: Water molecules diffuse out from the cell sap of the root hair cell <u>by osmosis</u>

E3: (the remaining) soil <u>water</u> becomes hypertonic to the cell sap of the root hair cell as the soil dries out.

[3 *marks*]

4. Diagram 4.1 shows the process of phagocytosis as second line of defence to destroy the bacteria

Rajah 4.1 menunjukkan proses fagositosis sebagai barisan pertahanan kedua untuk memusnahkan bakteria.

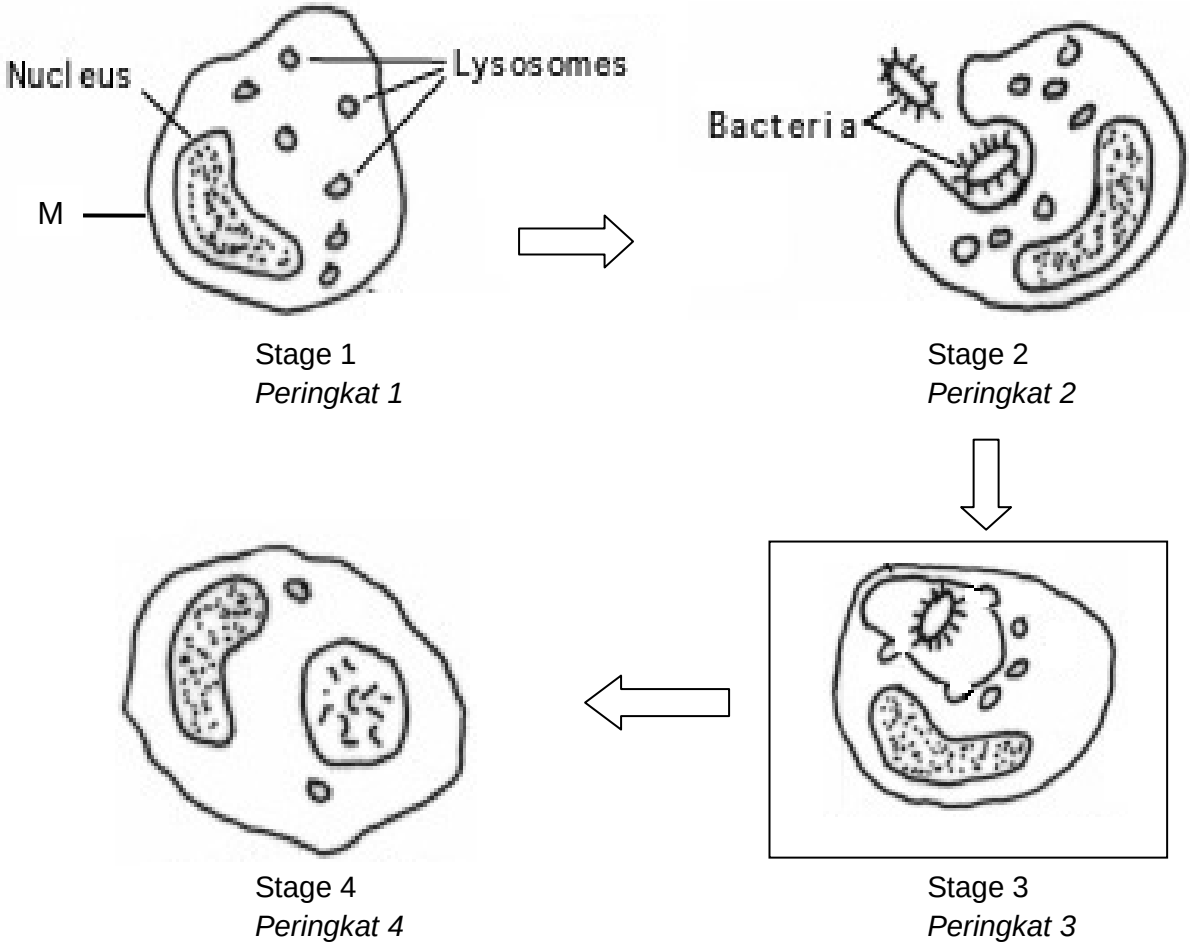


Diagram 4.1/ Rajah 4.1

(a) (i) Name cell M involved in mechanism above.

Namakan sel M yang terlibat dalam mekanisma di atas.

Neutrophil / eosinophil / basophil / granulocyte / phagocyte

[1 mark]

(ii) Draw a diagram in stage 3

Lukis rajah dalam peringkat 3.

[1 mark]

(b) Explain the function of lisosome in mechanism above

Terangkan peranan lisosom dalam mekanisma di atas

F : digest bacteria

E : because lisosome contain <u>hydrolytic enzymes</u> / <u>cellulase</u> which <u>digest cellulose</u> / by <u>breaking down</u> the <u>bacteria cell wall</u>.

[2 mark]

(c) Explain what happen in stage 2.

Terangkan apa yang berlaku dalam peringkat 2.

F : phagocytes surrounds / engulfs the bacteria using pseudopodia

E : forming phagocytic vacuole / fagosome /food vacuole

[2 mark]

(d) How the action of M to pathogen is different to lymphocyte?

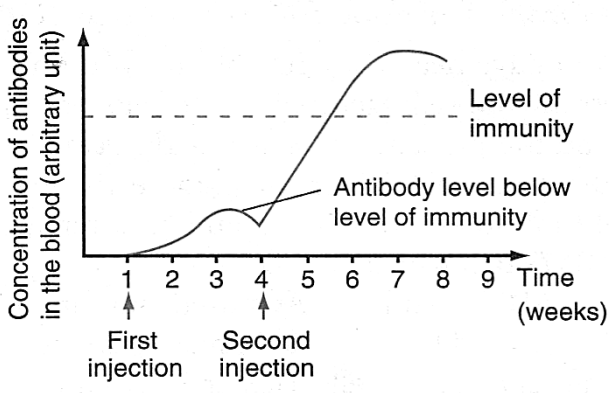
Bagaimanakah tindakan M terhadap patogen adalah berbeza dengan limfosit?

M kill the pathogen by engulf and digest the pathogen but lymphocyte produce antibody then antibody kill the pathogen / neutralize the toxin from pathogen

[1 marks]

(e) Diagram below show a type of immunity occurs in human.

Rajah di bawah menunjukkan jenis immuniti yang berlaku dalam manusia.



(i) Name the type of immunity shows in the diagram.

Namakan jenis immuniti yang ditunjukkan dalam rajah.

Answer:

Artificial active immunity

[1 mark]

(ii) Name the second injection and why the person should take second injection?
Namakan suntikan kedua dan mengapa individu ini perlu mengambil suntikan kedua?

Sample answer:

N: booster dose *//* an additional administration of a vaccine

E: to stimulate lymphocyte produce more antibody until achieve immunity level.

[2 mark]

(f) The above immunity is example of third line of defence. What make it different to the second line of defence?

Sample answer:

P1: Third line of defence – <u>specific response to pathogen infection</u> but second line of defence – <u>non-specific response</u>/generalized responses <u>to pathogen infection</u>

P2: Third line of defence involved production of antibody(active immunity)/ used supply antibody (passive immunity) from leucocyte but second line of defence involve the physical structure of leucocyte

[2 marks]

5. Diagram 5.1 shows the stages of the ovarian cycle in human ovary
Diagram 5.2 shows the thickness of the endometrium of uterus before the fertilisation in the second menstrual cycle.
Rajah 5.1 menunjukkan peringkat kitaran ovary dalam ovary manusia.
Rajah 5.2 menunjukkan ketebalan endometrium dalam uterus sebelum berlaku persenyawaan dalam kitarhaid yang kedua.

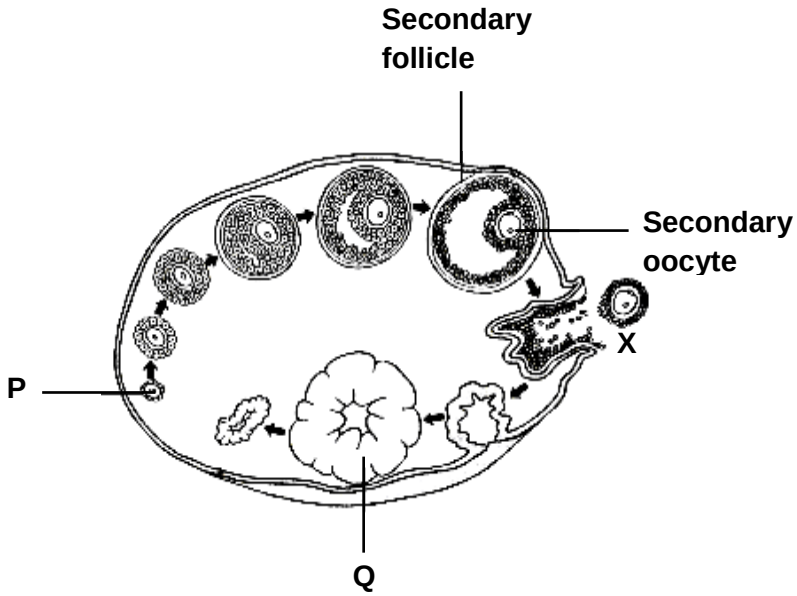


Diagram 5.1

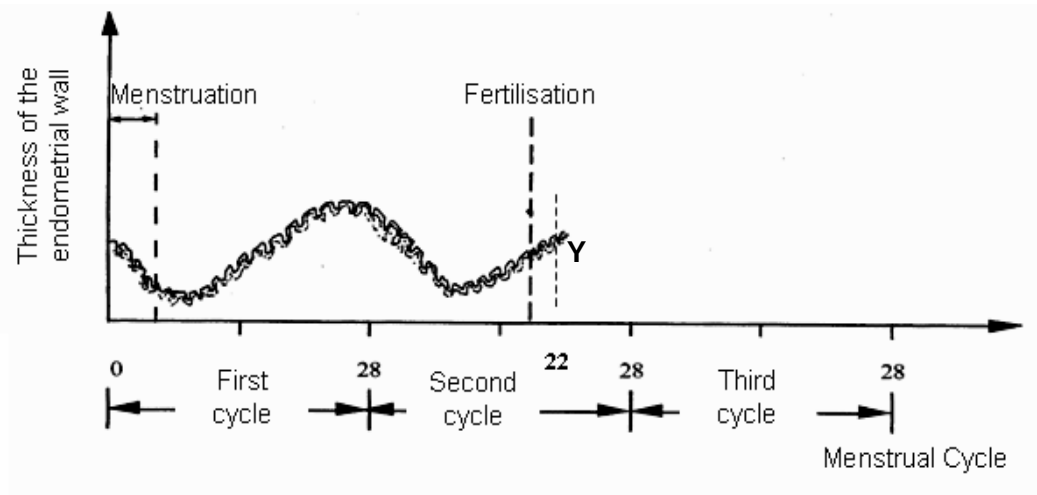


Diagram 5.2

a) (i) Describe the change in the structure of follicle P into a secondary follicle.
Terangkan perubahan struktur folikel P dalam pembentukan folikel sekunder.

[2 marks]

Sample answer:

P1 : FSH concentration increases // is released (by the pituitary gland).

P2 : Stimulates the development of follicle cells. (1m)

P3 : Primary follicle developed into secondary / Graafian follicle // Primary oocyte developed into secondary oocyte

(ii) Relate the change in **(a)(i)**to the thickness of the endometrium
Hubungkan perubahan dalam (a) (i) dengan ketebalan endometrium

[1 mark]

Sample answer:

P1 : The thickness of the endometrial wall increases

b) Explain the process that occurs at X.
Terangkan proses yang berlaku pada X.

[2 marks]

Sample answer:

P1 : Ovulation

P2 : The release of secondary oocyte from the (matured) secondary follicle / Graafian follicle to the oviduct / Fallopian duct

c) Explain the effect of the change of structure Q to the thickness of the endometrium.
Terangkan kesan perubahan struktur Q keatas ketebalan dinding endometrium.

[2 marks]

Sample answer:

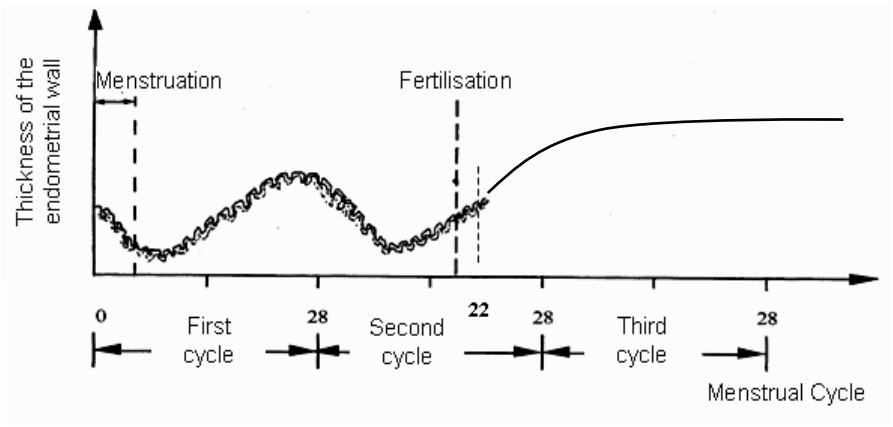
P1 : The thickness of the endometrial wall / uterine lining decreases.

P2 : The level of progesterone decreases.

d) (i) Fertilisation takes place in the second menstrual cycle.
Complete the graph in Diagram 5.2 to show the changes in the thickness of the endometrium after point Y
Persenyawaan berlaku dalam kitar haid yang kedua
Lengkapkan graf dalam Rajah 5.2 untuk menunjukkan perubahan ketebalan endometrium selepas titik Y

[1 mark]

Answer:



(ii) Explain your answer in (d)(i).

Terangkan jawapan di dalam (d)(i).

[2 marks]

Sample answer:

P1 : The corpus luteum / placenta developed.

P2 : The corpus luteum / placenta released progesterone (and oestrogen).

e) (i) State the changes in the thickness of the endometrium after point Y relating to the secretion of hormones secreted by the ovary.

Terangkan hubungan perubahan ketebalan endometrium selepas titik Y dengan perembesan hormon oleh ovari.

[1 mark]

Sample answer:

P1 : The thickness of the endometrial wall increases / is maintained.

(ii) State the importance of thickened endometrium to the continuity of life

Nyatakan kepentingan ketebalan endometrium dalam kesinambungan hidupan

[1 mark]

Sample answer:

P1 : Increase the chance of implantation // development of embryo / blastocyst.

SECTION B

[40 *marks*]

Answer **any** two questions from this section

*Jawab mana-mana **dua**soalandaripadabahagianini*

6. Diagram 6.1 shows the growth and development process at the shoot tip.
Rajah 6.1 menunjukkan proses pertumbuhan dan perkembangan pada hujung pucuk.

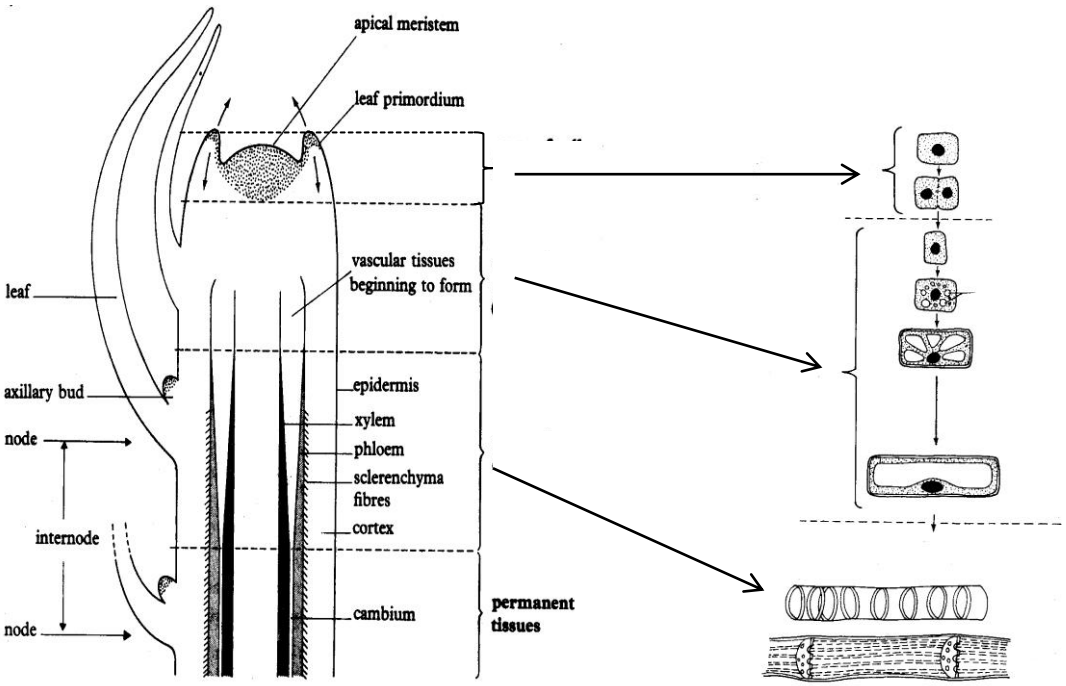


Diagram 6.1

a) Explain the process of primary growth that shown in Diagram 6.1
Terangkan proses pertumbuhan primer yang ditunjukkandalam Rajah 6.1

[8 marks]

Sample answer:

Cell division

P1: Cell division take place by mitosis

P2: Each cell divides to become two cells which are identical to the parent cell

P3: This process repeats itself until a mass of cells consisting of many identical cells are formed

Cell elongation

P4: Cell elongation cause by intake of water and nutrient into the cell from the environment

P5: Water accumulates in the vacuoles of plant cells to form large central vacuole, causing the primary wall to stretch

P6: The nutrients are used in the building up of the protoplasm// more organelles leading to an increase in the cell size and volume

Cell differentiation

P7: Cells begin to differ from each other to form groups of specialised cells

P8: to perform new and specialised functions // Example: cell differentiation in the epidermis of roots to form root hair to enable the cell to have a large total surface area for absorption of water from the soil

P9: Cells differentiation causing the changes of shape and complexity of organism

b) Explain the importance of primary growth to plant.
Terangkan kepentingan pertumbuhan primer kepada tumbuhan

[4 marks]

Sample answer:

P1: During this time the stem and roots of plant increase in length. This allows a plant to achieve its maximum height

P2: Its bring about the formation of primary xylem that helps in the transport of water and mineral

P3: Its bring about the formation of primary phloem that helps in the transports organic substances

P4: Its provides support because the walls of xylem tissue are thickened with lignin

c) Diagram 6.2 shown the tropism respond at shoot tip and root tip.
Rajah 6.2 menunjukkan gerakbalas tropisme pada hujung pucuk dan hujung akar.

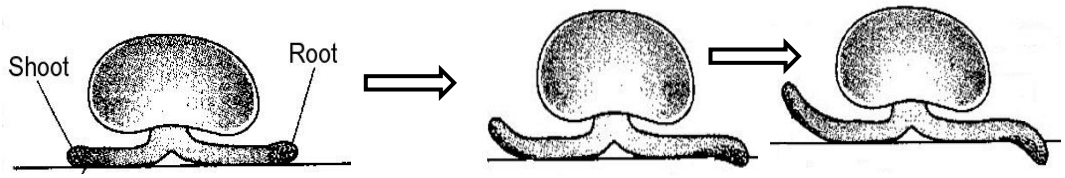


Diagram 6.2

Base on diagram 6.2 explain how the tropism response occurred.
Berdasarkan rajah 6.2 terangkan bagaimana gerakbalas tropisme berlaku.

[8 marks]

Sample answer:

P1: auxins produced by shoot and root
P2: auxins diffuse into zone of elongation
P3: (Owing to gravity) auxins move to lower side of shoot and root
P4: The lower side of shoot and root has a higher concentration of auxins than the upper side
P5: height concentration of auxins in the shoot promotes elongation of cells.
P6: the lower side of the shoot will faster than the upper side
P7: the shoot curves and grows upward (negative geotropism)

P8: height concentration of auxins in the root inhibits elongation of cells.
P9: So the upper side of the root will grow faster than the lower side
P10: the root curves and grows downwards (positive geotropism)

7. (a) Explain the interaction based on Diagram 7.1
Terangkan interaksi berdasarkan Rajah 7.1

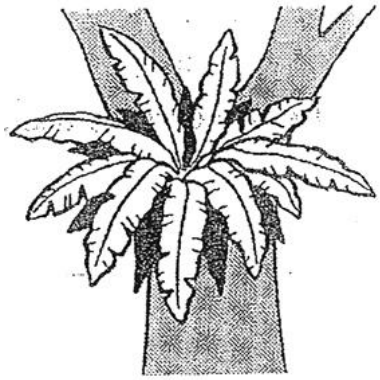


Diagram 7.1
Rajah 7.1

[4marks]

Sample answer:

F: Commensalism
E1:relationship between two species that benefits one species/ commensal but neither benefits nor harms the other species/ host
E2: fern has a sponge-like root mass that soaks up rain water and absorbs nutrients released from the decaying litter.
E3: fern leaves has mesophyll cell contain chloroplast do photosynthesis

(b) Diagram 7.2 shows mechanism of photosynthesis in plant. Explain why the product from light reaction need for dark reaction.
Rajah 7.2 menunjukkan mekanisma fotosintesis dalam tumbuhan.Terangkan Mengapa produk dari tindakbalas cahaya diperlukan untuk tindakbalas gelap.

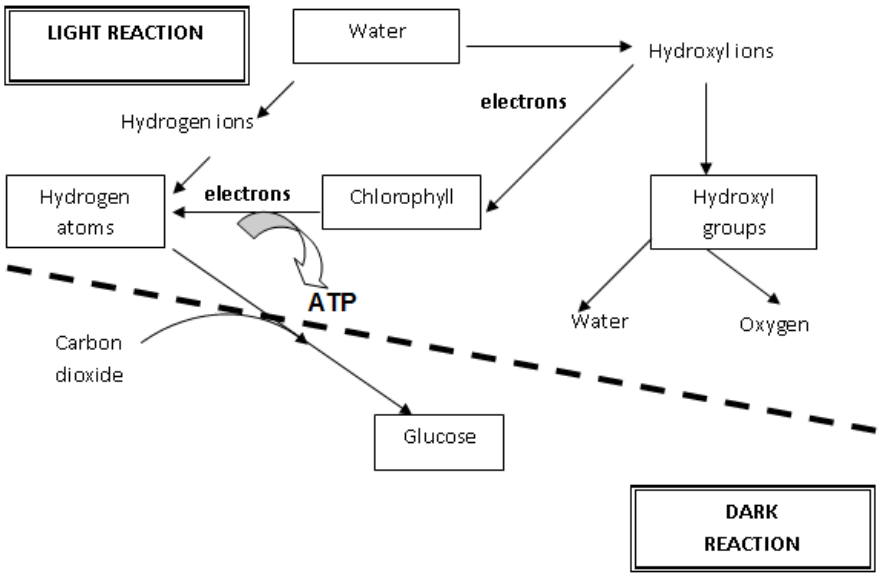


Diagram 7.2 [6marks]

Rajah 7.2

Sample answer:

F: **Mechanism of photosynthesis in plant consist of light reaction anddark reaction**

E1: **Chlorophyll absorbs light energy released electrons andproduce ATP**

E2: **Light energy is also split the water molecules intohydrogen ion(H^+)and hydroxyl ions(OH^-)/Photolysis of water**

E3: **Hydrogen ions combine with electron from chlorophyll to form hydrogen atoms**

E4: **<u>Hydrogen atom</u> and <u>ATP</u> will be used in dark reaction**

E5: **Each hydroxyl ion loses an electron to form hydroxyl group (the electron is received by the chlorophyll)**

E6: **The hydroxyl groups then combine to form water and gaseous oxygen**

E7: **<u>Hydrogen atomfit/ reduce</u> carbon dioxide in dark reaction to form <u>glucose</u>**

E8: **Reduction of carbon dioxide need <u>ATP</u> from light reaction**

E9: **The reaction catalysed by photosynthetic enzyme in stroma**

E10: **Produced glucose molecules, then glucose undergo condensation/ converted to starch for storage**

(c) Diagram 7.3 shows the condition of the town.
Rajah 7.3 menunjukkan sebuah bandar.

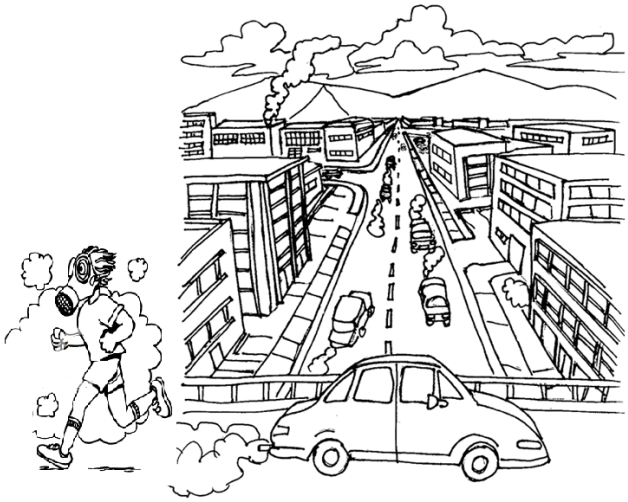


Diagram 7.3
Rajah 7.3

(i) Discuss the effect of air pollution may occur in the town.
Bincangkan kesan pencemaran udaya yang mungkin berlaku dalam bandar.

[6 marks]

Sample answer:

F1: formation of haze / smog
E1: cause by fine particle matter/smoke/ soot
E2: prevents vision /reduce light intensity photosynthesis/ reduce oxygen content
F2: acid rain
E1: cause by SO_2 / NO_2
E2: estroy building
F3: increasetemperature
E1: cause by CO_2
E2: green house effect/ global warming
F4: depletion of ozonelayer
E1: cause by CFC gases
E4: more uv penetration
F5: respiratory problems/allergies/risk for cancer
E1: cause by CO/ SO_2 / NO_2
E2: cause health hazards

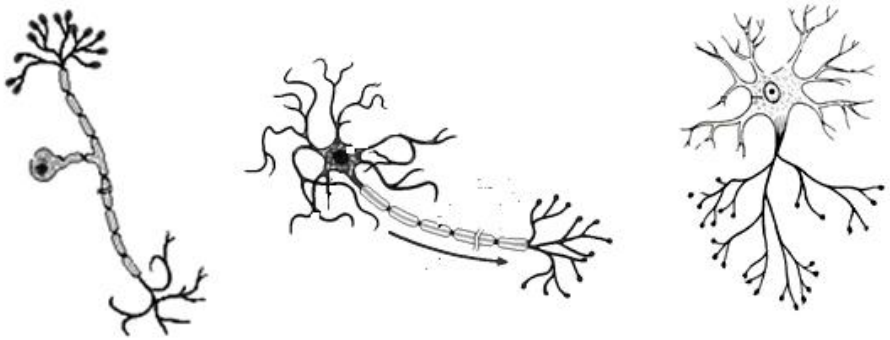
(ii) If you are an environmental activist, suggest how you would explain to the government about the measures needed to overcome the type of pollution.
Jika anda seorang aktivis alam sekitar, cadangkan bagaimana anda akan menjelaskan kepada kerajaan mengenai langkah-langkah yang diperlukan untuk mengatasi jenis pencemaran.

[4 marks]

Sample answer:

F1: implementation of laws
E1: control and prevent pollution using the environmental act
F2: use of technology
E1: using unleaded petrol for cars/ fit catalytic converter in factory
F3: education
E3: media massa/ internate/ scholl

8. (a) Diagram 8.1 shows three types of neurons.
Rajah 8.1 menunjukkantigajenis neuron.



Neurone P | Neurone Q | Neurone R

Neuron P | *Neuron O* | *Neuron R*

Diagram 8.1
Rajah 8.1

Name types of neurone P, Q and R and state **two** differences between the structure of neurone P and neurone Q
Namakan *jenis neuron P, Q dan R dan nyatakan* ***dua*** *perbezaan di antara struktur bagi neuron P dan neuron Q*

[4 *marks*]

Sample answer:

Neurone P is afferent neurone

Neurone Q is efferent neurone

Neurone R isinterneurone

3√ = 2 marks
2√ = 1 marks

Neurone P	Neurone Q
P1: has a long dendron but a short axon	**Has a short dendron but a long axon**
P2: cell body is located in the middle of the cell	**Cell body is located at the terminal / end of the cell**

(b) Diagram 8.2 shows the transmission of a nerve impulse from neurone P to neurone R.
Rajah 8.2 menunjukkan pemindahan impuls saraf dari neuron P ke neuron R.

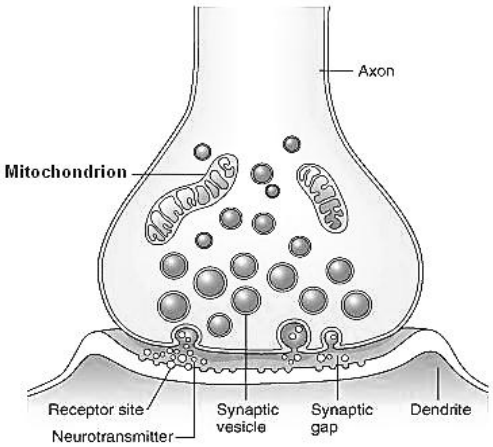


Diagram 8.2
Rajah 8.2

Explain the transmission of a nerve impulse from neurone P to neurone R
Terangkan pemindahan impuls saraf dari neuron P ke neuron R

[6 *marks*]

Sample answer:

P1: when impulse reaches the synaptic knob / terminal / terminal axon / presynaptic membrane
P2: it stimulates the synaptic vesicles
P3: to release neurotransmitter
P4: mitochondrion (in the synaptic terminal) produces energy / ATP
P5: for active transport / transmission of the impulse
P6: (neurotransmitter) diffuse across / into synaptic cleft / synapse to the next dendrite / neurone R / postsynaptic membrane
P7: transmission of impulse from neurone P to neurone R is in the form of chemicals

(c) Diagram 8.3a shows example of voluntary action and
Diagram 8.3b shows example of involuntary action. By using pathway of transmission of information from receptors to effectors, explain similarities and difference between voluntary action and involuntary action.
Rajah 8.3a menunjukkan contoh tindakan terkawal dan Rajah 8.3b menunjukkan contoh tindakan luar kawal. Dengan menggunakan laluan pemindahanmaklumat dari reseptor kepada efektor, terangkan persamaan dan perbezaan tindakan terkawal dan tindakan luar kawal.

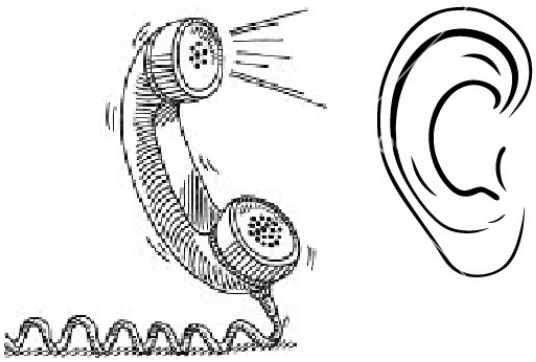


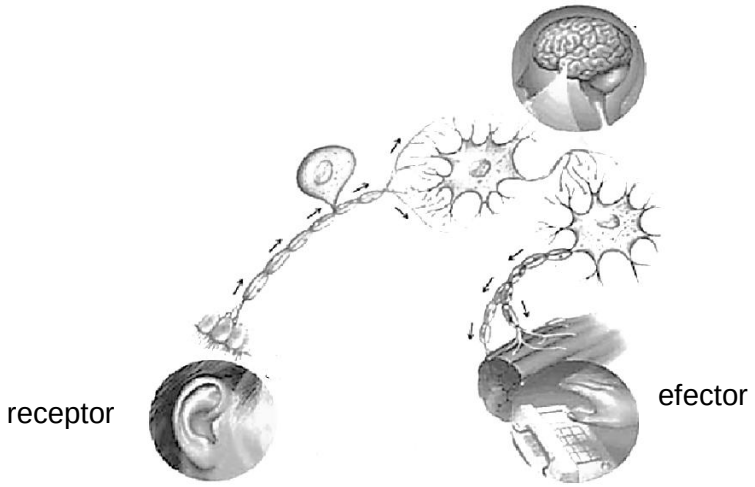
Diagram 8.3a
Rajah 8.3a

Diagram 8.3b
Rajah 8.3b

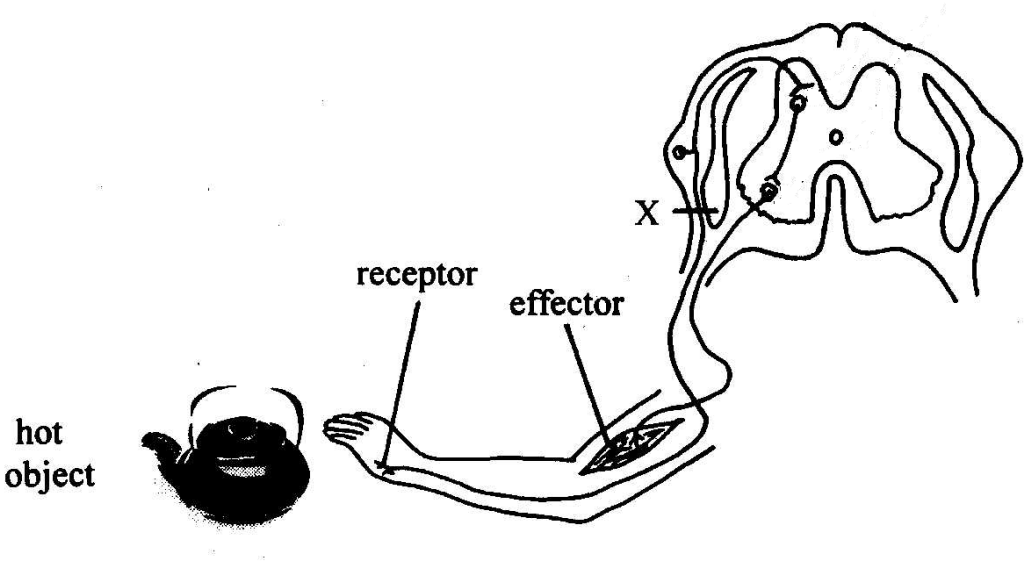
[10 mark]

Sample answer:

Pathway of transmission of information from receptors to effectors for voluntary action



Pathway of transmission of information from receptors to effectorsfor involuntary action



Similarities

S1: **both voluntary action and involuntary action involved receptor**

E1: **to detect the stimulus and trigger impulse**

S2: **both voluntary action and involuntary action involved 3 neuron**

E2: **carry impulse from receptor to efector**

S3: **both voluntary action and involuntary action involved efector**

E3: contract to show the response

Differences

D1: Voluntary action is controlled by conscious thoughts but Involuntary action occurs automatically without any conscious control

E1: because voluntary action Involves the integration and interpretationof information in the cerebrum but involuntary action involve spinal cord only

D2: Voluntary action are under the control of the will of the Individual but involuntaryaction are not control by the will

E2: because voluntary action involve the action of doing thing for activity but involuntary action involve the action to protect the person from danger

9. (a) Diagram 9.1 and 9.2 shows the histogram about distribution of genetic variation in human.

Rajah 9.1 dan 9.2 menunjukkan histogram mengenai taburan variasi genetik dalam manusia.

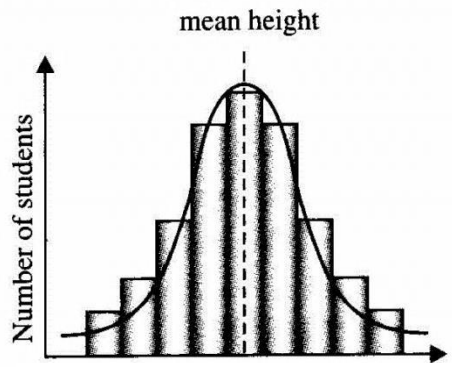


Diagram 9.1

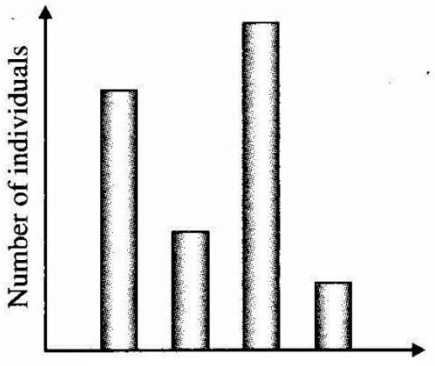


Diagram 9.2

(i) With a suitable example, explain the differences of two kinds of variation.

Dengan menggunakan contoh yang sesuai, terangkan perbezaan di antara kedua-dua variasi tersebut.

[7 *marks*]

Sample answer:

Example of continuous variation: Height or weight

Example of discontinuous variation: ABO blood group

Differences:

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

(ii) What is the importance of variation to organism?

Apakah kepentingan variasi kepada organisma?

[3 *marks*]

Sample answer:

P1: variation provided better adaptation for organism to survive in the changing environment

P2: variation are essential to the survival of species / to survive more successfully

P3: variation be able to organism explore a new habitat

P4: to ensure organism survival from predator

(b) Diagram 9.3a, 9.3b and 9.3c shows the genetic factors that affected on the variation of organism.

Rajah 9.3a, 9.3b dan 9.3c menunjukkan faktor-faktor genetik yang member kesan ke atas variasi pada organisma.

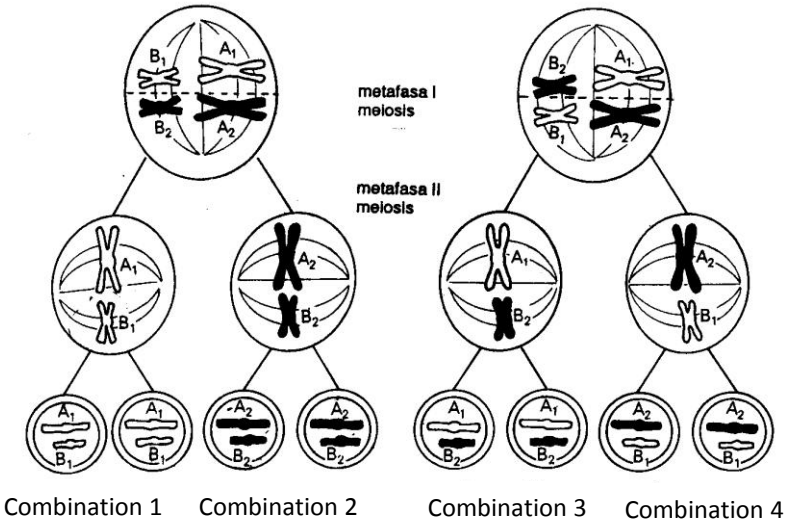


Diagram 9.3a

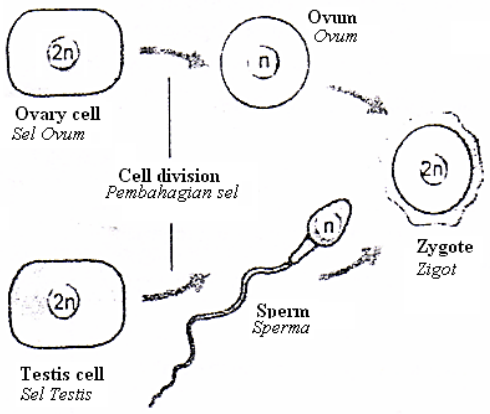


Diagram 9.3b

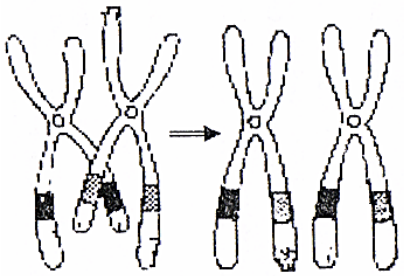


Diagram 9.3c

Explain how these factors in the diagram above will cause the variation among the organism.

Terangkan bagaimana faktor-faktor dalam rajah di atas akan menyebabkan variasi dikalangan organisma. [10 *marks*]

Sample answer:

F1: meiosis

P1: produce varies gamete with different genetic content

P2: through homologous chromosomes random assortment during metaphase I

F2: crossing over

P3: two homologous chromosomes are paired up / synapsis during prophase I

P3: crossing over occurs between non-sister chromatids at the chiasma

P4: chromatids break and rejoin in such a way that segments of chromatids are exchange // causing a genetic recombination

P5: genes in the chromosomes is altered and gametes with various combinations of chromosomes are produced

F3: Fertilization

P6: random fertilization between sperm and ovum

P7: produce zygote with varies genetic material

End…